APPENDIX B – BIOLOGICAL RESOURCES

APPENDIX B1 – BIOLOGICAL TECHNICAL REPORT

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APPENDIX B1 – BIOLOGICAL TECHNICAL REPORT

1.1 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

1.1.1 Federal Laws

Federal legislation and policy applicable to biological resources within the SunZia Southwest Transmission Project area of influence includes the:

- National Environmental Policy Act (42 USC § 4321, et seq., 40 CFR § 1500.1, et seq.)
- Endangered Species Act of 1973 (16 USC 460 et seq.), as amended
- Migratory Bird Treaty Act (16 USC 703 et seq.)
- Bald and Golden Eagle Protection Act (16 USC 668)
- Sikes Act (16 USC §670g, et seq.)
- Fish and Wildlife Coordination Act (16 USC §662, et seq.)
- State and Tribal Wildlife Grants Program
- Federal Land Policy Management Act (43 USC §1701)
- Federal Water Pollution Control Act Amendments of 1972 ([Clean Water Act] 33 USC §1251 et seq.)
- Bureau of Land Management Policy 6840 (Special Status Species Management)
- Executive Order 13112 (Invasive Species)

The *National Environmental Policy Act* requires the federal government to assess the environmental impacts of most major federal actions, which include actions undertaken (1) on federal land, (2) by a federal agency, (3) with federal funds, or (4) where the federal government will be issuing a permit.

The *Endangered Species Act* (ESA) authorizes the U.S. Fish and Wildlife Service (USFWS) to protect plant and wildlife species determined to be in danger of extinction, and the habitats on which these species depend. The ESA requires federal agencies to ensure that they do not carry out, fund, or authorize actions likely to jeopardize the continued existence of a listed species. Critical habitat, which includes areas essential to the conservation and recovery of listed species, may be designated and receives additional protection from federal actions.

The *Migratory Bird Treaty Act* (MBTA) protects more than 800 migratory bird species by making it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, any migratory bird, or the parts, nests, or eggs of such a bird. Each year, the USFWS Migratory Bird Program compiles proposed and final regulations to authorize migratory bird hunting seasons, which are typically managed by state game and fish agencies. All native birds occurring within the Project area are protected under the MBTA, except members of the families Phasianidae (turkeys and grouse) and Odontophoridae (New World quail) (USFWS 2005a).

The *Bald and Golden Eagle Protection Act* (BGEPA) prohibits any form of possession or take of Bald Eagles, Golden Eagles, or their eggs, feathers, or any other parts. Certain exceptions for Native American cultural uses apply (1994 Memorandum [59 FR 22953, April 29, 1994]).

The *Sikes Act* requires federal land management agencies to coordinate with state wildlife agencies in the development of comprehensive plans for wildlife conservation on public lands. Where not in conflict with other land uses, these plans may permit hunting and fishing to occur on federal land in accordance with state regulations, may allow cooperative habitat improvement, and may regulate off-highway vehicle (OHV) use. The Sikes Act also requires that the Department of Defense develop conservation plans for military reservations with significant natural resources.

The *Fish and Wildlife Coordination Act* requires consultation with the USFWS and state fish and wildlife agencies where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted...or otherwise controlled or modified" by any agency under a Federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

The *State and Tribal Wildlife Grants Program* provides federal funding for state conservation actions, in part for proactive work to reduce the need to list species under the ESA. States that receive the funding develop a State Wildlife Action Plan (SWAP), which assesses Species of Greatest Conservation Need (SGCN) within that state. These may include species already listed under the ESA, species with ranges restricted to that state or region, or those where the state is an important component of the species' range. Conditions of the state's habitat elements are also assessed.

The *Federal Land Policy Management Act* requires that the public lands be managed in a manner "that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use; and that federal land management agencies provide meaningful public involvement with state and local agencies on land use decisions".

The *Federal Water Pollution Control Act* requires compliance with state regulatory agencies responsible for Section 402 permits, which in Arizona, are administered by the Arizona Department of Environmental Quality (ADEQ) under authority of the Environmental Protection Agency. Projects may also require an Arizona Pollution Discharge Elimination System (AZPDES) and/or a Stormwater Runoff permit from the ADEQ. The New Mexico Environment Department Groundwater Pollution Prevention Section (GWPPS) of the Ground Water Quality Bureau administers, reviews, and approves ground water Discharge Permits for discharges that have the potential to impact ground water quality pursuant to Subparts III and V of the Water Quality Control Commission (WQCC) regulations (20.6.2 New Mexico Administrative Code).

Executive Order 13112 requires that federal agencies prevent the introduction and spread of invasive species, detect and respond rapidly to control such species, monitor invasive species populations, and restore native species and habitat conditions in ecosystems that have been invaded. In addition, the order requires that a federal agency "not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species."

1.1.2 State Laws

1.1.2.1 Arizona

The State of Arizona has no threatened and endangered species laws. Wildlife in Arizona is managed by the Arizona Game and Fish Department (AZGFD), and applicable laws relating to State wildlife resources are contained in Chapter 17 of the Arizona Revised Statutes. The AZGFD Commission provides some protection for species of vulnerable conservation status through regulation of hunting seasons, bag limits, or complete prohibition of take.

The *Arizona Native Plant Law* (Arizona Revised Statute [ARS] § 3-901-907) is administered by the Arizona Department of Agriculture (ADA). The law lists plants protected under the law. The ADA defines four categories of protected native plants over which it exercises jurisdiction within the State. These categories are: Highly Safeguarded, Salvage Restricted, Salvage Assessed, and Harvest Restricted. The Highly Safeguarded category is the highest category of protection provided for native plants in Arizona, and includes all ESA candidate species. "Permits applicable to highly safeguarded native plants may be issued only for collection for scientific purposes or for the noncommercial salvage of highly safeguarded native plants whose existence is threatened by intended destruction, or by their location or by a change in land usage, and if the permit may enhance the survival of the affected species" (ARS 3-906 C).

Three additional categories allow plants to be moved or harvested, provided ADA regulations are complied with. All categories of ADA-listed plants require a permit from the agency, and all but Harvest Restricted plants also require tags and seals prior to moving any protected plants. ADA jurisdiction includes all lands within the State, but since native plants occurring on private lands are the property of the landowner, their removal requires only that the ADA be notified prior to their removal. Laws regulating native plants in Arizona that fall under the auspices of the ADA are found in the State of Arizona Administrative Code – Article 11, consisting of Sections R3-3-1101 through R3-3-1111 and Appendix A, changed from 3 AAC 4, Article 6 at 10 AAR 726, and in the Arizona Revised Statutes – Title 3, Chapter 7, Articles 1 and 2 (subsections 3-901 through 3-916). Highly Safeguarded plant species are included in this review of sensitive resources within the study area. The remaining three categories of protected native plants are not included since they are not considered to be in jeopardy and regulatory permitting and compensation measures are in place for these categories.

1.1.2.2 New Mexico

The *New Mexico Wildlife Conservation Act* of 1978 (New Mexico Statutes Annotated [NMSA] 1978 § 17-2-37 *et seq.*) is administered by the New Mexico Department of Game and Fish (NMDGF), and provides authority for the listing of threatened and endangered species by the NMDGF. Rare plants in New Mexico are protected under the 1985 *New Mexico Endangered Plant Species Act* (NMSA 1978 § 75-6-1), which is administered by the Forestry Division of the New Mexico Energy, Minerals and Natural Resources Department. Rare plants may be listed as endangered or as species of concern.

1.1.3 Regulations and Regional Plans

The *Bureau of Land Management Policy 6840* (*Special Status Species Management Manual*) describes the agency's policy for special-status species occurring on lands administered by the agency. In addition to requirements for federal agencies regarding species listed under the ESA, the BLM gives additional consideration to those proposed or candidates for ESA listing. The Bureau of Land Management (BLM) also creates a list of sensitive species for which BLM land is of particular conservation value.

The AZGFD created a list of *Wildlife Species of Concern* (WSC) in 1996, which included all species listed under the ESA occurring in Arizona at the time, as well as a number of other species. Although the list does not grant statutory protection to species not listed under the ESA, special consideration is granted in land use planning and take of those species is strongly limited or prohibited.

Pima County, Arizona created the *Sonoran Desert Conservation Plan* (SDCP) to allow for the rapid urban expansion that was taking place, while preserving large areas with high conservation value. The SDCP also provided a framework for a pending Multi-Species Conservation Plan (MSCP) to support an incidental take permit for 10 species listed under the ESA. An additional 46 Priority Vulnerable Species (PVS) were identified as part of the SDCP. Habitat for all species was modeled, and Priority Conservation Areas (PCAs) were assigned to several tiers of varying conservation value.

1.2 STUDY AREA

The biological study area for the Project encompassed all proposed alignments and surrounding natural systems with significant connectivity. Regional watersheds crossed by the Project were included, as species present downstream could be affected by erosion and siltation caused by construction activities. Adjacent mountain ranges were also included within the study area when proposed alignments crossed potential wildlife movement corridors between ranges. The defined study corridor is an area four miles on either side of project alignments (total 8-mile width).

1.3 LAND STATUS

Federal lands that occur within the study area include BLM, USFWS (Bosque del Apache and Sevilleta NWRs); National Park Service (Saguaro National Park; east and west units); United States Forest Service; and Native American Reservation Land (San Xavier District of the Tohono O'odham Nation). Land status within the Project area also includes Arizona and New Mexico State Trust Lands, AZGFD Wildlife Management Areas, state and local parks, and private lands.

1.4 REGIONAL GEOLOGICAL SETTING

The SunZia Southwest Transmission Project route lies within the southern and eastern boundaries of the Basin and Range physiographic province. The Basin and Range province is characterized by mostly parallel, north-south trending mountain ranges separated by alluvial-filled basins (Fenneman 1931). Valley fills are known to be up to 10,000 feet in depth in some

areas (Richard et al. 2007). The Basin and Range Province terminates in eastern New Mexico with the beginning of the Great Plains. A large area of uplift in the northern and western portion of New Mexico, and the northern and eastern portion of Arizona is part of the Colorado Plateau.

Because of its large scale, the Project traverses a number of geological formations and geological features. The geological units within the Project area range from Paleozoic-age rocks to the younger Tertiary and Quaternary sediments and volcanics. Rocks along the Project route preserve a record of the great changes that have occurred in western North America, ranging from a marine environment during the Permian, to terrestrial environments during the Cretaceous, to large lakes and their associated river systems during the Miocene and Pliocene and a valley-filling period during the Pleistocene.

1.5 EXISTING ENVIRONMENT

1.5.1 Climate

Climate in the study area is generally arid, with variations in precipitation and temperature regulated by elevation and physiographic structure. There is a wide elevation range within the study area. Elevation within the New Mexico portion of the study area varies from approximately 4,149 feet on the Lordsburg Playa to a high of 8,615 feet at Gallinas Peak west of Corona, New Mexico in the vicinity of the proposed SunZia East Substation. Elevations in Arizona vary from approximately 1,350 feet north of Casa Grande at the Gila River to a high of 10,720 feet at Mt. Graham in the Pinaleño Mountains southwest of Safford, Arizona.

Average annual temperatures vary considerably in the region. Generally, for every 1,000 feet elevation increase there is a 4-degree Fahrenheit decrease (adiabatic lapse rate) in temperature (Hendricks 1985; Lowe 1964). During the dry period of early summer, daytime high temperatures at lower elevations commonly exceed 100 degrees Fahrenheit. The clear nighttime skies allow daytime heat buildup to radiate upward, and the temperature range for a single day may be in the range of 25 to 35 degrees Fahrenheit in New Mexico, and as great as 50 to 60 degrees Fahrenheit in the lower deserts in southwestern Arizona (Western Region Climate Center [WRCC] 2010).

Annual precipitation in the study area results from a regional bimodal precipitation pattern of localized, often intense storms during the summer monsoon (July to mid-September), and Pacific winter storms (November to March) with more gentle rains that are typically more widespread and of greater duration. Moisture supporting the summer monsoon comes from the Gulf of Mexico and to a lesser extent from the Gulf of California for the Arizona portion of the area (WRCC 2010). Leftover moisture from tropical hurricanes in both the Atlantic and Pacific can contribute significant amounts of moisture to the area, but this is infrequent and irregular (Lowe 1964). The combination of the dry air, high temperatures, and abundant sunshine result in high evaporation rates in the study area (Hendricks 1985; WRCC 2010). Spring and fall are typically dry and hot, and extended droughts are not uncommon in the region, often lasting several years.

1.6 VEGETATION

1.6.1 Biomes

There are 12 biomes that occur within the Project vicinity, which are discussed individually below. Biome names used in this report are from Brown (1982a). While all of these biomes are present within the Project vicinity, Project routes in general are mostly confined to lower elevations, and do not enter biomes occurring at the highest elevations. Plant scientific and common names used in this document are referenced to the United States Department of Agriculture (USDA) Plants Database (USDA 2009).

Petran Subalpine Conifer Forest

Petran subalpine conifer forest within the study area occurs only as a small area at the very top of the Pinaleño Mountains southwest of Safford, Arizona, where Engelmann spruce (*Picea engelmannii*) is the dominant tree occurring with corkbark fir (*Abies lasiocarpa*). Annual precipitation at these elevations in the region may be as much as 40 inches, much of which is winter snowfall (Pase and Brown 1982a).

Petran Montane Conifer Forest

Within the study area, this plant community only occurs in small areas atop the Organ Mountains east of Las Cruces, New Mexico, and on the Santa Catalina, Rincon, Galiuro, and Pinaleño mountains in Arizona (Brown 1982a). Montane conifer forest in the region is typically dominated by either ponderosa pine (*Pinus ponderosa*), typically in the lower reaches, or mixed conifer forest consisting of white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*) and limber pine (*Pinus flexilis*) at cooler, middle and higher elevations (Pase and Brown 1982b). Lower portions of these forests may be locally dominated by Gambel oak (*Quercus gambelii*) or New Mexican locust (*Robinia neomexicana*).

Great Basin Conifer Woodland

Outside of the Great Basin Physiographic Province, there is a broad band of vegetative communities across the southern Rockies that have origins in the Great Basin proper. Great Basin Conifer Woodland is generally found above grasslands or chaparral where fire frequency is low but precipitation is insufficient for development of montane conifer forests. This plant community is typified by the dominance of two small evergreen trees, junipers (*Juniperus* spp.) and piñon pines (*Pinus edulis* and *P. monophylla*), with an understory of mixed shrubs, grasses, and herbaceous plants. Some cacti, particularly *Opuntia* species, also occur (Brown 1982b).

Interior Chaparral

Chaparral communities are dominated by evergreen shrubs, which may reach 90 percent ground cover. High shrub cover prevents the establishment of a significant understory of grasses or herbaceous plants, except in early-successional stages and rocky, open patches. Arizona Interior Chaparral is dominated by Sonoran scrub oak (*Quercus turbinella*), along with manzanitas (*Arctostaphylos* spp.), deerbrush (*Ceanothus* spp.), and many others. Interior Chaparral is subject to regular wildfires, and may depend on fire to prevent conversion to forests at the upper

elevation limit of the community. Some shrub species depend on fire for germination, and nearly all can regenerate post-fire from the root crown (Pase and Brown 1982c).

Plains and Great Basin Grassland

The western edge of the Plains biome within the study area is largely a shortgrass prairie plant association. Dominant plant species are grasses including several gramas (*Bouteloua* spp.), Galleta grasses (*Pleuraphis jamesi* and *P. rigida*), Plains lovegrass (*Eragrostis intermedia*), and numerous others. Shrub invasion may occur with fire suppression or grazing pressure, and chollas and some prickly pears can be abundant as well (Brown 1982c).

Semidesert Grassland

Semidesert grasslands, while dominated by grasses, have high shrub diversity and in areas with fire suppression or heavy grazing often convert to desertscrub. Precipitation is slightly greater in summer, and summer rainfall supports the majority of grass growth. Cacti may be common, and include several species of cholla and prickly pear as occasional dominant plant species, particularly where livestock grazing is heavy. Typical grasses may include species of grama (*Bouteloua* spp.), three-awn (*Aristida* spp.), tobosa grass (*Pleuraphis mutica*), and others. Mesquite is generally the most important shrub species, with creosote bush, numerous *Yucca* species and the related sotol (*Dasylirion wheeleri*) and beargrasses (*Nolina* spp.), ocotillo, and several other shrubs common in places (Brown 1982d).

Plains Riparian Wetlands

The Rio Grande and associated tributaries within the study area may support Plains Riparian Wetlands. Tree species in this habitat within the study area include Rio Grande cottonwood (*Populus deltoides wislizeni*), narrowleaf cottonwood (*P. angustifolia*), peachleaf willow (*Salix amygdaloides*), and narrowleaf willow (*S. exigua*) (Minckley and Brown 1982).

Chihuahuan Desertscrub

Rainfall in Chihuahuan Desertscrub is largely from summer thunderstorms, although occasionally strong Pacific winter storms will reach the region. Dominant shrubs in finer soils include creosote bush, American tarwort (*Flourensia cernua*), and viscid acacia (*Acacia neovernicosa*). Rocky uplands and bajadas are dominated by species of *Agave*, *Yucca*, *Nolina*, and other succulent shrubs. Prickly pear species are the most common large cacti, but the diversity of small globular cacti is higher in this plant community than in any other in North America. Some major cactus genera are *Echinocereus*, *Mammillaria*, *Coryphantha*, and *Escobaria*. Perennial herbaceous plants may be a major component of the community, and some annuals may occur in response to sufficient winter rains. Chihuahuan Desertscrub gradually intergrades into Semidesert Grassland with increasing elevation or rainfall (Brown 1982e).

Sonoran Desertscrub

The Sonoran Desertscrub biome is divided into two major subdivisions: the Lower Colorado River Subdivision and the Arizona Upland Subdivision (Turner 1982). The subdivisions are primarily separated by a variation in the total effective annual precipitation, and are a byproduct

of the bimodal rainfall regime previously mentioned. Sonoran Desertscrub is typically bounded on the east by either Chihuahuan desertscrub or semidesert grassland habitats. In the Project area, this occurs respectively in the southern and northern segments of the San Pedro Valley. With milder winters and additional rainfall, the region to the south of the Sonoran Desert merges into Sinaloan thornscrub habitat south of the United States-Mexico border (Turner 1982). To the west, in Southern California and northwest Arizona the Sonoran Desert abuts the Mohave Desertscrub biome. Sonoran Desertscrub north of the Project area, near Superior, Arizona, is bounded by areas of interior chaparral, but in the Project area most Sonoran Desertscrub abuts semidesert grassland. The presence of a variety of xeric-adapted sclerophyllous tree species and many species of cacti and other succulents distinguishes the Sonoran Desert from less-diverse, shrub-dominated North American desert biomes (Turner 1982).

Arizona Upland Subdivision

The Arizona Upland plant community is a mix of desertscrub and subtropical thornscrub elements. Rainfall is higher than in other North American desert communities, with a notably bimodal pattern. Approximately half of the rainfall occurs in winter, supporting diverse spring annuals, and approximately half falls in a summer monsoon period as heavy, localized thunderstorms (Turner 1982). The Arizona Upland subdivision occurs from higher elevation valley floors typically associated with sky island mountain ranges, up to the elevation limit where winter freezes exclude many succulent species. This plant community is best developed on upper bajadas and low montane foothills where orographic effects increase precipitation into the surrounding desert.

Small trees or shrubs are a dominant vegetative component, with a high diversity of Fabaceae including yellow paloverde (*Parkinsonia microphylla*), blue paloverde (*P. florida*), several mesquites (*Prosopis* spp.), desert ironwood (*Olneya tesota*), catclaw acacia (*Acacia greggii*), and whitethorn acacia (*Acacia constricta*). Cactus diversity is relatively high, and cacti are often dominant or co-dominant. Prickly pears (*Opuntia* spp.) and chollas (*Cylindropuntia* spp.) may reach very high diversity, and common small or clumped cacti include several species of hedgehog cactus (*Echinocereus* spp.) and pincushion cactus (*Mammillaria* spp.). Larger cacti include the saguaro (*Carnegiea gigantea*) and barrel cacti (*Ferocactus* spp.). Jojoba (*Simmondsia chinensis*), creosote bush, ocotillo (*Fouquieria splendens*), and numerous other shrubs are also present (Turner 1982).

Lower Colorado River Valley Subdivision

The Lower Colorado River Valley subdivision is the warmer and drier of the two subdivisions of the Sonoran Desertscrub biome. It occurs at lower elevations and typically further to the west where regional geology limits annual precipitation. Precipitation falls mainly during winter from Pacific storms, and moisture from monsoonal systems that occur in summer contribute only small amounts to total annual precipitation. Precipitation from monsoon events lessens in areas further to the north and west from monsoonal moisture originating in the Gulf of Mexico and the Gulf of California. Because of the low annual precipitation, vegetation in the Lower Colorado River Valley subdivision is typically open and less diverse, with plant communities often dominated by creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*), or they may occur as essential monocultures of creosote bush over very large areas. Cacti can be an important

component within this subdivision, but do not dominate as they do in the Arizona Upland subdivision, where they are an important element in plant communities (Turner 1982).

Interior and Sonoran Riparian Woodland

Riparian woodlands are dominated by trees and shrubs dependent on surface water or shallow groundwater, and generally exist as narrow bands along major streams and rivers. The majority of the tree species are (at least regionally) riparian obligates, and do not occur in upland habitats within arid Southwestern biomes. The high productivity and cooler, more humid microclimate within riparian woodlands supports numerous herbaceous plant and wildlife species generally restricted to riparian zones as well.

Riparian plant communities do not change as rapidly with elevation as upland plant communities, as the woodlands provide thermal buffering not present elsewhere and competition for water is generally not a limiting factor. The shift between Interior and Sonoran Riparian Woodland is driven by elevation, although there is much overlap of the vegetative community. Interior Riparian communities are generally found above 3,900 feet elevation, often in montane canyons, while Sonoran Riparian communities surround valley and lowland rivers and streams.

Dominant tree species common to both communities include Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), and velvet mesquite (*Prosopis velutina*). Large stands of velvet mesquite in particular are important components of lowland woodlands in the Southwest. Increasing elevation allows the occurrence of netleaf hackberry (*Celtis laevigata*), Arizona walnut (*Juglans major*), Arizona sycamore (*Platanus wrightii*), Arizona alder (*Alnus oblongifolia*), velvet ash (*Fraxinus velutina*), and many others (Minckley and Brown 1982).

Interior and Sonoran Riparian Scrubland

This community occurs as a transition between riparian woodlands and xeroriparian washes, and is present in areas where either disturbance is too great or water may be insufficient to support development of mature forest. Goodding willow is one of the larger tree species, and several species of mesquite, desert willow (*Chilopsis linearis*), paloverdes (*Parkinsonia* spp.), catclaw acacia, and other native trees and shrubs are present. Some areas of riparian scrubland may have originally been riparian woodland, but have been converted to stands of the invading shrub Saltcedar (*Tamarix* sp.) (Minckley and Brown 1982).

Xeroriparian Scrubland

The numerous minor, ephemeral washes found in Sonoran and Chihuahuan Desertscrub, and up into Semi-desert Grassland do not represent entirely separate plant communities, as there is strong species overlap with surrounding uplands. These areas exhibit shifts in species dominance with higher density and productivity of shrub species which may also be present away from washes. This increased shelter and food availability results in a habitat of disproportionate importance to most wildlife species that are present.

1.7 SPECIAL-STATUS SPECIES

1.7.1 Review Methodology

The initial study area reviewed was defined by a buffer around all proposed Project alternatives, and encompassing areas with significant connectivity to proposed alternatives. The initial review included special-status species listed for counties that are included within any portion of the study area. This includes Doña Ana, Grant, Hidalgo, Lincoln, Luna, Otero, Sierra, Socorro, and Torrance counties in New Mexico, and Cochise, Graham, Greenlee, Pima, and Pinal counties in Arizona. A review of special-status wildlife and plant species that could potentially occur within the study area was conducted using data obtained from federal and state agency websites, including the USFWS Southwest Region Ecological Services office, the AZGFD Heritage Data Management System (HDMS), the New Mexico Department of Game and Fish – Biota Information System of New Mexico (BISON-M), and the New Mexico Rare Plant Technical Council – New Mexico Rare Plants database.

The review included special-status species and habitat GIS information acquired from or provided by the United States Geological Survey (USGS), USFWS, United States Forest Service (USFS), the New Mexico and Arizona offices of the BLM, and the AZGFD. Additional input was solicited from the Las Cruces and Socorro (NM) and Safford and Tucson (AZ) BLM field offices, the NMDGF, and independent researchers in the area. Project public review comments were reviewed and appropriate information has been incorporated into this document.

The known or potential presence for each species within the study area was evaluated based on existing records, presence of suitable habitat, and species distribution. Species addressed in the Biotechnical Report include only those species that were known to occur or have a reasonable potential for occurrence within the Project area of influence. For example, non-mobile species that are restricted to high-elevation habitats would not occur within the Project area of influence since no Project alternative passes through high-elevation habitat. Likewise, aquatic-dependent species occurring downstream of a proposed Project alignment are considered within the Project area of influence, but those upstream of the alignment will have little or no potential for impacts in most cases. Species with special status under a jurisdiction that does not encompass the entire Project area (i.e., listed as WSC by the State of Arizona or Threatened by the State of New Mexico) have been reviewed only for presence within that jurisdiction.

Table 1 includes a brief habitat description for each species, and whether the species is known to occur or the potential for occurrence within the Project area of influence. The last column in Table 1 lists justification(s) for exclusion of a species from further detailed analysis. Exclusion typically results from a lack of suitable habitat or the Project area of influence being significantly outside of the currently understood or reasonably anticipated range of the species. Species that are known or may potentially occur within the Project area of influence are discussed following Table 1. Species whose overall distribution intersects the study area, but whose typical habitat lies outside of the Project area of influence were not considered further. A total of approximately 700 special-status species were reviewed, and 254 of these species were determined to have some potential for occurring within the Project area of influence.

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence

Common Name *Scientific name*	Status	Habitat and Notes	Species Occurrence within Project Area of Influence			Page
			Known	Potential	Notes on Exclusion	
Abbreviations BCC: Bird Species of Conservation Concern BGEPA: Bald and Golden Eagle Protection Act BLMS: Bureau of Land Management Sensitive Species C: ESA Listing Candidate CA: Conservation Agreement (protected) CH: Critical Habitat DM: Delisted Monitoring DPS: Distinct Population Segment E: ESA Endangered Species FS: U.S. Forest Service Sensitive Species HS: Highly Safeguarded (AZ – ADA) NEP: Nonessential Experimental Population NME: New Mexico Endangered Species NMS: New Mexico Sensitive Species NMT: New Mexico Threatened PBGS: Priority Big Game Species (BLM) PCH: Proposed Critical Habitat PE: Proposed Endangered (ESA) PVS: Priority Vulnerable Species (Pima County, AZ) SC: USFWS Species of Concern SGCN: Species of Greatest Conservation Need (NM or AZ) STW: Special Trout Waters (NM) T: ESA Threatened Species UR: Under Review for ESA Listing WSC: AZGFD Wildlife Species of Concern						
MAMMALS						
Arizona Shrew *Sorex arizonae*	BLMS (NM); FS; SC; NME; WSC; SGCN (AZ, NM); PVS	Moist canyons of middle to high elevations; known only from the Santa Rita, Huachuca, and Chiricahua mountains of Arizona.	No	None	No suitable habitat, and outside of known range	—
Merriam's Shrew *Sorex merriami*	FS; SGCN (AZ)	Dry, cool, grassy habitats near streams in coniferous forest.	No	None	No suitable habitat, and outside of known range	—
Dwarf Shrew *Sorex nanus*	FS; SGCN (AZ)	High-elevation rocky slopes and talus.	No	None	No suitable habitat, and outside of known range	—
Water Shrew *Sorex palustris*	SGCN (AZ)	Closely associated with water and in wet meadows at high elevations.	No	None	No suitable habitat	—
Cockrum's Desert Shrew *Notiosorex cockrumi*	FS; SGCN (AZ)	Madrean riparian habitats among sacaton in southeastern Arizona mountains.	No	Very Low	—	1-77
California Leaf-nosed Bat *Macrotus californicus*	BLMS (AZ, NM); FS; SC; WSC; SGCN (AZ); PVS;	Desertscrub with caves or mines for roosts.	No	Low (AZ only)	—	1-77

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
Mexican Long-tongued Bat *Choeronycteris mexicana*	BLMS (AZ, NM); FS; SC; WSC; NMS; SGCN (NM); PVS	Canyons with mixed oak-conifer forests or semidesert grassland; roosts in caves, mines, buildings, and crevices, usually near water and riparian vegetation.	Yes	Present (AZ only)	—	1-79
Lesser Long-nosed Bat *Leptonycteris curasoae yerbabuenae*	E; NMT; WSC; SGCN (AZ, NM); PVS	Desertscrub or grassland to oak woodland where agaves or saguaros are present as food sources.	Yes (AZ portion only)	Present	—	1-80
Mexican Long-nosed Bat *Leptonycteris nivalis*	E; NME; SGCN (NM)	Caves and mines in the pine-oak belt; occasionally into desertscrub.	No	Low (NM only)	—	1-82
Yuma Myotis *Myotis yumanensis*	BLMS (NM); SC; NMS; SGCN (AZ)	Roosts in caves, mines, bridges, and other manmade structures; requires presence of open water habitat for foraging.	No	Moderate	—	1-83
Western Small-footed Myotis *Myotis ciliolabrum*	BLMS (NM); SC; NMS	Roosts in crevices in cliffs, rock piles, embankments, and caves.	No	Moderate	—	1-84
Fringed Myotis *Myotis thysanodes*	BLMS (NM); SC; NMS	Uses a variety of roost types, typically in oak and piñon woodlands.	No	Low	—	1-85
Cave Myotis *Myotis velifer*	BLMS (AZ, NM); SC; NMS; SGCN (AZ)	Roosts in mines and caves at lower elevations within a couple miles of water.	Yes	Present	—	1-86
Long-legged Myotis *Myotis volans*	BLMS (AZ, NM); SC; NMS	Mostly ponderosa pine or other coniferous forest habitats.	No	None	No suitable habitat	—
Arizona Myotis *Myotis lucifugus occultus*	BLMS (AZ, NM); SC; NMS; SGCN (NM)	Ponderosa pine, oak-pine woodland, or riparian habitats.	No	None	No suitable habitat	—
Long-eared Myotis *Myotis evotis*	BLMS (NM); SC; NMS	Ponderosa pine or spruce-fir forests.	No	None	No suitable habitat	—
Western Red Bat *Lasiurus blossevillii*	FS; SC; WSC; NMS; SGCN (AZ, NM); PVS	Riparian or encinal habitat at various elevations.	No	High	—	1-87

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Western Yellow Bat *Lasiurus xanthinus*	NMT; FS; WSC; SGCN (AZ, NM); PVS	Associated with desert fan palms at natural oases or landscaping; records from Southwest in riparian woodland.	Yes	Present	—	1-88
Spotted Bat *Euderma maculatum*	BLMS (AZ, NM); FS; SC; NMT; WSC; SGCN (AZ, NM)	Roosts in crevices and caves in rocky cliffs from below sea level to pine forest elevations.	No	Low	—	1-88
Allen's Big-eared Bat *Idionycteris phyllotis*	BLMS (AZ, NM); FS; SC; NMS; SGCN (AZ, NM); PVS	Mostly occurs in montane forested areas associated with cliffs, boulder piles, mines, or caves used as roosts.	No	Low (AZ only)	—	1-90
Pale Townsend's Big-eared Bat *Corynorhinus townsendii pallescens*	BLMS (AZ, NM); FS; SC; NMS; SGCN (AZ); PVS	Day roosts in caves or mine tunnels, night roosts often in buildings; occurs in desertscrub and desert mountains into montane coniferous forest.	No	Low	—	1-91
Big Free-tailed Bat *Nyctinomops macrotis*	BLMS (NM); SC; NMS	Roosts in crevices or rock shelters, usually in high cliffs.	No	Low (AZ only)	—	1-92
Pocketed Free-tailed Bat *Nyctinomops femorosaccus*	FS; SGCN (AZ)	Low desert habitats with rocky cliffs that support roosting habitat; human structures.	No	Low	—	1-93
Mexican Free-tailed Bat *Tadarida brasiliensis*	SGCN (AZ)	Low to middle elevations where cave or mine habitats are available for roosts; also roost in manmade structures such as bridges.	Yes	Present	—	1-94
Greater Mastiff Bat *Eumops perotis californicus*	BLMS (AZ, NM); FS; SC; NMS; SGCN (AZ)	Roost in crevices and shallow caves on the sides of cliffs and rock walls.	No	Very Low (AZ only)	—	1-94
Underwood's Bonneted Bat *Eumops underwoodii*	BLMS (AZ); SC; SGCN (AZ)	Crevices in cliffs and caves.	No	None	No suitable habitat, and outside of known range	—
Antelope Jackrabbit *Lepus alleni*	SGCN (AZ)	Open higher elevation deserts and semi-desert grasslands.	Yes	Present	—	1-95

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White-sided Jackrabbit *Lepus callotis gaillardia*	BLMS (NM); FS; NMT; SGCN (NM)	Tobosa grass habitat in the Animas Valley.	No	None	Outside of known range	—
Gray-footed Chipmunk *Neotamias canipes sacramentoensis*	NMS; FS	Brushy hillsides with rock crevices; downed logs from piñon-juniper up to tundra; primarily in ponderosa pine forest.	No	None	Outside of known range	—
Gray-collared Chipmunk *Neotamias cinereicollis*	SGCN (AZ)	Montane coniferous forest.	No	None	Outside of known range	—
Peñasco Least Chipmunk *Neotamias minimus atristriatus*	NME; FS; SGCN (NM)	Ponderosa pine forest.	No	None	Outside of known range	—
Organ Mountains Colorado Chipmunk *Neotamias quadrivittatus australis*	NMT; BLMS (NM)	Mesic, high-elevation habitats in the Organ Mountains.	No	None	No suitable habitat, and outside of known range	—
Oscura Mountains Colorado Chipmunk *Neotamias quadrivittatus oscuraensis*	NMT; BLMS (NM)	Mesic, high-elevation habitats in the Oscura Mountains.	No	None	No suitable habitat	—
Harris' Antelope Squirrel *Ammospermophilus harrisii*	SGCN (AZ)	All areas in Arizona below the Mogollon Rim and below deciduous forest elevations.	Yes	Present	—	1-96
Tularosa Rock Squirrel *Spermophilus variegatus tularosae*	NMS	Malpais lava flow in Otero and southern Lincoln counties, New Mexico.	No	None	Outside of known range	—
White Mountains Ground Squirrel *Spermophilus tridecemlineatus monticola*	FS	Grasslands; relict, isolated distribution.	No	None	Outside of known range	—

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Gunnison's Prairie Dog *Cynomys gunnisoni*	C; FS; NMS, SGCN (AZ, NM)	Short and mid-height grassy habitats.	No	Moderate	----	1-96
Black-tailed Prairie Dog *Cynomys ludovicianus arizonensis*	BLMS (NM); SC; WSC; NMS; SGCN (AZ, NM)	Short and mid-height grass prairie habitats.	No	None	Outside of known range	—
Abert's Squirrel *Sciurus aberti*	SGCN (NM)	Ponderosa pine forest.	No	None	Outside of known range in New Mexico	—
Arizona Gray Squirrel *Sciurus arizonensis*	FS; SGCN (AZ, NM)	Stream-sides and canyon bottoms in deciduous or mixed forest habitats.	No	None	Outside of known New Mexico range; no suitable habitat in Arizona	—
Chiricahua Fox Squirrel *Sciurus nayaritensis chiricahuae*	FS; SC; SGCN (AZ)	Pine-oak forests of the Chiricahua Mountains in Arizona.	No	None	No suitable habitat, and outside of known range	—
Mearns' Pocket Gopher *Thomomys bottae mearnsii*	BLMS (NM); SC; NMS	Wide variety of habitats and elevations.	No	Moderate	—	1-97
Botta's Pocket Gopher *Thomomys bottae aureus*	FS	Most habitats that provide soils suitable for digging and suitable food sources; subspecies with restricted range.	No	None	Outside of known range	—
Graham Mountains Pocket Gopher *Thomomys bottae grahamensis*	FS	Riparian habitats; restricted range.	No	None	No suitable habitat	—
Guadalupe Pocket Gopher *Thomomys bottae guadalupensis*	FS	Restricted to montane forests; limited distribution.	No	None	No suitable habitat	—
Southern Pocket Gopher *Thomomys umbrinus*	SGCN (AZ, NM)	Shallow, rocky soils of the oak belt.	No	None	No suitable habitat in New Mexico; outside of known Arizona range	—

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Huachuca Mountains Pocket Gopher *Thomomys umbrinus intermedius*	FS	Highly restricted distribution; found only in Huachuca Mountains on rocky slopes above 9,000 ft.	No	None	No suitable habitat, and outside of known range	—
Desert Pocket Gopher *Geomys arenarius arenarius*	BLMS (NM), NMS	Soft or sandy soils, often in valley bottoms near water.	Yes	Present	—	1-98
White-ankled Mouse *Peromyscus pectoralis laceianus*	FS	Chihuahuan desertscrub; highly restricted distribution limited to small area of Eddy County, New Mexico.	No	None	Outside of known range	—
Apache Pocket Mouse *Perognathus apache melanotis*	SGCN (AZ)	Areas of sandy soils; known only from the southeast fringes of the Willcox Playa.	No	None	Outside of known range	—
Arizona Pocket Mouse *Perognathus amplus*	SGCN (AZ)	Generally flat terrain in desert scrub habitats of the Mohave, Sonoran and Great Basin deserts.	No	High	—	1-99
Banner-tailed Kangaroo Rat *Dipodomys spectabilis*	BLMS (AZ); SGCN (AZ)	Desertscrub and desert grassland habitats with mesquite, cacti, and sparse grasses.	Yes	Present	—	1-99
New Mexico Banner-tailed Kangaroo Rat *Dipodomys spectabilis clarenci*	FS	Prefers well-developed grasslands; possibly extirpated in AZ; NM distribution and abundance highly reduced.	No	None	No suitable habitat, and outside of known range	—
Fulvous Harvest Mouse *Reithrodontomys fulvescens*	FS	Primarily dense grassy habitats with mixed shrubs.	No	Low	—	1-100
Plains Harvest Mouse *Reithrodontomys montanus*	FS	Well-developed grasslands in southeastern Arizona and New Mexico (secure in NM).	No	Low	—	1-101

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Tularosa Rock Pocket Mouse *Chaetodipus intermedius ater*	NMS	Malpais lava field west of Three Rivers, New Mexico.	No	None	Outside of known range	—
American Beaver *Castor canadensis*	SGCN (AZ, NM)	Montane rivers; irrigation ditches.	No	Moderate	—	1-102
Mesquite Mouse *Peromyscus merriami*	FS; PVS	Dense stands of mesquite, but also occurs in dense patches of cacti and grasses.	No	High	—	1-103
Northern Pygmy Mouse *Baiomys taylori ater*	FS; SGCN (NM)	Grassland habitats, particularly along drainages.	No	Moderate	—	1-103
Mount Graham Red Squirrel *Tamiasciurus hudsonicus grahamensis*	E (CH); WSC	Spruce or spruce-Douglas fir forest; found only high in the Pinaleño Mountains of Arizona.	No	None	No suitable habitat, and outside of known range	—
Red Squirrel *Tamiasciurus hudsonicus lychnuchus*	NMS	Woodlands composed of ponderosa pine, spruce, and Douglas fir.	No	None	No suitable habitat, and outside of known range	—
Yellow-nosed Cotton Rat *Sigmodon ochrognathus*	BLMS (NM); FS; SC; SGCN (NM)	Grassy, rocky slopes from 3,000 to 8,000 feet elevation; grass is usually sparse with scattered beargrass, agave, or yucca.	No	Very Low	—	1-104
Mexican Woodrat *Neotoma mexicana mexicana*	SGCN (AZ)	Montane coniferous forest.	No	None	No suitable habitat	—
White Sands Woodrat *Neotoma micropus leucophaea*	SC	Open grassland habitats.	No	None	Outside of known range	—
Southern Red-backed Vole *Clethrionomys gapperi*	FS	Cool, mesic, high-elevation forests with abundant surface litter.	No	None	No suitable habitat	—

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Arizona Montane Vole *Microtus montanus arizonensis*	FS; SGCN (AZ, NM)	Damp to wet montane grasslands in ponderosa pine or mixed coniferous forest.	No	None	No suitable habitat, and outside of known range	—
Long-tailed Vole *Microtus longicaudus*	FS	Mesic habitat in mixed conifer forest with ample cover; favors grassy understory.	No	None	No suitable habitat	—
White-bellied Long-tailed Vole *Microtus longicaudus leucophaeus*	FS	Endemic to Pinaleño Mountains above 8,000 feet; mesic meadows.	No	None	No suitable habitat	—
Pecos River Muskrat *Ondatra zibethicus ripensis*	SC; NMS	Occurs along rivers and drainage ditches.	No	None	Outside of known range	—
New Mexico Meadow Jumping Mouse *Zapus hudsonius luteus*	C; BLMS (AZ, NM); FS; NME; WSC; SGCN (AZ, NM)	Persistent emergent, herbaceous wetlands, open riparian areas, and wet meadows below 8,000 feet elevation.	No	Low (NM only)	—	1-105
Mexican Gray Wolf *Canis lupus baileyi*	E (NEP); NME; WSC; SGCN (AZ, NM)	Chaparral, woodland, and forested areas.	No	Very Low	—	1-106
Red Fox *Vulpes vulpes*	NMS; SGCN (AZ)	Open to semi-open habitats at middle elevations in the southwest.	No	Very Low	—	1-107
Kit Fox *Vulpes macrotis*	SGCN (AZ)	Areas of open ground among low desert vegetation in desertscrub or desert grasslands where soils are sufficiently friable to allow for burrow construction.	Yes	Present	—	1-108
Black Bear *Ursus americanus*	SGCN (NM); BLM (AZ) – PBGS	Montane conifer forests.	Yes	Present (AZ)	—	1-109
White-nosed Coati *Nasua narica*	FS; SGCN (NM)	Canyon woodlands and foothills in rocky areas that provided den and shelter habitat.	Yes	Present	—	1-109

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Ringtail *Bassariscus astutus*	NMS	Rocky canyons; often associated with riparian conditions.	Yes	Present	—	1-110
Black-footed Ferret *Mustela nigripes*	E (NEP); WSC	Lives among and preys upon prairie dogs (*Cynomys* spp.).	No	None	Outside of the current reintroduced range	—
Western Spotted Skunk *Spilogale gracilis*	NMS	Rocky, brushy habitats.	No	Moderate	—	1-111
Hooded Skunk *Mephitis macroura milleri*	NMS; FS	Rocky slopes and arroyos near cliffs.	No	Low	—	1-112
Common Hog-nosed Skunk *Conepatus leuconotus*	NMS	Shelters in crevices, caves and mines, and inhabits elevations from desertscrub up to 9,000 feet.	Yes	Present	—	1-112
Southwestern River Otter *Lontra canadensis sonorae*	BLMS (NM); SC; WSC; SGCN (AZ)	Perennial riverine habitats.	No	None	Outside of known range	—
Jaguar *Panthera onca*	E (PCH); WSC; SGCN (AZ, NM)	Occurs through a wide range of habitats up to subalpine conifer forest.	No	Very Low	—	1-113
Ocelot *Leopardus (Felis) pardalis*	E; WSC; SGCN (AZ)	Partly cleared forests, second growth woodland, and abandoned cultivated areas reverted to brush.	No	Very Low	—	1-114
Mountain Lion *Puma concolor*	BLM (AZ) – PBGS	Variety of habitats over a wide elevation range; wherever deer or other prey occurs.	Yes	Present	—	1-115
Jaguarundi *Puma* (*Herpailurus*) *yagouaroundi tolteca*	E	Prefers thick, thorny vegetation, including mesquite, cacti, and thorny shrub species.	No	Very Low	—	1-116
Mule Deer *Odocoileus hemionus*	SGCN (NM)	Upland desert, chaparral, oak woodland or low-elevation pine forest.	Yes	Present	—	1-117
Coues White-tailed Deer *Odocoileus virginianus couesi*	SGCN (AZ; NM); BLM (AZ) – PBGS	Evergreen oak or oak-juniper-piñon woodlands.	Yes	Present (AZ)	—	1-117

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American Pronghorn *Antilocapra americana americana*	SGCN (AZ)	Open, short-grass desert habitats.	Yes	Present	—	1-118
Sonoran Pronghorn *Antilocapra americana sonoriensis*	E; WSC	Desertscrub habitat of alluvial valleys in southern Arizona and northern Mexico.	No	None	Outside of known range	—
Rocky Mountain Bighorn Sheep *Ovis canadensis canadensis*	FS; SGCN (AZ, NM)	Steep, rocky terrain, often near a water source.	No	None	Outside of known range	—
Desert Bighorn Sheep *Ovis canadensis mexicana*	FS; NMT; SGCN (AZ, NM)	Steep, rocky terrain, often near a water source.	Yes	Present	—	1-119
BIRDS						
Western Grebe *Aechmophorus occidentalis*	SGCN (AZ)	Lakes and reservoirs containing emergent vegetation and areas of open water.	No	None	Vagrant or accidental only	—
Clark's Grebe *Aechmophorus clarkii*	SGCN (AZ)	Lakes and reservoirs containing emergent vegetation and areas of open water.	No	None	Vagrant or accidental only	—
Eared Grebe *Podiceps nigricollis*	SGCN (NM)	Open freshwater habitats.	No	Low	—	1-120
Brown Pelican *Pelecanus occidentalis*	DM; NME	A coastal species, although rarely a stray bird is moved inland with large storms.	No	None	Vagrant or accidental only	—
Neotropic Cormorant *Phalacrocorax brasilianus*	NMT; FS; SGCN (NM)	Uses a wide variety of wetland habitats.	Yes	Present	—	1-121
Great Egret *Ardea alba*	SGCN (AZ)	Marshes, drainage ditches, wetlands.	Yes	Present	—	1-122
Cattle Egret *Bubuculus ibis*	SGCN (AZ)	Pastures, weedy fields, irrigation ditches; commonly associated with livestock.	Yes	Present	—	1-123

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American Bittern *Botaurus lentiginosus*	WSC; SGCN (AZ, NM); BCC	Inhabits freshwater with emergent vegetation.	Yes	Present	—	1-123
Snowy Egret *Egretta thula*	SGCN (AZ)	Marshes, drainage ditches, wetlands.	Yes	Present	—	1-124
Least Bittern *Ixobrychus exilis*	SC; WSC; BCC	Inhabits freshwater with emergent vegetation.	Yes	Present	—	1-125
White-faced Ibis *Plegadis chihi*	BLMS (NM); FS; SC; SGCN (NM)	Freshwater ponds, rivers, and marshes.	Yes	Present	—	1-126
Black-bellied Whistling-duck *Dendrocygna autumnalis*	WSC	Wetland and riparian habitats.	Yes	Present	—	1-127
Fulvous Whistling-duck *Dendrocygna bicolor*	BLMS (NM); SC	Wetland and riparian habitats.	No	None	Outside of known range	—
Wood Duck *Aix sponsa*	SGCN (AZ)	Wooded wetlands where tree cavities provide nest sites.	Yes	Present	—	1-127
Northern Pintail *Anas acuta*	SGCN (NM)	Freshwater marshes, ponds, and lakes.	Yes	Present	—	1-128
Canada Goose *Branta canadensis*	SGCN (AZ)	Lakes, ponds, reservoirs, and rivers.	No	None	Outside of known range	—
Common Merganser *Mergus merganser*	SGCN (AZ)	Cool, clear, perennial creeks and rivers.	No	None	Outside of known range	—
Mississippi Kite *Ictinia mississippiensis*	WSC; SGCN (AZ)	Lowland riparian deciduous forest adjacent to desertscrub.	Yes	Present	—	1-130
Northern Harrier *Circus cyaneus*	SGCN (NM)	Wetland, open fields, or grasslands.	Yes	Present	—	1-131
Osprey *Pandion haliaetus*	WSC; SGCN (NM)	Nests near water; feeds primarily on fish.	Yes	Present	—	1-131

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Bald Eagle *Haliaeetus leucocephalus*	DM, BGEPA; BLMS (AZ); FS; NMT; WSC; SGCN (NM); BCC	Areas with large trees and cliffs near large bodies of water; rivers and reservoirs from 460 to 7,930 feet elevation.	Yes	Present	—	1-134
Golden Eagle *Aquila chrysaetos*	BGEPA; BLMS (AZ); SGCN (AZ, NM); BCC	Inhabits open, mountainous or hilly terrain.	Yes	Present	—	1-134
Zone-tailed Hawk *Buteo albonotatus*	FS	Forages over open habitats including grasslands, deserts, and cliff faces.	Yes	Present	—	1-135
Northern Goshawk *Accipiter gentilis*	BLMS (NM); FS; SC; WSC; NMS; SGCN (AZ, NM)	Old-growth coniferous or mixed coniferous-deciduous woodlands.	No	None	No suitable habitat	—
Common Black Hawk *Buteogallus anthracinus*	NMT; FS; SC; WSC; SGCN (NM); BCC	Gallery forest habitats with tall trees, usually along shallow permanent streams and rivers with clear water.	Yes	Present (AZ); Very Low (NM)	—	1-136
Northern Gray Hawk *Buteo (Asturina) nitidus maximus*	BLMS (NM); FS; SC; WSC	Riparian deciduous forest and adjacent open lands.	Yes	Present	—	1-137
Swainson's Hawk *Buteo swainsoni*	FS; PVS	Prairie, desert, open woodlands.	Yes	Present	—	1-138
Ferruginous Hawk *Buteo regalis*	BLMS (NM); WSC; SGCN (AZ, NM); BCC	Often associated with prairie dog colonies in open, arid country.	Yes	Present	—	1-139
American Peregrine Falcon *Falco peregrinus anatum*	NMT; BLMS (AZ); FS; SC; WSC; SGCN (AZ, NM); BCC	Open habitats in rugged country, usually near lakes, rivers, or streams and with rocky outcrops or cliffs nearby.	Yes	Present	—	1-139
Arctic Peregrine Falcon *Falco peregrinus tundrius*	NMT; SC; BCC	Open habitats in rugged country, usually near lakes, rivers, or streams and with rocky outcrops or cliffs nearby.	No	Very Low	—	1-140

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Northern Aplomado Falcon *Falco femoralis septentrionalis*	E (NEP); NME; WSC; SGCN (AZ, NM)	Grassland and savannah habitats.	Yes	Present	—	1-141
Crested Caracara *Caracara cheriway*	WSC	Sonoran desertscrub in Arizona.	Yes	Present	—	1-143
Blue Grouse *Dendragapus obscurus*	SGCN (AZ, NM)	Dry shrub and grassland habitats into coniferous woodlands.	No	None	Outside of known range	—
Montezuma Quail *Cyrtonyx montezumae*	SGCN (NM)	Grassland habitats of semi-arid mountain slopes in open Madrean woodlands.	Yes	Present	—	1-144
Scaled Quail *Callipepla squamata*	SGCN (NM)	Semi-desertscrub and grasslands.	Yes	Present	—	1-144
Masked Bobwhite *Colinus virginianus ridgwayi*	E; WSC; SGCN (AZ)	Desert grasslands with vegetation containing areas of dense grasses and shrubs providing cover, forbs for forage.	No	None	Outside of known range	—
Gould's Wild Turkey *Meleagris gallopavo mexicana*	NMT; FS; SC; SGCN (AZ, NM)	Open grassy savannah with a variety of oaks, chaparral, and stunted piñon juniper woodlands.	Yes	Present (AZ only)	—	1-145
Yuma Clapper Rail *Rallus longirostris yumanensis*	E; WSC; SGCN (AZ)	Tall dense vegetation associated with marshes, rivers, and lakes.	Yes	Present	—	1-146
Sandhill Crane *Grus canadensis canadensis*	SGCN (NM)	River valleys, marshes, and meadows; irrigated pastures; agricultural areas that provide grains for forage.	Yes	Present	—	1-147
Whooping Crane *Grus americana*	E; NME	River valleys and agricultural areas; extirpated from New Mexico in 2002.	No	None	No reintroductions are planned in the region	—
Western Snowy Plover *Charadrius nivosus nivosus*	SGCN (AZ, NM); BCC	Barren shorelines and mudflats along lakes or rivers.	No	Low	—	1-148

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			Known	**Potential**	**Notes on Exclusion**	
Piping Plover *Charadrius melodus*	T (CH); NMT	Sandy beaches, lake shores, and dune areas.	No	Very Low	—	1-149
Mountain Plover *Charadrius montanus*	NMS; FS; SGCN (AZ, NM) BCC	Short-grass plains; grassy or bare dirt fields.	Yes	Present	—	1-151
Long-billed Curlew *Numenius americanus americanus*	SGCN (NM); BCC	Shallow freshwater wetlands and adjacent uplands.	Yes	Present	—	1-152
Wilson's Phalarope *Phalaropus tricolor*	SGCN (NM)	Shores of shallow wetland areas.	Yes	Present	—	1-152
Least Tern *Sterna antillarum*	E; NME; SGCN (NM)	Beaches, shorelines, and mudflats of both fresh and saltwater habitats.	No	None	Outside of known range	—
Black Tern *Chlidonias niger*	SC; BLMS (NM)	Freshwater lakes, rivers, and interior wetlands.	Yes	Present	—	1-154
Band-tailed Pigeon *Patagioenas (Columba) fasciata*	SGCN (NM)	Oak or oak-conifer woodlands; suburban areas.	No	Moderate	—	1-155
Mourning Dove *Zenaida macroura*	SGCN (NM)	Occurs in a wide variety of habitats.	Yes	Present	—	1-155
Common Ground-dove *Columbina passerina pallescens*	NME; FS; SGCN (NM)	Brushy rangeland, fallow agricultural fields, or other dry, open areas.	Yes	Present	—	1-156
Thick-billed Parrot *Rhynchopsitta pachyrhyncha*	SGCN (AZ)	Upper elevation pine habitats.	No	None	Outside of known range	—
Yellow-billed Cuckoo *Coccyzus americanus*	C; FS; WSC; NMS; PVS; SGCN (AZ); BCC	Below 6,500 feet elevation in large blocks of mature, native riparian woodlands.	Yes	Present	—	1-157

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			Known	**Potential**	**Notes on Exclusion**	
Mexican Spotted Owl *Strix occidentalis lucida*	T (CH); WSC; NMS; SGCN (AZ, NM)	Dense forest, coniferous and hardwood, steep-walled canyons; no critical habitat within Project area of influence.	Yes	Present	—	1-158
Whiskered Screech Owl *Megascops trichopsis*	NMT; FS: SGCN (AZ, NM)	Madrean oak woodland in the Animas and Peloncillo mountains of New Mexico, and southeastern Arizona from the Baboquivari Mountains north to the Santa Catalina Mountains and east to the Chiricahua Mountains.	No	None	No suitable habitat	—
Cactus Ferruginous Pygmy-owl *Glaucidium brasilianum cactorum*	BLMS (AZ); FS; SC; WSC; SGCN (AZ); PVS	Sonoran desertscrub, semi-desert grassland, and occasionally in riparian woodland or suburban developments retaining adequate habitat elements.	No	Low	—	1-160
Elf Owl *Micrathene whitneyi*	SC; SGCN (NM); BCC	Broad-leaf riparian or xeric desert washes with leguminous tree species or saguaros.	Yes	Present	—	1-161
Western Burrowing Owl *Athene cunicularia hypugaea*	BLMS (AZ, NM); FS; SC; SGCN (AZ, NM); PVS; BCC	Open, level areas where low vegetation provides good visibility; often associated with burrowing rodents.	Yes	Present	—	1-162
Buff-collared Nightjar *Caprimulgus ridgwayi*	NME; FS; SGCN (AZ)	Dry montane canyons in border mountains in Arizona and New Mexico.	No	None	Outside of known range	—
Black Swift *Cypseloides niger*	NMS; SGCN (NM)	Nest on cliffs or in shallow rock shelters of canyons.	No	Very Low	—	1-163
Violet-crowned Hummingbird *Amazilia violiceps*	FS; WSC; SGCN (AZ, NM)	Montane and riparian habitats.	No	None	Vagrant or accidental only	—
Lucifer Hummingbird *Calothorax lucifer*	NMT; FS; SGCN (AZ, NM)	Desertscrub and brushy canyons in the Peloncillo Mountains; rare summer visitor in Arizona as far north as Tucson.	No	None	Vagrant or accidental only	—
Costa's Hummingbird *Calypte costae*	NMT; FS; SGCN (NM); BCC	Low-elevation desertscrub habitats.	Yes	Present (AZ); Very Low (NM)	—	1-164

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Broad-billed Hummingbird *Cynanthus latirostris*	NMT; FS; SGCN (AZ, NM)	Low desert riparian canyons; Animas and Peloncillo mountains in southern Hidalgo County, New Mexico.	No	Low (AZ); Very Low (NM)	—	1-165
Magnificent Hummingbird *Eugenes fulgens*	SGCN (AZ)	Madrean pine-oak forests or mixed conifer habitats.	No	Low (AZ); Very Low (NM)	—	1-166
White-eared Hummingbird *Hylocharis leucotis*	NMT; FS	Montane woodlands and canyons.	No	None	Vagrant or accidental only	—
Blue-throated Hummingbird *Lampornis clemenciae*	SGCN (AZ)	Cool, moist canyons of higher elevations.	No	None	No suitable habitat	—
Eared Quetzal *Euptilotis neoxenus*	FS	Madrean pine-oak woodlands and adjacent canyons; typically nests in forests above sycamore-dominated canyons.	No	None	No suitable habitat, and outside of known range	—
Elegant Trogon *Trogon elegans*	NME; WSC; SGCN (AZ, NM); BCC	Middle elevation streamside woodlands.	No	Very Low (AZ); None (NM)	—	1-167
Green Kingfisher *Chloroceryle americana*	SGCN (AZ)	Clear, shallow aquatic habitats.	No	None	Outside of known range	—
Belted Kingfisher *Megaceryle alcyon*	WSC	Rivers, ponds, and lakes.	Yes	Present	—	1-168
Red-headed Woodpecker *Melanerpes erythrocephalus*	SGCN (NM)	Open or dense woodlands.	No	None	No suitable habitat, and outside of known range	—
Lewis's Woodpecker *Melanerpes lewis*	SGCN (NM); BCC	Open woodlands.	Yes	Present	—	1-168
Gila Woodpecker *Melanerpes uropygialis*	NMT; FS; SGCN (AZ, NM); BCC	Common in Arizona; New Mexico range restricted to the Gila River Valley and southern Hidalgo County.	Yes	Present	—	1-169

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Gilded Flicker *Colaptes chrysoides*	BLMS (AZ); SGCN (AZ); BCC	Low deserts; prefers saguaro forests.	Yes	Present	—	1-170
Arizona Woodpecker *Picoides arizonae*	SGCN (AZ); BCC	Primarily inhabits evergreen oak habitats.	No	Low	—	1-171
American Three-toed Woodpecker *Picoides dorsalis*	SGCN (AZ)	High-elevation montane coniferous forest.	No	None	No suitable habitat, and outside of known range	—
Williamson's Sapsucker *Sphyrapicus thyroideus*	SGCN (NM)	Middle to high-elevation forests.	No	Very Low	—	1-172
Rose-throated Becard *Pachyramphus aglaiae*	FS; WSC; SGCN (AZ); BCC	Riparian woodlands in southern Arizona.	No	None	Outside of known range	—
Olive-sided Flycatcher *Contopus cooperi*	SGCN (AZ, NM)	Summer resident in coniferous forests.	No	None	No suitable habitat	—
Greater Pewee *Contopus pertinax*	SGCN (NM)	Open pine woodland with oak understory.	No	Very Low	—	1-172
Northern Buff-breasted Flycatcher *Empidonax fulvifrons pygmaeus*	FS; SC; WSC; SGCN (AZ); BCC	Dry woodlands of canyon floors.	No	None	No suitable habitat, and outside of known range	—
Southwestern Willow Flycatcher *Empidonax traillii extimus*	E (CH); NME; WSC; SGCN (AZ, NM); PVS	Below 8,500 feet elevation in dense riparian woodlands. Designated critical habitat in the study area in New Mexico and Arizona.	Yes	Moderate (AZ); Present (NM)	—	1-173
Dusky-capped Flycatcher *Myiarchus tuberculifer*	SGCN (AZ)	Wooded canyons and adjacent slopes occupied by evergreen oaks; and deciduous riparian drainages.	No	Low	—	1-176
Northern Beardless-tyrannulet *Camptostoma imberbe*	NME; FS; SGCN (NM); BCC	Lowland riparian woodland and adjacent scrub in border mountain ranges.	No	Present (AZ only)	—	—

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			Known	**Potential**	**Notes on Exclusion**	
Tropical Kingbird *Tyrannus melancholicus*	WSC	Lowlands near water; associated with cottonwood trees.	Yes	Present	—	1-178
Thick-billed Kingbird *Tyrannus crassirostris*	NME; FS; WSC; SGCN (AZ, NM)	Broadleaf riparian woodland.	Yes	Present (AZ only)	—	1-178
Sulphur-bellied Flycatcher *Myiodynastes luteiventris*	SGCN (AZ)	Riparian woodland habitats in Arizona.	No	Low	—	1-179
Loggerhead Shrike *Lanius ludovicianus*	BLMS (NM); FS; SC; NMS; SGCN (NM); BCC	Open or brushy areas.	Yes	Present	—	1-180
Bell's Vireo *Vireo bellii*	NMT; FS; SGCN (NM); PVS; BCC	Low, dense vegetation of lowland desert streams.	Yes	Present	—	1-181
Arizona Bell's Vireo *Vireo bellii arizonae*	FS; SGCN (AZ)	Low, dense vegetation of lowland desert streams.	Yes	Present	—	—
Gray Vireo *Vireo vicinior*	NMT; SC; FS; SGCN (NM); BCC	Dry, hot scrub habitats.	Yes	Present	—	1-182
Pinyon Jay *Gymnorhinus cyanocephalus*	BLMS (AZ); SGCN (AZ, NM); BCC	Piñon-juniper woodland.	Yes	Present	—	1-183
Gray Jay *Perisoreus canadensis*	SGCN (AZ)	Spruce forest.	No	None	No suitable habitat, and outside of known range	—
Clark's Nutcracker *Nucifraga columbiana*	SGCN (AZ)	High-elevation coniferous forest habitats.	No	None	No suitable habitat, and outside of known range	—
Desert Purple Martin *Progne subis hesperia*	BLMS (AZ); SGCN (AZ)	Sonoran desertscrub in the presence of saguaros.	Yes	Present	—	1-184
Bank Swallow *Riparia riparia*	SGCN (NM)	Nests in steep soil embankments as along rivers and road cuts.	No	Low	—	1-184

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Juniper Titmouse *Baeolophus ridgwayi*	SGCN (NM); BCC	Juniper or piñon-juniper woodland.	Yes	Present	—	1-185
Mexican Chickadee *Poecile sclateri*	SGCN (AZ)	Coniferous forest.	No	None	No suitable habitat, and outside of known range	—
Black-capped Gnatcatcher *Polioptila nigriceps*	WSC; SGCN (AZ)	Thick brush of dry washes and adjacent slopes.	No	None	Outside of known range	—
American Dipper *Cinclus mexicanus*	SGCN (AZ)	Generally associated with clear, swift waters of higher elevations streams.	No	None	No suitable habitat	—
Azure Eastern Bluebird *Sialia sialis fulva*	SGCN (AZ)	Open savannah woodlands where evergreen oaks dominate.	No	None	Outside of known range	—
Swainson's Thrush *Catharus ustulatus*	SGCN (AZ)	Coniferous forests and associated riparian thickets; may occur in low desert habitat during migration.	Yes	Present	—	—
Gray Catbird *Dumetella carolinensis*	WSC; SGCN (AZ)	Woody thickets; often associated with riparian areas.	No	None	Outside of known range	—
Sage Thrasher *Oreoscoptes montanus*	SGCN (NM)	Sagebrush plains.	Yes	Present	—	1-186
Bendire's Thrasher *Toxostoma bendirei*	SGCN (NM); BCC	Open grassland, scrub, or woodland habitats.	Yes	Present	—	1-187
LeConte's Thrasher *Toxostoma lecontei*	BLMS (AZ); SGCN (AZ); BCC	Sparsely vegetated low-elevation Sonoran Desert.	No	Low	—	1-188
Sprague's Pipit *Anthus spragueii*	C; WSC; SGCN (AZ, NM); BCC	Winters in grasslands in southern Arizona and New Mexico.	No	Low	—	1-189
Grace's Warbler *Dendroica graciae*	BCC; SGCN (NM)	Coniferous or mixed forests, particularly with ponderosa pine.	No	None	No suitable habitat	—
Black-throated Gray Warbler *Dendroica nigrescens*	SGCN (NM); BCC	Shrubland, brushy undergrowth, piñon-juniper.	No	Low	—	1-190

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			Known	**Potential**	**Notes on Exclusion**	
Yellow Warbler *Dendroica petechia*	SC; SGCN (AZ, NM); BCC	Mesquite and riparian woodlands.	Yes	Present	—	1-190
MacGillivray's Warbler *Oporornis tolmiei*	SGCN (AZ)	Cool, montane, riparian woodland habitats.	Yes	Present	—	—
Orange-crowned Warbler *Oreothlypis* (*Vermivora*) *celata*	SGCN (AZ)	Cool, montane habitats; riparian and desertscrub habitats in winter; urban areas.	Yes	Present	—	1-192
Lucy's Warbler *Vermivora luciae*	SGCN (NM); BCC	Arid scrub, primarily mesquite or cottonwood along streams and washes.	Yes	Present	—	1-193
Red-faced Warbler *Cardellina rubifrons*	SGCN (NM); BCC	High-elevation montane forests; generally above 6,000 feet.	No	None	No suitable habitat	—
Painted Redstart *Myioborus pictus*	SGCN (NM)	Pine-oak canyons.	No	None	No suitable habitat	—
Abert's Towhee *Pipilo aberti*	NMT; FS; SGCN (NM); PVS	Riparian deciduous woodland and riparian scrub with a dense understory.	Yes	Present (AZ)	Outside of known New Mexico range	1-194
Botteri's Sparrow *Peucaea* (*Aimophila botterii*)	BLMS (AZ); NMS; SGCN (AZ); BCC	A grassland species that prefers taller grasses (commonly sacaton); semi-arid grasslands in southern Arizona and New Mexico.	No	Low	—	1-194
Rufous-winged Sparrow *Aimophila carpalis*	SGCN (AZ), PVS; BCC	Inhabits grassy areas in Sonoran desertscrub.	Yes	Present	—	1-195
Sage Sparrow *Amphispiza belli*	SGCN (NM)	Saltbush or sage flats.	No	Moderate	—	1-196
Grasshopper Sparrow *Ammodramus savannarum*	SC; SGCN (AZ, NM); BCC	Brushy grassland habitats.	No	Low	—	1-197
Arizona Grasshopper Sparrow *Ammodramus savannarum ammolegus*	NME; FS; SGCN (AZ); BCC	Brushy grassland habitats; breeds in New Mexico only in the southern Animas Valley and the western Playas Valley.	Yes	Very Low (NM), Present (AZ)	Outside of known New Mexico range	1-198

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			Known	**Potential**	**Notes on Exclusion**	
Baird's Sparrow *Ammodramus bairdii*	NMT; BLMS (AZ, NM); FS; SC; WSC; SGCN (AZ, NM); BCC	Mixed grassland habitats; weedy fields.	No	Low	—	—
Lincoln's Sparrow *Melospiza lincolnii*	SGCN (AZ)	High-elevation riparian thickets and wetlands.	Yes	Present	—	1-199
Savannah Sparrow *Passerculus sandwichensis*	SGCN (AZ)	A variety of open, grassy habitats.	Yes	Present	—	1-200
White-crowned Sparrow *Zonotrichia leucophrys*	SGCN (AZ)	Brushy areas in riparian, suburban, and other habitats.	Yes	Present	—	1-201
Yellow-eyed Junco *Junco phaeonotus*	SGCN (AZ, NM)	Middle elevation pine-oak to ponderosa pine forest.	No	None	No suitable habitat	—
Painted Bunting *Passerina ciris pallidior*	SGCN (NM); BCC	Brushy thickets along streams and woodland edges.	No	Low	—	1-201
Indigo Bunting *Passerina cyanea*	SGCN (AZ)	Brushy, riparian habitats.	Yes	Present	—	1-202
Varied Bunting *Passerina versicolor*	NMT; FS; SGCN (NM); BCC	Low-elevation brushy canyons and desert washes; in New Mexico only at Carlsbad Caverns NP and southern Hidalgo County.	No	High	Outside of known New Mexico range	—
McCown's Longspur *Calcarius mccownii*	SGCN (AZ); BCC	Open habitats with sparse vegetation.	No	Very Low	—	1-204
Bobolink *Dolichonyx oryzivorus*	WSC	Hayfields and damp meadows.	No	None	Outside of known range	—
Hooded Oriole *Icterus cucullatus*	SGCN (NM)	Occupies a wide variety of habitats; particularly associated with palm trees.	No	Moderate	—	1-204
Cassin's Finch *Carpodacus cassinii*	SGCN (AZ); BCC	Open, mature, coniferous forest or woodland.	No	None	No suitable habitat	—

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			Known	**Potential**	**Notes on Exclusion**	
Evening Grosbeak *Coccothraustes vespertinus*	SGCN (AZ)	Mixed conifer and spruce forests; often with a deciduous tree component; down to piñon-ponderosa pine ecotone in winter.	No	None	No suitable habitat	—
Pine Grosbeak *Pinicola enucleator*	SGCN (AZ)	Spruce-fir forests.	No	None	No suitable habitat, and outside of known range	—
AMPHIBIANS						
Arizona Tiger Salamander *Ambystoma mavortium* (*tigrinum*) *nebulosum*	SGCN (NM, AZ)	Occurs from desertscrub to spruce woodland where temporary standing water provides breeding habitat.	No	Moderate	—	1-205
Sonora Tiger Salamander *Ambystoma mavortium* (*tigrinum*) *stebbinsi*	E; WSC; SGCN (AZ)	Grassland with ponds, cattle tanks, streams, and other water sources.	No	None	Outside of known range	—
Sacramento Mountain Salamander *Aneides hardii*	NMT; FS; SC; SGCN (NM)	Occurs associated with large woody debris or rock piles in fir and spruce woodlands.	No	None	No suitable habitat, and outside of known range	—
Western Barking Frog *Eleutherodactylus augusti cactorum*	FS; WSC; SGCN (AZ)	Rocky hillsides or escarpments with cracks and fissures; creosote bush flats with abundant rodent burrows.	No	None	Outside of known range	—
Arizona Tree Frog *Hyla wrightorum*	SGCN (AZ, NM)	Madrean evergreen woodland to Petran Montane Conifer Forest.	No	None	No suitable habitat, and outside of known range	—
Huachuca-Canelo Hills DPS Arizona Treefrog *Hyla wrightorum*	C (DPS); BLMS (AZ)	Madrean evergreen woodland and Petran montane conifer forest; Huachuca Mountains and adjacent Canelo Hills.	No	None	No suitable habitat, and outside of known range	—
Pacific Treefrog *Pseudacris regilla*	SGCN (AZ)	Native populations occur in Arizona only near the Colorado River; introduced population in Tucson at plant nurseries.	No	None	Outside of known native range	—
Western Chorus Frog *Pseudacris triseriata*	SGCN (NM)	Wet meadows, flooded fields, roadside ditches, and shortgrass prairie playa lakes.	No	Low	—	1-206

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Rio Grande Leopard Frog *Lithobates berlandieri*	SGCN (NM)	Clear perennial streams or pools; stock tanks.	No	None	Outside of known range	—
Plains Leopard Frog *Lithobates blairi*	FS; WSC; SGCN (AZ, NM)	Ponds, streams, cattle tanks, and irrigation ditches in semidesert grassland or Madrean evergreen woodland.	No	Moderate	—	1-207
Chiricahua Leopard Frog *Lithobates chiricahuensis*	T (CH); WSC; NMS; SGCN (AZ, NM); PVS	Streams in mountainous areas of Arizona, southwest New Mexico, and Mexico.	No	Very Low	—	1-207
Northern Leopard Frog *Lithobates pipiens*	FS; WSC; SGCN (AZ, NM)	Permanent waters of lakes, streams, earthen tanks; may forage far from water.	No	Moderate	—	1-209
Ramsey Canyon Leopard Frog *Lithobates subaquavocalis*	BLMS (AZ), FS; SC; SGCN (AZ)	Springs, cienegas, small streams, and earthen tanks; no longer accepted as distinct species by USFWS; subsumed into *L. chiricahuensis*.	No	None	Outside of known range	—
Lowland Leopard Frog *Lithobates yavapaiensis*	NME; BLMS (AZ, NM); FS; SC; WSC; SGCN (AZ, NM); PVS	Usually near permanent water, from desert to oak-pine woodlands.	Yes	Present	---	1-209
Sonoran Desert Toad *Ollotis alvaria* (Syn: *Bufo alvarius*)	NMT; SGCN (NM)	Desertscrub with rock pools or stock ponds, or broad-leaf riparian habitat.	No	None	Outside of known New Mexico range	—
Arizona Toad *Bufo microscaphus microscaphus*	BLMS (NM); FS; SC; NMS; SGCN (AZ, NM)	Rocky streams from lowland to upland (pine-oak woodland) riparian areas.	No	None	Outside of known range	—
Great Plains Narrow-mouthed Toad *Gastrophryne olivacea*	NME; BLMS (AZ); FS; WSC; SGCN (AZ, NM)	Occurs at a variety of water sources from Lower Colorado River subdivision up to Madrean Evergreen Woodland.	Yes	Present (AZ only)	—	1-211
Lowland Burrowing Treefrog *Pternohyla fodiens*	BLMS (AZ); WSC	Associated with pools in Semidesert Grassland or mesquite-lined washes.	No	None	Outside of known range	—

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REPTILES						
Desert Box Turtle *Terrapene ornata luteola*	BLMS (AZ); SGCN (AZ, NM); PVS	Inhabits areas with sandy soils in treeless plains and rolling grasslands.	Yes	Present	—	1-212
Western Painted Turtle *Chrysemys picta bellii*	SGCN (NM)	Permanent waters of rivers, lakes, and ponds.	Yes	Present	—	1-213
Big Bend Slider *Trachemys gaigeae*	NMS; SGCN (NM)	Freshwater rivers, lakes, and ponds.	Yes	Present	—	1-213
Arizona Mud Turtle *Kinosternon arizonae*	SGCN (AZ)	Ponds, ditches, and earthen cattle tanks from Lower Colorado River Sonoran desertscrub up to semidesert grassland.	No	None	Outside of known range	—
Yellow Mud Turtle *Kinosternon flavescens*	SGCN (AZ)	Ponds and temporary water in Chihuahuan desertscrub and semidesert grassland.	No	Moderate	—	1-214
Sonora Mud Turtle *Kinosternon sonoriense sonoriense*	BLMS (AZ); SGCN (AZ, NM)	Ponds and streams.	Yes	Present	—	1-215
Sonoyta Mud Turtle *Kinosternon sonoriense longifemorale*	C; BLMS (AZ); SGCN (AZ)	Ponds and streams.	No	None	Outside of known range	—
Sonoran Desert Tortoise *Gopherus agassizii*	C; FS; WSC; SGCN (AZ)	Rocky foothills in desertscrub and semidesert grassland.	Yes	Present	—	1-216
Chuckwalla *Sauromalus ater*	SC	Rock outcrops, boulder fields, and other areas with crevices for shelter in Mohave, Sonoran, and Great Basin desertscrub.	No	Low	—	1-218
Eastern Collared Lizard *Crotaphytus collaris auriceps*	SGCN (NM)	Desertscrub to conifer woodland habitats.	Yes	Present	—	1-218
Sonoran Collared Lizard *Crotaphytus nebrius*	SGCN (AZ)	Steep slopes and rocky areas above the low desert.	Yes	Present	—	1-219

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Bleached Earless Lizard *Holbrookia maculata ruthveni*	NMS	Endemic to the white gypsum sands of the Tularosa Basin in New Mexico.	No	None	Outside of known range	—
Yuma Desert Fringe-toed Lizard *Uma rufopunctata*	BLMS (AZ); SC; WSC; SGCN (AZ)	Dunes and sandy flats with sparse vegetation in Lower Colorado River desertscrub.	No	None	No suitable habitat, and outside of known range	—
Southwestern Fence Lizard (White Sands Prairie Lizard) *Sceloporus cowlesi*	NMS	Endemic to dune areas of White Sands National Monument and White Sands Missile Range.	No	None	Outside of known range	—
Northern Sagebrush Lizard *Sceloporus graciosus graciosus*	BLMS (AZ)	On plains, and in low valleys and steep slopes between desertscrub and Petran subalpine conifer forest.	No	None	Outside of known range	—
Slevin's Bunchgrass Lizard *Sceloporus slevini*	NMT; FS; SGCN (AZ, NM)	Generally in grassland habitats; in New Mexico known only from the southern end of the Animas Valley in Hidalgo County.	No	None	Outside of known range	—
Striped Plateau Lizard *Sceloporus virgatus*	SGCN (AZ)	Madrean evergreen woodland up to subalpine conifer forest habitats.	No	None	Outside of known range	—
Texas Horned Lizard *Phrynosoma cornutum*	BLMS (NM); SC;	Chihuahuan and desert grassland habitats; flat ground often with scattered shrubs.	Yes	Present	—	1-220
Goode's Horned Lizard *Phrynosoma goodei*	SGCN (AZ)	Occur primarily on sandy substrates or dunes; may also be present on gravelly substrates or desert pavement.	No	Low	—	1-221
Regal Horned Lizard *Phrynosoma solare*	SGCN (AZ, NM)	Areas of open vegetation on relatively level terrain of Chihuahuan and Sonoran desertscrub or semidesert grassland.	Yes	Present	—	1-221
Arizona Striped Whiptail *Aspidoscelis arizonae*	BLMS (AZ); SGCN (AZ)	Open semidesert grasslands in the Sulphur Springs Valley, Arizona.	No	Moderate	—	1-222

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			Known	**Potential**	**Notes on Exclusion**	
Giant Spotted Whiptail *Aspidoscelis burti stictogrammus*	NMT; BLMS (NM); FS; SC; SGCN (AZ, NM); PVS	Semidesert grassland and Madrean evergreen woodland; shrubby vegetation along washes, riparian corridors, and low valley bottoms.	Yes	Present	—	1-223
Gila Spotted Whiptail *Aspidoscelis flagellicauda*	SGCN (AZ)	Primarily a species of Madrean evergreen woodland, piñon-juniper, and chaparral habitats.	No	High	—	1-224
Gray-checkered Whiptail *Aspidoscelis dixoni*	BLMS (NM); NME; SGCN (NM)	Sandy soils in creosote bush flats mostly devoid of understory vegetation.	No	None	Outside of known range	—
Little White Whiptail *Aspidoscelis gypsi*	NMS	Endemic to the white gypsum sands of the Tularosa Basin in New Mexico.	No	None	Outside of known range	—
Redback Whiptail *Aspidoscelis xanthonota*	SC; SGCN (AZ); PVS	Bajadas and drainages of mountains in Arizona Upland desertscrub.	No	None	Outside of known range	—
Mountain Skink *Eumeces (tetragrammus) callicephalus*	NMT; FS; SGCN (AZ, NM)	Semidesert grassland to pine-oak woodland in border mountains.	No	None	Outside of known range	—
Madrean Alligator Lizard *Elgaria kingii*	SGCN (NM)	Low valleys, foothills, and steep slopes of foothills from semidesert grassland up to Petran Montane Conifer Forest.	No	Low	—	1-225
Bezy's Night Lizard *Xantusia bezyi*	SGCN (AZ)	Crevice-dwelling species of rock piles and cliff faces in Arizona Upland desertscrub and Interior Chaparral habitats.	No	None	Outside of known range	—
Desert Night Lizard *Xantusia vigilis*	SGCN (AZ)	Foothills and brushy mountain slopes of desertscrub and Interior Chaparral.	No	None	Outside of known range	—
Texas Banded Gecko *Coleonyx brevis*	SGCN (NM)	Rocky limestone foothills in desertscrub habitat below 5,000 feet elevation.	No	None	Outside of known range	—
Reticulate Gila Monster *Heloderma suspectum suspectum*	NME; FS; SGCN (AZ, NM)	Steep rocky terrain; along washes; primarily in desertscrub, but also in other habitats into chaparral.	No	Low	—	1-226

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Rosy Boa *Charina trivirgata*	BLMS (AZ); SC; SGCN (AZ)	Rocky outcrops of foothills or desert mountains.	No	None	Outside of known range	—
Sonoran Coralsnake *Micruroides euryxanthus*	SGCN (AZ)	Sonoran Desertscrub up to lower Great Basin Conifer Woodland.	Yes	Present	—	1-227
Tucson Shovel-nosed Snake *Chionactis occipitalis klauberi*	C; PVS	Lower Sonoran life zone with fine, sandy soils.	No	Moderate to High	—	1-227
Organpipe Shovel-nosed Snake *Chionactis palarostris*	SGCN (AZ); PVS	Gravelly soils of valley bajadas and bottoms in paloverde-cacti-mixed scrub habitat.	No	None	Outside of known range	—
Variable Sandsnake *Chilomeniscus stramineus*	SGCN (AZ)	Primarily a resident of Arizona Upland Desertscrub.	No	High	—	1-229
Hooded Night Snake *Hypsiglena* sp. nov.	SGCN (AZ)	Inhabits Lower Colorado Subdivision Sonoran Desert up into Petran Montane Conifer Forest.	No	High	—	1-229
Saddled Leaf-nosed Snake *Phyllorhynchus browni*	SGCN (AZ)	Alluvial soils of bajadas and flats in Arizona Upland Subdivision Desertscrub habitat; generally below 3,000 feet.	No	High	—	1-230
Chihuahuan Black-headed Snake *Tantilla wilcoxi*	SGCN (AZ)	Madrean evergreen woodland or Petran Montane Conifer Forest habitats.	No	None	Outside of known range	—
Yaqui Black-headed Snake *Tantilla yaquia*	FS; NMS; SGCN (AZ, NM)	Loose, rocky soils of riparian woodland; in New Mexico only from the Guadalupe and Peloncillo mountains.	No	None	Outside of known range	—
Ground Snake *Sonora semiannulata*	SC; PVS	Plains, valleys, and foothill habitats.	Yes	Present	—	1-230
Green Rat Snake *Senticolis triaspis intermedia*	NMT; FS; SGCN (AZ, NM)	Rocky slopes or associated with riparian habitats in Madrean evergreen woodland.	No	None	Outside of known range	—

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Sonoran Whipsnake *Masticophis bilineatus*	SGCN (AZ)	Brushy, rocky habitats from Arizona Upland Desertscrub up into Great Basin Conifer Woodland.	No	High	—	1-231
Brown Vinesnake *Oxybelis aeneus*	FS; WSC; SGCN (AZ)	Steep grassy slopes in Madrean evergreen woodland or in wooded canyons.	No	None	Outside of known range	—
California Kingsnake *Lampropeltis getula californiae*	NMS; SGCN (NM)	Low desert up to piñon-juniper; usually a riparian or grassland inhabitant in New Mexico; known primarily from the Peloncillo Mountains in Hidalgo County.	No	Low	—	1-232
Western Black Kingsnake *Lampropeltis getula nigrita*	SGCN (AZ)	Occurs from desertscrub up to lower portions of Great Basin Conifer Woodland and Madrean Evergreen Woodland.	No	None	Outside of known range	—
Sonoran Mountain Kingsnake *Lampropeltis pyromelana*	SGCN (NM)	Talus or other rocky habitat; often associated with streambeds; 4,500 to 8,200 feet elevation.	No	None	No suitable habitat	—
Milk Snake *Lampropeltis triangulum*	SGCN (AZ, NM)	Occurs in a wide variety of habitats from desertscrub up to coniferous forest.	No	Moderate (NM portion only)	—	1-233
Northern Mexican Garter Snake *Thamnophis eques megalops*	C; BLMS (NM); FS; NME; WSC; SGCN (AZ, NM); PVS	Inhabits streams, rivers, cienegas and ponds with dense shoreline vegetation from Sonoran desertscrub up into Petran montane conifer forest.	Yes (AZ portion only)	Present	—	1-233
Narrow-headed Garter Snake *Thamnophis rufipunctatus*	UR; NMT; BLMS (NM); FS; SC; WSC; SGCN (AZ, NM)	A highly aquatic species of rocky lakeshores and clear rocky streams. Occurs from piñon-juniper up to ponderosa pine woodland.	No	None	No suitable habitat, and outside of known range	—
New Mexico Garter Snake *Thamnophis sirtalis dorsalis*	SGCN (NM)	Occurs in a very wide variety of habitats, often near water.	Yes	Present	—	1-234
Desert Massasauga *Sistrurus catenatus edwardsii*	UR; WSC; SGCN (AZ, NM)	Desert grasslands or shortgrass prairies.	No	Moderate	—	1-235

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Western Diamondback Rattlesnake *Crotalus atrox*	SGCN (NM)	Washes, outcrops and foothills of semi-arid lowland areas; generally below 5,000 feet elevation.	Yes	Present	—	1-236
Arizona Black Rattlesnake *Crotalus cerberus*	SGCN (AZ)		No	Low	—	1-237
Banded Rock Rattlesnake *Crotalus lepidus klauberi*	SGCN (NM)	Typically occurs on rocky slopes or in talus; also associated with dry, vegetated drainages.	No	Very Low	—	1-237
Mottled Rock Rattlesnake *Crotalus lepidus lepidus*	NMT; FS; SGCN (NM)	Typically occurs on rocky slopes or in talus; also associated with dry, vegetated drainages.	No	None	No suitable habitat, and outside of known range	—
Twin-spotted Rattlesnake *Crotalus pricei*	FS; SGCN (AZ)	Petran Montane to Subalpine conifer forest habitats.	No	None	Outside of known range	—
Tiger Rattlesnake *Crotalus tigris*	SGCN (AZ)	Occurs in a variety of habitats including canyon bottoms, dry, rocky hillsides and talus.	Yes	Present	—	1-238
Prairie Rattlesnake *Crotalus viridis viridis*	SGCN (AZ)	Desertscrub and grassland habitats.	No	None	Outside of known Arizona range	—
New Mexican Ridge-nosed Rattlesnake *Crotalus willardi obscurus*	T (CH); NME; SGCN (AZ, NM)	Madrean evergreen woodland and Petran montane forests. Restricted to the Animas and southern Peloncillo mountains in the United States.	No	None	No suitable habitat, and outside of known range	—
Arizona Ridge-nosed Rattlesnake *Crotalus willardi willardi*	FS; WSC; SGCN (AZ)	Heavily wooded canyons in Madrean evergreen woodland or Petran Montane Conifer Forest; sometimes lower.	No	None	Outside of known range	—
FISH						
Apache Trout *Oncorhynchus apache*	T; WSC; SGCN (AZ)	High elevation-cold, clear streams.	No	None	—	1-239
Rio Grande Cutthroat Trout *Oncorhynchus clarki virginalis*	C; FS; NMS; SGCN (NM); STW	Clear, cold streams and lakes.	No	None	No suitable habitat, and outside of known range	—

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Gila Trout *Oncorhynchus gilae*	T; NMT; WSC; SGCN (AZ, NM)	Verde River drainage of Arizona and the upper Gila basin of New Mexico.	No	None	No suitable habitat, and outside of known range	—
Rainbow Trout *Oncorhynchus mykiss*	STW	Lakes and streams with good water quality; introduced in Southwest.	No	None	No suitable habitat	—
Brook Trout *Salvelinus fontinalis*	STW	Found in clear, cool, well-oxygenated creeks, small to medium rivers, and lakes.	No	None	No suitable habitat	—
Brown Trout *Salmo trutta*	STW	Found in cold, medium to high gradient streams; some lake populations; introduced in New Mexico and Arizona.	No	None	No suitable habitat	—
Longfin Dace *Agosia chrysogaster*	BLMS (AZ, NM); FS; SC; SGCN (AZ); PVS	A wide range of habitats, from sand-bottomed desert streams to cool, clear creeks in the lower mountains.	Yes	Present	—	1-240
Mexican Stoneroller *Campostoma ornatum*	SC; FS; WSC; SGCN (AZ)	Small to medium-sized creeks in Chihuahuan desert habitat.	No	None	Outside of known range	—
Gila Chub *Gila intermedia*	E (CH); NME; BLMS (NM); WSC; SGCN (AZ, NM); PVS	Smaller streams, springs, and marshes. Adults prefer heavily vegetated deeper pools, while juveniles occur in riffles, pools, and along undercut banks.	Yes (AZ portion only)	Present	—	1-241
Roundtail chub (Lower Colorado River Basin DPS) *Gila robusta*	C; NME; BLMS (NM); FS; WSC; SGCN (AZ, NM)	Medium to small, warm rivers; associated with vegetation or boulder cover in smaller streams; present in Aravaipa Creek.	No	None	—	1-242
Headwater Chub *Gila nigra*	C; NME; BLMS (AZ); FS; SGCN (AZ, NM)	Mid-sized streams, associated with deep, near-shore pools adjacent to stream riffles.	No	None	Outside of known range	—
Chihuahua Chub *Gila nigrescens*	T; NME; SGCN (NM)	Occurs in U.S. only along a single reach of the Mimbres River in New Mexico; approximately 30 miles north of the study area.	No	None	Outside of known range	—

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Rio Grande Chub *Gila pandora*	FS; NMS; SGCN (NM)	Impoundments and pools of moderate-sized streams; frequently associated with aquatic vegetation.	No	None	Extirpated from Middle Rio Grande	—
Yaqui Chub *Gila purpurea*	E (CH); WSC; SGCN (AZ)	Deep pools of small streams with dense aquatic vegetation; Yaqui River watershed along Arizona border.	No	None	Outside of known range	—
Speckled Chub *Macrhybopsis aestivalis*	SGCN (NM)	Large, low-gradient streams with a fine gravel or sand substrate; extirpated from the Project area.	No	None	---	—
Rio Grande Silvery Minnow *Hybognathus amarus*	E (CH); NME; SGCN (NM)	Low-gradient, large streams with sandy or silty bottoms; critical habitat designated on the Rio Grande in Socorro County, New Mexico.	Yes (NM portion only)	Present	—	1-242
Smallmouth Buffalo *Ictiobus bubalus*	SGCN (NM)	Clear waters with moderate current; reservoirs.	Yes	Present	—	1-243
Rainwater Killifish *Lucania parva*	SGCN (NM)	Rio Grande and Pecos rivers in New Mexico.	No	None	Outside of known range	—
Spikedace *Meda fulgida*	E (CH); NME; WSC; SGCN (AZ, NM)	Non-turbulent waters of moderate to shallow depth over substrates of finer sediments; critical habitat designated in Aravaipa Canyon.	Yes (AZ portion only)	Present	—	1-244
Beautiful Shiner *Cyprinella formosa*	T (CH); WSC; SGCN (AZ)	Small to medium sized streams and ponds with sand, gravel, and rock bottoms.	No	None	Outside of known range	—
Rio Grande Shiner *Notropis jemezanus*	SC; BLMS (NM); NMS; SGCN (NM)	Laminar flow areas of large rivers; currently only the Pecos River in New Mexico.	No	None	Extirpated from Rio Grande	—
Colorado Pikeminnow *Ptychocheilus lucius*	E (CH, NEP); NME; WSC; SGCN (AZ)	Medium to large rivers with rocky or sandy substrates.	No	None	Outside of known range	—
Speckled Dace *Rhinichthys osculus*	BLMS (AZ, NM)	Generally a bottom dweller, in rocky riffles, runs and pools of headwaters, creeks, and small to medium rivers.	No	Moderate	—	1-246

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Loach Minnow *Tiaroga cobitis*	E (CH); NME; WSC; SGCN (AZ, NM)	Bottom-feeding species that occurs in gravelly riffles in small to medium-sized streams and rivers; critical habitat designated in Aravaipa Canyon.	Yes (AZ portion only)	Present	—	1-246
Yaqui Sucker *Catostomus bernardini*	SGCN (AZ)	A variety of habitats from small creeks to large rivers and reservoirs from desert to montane elevations.	No	None	Extirpated from the United States	—
Desert Sucker *Catostomus clarki*	BLMS (AZ, NM); FS; SC; NMS; SGCN (AZ, NM); PVS	Inhabits small to moderately large streams with riffles and pools.	Yes; Arizona portion only	Present	—	1-248
Sonora Sucker *Catostomus insignis*	BLMS (AZ, NM); FS; SC; NMS; SGCN (AZ, NM); PVS	Gravel-bottomed lentic waters with pool habitats.	No	Moderate	—	1-249
Flannelmouth Sucker *Catostomus latipinnis*	BLMS (AZ); SC; SGCN (AZ)	Pools and runs of moderate to large rivers; mouths of tributaries; rare in small creeks.	No	None	Occurred within study area, now extirpated	—
Rio Grande Sucker *Catostomus plebeius*	FS; SC; SGCN (NM)	Middle-elevation streams with low sediment load and gravel or cobble beds.	Yes	Present	—	1-250
Razorback Sucker *Xyrauchen texanus*	E (CH); WSC; NMS; SGCN (AZ)	Below 6,000 feet elevation in backwaters and impoundments near strong currents or deep pools. Critical habitat designated in Gila River, but species is extirpated.	No	None	Outside of known range and critical habitat	—
Gray Redhorse *Moxostoma congestum*	NME; SC; SGCN (NM)	Inhabits medium to large, clear, warm streams; pools and occasionally deep runs.	No	None	Outside of known range	—
Blue Catfish *Ictalurus furcatus*	SGCN (NM)	Deep waters of large rivers; present at Bosque del Apache NWR.	Yes	Present	—	1-251
Yaqui Catfish *Ictalurus pricei*	T (CH); WSC	An inhabitant of ponds, streams and rivers; a bottom feeder on fish, invertebrates, plants and detritus.	No	None	Outside of known range	—

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Desert Pupfish *Cyprinodon macularius* (Includes Quitobaquito Desert Pupfish, *C. eremus*)	E (CH); WSC; SGCN (AZ); PVS	Below sea level to 4,950 feet elevation in streams and isolated springs of lower Gila River basin; critical habitat outside study area in Arizona and California.	Yes (AZ portion only)	Present	—	1-251
White Sands Pupfish *Cyprinodon tularosa*	NMT; SGCN (NM)	Native population occurs in saline river; introduced populations restricted to a small area of the Tularosa Basin.	No	None	Outside of known range	—
Gila Topminnow *Poeciliopsis occidentalis*	E; NMT; WSC; SGCN (AZ, NM); PVS	Below 4,500 feet elevation, formerly in large river backwaters; now only in small streams, springs, and cienegas.	Yes (AZ portion only)	Present	—	1-252
Yaqui Topminnow *Poeciliopsis occidentalis sonoriensis*	E; SGCN (AZ)	Small to moderately sized streams, and cienegas; Yaqui River watershed along Arizona border.	No	None	Outside of known range	—
Mexican Tetra *Astyanax mexicanus*	NMT	Occurs in a variety of habitat; prefers springs and pools.	No	None	Outside of known range	—
INVERTEBRATES						
Marsh Snail Slug *Derocerus heterura*	SGCN (NM)	8,000- to 9,000-foot elevation range, in the Mogollon and Black ranges, New Mexico.	No	None	No suitable habitat, and outside of known range	—
Cockerell's Striate Disc Snail *Discus shimeki cockerelli*	BLMS (AZ, NM); SC; NMS; SGCN (AZ)	High-elevation terrestrial snail.	No	None	No suitable habitat	—
Northern Threeband *Humboltiana ultima*	FS	Leaf litter in mesic canyons of limestone mountains; in New Mexico, found only in the Guadalupe Mountains.	No	None	Outside of known range	—
Bearded Mountainsnail *Oreohelix barbata*	FS; SGCN (NM)	Rock rubble along streams where adequate leaf litter is present; Chiricahua (Arizona) and Mogollon (New Mexico) mountains.	No	None	Outside of known range	—

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Florida Mountainsnail *Oreohelix florida*	NME; SC	Moderate to high-elevation peaks on rocky limestone substrate; likely extinct.	No	Very Low	—	1-253
Pinaleño Mountainsnail *Oreohelix grahamensis*	FS; GCN (AZ)	Southeast slope of Mount Graham in the Pinaleño Mountains; 8,500 feet elevation.	No	None	No suitable habitat	—
Magdalena Mountainsnail *Oreohelix magdalenae*	FS	Found under loose, igneous stones in leaf litter; only in the Magdalena Mountains of New Mexico above 7,000 feet.	No	None	No suitable habitat and outside of known range	—
Black Range Mountainsnail *Oreohelix metcalfei acutidiscus*	FS; SGCN (NM)	Strict calciphile species; known only from Sawyer Peak area in the Black Range, New Mexico.	No	None	Outside of known range	—
Black Range Mountainsnail *Oreohelix metcalfei concentrica*	FS; SGCN (NM)	Strict calciphile species restricted to the Black Range, New Mexico.	No	None	Outside of known range	—
Black Range Mountainsnail *Oreohelix metcalfei cuchillensis*	SGCN (NM)	Strict calciphile species restricted to the Cuchillo Mountains, New Mexico.	No	None	Outside of known range	—
Black Range Mountainsnail *Oreohelix metcalfei hermosensis*	SGCN (NM)	Strict calciphile that occurs in rock rubble along Palomas Creek, Black Range, New Mexico.	No	None	Outside of known range	—
Black Range Mountainsnail *Oreohelix metcalfei metcalfei*	FS; SGCN (NM)	Strict calciphile from the Percha Creek area near Kingston, New Mexico.	No	None	Outside of known range	—
Black Range Mountainsnail *Oreohelix metcalfei radiata*	FS; SGCN (NM)	Strict calciphile from stream drainages west of Emory Pass in the Black Range, New Mexico.	No	None	Outside of known range	—

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Mountainsnail *Oreohelix nogalensis*	FS	High elevations in the Sacramento Mountains, New Mexico.	No	None	Outside of known range	—
Socorro Mountainsnail *Oreohelix neomexicana*	NMS; SGCN (NM)	Occurs in a variety of montane habitats where adequate moisture is present; leaf litter and rocks over a wide elevation range.	No	Very Low	—	1-254
Mineral Creek Mountainsnail *Oreohelix pilsbryi*	FS; SGCN (NM)	Calciphile known only from Mineral Creek in the vicinity of Chloride, New Mexico.	No	None	Outside of known range	—
Morgan Creek Mountainsnail *Oreohelix swopei*	FS	Narrowly endemic to Morgan, Diamond Creek, and Black Canyons in the Black Range of New Mexico.	No	None	Outside of known range	—
Subalpine Mountainsnail *Oreohelix subrudis*	FS	Wide-ranging species from Canada south to Utah; also ranges associated with Mogollon Rim in Arizona and New Mexico.	No	None	Outside of known range	—
Fringed Mountainsnail *Radiocentrum ferrissi*	SGCN (NM)	Arid lower elevations of the Big Hatchet Mountains, New Mexico.	No	None	Outside of known range	—
Hacheta Mountainsnail *Radiocentrum hachetanum*	SGCN (NM)	Higher elevations of the Big Hatchet Mountains, New Mexico.	No	None	Outside of known range	—
Obese Thorn Snail *Carychium exiguum*	SGCN (NM)	Marshy habitats over a very wide range; in New Mexico only recorded from Tularosa Creek in the vicinity of Mescalero.	No	None	Outside of known range	—
Cockerell Holospira Snail *Holospira cockerelli*	SGCN (NM)	A calciphile species limited to the eastern foothills of the Black Range and Cuchillo mountains, New Mexico.	No	None	Outside of known range	—
Cross Holospira Snail *Holospira crossei*	SGCN (NM)	A calciphile species of wooded slopes and exposed locations in the Big Hatchet and Alamo Hueco mountains, New Mexico.	No	None	Outside of known range	—

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Metcalf Holospira Snail *Holospira metcalfi*	SGCN (NM)	Restricted to Howell's Ridge in the Little Hatchet Mountains, New Mexico, on rocky substrate in areas of mesic vegetation.	No	None	Outside of known range	—
Vagabond Holospira *Holospira montivaga*	FS	Restricted to the Guadalupe Mountains of Texas and New Mexico.	No	None	Outside of known range	—
Spruce Snail *Microphysula ingersolli*	SGCN (NM)	Occurs among damp ground debris from the Canadian Life Zone up to timberline.	No	None	No suitable habitat	—
New Mexico Ramshorn Snail *Pecosorbis kansasensis*	SGCN (NM)	Seasonal pools.	No	None	Outside of known range	—
Ovate Vertigo Snail *Vertigo ovata*	SC; SGCN (NM)	Damp soil of marshy areas or springs.	No	Very Low	—	1-255
Succineid Snails Family Succineidae (all species)	BLMS (AZ)	Springs, streams, rivers and floodplains and irrigation canals.	No	Low	—	1-255
Western Glass Snail *Vitrina pellucida alaskana*	SGCN (NM)	Damp montane meadows, streams and other water bodies; high elevations from the Sacramento Mountains north.	No	None	No suitable habitat	—
Bylas Springsnail *Pyrgulopsis arizonae*	BLMS (AZ); SC; SGCN (AZ)	Thermal springs on the north side of Gila River between Bylas and Pima, Arizona.	No	None	No suitable habitat	—
San Bernardino Springsnail *Pyrgulopsis bernardina*	T; BLMS (AZ); SGCN (AZ)	Two springs in the Yaqui River watershed along Arizona border.	No	None	Outside of known range	—
Hydrobiid Springsnails *Pyrgulopsis* spp.	BLMS (AZ)	Freshwater springs and their outflows.	No	Low	—	1-256
Chupadera Springsnail *Pyrgulopsis chupaderae*	E (CH); NME; SGCN (NM)	Willow Spring at the south end of the Chupadera Mountains, New Mexico.	No	None	Outside of known range	—
Gila Springsnail *Pyrgulopsis gilae*	C; NMT; FS; SGCN (NM)	Thermal springs along the Gila River in Grant County, New Mexico.	No	None	Outside of known range	—

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Socorro Springsnail *Pyrgulopsis neomexicana*	E; NME; SGCN (NM)	Restricted to Torreon Springs and its outflow at in the southeastern Magdalena Mountains near Socorro, New Mexico.	Yes	Present	—	1-257
New Mexico Springsnail *Pyrgulopsis thermalis*	C; NMT; FS; SGCN (NM)	Thermal freshwater springs on the Gila River in Grant County, New Mexico.	No	None	Outside of known range	—
Huachuca Springsnail *Pyrgulopsis thompsoni*	C; BLMS (AZ); FS; SGCN (AZ)	Springs in border mountain ranges in Arizona, into northern Sonora, Mexico.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella amblya cornudasensis*	BLMS (NM)	Igneous rock talus in the low-elevation Cornudas Mountains.	No	None	Outside of known range	—
Animas Peak Woodlandsnail *Ashmunella animasensis*	SGCN (NM)	High-elevation igneous talus in the Animas Mountains, New Mexico.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella tetradon tetradon*	FS	Deep canyons in the Mogollon Mountains of New Mexico, in leaf litter along creek bottoms.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella tetradon mutator*	FS	Deep canyons in the Mogollon Mountains of New Mexico, in leaf litter along creek bottoms.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella tetradon inermis*	FS	Deep canyons in the Mogollon Mountains of New Mexico, in leaf litter along creek bottoms.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella tetradon animorum*	FS	Known from Holden's Spring in the Black Range, Sierra County, New Mexico.	No	None	Outside of known range	—
Silver Creek Woodlandsnail *Ashmunella binneyi*	FS	Local endemic of the Black Range in New Mexico; occurs in upper Silver Creek, Bull Top and Spring Creek Canyons.	No	None	Outside of known range	—

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Woodlandsnail *Ashmunella cockerelli argenticola*	FS	Known from Silver Creek Canyon in the New Mexico Black Range, Grant County.	No	None	Outside of known range	—
Black Range Woodlandsnail *Ashmunella cockerelli cockerelli*	FS	Known from a ravine near Sawyer Peak in the southwestern Black Range, Grant County, New Mexico.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella cockerelli perobtusa*	FS	Near Sawyer Peak and the Grand Central Mine, Black Range, Grant County, New Mexico.	No	None	Outside of known range	—
Whitewater Creek Woodlandsnail *Ashmunella danielsi*	FS	Known only from Little Whitewater Creek Canyon in the Mogollon Mountains; on a wooded slope in igneous rock talus.	No	None	Outside of known range	—
Hacheta Grande Woodlandsnail *Ashmunella hebardi*	NMT; BLMS (NM)	High-elevation rocky habitat in the Big Hatchet Mountains of Hidalgo County, New Mexico.	No	None	No suitable habitat, and outside of known range	—
Cooke's Peak Woodlandsnail *Ashmunella macromphala*	NMT; BLMS (NM)	Known only from high-elevation rocky habitat on Cooke's Peak in the south end of the Mimbres Mountains north of Deming, New Mexico.	No	None	No suitable habitat	—
Big Hatchet Woodlandsnail *Ashmunella mearnsii*	SGCN (NM)	Recorded only from Big Hatchet Peak.	No	None	Outside of known range	—
Iron Creek Woodlandsnail *Ashmunella mendax*	FS; SGCN (NM)	Above 5,500 feet elevation in the Black Range, New Mexico.	No	None	Outside of known range	—
Capitan Woodlandsnail *Ashmunella pseudodonta*	FS	Talus accumulations in the Capitan Mountain complex, New Mexico.	No	None	Outside of known range	—
Woodlandsnail *Ashmunella rhyssa altissima*	SGCN (NM)	Rock talus above tree line in the Sacramento Mountains, New Mexico.	No	None	Outside of known range	—

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Animas Talussnail *Sonorella animasensis*	SGCN (NM)	Igneous rock rubble and talus between 6,500 and 7,000 feet elevation, in the Animas Mountains, New Mexico.	No	None	Outside of known range	—
Clark Peak Talussnail *Sonorella christenseni*	FS; SC; SGCN (AZ)	High-elevation rocky areas in the Pinaleño Mountains of Arizona.	No	None	No suitable habitat	—
San Xavier Talussnail *Sonorella eremita*	CA; SGCN (AZ)	Known only from San Xavier hill south of Tucson, Arizona.	No	None	Outside of known range	—
Pinaleño Talussnail *Sonorella grahamensis*	FS; SC; SGCN (AZ)	High-elevation talus of the Pinaleño Mountains of Arizona.	No	None	No suitable habitat	—
New Mexico Talussnail *Sonorella hachitana*	SGCN (NM)	Middle to upper elevations of the Big Hatchet, Florida, Peloncillo, and Tres Hermanas mountains, the Carrizalillo Hills, and Pyramid Peak, New Mexico.	No	None	No suitable habitat	—
Talussnail *Sonorella hachitana peloncillensis*	FS	Endemic to Skull Canyon in the Peloncillo Mountains, Hidalgo County, New Mexico.	No	None	Outside of known range	—
Mimic Talussnail *Sonorella imitator*	FS; SGCN (AZ)	Peaks in the Pinaleño Mountains above 9,000 feet elevation.	No	None	No suitable habitat	—
Wet Canyon Talussnail *Sonorella macrophallus*	CA; FS; SGCN (AZ)	Middle elevation canyon bottom along the perennial portion of Wet Canyon in the Pinaleño Mountains, Arizona.	No	None	No suitable habitat	—
Franklin Mountain Talussnail *Sonorella metcalfi*	SGCN (NM)	Franklin Mountains in Texas, and the southern Organ Mountains in New Mexico.	No	None	Outside of known range	—
Organ Mountain Talussnail *Sonorella orientis*	SGCN (NM)	Occurs on igneous or limestone substrate in the Organ, San Andres, and Oscura Ranges in New Mexico.	No	None	No suitable habitat	—
Black Mountain Talussnail *Sonorella papagorum*	SGCN (AZ)	Known only from Black Mountain south of Tucson, Arizona.	No	None	Outside of known range	—

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Doña Ana Talussnail *Sonorella todseni*	SGCN (NM)	Igneous rock talus; north slope of Doña Ana Mountains, New Mexico.	No	None	Outside of known range	—
Talussnails *Sonorella* spp.	PVS	Talus or rocky slopes of hills and canyons; usually on limestone substrates.	Yes	Present	—	1-258
Shortneck Snaggletooth Snail *Gastrocopta dalliana*	SGCN (NM)	Known from leaf litter at 5,900 feet elevation on Animas Peak in the Animas Mountains, New Mexico.	No	None	Outside of known range	—
Sonoran Snaggletooth Snail *Gastrocopta prototypus*	SGCN (NM)	Among leaf litter in rocky habitat in the Mogollon Mountains; possibly in other ranges in southwestern New Mexico.	No	None	No suitable habitat	—
Distorted Metastoma Snail *Metastoma roemeri*	SGCN (NM)	Limestone bedrock outcrops and talus in the San Andres, Franklin, Sacramento, and Guadalupe mountains, New Mexico.	No	None	No suitable habitat	—
Blunt Ambersnail *Oxyloma retusum*	FS; SGCN (NM)	Associated with aquatic vegetation in the Tularosa River and its floodplain; possibly elsewhere in the Sacramento Mountains.	No	None	Outside of known range	—
Crestless Column Snail *Pupilla hebes*	SGCN (NM)	High-elevation (above 7,400 feet) wet meadows; usually associated with springs.	No	None	No suitable habitat	—
Three-toothed Column Snail *Pupilla sonorana*	SGCN (NM)	Piñon-juniper or oak woodland to high peaks in several mountain ranges of southern New Mexico.	No	None	No suitable habitat	—
Whitewashed Radabotus Snail *Radabotus dealbatus neomexicanus*	SGCN (NM)	Occurs on calcareous bedrock in the San Andres, Sacramento, Guadalupe, and Oscura mountains, New Mexico.	No	None	No suitable habitat	—
Whitewashed Radabotus Snail *Radabotus durangoanus*	SGCN (NM)	Limestone talus or under vegetation on steep slopes; Little Hatchet, San Andres, and Sacramento mountains, New Mexico.	No	None	No suitable habitat	—

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Vallonia Snail *Vallonia sonorana*	SGCN (NM)	Leaf litter on Big Hatchet Peak, Big Hatchet Mountains, New Mexico.	No	None	No suitable habitat, and outside of known range	—
Alamosa Springsnail *Tryonia alamosae*	E; SGCN (NM)	Ojo Caliente and Warm Springs in the San Mateo Mountains, New Mexico.	No	None	Outside of known range	—
Gila Tryonia *Tryonia gilae*	BLMS (AZ); SC; SGCN (AZ)	Occurs in a single spring on the north side of the Gila River near Bylas, Arizona.	No	None	Outside of known range	—
Quitobaquito Tryonia *Tryonia quitobaquitae*	SC; SGCN (AZ)	Springs at Quitobaquito in southwestern Pima County, Arizona.	No	None	Outside of known range	—
California Floater *Anodonta californiensis*	SC; SGCN (AZ)	Freshwater perennial streams.	No	None	Outside of known range	—
Moore's Fairy Shrimp *Streptocephalus moorei*	NMS; SGCN (NM)	Turbid alkaline waters of natural playas or artificial earthen tanks.	No	Low	—	1-259
Bowman's Fairy Shrimp *Streptocephalus thomasbowmani*	SGCN (NM)	Interior draining intermittent playas.	Yes	Present	—	1-259
Lynch Tadpole Shrimp *Lepidurus lemmoni*	SGCN (NM)	Interior draining intermittent playas.	Yes	Present	—	1-260
Arizona Cave Amphipod *Stygobromus arizonensis*	SC; SGCN (AZ)	Known only from the Huachuca and Chiricahua mountains of southern Arizona.	No	None	Outside of known range	—
Socorro Isopod *Thermosphaeroma thermophilum*	E; NME	Occurs only at Sedillo Spring, about 3 miles southwest of Socorro, New Mexico.	No	None	Nearest alternative is 4 miles from Sedillo Spring	—
Slate Millipede *Comanchelus chihuanus*	BLMS (NM); SC; SGCN (NM)	Basalt mesas and grasslands.	No	Low	—	1-261
Arkenstone Cave Pseudoscorpion *Albiorix anophthalmus*	PVS	Eyeless, troglobitic pseudoscorpion; known only from Arkenstone Cave in Colossal Cave Mountain Park.	No	None	Outside of known range	—

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Sabino Canyon Damselfly *Argia sabino*	FS	Associated with streams; in the United States, known only from the Santa Catalina Mountains.	No	None	Outside of known range	—
Bleached Skimmer Dragonfly *Libellula composita*	FS	Ponds and streams with emergent vegetation, usually spring fed, in open arid country; scattered localities.	No	Very Low	—	—
Dashed Ringtail *Erpetogomphus heterodon*	FS	Clear, rocky, mountain streams and rivers; known from 2 rivers in western New Mexico in the Gila National Forest.	No	None	No suitable habitat, and outside of known range	—
Arizona Snaketail *Ophiogomphus arizonicus*	FS	Found in swift rocky mountain streams in pine woodlands; silt bottoms important for larval habitat.	No	None	No suitable habitat	—
Grasshopper 1 *Aeoloplides rotundipennis*	SGCN (NM)	Grasslands.	No	Moderate	—	1-262
Hebard's Blue-winged Desert Grasshopper *Anconia hebardi*	SGCN (NM)	Desert salt flats and playas.	No	Moderate	—	1-263
Grasshopper 2 *Cibolacris samalayucae*	SGCN (NM)	Sand dunes.	No	None	Outside of known range	—
Grasshopper 3 *Melanoplus magdalenae*	SGCN (NM)	Montane.	No	Very Low	—	1-263
Shotwell's Range Grasshopper *Shotwellia isleta*	SGCN (NM)	Non-saline playa lakes.	No	Low	—	1-264
Grasshopper 4 *Trimerotropis salina*	SGCN (NM)	Salt flats, alkali river bottoms, and seeps.	No	High	—	1-265
Pinaleño Monkey Grasshopper *Eumorsea Pinaleño*	FS; SC	High elevations of the Pinaleño Mountains in southern Arizona.	No	None	No suitable habitat	—

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White Sands Sand-treader Camel Cricket *Ammobaenetes arenicolus*	SGCN (NM)	Endemic to gypsum sand dunes in south-central New Mexico.	No	None	Outside of known range	—
Arizona Giant Sand-treader Cricket *Daihinibaenetes arizonensis*	BLMS (AZ)	Endemic to blow-sand and wash habitats in north-central Arizona.	No	None	Outside of known range	—
Camel Cricket *Ceuthophilus leptopus*	SGCN (NM)	Occurs in mesic montane canyons in the Organ Mountains.	No	None	Outside of known range	—
Camel Cricket *Ceuthophilus mescalero*	SGCN (NM)	Bedrock and talus on Sierra Blanca Peak in the Sacramento Mountains, New Mexico.	No	None	No suitable habitat, and outside of known range	—
Navajo Jerusalem Cricket *Stenopelmatus navajo*	BLMS (AZ)	Sand dunes and sandy habitats of north-central Arizona.	No	None	Outside of known range	—
Mayfly *Homoeoneuria alleni*	SGCN (NM)	Known only from the lower Rio Grande, New Mexico.	No	None	Outside of known range	—
Mayfly *Lachlania dencyannae*	FS; SGCN (NM)	Endemic to the Gila River system in New Mexico.	No	None	Outside of known range	—
Mayfly *Leucrocuta petersi*	SGCN (NM)	Drainages of the Gila and Canadian River systems.	No	None	Outside of known range	—
Mayfly *Homoleptohyphes quercus*	FS	Reported only from Coconino and Pinal counties in Arizona; apparently restricted to certain isolated montane creeks.	No	None	No suitable habitat	—
Santa Rita Mountains Chlorochroan Bug *Chlorochroa rita*	BLMS (AZ); SC	Habitat uncertain; either a montane riparian associate or may feed on species of cacti.	No	None	Outside of known range	—
Chiricahua Water Scavenger Beetle *Cymbiodyta arizonica*	BLMS (AZ); FS	Freshwater aquatic habitats of streams and ponds.	No	None	Outside of known range	—

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Bonita Diving Beetle *Stictotarsus* (*Deronectes*) *neomexicanus*	FS; SC	Freshwater aquatic habitats, typically high-elevation springs in Texas and New Mexico.	No	None	No suitable habitat, and outside of known range	—
Maricopa Tiger Beetle *Cicindela oregona maricopa*	SC	Sandy to rocky stream banks; seeps and reservoir banks.	No	Very Low	—	1-265
Arizona Water Penny Beetle *Psephenus arizonensis*	SC	Perennial streams; known only from Cave Creek in the Chiricahua Mountains of southern Arizona.	No	None	No suitable habitat, and outside of known range	—
White Mountains Water Penny Beetle *Psephenus montanus*	SC	High-elevation perennial streams; known only from the Black River in Greenlee and Apache counties, Arizona.	No	None	No suitable habitat, and outside of known range	—
Animas Minute Moss Beetle *Limnebius aridus*	BLMS (NM); SGCN (NM)	Associated with algae of springs and stream margins.	No	None	No suitable habitat	—
Anthony Blister Beetle *Lytta mirifica*	BLMS (NM); FS; SGCN (NM)	Low-elevation deserts.	No	None	Outside of known range	—
Desert Viceroy Butterfly *Limenitis archippus obsoleta*	SC; SGCN (NM)	Riparian corridors with willow, cottonwood, or aspen.	Yes	Present	—	1-266
Capitan Mountains Fritillary Butterfly *Speyeria atlantis capitanensis*	CA; SGCN (NM)	High-elevation montane meadows; larvae feed on violets; known only from the Capitan Mountains, New Mexico.	No	None	No suitable habitat	—
Nokomis Fritillary *Speyeria nokomis nokomis*	FS	Streamside meadows and seeps with an abundance of violets in generally desert landscapes.	No	None	No suitable habitat	—
Nitocris Fritillary *Speyeria nokomis nitocris*	FS	Alpine meadows.	No	None	No suitable habitat, and outside of known range	—

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Sacramento Mountains Checkerspot Butterfly *Euphydryas anicia cloudcrofti*	CA; FS; SGCN (NM)	Known only from the vicinity of Cloudcroft, New Mexico in the Sacramento Mountains.	No	None	No suitable habitat	—
Chiricahua White Butterfly *Neophasia terlootii*	SGCN (NM)	Larvae feed on ponderosa and Apache pines; the species may occur in Hidalgo County, New Mexico.	No	None	No suitable habitat	—
Southwestern Oak Hairstreak Butterfly *Satyrium* [*Fixsenia*] *favonius ilavia*	SGCN (NM)	Mid-elevation scrub oak chaparral; larvae feed on scrub oak.	No	Very Low	—	1-267
Oslar's Hairstreak Butterfly *Phaeostrymon alcestis oslari*	SGCN (NM)	Inhabits washes at middle elevations where the larvae feed on soapberry; occurs on the Gray Ranch in Hidalgo County, New Mexico.	No	None	No suitable habitat	—
Sandia Hairstreak Butterfly *Callophrys* [*Sandia*] *mcfarlandi*	SGCN (NM)	Yucca-agave desert where the larvae feed on beargrass.	No	High	—	1-267
Xami Hairstreak Butterfly *Callophrys* [*Xamia*] *xami*	SGCN (NM)	Rocky canyons and slopes; larval food plants are *Sedum* spp. and *Escheveria* spp.	No	Low	—	1-268
Spalding's Blue Butterfly *Euphilotes spaldingi*	SGCN (NM)	Plateaus and outcrops in piñon-juniper habitat; larvae feed on buckwheat.	No	Low	—	1-269
Boisduval's Blue Butterfly *Plebejus* (*Icaricia*) *icarioides* spp.	SC	Occurs over a wider range of habitats; wherever suitable *Lupinus* spp. larval food plants occur.	No	Moderate	—	1-269
Buchholz's Blue Butterfly *Plebejus* [*Icaricia*] *icarioides buchholzi*	SGCN (NM)	A wide variety of habitats where the larval food plants, lupines, grow.	No	High	—	1-270

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Arizona Metalmark Butterfly *Calephelis rawsoni arizonensis*	SGCN (NM)	Moist areas including stream edges, gulches, subtropical woodland, shaded limestone outcrops.	No	None	Outside of known range	—
Four-spotted Skipperling *Piruna polingii*	FS; SGCN (NM)	Moist woodlands or meadows.	No	Low	—	1-271
Sunrise Skipper *Adopaeoides prittwitzi*	SGCN (NM)	Upland marshes and springs.	No	None	No suitable habitat	—
Hobomok Skipper *Poanes hobomok*	SGCN (NM)	Damp woods, marshes, and along streams; larvae feed on a variety of grasses.	No	None	No suitable habitat	—
Mountain Checkered Skipper *Pyrgus xanthus*	SGCN (NM)	High mountain clearings above 8,000 feet elevation.	No	None	No suitable habitat	—
Cassus Roadside Skipper *Amblyscirtes cassus*	SGCN (NM)	Open oak woods and rocky washes.	No	Low	—	1-271
Large Roadside Skipper *Amblyscirtes exoteria*	SGCN (NM)	Open woodland in the oak zone.	No	None	No suitable habitat	—
Slaty Roadside Skipper *Amblyscirtes nereus*	SGCN (NM)	Open woodland near springs.	No	None	No suitable habitat	—
Texas Roadside Skipper *Amblyscirtes texanae*	SGCN (NM)	Open woodland and rocky washes; usually in areas with a limestone substrate.	No	Moderate	—	1-272
Cestus Skipper *Atrytonopsis cestus*	FS	Rare species with few records; known from Baboquivari, Atascosa, Tumacacori, Santa Catalina, and Galiuro mountains.	No	None	No suitable habitat, and outside of known range	—
Deva Skipper *Atrytonopsis deva*	SGCN (NM)	Mountain canyons and open desert woodland.	No	Low	—	1-273
Moon-marked Skipper *Atrytonopsis lunus*	SGCN (NM)	Middle elevation grasslands and open woodlands.	No	None	No suitable habitat	—

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Scudder's Dustywing Skipper *Erynnis scudderi*	SGCN (NM)	Montane woodland.	No	None	No suitable habitat, and outside of known range	—
Huachuca Giant Skipper *Agathymus evansi*	FS	Associated with agave plants; known only from Huachuca Mountains and vicinity.	No	None	Outside of known range	—
Mary's Giant Skipper *Agathymus mariae*	SGCN (NM)	Thorn forest and desert hills; larval food plant is *Agave lechuguilla*.	No	None	Outside of known range	—
Carlsbad Agave Borer Skipper *Agathymus neumoegeni carlsbadensis*	SGCN (NM)	Shrub grassland or open woodland with the larval food plant, *Agave parryi*.	No	None	Outside of known range	—
Orange Giant Skipper *Agathymus neumoegeni neumoegeni*	SGCN (NM)	Shrub grassland or open woodland with the larval food plant, *Agave parryi*.	No	Low	—	1-273
Poling's Giant Skipper *Agathymus polingi*	SGCN (NM)	Dry hills and open woodland with larval food plants *Agave schottii* or *A. toumeyana*.	No	Very Low	—	1-274
Ursine Giant Skipper *Megathymus ursus ursus*	SGCN (NM)	Grassy shrubland and open yucca-oak woodland in the presence of *Yucca* spp.	No	Moderate	—	1-275
Viola's Yucca Borer Skipper *Megathymus ursus violae*	SGCN (NM)	Grassy shrubland and open yucca-oak woodland in the presence of *Yucca* spp.	No	None	Outside of known range	—
Notodontid Moth *Astylis* sp. 1	UR	Mixed oak-juniper woodland.	No	None	Outside of known range	—
Notodontid Moth *Heterocampa* sp. 1 nr. *Amanda*	UR	Mixed oak-juniper woodland.	No	None	Outside of known range	—
Notodontid Moth *Litodonta* sp. 1 nr. *Alpina*	UR	Oak to fir woodlands.	No	None	Outside of known range	—
Notodontid Moth *Euhyparpax rosea*	FS	Probably oak-juniper or oak-pine habitats.	No	None	Outside of known range	—

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Zephyr Eyed Silkmoth *Automeris zephyria*	SGCN (NM)	Streams supporting willows (*Salix* spp.) in piñon-juniper woodland and conifer forest above 4,800 feet elevation.	No	Very Low	—	1-275
Buck Moth Species *Hemileuca artemis*	SGCN (NM)	Known from the Las Cruces, New Mexico area; larvae feed on *Populus* spp.	No	Low	—	1-276
PLANTS						
Parish's Indian Mallow *Abutilon parishii*	BLMS (AZ); FS; SC	Rocky slopes and canyon bottoms in desertscrub, and up into semidesert grassland; 2,500 to 4,900 feet elevation.	No	Low	—	1-277
Mosquito Plant *Agastache cana*	SC; NMSC	Rocky granite substrates from the upper edges of desert habitat ecotonal with small-leaved oaks up to piñon-juniper woodland.	No	None	No suitable habitat	—
Organ Mountains Giant Hyssop *Agastache pringlei* var. *verticillata*	SC; NMSC	Steep, wooded slopes of igneous talus or bedrock from Gambel oak to pine woodlands; 5,900 to 7,500 feet elevation.	No	None	No suitable habitat	—
Arizona Century Plant *Agave arizonica*	HS	Sonoran desertscrub, chaparral, or juniper grassland; known only from the New River Mountains of central Arizona.	No	None	Outside of known range	—
Tonto Basin Century Plant *Agave delamateri*	SC; HS	Open, hilly slopes of the Sonoran Desert adjacent to major drainages; populations associated with prehistoric agave cultivation in central Arizona.	No	None	Outside of known range	—
Murphey's Century Plant *Agave murpheyi*	BLMS (AZ); SC; HS	Hilly slopes or alluvial terraces adjacent to major drainages; populations associated with prehistoric agave cultivation; known populations restricted to central Arizona.	No	None	Outside of known range	—
Smallflower Century Plant *Agave parviflora* ssp. *parviflora*	SC; HS	Desert grasslands and open oak woodland of southern Pima and Santa Cruz counties in Arizona.	No	None	Outside of known range	—

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			Known	**Potential**	**Notes on Exclusion**	
Trelease's Century Plant *Agave schottii* var. *treleasei*	SC; HS	High-elevation desertscrub, grassland, and juniper and oak woodlands; known only from the Santa Catalina Mountains north of Tucson, Arizona.	No	None	No suitable habitat, and outside of known range	—
Goodding's Onion *Allium gooddingii*	FS; CA; HS (AZ)	Moist, shady canyons in spruce-fir forests.	No	None	No suitable habitat, and outside of known range	—
Saiya *Amoreuxia gonzalezii*	FS; SC; HS	Rocky, limestone hillsides at middle elevations; known in the United States only from the Santa Rita Mountains of southern Arizona.	No	None	No suitable habitat, and outside of known range	—
Fugate's Bluestar *Amsonia fugatei*	BLMS (NM); SC; NMSC	Ridges and slopes in Chihuahuan desertscrub habitat.	Yes	Present	—	1-277
Arizona Bluestar *Amsonia grandiflora*	FS; SC	Open oak woodland habitat in southern Santa Cruz and Pima counties in Arizona.	No	None	No suitable habitat, and outside of known range	—
Kearney's Bluestar *Amsonia kearneyana*	E; HS	Known only from west-facing drainages of the Baboquivari Mountains between 3,600 and 3,800 feet elevation.	No	None	Outside of known range	—
Chapline's Columbine *Aquilegia chaplinei*	SC; NMSC	Occurs at limestone seeps, springs, and shaded riparian canyon bottoms between 4,700 and 5,500 feet elevation.	No	None	No suitable habitat	—
Rincon Mountain Rockcress *Arabis tricornuta*	FS	Occurs on steep rocky slopes, beneath pines, and along road and sand banks at moderate to high elevations in Arizona.	No	None	No suitable habitat, and outside of known range	—
Sacramento Pricklypoppy *Argemone pinnatisecta* (*A. pleiacantha*)	E; NME; BLMS (NM)	Occurs on gravelly soils of open or disturbed ground; slopes or canyon bottoms.	No	None	No suitable habitat	—
Gypsum Hotspring Aster *Arida blepharophylla*	BLMS (NM); SC; NMSC	Alkaline soils of springs or seeps in Chihuahuan desertscrub habitat.	No	Very low	—	1-278

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			Known	**Potential**	**Notes on Exclusion**	
Lemmon's Milkweed *Asclepias lemmonii*	FS	Canyons, roadsides, and open woodlands of mountains between 5,300 and 7,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Countess Dalhousie's Spleenwort *Asplenium dalhousiae*	BLMS (AZ)	Grows in moist soils among rocks in Madrean oak woodland.	No	None	No suitable habitat, and outside of known range	—
Tall Milkvetch *Astragalus altus*	FS; SC; NMSC	Occurs on steep slopes on limestone substrates; known only in the vicinity of Cloudcroft, New Mexico.	No	None	No suitable habitat	—
Castetter's Milkvetch *Astragalus castetteri*	SC; NMSC	Dry, rocky slopes of montane scrub and juniper woodlands.	No	None	Outside of known range	—
Coppermine Milkvetch *Astragalus cobrensis* var. *aguirei*	FS; SC; NMSC	Piñon-juniper or pine-oak woodlands in the Chiricahua and Peloncillo mountains.	No	None	No suitable habitat, and outside of known range	—
Santa Fe Milkvetch *Astragalus feensis*	SC; NMSC	Gravelly or sandy hillsides in grassland or juniper-piñon woodland habitats.	No	None	Outside of known range	—
Huachuca Milkvetch *Astragalus hypoxylus*	BLMS (AZ); FS; SC	Open, rocky hillsides of oak-juniper-piñon woodlands in the Huachuca and Patagonia mountains of southern Arizona.	No	None	No suitable habitat, and outside of known range	—
Kerr's Milkvetch *Astragalus kerrii*	BLMS (NM); FS; SC; NMSC	On granitic alluvium from piñon-juniper to pine woodlands.	No	None	Outside of known range	—
Sierra Blanca Kittentails *Besseya oblongifolia*	FS	Endemic to alpine tundra in the Sacramento Mountains in New Mexico.	No	None	No suitable habitat	—
Chiltepin *Capsicum annuum* var. *glabriusculum*	FS	Well-drained sandy loam soils beneath partial shade canopy.	No	Very Low	—	1-279
New Mexico Milkvetch *Astragalus neomexicanus*	SC; NMSC	Dry slopes from piñon-juniper to ponderosa pine woodlands between 6,850 and 8,450feet elevation.	No	None	No suitable habitat	—

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			Known	**Potential**	**Notes on Exclusion**	
Griffith's Saltbush *Atriplex griffithsii*	BLMS (NM); NMSC	Saline playa margins.	No	High	—	1-279
Kofa Mountain (Harrison's) Barberry *Berberis harrisoniana*	BLMS (AZ)	Deep, rocky, shaded canyons in southwestern Arizona.	No	None	No suitable habitat, and outside of known range	—
Chenopod Brickellbush *Brickellia chenopodina*	SC; NMSC	Alluvial soils; known only from the type specimen taken on the Gila River in northern Grant County, New Mexico.	No	None	Outside of known range	—
Chihuahuan Sedge *Carex chihuahuensis*	FS	Wet meadows, cienegas, marshy areas, and canyon bottoms.	No	None	No suitable habitat	—
Giant Sedge *Carex spissa* var. *ultra*	BLMS (AZ); FS	Saturated soils at seeps, springs, and streams.	No	Very Low	—	1-280
Cochise Sedge *Carex ultra* (=*C. spissa* var. *ultra*)	FS	Saturated soils near perennial seeps, streams, and springs.	No	None	No suitable habitat	—
Saguaro (crested form) *Carnegiea gigantea*	HS	Throughout the Sonoran Desert, generally in rocky soils and low mountains. Crested plants are a very small proportion of the population.	Yes	Present	—	1-281
Organ Mountains Paintbrush *Castilleja organorum*	BLMS (NM); SC; NMSC	Lower montane coniferous forest or piñon-juniper woodland; between 7,000 and 8,000 feet elevation.	No	None	No suitable habitat	—
Trans-Pecos Indian Paintbrush *Castilleja nervata*	FS	Known from only a few sites in fire-adapted bunchgrass meadows.	No	None	Outside of known range	—
Swale Paintbrush *Castilleja ornata*	BLMS (NM); SC; NMSC	Seasonally wet grasslands; 5,200 to 6,900-foot elevation range; southern Hidalgo County, New Mexico, into Mexico.	No	None	Outside of known range	—
Plain Thistle *Cirsium inornatum*	SC; NMSC	Mountain meadows and roadsides above 7,500 feet elevation.	No	None	No suitable habitat, and outside of known range	—

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Sacramento Mountains Thistle *Cirsium vinaceum*	T; NME; BLMS (NM)	High-elevation (7,500 to 9,500 feet) wet meadows, springs, and along streams in the Sacramento Mountains in New Mexico.	No	None	No suitable habitat, and outside of known range	—
Wright's Marsh Thistle *Cirsium wrightii*	C; FS; NME	Wet, alkaline soils of seeps, marshy areas, and streams; 3,450 to 8,500 feet elevation.	No	None	Outside of known range	—
Playa Spider Plant *Peritoma* (*Cleome*) *multicaulis*	NME; SC	Saline playas and springs.	No	Very Low	—	1-281
Mexican Hemlock Parsley *Conioselinum mexicanum*	SC	Cool, shaded mountain slopes at middle to high elevations; Huachuca and Santa Rita mountains and San Francisco River area.	No	None	No suitable habitat	—
Cochise Foxtail Cactus *Coryphantha robbinsorum*	T; HS	Limestone substrate in desertscrub and semidesert grassland, from southeastern Cochise County, Arizona into Mexico.	No	None	Outside of known range	—
Pima Pineapple Cactus *Coryphantha scheeri* var. *robustispina*	E; HS; PVS	Sonoran desertscrub or semidesert grassland to 4,000 feet elevation; Santa Cruz and east-central Pima counties in Arizona, and Sonora, Mexico.	No	Moderate	—	1-282
Smooth Babybonnets *Coursetia glabella*	FS; SC	Madrean oak to pine-oak woodlands in southeastern Arizona.	No	None	No suitable habitat, and outside of known range	—
Wooton's Hawthorn *Crataegus wootoniana*	SC; FS; NMSC	Understory of canyon bottoms at lower to middle elevation coniferous forest; 6,500 to 8,000-foot elevation range.	No	None	No suitable habitat	—
Warner's Dodder *Cuscuta warner*i	SC; NMSC	Usually occurs in open wet areas as a parasite on fogfruit (*Phyla* spp.).	No	None	Outside of known range	—
Davidson's Cliff Carrot *Cymopterus davidsonii*	SC; NMSC	Cool, rocky habitat within piñon-juniper or lower montane conifer forest; 6,500 to 8,000 foot elevation range.	No	None	Outside of known range	—

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Greater Yellow Lady's Slipper *Cypripedium parviflorum* var. *pubescens*	FS; HS	Damp woods, wet meadows, or boggy areas at middle to high elevations.	No	None	No suitable habitat, and outside of known range	—
Albuquerque Prairie Clover *Dalea scariosa*	BLMS; SC; NMSC	Occurs on sandy-clay soils of bluffs or road cuts; 4,750 to 4,900 foot elevation range.	No	None	Outside of known range	—
Gentry's Indigobush *Dalea tentaculoides*	BLMS (AZ); FS; SC; HS; PVS	Canyon bottoms, flood terraces, and nearby hillsides in the Pajarito and Baboquivari mountains in Arizona, and into Mexico.	No	None	Outside of known range	—
New Mexico Larkspur *Delphinium novomexicanum*	SC; NMSC	High-elevation montane meadows or canyon bottoms; 7,200- to 11,200-foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Metcalfe's Ticktrefoil *Desmodium metcalfei*	FS; SC; NMSC	Occurs on rocky slopes or in canyons of oak or piñon-juniper habitats.	No	Low	—	1-283
Mogollon Mountain Draba *Draba mogollonica*	SC; NMSC	Cool, moist northern slopes; occurs on volcanic substrates between 5,000 and 9,000 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Standley's Draba *Draba standleyi*	BLMS; SC; NMSC	Cracks and crevices in moist, shaded, high-elevation habitats.	No	None	No suitable habitat, and outside of known range	—
Nichol's Turk's Head Cactus *Echinocactus horizonthalonius* var. *nicholii*	E; HS; PVS	Sonoran desertscrub habitat on limestone substrate; known only from the Waterman and Vekol mountains in southern Arizona, and Sierra El Viejo, Sonora, Mexico.	No	None	Outside of known range	—
Kuenzler's Hedgehog Cactus *Echinocereus fendleri* var. *kuenzleri*	E; NME; BLMS (NM)	Limestone ledges, rock cracks, and gentle slopes of sunny, grassy hillsides in piñon-juniper savannah up to about 5,000 feet.	No	None	Outside of known range	—

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Arizona Hedgehog Cactus *Echinocereus triglochidiatus* var. *arizonicus*	E; HS	Usually among boulders in oak woodlands and chaparral between 3,450 and 4,600 feet elevation; no closer than 25 miles north of the study area.	No	None	Outside of known range	—
Acuña Cactus *Echinomastus erectocentrus* var. *acunensis*	PE (PCH); HS; PVS	Low hills and gravel ridges in Sonoran desertscrub habitat; closest record of the species is within 8 miles.	No	Moderate (AZ portion only)	—	1-283
Needle-spined Pineapple Cactus *Echinomastus erectocentrus* var. *erectocentrus*	SC; PVS	Low-profile slopes of Upland Sonoran or semidesert grassland habitats, typically on limestone substrates.	Yes	Present	—	1-284
Cory's Jointfir *Ephedra coryi*	SC; NMSC	Occurs on limestone, sandy, or dune soils below 5,000 feet elevation.	No	None	Outside of known range	—
Guadalupe Rabbitbush *Ericameria nauseosa* var. *texensis*	SC; BLMS; FS; NMSC	Cliffs and crevices in limestone substrate in Chihuahuan desertscrub or piñon-juniper woodland; 4,900 to 7,000 feet elevation.	No	None	Outside of known range	—
Mogollon Fleabane *Erigeron anchana*	SC	Chaparral to pine woodland on granite substrate in central Arizona.	No	None	No suitable habitat, and outside of known range	—
Arid Throne Fleabane *Erigeron arisolius*	FS	Scattered localities of extreme southeast Arizona; favors moist or open grassy areas.	No	Very Low	—	1-285
Pinaleño Fleabane *Erigeron heliographis*	SC	High-elevation mixed conifer forest in the Pinaleño Mountains of southern Arizona.	No	None	No suitable habitat	—
Chiricahua Fleabane *Erigeron kuschei*	FS; SC	High elevations n the Chiricahua Mountains, Arizona.	No	None	No suitable habitat, and outside of known range	—
Lemmon's Fleabane *Erigeron lemmonii*	C; BLMS (AZ); HS	Known only from the Huachuca Mountains; 6,300 to 7,300 feet elevation.	No	None	No suitable habitat, and outside of known range	—

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Fish Creek Fleabane *Erigeron piscaticus*	BLMS (AZ); FS	Alluvial soils in shady canyon bottoms between 2,250 and 3,500 feet elevation.	No	Very low	—	1-285
Sacramento Mountains Fleabane *Erigeron rybius*	SC; NMSC	Meadows and forest openings in coniferous forests; 7,000 to 9,200 foot elevation range.	No	None	No suitable habitat	—
Rock Fleabane *Erigeron scopulinus*	SC; NMSC	Cliffs and crevices in rhyolitic substrates; 6,000 to 9,000 foot elevation range.	No	None	No suitable habitat	—
San Carlos Buckwheat *Eriogonum capillare*	BLMS (NM); SC	Generally on wash floodplains in gravels or sandy areas; often far from water.	Yes	Present	—	1-286
San Pedro River Buckwheat *Eriogonum terrenatum*	BLMS (AZ)	Gravelly to clayey soils of the Pantano and Saint David formations.	No	Moderate	—	1-287
Wooton's Buckwheat *Eriogonum wootonii*	SC; NMSC	Slopes and openings in montane coniferous forest; 6,000 to 11,500 foot elevation range.	No	None	Outside of known range	—
Round-leaf Broom *Errazurizia rotundata*	BLMS (AZ)	Occurs on exposed sites in desertscrub habitats.	No	None	No suitable habitat, and outside of known range	—
Duncan's Foxtail Cactus *Escobaria dasyacantha* var. *duncanii*	NME; SC; BLMS (NM)	Occurs on limestone hills in Chihuahuan desert and desert grassland; 3,400 to 5,400 foot elevation range.	No	None	Outside of known range	—
Orcutt's Pincushion Cactus *Escobaria orcuttii* var. *macraxina*	SC; NMSC	Occurs on rocky limestone soils or in cracks in bedrock in Chihuahuan desertscrub or desert grassland between 4,000 and 6,000 feet elevation.	No	Moderate	—	1-288
Organ Mountain Foxtail Cactus *Escobaria organensis*	NME; BLMS (NM); SC	Chihuahuan desertscrub, oak, and piñon-juniper habitats on a variety of substrates; 4,400 to 8,530 foot elevation.	No	None	Outside of known range	—
San Andres Mountain Foxtail Cactus *Escobaria sandbergii*	BLMS (NM); SC; NMSC	Rocky soils from Chihuahuan desertscrub to oak and piñon-juniper savanna; 4,200 to 7,400 feet elevation.	No	Very Low	—	1-288

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Sneed's Pincushion Cactus *Escobaria sneedii* var. *sneedii*	E; NME; BLMS (NM)	Limestone ledges and rocky slopes in the Organ Mountains near Las Cruces, and the Franklin and Guadalupe mountains of New Mexico and Texas.	No	None	Outside of known range	—
Sacramento Mountain Foxtail Cactus *Escobaria villardii*	NME; BLMS (NM); FS; SC	Occurs on loamy limestone soils of desert grassland with Chihuahuan desertscrub elements; 4,500 to 6,500 feet elevation.	No	None	No suitable habitat	—
Woodland Spurge *Euphorbia micropus (plummerae)*	SC	Shady canyon bottoms and open hillsides in pine-oak habitat.	No	None	No suitable habitat, and outside of known range	—
Flannel Bush *Fremontodendron californicum*	BLMS (AZ)	Well-drained rocky slopes in chaparral or oak-pine woodland habitats; not recorded within 30 miles of study area.	No	None	Outside of known range	—
Chiricahua Mountain Dwarf Gentian *Gentianella wislizeni*	SC	High-elevation meadows.	No	None	No suitable habitat	—
Patagonia Mountain Leatherpetal *Graptopetalum bartramii*	BLMS (AZ); FS; SC	Rocky outcrops of canyons and arroyos in Madrean evergreen woodland.	No	None	No suitable habitat, and outside of known range	—
New Mexico Gumweed *Grindelia arizonica* var. *neomexicana*	SC; NMSC	Occurs on rocky substrates in piñon-juniper and low-elevation coniferous forest; 6,500 to 7,500 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Todsen's Pennyroyal *Hedeoma todsenii*	E (CH); NME; BLMS (NM)	Piñon-juniper habitat on steep, gravelly hillsides in the San Andres and Sacramento mountains, New Mexico.	No	Low (NM portion only)	—	1-289
Pecos (Paradox) Sunflower *Helianthus paradoxus*	T (CH); NME; BLMS (NM)	Permanent wetland habitats at cienegas, springs, and along streams; nearest record of the species is at least 20 miles distant.	No	None	Outside of known range	—
Arizona Alum Root *Heuchera glomerulata*	FS	Shady, rocky slopes near seeps and streams in southeastern Arizona mountains.	Yes	Present	—	1-290

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Huachuca Golden Aster *Heterotheca rutteri*	BLMS (AZ); FS; SC	Grasslands between 4,000 and 5,000 feet elevation. All known records are at least 30 miles south of the study area.	No	None	Outside of known range	—
Wooton's Alumroot *Heuchera wootonii*	SC; NMSC	North-facing outcrops on steep slopes from Gambel oak to upper coniferous forest habitats; elevations of 7,000 to 12,000 feet.	No	None	No suitable habitat	—
Shining Coralroot *Hexalectris nitida*	NME; BLMS (NM); SC	Occurs in leaf litter among oaks in deep canyons; 4,300 feet elevation.	No	None	Outside of known range	—
Chisos Mountains Coralroot *Hexalectris revoluta*	BLMS (AZ); FS	Grows in canyon bottoms, among rocks, and under oaks or other cover between 5,000 and 8,000 feet elevation.	No	None	Outside of known range	—
Crested Coralroot *Hexalectris spicata* var. *arizonica*	NME; SC	Occurs in deep leaf litter on limestone substrates in oak, juniper, or pine woodlands.	No	None	No suitable habitat	—
Purple-spiked Coralroot *Hexalectris warnockii*	BLMS (AZ); FS; SC; HS	Grows among rocks and fallen logs in mixed oak woodland.	No	None	No suitable habitat, and outside of known range	—
Rusby's Hawkweed *Hieracium abscissum* (=*H. rusbyi*)	FS	Little known of this species; it has been collected only a few times; likely habitat is coniferous forest understory.	No	None	No suitable habitat	—
Pringle's Hawkweed *Hieracium pringlei*	SC	Canyon bottoms, steep slopes, and terraces in piñon-juniper woodland and Petran montane conifer forest habitats.	No	None	No suitable habitat, and outside of known range	—
New Mexico Bitterweed *Hymenoxys ambigens* var. *neomexicana*	SC; NMSC	Canyon bottoms or slopes from oak or pine woodland; 5,400 to 7,250 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Tall Bitterweed *Hymenoxys brachyactis*	FS; SC; NMSC	Open areas in piñon-juniper to coniferous forests; 6,900 to 8,200 feet elevation.	No	None	No suitable habitat	—
Vasey's Bitterweed *Hymenoxys vaseyi*	SC; NMSC	Dry, open montane scrub or piñon-juniper woodland; 6,900 to 8,200 feet elevation.	No	None	No suitable habitat	—

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Sierra Blanca Cliff Daisy *Ionactis elegans*	FS; SC; NMSC	Igneous cliffs in coniferous forest; 7,600-to 9,500-foot elevation range.	No	None	No suitable habitat	—
Gypsum Scalebroom *Lepidospartum burgessii*	NME; BLMS (NM); SC	Gypsum dunes stabilized with Chihuahuan desertscrub and grass species; 3,500 to 3,700 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Huachuca Water-umbel *Lilaeopsis schaffneriana* var. *recurva*	E (CH); HS; PVS	Shallow water or saturated soils at springs, seeps or edges of streams between 4,000 and 6,500 feet elevation.	Yes (AZ portion only)	Present	No critical habitat within Project area of influence	1-290
Lemon Lily *Lilium parryi*	FS; SC	Saturated soils on slopes of shaded stream courses above 5,500 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Chiricahua Mudwort *Limosella pubiflora*	BLMS (NM); FS; SC; NMSC	Muddy edges of ponds; cienegas; 5,000 to 6,500 foot elevation range.	No	None	Outside of known range	—
Huachuca Mountains Lupine *Lupinus huachucanus*	FS	Restricted to the Chiricahua, Huachuca, and Santa Rita mountains, where it occurs in pine forest on moderate to steep slopes.	No	None	No suitable habitat	—
Lemmon's Lupine *Lupinus lemmonii*	FS	Endemic to mountains of southeastern Arizona; occurs mostly in Chiricahua and Dragoon mountains.	No	None	No suitable habitat	—
Sierra Blanca Lupine *Lupinus sierra-blancae*	FS; SC; NMSC	Open areas of pine or fir forests; 5,900 to 10,000 foot elevation range.	No	None	No suitable habitat	—
Counter-clockwise Fishhook Cactus *Mammillaria mainiae*	FS	Restricted to western bajadas of Baboquivari Mountains in Arizona.	No	None	Outside of known range	—
Wilcox Fishhook Cactus *Mammillaria wrightii* var. *wilcoxii*	NME; SC	Desert grasslands; 3,500 to 5,000 foot elevation range.	No	None	Outside of known range	—
Arizona Manihot *Manihot davisiae*	FS	Limestone soils.	No	None	Outside of known range	—

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Guadalupe Stickleaf *Mentzelia humilis* var. *guadalupensis*	SC; NMSC	Occurs on gypseous soils of the Yeso formation; 4,400 to 5,100 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Wiggins' Swallow-wort *Metastelma mexicanum*	FS; SC	Open slopes and rocky canyons; border mountains in Arizona into Sonora, Mexico.	No	None	Outside of known range	—
Green Medusa Orchid *Microthelys rubrocallosa*	SC; NMSC	Mesic, mixed coniferous forest; approximately 8,100 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Sycamore Canyon Muhly *Muhlenbergia elongata* (=*M. xerophila*)	FS	Collected from only 10 localities in Arizona; rocky seeps in woodland canyons and in wet soil adjacent to streambeds.	No	None	No suitable habitat	—
Southwestern Muhly *Muhlenbergia palmeri* (=*M. dubioides*)	FS	Woodland canyons and along stream courses; collected from only seven localities in Arizona.	No	None	No suitable habitat	—
Hairy Muhly *Muhlenbergia villiflora* var. *villosa*	BLMS (NM); SC; NMSC	Alkaline or calcareous soils in desert grassland habitats; 4,800 to 5,200 foot elevation range.	No	None	No suitable habitat	—
Cliff Nama *Nama xylopodum*	SC; NMSC	Cliffs in desertscrub or piñon-juniper-oak woodland; 4,500 to 6,500 feet elevation.	No	None	Outside of known range	—
Lemmon's Cloak Fern *Notholaena lemmoni*	SC	Lower Sonoran to oak woodland habitats on limestone or igneous bedrock, from 2,840 to 6,000 feet elevation.	No	Very Low	—	1-291
Organ Mountains Evening Primrose *Oenothera organensis*	BLMS (NM); SC; NMSC	Occurs at seeps, springs, and xeroriparian colluviums in canyons of the Organ Mountains; 5,700 to 7,600 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Sand Prickly-pear *Opuntia arenaria*	NME; SC	Sandy soils and stable dunes in Chihuahuan desertscrub; 3,800 to 4,300 feet elevation.	No	Very Low	—	1-292

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
Toumey's Groundsel *Packera* (*Senecio*) *neomexicana* var. *toumeyi*	FS	Occurs infrequently in Chiricahua, Huachuca, Santa Catalina, and Pinal mountains, mostly in pine forest at 5,200 to 9,200 foot elevation range.	No	None	No suitable habitat	—
Mohave Panicum *Panicum mohavense*	SC; NMSC	Piñon-juniper woodland; known only from a single occurrence in New Mexico.	No	None	Outside of known range	—
Virlet's Paspalum *Paspalum virletii*	FS	Two Arizona records; sandy washes or canyons in semidesert grassland and Madrean evergreen woodland.	No	None	Outside of known range	—
Arizona Passionflower *Passiflora arizonica*	FS	Occurs in the Lower Sonoran Zone up to 5,900 feet; grows on rocky desert hillsides.	No	None	Outside of known range	—
Beardless Chinchweed *Pectis imberbis*	FS; SC	Open grassland, sometimes with oaks; 4,000 to 5,500 feet elevation; only recorded over 30 miles from study area.	No	None	Outside of known range	—
Chihuahua Scurf-pea *Pediomelum pentaphyllum*	UR; NME; BLMS (NM); FS; SC	Bare areas in desertscrub and in desert grasslands on sandy or loamy soils; 3,600 to 4,500 foot elevation range.	No	Moderate	—	1-293
Night-blooming Cereus *Peniocereus greggii* var. *greggii*	NME; BLMS (NM); SC	Chihuahuan desertscrub or desert grassland habitats.	No	High	—	1-294
Alamo Beardtongue *Penstemon alamosensis*	BLMS (NM); FS; SC; NMSC	Rocky canyons; 4,300 to 5,300 foot elevation range, on limestone substrate.	No	None	No suitable habitat	—
Scarlet Penstemon *Penstemon cardinalis* ssp. *cardinalis*	SC; NMSC	Canyons and rocky slopes from piñon-juniper to lower coniferous forest habitats; 7,000 to 9,000 foot elevation range.	No	None	No suitable habitat	—
Guadalupe Penstemon *Penstemon cardinalis* ssp. *regalis*	FS; SC; NMSC	Canyon bottoms and limestone slopes from montane scrub to lower coniferous forest habitats; 4,500 to 6,000 feet elevation.	No	None	Outside of known range	—

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
Catalina Beardtongue *Penstemon discolor*	FS; HS	Cracks or soil accumulations in bedrock at chaparral or pine-oak woodlands; 4,400 to 7,200 feet elevation.	No	Very Low	—	1-294
Maguire's Beardtongue *Penstemon linarioides* ssp. *maguirei*	SC; NMSC	On limestone cliffs in piñon-juniper habitat; 6,000 to 6,500 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Metcalfe's Penstemon *Penstemon metcalfei*	SC; NMSC	Steep or north-facing slopes in coniferous forest; 6,600 to 9,500 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
New Mexico Beardtongue *Penstemon neomexicanus*	SC; NMSC	Wooded slopes or openings in ponderosa pine or fir forest; 6,000 to 9,000 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
San Mateo Penstemon *Penstemon pseudoparvus*	SC; NMSC	Meadows or open coniferous woodlands; 9,000 to 10,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Clifton Rock Daisy *Perityle ambrosiifolia*	BLMS (AZ)	Crevices in rocky habitat near seeps or flowing water.	No	None	No suitable habitat, and outside of known range	—
Nodding Cliff Daisy *Perityle cernua*	BLMS (NM); SC; NMSC	Cliffs of igneous rock; 5,000 to 8,800 feet elevation; Organ Mountains, New Mexico.	No	None	No suitable habitat, and outside of known range	—
Chiricahua Rock Daisy *Perityle cochisensis*	FS	Endemic to rhyolite cliffs in the Chiricahua Mountains.	No	None	No suitable habitat, and outside of known range	—
Fish Creek Rock Daisy *Perityle saxicola*	SC	Rocky slopes and cliffs in Sonoran desertscrub habitat along the Salt River drainage in central Arizona.	No	None	Outside of known range	—
San Andres Rock Daisy *Perityle staurophylla* var. *homoflora*	SC; NMSC	Limestone cliffs and crevices; 6,400 to 7,000 foot elevation range.	No	None	No suitable habitat, and outside of known range	—

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
New Mexico Rock Daisy *Perityle staurophylla* var. *staurophylla*	BLMS (NM); SC; NMSC	Crevices and protected situations on limestone cliffs; 4,900 to 7,000 foot elevation range.	No	None	Outside of known range	—
Sivinski's Scorpionweed *Phacelia sivinskii*	SC; NMSC	Juniper or desertscrub habitats on gypseous soils; 5,900 to 6,450 feet elevation.	No	Low	—	1-295
Pinos Altos Fame Flower *Phemeranthus humilis (humile)*	BLMS (NM); SC; NMSC	Shallow, gravel-clay soils, in rock pockets, or on bedrock benches in grassland and Madrean oak or piñon-juniper woodlands.	No	None	No suitable habitat	—
Silvercup Philadelphus *Philadelphus microphyllus* var. *argyrocalyx*	SC; NMSC	Piñon-juniper woodland to lower coniferous woodlands; 6,900 to 8,500 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Broadleaf Groundcherry *Physalis latiphysa*	FS	Known from only scattered localities in Arizona near washes in desertscrub or desert grassland, including Cienega Creek.	Yes	Present	—	1-295
Golden Bladderpod *Physaria aurea*	SC; NMSC	Limestone substrate in coniferous forest; 6,500 to 9,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Goodding's Bladderpod *Physaria gooddingii*	SC; NMSC	Openings in piñon-juniper or pine woodlands; 6,000 to 7,500 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Lincoln County Bladderpod *Physaria lata*	SC; NMSC	Rocky substrate and areas of disturbed soils in piñon-juniper-oak or coniferous woodlands; 7,000 to 9,600 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Hinckley's Ladder *Polemonium pauciflorum* ssp. *hinckleyi*	FS; SC	Moist soils along shaded streams from pine-oak to fir woodlands.	No	None	No suitable habitat	—
Mescalero Milkwort *Polygala rimulicola* var. *mescalerorum*	NME; BLMS (NM); SC	Occurs on limestone cliffs in montane scrub habitat; 5,700 to 6,300 foot elevation range.	No	None	No suitable habitat, and outside of known range	—

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
Chiricahua Cinquefoil *Potentilla rhyolitica* var. *chiricahuensis*	FS	Endemic to upper elevations of the Chiricahua Mountains; in rocky openings in mixed conifer forest.	No	None	No suitable habitat, and outside of known range	—
Huachuca Cinquefoil *Potentilla rhyolitica* var. *rhyolitica*	FS	Endemic to summit areas of the Huachuca and Santa Rita mountains; in crevices of rhyolitic and quartzitic outcrops.	No	None	No suitable habitat, and outside of known range	—
Sierra Blanca Cinquefoil *Potentilla sierra-blancae*	FS; SC; NMSC	Crests and ridges of mountaintops at high elevations; 11,000 to 12,000 feet; and in canyons down to about 8,000 feet.	No	None	No suitable habitat, and outside of known range	—
Mexican Tansy Aster *Psilactis gentryi* (=*Machaeranthera mexicana*)	FS	Known in the United States from only two collections in the Huachuca Mountains; in moist habitats, highland meadows, fields, roadsides, and stream or lake margins.	No	None	No suitable habitat, and outside of known range	—
Whisk Fern *Psilotum nudum*	HS	Primarily a tropical species with two records in Arizona; near seeps in Chimenea Canyon in the Rincon Mountains.	No	None	No suitable habitat	—
Parish's Alkali Grass *Puccinellia parishii*	NME; BLMS; SC; HS	Occurs over a rather wide elevation range; 2,600 to 7,200-foot elevation range at alkaline seeps, springs, or similar habitats.	No	None	Outside of known range	—
Arizona Cliffrose *Purshia (Cowania) subintegra*	E; HS	Occurs on Tertiary limestone lake bed deposits of the Verde Valley Formation in Sonoran desertscrub habitat to 4,000 feet.	No	None	No suitable habitat, and outside of known range	—
Mescalero Black Currant *Ribes mescalerium*	SC; NMSC	Dry montane coniferous forest; 7,000 to 9,000 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Blumer's Dock *Rumex orthoneurus*	FS; SC; HS	High-elevation riparian cienegas.	No	None	No suitable habitat	—
Aravaipa Sage *Salvia amissa*	BLMS (AZ); FS; SC	Understory plant of shady floodplain terraces on alluvial soils.	No	Very Low	—	1-296

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
Supreme Sage *Salvia summa*	SC; NMSC	Partly shaded limestone cliffs; 5,000 to 7,000 foot elevation range.	No	None	No suitable habitat	—
Chiricahua Mountain Brookweed *Samolus vagans*	FS	Moist, sandy soil around seeps, springs, and streams between 4,000 and 7,200 feet; in mountains of SE Arizona.	No	None	No suitable habitat	—
Smooth Figwort *Scrophularia laevis*	BLMS; SC; NMSC	Restricted to quartz-monzonite substrate in piñon-juniper and other coniferous forests; 6,900 to 8,500 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Mimbres Figwort *Scrophularia macrantha*	BLMS; SC; NMSC	North-facing igneous cliffs and talus in piñon-juniper or montane coniferous forest; elevations of 6,500 to 8,200 feet.	No	None	No suitable habitat	—
New Mexico Stonecrop *Sedum integrifolium* ssp. *neomexicanum*	BLMS; FS; SC; NMSC	Igneous soils of alpine tundra; 9,900 to 11,800 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Huachuca Groundsel *Senecio multidentatus* var. *huachucanus*	FS; HS	Steep, rocky, high-elevation slopes of the Huachuca, Chiricahua, and Santa Rita mountains of southern Arizona.	No	None	No suitable habitat, and outside of known range	—
Gila Groundsel *Senecio quaerens*	SC	High-elevation spruce or ponderosa pine forest.	No	None	No suitable habitat, and outside of known range	—
Sacramento Groundsel *Senecio sacramentanus*	SC; NMSC	Meadows of montane coniferous forest; 8,000 to 11,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Gray Sibara *Sibara grisea*	BLMS; SC; NMSC	Limestone crevices and cliffs in interior chaparral or piñon-juniper woodland; 4,500 to 6,000 feet elevation.	No	None	Outside of known range	—
Plank's Campion *Silene plankii*	BLMS (NM); NMSC	Rocky, igneous substrates; 5,000 to 9,200 feet elevation.	No	Low	—	1-297

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
Common Name ***Scientific name***	**Status**	**Habitat and Notes**	**Species Occurrence within Project Area of Influence**			**Page**
			Known	**Potential**	**Notes on Exclusion**	
Thurber's Campion *Silene thurberi*	SC; NMSC	Slopes and rocky areas; arroyos and mountains; 5,000 to 7,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Wright's Campion *Silene wrightii*	BLMS (NM); SC; NMSC	Cliffs or rocky outcrops of montane or subalpine coniferous forests; 6,800 to 8,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Nodding Blue-eyed Grass *Sisyrinchium cernuum*	FS	Riparian habitats in Shaw Canyon in Rincon Mountains, and Big Casa Blanca Canyon in Santa Rita Mountains.	No	None	No suitable habitat	—
Guadalupe Mescal Bean *Sophora gypsophila* var. *guadalupensis*	BLMS; FS; SC; NMSC	Fine-grained gypseous sandstone; Chihuahuan desertscrub or juniper habitats; 5,260 to 6,650 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Porter's Globemallow *Sphaeralcea procera*	BLMS (NM); NMSC	Chihuahuan desert grassland.	No	Very Low	—	1-297
Wright's Globemallow *Sphaeralcea wrightii*	SC; NMSC	Rocky slopes of Chihuahuan desertscrub and grassland habitats; 4,000 to 6,000 foot elevation range.	No	Moderate	—	1-298
Canelo Hills Ladies' Tresses *Spiranthes delitescens*	E; HS	Wetland meadows associated with sedges and grasses; 4,000 to 5,000 feet elevation.	No	None	No suitable habitat, and outside of known range	—
Porsild's Starwort *Stellaria porsildii*	FS; SC; NMSC	Occurs in shaded, partially open understory of mixed coniferous and aspen woodlands, 7,900 to 8,200 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Lemmon's Stevia *Stevia lemmonii*	FS	Canyon slopes and stream beds in pine-oak woodlands; most records in Arizona are from the Santa Rita and Rincon mountains.	No	None	No suitable habitat	—
Sierra Blanca Kittentails *Synthyris oblongifolia*	SC; NMSC	Alpine meadows between 11,000 and 12,000 foot elevation.	No	None	No suitable habitat, and outside of known range	—

Table 1. Special-Status Species that were Evaluated for Potential Occurrence within the Study Area and Project Area of Influence						
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			Known	**Potential**	**Notes on Exclusion**	
Tepic Fame Flower *Talinum marginatum*	FS; SC	Soil pockets in bedrock terraces in Madrean pine-oak woodland; Huachuca Mountains of southern Arizona, and in Mexico.	No	None	No suitable habitat, and outside of known range	—
Aravaipa Woodfern *Thelypteris puberula* var. *sonorensis*	BLMS (AZ); FS	Moist soils of shaded riverbanks in mesic canyons; at seeps, and in wet meadows.	No	Very Low	—	1-299
White Mountains Clover *Trifolium neurophyllum*	SC	Streamsides and wet meadows in the White Mountains of Arizona, and Mogollon Mountains in New Mexico.	No	None	No suitable habitat, and outside of known range	—
Blue Sand Lily *Triteleiopsis palmeri*	BLMS (AZ)	Low-elevation sandy desert flats and dunes; nearest record is in far western Pima County, Arizona.	No	None	No suitable habitat, and outside of known range	—
Tumamoc Globeberry *Tumamoca macdougalii*	BLMS (AZ); FS; PVS	Undisturbed soils along washes below 3,000 feet.	No	Low	—	1-299
Texas Tobacco-Root *Valeriana texana*	SC; NMSC	Shaded cliffs or canyon bottoms of piñon-juniper or coniferous forests; 5,200 to 8,000 foot elevation range.	No	None	No suitable habitat, and outside of known range	—
Limestone Arizona Rosewood *Vauquelinia californica* ssp. *pauciflora*	SC	Low-elevation canyons, rocky slopes, and hillsides.	No	None	Outside of known range	—
Shade Violet *Viola umbraticola*	FS	Shady riparian canyon bottoms, usually in pine-oak forests; recorded from Santa Catalina Mountains.	No	None	No suitable habitat	—

1.8 SPECIAL-STATUS SPECIES

1.8.1 Special-Status Species with Potential to Occur within the Project Area of Influence

1.8.1.1 Mammals

Cockrum's Desert Shrew

Status

Cockrum's Desert Shrew (*Notiosorex cockrumi*) is a Forest Service sensitive species and an Arizona SGCN (AZGFD 2006a; USFS 2007a). Cockrum's Desert Shrew was only recently recognized as a distinct species and separated from the Desert Shrew (*Notiosorex crawfordi*) (Baker et al. 2003). The Coronado National Forest is the only National Forest of occurrence for this species (USFS 2007a).

Distribution

Cockrum's Desert Shrew is currently known from southeast and south-central Arizona to central Sonora, Mexico. The actual range is likely to be considerably larger. However further genetic analysis of museum specimens identified as *Notiosorex crawfordi* and/or new captures would be required to determine the full extent of its range (Baker et al. 2003).

Habitat and Life History

The type locality for Cockrum's Desert Shrew is described as mesquite grassland dominated by big sacaton (*Sporobolus wrightii*), with an Arizona walnut and ash riparian overstory. The species is sympatric with the Desert Shrew (*N. crawfordi*) over much of southeastern Arizona. Habitat for the Desert Shrew includes nearly every arid habitat as long as it contains adequate cover, such as dead agave plants, or piled debris (Hoffmeister 1986).

Threats to the Survival of the Cockrum's Desert Shrew

Threats to Cockrum's Desert Shrew may only be its extremely limited distribution, although future genetic analysis could possibly determine the species occurs over a wider area.

Potential for Occurrence in the Study Area

Cockrum's Desert Shrew has been reported from the vicinity of the Cienega Creek Natural Preserve in Pima County (Baker et al. 2003).

California Leaf-nosed Bat

Status

The California Leaf-nosed Bat (*Macrotus californicus*) is a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, a USFWS species of concern, and an

AZGFD WSC and SGCN (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; USFS 2007a). It is also a Pima County PVS (Pima County 2004).

Distribution

The California Leaf-nosed Bat is a year-round inhabitant of lowland desert areas of the southwestern United States (Arizona, Southern California, and Nevada) and northwestern Mexico, including Baja California (Harvey et al. 1999; Nowak 1994). There are no records of the species occurring in New Mexico (BISON-M 2008).

Habitat and Life History

The California Leaf-nosed Bat is primarily a resident of caves and mines in desertscrub habitat, generally below 3,280 feet elevation (Barbour and Davis 1969; Hoffmeister 1986; Western Bat Working Group [WBWG] 2005a). These bats use a variety of situations for night roosts, such as open buildings, porches, bridges, rock shelters and mines (Harvey et al. 1999). They require relatively warm winter roost sites because they do not hibernate and cannot tolerate temperatures below 60°F for more than a few hours (Hoffmeister 1986).

The California Leaf-nosed Bat feeds mostly on large night-flying beetles and moths, which they take in flight. They also consume grasshoppers and insect larvae, especially of moths, which they take off of bushes or from the ground, and they occasionally also eat fruit, including those of cacti (Hoffmeister 1986; Vaughan 1959). There is evidence that the California Leaf-nosed Bat may use the same roost throughout its life (Brown et al. 1993a). Their foraging range varies with season and prey availability, the range being potentially greater in summer when prey is more abundant and there are not the thermal constraints on the species that are present during winter, when the bats must balance energy expenditure and water balance with prey availability (Bell et al. 1986; Brown et al. 1993b). Reported foraging range for the species varies from 0.5 mile to over 3 miles from roosts (Brown et al. 1993b; Vaughan 1959). Several foraging flights are performed during the night, with the bats returning to the roost to consume larger prey (Barbour and Davis 1969).

Threats to the Survival of the California Leaf-nosed Bat

Threats to this species include mine closures, vandalism at roosts, and vegetation removal within foraging distance of roosts (Brown et al. 1993a).

Potential for Occurrence in the Study Area

The species is not recorded from New Mexico, and in Arizona its range is restricted to portions of the state mostly south of the Mogollon Rim (AZGFD 2001a). Within the study area, a Tier 1 PCA is designated for a portion of the Silverbell Mountains northwest of Tucson (Pima County 2004). The only records of the species within the study area are at Picacho, Arizona, the Tucson Mountains in Saguaro National Park, a site near Oracle Junction, Arizona, and in the San Pedro Valley (AZGFD 2001a). There are few areas within the known range of the California Leaf-nosed Bat where Project alternatives are in proximity to montane habitat that may contain mines or caves that could support these bats. Since these bats are not known to forage far from their

roosts, potential for the California Leaf-nosed Bat occurring within the Project area of influence is low.

Mexican Long-tongued Bat

Status

The Mexican Long-tongued Bat (*Choeronycteris mexicana*) is a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an SGCN in New Mexico and Arizona (AZGFD 2010a; BISON-M 2008; BLM 2010; USFS 2007a). It is also a Pima County PVS (Pima County 2004).

Distribution

The Mexican Long-tongued Bat occurs in southeastern Arizona, far southwestern New Mexico, and south to Central America (Findley et al. 1975; Harvey et al. 1999; Hoffmeister 1986).

Habitat and Life History

The Mexican Long-tongued Bat is found in canyons of mixed oak-conifer forests or in Semidesert Grassland habitats in mountain ranges surrounded by desert. Roost sites are usually near a water source and riparian vegetation. Documented records indicate this species occurs at elevations from 2,540 to 7,320 feet, but most observations are from 4,000 to 6,000 feet. Caves, inactive mines, unoccupied buildings, and wide rock crevices are used as day and night roosts. (AZGFD 2006b; Barbour and Davis 1969; Harvey et al. 1999; Hoffmeister 1986). Abandoned mines, or cliffs with large shelters in the area, may provide suitable roosting habitat for Mexican Long-tongued Bats. Population groups usually have 15 or fewer individuals. Most of these bats in Arizona migrate to Mexico during the winter and do not hibernate (AZGFD 2006b). A few individuals have been found in winter, and it is theorized that they may move up into the temperature inversion zone of the mountains to spend the winter.

This species is primarily a nectar and pollen feeder, but probably also opportunistically eats insects found at flowers while feeding at blossoms. Paniculate agaves are a major source of food for the species (Barbour and Davis 1969; Hoffmeister 1986). During the summer, females are found at the northern extent of their range in southern Arizona, where they stay in nursery colonies. Young are born between mid to late June and early July, and are able to fly within 2 to 3 weeks (Hoffmeister 1986; Pima County 2004).

Threats to the Survival of the Mexican Long-tongued Bat

Threats to the Mexican Long-tongued Bat include disturbance at or loss of roost sites from recreational caving and mining activity or closures, loss of riparian habitat, and loss of food plants, particularly *Agave* spp. (AZGFD 2006b).

Potential for Occurrence in the Study Area

Tier 1 and 2 PCAs are delineated for the species within the study area by Pima County. Tier 1 PCAs are delineated only for portions of the Rincon and Whetstone mountains. Tier 2 PCAs are

delineated for the central Sierrita Mountains, eastern Santa Catalina Mountains, Little Rincon Mountains, north end of the Santa Rita Mountains and the Empire Mountains (Pima County 2004). The study area is at the very northern edge of the known range of the species, but there are many records of the species from within the study area limits, including Cienega Creek east of Tucson, Colossal Cave Mountain Park, and the Muleshoe Ranch north of Willcox, Arizona (BLM 2009). Like the Lesser Long-nosed Bat, the Mexican Long-tongued Bat is known to visit hummingbird feeders, and has commonly been recorded at feeders in Tucson, particularly along the Rillito River and Pantano Wash (Pima County 2010). Presence of the Mexican Long-tongued Bat within the Project area of influence is likely to involve only a small number of foraging individuals. Suitable roost habitat for the species is unlikely to occur in proximity to proposed Project alternatives.

Lesser Long-nosed Bat

Status

The Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*) was listed as endangered under the ESA on September 30, 1988 (USFWS 1988). There is no designated critical habitat for the species. This bat is listed as threatened and an SGCN in New Mexico. It is also an AZGFD WSC, SGCN, and a Sonoran Desert Conservation Plan PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004). A recovery plan was published in May 1994 (USFWS 1994a), and a 5-year review was completed in February 2007 (USFWS 2007a). The recommendation of the recent review, based on observed population increases and improved survey data, was a down-listing of the species from endangered to threatened status (USFWS 2007a), although a ruling has not been issued making that change.

At the time of listing, populations of this species were believed to be declining rapidly (BISON-M 2008). However, there was subsequent debate about the actual status and trends for the species (Cockrum and Petryszyn 1991), and more recent information shows a larger total population that may indicate that the species population is increasing (USFWS 2007a). Additional data is still needed to determine if the population increase reflects a long-term pattern or short-term variability. Obtaining good population numbers is complicated by three behavioral factors exhibited by the species: roost switching movements that may result from factors including disturbance or annual variability of food resources, a diffuse and opportunistic migration pattern for the species, and that a varying number of the bats remain year round in Mexico from year to year.

Distribution

In Arizona, roosts of the Lesser Long-nosed Bat are known in caves and abandoned mines in the lower elevations of several mountain ranges primarily in Pima, Santa Cruz, and Cochise counties. In New Mexico, the species apparently only occurs in Hidalgo County, where it is recorded from roosts in the Peloncillo and Animas mountains (Barbour and Davis 1969; Findley et al 1975; USFWS 2007a).

Habitat and Life History

Typical habitats used by the Lesser Long-nosed Bat in the southwestern United States vary seasonally, and include Sonoran Desertscrub in late spring and early summer during the maternity season, and Semidesert Grassland, lower edges of oak woodlands, and cottonwood (*Populus* spp.) and sycamore (*Platanus* sp.) riparian areas after the young have fledged. Specific habitat requirements include a good supply of suitable plant species for foraging and access to favorable roost sites (BISON-M 2008).

A portion of the total population of this species is migratory, wintering in Mexico and migrating north into Arizona and southwestern New Mexico for the summer and early fall (USFWS 2007a). This bat follows the blooming sequence of columnar cacti progressing from south to north: cardón (*Pachycereus pringlei*), senita (*Pachycereus schottii*), organpipe (*Stenocereus thurberi*), and saguaro (*Carnegiea gigantea*) (Flemming et al. 2001; 1996). The bats reach their maternity roosts in northern Mexico and southern Arizona in April (Hinman and Snow 2003), from which they forage primarily on nectar and pollen of columnar cacti (Hoffmeister 1986). The Lesser Long-nosed Bat serves as an important pollinator and seed-disperser for these cactus species. These bats normally roost and have their maternity colonies in caves or in abandoned mines (*ibid*). After the young are able to fly, they move north and east to higher elevations, including the study area, where they forage primarily on paniculate agave species for the remainder of the summer. They are also known to use non-paniculate agaves such as Schott's century plant (*Agave schottii*), which gives them some flexibility in their foraging (Barbour and Davis 1969).

Threats to the Survival of the Lesser Long-nosed Bat

Threats to the Lesser Long-nosed Bat include disturbance or killing of bats at roosts, particularly at maternity colonies, and loss of food plant sources due to land alteration, primarily for agriculture. Development of lands over large areas along migratory corridors may result in habitat fragmentation. A lack of formal protection for essential habitat is thought to be a threat to the species (NMDGF 2008).

Potential for Occurrence in the Study Area

The study area is near the northern limit of the species' range, but roosts are known within the study area. There is always the possibility that additional, undocumented roosts could also exist within the study area as there are concentrations of agaves that could be used by the bats as food. The Lesser Long-nosed Bat is capable of traveling long distances (in the range of 30 to 60 miles; USFWS 1994a) in a single night to forage. The proximity of the southern portion of the study area to known roosts makes it likely that these populations forage within the study area at least occasionally. However, foraging areas used by the bats vary from year to year with the annual productivity of the cacti and agave blooms, and the bats likely shift to different roosts to be closer to the better foraging areas in a given year.

Locations within the study area where suitable foraging habitat for the Lesser Long-nosed Bat are likely to be present include southeastern Pinal County, particularly east of the Picacho Mountains, and east through the Tucson valley. There is a large population of saguaros in the

San Pedro Valley that could provide forage for the species. These areas would likely only be used by small numbers of males and non-breeding females, since the bulk of the population is at maternity sites far to the southwest during the main saguaro bloom. Late season (post-fledge and later, pre-migration gathering) foraging may occur on paniculate agaves in the study area throughout a large area from the Catalina-Rincon Mountain complex south and east through Arizona and into far southwestern New Mexico.

Within the study area a Tier 1 PCA is delineated for the Rincon and eastern Santa Catalina mountains. Tier 2 PCAs are delineated for the north end of the Sierrita Mountains, portions of the Roskruge, Waterman, Silverbell, Tucson, Santa Rita, Empire, Rincon and Santa Catalina mountains (Pima County 2004). The bats have commonly been recorded visiting hummingbird feeders at night in Tucson in late summer, and reports of this use have increased in recent years with public awareness of the presence of the bats in the area.

Mexican Long-nosed Bat

Status

The Mexican Long-nosed Bat (*Leptonycteris nivalis*) was listed as endangered under the ESA on September 30, 1988 (USFWS 1988). There is no designated critical habitat for the species. The species is also a State of New Mexico endangered species and an SGCN in New Mexico (BISON-M 2008). A recovery plan was published in September 1994 (USFWS 1994b), and notice of a pending 5-year review was given by the USFWS in February 2009 (USFWS 2009a).

Distribution

The Mexican Long-nosed Bat is primarily a Mexican species that ranges south to central Guatemala, but occurs in the United States during the summer months in mountains of the Trans-Pecos area of Texas along the Rio Grande (Barbour and Davis 1969; Harvey et al. 1999; Schmidly 1991), and in southern Hidalgo County, New Mexico (Hoyt et al. 1994). Records of the species in the United States include a maternity roost site in Big Bend National Park (BBNP), netting records in BBNP and in the Chinati Mountains of Presidio County approximately 80 miles northwest of BBNP, a site in the Animas Mountains in New Mexico, and Guadalupe Canyon in the Peloncillo Mountains on the New Mexico-Arizona border (Hoyt et al. 1994; BISON-M 2008).

Habitat and Life History

The Mexican Long-nosed Bat is a colonial, cave inhabiting species. These bats appear to prefer montane habitats, mostly in upper elevation desertscrub and higher pine-oak woodlands (Barbour and Davis 1969; NMDGF 2008; Schmidly 1991). They are feeders of nectar and pollen of flowers, primarily using species of *Agave* as their main food source while they are in residence in the United States. They may also take soft fruits and insects encountered during flower-visiting foraging (Barbour and Davis 1969; NMDGF 2008; Schmidly 1991).

The only recorded roosts in the United States are a cave in BBNP, which serves as a maternity site for the species, and an abandoned building on the OK Bar Ranch in the Animas Mountains that has been used as a night roost (Hoyt et al. 1994; Schmidly 1991). Estimates of numbers of

bats at the BBNP cave site have varied from over 13,000 to zero in some years. It is thought the presence of this species in the United States, at the northern edge of its range, may reflect fluctuation of the core population in Mexico from year to year, or a lack of food resources within the core range (Schmidly 1991). While the bats typically roost at higher elevations, they may visit lower elevations while foraging, as evidenced by a netting record along the Rio Grande (Barbour and Davis 1969).

Threats to the Survival of the Mexican Long-nosed Bat

The primary threat to the species is disturbance or killing of bats in roosts. Loss of food resources from conversion of land for agriculture or agave harvesting in Mexico could adversely affect the species (NMDGF 2008).

Potential for Occurrence in the Study Area

Like the Lesser Long-nosed Bat, the Mexican Long-nosed Bat is a strong flier (Schmidly 1991), and is capable of flying long distances in a single night to forage. However, since the nearest record of the species, which represents the northernmost extent of its range as it is currently known, is over 50 miles south of the study area, this species is not likely to regularly occur within the study area. The potential for the species occurring within the Project area of influence in the Peloncillo Mountains is very low, and would likely be limited to small numbers of foraging individuals in some years.

Yuma Myotis

Status

The Yuma Myotis (*Myotis yumanensis*) is a New Mexico BLM sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an AZGFD SGCN (AZGFD 2006a; BISON-M 2008).

Distribution

The Yuma Myotis occurs over much of the western United States and far southwestern Canada, as far east as western Texas and south to Southern Mexico (Harvey et al. 1999; Hinman and Snow 2003).

Habitat and Life History

Yuma Myotis are found in a wide variety of habitats from low desert to moderate elevations, generally below 6,890 feet (BISON-M 2008). The Yuma Myotis is almost always associated with some kind of open water source, typically rivers or streams, but they often utilize tinajas, ponds or irrigation ditches (BISON-M 2008; Harvey et al. 1999; Hoffmeister 1986). These bats forage primarily over water, flying very low over the surface.

This species is primarily a summer visitor in Arizona; however, they may persist through the winter at lower elevations in the southern part of their range in the United States (Hoffmeister 1986). They are known to roost in crevices in cliffs, in buildings and bridges, and they have been

recorded using abandoned swallow nests (Harvey et al. 1999). Compared with other species of myotis, the Yuma Myotis is seldom found in mines or caves (BISON-M 2008). The Yuma Myotis, like many insectivorous bats, feeds on a variety of insects, but primarily takes moths, flies, and beetles (Harvey et al. 1999; Hinman and Snow 2003).

Threats to the Survival of the Yuma Myotis

Threats to the Yuma Myotis include disturbance of maternity colonies, to which they are apparently highly susceptible, resulting in abandonment of roost sites. Mining activity and closure of mines may result in loss of suitable roost habitat for the species. Impacts to riparian habitats where they forage, and accumulation of agricultural pesticides from ingestion of contaminated insects are additional threats to the Yuma Myotis (AZGFD 2003a).

Potential for Occurrence in the Study Area

Yuma Myotis are likely to forage along the Rio Grande in New Mexico. In Arizona, the most likely locations for the species in the study area would be Aravaipa Canyon, Cienega Creek, and possibly along effluent-fed perennial reaches of the Santa Cruz River near Tucson. There are probably few other areas within the study area that combine dependable water sources with suitable roost habitat for the species. The potential for the Yuma Myotis occurring within the area of influence of the Project is moderate.

Western Small-footed Myotis

Status

The Western Small-footed Myotis (*Myotis ciliolabrum*) is a New Mexico BLM sensitive species, a USFWS species of concern, and a State of New Mexico sensitive species (AZGFD 2010a; BISON-M 2008).

Distribution

The Western Small-footed Myotis occurs from southwestern Canada south through the western United States to central Mexico (Harvey et al. 1999; Schmidly 1991).

Habitat and Life History

This species occurs in a variety of habitats, usually above 3,500 feet elevation, and is not often found in low deserts (Hoffmeister 1986). The Western Small-footed Myotis roosts in a variety of habitats; in crevices in rocky cliffs, in holes in embankments, in mines and caves, in talus piles, under bark, in buildings, trees, and even under rocks on the ground (Barbour and Davis 1969; Harvey et al. 1999; Hoffmeister 1986). The Western Small-footed Myotis feeds on a variety of small insects. Insect prey that have been recorded include true bugs, leafhoppers, ants, moths, beetles, and flies (Barbour and Davis 1969; Harvey et al. 1999).

Threats to the Survival of the Western Small-footed Myotis

Threats to the Western Small-footed Myotis include disturbance of hibernacula, killing of bats, recreational caving, and pesticide poisoning (AZGFD 2003b).

Potential for Occurrence in the Study Area

The potential for the Western Small-footed Myotis to occur within the Project area of influence of the Project is moderate.

Fringed Myotis

Status

The Fringed Myotis (*Myotis thysanodes*) is a New Mexico BLM sensitive species, a USFWS species of concern, and a State of New Mexico sensitive species (AZGFD 2010a; BISON-M 2008).

Distribution

The Fringed Myotis ranges from southern British Columbia south through the western United States and into Mexico (Adams 2003).

Habitat and Life History

The Fringed Myotis is found in a wide variety of habitats from creosote bush in the low desert up into coniferous forests, but it is most commonly encountered in oak or piñon woodlands (Barbour and Davis 1969; Harvey et al. 1999). This bat roosts in mines, caves, rock crevices, trees and buildings (Hoffmeister 1986; Barbour and Davis 1969; Schmidly 1991). The Fringed Myotis is a widespread but rather uncommonly encountered bat. They will group in clusters of up to 300 bats in maternity sites in mines or caves (Barbour and Davis 1969). The Fringed Myotis feeds on various insects, but it seems to select small beetles and moths preferentially (Harvey et al. 1999).

Threats to the Survival of the Fringed Myotis

Threats to the Fringed Myotis include disturbance of roosts by human activities associated with recreational caving, mine exploration and vandalism. Mine closures and reactivation of old mines may impact bats and their roosting habitat. Destruction of structures, including bridges, may remove suitable roost habitat. Pesticides in the environment may affect insects used as prey and indirectly affect bats that consume contaminated insects when residues accumulate in their bodies (AZGFD 2011a).

Potential for Occurrence in the Study Area

Because the species is primarily a resident of higher elevation habitats the potential for the Fringed Myotis occurring within the Project area of influence is low.

Cave Myotis

Status

The Cave Myotis (*Myotis velifer*) is a New Mexico and Arizona BLM sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an AZGFD SGCN (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010).

Distribution

The distribution of the Cave Myotis is from the south-central plains states into the southwestern United States, and south to Central America (Barbour and Davis 1969; Harvey et al. 1999). The Cave Myotis occurs in New Mexico in and near the Pecos River Valley and the southwestern corner of the state. The New Mexico populations are apparently disjunct, and the species is not known from the intervening Rio Grande Valley (Findley et al. 1975). In Arizona, the Cave Myotis occurs mostly south of the Mogollon Plateau (Hoffmeister 1986).

Habitat and Life History

The Cave Myotis is primarily a bat of lower elevations in xeric habitats including creosote bush, paloverde-mixed scrub, and lower desert grassland plant associations (Barbour and Davis 1969; Findley et al. 1975; Hoffmeister 1986). However, the Cave Myotis seldom occurs more than a few miles from a permanent water source (Hoffmeister 1986). The Cave Myotis most often inhabits mines and caves where colonies of several thousand may occur (Barbour and Davis 1969; Harvey et al. 1999). Colonies have also been recorded in manmade structures such as bridges and buildings, and a few individuals, probably males, have been found in abandoned swallow nests (Barbour and Davis 1969; Harvey et al. 1999; Hoffmeister 1986).

The Cave Myotis typically leaves day roosts 10 to 15 minutes after sunset to find water to drink and to forage on insects, primarily moths and beetles. Foraging usually lasts approximately one-half hour before the bats retire to a roost site to digest their meal (Barbour and Davis 1969; Schmidly 1991).

Mating evidently occurs in Mexico or elsewhere south of the United States, and females migrate north through Mexico in early April. They roost in large colonies of females only, and typically bear a single young in mid-June or early July (Harvey et al. 1999; Hoffmeister 1986). Most Cave Myotis in Arizona and southwestern New Mexico are likely migratory (Findley et al. 1975; Hoffmeister 1986).

Threats to the Survival of the Cave Myotis

Threats to the Cave Myotis include disturbance of roosts, particularly maternity roosts, which they may abandon, roost destruction, and mine closures. Habitat loss associated with development, particularly of riparian foraging habitat, is detrimental to the species (Hinman and Snow 2003).

Potential for Occurrence in the Study Area

Project alignments are unlikely to pass through terrain that would support suitable cave or mine roost habitat for the Cave Myotis, but the species likely forages within the Project area.

Western Red Bat

Status

The Western Red Bat (*Lasiurus blossevillii*) is a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico sensitive species and SGCN, and an AZGFD WSC and SGCN. The Western Red Bat is a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004; USFS 2007a).

Distribution

The Western Red Bat is most likely migratory in the southwestern United States (Schmidly 1991). Most records from Arizona are in the central and southeastern portions of the state (AZGFD 2003c; Hoffmeister 1986). The species has been recorded at a few locations in southern New Mexico (Findley et al. 1975).

Habitat and Life History

The Western Red Bat inhabits riparian areas where broad-leaved trees such as cottonwoods and sycamores occur. In the eastern United States there are records of the species using caves (Hoffmeister 1986), and even hibernating on the ground among leaves (Mormann et al. 2004). The Western Red Bat is generally solitary (AZGFD 2003c). Red Bats feed on a variety of flying insects (Barbour and Davis 1969; Hinman and Snow 2003; Hoffmeister 1986). Mating occurs between August and October, but fertilization does not occur until spring. The species normally has a single litter of two, but as many as five young have been recorded (Hinman and Snow 2003).

Threats to the Survival of the Western Red Bat

Threats are primarily associated with impacts to or loss of riparian habitat; particularly broad-leaved deciduous trees used for roosting (AZGFD 2003c; Hinman and Snow 2003).

Potential for Occurrence in the Study Area

Tier 1 PCAs for the Western Red Bat are designated in the Rincon Mountains and along Agua Verde and Cienega Creeks, and there are several Tier 2 PCAs elsewhere (Pima County 2004). The potential for the Western Red Bat to occur within the Project area of influence is high, primarily in urban Tucson and at Cienega Creek.

Western Yellow Bat

Status

The Western Yellow Bat (*Lasiurus xanthinus*) is a State of New Mexico threatened species and SGCN, a Forest Service sensitive species, an AZGFD WSC and SGCN, and a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004; USFS 2007a).

Distribution

This bat is a tropical species that ranges from central Mexico north to the southern United States (AZGFD 2003d). The species has been recorded in Arizona from areas where palms have been planted for landscaping, including Phoenix, Tucson, and Yuma, and at a few locations associated with riparian habitat (Hoffmeister 1986). The species is recorded in New Mexico only from the Guadalupe Canyon area of southern Hidalgo County (Findley et al. 1975).

Habitat and Life History

The Western Yellow Bat is known from urban settings in Arizona where it is found most commonly in association with the Washington fan palm (*Washingtonia filifera*) or other palms, and also occurs in broad-leaf deciduous riparian habitats (Barbour and Davis 1969; Hinman and Snow 2003; Hoffmeister 1986). The pelage of this species is nearly identical to the color of dead palm fronds. The Southern Yellow bat is insectivorous, feeding on a variety of insects (Hinman and Snow 2003).

Threats to the Survival of the Western Yellow Bat

Threats to the Western Yellow Bat are primarily associated with loss of roosting habitat, resulting from trimming of palm fronds, and removal of broad-leaved tree species in riparian habitats (AZGFD 2003d; NMDGF 2008).

Potential for Occurrence in the Study Area

There are several designated Tier 2 PCAs in Pima County, Arizona that are located within the study area. These PCAs are associated with planted fan palms in urban areas, or with broadleaf riparian habitats (Pima County 2004). The potential for the Western Yellow Bat to occur within the Project area of influence is moderate.

Spotted Bat

Status

The Spotted Bat (*Euderma maculatum*) is a State of New Mexico threatened species and SGCN, a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, a USFWS species of concern, and an AZGFD WSC and SGCN (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; USFS 2007a).

Distribution

The Spotted Bat ranges from southern British Colombia, through the western United States, and south to Queretaro, Mexico (Hoffmeister 1986), but apparently is not found along the Pacific coast (Harvey et al. 1999). The species ranges east as far as Big Bend National Park along the Rio Grande in Texas, where cliff roost habitat is abundant (Nowak 1994). In Arizona, the species is recorded from a few locations, including Littlefield, Maricopa Junction, Roll, Tempe, Yuma, and on the Kaibab Plateau (Hinman and Snow 2003), and may be locally common in northern Arizona (WBWG 2005b). Records from New Mexico include areas along the Rio Grande and adjacent mountains (Findley et al. 1975), and more recently in a variety of other locations including Grant, San Juan, and Otero Counties, which may imply a wider distribution of the species in the state (NMDGF 2008).

Habitat and Life History

This bat has been recorded from a wide range of habitats, but mostly from dry desert environments, from below sea level up to conifer habitat (Nowak 1994). Most records indicate that the Spotted Bat has a preference for rocky cliffs where it roosts in crevices (Findley et al. 1975; Harvey et al. 1999), but it has also been recorded from caves and in buildings (Nowak 1994; WBWG 2005b). There are several records from riparian associations, with or without cliff roost habitat nearby (Hoffmeister 1986). The Spotted Bat may shift its habitat seasonally, being present at high elevations in the summer, and moving to lower elevations in the winter where more food would be available (Barbour and Davis 1969).

The Spotted Bat forages in a variety of situations, including open meadows, over desert washes, and above tree level. Based on known records, the diet of the Spotted Bat consists almost entirely of small moths, and only a few other insects have been noted (Harvey et al. 1999; Schmidly 1991; WBWG 2005b). Most records indicate that this species is essentially solitary. A single young is produced in June or July (Barbour and Davis 1969; Nowak 1994).

Threats to the Survival of the Spotted Bat

Since the Spotted Bat is normally a resident of remote, rocky areas, impacts from human activities are less likely than for some other species. However, modification or loss of foraging habitat could impact the species. Mining or other developments that impact rocky terrain in forest or desert could impact roosts that may be used by the species. Pesticides may impact prey used by Spotted Bats and indirectly affect bats that consume contaminated insects when residues accumulate in their bodies. Recreational rock climbing could disturb roosting bats. Construction of dams that flood cliff habitats could remove roosts. Invasive native plant species can alter native vegetation communities and affect prey that could be used by the bats. Because of their apparent low densities and small populations, specimen collection may also adversely affect the species (AZGFD 2003e; WBWG 2005b).

Potential for Occurrence in the Study Area

Since the Project would generally avoid rocky terrain that could support roosts for the Spotted Bat, the potential for this species occurring within the Project area of influence is low.

Allen's Big-eared Bat

Status

Allen's Big-eared Bat (*Idionycteris phyllotis*) is a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an SGCN in Arizona and New Mexico. Allen's Big-eared Bat is a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; Pima County 2004; USFS 2007a).

Distribution

Allen's Big-eared Bat ranges from the southwestern United States, primarily in New Mexico and Arizona, south to central Mexico (Barbour and Davis 1969; Czaplewski 1983; Harvey et al. 1999; Nowak 1994).

Habitat and Life History

Allen's Big-eared Bat is found in areas of ponderosa pine, piñon-juniper, riparian woodlands, and desertscrub (Barbour and Davis 1969; Findley et al. 1975; Hoffmeister 1986). It is commonly found in association with boulder piles, cliffs, rocky outcroppings, or lava flows. It is often netted over streams or ponds where it may forage for insects or drink water (AZGFD 2001b; Hinman and Snow 2003). Mesquite, whitethorn acacia (*Acacia constricta*), and agaves (*Agave* spp.) are commonly found along water sources where this bat has been netted at lower elevations (Hoffmeister 1986). It roosts in mine tunnels, rock piles, and under exfoliating bark of conifer trees. The diet of this bat is predominantly insects, mainly moths, soldier beetles, dung beetles, leaf beetles, roaches, and flying ants, all taken in flight (Czaplewski 1983; Harvey et al. 1999; Hinman and Snow 2003). Females form maternity colonies in early summer. Young are born in mid to late June and fledge by the end of July (Pima County 2004).

Threats to the Survival of Allen's Big-eared Bat

The greatest potential threats to the species are disturbance of roosts, particularly maternity colonies, which they will readily abandon (AZGFD 2001b). Loss of roost sites to mining activity or other developments could adversely affect the species.

Potential for Occurrence in the Study Area

Designated Tier 2 PCAs for this species occur within the study area in the Happy Valley area east of the Rincon Mountains and in the north end of the Whetstone Mountains (Pima County 2004). Because of a general lack of suitable rocky habitat along most Project alternatives, the potential for Allen's Big-eared Bat to occur within the area of influence of the Project is low.

Pale Townsend's Big-eared Bat

Status

Pale Townsend's Big-eared Bat (*Corynorhinus townsendii pallescens*) is a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, a USFWS species of concern, and an SGCN in Arizona. The species is also a State of New Mexico sensitive species and a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; Pima County 2004; USFS 2007a).

The taxonomy of the subspecies of *Corynorhinus* (*Plecotus*) has recently been realigned based on mitochondrial and DNA analyses performed by Piaggio and Perkins (2005). The Pale Townsend's Big-eared Bat (*C. t. pallescens*) is now represented by a population confined to Colorado and New Mexico. The subspecies in Arizona and most of the remainder of the western United States is now considered to be *C. t. townsendii*, although agencies in New Mexico and Arizona currently retain *C. t. pallescens* as the valid regional taxon on sensitive species lists.

Distribution

The distribution of the Townsend's Big-eared Bat is from southwestern Canada south to southern Mexico (Harvey et al. 1999; Hinman and Snow 2003; Nowak 1994).

Habitat and Life History

Townsend's Big-eared Bats normally roost in mines or caves, and they typically return to the same roost each year (Harvey et al. 1999). It is probably the bat species most frequently encountered in caves and mines in the western United States (Barbour and Davis 1969). This bat has been recorded roosting in buildings in California and Texas (Barbour and Davis 1969; Schmidly 1991), and also uses bridges, rock crevices, and hollow trees for roosting (WBWG 2005c). The Big-eared Bat is found from low desert up into coniferous forest (Hoffmeister 1986). Colonies of Big-eared Bats usually occur in groups of about a dozen, up to a couple of hundred bats (Barbour and Davis 1969; Hinman and Snow 2003; WBWG 2005c). Many references have stated that the Big-eared Bat prefers moths to other prey (Barbour and Davis 1969; Harvey et al. 1999; Hinman and Snow 2003; WBWG 2005c). However, other records indicate a variety of prey in their diet (Schmidly 1991).

Threats to the Survival of Pale Townsend's Big-eared Bat

Potential threats to the species include disturbance of roost sites and killing of bats in roosts. The few known maternity sites are highly susceptible to disturbance. Habitat loss of roost sites from mine closures and deforestation that affects foraging habitat are known threats to the species (AZGFD 2003f).

Potential for Occurrence in the Study Area

Within the study area there are three Tier 1 PCAs for Pale Townsend's Big-eared Bat; two in the Rincon Mountains and one on the northeast flank of the Santa Rita Mountains. Tier 2 PCAs are designated for the west flank of the Tucson Mountains, the north-central portion of the Santa

Rita Mountains, and the central portion of the Sierrita Mountains (Pima County 2004). Due to a general lack of suitable potential roost habitat along most of the Project alternatives, the potential for the Pale Townsend's Big-eared Bat to occur within the Project area of influence is low.

Big Free-tailed Bat

Status

The Big Free-tailed Bat (*Nyctinomops macrotis*) is a BLM sensitive species in New Mexico, a Forest Service sensitive species, a USFWS species of concern, and a State of New Mexico sensitive species (AZGFD 2010a; BISON-M 2008; USFS 2007a).

Distribution

The Big Free-tailed Bat is found from the southwestern United States, as far north as central Utah and Colorado, south to northern South America, and east to the Caribbean (Harvey et al. 1999; Hoffmeister 1986). Big free-tailed Bats are probably at the northern limit of their range in the southwestern United States (Harvey et al. 1999). The species is apparently uncommon within its range in the United States in general, but may be locally common, and records for this species are often of individual bats from widespread locations (Barbour and Davis 1969).

Habitat and Life History

The Big Free-tailed Bat roosts among rocky, usually high cliffs in crevices, rock shelters, under slabs of rock, and occasionally in buildings (Harvey et al. 1999; Hoffmeister 1986). The Big Free-tailed Bat feeds on a variety of insect prey including true bugs, leafhoppers, flying ants, moths, crickets, and others (Harvey et al. 1999; Schmidly 1991). Maternity colonies are known in the United States from New Mexico, Arizona, and from Big Bend National Park on the Rio Grande, in Texas (Hoffmeister 1986; Schmidly 1991). The Big Free-tailed Bat evidently has a single young per year (Barbour and Davis 1969; Schmidly 1991).

Threats to the Survival of the Big Free-tailed Bat

Roosting habitats of this species in steep, rocky country generally place the bats away from direct impacts from humans or development. Pesticides targeted at insect pests could adversely affect the species if affected insects are consumed.

Potential for Occurrence in the Study Area

The species is recorded from the Santa Catalina Mountains. The remote habitats of this species make it unlikely that any of the Project alternatives would impact habitat or individuals of this species. The potential for the Big Free-tailed Bat occurring within the Project area of influence is low.

Pocketed Free-tailed Bat

Status

The Pocketed Free-tailed Bat (*Nyctinomops femorosaccus*) is a Forest Service sensitive species and an AZGFD SGCN (AZGFD 2006a; USFS 2007a).

Distribution

The species is uncommon in the United States and reaches its northern limit in west-central Arizona near the Bill Williams River (Harvey et al. 1999; Hoffmeister 1986). They have been recorded in southeastern and southwestern New Mexico (Adams 2003). The species occurs in the vicinity of Big Bend National Park in Texas, north to Carlsbad Caverns National Park in New Mexico, and has been recorded as far south as the State of Michoacán, Mexico (Barbour and Davis 1969).

Habitat and Life History

The Pocketed Free-tailed Bat gets its name from a fold on the underside of the interfemoral membrane, which forms a pocket near the knee (Harvey et al. 1999). The Pocketed Free-tailed Bat is normally found in areas with high cliffs in rugged, rocky country, but has also been found associated with buildings (Adams 2003; Barbour and Davis 1969; Hoffmeister 1986). The Pocketed Free-tailed Bat is gregarious by nature, but colonies seldom exceed 100 individuals (Barbour and Davis 1969; Harvey et al. 1999; Schmidly 1991). They most commonly feed on moths, but they regularly take a variety of other insects including, grasshoppers, lacewings, leafhoppers, stinkbugs, crickets, flying ants, flies, and beetles (Adams 2003; Harvey 1999; Schmidly 1991). They have a single young in late June or July, which are volant by August (Adams 2003).

Threats to the Survival of the Pocketed Free-tailed Bat

Because roosts tend to be remote and occur in steep, rocky cliffs, there are no threats currently identified for the species. Potential threats could include disturbance of roosts by human presence associated with rock climbing and ground disturbances associated with cross country development of energy right-of-ways. Application of pesticides for insect control could affect the bats if contaminated prey species are consumed. Vegetation removal and fires could affect prey species used by the Pocketed Free-tailed Bat (AZGFD 2003g).

Potential for Occurrence in the Study Area

Electrical transmission lines typically avoid crossing mountains or areas that contain abrupt changes in terrain because of engineering challenges and increased environmental impacts. Most Project alternatives would not pass through habitat that might support roosts of the Pocketed Free-tailed Bat. However, there is potential for suitable roosting habit for this species in the north end of the Galiuro Mountains in Arizona. There are a few historic records of the species from the Tucson Valley (University of Arizona 2011), which may represent occupation in buildings or vagrant animals from the surrounding mountains. The potential for the Pocketed Free-tailed Bat occurring in the Project area is low.

Mexican Free-tailed Bat

Status

The Mexican Free-tailed Bat (*Tadarida brasiliensis*) is an SGCN in Arizona.

Distribution

The Mexican Free-tailed Bat ranges from approximately the southern half of the United States south through Mexico, the Caribbean, Central American and south along the western coast of South America to the interior of the continent (Wilkins 1989).

Habitat and Life History

The Brazilian Free-tailed Bat is primarily an inhabitant of caves, mines, and crevices in bridges, and is present in most of the southwestern United States (Barbour and Davis 1969; Hoffmeister 1986). The Brazilian free-tailed bat typically occurs in very large colonies. A maternity colony of this species at Bracken Cave in Texas has been estimated at twenty million bats and is the largest known aggregation of any mammal species (Barbour and Davis 1969; Harvey et al. 1999). However, small groups of no more than a dozen of these bats are not uncommon. Brazilian free-tailed bats are usually found at lower elevations in desert scrub habitats, but have been recorded as high as 9,200 feet (Barbour and Davis 1969). The Brazilian free-tailed bat feeds primarily on small moths and beetles (Barbour and Davis 1969; Harvey et al. 1999).

Threats to the Survival of the Mexican Free-tailed Bat

Threats to the species include human disturbance of roosts, and pesticides that contaminate their insect prey.

Potential for Occurrence in the Study Area

The Mexican Free-tailed Bat is present within the study corridor.

Greater Mastiff Bat

Status

The Greater Mastiff Bat (*Eumops perotis californicus*) is a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an AZGFD SGCN (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; USFS 2007a).

Distribution

The range of the species in the United States is from southwest Texas west to southern and central California (Barbour and Davis 1969). The species has a disjunct distribution, but occurs as far south as central South America (Barbour and Davis 1969; Best et al. 1996; Nowak 1994).

Habitat and Life History

The Greater Mastiff Bat is the largest bat found in the United States. These bats primarily inhabit the low deserts of the southwest, and are found in rocky areas where they roost in crevices in cliffs (Barbour and Davis 1969; Hoffmeister 1986). They are also recorded using buildings for roosts (Barbour and Davis 1969). Because of their large size and long, narrow wings, they cannot easily take flight directly from the roost but must drop at least 10 feet to attain sufficient speed for flight (Adams 2003; Schmidly 1991). Their body form indicates that they are likely capable of prolonged high-speed flight (Best et al. 1996; Vaughan 1966). The species is insectivorous. Greater Mastiff Bats are apparently permanent residents within their range in the United States and are not migratory (Best et al. 1996).

Threats to the Survival of the Greater Mastiff Bat

The principle threats to the Greater Mastiff Bat are habitat loss from development and mining, disturbance of roosts and pesticide poisoning (AZGFD 2002a).

Potential for Occurrence in the Study Area

There are a few records of this species within the study area, but the species is probably rare in the area. The Project is unlikely to affect roosting habitat used by this species, and the bats are likely to occur within the Project area of influence only during foraging activities.

<u>Antelope Jackrabbit</u>

Status

The Antelope Jackrabbit (*Lepus alleni*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Antelope Jackrabbit occurs from south-central Arizona south along the west coast of the Mexican mainland south to the state of Nayarit (Best and Henry 1993).

Habitat and Life History

The Antelope Jackrabbit occupies higher desert elevations on bajadas and low hills at the base of mountain fronts, and ranges up into semi-arid grassland habitats. The animals do not drink water even when it is present, but obtain their water needs from their vegetarian diet that consists of green grasses, forbs and other plant materials. Much of the diet includes fleshy parts of cacti, particularly *Opuntia engelmannii*. Three or four litters of one to five young are produced each year. Bobcats, Coyotes (*Canis latrans*), and Golden Eagles are primary predators of the species (Best and Henry 1993; Hoffmeister 1986).

Threats to the Survival of the Antelope Jackrabbit

Threats to the species include conversion of land for agriculture or development and increases in road development that result in increased road mortality.

Potential for Occurrence in the Study Area

Antelope Jackrabbits occur within the study corridor in Arizona.

Harris' Antelope Squirrel

Status

The Harris' Antelope Squirrel (*Ammospermophilus harrisii*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Harris' Antelope Squirrel is a common and widely dispersed species that occurs though most of Arizona south of the Mogollon Rim and east of the Colorado River, south into northern Mexico and east to far southwestern New Mexico (Best et al. 1990).

Habitat and Life History

Harris' Antelope Squirrels occupy dry, rocky desert areas, where they feed on a variety of foods including fruit and seeds of a variety of desert plants including those of paloverde, mesquite, and many cactus species. The animals excavate burrows at the base of desert shrubs, and less often in open areas. The animals are diurnally active, even in the hottest parts of the day. They do not hibernate, but are less active in winter, having stored seed so that they do not have to forage in cold weather (Best et al. 1990; Hoffmeister 1986).

Threats to the Survival of the Harris Ground Squirrel

There are no significant identified threats to this species. Some habitat loss may occur due to land conversion for various human uses.

Potential for Occurrence in the Study Area

The Harris' Antelope Squirrel is locally common in much of the study corridor in Arizona.

Gunnison's Prairie Dog

Status

Gunnison's Prairie Dog (*Cynomys gunnisoni*) is a Forest Service Sensitive species, a State of New Mexico sensitive species, and an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008; USFS 2007a). Montane populations were found to warrant listing under the ESA, and are currently candidates for listing (USFWS 2008a). The USFWS did not consider montane populations to be a Distinct Population Segment (DPS), a finding which was challenged in court. The montane populations may be designated a DPS or separate subspecies, separating those in the study area from the candidate population, or the entire species may be added to the candidate list or ESA (Wild Earth Guardians v. Salazar 2010).

Distribution

The recent historic distribution of Gunnison's Prairie Dog includes approximately the southeastern half of the Colorado Plateau, extending into the central Rocky Mountains in intermontane valleys (Pizzimenti and Hoffman 1973).

Habitat and Life History

Gunnison's Prairie Dog is a colonial burrowing mammal that is a keystone species of high mountain valley grassland habitats in the region. Prairie dogs feed primarily on grasses and forbs and are diurnally active. Colonies at higher elevations may hibernate during winter, but others simply reduce above-ground activity, and depend on stored fat reserves to carry them through the winters when food availability is limited (Pizzimenti and Hoffman 1973).

Threats to the Survival of Gunnison's Prairie Dog

Threats to Gunnison's Prairie Dog include habitat loss, shooting, pesticide poisoning and disease.

Potential for Occurrence in the Study Area

Reintroduction efforts for Gunnison's Prairie Dog have been conducted at Sevilleta National Wildlife Refuge (Davidson et al. 1999; UNM 2009). Populations may exist within 2 miles of the nearest Project alternative. The only potential impact to these populations from Project development would include the addition of raptor nesting or foraging perch habitat provided by transmission line structures. Natural nesting and perch habitat is present in adjacent mountains surrounding the reintroduction sites, and the Project would not substantially change the amount of raptor nesting in the area.

<u>Mearns' Pocket Gopher</u>

Status

Mearns' Pocket Gopher (*Thomomys bottae mearnsii*), a subspecies of Botta's Pocket Gopher (*T. bottae*), is a New Mexico BLM sensitive species, a USFWS species of concern, and State of New Mexico sensitive species (BISON-M 2008).

Distribution

Mearns' Pocket Gopher occurs in southwestern New Mexico and southeastern Arizona (Hoffmeister 1986).

Habitat and Life History

For the species (*T. bottae*), pocket gophers live within a variety of habitats over a wide elevation range. Essentially occurring anywhere soils are suitably friable for digging, and that provide adequate forage (Findley et al. 1975; Hoffmeister 1986). They are known to use a wide variety of herbaceous plants, grasses, tubers and roots of weeds and shrubs, and often pull entire plants

beneath ground where they can be consumed in the safety of their tunnels (Hoffmeister 1986). Pocket gophers spend almost their entire lives beneath ground in their burrows, and the animals are usually solitary. Breeding typically occurs in spring at lower elevations, but likely varies considerably with elevation. Three to four young is the typical litter size (Hoffmeister 1986).

Threats to the Survival of the Mearns' Pocket Gopher

Threats to the survival of Mearns' Pocket Gopher are probably primarily associated with habitat degradation or loss from developments that permanently alter ground structure.

Potential for Occurrence in the Study Area

Due to the variety of habitats that may be occupied by this species, and the proximity to the known range of the species, the potential for Mearns' Pocket Gopher occurring within the Project area of influence is moderate.

Desert Pocket Gopher

Status

The Desert Pocket Gopher (*Geomys arenarius arenarius*) is a New Mexico BLM and State of New Mexico sensitive species and a USFWS species of concern (BISON-M 2008).

Distribution

The Desert Pocket Gopher occurs from the lower Rio Grande Valley in the vicinity of Socorro south along the river into west Texas and Chihuahua, Mexico, and west of the river into the eastern half of the Deming Plain (BISON-M 2008; Findley et al. 1975; Williams and Baker 1974).

Habitat and Life History

Desert Pocket Gophers inhabit areas that contain mostly non-cohesive soils, such as loams and sands, as occur along portions of the Rio Grande (BISON-M 2008; Findley et al. 1975). They are commonly associated with habitats adjacent to open water, such as along rivers or irrigation canals (Williams and Baker 1974). The Desert Pocket Gopher eats a variety of grasses, cultivated alfalfa, and some native forbs (BISON-M 2008; Davis and Schmidly 2010a). Desert Pocket Gophers breed during the summer months, and may have more than one litter (Williams and Baker 1974).

Threats to the Survival of the Desert Pocket Gopher

Threats to the Desert Pocket Gopher may include rodenticides and other pesticides, habitat loss from development, and changes in the water table that affect its habitat.

Potential for Occurrence in the Study Area

The Desert Pocket Gopher is present within the Project area of influence.

Arizona Pocket Mouse

Status

The Arizona Pocket Mouse (*Perognathus amplus*) is an SGCN in Arizona.

Distribution

The Arizona Pocket Mouse occurs in western and central Arizona and northwest Sonora, Mexico (Hoffmeister 1986; Wilson and Reeder 2005).

Habitat and Life History

The Arizona Pocket Mouse is a resident of desertscrub habitat in the Mohave, Sonoran, and portions of the Great Basin deserts. The species is almost exclusively a seed feeder, with only very small portions of its diet consisting of invertebrates or green vegetation. They do not need to drink water since they get their needed moisture from their diet. They are nocturnal and store seeds to carry them over during colder weather, when they remain below ground (Hoffmeister 1986).

Threats to the Survival of the Arizona Pocket Mouse

Habitat loss due to conversion of lands for various human uses and the effects of invasive plant species on their habitat are the principle threats to the species.

Potential for Occurrence in the Study Area

The Arizona Pocket Mouse is very likely present within the study corridor in Arizona.

Banner-tailed Kangaroo Rat

Status

The Banner-tailed Kangaroo Rat (*Dipodomys spectabilis*) is an Arizona BLM sensitive species and an SGCN in Arizona (AZGFD 2006a; BLM 2010).

Distribution

The Banner-tailed Kangaroo Rat occurs in most of New Mexico, far west Texas, southeastern Arizona, north-central Sonora, central Chihuahua, and as a disjunct subspecies in Zacatecas and Aguascalientes, Mexico (Best 1988).

Habitat and Life History

Banner-tailed Kangaroo Rats inhabit grassy flats of bajadas and mesquite flats, and in open creosote bush desert. Grasses are important in their habitat, but they are intolerant of high grass density. Catclaw acacia and cacti are common components of their habitat in many areas in southern Arizona. Over time, the animals build large soil mounds, raised an average of approximately 12 inches above surrounding ground level. Burrow entrances are distinctively

larger in diameter than those constructed by other kangaroo rats. Unlike most members of the genus, Banner-tailed Kangaroo Rats are not colonial. The multiple entrances to the mounds are the result of multi-generation development by the animals, and only one or two individuals occupy a mound complex (Best 1988). Banner-tailed Kangaroo Rats are nocturnal foragers, feeding primarily on seeds of grasses, and store seeds in caches within their mounds. They also east green grasses, some forbs, and occasionally a few insects or other rodents (Best 1988; Hoffmeister 1986).

Threats to the Survival of the Banner-tailed Kangaroo Rat

Habitat degradation through overgrazing and other factors that facilitate shrub invasion or degrade grasslands are the primary threats to Banner-tailed Kangaroo Rat (Waser and Ayers 2003).

Potential for Occurrence in the Study Area

Banner-tailed Kangaroo Rats are present within the study area.

Fulvous Harvest Mouse

Status

The Fulvous Harvest Mouse (*Reithrodontomys fulvescens*) is a Forest Service sensitive species (USFS 2007a). Although considered globally secure, the species is considered critically imperiled in New Mexico (BISON-M 2008).

Distribution

Within Arizona, the Fulvous Harvest Mouse occurs in southernmost Arizona, east of the Altar Wash and north along the Santa Cruz River corridor almost to Tucson (Hoffmeister 1986). In New Mexico, it is known only from isolated locations within the Peloncillo Mountains (Findley et al. 1975).

Habitat and Life History

A species of grassy slopes and alluvial fans, the Fulvous Harvest Mouse is usually found with scattered oaks and other deciduous trees (Hoffmeister 1986). Litters of two to four young may be produced year round, and sexual maturity is reached at 2 to 4 months of age. Nests are usually constructed 1 to 3 feet above ground. Their diet varies seasonally based upon availability of resources, but generally consists of seeds and invertebrates (Spencer and Cameron 1982).

Threats to the Survival of the Fulvous Harvest Mouse

Within New Mexico, the Fulvous Harvest Mouse is threatened by its limited distribution. It is also highly sensitive to degradation of mesic, dense grassland habitat (USFS 2007a).

Potential for Occurrence in the Study Area

In New Mexico, the Fulvous Harvest Mouse only occurs in the southern Peloncillo Mountains outside the study area. The nearest records of the species to the Project are in the vicinity of the Santa Cruz River south of Tucson and near the San Xavier Mission (Hoffmeister 1986). However, habitat loss in the Santa Cruz River Valley has likely reduced or eliminated populations in the area, and the potential for its occurring within the Project area of influence is low.

Plains Harvest Mouse

Status

The Plains Harvest Mouse (*Reithrodontomys montanus*) is a Forest Service sensitive species (USFS 2007a).

Distribution

As the common name suggests, the Plains Harvest Mouse occurs throughout much of the Midwest plains, south into central and western Texas, as well as the eastern two-thirds of New Mexico, southeastern Arizona, and the Mexican states of Sonora, Chihuahua, and Durango (Wilkins 1986). In Arizona, the species' range includes the Chino, Skull, and Verde valleys, Santa Rosa Wash, and parts of the southeastern corner of the state including the Sulphur Springs and San Pedro valleys (Hoffmeister 1986). The species is never found in large numbers (Wilkins 1986).

Habitat and Life History

The Plains Harvest Mouse occupies a variety of grassland types, including old hay fields, moderately grazed pastures, and roadway medians, and some cultivated fields. Nests are constructed of tightly compacted grasses forming a small ball with a single opening, lined with softer materials such as thistle and milkweed fluff or cotton fibers. Nests are suspended from taller grasses, situated in tin cans on the ground, tucked beneath rocks, lumber, or other debris, or within burrows. Breeding occurs from February through November in the north, and probably year round in southern locations (Wilkins 1986).

Threats to the Survival of the Plains Harvest Mouse

Habitat loss due to urbanization and agriculture is the main threat to the species(USFS 2007a).

Potential for Occurrence in the Study Area

The Plains Harvest Mouse may occur in the Project area of influence, most likely in the northern Sulphur Springs Valley north of Willcox, Arizona, and possibly in the Rio Grande Valley in the New Mexico portion of the Project. Potential for occurrence is low.

American Beaver

Status

The American Beaver (*Castor canadensis*) is an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008).

Distribution

The American Beaver occurs throughout North America except in areas where suitable habitat is not present; including tundra, the desert Southwest away from major rivers, and southern Florida. The species barely enters northern Mexico (Jenkins and Busher 1979).

Beaver populations are smaller and less wide-spread than in the 19th century in New Mexico and Arizona, when they were common throughout the area where perennial waters occurred along with suitable trees and tuberous plants for forage (Hoffmeister 1986). Trapping for their pelts during those times removed the species from many areas, and as a result the species has a somewhat reduced range today (BISON-M 2008; Findley et al. 1975; Hoffmeister 1986). The placement of dams on major rivers in Arizona has affected beaver populations in the state, but extant populations are stable (Hoffmeister 1986). Reintroductions by the NMDGF between 1947 and 1958 resulted in a return of the species to some of its former range. Today, in New Mexico, populations are concentrated in montane habitats of the northern portion of the state and along segments of the Rio Grande (BISON-M 2008). A successful reintroduction of the Beaver to the San Pedro River in Arizona was conducted in the 1990s. They have apparently expanded their range upstream to Mexico and downstream as far as the Gila River as a result of this introduction (Radke 2011).Habitat and Life History

These colonial rodents cut trees along water courses and construct dams, canals and lodges from the materials. Their dams may cause extensive ponding of waters resulting in significant changes in hydrology, sediment accumulations, and plant and animal community productivity. Because of the long-lasting effects of their habitat modifications, the Beaver is a considered a keystone species associated with lotic ecosystems (Naiman et al. 1986). They build lodges in aquatic sites that provide predator protection and a place for storage of food for overwintering. Lodges typically have two or more underwater entrances and a single chamber just above the water line. Beavers eat leaves, twigs, and bark of woody plants occurring in their habitat, and have a strong preference for aspen (*Populus tremuloides*) as a primary food source. They also consume a variety of aquatic plants and bulbs (Hoffmeister 1986; Jenkins and Busher 1979). Beavers have a single brood of two to four young, generally in May or June (Jenkins and Busher 1979). Adult males may weigh more than 60 pounds (Hoffmeister 1986).

Threats to the Survival of the American Beaver

Groundwater pumping, water diversion, pollution, and conversion of lands for agriculture are the greatest potential threats to the American Beaver.

Potential for Occurrence in the Study Area

The American Beaver occurs within the Project area of influence along the Rio Grande near the Socorro and San Antonio crossings. Beavers were also introduced to the upper San Pedro River, and individuals have dispersed downstream into the Gila River. However, no suitable habitat for resident American Beavers currently exists at any Project alternative crossing of the San Pedro River.

Mesquite Mouse

Status

The Mesquite Mouse (*Peromyscus merriami*) is a Forest Service sensitive species and a Pima County PVS (Pima County 2004; USFS 2007a).

Distribution

The Mesquite Mouse occurs in South-central Arizona in Pinal, Pima, and Santa Cruz counties south to northern Sinaloa, Mexico (Hoffmeister 1986; Riddle et al. 2000).

Habitat and Life History

The Mesquite Mouse is a resident almost exclusively of mesquite bosques. It commonly co-occurs with the Cactus Mouse (*P. eremicus*), and is difficult to distinguish from this species (Hoffmeister 1986). The Mesquite Mouse is granivorous.

Threats to the Survival of the Mesquite Mouse

The greatest threat to the Mesquite Mouse is habitat loss from clearing of land for grazing, development, and cutting of mesquite for firewood (Hoffmeister 1986).

Potential for Occurrence in the Study Area

Tier 1 PCAs are delineated within the study area on the Santa Cruz River, Tanque Verde Wash, and lower Cienega Creek (Pima County 2004). Potential for the Mesquite Mouse occurring within the Project area of influence is high.

Northern Pygmy Mouse

Status

The Northern Pygmy Mouse (*Baiomys taylori ater*) is a Forest Service sensitive species and an SGCN in New Mexico (BISON-M 2008; USFS 2007a).

Distribution

The Northern Pygmy Mouse occurs in southeastern Arizona, northeastern Sonora and northwestern Chihuahua, Mexico (Eshelman and Cameron 1987; Hoffmeister 1986).

Habitat and Life History

The Northern Pygmy Mouse occurs in plains and desert grassland habitats, where it commonly co-occurs with the Hispid Cotton Rat (*Sigmodon hispidus*) (Eshelman and Cameron 1987). They commonly occur in areas that receive runoff or supplemental water, such as roadside ditches. The Northern Pygmy Mouse is a seed-eater.

Threats to the Survival of the Northern Pygmy Mouse

There are no recognized threats to the species, but any ground-disturbing activities could degrade or remove suitable habitat and may result in loss of individual animals or their young.

Potential for Occurrence in the Study Area

Potential for the Northern Pygmy Mouse occurring within the Project area of influence is moderate.

Yellow-nosed Cotton Rat

Status

The Yellow-nosed Cotton Rat (*Sigmodon ochrognathus*) is a New Mexico BLM sensitive species, a Forest Service sensitive species, a USFWS species of concern, and a State of New Mexico SGCN (AZGFD 2010a; BISON-M 2008; USFS 2007a).

Distribution

The species occurs along the east side of the Sierra Madre Occidental in the state of Durango, Mexico and north to New Mexico and Arizona (Baker and Shump 1978). Arizona records include the Rincon Mountains (University of Arizona 2011).

Habitat and Life History

The Yellow-nosed Cotton Rat normally inhabits xeric, rocky slopes of desert mountains among scattered bunch grasses where agaves, beargrass, or yuccas predominate within piñon-juniper or oak woodlands, but is known to occur up to ponderosa pine and Douglas fir woodlands (AZGFD 2003h; Baker and Shump 1978; Hoffmeister 1986). They feed on a variety of grass species, but also eat pricklypear fruits in season (AZGFD 2003h; Baker and Shump 1978; Hoffmeister 1986). Reproduction may occur throughout the year, and litter size is between two and six, with the young being precocious, and females less than 2 months old have been known to breed (AZGFD 2003h; Hoffmeister 1986).

Threats to the Survival of the Yellow-nosed Cotton Rat

Primary threats to the species are overgrazing and colonization by invasive plant species that alter the native plant community, particularly where this results in the loss of native grasses (AZGFD 2003h).

Potential for Occurrence in the Study Area

There is very little potential habitat for the species in the study corridor, and the Yellow-nosed Cotton Rat has only a very low potential for occurring within the Project area of influence.

New Mexico Meadow Jumping Mouse

Status

The New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*) is a candidate for listing under the ESA, is a BLM sensitive species in New Mexico, a Forest Service sensitive species, and a State of New Mexico endangered species and SGCN (BISON-M 2008; USFS 2007a). It is also an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

In New Mexico, the Meadow Jumping Mouse is recorded from the Jemez, San Juan, and Sacramento Mountains, and several locations in the Rio Grande Valley including Espanola, Isleta, Belen, and Socorro at Bosque del Apache NWR. In Arizona, the species is restricted to the White and Mogollon Mountains (BISON-M 2008).

Habitat and Life History

Typical habitats for the Meadow Jumping Mouse include marshes, wet meadows, and edges of streams or canals that support a diverse streamside or emergent vegetation (Morrison 1990, Frey 2007). The species occurs up to upper ponderosa pine woodlands (BISON-M 2008). Meadow Jumping Mice are somewhat omnivorous, and feed on fruits, seeds, and invertebrates (BISON-M 2008). In New Mexico, breeding may occur between May and September. Three or four young are produced per litter.

Threats to the Survival of the Meadow Jumping Mouse

The principal threat to the Meadow Jumping Mouse is habitat alteration or loss, often associated with livestock grazing impacts to stream or meadow habitats (Frey and Malaney 2009).

Potential for Occurrence in the Study Area

Within the study area the Meadow Jumping Mouse is recorded from Bosque del Apache NWR and other areas along the Rio Grande corridor, including at Socorro and Belen. Although assumed extirpated from the middle Rio Grande in the Socorro area (Frey 2006), surveys within Bosque del Apache NWR confirmed the species still persists there (Wright and Frey 2011). No other populations are known from the study area. Potential for the New Mexico Meadow Jumping Mouse occurring outside the refuge within the Project area of influence is low.

Mexican Gray Wolf

Status

Populations of the Mexican Gray Wolf (*Canis lupus baileyi*) in the Southwest are designated a Nonessential Experimental Population (NEP) by the U.S. Fish and Wildlife Service. Critical habitat is not designated for NEPs. The Mexican Gray Wolf is a State of New Mexico endangered species and SGCN. It is also an AZGFD WSC and SGCN (BISON-M 2008; AZGFD 2010a; 2006a).

Distribution

Wolves in the Southwest were extirpated from many regions before distribution and subspecific relationships could be fully elucidated. The Mexican Wolf was present through southeastern and perhaps central Arizona, southern New Mexico, and the Rio Grande Valley to approximately the Big Bend region in Texas, and a broad range throughout the Sierra Madre in Mexico (USFWS 1982a). The range of the Mexican Wolf contracted continually through the 19th and 20th centuries and prior to the eventual capture of the last wild wolves, natural populations were only known from a few locations in the Sierra Madre. Wolves in central and northern Arizona, including the current range of the NEP, were of the now-extinct subspecies *C. l. youngi* (*mogollonensis*), the Southern Rocky Mountains or Mogollon Rim Wolf (Hoffmeister 1986).

For approximately 18 years, no confirmed wild Mexican Wolves were documented. In 1998, captive-raised wolves were released into the Blue Range Wolf Recovery Zone, composed of Gila and Apache National Forests in east-central Arizona and west-central New Mexico. The primary recovery zone, where wolves were initially released, includes the central portion of the Apache National Forest in Apache and Greenlee counties, Arizona. Wolves have dispersed naturally throughout much of the secondary recovery zone, and have been captured in the Burro Mountains in southern New Mexico (USFWS 2003a).

Habitat and Life History

Mexican Wolves were generally found in montane forests, although prior to increases in grazing and other human activities would occur in grasslands in the Southwest as well. Prior to the introduction of grazing livestock, Wolves were primarily predators of large mammals over an expansive hunting territory, although other smaller prey were taken opportunistically. Large mammalian prey species in the United States range of the Mexican Wolf include the Mule Deer (*Odocoileus hemionus*), White-tailed Deer (*O. virginianus*), Elk (*Cervus elaphus*), Collared Peccary (*Pecari tajacu*), Bighorn Sheep (*Ovis canadensis*), and Pronghorn (*Antilocapra americana*). Plant matter such as berries and grasses are consumed occasionally (USFWS 1982a).

Wolves are a social dog species. Males and females reach reproductive age at 2-3 years and generally mate for life. Litter size for Gray Wolves ranged from 3-6 in several populations (Mech 1981), but has not been reported for the Mexican Wolf. Packs center on a mated pair and their offspring, but may include breeding adults dispersed from other packs (Lehman et al. 1992). Packs may be as large as 36 wolves (Mech 1981), but are typically smaller in Mexican Wolves. Packs in the NEP average 5 or fewer wolves (USFWS 2007b).

Threats to the Survival of the Mexican Gray Wolf

The primary threat that eventually led to the extirpation of all Mexican Wolves from the wild was hunting, largely driven by ranching interests due to livestock predation by Wolves as well as concerns over human safety and general anti-predator sentiment. Wolf eradication programs were administered by the U.S. Department of Agriculture and the USFWS (USFWS 1982a). Rabies outbreaks contributed to declines, and mange, parvovirus, and canine distemper have been detected in wild Wolves. Wolves released into the NEP are vaccinated for rabies, parvovirus, coronavirus, and distemper (USFWS 2007b). Hybridization with domestic dogs or Coyotes presents a risk of genetic pollution to wild Wolves (USFWS 2006a). Current threats to Wolves in the NEP include both legal and illegal take, often but not always associated with livestock depredation, road mortality, and recapture of Wolves leaving the NEP recovery zone (USFWS 2008b).

Potential for Occurrence in the Study Area

The Gila National Forest in New Mexico is designated as a portion of the secondary recovery zone for the Blue Range Wolf Recovery Area. Surrounding areas outside of the Gila National Forest are within the boundary of the NEP, but not the recovery area. Current management direction dictates that Wolves dispersing beyond the recovery area boundary will be returned to the recovery area, and those that do so repeatedly will be returned to captivity. Management rules relating to the NEP are currently being revised, and the policy for removal of Wolves outside the recovery area may change over the Project timeline.

No portion of the Project enters Gila National Forest or the Wolf recovery zone, but much of the Project overlaps the established NEP boundary. Wolves are long-range dispersers, and may enter the Project area of influence. In 2002, one male Wolf was tracked moving into the Burro Mountains in Grant County, New Mexico, the closest portion of the recovery area to the Project. The Wolf was eventually captured outside the recovery area and was returned to captivity (USFWS 2003a). No other Wolves are regularly using areas near the study corridor (AZGFD 2009a).

<u>Red Fox</u>

Status

The Red Fox (*Vulpes vulpes*) is a State of New Mexico sensitive species and an SGCN in Arizona (AZGFD 2006a; BISON-M 2008).

Distribution

The Red Fox is the most widely distributed carnivore in the world, being generally distributed throughout the Nearctic region, and it has been introduced to Australia and portions of the northeastern United States where it did not occur naturally (Lariviere and Pasitschniak-Arts 1996). In Arizona, the species is recorded only in the northeastern portion of the state (Hoffmeister 1986), and in New Mexico it is recorded primarily in the San Juan River Basin and at higher elevations in the mountains of the northern part of the state, with a handful of records from other parts of the state (Findley et al. 1975).

Habitat and Life History

The Red Fox uses a variety of habitat types including semi-desert, boreal forests, and farmland. Typical habitat is heterogeneous, with prey availability apparently being the main habitat element required (Lariviere and Pasitschniak-Arts 1996). Red Foxes are mostly nocturnally active. Primary prey of the Red Fox includes burrowing mammals, lagomorphs, and gallinaceous birds. Red Foxes form a monogamous pair and construct multiple entrance dens in friable soils in agricultural areas or in areas of mixed habitat. Litter size ranges from 1 to 12 (Lariviere and Pasitschniak-Arts 1996).

Threats to the Survival of the Red Fox

The primary threats to the species are from hunting of the animals for their fur. Habitat alteration or competition from Coyotes can exclude Red Foxes from an area.

Potential for Occurrence in the Study Area

The only records for the species in the vicinity of the New Mexico portion of the Project are from Doña Ana County (Findley et al. 1975). Primarily due to the paucity of records of the species in central and southern New Mexico, the potential for the Red Fox occurring within the Project area of influence is very low.

Kit Fox

Status

The Kit Fox (*Vulpes macrotis*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Kit Fox has a rather large range in North America, from southern Oregon and southwest Idaho south and east to Baja California Sur, west-central Texas and the state of Aguascalientes, Mexico (McGrew 1979).

Habitat and Life History

Kit Foxes generally inhabit fairly open ground among low desert vegetation, in desertscrub or desert grasslands, where soils are sufficiently friable to allow for burrow construction (Hoffmeister 1986). The Kit Fox is a small fox, usually weighing less than 4.5 pounds. They are nocturnally active and prey on rodents, cottontails, jackrabbits, lizards, birds and insects (Hoffmeister 1986; McGrew 1979). Access burrows to their dens are usually too narrow to admit predators such as Coyotes or Badgers (McGrew 1979).

Threats to the Survival of the Kit Fox

Threats to Kit Foxes are numerous, and include habitat loss from conversion of desert lands for various human uses, effects poisons used for rodent and predator control, shooting, road mortality, and irresponsible OHV use.

Potential for Occurrence in the Study Area

Kit Foxes are present in the study corridor.

Black Bear

Status

The Black Bear (*Ursus americanus*) is an Arizona BLM priority big game species.

Distribution

The Black Bear occurs in most mountainous regions of North America, with isolated populations along the Gulf Coast in subtropical woodlands (Lariviere 2001).

Habitat and Life History

The Black Bear occurs primarily at and above middle elevations (encinal woodland habitat) in most mountain ranges in New Mexico and Arizona, where they commonly inhabit canyons that contain perennial streams. They occasionally occur as low as semidesert grasslands in spring or early summer (Hoffmeister 1986). They are not present in the low deserts of south-central and southwestern Arizona, or in the eastern plains of New Mexico (Findley et al. 1975; Hoffmeister 1986).

Black Bears are primarily nocturnal, but are occasionally about during the day. Black Bears have a primarily omnivorous vegetarian diet, but are opportunistic in their foraging, and will kill other animals including deer and livestock, and will also feed on carrion and garbage. Berries and fruits make up a large part of their diet, and they commonly range over large areas seasonally to find adequate food resources. Large secluded areas with adequate denning habitat are necessary habitat elements for Black Bears (Lariviere 2001). Young are born in winter, and litter size ranges from one to four (Hoffmeister 1986; Lariviere 2001).

Threats to the Survival of the Black Bear

Primary threats to the Black Bear are from hunting, trapping, poaching and road kills. Black Bears are apparently mostly disease free, and have few predators (Lariviere 2001).

Potential for Occurrence in the Study Area

Small numbers of Black Bears likely occur within the limits of the study area, but are unlikely to be encountered or impacted by development of the proposed Project, which would occur mostly at elevations below and in habitats outside of areas normally occupied by the species.

White-nosed Coati

Status

The White-nosed Coati (*Nasua narica*) is a Forest Service sensitive species and an SGCN in New Mexico (BISON-M 2008; USFS 2007a).

Distribution

The White-nosed Coati ranges from extreme northern South America north through Mexico to the southwestern United States, where it occurs in southern Arizona, New Mexico and Texas (Gompper 1995).

Habitat and Life History

Coatis inhabit woodlands and riparian habitats in association with water at middle elevations, often in steep terrain. They favor areas with rocky cliffs that provide shelters in which they may den. They hunt through leaf litter and dig in soil to excavate invertebrates. They also eat a variety of native fruits and nuts, and not uncommonly include rodents, reptiles and carrion in their diet. They are quite omnivorous and opportunistic in their feeding (Gompper 1995; Hoffmeister 1986). They typically occur in small groups usually comprised of a couple of females and their young. Males tend to be solitary except at breeding time.

Threats to the Survival of the White-nosed Coati

Primary threats to the Coati are habitat alteration and hunting of the species (BISON-M 2008).

Potential for Occurrence in the Study Area

Presence of the Coati in the study area may be limited to portions of the Project in Arizona. Suitable habitat for the species is present primarily in the Santa Catalina, Rincon, Galiuro, Winchester, and Pinaleño Mountains.

<u>Ringtail</u>

Status

The Ringtail (*Bassariscus astutus*) is a State of New Mexico sensitive species (BISON-M 2008).

Distribution

The Ringtail occurs from the states of Oaxaca and Vera Cruz in southern Mexico north well into the western United States, as far north as Oregon, northeastern Nevada, and southwestern Wyoming (Poglayen-Neuwall and Toweill 1988). The Ringtail occurs through much of Arizona except the plains areas of the northwestern portion of the state and the low deserts where rocky, mountainous habitat is inadequate (Hoffmeister 1986). Ringtails occur in southern and central New Mexico, but are rare in the plains of the northwest and eastern portions of the state (Findley et al. 1975).

Habitat and Life History

Ringtails prefer cliffs or steep, rocky, brushy habitats, often along streams or xeroriparian habitats in canyons. They often use caves for denning and foraging, and have a long history in the Southwest of being associated with buildings and mines at mining camps (Hoffmeister 1986; Poglayen-Neuwall and Toweill 1988). Ringtails are opportunistic in their diet, and make use of

prey and forage available seasonally in their habitat. Recorded foods include primarily invertebrates, small mammals, birds, lizards, fruits and berries, and carrion (AZGFD 2004i; Hoffmeister 1986; Taylor 1954; Toweill and Teer 1977). Ringtails are recorded obtaining nectar from blooming agaves, (Kuban and Schwartz 1985). The breeding season is between February and May with a litter size of one to four (Poglayen-Neuwall and Toweill 1988).

Threats to the Survival of the Ringtail

There are no significant threats to the Ringtail. Some animals are trapped for their fur, and poisoning of individuals may occur from consuming poisoned animal carcasses (AZGFD 2004c).

Potential for Occurrence in the Study Area

The Ringtail is likely to occur in many areas of the Project in New Mexico and Arizona, particularly in foothills where canyons or rocky habitats occur.

Western Spotted Skunk

Status

The Western Spotted Skunk (*Spilogale gracilis*) is a State of New Mexico sensitive species (BISON-M 2008).

Distribution

The distribution of the Western Spotted Skunk is from the state of Guanajuato, Mexico north to southern British Colombia, Canada, including all of the Rocky Mountains. Gaps in the range occur in central California and the lowlands of the western coast of Mexico (Verts et al. 2001). The Western Spotted Skunk occurs throughout most of Arizona (Hoffmeister 1986), and most of New Mexico with the exception of the eastern plains (Findley et al. 1975).

Habitat and Life History

Western Spotted Skunks typically inhabit rocky terrain where they frequent cliffs, crevices, and rock piles (Hoffmeister 1986). These strictly nocturnal animals are omnivorous in their diet, typically concentrating on invertebrates and small mammals (Verts et al. 2001). They also feed on birds and their eggs, lizards, toads, berries, fruits, and carrion. Litters of two to five young are born in May or early June (Hoffmeister 1986; Verts et al. 2001).

Threats to the Survival of the Western Spotted Skunk

Threats to the Western Spotted Skunk include trapping for pelts and collateral losses from varmint trapping and poisoning. They are seldom found as road-killed animals (BISON-M 2008).

Potential for Occurrence in the Study Area

The potential for the Western Spotted Skunk occurring within the Project area of influence in New Mexico is moderate.

Hooded Skunk

Status

The Hooded Skunk (*Mephitis macroura milleri*) is a State of New Mexico sensitive species and Forest Service sensitive species (BISON-M 2008; USFS 2007a).

Distribution

The Hooded Skunk occurs from tropical Central America (Costa Rica) north into the southwestern United States in Arizona, New Mexico, and west Texas (Hwang and Lariviere 2001). In New Mexico, the Hooded Skunk is recorded only from Catron, Grant, Hidalgo, and Luna counties (BISON-M 2008; Findley et al. 1975).

Habitat and Life History

Hooded Skunks are primarily a low desert species, but do occur up into ponderosa pine woodlands (Findlay et al. 1975; Hwang and Lariviere 2001). They inhabit rocky canyons, riparian habitats, forest edges, cultivated fields, and suburban areas. They forage at night among ground litter for invertebrates, small vertebrates, bird eggs, and berries (Hoffmeister 1986). Litter size is from three to eight (Hwang and Lariviere 2001).

Threats to the Survival of the Hooded Skunk

There are no recognized threats to the species. The Hooded Skunk is considered sensitive in New Mexico, primarily due to its limited distribution in the state.

Potential for Occurrence in the Study Area

Project alternatives within the range of the Hooded Skunk in New Mexico avoid suitable habitat for the species. Hooded Skunks are present in the study corridor in Arizona.

Common Hog-nosed Skunk

Status

The Common Hog-nosed Skunk (*Conepatus leuconotus*) is a State of New Mexico sensitive species (BISON-M 2008).

Distribution

The Hog-nosed Skunk occurs from northern Costa Rica north into the southwestern United States as far north as southeast Colorado and the Oklahoma panhandle (Dragoo and Sheffield 2009). The range of the species in Arizona is diagonally across the state from the southeast

through the Mogollon Rim area and northwest as far as the Hualapai Mountains (Hoffmeister 1986). The species occurs through most of New Mexico with the exception of the plains habitats in the east-central and northwestern portions of the state (Findley et al. 1975).

Habitat and Life History

Hog-nosed Skunks inhabit rocky areas and canyons in desertscrub, creosote bush, grasslands, and up to pine-fir woodlands where they shelter in holes in the ground, crevices, caves, abandoned mines, and in woodrat nests (Dragoo and Sheffield 2009; Hoffmeister 1986). Hog-nosed Skunks are excellent digging animals and root amongst ground debris and surface soils for insects, small vertebrates and fruits (Dragoo and Sheffield 2009; Hoffmeister 1986). Litter size is typically two to four, with young born in April or May (Dragoo and Sheffield 2009).

Threats to the Survival of the Common Hog-nosed Skunk

The Hog-nosed Skunk has been in decline throughout the United States for many years, and the species has various protections in different states. Impacts to the species include habitat degradation, fragmentation, and loss, often resulting from conversion of lands for agriculture. Pesticide poisoning and road mortality are other threats to the species (Dragoo and Sheffield 2009).

Potential for Occurrence in the Study Area

The Hog-nosed Skunk is likely to be present within the Project area of influence in New Mexico.

Jaguar

Status

The Jaguar (*Panthera onca*) is an ESA-listed endangered species, an AZGFD WSC and SGCN, and a State of New Mexico SGCN (AZGFD 2010a; 2006a; BISON-M 2008). The USFWS has initiated the process of proposing critical habitat for the Jaguar (USFWS 2010a), and is expected to release a proposed rule in spring 2012. A recovery plan for the species is underway, and an interim recovery outline provides the most current information on the status of Jaguars in the Southwest (Jaguar Recovery Team and USFWS 2012).

Distribution

There are historic records of Jaguars as far north as the south rim of Grand Canyon in Arizona (Hoffmeister 1986) and Santa Fe, New Mexico (Findley et al. 1975). However, most records, including recent ones are from the northern portions of the species' range in the United States along the Mexican border. Recent records include a 1996 record from the Peloncillo Mountains in southwestern New Mexico, followed by several in mountain ranges in southern Arizona through 2009, when an adult animal was captured by the AZGFD during a study of other large predators (AZGFD 2009b; BISON-M 2008). That individual died as a result of age and health complications, but another Jaguar was reported from Arizona in 2011 (AZGFD 2011b).

Habitat and Life History

Jaguars will use a wide variety of habitats, but in the southwestern United States they seem to occur most often in Madrean evergreen woodland, semidesert grassland with a large shrub component that provides cover, or along riparian habitats (Brown 1983). Jaguars may occasionally occur in Sonoran desertscrub habitat, but this may occur during movements between areas of more suitable habitat for the species. All preferred habitats include access to water (BISON-M 2008). In northern Mexico and the southwestern United States, Jaguars likely feed on a variety of larger animals including deer, Collared Peccary, and on occasion have been recorded taking cattle or horses (AZGFD 2004d; Hoffmeister 1986).

Threats to the Survival of the Jaguar

The primary threats to the Jaguars are poaching and habitat fragmentation, particularly from large highways that create a dangerous barrier to dispersal (Jaguar Recovery Team and USFWS 2012). Abundance of suitable prey and resting areas are critical elements of Jaguar habitat (AZGFD 2004d).

Potential for Occurrence in the Study Area

Portions of the study area in southeastern Arizona and southwest New Mexico coincide with the Jaguar Conservation Emphasis Area (AZGFD/NMDGF 2007). This area was delineated based on GIS modeling that combined species records and habitat considered suitable to support the species, with consideration given to connectivity of habitats from northern Mexico into the southwestern U.S (Johnson et al. 2009). Since most contemporary records of the Jaguar are far south of the study area, the potential for the Jaguar to occur within the Project area is very low.

<u>Ocelot</u>

Status

The Ocelot (*Leopardus pardalis*) is listed endangered under the ESA and is an AZGFD WSC and SGCN (AZGFD 2010a; 2006a). There is no designated critical habitat for the Ocelot. A draft recovery plan for the species was released in 2010 (USFWS 2010b).

Distribution

The Ocelot occurs from northern South America north to the southwestern United States near the Mexican border in Texas and southeast Arizona in Cochise, Pima, and Santa Cruz counties (AZGFD 2004e). A single, subadult male Ocelot traveled into Apache County and was found dead after being hit by a car near Globe. The condition of the Ocelot and genetic information supported the conclusion that it was of wild origin (Holbrook et al. 2011).

Habitat and Life History

Ocelots have a small home range, on the order of 1 square mile in Texas, and are active primarily at night, but are also often observed during the daytime (AZGFD 2004e; Murray and Gardner 1997). They prefer habitats that are heavily vegetated, providing good visual cover, particularly

along gallery riparian streams (Murray and Gardner 1997; Hoffmeister 1986). Ocelots hunt both on the ground and in trees, and take a variety of prey including small to medium-sized mammals, birds, reptiles, amphibians, a few fish and invertebrates, and some vegetation (AZGFD 2004e; Murray and Gardner 1997).

Ocelots have their young in dens among rocks, hollow logs or trees, or dense vegetation (AZGFD 2004e; Murray and Gardner 1997). Ocelots usually have two young that are born between September and November after a gestation of approximately 70 to 80 days. Young are dependent on the female for food until they are several months old (AZGFD 2004e; Davis and Schmidly 2010b).

Threats to the Survival of the Ocelot

Habitat loss, primarily from changes in riparian vegetation, conversion to agriculture, and urbanization, are the primary threats to the Ocelot in the southwestern United States (AZGFD 2004e; Murray and Gardner 1997). Road mortality, poaching, and accidental trapping are also threats, but are greater elsewhere within the range of the species.

Potential for Occurrence in the Study Area

Ocelot detections in Arizona have increased in recent years, primarily along the border with Mexico (AZGFD 2012, Sky Island Alliance 2010). However, the individual found dead near Globe would have crossed through the study corridor, potentially following the San Pedro River. Ocelots may occur in the study area in the future, although this cannot reasonably be predicted. The San Pedro River remains the most suitable habitat for the species in the study area.

<u>Mountain Lion</u>

Status

The Mountain Lion (*Puma concolor*) is an Arizona BLM priority big game species.

Distribution

The Mountain Lion occurs from west central Canada south primarily in the western United States and sporadically throughout the Americas (Currier 1983). The Mountain Lion occurs throughout most of New Mexico and Arizona, generally preferring montane habitats, but occurring wherever its main prey, deer, are available. They generally avoid the hot, low desert regions of southwestern Arizona, and are almost unknown in the plains region of eastern New Mexico (Findley et al. 1975; Hoffmeister 1986).

Habitat and Life History

Mountain Lions are primarily active during crepuscular hours and at night, when they conduct most of their hunting activities. In addition to deer, Mountain Lions take a variety of prey, and are somewhat omnivorous in their diet. Other prey items recorded for Mountain Lions include Bighorn Sheep, Pronghorn, rabbits, ground squirrels, Collared Peccary, Pronghorn, Porcupine, gophers, rats, and occasionally take livestock, including cattle, sheep and horses (Hoffmeister

1986; Martin et al. 1951). Litter size is typically 3 to 4, and the young stay with the mother from 1 ½ to 2 years. Mountain Lion may live up to 12 years in the wild (Currier 1983).

Threats to the Survival of the Mountain Lion

Mountain Lions require large areas of undeveloped habitat. The principle threat to Mountain Lions is habitat loss, particularly where it affects their prey base. The Mountain Lion is a regulated game animal in Arizona, and about 300 animals are taken each year under permit (AZGFD 2007b).

Potential for Occurrence in the Study Area

Mountain Lions occur within the mountains and canyon areas within the study area in both New Mexico and Arizona.

Jaguarundi

Status

The Jaguarundi (*Puma* (*Herpailurus*) *yagouaroundi*) is listed endangered under the ESA, including the Sinaloan subspecies (*P. y. tolteca*) in the Southwest (USFWS 1976). There is no designated critical habitat for the Jaguarundi.

Distribution

The Jaguarundi occurs from South America to extreme southern Texas. There are no documented records of the species in Arizona (AZGFD 2004c; de Oliveira 1998). However, Little (1938) claims to have observed a Jaguarundi on the northwest flank of the Huachuca Mountains in the spring of 1938. Hoffmeister (1986) considered this sighting spurious. There are also undocumented reports from the Chiricahua and Santa Rita Mountains, along the upper San Pedro River, and on the Tohono O'odham Reservation (AZGFD 2004f). Brown and Lopez Gonzalez (1999) reviewed existing reports of the species from Arizona, as well as its range and status in western Mexico, and concluded the species was likely never present in Arizona in historical times. However, protection under the ESA would extend to any that should occur in the state.

Habitat and Life History

Jaguarundis use a variety of habitats throughout their range, but at the northern limits of their range they typically occur in thick, often thorny vegetation, in which they hunt and find shelter from predators (Davis and Schmidly 2010c; de Oliveira 1998). Most of their time is spent on the ground, but they are good climbers, and will hunt in trees (Davis and Schmidly 2010c). They feed primarily on birds, lizards, rodents, and rabbits, but also may take fish, arthropods, and some vegetation and fruit (AZGFD 2004f; Davis and Schmidly 2010c; de Oliveira 1998). Jaguarundis den in old logs, hollow trees, or among dense vegetation. Litter size varies from 1 to 4 young, with 2 being typical. They breed year round in the tropics, and may produce two litters per year from Mexico south, but in southern Texas they have only a single litter in the fall (de Oliveira 1998).

Threats to the Survival of the Jaguarundi

Threats to the Jaguarundi include habitat modification or loss, predator control operations, predation by dogs, and shooting by humans (AZGFD 2004f; Davis and Schmidly 2010c).

Potential for Occurrence in the Study Area

Potential for the Jaguarundi occurring within the Project area of influence is very low, and would be limited to the crossing area of the San Pedro River in Arizona.

Mule Deer

Status

The Mule Deer (*Odocoileus hemionus*) is a State of New Mexico SGCN (BISON-M 2008) and is an Arizona BLM priority big game species

Distribution

The Mule Deer occurs throughout most of western North America from central Canada south into San Luis Potosi in north-central Mexico (Anderson and Wallmo 1984). Mule Deer occur throughout most of New Mexico, but are less common in the grasslands in the eastern portion of the state (Findley et al. 1975).

Habitat and Life History

Mule Deer are both browsers and grazers, with the diet including a variety of vegetation by elevation and season. Mule Deer breed in the winter and have their young in June or July. The typical litter size is two (Anderson and Wallmo 1984; Hoffmeister 1986). Mule Deer often migrate to different elevations by season, spending time at higher elevations in summer, and coming down to lower elevations in winter, particularly if snow cover prevents access to adequate forage (Anderson and Wallmo 1984).

Threats to the Survival of the Mule Deer

Habitat alteration, hunting pressures and road mortality are significant impacts on the species.

Potential for Occurrence in the Study Area

Mule Deer are present in the Project area of influence.

Coues White-tailed Deer

Status

Coues White-tailed Deer (*Odocoileus virginianus couesi*) is an SGCN in New Mexico and Arizona and an Arizona BLM priority big game species (AZGFD 2006a; BISON–M 2008).

Distribution

Coues White-tailed Deer range from southwestern New Mexico and the sky islands of southeastern Arizona north and west on the Mogollon Rim as far as the San Francisco Peaks near Flagstaff and the Bradshaw Mountains, and south into approximately the northwestern quarter of Mexico (Hoffmeister 1986; Smith 1991).

Habitat and Life History

White-tailed Deer in Arizona typically occupy wooded habitats including encinal woodlands and oak-juniper-piñon forest up to pine elevations. They occasionally occur lower in desertscrub habitat (Hoffmeister 1986). They graze on grasses and forbs in spring and early summer, switching to browsing of new woody growth of shrubs and trees in late summer and fall. Acorns are an important food source late in the year. Succulents form a large part of their diet in xeric areas, and agricultural crops are commonly used where available (Hoffmeister 1986; Smith 1991). Mountain Lions and Wolves are the most common natural predators of White-tailed Deer in Arizona, and Coyotes are significant predators of fawns (Smith 1991).

Threats to the Survival of the Coues White-tailed Deer

Habitat loss, road mortality, and poaching may affect deer populations to a small degree, but populations are typically resilient provided adequate forage is available.

Potential for Occurrence in the Study Area

Coues White-tailed Deer occur within the study area in Arizona.

<u>American Pronghorn</u>

Status

The American Pronghorn (*Antilocapra americana americana*) is an AZGFD SGCN and an Arizona BLM priority big game animal (AZGFD 2006a).

Distribution

The species originally ranged in large numbers through most of the open plains grasslands on the eastern slope of the Rocky Mountains, from southern Canada south to central New Mexico and Arizona. Pronghorn range and numbers contracted significantly as a result of hunting pressures, land conversion and human encroachment in general (Findley et al. 1975; Hoffmeister 1986). Populations in New Mexico are genetically mixed from introductions that occurred between 1936 and 1957. Current Arizona populations are derived from a variety of sources, some transplanted from distant states. The southern Arizona populations are descendents of transplanted animals from northern Arizona (Hoffmeister 1986; O'Gara 1978).

Habitat and Life History

The American Pronghorn requires long-range visibility to avoid predators and so lives in open cover, grassland, or grassland with low shrubs where the vegetation has a low profile (Hoffmeister 1986). Pronghorn are dependent on water but obtain needed water from vegetation during much of the year. Pronghorn are diurnally active, with most activity occurring during morning and evening. In spring and summer they feed primarily on a variety of grasses and forbs, and may switch to browsing shrubs later in the year as these resources dwindle. Pronghorn in the western United States mate in late August and early September, and young are born the following May (Hoffmeister 1986).

Threats to the Survival of the American Pronghorn

Habitat degradation and conversion of lands for agriculture or human development along with predation of fawns by Coyotes are the principle threats to Pronghorns. Habitat fragmentation often results from placement of fencing on grazing allotments and along roadways. Pronghorn are reluctant to cross fences, and typically go under fences as opposed to jumping over them as deer will (AZGFD 2002b).

Potential for Occurrence in the Study Area

A population of approximately 100 Pronghorn is resident in the northern Sulphur Springs Valley, and is actively managed by the AZGFD. The Bonita Ranch Grassland Restoration Project is actively restoring thousands of acres of habitat for grassland wildlife species in the northern end of the valley, including the resident Pronghorn population (AZGFD 2010b). The area occupied by this population is in the vicinity of links C130a and C130b.

<u>Desert Bighorn Sheep</u>

Status

The Desert Bighorn Sheep (*Ovis canadensis mexicana*) is a State of New Mexico threatened species, a Forest Service sensitive species, and is an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008; USFS 2007a). The Bighorn Sheep is particularly important to most state and federal land management agencies because of its status as a game species, limited distribution, and its declines or extirpation from many mountain ranges. Except for the Peloncillo Mountains population (for which hunting permits are available), all Bighorn populations within New Mexico are listed by the State of New Mexico as threatened.

Distribution

The Desert Bighorn Sheep occurs in mountainous habitats in southern Arizona and New Mexico and in west Texas. Populations in New Mexico are currently restricted to seven mountain groups; the Ladron, Fra Cristobal, Caballo, San Andres, Peloncillo, Big and Little Hatchet mountains, and at Red Rock on the Gila River (BISON-M 2008). The 2010 NMDGF surveys for Desert Bighorn Sheep resulted in a statewide population estimate of 575-635 animals (NMDGF 2010).

Habitat and Life History

Desert Bighorn Sheep require habitat with relatively low vegetation that provides good visibility for predator avoidance, and steep terrain that allows an effective route of escape. Bighorns will frequently use high ridges of the mountain ranges as lookout sites. High, inaccessible sites are also important for protection from predators during lambing. The only natural predator of the species in New Mexico is the Mountain Lion (*Puma concolor*). Water is a critical component of the habitat, and may be available in natural rock catchments, springs, and man-made supplemental water tanks. Many of these sources may be dry before the onset of the summer rains, making any remaining sources critical to the survival of the bighorns. Bighorns eat a wide variety of desert vegetation, including fruits and leaves of mesquite, ironwood, paloverde, catclaw acacia, coffeeberry bush, jojoba, white brittlebush, and fairy duster. Bighorns will also consume succulent plants for both food and water, including saguaro, cholla, prickly pear, other cacti, and agaves (Hoffmeister 1986).

Threats to the Survival of the Desert Bighorn Sheep

Threats to Desert Bighorn Sheep include disease, illegal hunting, predation by Mountain Lions, human disturbance, and habitat loss resulting from the encroachment of human developments.

Potential for Occurrence in the Study Area

Desert Bighorn Sheep occur in the Galiuro Mountains in Arizona, including Aravaipa Canyon and associated tributaries, although suitable steep, rugged terrain is avoided by the Project in that area. A movement corridor, part of which is designated as an Area of Critical Environmental Concern (ACEC) by the Socorro Field Office of the BLM, would be crossed by a proposed Project alternative between Polvadera Mountain and Socorro Peak.

1.8.1.2 Birds

<u>Eared Grebe</u>

Status

The Eared Grebe (*Podiceps nigricollis*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Eared Grebe ranges from central western Canada south to El Salvador. In the Project area the Eared Grebe is present only as a wintering species (Cullen et al. 1999).

Habitat and Life History

The Eared Grebe inhabits shallow freshwater marshes, ponds, and lakes during the breeding season, but is found in a wider variety of aquatic habitats in other seasons. They may spend extensive time at hyper-saline lakes in the fall, where an absence of fish allows high density invertebrate populations to survive, and providing rich feeding grounds for the birds. Eared

Grebes feed on the surface or by diving for a variety of aquatic invertebrates, but occasionally take small fish or amphibians (Cullen et al. 1999; Terres 1980).

Nesting is usually in colonies, and nests are floating platforms constructed of emergent vegetation in open water. Three to five dull bluish or greenish-white eggs are laid between late April and June (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Eared Grebe

Habitat alteration or loss and human disturbance are the greatest threats to the species (Cullen et al. 1999).

Potential for Occurrence in the Study Area

The Eared Grebe is listed as uncommon at Bosque del Apache NWR (USFWS 1995a). Small numbers of these birds may occur along the Rio Grande during migration or in winter.

Neotropic Cormorant

Status

The Neotropic Cormorant (*Phalacrocorax brasilianus*) is a State of New Mexico threatened species, a Forest Service sensitive species, and a New Mexico SGCN (BISON-M 2008; USFS 2007a).

Distribution

The Neotropic Cormorant occurs from southeastern Arizona, central New Mexico, and north-central and eastern Texas, east to southwestern Louisiana, and south to Tierra del Fuego. The species also occurs in the Caribbean (American Ornithologists' Union [AOU] 1998). The species occurs in small numbers at Elephant Butte and Caballo Reservoirs and at Bosque del Apache NWR (NMDGF 2008).

Habitat and Life History

The Neotropic Cormorant inhabits freshwater ponds, lakes, rivers, marshes, and coastal marine waters (AOU 1998; Ehrlich et al. 1988; Terres 1980). They feed on a variety of fresh water and marine fishes, and also take amphibians, reptiles, crustaceans, mollusks, and some insects (Ehrlich et al. 1988; Terres 1980). The Neotropic Cormorant is a colonial nesting species. They nest on rocky cliffs along coasts, or in trees in the interior (Terres 1980). Three to four pale blue eggs are typically laid between April and July. The young are fully independent 10 weeks after hatching (Terres 1980).

Threats to the Survival of the Neotropic Cormorant

Threats to the species include habitat degradation including the effects of erosion and development, nest site disturbance, fluctuations in food supply, shooting, and the effects of pesticides in their environment (NMDGF 2008; Telfair and Morrison 2005; Terres 1980). Based

on current knowledge and recent records, the presence of the species in New Mexico is apparently in decline (NMDGF 2008).

Potential for Occurrence in the Study Area

The Neotropic Cormorant is not currently known to nest in Arizona, but the birds have been expanding their range into southern Arizona in recent years. They have appeared as far west as the Painted Rock and Gillespie Dams along the Gila River southwest of Phoenix, and have been recorded at the Picacho Reservoir within the study area (Corman and Wise-Gervais 2005). They are known to breed at Bosque del Apache National Wildlife Refuge (USFWS 1995a), and the species was recently observed along the Rio Grande at the San Antonio alternative crossing of the Rio Grande (Maliakal-Witt and Witt 2010).

Great Egret

Status

The Great Egret (*Ardea alba*) is a WSC in Arizona (AZGFD 2010a).

Distribution

The Great Egret is a year-round resident in the southeastern United States, the western Caribbean, the coasts of Mexico and Central America, and central California. The birds also breed in portions of the Midwestern United States and other sites in the interior (McCrimmon et al. 2001).

Habitat and Life History

Great Egrets inhabit a wide variety of wetland habitats, including manmade features, and may occur wherever there is an adequate food supply. They feed on fish, other small vertebrates, and insects (Ehrlich et al. 1988). Typically three eggs are laid in a flimsy, lined or unlined nest constructed of poorly consolidated sticks. Nests are usually in the tops of trees or dense, shrubby vegetation (McCrimmon et al. 2001).

Threats to the Survival of the Great Egret

Threats to the species include habitat loss, agricultural pesticides, heavy metals from pollution, and shooting of individuals (AZGFD 2002c; McCrimmon et al. 2001).

Potential for Occurrence in the Study Area

The Great Egret has been recorded nesting at Picacho Reservoir near Casa Grande, Arizona (Corman and Wise-Gervais 2005) and is a rare visitor to the Sweetwater Wetlands in Tucson (City of Tucson [COT] 2006). Great Egrets may occasionally occur at various aquatic sites within the Project area of influence of the Arizona portion of the Project.

Cattle Egret

Status

The Cattle Egret (*Bubuculus ibis*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The Cattle Egret has a very wide global range, and naturally dispersed to South America from the Old World in the 1800s. Its current range in our region encompasses all of the United States, Central America, and the Caribbean, and the species continues to expand its range northward into Canada and elsewhere (Telfair 2006). The species began nesting in Arizona in about 1988 at Yuma, Arizona on the Colorado River, but its expansion in the state beyond the Colorado River has not been rapid, and it is not well-established anywhere in the Project area (Corman and Wise-Gervais 2005).

Habitat and Life History

The Cattle Egret occurs in a variety of open habitats, usually away from water, including fallow fields, and is commonly associated with livestock, where it forages on insects flushed by the animals (Ehrlich et al. 1988; Terres 1980). They also feed on a variety of other invertebrates including mollusks, crustaceans, and annelids, and occasionally on nestling birds. Nests are constructed by the female from sticks, reeds, or other vegetation gathered by the male. Three to four light blue-green to bluish-white eggs are laid (Ehrlich et al. 1988).

Threats to the Survival of the Cattle Egret

There are no identified threats to the Cattle Egret, but habitat loss resulting from conversion of livestock range to other uses may adversely impact the animals.

Potential for Occurrence in the Study Area

The Cattle Egret has been reported at the Sweetwater Wetlands on the Santa Cruz River in Tucson, but is considered a rare visitor there. Cattle Egrets may occur anywhere along the Project in agricultural lands, particularly where livestock are present. Small numbers of Cattle Egret may be present on occasion within the Project area of influence in Arizona.

American Bittern

Status

The American Bittern (*Botaurus lentiginosus*) is an AZGFD WSC, a USFWS BCC and an AZGFD and State of New Mexico SGCN (AZGFD 2010a; 2006a; BISON-M 2008; USFWS 2008c).

Distribution

The American Bittern ranges from northern Canada south to Central America (Lowther et al. 2009; Terres 1980).

Habitat and Life History

The American Bittern typically inhabits freshwater or brackish marshes and wet meadows, but may also occupy other habitats that contain either fresh or salt water, or even dry grasslands (Lowther et al. 2009; Terres 1980). The American Bittern will feed on almost any animal that it can capture, including fish, eels, frogs, snakes, salamanders, small rodents, crayfish, and other invertebrates (Ehrlich et al. 1988; Lowther et al. 2009; Terres 1980). They capture prey by slow stalking followed by a rapid strike of the bill (Terres 1980). They produce three to five buff-brown to olive-buff eggs (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the American Bittern

Habitat degradation, alteration, or loss, human disturbance, and pesticides are the greatest threats to the species (Lowther et al. 2009).

Potential for Occurrence in the Study Area

The American Bittern is an occasional visitor to Bosque del Apache NWR during winter (USFWS 1995a). Small numbers of American Bitterns may occasionally be present at aquatic sites throughout the Project area.

<u>Snowy Egret</u>

Status

The Snowy Egret (*Egretta thula*) is an AZGFD WSC (AZGFD 2010a).

Distribution

The Snowy Egret is a year-round resident in the southeastern United States, central California, and the coasts of Mexico and Central America as far south as El Salvador, and breeds in several areas of the interior of the United States along major river watersheds (Parsons and Master 2000).

Habitat and Life History

The Snowy Egret inhabits freshwater marshes, lakes, ponds, rivers, and commonly occurs where livestock are present. Its diet includes fish, aquatic invertebrates, and small vertebrates (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Snowy Egret

Threats to this species include stream channelization, clearing of floodplain forests, loss and degradation of wetlands, and some recreational activities that impact nesting sites (AZGFD 2002d).

Potential for Occurrence in the Study Area

The Snowy Egret is present at the Sweetwater Wetlands on the Santa Cruz River in Tucson in most years, and likely occurs occasionally at the Picacho Reservoir and along irrigation canals in the agricultural area near the Pinal Central Substation. Snowy Egrets are likely to be present occasionally at aquatic sites in the Arizona portion of the Project.

Least Bittern

Status

The Least Bittern (*Ixobrychus exilis*) is a USFWS species of concern and BCC, and an AZGFD WSC (AZGFD 2010a; USFWS 2008c).

Distribution

The Least Bittern breeds from southeastern Canada south through the United States (mostly eastern United States) and Mexico to Costa Rica. The species winters in Baja California and the Caribbean (Poole et al. 2009). There are breeding areas in east-central and southeast New Mexico, and the birds are present year round along the Lower Colorado River. Breeding populations are also present in some years along the Salt and Gila rivers, at Picacho Reservoir in Pinal County, Arizona, and at the Dankworth Ponds south of Safford, Arizona (AZGFD 2001c; Poole et al. 2009).

Habitat and Life History

The Least Bittern lives among tall, dense emergent vegetation; primarily cattails or reeds in fresh, brackish, or salt waters. It feeds primarily on small fish and insects, but also takes amphibians, small mammals such as shrews and mice, and other invertebrates including leeches, crayfish, and mollusks (Poole et al. 2009; Terres 1980). Nests are typically constructed over water among emergent or woody vegetation and close to open water. The male generally constructs the nest from dried and live plant materials gathered by the female (AZGFD 2001c; Terres 1980).

Threats to the Survival of the Least Bittern

The primary threat to the Least Bittern is loss of wetland habitats from groundwater pumping, channelization, and water diversion. Siltation from erosion and pesticide contamination from agriculture may adversely affect water quality and prey used by this species (AZGFD 2001c).

Potential for Occurrence in the Study Area

In Arizona, the most suitable habitats within the study area are at Picacho Reservoir and the Dankworth Ponds. Least Bittern may occasionally occur at these locations.

White-faced Ibis

Status

The White-faced Ibis (*Plegadis chihi*) is a New Mexico BLM sensitive species, a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico SGCN, and an AZGFD WSC (AZGFD 2010a; BISON-M 2008; USFS 2007a).

Distribution

The White-faced Ibis breeds primarily in Southern California, along the Gulf Coast, and in central Mexico, but there are numerous localized breeding areas in the western United States The largest breeding colonies occur in Utah, Nevada, Oregon, and coastal Texas and Louisiana, and the birds breed as far south as central Chile and Argentina (Ryder and Manry 1994). There are breeding records of the White-faced Ibis in New Mexico, both in the northern part of the state, north of the study area, and at Bosque del Apache NWR (Ryder and Manry 1994; Stahlecker 1989; USFWS 1995a). The species has occasionally been recorded nesting in Arizona, notably at Cibola Lake near the Colorado River (Corman and Wise-Gervais 2005). In the United States the birds winter mostly along the Gulf Coast, at Salton Sea, and along the southern reach of the Colorado River (Ryder and Manry 1994). They also occur in flooded agricultural fields in California and southwestern Arizona in winter (Ryder and Manry 1994).

Habitat and Life History

Inland habitats are typically shallow freshwater wetlands that support bulrushes (*Scirpus* spp.) or cattails. They also frequent flooded agricultural fields, particularly alfalfa, in winter (Ryder and Manry 1994). The White-faced Ibis feeds on aquatic insects, wet soil invertebrates, snails, fish, small vertebrates, and occasionally some aquatic vegetation (Ehrlich et al. 1988; Ryder and Manry 1994; Terres 1980). They construct their nest in bulrushes or reeds, in low shrubs or trees, and occasionally on floating mats of dead vegetation (AZGFD 2002e; Ehrlich et al. 1988; Terres 1980). The nest structure is a deep cup made of dead reeds lined with grasses. Three to four greenish-blue eggs are produced between May and July (Terres 1980).

Threats to the Survival of the White-faced Ibis

Principal threats to the White-faced Ibis include habitat alteration and loss due to development, changes in water levels due to groundwater pumping or diversion, disturbances during nesting, and pesticide contamination (AZGFD 2002e).

Potential for Occurrence in the Study Area

The White-faced Ibis is recorded from Bosque del Apache NWR on the Rio Grande in New Mexico, including during the nesting season. They may also be present in small numbers during

migration or in winter at Picacho Reservoir near Casa Grande, Arizona, and on the Santa Cruz River in Tucson at the Sweetwater Wetlands.

Black-bellied Whistling-duck

Status

The Black-bellied Whistling-duck (*Dendrocygna autumnalis*) is an AZGFD WSC (AZGFD 2010a).

Distribution

The Black-bellied Whistling-duck is primarily a resident of South America, coastal Central America, and Mexico, but it is also a breeding species at the northern limits of its range in southern Arizona, Texas, and Louisiana. A northward shift in the limits of the species' distribution in Arizona in recent years may indicate an ongoing range expansion (Corman and Wise-Gervais 2005; James and Thompson 2001).

Habitat and Life History

The Black-bellied Whistling-duck inhabits shallow waters of streams, rivers, marshes, ponds, and small man-made reservoirs and livestock catchments and adjacent open woodlands (Corman and Wise Gervais 2005; Ehrlich et al. 1988; Terres 1980). The species is primarily granivorous, but mollusks and insects make up a small portion of their diet (Ehrlich et al. 1988; Terres 1980

The species is normally a cavity nester, nesting in trees in woodlands adjacent to aquatic habitats, but may also nest on the ground among shoreline emergent vegetation or among grasses near the shoreline (Ehrlich et al. 1988; Corman and Wise-Gervais 2005). Ten to 14 white to creamy-white eggs are normally laid (Ehrlich et al. 1988).

Threats to the Survival of the Black-bellied Whistling-duck

Habitat loss is probably the primary threat to the species in Arizona, but use of herbicides to control aquatic and emergent vegetation present some issues for the species (AZGFD 2002f). Populations in Arizona are subject to hunting pressures (Corman and Wise-Gervais 2005).

Potential for Occurrence in the Study Area

The highest potential for the Black-bellied Whistling-duck occurring within the Project area is along the San Pedro or Santa Cruz rivers in Arizona. Small numbers of these birds may occasionally occur at these locations.

Wood Duck

Status

The Wood Duck (*Aix sponsa*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

Wood Ducks occur over much of central North America, breeding primarily the eastern United States, southern Canada, the Pacific Northwest and south into California, and wintering in several areas of the Rocky Mountains, the Sierras in California, southwestern and central United States and south central Texas (Hepp and Bellrose 1995).

Habitat and Life History

Wood Ducks occupy a wide variety of aquatic habitats including riparian, wooded wetland and freshwater marsh habitats, where they are cavity nesters. Riparian habitats are the most important habitat type used for nesting by the birds. The Wood Duck is an important hunted waterfowl, with its annual take exceeded only by the Mallard (*Anas platyrhynchos*). Wood Ducks are essentially omnivorous, with the primary components of their diet including seeds, fruits and invertebrates (Hepp and Bellrose 1995).

Threats to the Survival of the Wood Duck

Forested wetland habitat loss is the primary threat to the species. Large numbers of the birds are taken annually by hunting, but as with all waterfowl, limits are set annually in response to population trends. No other significant specific threats to the species are recognized (Hepp and Bellrose 1995).

Potential for Occurrence in the Study Area

Wood Ducks are present within the study corridor during winter.

<u>Northern Pintail</u>

Status

The Northern Pintail (*Anas acuta*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

In the Americas the Northern Pintail ranges generally from Alaska to Costa Rica, except for the northeastern and Great Lakes regions of the United States and portions of eastern Canada (Austin and Miller 1995). The Northern Pintail nests at Bosque del Apache NWR, and persists there in numbers during fall and winter (USFWS 1995a).

Habitat and Life History

Northern Pintails inhabit ponds and marshes, estuaries, ponds in prairie habitats, grasslands, and cultivated fields (Ehrlich et al. 1988; Terres 1980). Northern Pintails are shallow-water feeders, tipping off the surface to feed. The diet of the Northern Pintail is primarily vegetation, including seeds of emergent vegetation, agricultural grains, pondweeds, smartweed, but also minnows, tadpoles, invertebrates including mollusks, crayfish, leeches, worms, and aquatic insects (Austin and Miller 1995; Ehrlich et al. 1988; Terres 1980). Their nests, constructed of sticks, leaves, and

grasses, are often built far from water. Six to nine olive-green to olive-buff eggs are laid between May and July (Terres 1980).

Threats to the Survival of the Northern Pintail

Habitat loss is the primary threat to the Northern Pintail. Nests built in agricultural fields may be lost to plowing. Birds commonly ingest lead shot during bottom feeding, often resulting in death of the birds (Terres 1980).

Potential for Occurrence in the Study Area

The Northern Pintail is abundant in winter at Bosque del Apache NWR and throughout the Rio Grande Valley. The species is likely to also occur at numerous other aquatic sites within the Project area of influence, including the Cluff Ranch, Willcox Playa, 3-Links Farm, Sweetwater Wetlands and Picacho Reservoir.

Canvasback

Status

The Canvasback (*Athya valisineria*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The breeding range of the Canvasback is from Alaska south through the prairies of Central Canada south as far as Colorado. Wintering areas are south of the breeding range as far as Central Mexico, and including the east and west coasts of the continental United States and Baja California, Mexico (Mowbray 2002).

Habitat and Life History

The Canvasback occupies a variety of wetland habitats during the breeding season, preferring those bordered by dense emergent vegetation, including fresh and alkaline-water marshes, small lakes, ponds, rivers and river impoundments. In migration they use a variety of marine and fresh water habitats including estuaries, brackish marshes, lakes, ponds, and treatment ponds (Mowbray 2002). Canvasbacks are somewhat omnivorous, feeding on a variety of vegetation and invertebrates, but are primarily vegetarians (Mowbray 2002; Terres 1980). Canvasbacks build a nest that is large and bulky with a crudely constructed foundation. Old vegetation available in the vicinity of the nest site is used to construct an interior bowl that is augmented with green vegetation and down (Mowbray 2002). Seven to nine gray to greenish-olive eggs are laid in May or June (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Canvasback

Hunting and degradation or loss of wetland habitats are the primary threats to the Canvasback. Since the species feeds on underground plant parts, they may be susceptible to poisoning from pesticides taken up by their food plants. Ingestion of lead shot is also a concern for the species (Mowbray 2002).

Potential for Occurrence in the Study Area

Canvasbacks are likely to occur within the Project area of influence in Arizona at Cluff Ranch, Willcox Playa, 3-Links Farm, Sweetwater Wetlands and the Picacho Reservoir.

Mississippi Kite

Status

The Mississippi Kite (*Ictinia mississippiensis*) is an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

The Mississippi Kite breeds in the southern United States, primarily in the southern Great Plains, and along the Mississippi River, and Gulf States (Glinski 1998a; Parker 1999). In Arizona, they occur along several rivers including the Big Sandy, Bill Williams, Hassayampa, Gila, Salt, Santa Cruz, and primarily the San Pedro. The species winters in South America. (AZGFD 2003i; Glinski 1998a).

Habitat and Life History

The breeding habitat for the Mississippi Kite is open forest or grasslands with scattered trees. In Arizona, most breeding has occurred along lowland riparian deciduous forest as found along the San Pedro River, which contains scattered live cottonwoods with a snag component used during foraging. Understory vegetation is an important element in kite habitat as it supports populations of cicadas, which are a major food source for the birds. The birds also feed on other insects, frogs, toads, small snakes, birds, and small mammals including bats, and a variety of road-killed animals (Glinski 1998a; Parker 1999). In Arizona, kites nest primarily in the tops of cottonwood trees. The birds produce two white eggs in early June, which hatch in the first week of July, but the young do not generally fledge until late August (Glinski 1998a).

Threats to the Survival of the Mississippi Kite

Degradation or loss of riparian nesting and foraging habitat are the greatest threats to the species. Pesticide poisoning accumulated from insect prey and harassment by humans may also adversely affect the species (AZGFD 2003i).

Potential for Occurrence in the Study Area

The species is known to occur within the study area in Arizona. The highest-quality breeding habitat for the Mississippi Kite in Arizona is along the San Pedro River between Winkelman and Dudleyville. A few of these birds may be present within the Project area of influence along portions of the route near the San Pedro River.

Northern Harrier

Status

The Northern Harrier (*Circus cyaneus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Northern Harrier, a circumpolar species, ranges from Alaska and most of Canada south to at least Panama. The species also occurs in Europe and Asia, and these populations migrate to northern Africa and tropical Asia during winter (Macwhirter and Bildstein 1996; Snyder 1998).

Habitat and Life History

Northern Harriers generally inhabit moist, open areas including fresh, brackish, and saltwater marshes, and wet meadows, but also prairies and tall grasslands (Snyder 1998; Wheeler 2003). Somewhat gregarious, individuals commonly perch on fence posts, low bushes, or high points in flat terrain. The Northern Harrier is a diurnal, low-altitude aerial hunter, cruising low over open plains in search of rodents, rabbits and hares, birds, reptiles and amphibians, larger insects, and carrion (Ehrlich et al. 1988; Snyder 1998; Wheeler 2003). They are known to occasionally drown small ducks by holding them under water (Wheeler 2003). Nests are constructed on the ground of twigs and grasses. Typical clutch size is four to six eggs (Snyder 1998).

Threats to the Survival of the Northern Harrier

Threats to the Northern Harrier are primarily habitat modification or loss and pesticide-caused eggshell thinning (Ehrlich et al. 1988).

Potential for Occurrence in the Study Area

The Northern Harrier is common in grasslands and agricultural areas in the Project area during winter, and the birds can be expected to occur in many Project areas. The species was recently observed at all potential Project alternative crossings of the Rio Grande (Maliakal-Witt and Witt 2010).

Osprey

Status

The Osprey (*Pandion haliaetus*) is an AZGFD WSC and a State of New Mexico SGCN (AZGFD 2010a; BISON-M 2008).

Distribution

The Osprey has a nearly global distribution, and in North America breeds primarily in Alaska, Canada, and the Pacific Northwestern portion of the United States. In Arizona, they nest at lakes on the Mogollon Rim and in the White Mountains of the eastern portion of the state, where they are concentrated on the North Fork of the White River and on a segment of the Black River

(Dodd and Vahle 1998; Poole et al. 2002; Terres 1980). Ospreys winter in the United States along the California coast, the Lower Colorado River Valley, and along the Gulf Coast and southern Atlantic seaboard. The wintering range extends through Central and South America to southern Chile and portions of the Caribbean (AOU 1998; Poole et al. 2002).

Habitat and Life History

Ospreys occupy habitats at lakes, rivers, estuaries, large open marsh areas, and along seacoasts (AOU 1998; Dodd and Vahle 1998). Important habitat elements are an adequate fish prey base and suitable large snags for perching, roosting, and nesting. Ospreys will nest singly or in colonies (Terres 1980). In Arizona, typical nesting sites contain more than one snag, which are used for territory defense, transfer of prey, and courting (Dodd and Vahle 1998). Ospreys will also nest on telephone poles, buildings, rock pinnacles, and artificial platforms erected for their use (Terres 1980). Ospreys are almost exclusively piscivorous, and only rarely take small rodents, birds, snakes, frogs, or carrion (Dodd and Vahle 1998; Terres 1980). Breeding occurs from April through September (AZGFD 2002g). The large stick nests are typically constructed atop dead snags, or on a large adjacent limb, mostly in dead ponderosa pine trees. The nests may incorporate a variety of debris from the area in the vicinity of the nest, and are normally lined with grasses or pine needles (Dodd and Vahle 1998; Terres 1980).

Threats to the Survival of the Osprey

Historically eggshell thinning from DDT was a serious threat to the species. This problem has abated to a great extent in the United States, but still exists for the species elsewhere. Other threats include habitat loss from logging, human recreational disturbance at nests, and harassment (AZGFD 2002g; Dodd and Vahle 1998).

Potential for Occurrence in the Study Area

Migrating birds could be present in the Project area in early fall and spring along the San Pedro River (Dodd and Vahle 1998). An Osprey was observed at the Arrey-Derry Project alternative crossing site during the recently conducted Project avian impact study on the Rio Grande (Maliakal-Witt and Witt 2010).

<u>Bald Eagle</u>

Status

The Bald Eagle (*Haliaeetus leucocephalus*; entire species) was listed as endangered in most states in the conterminous United States on March 11, 1967 (USFWS 1967), under endangered species legislation enacted in 1966 (Public Law 89-669), later carried over to the ESA. On July 12, 1995, the Bald Eagle was down-listed from endangered to threatened in all of the conterminous United States (USFWS 1995b), and the species was delisted range-wide on July 9, 2007 (USFWS 2007c). The species is currently a USFWS species of concern, and is being monitored for a five year period subsequent to its delisting. A post-delisting monitoring plan for the Bald Eagle was released in May of 2010 (USFWS 2010d).

A recovery plan for the Southwestern populations of the Bald Eagle was released by the USFWS on September 8, 1982 (USFWS 1982b). An October 6, 2004 petition to uplist the Sonoran Desert Area DPS of the Bald Eagle from threatened to endangered was denied by the USFWS on August 30, 2006. The Arizona District Federal Court, in response to a civil suit, enjoined the USFWS from finalizing the delisting of the population with the entire species on March 5, 2008. The USFWS subsequently conducted a 12-month review on the viability of the Sonoran Desert Area DPS of the Bald Eagle, and on February 25, 2010 published their finding in the Federal Register. The finding determined that based on current scientific and commercial information the Sonoran Desert Area DPS of the Bald Eagle did not meet the definition of a DPS (USFWS 2010c). The Arizona District Federal Court, which originally had enjoined the USFWS from delisting the Bald Eagle, has concurred with the USFWS 12-month review finding, and a notice to this effect was published in the Federal Register on September 2, 2011, finalizing the delisting of the species (USFWS 2011f). The USFWS updated and revised the 12-month review finding in 2012, determining that the Southwestern population was not a listable entity and did not meet the definition of threatened or endangered (USFWS 2012a).

The Bald Eagle is protected under the BGEPA, is a State of New Mexico threatened species and SGCN (BISON-M 2008), an Arizona BLM sensitive species, a Forest Service sensitive species, an AZGFD WSC and a USFWS Bird Species of Conservation Concern (BCC) (AZGFD 2010a; BLM 2010; USFS 2007a; USFWS 2008c).

Distribution

Bald Eagles occur over most of the North American continent wherever suitable habitat is present (AOU 1998). Bald Eagles may occur anywhere in Arizona and New Mexico where suitable habitat elements are present (Buehler 2000; Hunt 1998).

Habitat and Feeding

Bald Eagles occur at lakes, reservoirs, and along perennial rivers that support fish prey for the species. Large riparian trees, typically cottonwood, sycamore and/or willow, and cliffs are important habitat elements used for nesting and perching. In Arizona most nesting habitats of the Bald Eagle are in low-elevation desert riparian corridors, although some are in piñon-juniper or ponderosa pine woodlands (Corman and Wise-Gervais 2005; Hunt 1998).

Bald Eagles are opportunistic feeders, but fish make up the majority of their diet. Water birds can also be an important food source. Bald Eagles also consume mammals, shellfish, and carrion (Hunt 1998; Hunt et al. 1992; Wheeler 2003).

The Bald Eagle breeds on seacoasts, along rivers, in swamps, and on large lakes from central Alaska across central Canada to Labrador, and south to Baja California, central Arizona, central Texas, and across the Gulf States to southern Florida. It is present locally in the interior of North America (AOU 1998). Approximately 200 to 250 Bald Eagles winter in Arizona, primarily in the Flagstaff and Colorado River regions (AZGFD 1996; Phillips et al. 1964).

Bald Eagles nest in large live trees or snags or on cliffs near seacoasts, rivers, swamps, or large lakes (AOU 1998; Ehrlich et al. 1988). Nests have been found up to 5,900 feet from water, but the average distance to water is 660 feet (Hunt et al. 1992). Habitat surrounding Bald Eagle nest

sites varies from desertscrub to riparian or pine and nests are found both in canyons and in open country (Hunt 1998; Hunt et al. 1992; Wheeler 2003).

Threats to the Survival of the Bald Eagle

Increasing human population and increasing recreational use of breeding and wintering grounds may threaten Bald Eagles. Of 13 documented fatalities of breeding Bald Eagles in Arizona between 1987 and 1993, 5 were the result of shooting (Driscoll et al. 1999). Breeding eagles may be disturbed by human activities, such as river tubing near nest sites (Rubink 1982). Bald Eagles may also be affected by the loss of riparian habitat that provides potential nesting and perching locations.

River impoundments have inundated large reaches of riparian vegetation, livestock grazing has inhibited the regeneration of riparian tree species, and consumption of water for human use has lowered water tables and dewatered riparian areas (Hunt et al. 1992; Rubink 1982). River impoundments may benefit Bald Eagles by creating habitat for prey, including aquatic birds and introduced sport fish.

Potential for Occurrence in the Study Area

Bald Eagles are known to nest along the section of the Gila River near Winkelman, Arizona. This area includes the confluence with the San Pedro River, and is approximately 10 miles downstream of the northern boundary of the study area. It is conceivable that individual Bald Eagle may forage along the northern portion of the San Pedro River within the study area. However, most of this reach of the San Pedro River (the 7 mile upstream segment of the study area) is not perennial, and Bald Eagles are more likely to occur here during flow events. Small numbers of Bald Eagles may be present within the Project area of influence in winter, and are probably limited to portions of the Project along the mainstem Rio Grande, and occasional occurrences in the Sulphur Springs Valley in Cochise County, Arizona. Bald Eagles were encountered during the 2009-2010 winter/spring wintering bird survey conducted at four potential Project alternative crossings of the Rio Grande (Maliakal-Witt and Witt 2010).

Golden Eagle

Status

The Golden Eagle (*Aquila chrysaetos*) is protected under the BGEPA, is an Arizona BLM sensitive species, an SGCN in New Mexico and Arizona, and a BCC (AZGFD 2006a; BISON-M 2008; BLM 2010; USFWS 2008c).

Distribution

The Golden Eagle has a Holarctic distribution. In the Americas it ranges from Alaska south to central Mexico. Golden Eagles are most abundant in the western half of North America, but may occur nearly anywhere within the continental United States in winter. It is a year-round resident within all of the study area (Kochert et al. 2002).

Habitat and Life History

The Golden Eagle is a large, dark raptor that can have a wingspan of up to 8 feet (Alsop 2001). Golden Eagles are relatively common in the western United States and can be found in a variety of habitats, but prefer open ground or low hills where visibility is good for hunting (Ehrlich et al. 1988; Glinski 1998b). They nest on cliffs, large or small trees, and sometimes telephone poles (Glinski 1998b). The Golden Eagle feeds primarily on mammals, preferring rabbits and ground squirrels, but also will feed on snakes, birds, and large insects when mammals are unavailable (Ehrlich et al. 1988; Terres 1980; Glinski 1998b).

Threats to the Survival of the Golden Eagle

Golden Eagles are threatened by habitat loss, poisoning (from consuming carrion of poisoned animals), human disturbance (during nesting and occasionally from shooting), and highway deaths when the birds are attracted to road kills (AZGFD 2002h).

Potential for Occurrence in the Study Area

Golden Eagles are present in low numbers throughout the Project area of influence.

Zone-tailed Hawk

Status

The Zone-tailed Hawk (*Buteo albonotatus*) is a Forest Service sensitive species (USFS 2007a).

Distribution

Primarily a tropical species, the Zone-tailed Hawk occurs, during different seasons, from Arizona, New Mexico, and Texas south into Mexico and Central America (Johnson et al. 2000). In Arizona, the species is found throughout the northwestern, central, and southeastern portions of the state (Corman and Wise-Gervais 2005). In New Mexico, the species is scattered across the state, primarily in the southwestern and south-central areas with a few scattered locations to the north (Wheeler 2003).

Habitat and Life History

Zone-tailed Hawks are found primarily in deciduous desert riparian areas, with some use of subalpine marsh and pine-oak, piñon-juniper woodlands (BISON-M 2008; Corman and Wise-Gervais 2005; Johnson et al. 2000). Zone-tailed Hawks winter in southern Mexico and Central America, arriving in the United States in mid-March. Nesting commences in April (Corman and Wise-Gervais 2005; Johnson et al. 2000), generally below 7,000 feet (Wheeler 2003). North American and northern Mexican hawks depart for wintering grounds between September and October (Johnson et al. 2000).

Threats to the Survival of the Zone-tailed Hawk

Threats to the Zone-tailed Hawk include exposure to pesticides on their wintering grounds and loss or degradation of riparian habitat in North America (Johnson et al. 2000).

Potential for Occurrence in the Study Area

From mid-March to October there is a high potential for small numbers of Zone-tailed Hawks occurring in those portions of the study area containing desert riparian corridors or Madrean evergreen woodlands.

Common Black-hawk

Status

The Common Black-hawk (*Buteogallus anthracinus*) is a USFWS species of concern, a USFS sensitive species, a State of New Mexico threatened species and SGCN, an AZGFD WSC, and a USFWS BCC (AZGFD 2010a; BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

The Common Black-hawk ranges from central and southeast Arizona, southern New Mexico, and west Texas south through central Mexico and Central America to the north coasts of Colombia, Venezuela, and the eastern Caribbean Islands (AOU 1998; Terres 1980).

Habitat and Life History

Typical habitat for the species is along creeks and rivers that support mature gallery forest, or tropical deciduous forest south of the United States (AOU 1998; Schnell 1998; Terres 1980). The Common Black-hawk feeds on a variety of riparian associated species, including primarily fish and frogs, but also will take reptiles, small mammals, birds, crabs, and other invertebrates (Schnell 1998; Terres 1980). The hawks will perch and hunt from rocks at streamside, or low limbs over streams, or forage while walking along shores. The birds arrive in the southwestern United States in mid-March (Schnell 1998; Terres 1980). Nests are usually constructed by the female with materials provided by the male. Nest trees selected are usually broad-leaved riparian species, but ponderosa and Douglas fir are occasionally used. Common Black-hawks may rebuild nests of other raptor species (Schnell 1998). Two eggs are typically laid in mid-April, and hatch at the end of May. The male hunts and brings prey to the nest once the eggs have hatched (Schnell 1998).

Threats to the Survival of the Common Black-hawk

Threats to the Common Black-hawk include degradation or loss of riparian habitat. Groundwater pumping, channelization of streams, and water diversions may all adversely affect habitat. Common Black-hawks are indirectly susceptible to the effects of changes in water quality as it affects prey on which they depend. The trampling effects of livestock on deciduous tree recruitment in riparian areas may be detrimental to perpetuation of habitat. Common Black-hawks are also susceptible to human disturbance (AZGFD 2005; Schnell 1998).

Potential for Occurrence in the Study Area

Common Black-hawks occur in southwestern New Mexico primarily in the San Francisco, Gila, and Mimbres drainages, and occasionally in the middle Rio Grande Valley (BISON-M 2008). The best habitat for the Common Black-hawk within the study area in Arizona is along the San Pedro River and at Aravaipa Canyon. Common Black-hawks can be expected to occur in low numbers within the Project area of influence in the San Pedro Valley. The Project would cross an ephemeral reach of the Mimbres River lacking suitable habitat for the Common Black-hawk, and the species would not be expected to occur in the area.

Northern Gray Hawk

Status

The Northern Gray Hawk (*Buteo nitidus maximus*) is a New Mexico BLM sensitive species, a Forest Service sensitive species, a USFWS species of concern, and an AZGFD WSC (AZGFD 2010a; 2006a; BISON-M 2008; USFS 2007a).

Distribution

The range of the Gray Hawk extends from the southwestern United States south to Paraguay and southern Brazil (AOU 1998; Bibles et al. 2002). The species occurs within Arizona primarily in Pima, Santa Cruz, and Cochise counties, and along the Santa Cruz and San Pedro rivers, where most nesting in the state occurs (Glinski 1998c). Gray Hawks have also been recorded along the Verde River, Hassayampa, Salt, and Gila rivers (Glinski 1998c).

Habitat and Life History

Throughout most of their range, Gray Hawks inhabit upland tropical deciduous forests, but at the northern extent of their range, in Arizona, they tend to use broad-leaf riparian deciduous forest (Glinski 1998c). Reptiles, particularly lizards, make up a large portion of the diet of the Gray Hawk, but they also take snakes, nestling and adult birds, small mammals, insects, and occasionally fish (Bibles et al. 2002; Ehrlich et al. 1988; Glinski 1998c; Terres 1980). Gray Hawks arrive in Arizona in March and construct nests in the upper canopy of medium to large trees along riparian corridors (Glinski 1998c). They lay two or three eggs, with usually only one nestling surviving to fledge in Arizona (Glinski 1998c; Terres 1980).

Threats to the Survival of the Northern Gray Hawk

Primary threats to the Northern Gray Hawk in Arizona are alteration or loss of broad-leaf riparian habitat (AZGFD 2000a).

Potential for Occurrence in the Study Area

The Northern Gray Hawk is known to occur in small numbers within the Project area of influence primarily on the San Pedro River, and to a lesser extent on the Santa Cruz River (Glinski 1998c).

Swainson's Hawk

Status

Swainson's Hawk (*Buteo swainsoni*) is a Forest Service sensitive species, and a Pima County PVS (AZGFD 2010a; Pima County 2004; USFS 2007a).

Distribution

Swainson's Hawk is widely distributed in the western United States in the summer, and occurs throughout most of Arizona, with the exception of the low desert areas in the southwestern portion of the state (England et al. 1997; Glinski and Hall 1998). Most of the birds winter in the pampas of southern South America (AOU 1998).

Habitat and Life History

Swainson's Hawks may use savannas, open pine-oak woodlands, agricultural habitats, and semi-desert grassland interspersed with desertscrub (Glinski and Hall 1998; Ehrlich et al. 1988). What these habitats often have in common is the presence of scattered trees (AOU 1998). Swainson's Hawks feed on small mammals, birds, snakes, lizards, frogs and toads, insects; particularly crickets and grasshoppers, and occasionally on bats (Ehrlich et al. 1988; Glinski and Hall 1998; Terres 1980). Most Swainson's Hawks return to Arizona to breed in April, and they usually return to the area used in previous years (Glinski and Hall 1998; Terres 1980). Large nests of large sticks and twigs with a grass lining are usually placed in tall trees, but the birds may occasionally nest on cliffs, rocky pinnacles, or even on the ground (Ehrlich et al. 1988; Terres 1980). Both the male and female of a pair cooperate in nest construction (Glinski and Hall 1998). Clutch size is 2 or 3 eggs (Ehrlich et al. 1988; Glinski and Hall 1998; Terres 1980).

Threats to the Survival of Swainson's Hawk

Habitat loss due to urban development adversely impacts the species (AZGFD 2001d). At least one threat to this species is the shooting of birds perched along roadsides, but they are also susceptible to pesticides on their wintering grounds in Argentina (AZGFD 2001d; Ehrlich et al. 1992; Glinski and Hall 1998).

Potential for Occurrence in the Study Area

Within the study area, Tier 1 PCAs are delineated for the Swainson's Hawk in the vicinity of Brawley Wash in the Altar Valley southwest of Tucson, the Santa Rita Experimental Range south of Tucson, and parts of the Sierrita and Santa Rita mountains (Pima County 2004). Swainson's Hawks are common during migration in the grasslands and agricultural fields of the Sulphur Springs Valley near Willcox, Arizona (Glinski and Hall 1998), and are likely to occur in similar habitats elsewhere in the Project area.

Ferruginous Hawk

Status

The Ferruginous Hawk (*Buteo regalis*) is a New Mexico BLM sensitive species, a State of New Mexico SGCN, and an AZGFD WSC and SGCN, and a USFWS BCC (AZGFD 2010a; 2006a; BISON-M 2008; USFWS 2008c). Ferruginous Hawks are listed as sensitive by the Arizona BLM only for a small nesting population in central Arizona, outside the study area.

Distribution

The range of the Ferruginous Hawk is from southwestern Canada south through most of the western United States, and south to north-central Mexico (Bechard and Schmutz 1995; Glinski 1998d). The birds are residents in northern Arizona, and many winter in southern Arizona (Glinski 1998d).

Habitat and Life History

Typical habitats for Ferruginous Hawks are wide open grasslands, prairies, deserts, and open piñon-juniper woodland. Use of an area tends to be reduced by increased shrubby vegetation (Bechard and Schmutz 1995; Glinski 1998d). Ferruginous Hawks feed almost exclusively on small mammals, including prairie dogs, ground squirrels, jackrabbits and cottontails, but they will also eat snakes, lizards, large insects, and occasionally bats (Ehrlich et al. 1988; Terres 1980). Nests are usually placed in large trees, but they may also nest on cliffs, banks, buttes, slopes, or clay or rock pinnacles (Ehrlich et al. 1992: Mikesic 2008a; Terres 1980). Nests are very large and are constructed of coarse materials, primarily large sticks (Glinski 1998d). Nesting normally occurs in March, with 3-4 white eggs laid between March and May.

Threats to the Survival of the Ferruginous Hawk

Threats to the Ferruginous Hawk include habitat alteration, fragmentation, or loss, collisions with transmission lines and vehicles on highways, shooting and trapping of birds, and pesticides (AZGFD 2001e; Ehrlich et al. 1992; Terres 1980).

Potential for Occurrence in the Study Area

Because there is abundant suitable habitat for the Ferruginous Hawk within a large portion of the study area, the birds are certain to be present in some areas at least while foraging.

American Peregrine Falcon

Status

The American Peregrine Falcon (*Falco peregrinus anatum*) was, at one time, listed as endangered under the ESA, but recovered and was subsequently delisted. Post-delisting monitoring of the Peregrine Falcon will be performed until at least 2015 (USFWS 2003b). The Peregrine Falcon is a State of New Mexico threatened species and SGCN. It is an Arizona BLM sensitive species, a Forest Service sensitive species, a USFWS species of concern, and an

AZGFD WSC and SGCN (AZGFD 2010a; 2006a; BISON-M 2008; USFS 2007a). The Peregrine Falcon is a USFWS BCC (USFWS 2008c).

Distribution

The Peregrine Falcon has a nearly global distribution, and ranges from tropical habitats to tundra. The American subspecies occurs across most of North America, with the exception of arctic tundra and the Pacific Northwest (White et al. 2002).

Habitat and Life History

The Peregrine Falcon inhabits open country where prey is abundant (Ehrlich et al. 1988; Glinski 1998e). Their diet includes primarily birds, including Rock Doves (*Columba livia*), many aquatic bird species, game birds, and passerines. Rodents, bats, and occasionally flying insects are also consumed (Glinski 1998e; Terres 1980; White et al. 2002). Peregrine Falcons commonly hunt cooperatively as a pair (Glinski 1998e). Peregrine Falcons do not construct their own nests, but modify old nests of raptors and corvids. In Arizona, nests are primarily on cliff ledges, but elsewhere nests in trees are used (Glinski 1998e; Terres 1980). The nest is not much more than a scrape in the soil/gravel present on ledges (Glinski 1998e). The birds lay 3-4 eggs between March and June.

Threats to the Survival of the American Peregrine Falcon

Historically, the primary threat to Peregrine Falcons has been from pesticides, which accumulate in the birds and cause failure of nesting efforts resulting from eggshell thinning (AZGFD 2002i). Rock climbing near eyries can disturb nesting Peregrine Falcons. Disturbance of nesting birds and take of individual animals are current recognized threats to the birds in New Mexico (NMDGF 2008).

Potential for Occurrence in the Study Area

Due to the wide range of the species and the abundant open landscapes within the study area Peregrine Falcons are anticipated to potentially occur in many areas within the Project area of influence. Peregrine Falcons were observed at the Arrey-Derry and Las Cruces Project alternative crossings of the Rio Grande during the recently conducted Project avian impact study (Maliakal-Witt and Witt 2010).

<u>Arctic Peregrine Falcon</u>

Status

The Arctic Peregrine Falcon (*Falco peregrinus tundrius*) is a State of New Mexico threatened species, and a USFWS species of concern and BCC (BISON-M 2008; USFWS 2008c).

Distribution

Peregrine Falcons are almost global in their range, with the Arctic Peregrine nesting in arctic tundra of North America and migrating as far south as Argentina and Chile (Wheeler 2003, White et al. 2002).

Habitat and Life History

Peregrine Falcons may occur in a variety of open habitats, often at lakes or along rivers or streams, and commonly with rocky outcrops or cliffs nearby for nesting. Arctic Peregrine Falcons normally inhabit savannah, tundra, and may occur along seacoasts in winter. Peregrine Falcons are both perch and aerial hunters, taking a wide variety of prey, which is typically dominated by species of birds. They may restrict their hunting to selection of a few bird species that are common in areas where the Peregrine Falcons are present during a given season (Wheeler 2003). They take ducks, wading and shore birds, passerines, Rock Pigeons, upland game birds, and small raptors. They also occasionally take small mammals and insects (Terres 1980). Nest sites are typically near water and consist of a scrape on a cliff or within a re-used eagle, hawk, or raven nest (Ehrlich et al. 1988; Terres 1980). Peregrine Falcons lay three to four cream to buff-colored eggs between late May and June (Terres 1980; Wheeler 2003).

Threats to the Survival of the Arctic Peregrine Falcon

Pesticides in the environment are probably the greatest potential threat to Peregrine Falcons (NMDGF 2008). Their selection of nest sites in inaccessible places minimizes the potential for threats to the species. Recreational rock climbing has been known to disturb nesting Peregrine Falcons in some instances (Glinski 1998e), but is unlikely to impact the Arctic Peregrine due to the remoteness of nesting sites at high latitudes.

Potential for Occurrence in the Study Area

The Arctic Peregrine Falcon is considered very uncommon in the region, but individual birds could move through the Project area during migration.

<u>Northern Aplomado Falcon</u>

Status

The Northern Aplomado Falcon (*Falco femoralis septentrionalis*) was listed as endangered under the ESA on February 25, 1986 (USFWS 1986a). There is no designated critical habitat for the Northern Aplomado Falcon. The USFWS released a plan to re-establish the Aplomado Falcon in portions of its former range in southern New Mexico and Arizona on July 26, 2006 (USFWS 2006b), and began introductions shortly thereafter. The introduction is a Nonessential Experimental Population (NEP) established under the 10(j) rule of the ESA. The Northern Aplomado Falcon is listed as endangered and as an SGCN by the State of New Mexico, and is an AZGFD WSC and SGCN (AZGFD 2010a; 2006a; BISON-M 2008).

Distribution

The historic range of the Aplomado Falcon is from the southern tip of South America north to the southwestern United States, where the species occurred at the northern extent of its range in west Texas, south-central New Mexico, and southeastern Arizona (Keddy-Hector 2000). The range of the species apparently retracted from the United States to Mexico in the late 19th century for unknown reasons (Phillips et al. 1964). The last nesting pair known in the United States was at Deming, New Mexico in 1952 (Peregrine Fund 2009a). There have been successful re-introductions of the species in Texas and Mexico. The southern Texas population, where re-introduction efforts began in 1993 under a cooperative agreement between the Peregrine Fund and the USFWS, is now considered a sustainable population (Peregrine Fund 2009a). Beginning in 2006 Aplomado Falcons have been released at three sites in New Mexico, including near Lordsburg, Deming, and Truth or Consequences. Four pairs of falcons were observed in New Mexico in 2008, two on the Armendaris Ranch east of Truth or Consequences, and one pair each near Lake Valley, and on Otero Mesa (Peregrine Fund 2009b). Other Aplomado Falcons occurring in the United States may be vagrants from northern Mexico, where the birds still occur (Keddy-Hector 2000).

Habitat and Life History

The Aplomado Falcon occurs in open plains including grassland, savannah and desertscrub habitats, but is predominantly associated with semidesert grasslands in the southwestern United States. Occupied habitat typically includes scattered trees and shrubs used for perching and nesting (Keddy-Hector 2000). The only reliable records of the species in Arizona after the beginning of the 20th century are from the grass-yucca plains of Cochise County (Phillips et al 1964), and this is probably the typical habitat used in the United States.

Aplomado Falcons exhibit strong pair-bonding, are often observed together, and they will hunt cooperatively. They are also known to steal food from other birds, and will cache excess foods (Keddy-Hector 2000). Birds make up the bulk of prey, but insects are commonly taken, and they have been recorded taking bats, rodents, lizards, and frogs (Ehrlich et al. 1988; Keddy-Hector 2000; Terres 1980). They are strong fliers in pursuit of prey, and are effective at hunting on the ground as well (Keddy-Hector 2000).

Aplomado Falcons do not construct their own nest but modify old stick platforms placed in trees by other bird species, particularly those of other raptors or large corvids (Keddy-Hector 2000; Terres 1980). They produce 2-4 eggs that are laid between March and May (Terres 1980).

Threats to the Survival of the Northern Aplomado Falcon

The primary threats to the survival of the Aplomado Falcon are habitat degradation or loss and continued use of organochlorine pesticides and heavy metals released into the environment, which cause poisoning of prey and result in egg shell thinning (Keddy-Hector 2000).

Potential for Occurrence in the Study Area

Currently the USFW releases about 100 Aplomado Falcons between sites in Texas and New Mexico each year (Peregrine Fund 2009a). While the number of successful pairs in New Mexico

is still modest, continued releases over time will likely result in an increase the numbers of this species in southern New Mexico, as has occurred in southern Texas. One of the release sites is located a few miles west of Deming, New Mexico. There is abundant suitable habitat for the Aplomado Falcon in the Project area from the Sulphur Springs Valley north of Willcox, Arizona east to the eastern terminus of the Project north of Carrizozo, New Mexico. The 2009-2010 Project alternatives Rio Grande bird study located the Aplomado Falcon at the Las Cruces crossing site (Maliakal-Witt and Witt 2010), and the species is likely present elsewhere in grassland habitat in the New Mexico portion of the study area.

Crested Caracara

Status

The Crested Caracara (*Caracara cheriway*) is an AZGFD WSC (AZGFD 2010a).

Distribution

The distribution of the Crested Caracara includes most of South America, including Tierra del Fuego and the Falkland Islands, Central America and most of Mexico except the north-central portions. The species also ranges into southern Arizona, Texas, central Florida, and rarely southern Louisiana (AOU 1998; Morrison 1996). Their distribution in Arizona is limited to central and southern Pima County and as far north as the Red Rock area in southern Pinal County (Corman and Wise-Gervais 2005; Tersey 2009).

Habitat and Life History

The Crested Caracara occurs in a variety of habitats up to about 9,800 feet elevation where open to semi-open areas with low profile vegetation with scattered trees suitable for nesting are present. Areas that contain perches, including trees and fence posts, that provide a good view near nest sites are preferred (Morrison 1996). Caracaras are mostly restricted to Sonoran desertscrub habitat in southern Arizona, are commonly associated with a water source, and seldom occur outside of desertscrub habitat in valleys (Corman and Wise-Gervais 2005; Levy 1998).

Crested Caracaras are considered opportunistic feeders, feeding primarily on carrion, but they commonly feed on any animal materials either live or dead, including small mammals, reptiles, and invertebrates (AZGFD 2003j; Ehrlich et al. 1988; Levy 1998). They apparently nest primarily in saguaros in Arizona, placing the nest in low crotches of the plants generally above the tops of surrounding vegetation, and are thus usually well hidden (Levy 1998). Nests are constructed of finer desert vegetation, and are thus distinct from the stick nests of raptors and corvids that commonly occur in similar nesting situations (Levy 1998).

Threats to the Survival of the Crested Caracara

In the United States threats include road mortality of birds scavenging carrion, conversion of habitat to agriculture or residential uses, and illegal shooting and trapping. Poisoning for mammalian predator control is still somewhat of an issue for birds that feed at carrion, but the species is apparently secure within its range in Arizona (AZGFD 2003j).

Potential for Occurrence in the Study Area

The only portion of the Project where the Crested Caracara has potential to occur is in the vicinity of Red Rock, Arizona, where the birds have a long-term presence in the area associated with a nearby livestock feed yard (BLM 2009; Tersey 2009).

Montezuma Quail

Status

The Montezuma Quail (*Cyrtonyx montezumae*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Montezuma Quail ranges from Oaxaca, Mexico to the southwestern United States, where it reaches the northern extent of its range in southern New Mexico (Stromberg 2000; Terres 1980).

Habitat and Life History

Montezuma Quail typically inhabit oak or pine-oak woodlands where tall grasses, particularly tanglehead (*Heteropogon contortus*), provide cover. They are often found on steep grassy slopes, but also occur in foothills among mesquite, so long as grass cover is available (Stromberg 2000; Terres 1980). Montezuma Quail forage on the ground by digging for soft bulbs, sedge tubers, and seeds. The birds also consume acorns (*Quercus* spp.), fruits (*Juniperus* spp.), and insects (Bishop and Hungerford 1965; Ehrlich et al. 1988; Terres 1980). Nests are shallow depressions constructed in dense grasses with grass tops providing cover, and are lined with grasses. Ten to 12 white to cream-colored eggs are laid between April and September (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Montezuma Quail

Primary threats to Montezuma Quail are from cattle grazing and logging (Ehrlich et al. 1988). Other threats include habitat alteration from climate change and habitat invasion by nonnative plant species (Stromberg 2000).

Potential for Occurrence in the Study Area

The Montezuma Quail could occur within the Project area of influence in the Peloncillo, Winchester, and Galiuro mountains.

Scaled Quail

Status

The Scaled Quail (*Callipepla squamata*) is an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008).

Distribution

The range of the Scaled Quail is centered along the Rio Grande in northeast Mexico, New Mexico, and west Texas, extending into the grasslands of southeastern Arizona (Dabbert et al. 2009).

Habitat and Life History

Scaled Quails inhabit flats and associated washes of desert grassland and open arid scrub (Dabbert et al. 2009; Terres 1980). Their diet consists primarily of a variety of seeds, mostly those of weeds and grasses. Insects make up a small portion of the diet seasonally (Dabbert et al. 2009; Terres 1980). The nest of the Scaled Quail is a shallow scrape lined with dry grasses placed under bushes or among grasses, with or without a canopy (Dabbert et al. 2009; Ehrlich et al. 1988; Terres 1980). Scaled Quail lay 12 to 14 white to cream-colored eggs between April and September (Terres 1980).

Threats to the Survival of the Scaled Quail

The primary threat to the Scaled Quail is from the effects of livestock overgrazing. Hunting may locally depress some populations, but is probably not significant on a regional scale for the species (Dabbert et al. 2009).

Potential for Occurrence in the Study Area

Scaled Quail are likely to be present in many areas of the Project, through much of New Mexico to as far west as the San Pedro River Valley in Arizona.

<u>Gould's Wild Turkey</u>

Status

Gould's Wild Turkey (*Meleagris gallopavo mexicana*) is a State of New Mexico threatened species, is a USFS sensitive species, a USFWS species of concern, and an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008; USFS 2007a).

Distribution

Gould's Turkey is limited in New Mexico to Hidalgo County, where the species has persisted in small numbers in the Animas, San Luis and Peloncillo Mountains (BISON-M 2008). The species was common in southern Arizona at the turn of the 20th Century, but eventually was removed by hunting, primarily by miners. The birds have been reintroduced and are currently well-established in the Huachuca and Chiricahua Mountains, to a point where these populations have been used for other reintroductions in the Pinaleño, Galiuro, Santa Rita and Santa Catalina Mountains (AZGFD 2011c).

Habitat and Life History

Gould's Turkeys inhabit moderate to high elevations where terrain is steep and vegetation provides cover and forage. The birds forage on the ground for seeds, nuts, acorns and other plant parts and invertebrates. Ten to 12 eggs are typically laid in nests consisting of a shallow, lined depression concealed among grasses or shrubbery. The birds roost at night in taller trees, well above the ground (BISON-M 2008; Ehrlich et al 1988; National Geographic Society [NGS] 2002).

Threats to the Survival of Gould's Wild Turkey

The principle threats to Gould's Wild Turkey include habitat degradation or loss, competition with livestock for resources, disease, and disturbance and take by humans (BISON-M 2008).

Potential for Occurrence in the Study Area

Gould's Wild Turkeys are unlikely to occur in the study corridor in New Mexico, and are probably limited to where Link C170 would cross the Galiuro Mountains in Arizona.

<u>Yuma Clapper Rail</u>

Status

The Yuma Clapper Rail (*Rallus longirostris yumanensis*) was listed on March 11, 1967 (USFWS 1967), under endangered species legislation enacted in 1966 (Public Law 89-669), later carried into the ESA upon its enactment. This listing only protects the populations in California and Arizona, and does not extend to populations in Mexico. No critical habitat has been designated for this species. The Yuma Clapper Rail Recovery Plan was released in 1983 (USFWS 1983). The Yuma Clapper Rail is an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

In the western Americas, the Clapper Rail occurs locally along the Pacific coast from Central California to southern Baja California, in southeast California and south-central Arizona, and along the Pacific Coast of Mexico from Sonora to Nayarit (AOU 1998). The species also occurs along much of the Atlantic Seaboard and Gulf Coast.

The breeding range of the Yuma Clapper Rail is geographically isolated from those of all other subspecies of Clapper Rail. It is thought that the Yuma Clapper Rail was restricted to the area near Yuma, Arizona prior to 1940 but has since expanded its range. This range expansion is apparently the result of river impoundments and expanded agriculture creating stable marsh habitat in places where it did not previously exist (Rosenberg et al. 1991; U.S. Bureau of Reclamation 2008).

Yuma Clapper Rails were originally thought to migrate to Mexico because they were not detected on their breeding grounds in the United States during the winter months (Todd 1986). It is possible that Yuma Clapper Rails were not detected during the winter because wintering populations are almost completely silent (Rosenberg et al. 1991). Recent radio telemetry studies

have shown that over 70 percent of the breeding population winters along the Lower Colorado River (Eddleman 1989, as cited in Rosenberg et al. 1991).

Habitat and Life History

Yuma Clapper Rails in Arizona breed in freshwater marshes with dense vegetation exceeding 16 inches in height, including cattail (*Typha* spp.), and/or giant bulrush (*Scirpus californicus*). Pond openings, flowing channels, and emergent soils are important elements of suitable habitat for the species. Water depth at preferred sites is 12 inches or less (Todd 1986). The interface between water and soil is important, and rails use areas where the slope of the shoreline is relatively gentle. Conway et al. (1993) compared habitat variables between random sites and sites used heavily by Yuma Clapper Rails. They reported that during the breeding season, the rails used sites that had less residual vegetation, were farther from upland habitat, and were closer to vegetative edges, open water, and dry ground than were random sites. The density of Yuma Clapper Rails does not appear to be correlated with habitat patch size (Anderson and Ohmart 1985, Todd 1986). Yuma Clapper Rails have been found in wetlands as small as 0.3 acre (Todd 1986).

Threats to the Survival of the Yuma Clapper Rail

The primary threat to Yuma Clapper Rails is habitat destruction (AZGFD 1996). Marshes may be destroyed as the result of stream channelization, dam construction, or appropriations of water for human use. Marshland may also be affected locally by livestock grazing. Yuma Clapper Rails may also be threatened by concentrations of contaminants in wetlands (Todd 1986).

Agricultural runoff may have high concentrations of pesticides, and the quality as well as quantity of marshlands in the Colorado River basin may be threatened. Wetlands collect and concentrate pollutants that may affect both Yuma Clapper Rails and their prey base. Pesticides, especially DDT, and other pollutants may be of particular concern for Yuma Clapper Rails in Mexico, where pesticide use is unregulated (Todd 1986).

Potential for Occurrence in the Study Area

The only known occurrence records in the Project area for the Yuma Clapper Rail are occasional sightings of individuals at the Picacho Reservoir at the far west end of the study area, approximately 15 miles east of Casa Grande, Arizona (AZGFD 2006c; Todd 1986). This reservoir is used as temporary storage for irrigation water and is pumped dry regularly. Rails are only present during years with above-average rainfall when surplus water is allowed to persist in the reservoir.

<u>Sandhill Crane</u>

Status

The Sandhill Crane (*Grus canadensis*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Sandhill Crane breeds from northeast Siberia, Alaska, and most of west and central Canada south to the north-central United States including the Great Lakes Region. Other isolated breeding populations occur between northeastern California and northwest Colorado. Breeding populations also occur in western Cuba, and sporadically from Florida west to southern Mississippi. Birds winter in the southern United States, including central and southeastern California, southern Florida, wetlands and rivers in the Southwest, and into north-central Mexico (Tacha et al. 1992).

Habitat and Life History

Sandhill Cranes inhabit river valleys, marshes, and wet meadows during the breeding season, and in winter they occur along rivers and at playa lakes in the southwestern United States. Sandhill Cranes are omnivorous and opportunistic in their feeding habits, feeding off the surface, in the shallow subsurface, or in shallow aquatic habitats with emergent vegetation by probing with their long bills. They feed on seeds and cultivated grains, berries, tubers, insects, gastropods, crayfish, earthworms, amphibians and reptiles, small mammals, and birds (Tacha et al. 1992; Terres 1980). The large nests are constructed from marsh plants, dead sticks, grasses, and weeds, and are situated either in shallow water or on the ground in marshes or adjacent grasslands (Ehrlich et al. 1988; Terres 1980). Sandhill Cranes lay one to three olive-colored eggs with lavender to brown spots. Young are volant about 90 days after hatching (Terres 1980).

Threats to the Survival of the Sandhill Crane

Habitat loss is the most significant threat to the species (Ehrlich et al. 1988). Permits are allowed annually for hunting the species in both New Mexico and Arizona, but hunting is limited and does not significantly adversely affect the regional populations.

Potential for Occurrence in the Study Area

Sandhill Cranes are known to occur seasonally in the study area in both New Mexico and Arizona. Major wintering concentrations are located in or near Bosque del Apache NWR, Caballo Reservoir, and the Hatch and Uvas valleys in New Mexico, and in the Sulphur Springs Valley in southeastern Arizona. A study conducted by the University of New Mexico for the Project assessed avian collision risk at four potential alternative crossing sites of the Rio Grande, with numerous Sandhill Cranes observed at all four proposed locations (Maliakal-Witt and Witt 2010).

<u>Western Snowy Plover</u>

Status

The Western Snowy Plover (*Charadrius nivosus nivosus*) is an AZGFD WSC, a USFWS BCC and an SGCN in New Mexico and Arizona and New Mexico (AZGFD 2010a; 2006a; BISON-M 2008; USFWS 2008c). The Pacific Coast population of the Western Snowy Plover was listed as threatened under the ESA, under the name *C. alexandrinus nivosus* (USFWS 1993a), and critical habitat was designated in 1999 (USFWS 1999a). The critical habitat designation was revised in

2005 (USFWS 2005b), and revised again in 2012, concurrent with a taxonomic revision that recognized the separation of the North American species *C. nivosus* from the Eurasian species *C. alexandrinus* (USFWS 2012b).

Distribution

The Western Snowy Plover ranges discontinuously from southwest Washington and southwestern Montana south to Baja California Sur and portions of the western Great Plains as far east as northwest Texas (Page et al. 2009). The ESA-listed population and its designated critical habitat is restricted to the Pacific Coast, and does not occur in Arizona or New Mexico (USFWS 2011a).

Habitat and Life History

The Western Snowy Plover inhabits coastal shores, river bars, and shores of saline inland lakes, wastewater ponds, and manmade reservoirs (Page et al. 2009). Snowy Plovers forage along shorelines at the water's edge for marine or fresh water invertebrates and small fish. They also take terrestrial invertebrates (Ehrlich et al. 1988; Terres 1980). Snowy Plovers construct a simple scrape of a nest that is minimally augmented with twigs, shells, or other debris (Ehrlich et al. 1988; Terres 1980). Nests are often situated near a conspicuous feature (driftwood, cow dropping, or plant, for example) within otherwise barren habitat (Page et al. 2009). Two to three black-marked buff-colored eggs are laid in April or May (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Western Snowy Plover

Principle threats to the species are habitat modification and loss due to groundwater pumping, conversion of habitat for human use, and OHV use in nesting areas (AZGFD 2002j).

Potential for Occurrence in the Study Area

The Western Snowy Plover is uncommon in New Mexico, nesting in a few scattered locations, and is rare in Arizona (Page et al. 2009). It has been recorded at Bosque del Apache NWR. There is a low potential for small numbers of this species occasionally occurring within the Project area of influence.

<u>Piping Plover</u>

Status

The Piping Plover (*Charadrius melodus*) was listed as either threatened or endangered by population under the ESA, without critical habitat (USFWS 1985). Critical habitat was subsequently designated for several populations of the Piping Plover, but none that occur within the study area. The Piping Plover is a State of New Mexico threatened species (BISON-M 2008).

Distribution

The inland population breeding area is centered in the northern Great Plains from southeastern Alberta and southern Saskatchewan, and Manitoba south along the major prairie rivers to

northeast Nebraska (AOU 1988; Elliot-Smith and Haig 2004). Disjunct populations occur in northeast and southeast Colorado, southwest Kansas, and the panhandle region of Oklahoma and Texas (Elliot-Smith and Haig 2004). It is considered a very rare migrant species in New Mexico (NMDGF 2008).

Habitat and Life History

The Piping Plover requires open shoreline habitats suitable for nesting near waters that provide access to invertebrate prey species. Piping Plovers primarily inhabit sparsely vegetated, gravelly beaches, alkali, and sand flat habitats, but are also recorded using shores of reservoirs, lakes, and rivers, and human modified habitats including gravel pits and industrial ponds (Elliot-Smith and Haig 2004).

Piping Plovers feed at or near the water line at both marine and freshwater habitats, and glean invertebrates from rocks and vegetation further from the water's edge. Where associated with marine environments they feed primarily on shore-stranded marine invertebrates, including mollusks, marine worms, and crustaceans (Ehrlich et al. 1988; Elliot-Smith and Haig 2004). They also take benthic invertebrates from back beach ponds, and limicolous invertebrate species of algal flats, the edges of inland lakes, and terrestrial invertebrates in upland areas away from the water's edge (Elliot-Smith and Haig 2004; Terres 1980). The inland Piping Plover inhabits sparsely vegetated sandy or muddy shores of shallow, alkaline lakes or sandbars in rivers (AOU 1988; Elliot-Smith and Haig 2004).

Nests are constructed well above the high water mark in areas free of vegetation, and consist of a shallow scrape that is sometimes lined with concealing materials (Ehrlich et al. 1988; Elliot-Smith and Haig 2004; Terres 1980). Typically 4 (3-5) eggs are produced (Ehrlich et al. 1988; Elliot-Smith and Haig 2004; Terres 1980). Eggs lost to predation or other causes often stimulate re-nesting behavior. Up to five replacement clutches in a single season have been recorded (Elliot-Smith and Haig 2004).

Threats to the Survival of the Piping Plover

Primary threats to the Piping Plover include habitat degradation or loss resulting from urbanization, habitat change due to water table fluctuation resulting from human use, disturbance of nesting areas by OHV use, and predation by pets (Elliot-Smith and Haig 2004; NMDGF 2008).

Potential for Occurrence in the Study Area

The Piping Plover is a rare spring migrant to New Mexico, and has most often been observed at Bosque del Apache NWR south of Socorro (BISON-M 2008). There are no other areas within the study area where this species is anticipated to occur.

Mountain Plover

Status

The Mountain Plover (*Charadrius montanus*) is a Forest Service sensitive species and an AZGFD SGCN (AZGFD 2010a; 2006a; USFS 2007a). In New Mexico, the Mountain Plover is a state sensitive species and an SGCN (BISON-M 2008). The species is a USFWS BCC (USFWS 2008c).

Distribution

The breeding range of the Mountain Plover is restricted to the Great Plains region of North America, from southern Alberta, southwestern Saskatchewan, and northern Montana south through Wyoming, western Nebraska, Colorado, and western Kansas to northeastern Utah, northwestern, central, and southeastern New Mexico, western Texas, and western Oklahoma (AOU 1998). There is a record of the birds nesting in the short-grass prairies of east-central Arizona, and other non-nesting sightings elsewhere in Arizona (Corman and Wise-Gervais 2005). There are numerous occasional records of the Mountain Plover from eastern, central, and southern New Mexico (BISON-M 2008).

Habitat and Life History

Mountain Plovers are birds of the Great Plains, where they evolved with American Bison, Pronghorn, and prairie dogs. Areas used are typically grazed or otherwise disturbed, where vegetation is short-cropped (Mikesic 2008b). Mountain Plovers feed primarily on insects found on the ground (Ehrlich et al. 1988; Knopf and Wunder 2006; Terres 1980). For breeding habitat, they require sites where vegetation is less than 4 inches in height, there is at least 30 percent bare ground, and slopes less than about 2 percent (Knopf and Wunder 2006; Mikesic 2008b). In some areas, Mountain Plovers selectively nest in prairie dog towns, where these animals create ideal habitat by their grazing and burrowing (AZGFD 2001f; NGPC 2009). The nest is a slight depression on open ground, often abutting an object such as cow chips, and is occasionally partially lined with dried grasses (NGPC 2009; Terres 1980). Two to 4 eggs are normally laid (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Mountain Plover

The primary threats to the Mountain Plover include habitat alteration from conversion of land to agriculture, colonization by invasive weeds, or planted livestock forage that alters habitat. OHV use can be detrimental to nesting birds and habitat (AZGFD 2001f).

Potential for Occurrence in the Study Area

The Mountain Plover does not occur in large numbers in New Mexico or Arizona, but there is some breeding in portions of New Mexico as far south as Roswell, and as far west as Fence Lake (Knopf and Wunder 2006). There are annual wintering records for the species as far south as the Gray Ranch in Hidalgo County, New Mexico, south of the study corridor (BISON-M 2008). Records exists of the species nesting in the short-grass prairies of east-central Arizona and other non-nesting sightings elsewhere in Arizona (Corman and Wise-Gervais 2005). Wintering records

for the species in Arizona include agricultural fields in the Sulphur Springs Valley and near the Pinal Central Substation site within the study corridor. The species is likely to occasionally be present in winter in agricultural areas in the Arizona portion of the study corridor. Potential for occurrence within the study corridor in New Mexico is less likely.

Long-billed Curlew

Status

The Long-billed Curlew (*Numenius americanus*) is a BCC and a State of New Mexico SGCN (BISON-M 2008; USFWS 2008c).

Distribution

The Long-billed Curlew ranges from southwestern Canada south to El Salvador and the Yucatan Peninsula (Dugger and Dugger 2002). The Long-billed Curlew is most likely to occur in the study area during migration.

Habitat and Life History

In the study area, the Long-billed Curlew is most likely to occur in marshy areas, freshwater or saline playa lake shores, and in fallow cultivated grain fields or flooded alfalfa fields (Dugger and Dugger 2002). The Long-billed Curlew is apparently almost totally carnivorous, feeding on terrestrial invertebrates, mollusks, worms, both fresh water and marine crustaceans, and an occasional small vertebrate such as a frog or juvenile bird (Dugger and Dugger 2002; Ehrlich et al. 1988; Terres 1980). Nests consist of a subtle hollow on the ground in dry prairies or damp meadows; or occasionally on a rimmed platform (Ehrlich et al. 1988). The nest is usually sparsely lined with vegetation (Terres 1980). Four spotted white eggs are laid in April or May (Terres 1980).

Threats to the Survival of the Long-billed Curlew

The primary threat to the Long-billed Curlew is from habitat degradation or loss (Ehrlich et a. 1988).

Potential for Occurrence in the Study Area

The Long-billed Curlew is recorded occasionally at Bosque del Apache NWR, and may also occur in damp meadows along the Rio Grande and at playa lakes. The species was recorded at both the Arrey-Derry and Las Cruces alternative crossing sites on the Rio Grande (Maliakal-Witt and Witt 2010).

Wilson’s Phalarope

Status

Wilson’s Phalarope (*Phalaropus tricolor*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Wilson's Phalarope breeds in western and south-central Canada and northwestern and north-central portions of the United States, as far east as the Great Lakes Region. The birds winter on the Pacific coast and southern half of South America (Colwell and Jehl 1994).

Habitat and Life History

Wilson's Phalarope uses marshes, ponds and other open shallow-water habitats, saline lakes, and manmade waters such as wastewater ponds and irrigation ditches (Colwell and Jehl 1994; Terres 1980). The birds forage along muddy shores or in shallow waters for freshwater and shore inhabiting invertebrates, and seeds of aquatic plants (Ehrlich et al. 1988; Colwell and Jehl 1994; Terres 1980). Birds also spin on the water surface in shallows, stirring up invertebrates from the bottom which are then captured. Wilson's Phalarope is a semi-colonial nesting species (Terres 1980). Nests consist of a scrape that may be sparsely or densely lined with grasses. Three to 4 dark-marked buff eggs are laid in May or June (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Wilson's Phalarope

Habitat degradation or loss resulting from water diversion, groundwater pumping, or development are the primary threats to the species (Colwell and Jehl 1994; Ehrlich et al. 1988).

Potential for Occurrence in the Study Area

Wilson's Phalarope occurs within the study area principally during migration, where it is common at Bosque del Apache NWR and some other areas in the Rio Grande Valley.

<u>Wilson's Snipe</u>

Status

Wilson's Snipe (*Gallinago delicate*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

Wilson's Snipe breeds from Alaska east to the Maritime Provinces, south to the northern Rocky Mountains and Great Lakes Region, and winters south of the breeding areas as far as northern South America (Mueller 1999).

Habitat and Life History

Wilson's Snipe inhabits marshy wetlands and marshy areas of ponds, streams, and rivers edges where vegetation is of low to moderate height (Mueller 1999). Wilson's Snipe feeds mainly on insect larvae, but also consumes other damp soil invertebrates such as annelids, crustaceans and mollusks (Mueller 1999; Terres 1980). Vegetation in the diet is mostly incidental to the feeding behavior and is not thought to provide much nourishment for the species (Mueller 1999). Nests are a well concealed shallow scrape lined with grasses (Mueller 1999). Three to four pale to dark olive-buff eggs are laid between April and June (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Wilson's Snipe

Principle threats to the species include hunting and degradation or loss of wetland habitats (Mueller 1999).

Potential for Occurrence in the Study Area

Wilson's Snipe is commonly observed at the Sweetwater Wetlands on the Santa Cruz River in Tucson (COT 2006), and may occur at Picacho Reservoir.

Black Tern

Status

The Black Tern (*Chlidonias niger*) is a USFWS species of concern and a New Mexico BLM sensitive species (BISON-M 2008).

Distribution

The Black Tern nests in southern Canada and the northern United States, and winters along the west coast of the Americas from Jalisco, Mexico south to Peru, and on the Atlantic Coast of South America from Colombia to Surinam (AOU 1998; Heath et al. 2009).

Habitat and Life History

The Black Tern inhabits freshwater lakes, rivers, marshes, prairie sloughs, and wet meadows (AOU 1998; Terres 1980). The birds feed by hawking behavior, primarily on insects and other invertebrates, but also take small freshwater or marine fish (Ehrlich et al 1988; Heath et al. 2009; Terres 1980). The Black Tern is normally a semi-colonial nester among emergent vegetation of freshwater wetlands (Heath et al. 2009; Terres 1980). The nest is a shallow cup constructed from canes or reeds, sometimes constructed on floating vegetation, and commonly barely above the water (Ehrlich et al. 1988; Terres 1980). Usually 3 eggs are laid between May and August (Terres 1980).

Threats to the Survival of the Black Tern

The greatest threat to the Black Tern is from degradation or loss of wetlands used for nesting or in migration. Pesticides may adversely affect prey used by the Black Tern (Heath et al. 2009).

Potential for Occurrence in the Study Area

Black Terns are not common in New Mexico but migrate state-wide, and have been recorded in the middle Rio Grande Valley. Black Terns are an uncommon, but occasional visitor at Bosque del Apache NWR (BISON-M 2008; USFWS 1995a). Occasional individuals may occur within the Project area of influence.

Band-tailed Pigeon

Status

The Band-tailed Pigeon (*Patagioenas* (*Columba*) *fasciata*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Band-tailed Pigeon occurs from southwestern British Columbia south along the Pacific Coast to the tip of Baja California and from north-central Colorado and south-central Utah south to northern Argentina and east to Trinidad (Keppie and Braun 2000).

Habitat and Life History

Band-tailed Pigeons inhabit oak or coniferous woodlands, orchards and agricultural areas during migration (Ehrlich et al. 1988; Keppie and Braun 2000). They feed on nuts, berries, seeds, and inflorescences of trees and shrubs (Ehrlich et al. 1988; Keppie and Braun 2000; Terres 1980). Their crude nests are constructed of loosely placed twigs with little or no weaving of materials. One or two unmarked white eggs are laid year-round depending on latitude (Ehrlich et al. 1988; Keppie and Braun 2000; Terres 1980).

Threats to the Survival of the Band-tailed Pigeon

Band-tailed Pigeon populations continue to exhibit a slow decline subsequent to intermittent heavy shooting of the birds for food and as agricultural pests during the 20th century (Keppie and Braun 2000).

Potential for Occurrence in the Study Area

Band-tailed Pigeons in New Mexico generally occur at higher elevations than most Project alternatives, although there is a moderate potential for presence on Chupadera Mesa in juniper savanna.

Mourning Dove

Status

The Mourning Dove (*Zenaida macroura*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The range of the Mourning Dove extends from central Canada through all of the continental United States and south to Panama (Otis et al. 2008).

Habitat and Life History

The Mourning Dove inhabits open woodlands or desertscrub near a water source, agricultural areas, and suburbs (Ehrlich et al. 1988). The species is an opportunistic granivore, consuming

seeds and agricultural grains (Ehrlich et al. 1988; Otis et al. 2008). Nests are a simple collection of sticks occasionally lined with a few grasses or weeds. Two to three unmarked white eggs are laid between February and September (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Mourning Dove

The primary threats to the species are related to hunting, both as licensed take and residual ingestion of lead shot. Pesticides impact the species, but likely do not have population level effects (Otis et al. 2008).

Potential for Occurrence in the Study Area

Mourning Doves were observed at all four Project alternative crossings of the Rio Grande (Maliakal-Witt and Witt 2010), and are likely common at many locations within the study area.

Common Ground-dove

Status

The Common Ground-dove (*Columbina passerina pallescens*) is a State of New Mexico endangered species and SGCN (BISON-M 2008), and a Forest Service sensitive species (USFS 2007a).

Distribution

The Common Ground-dove ranges from Southern California and central Arizona south to Ecuador and eastern Brazil (AOU 1998). In New Mexico, it is restricted to the southern counties along the Mexican border (NMDGF 2008).

Habitat and Life History

The Common Ground-dove occupies low-elevation brushy scrub habitats, woodland edges, riparian woodlands, agricultural lands, pastures, beaches, and suburbs (AOU 1998; Ehrlich et al. 1988; NMDGF 2008; Terres 1980). The species is primarily granivorous and feeds on the ground on seeds, insects, and small berries (Ehrlich et al. 1988; Terres 1980; Martin et al. 1951). Common Ground-doves construct a poorly defined nest, consisting of a slight depression on the ground with a few pieces of vegetation; or, they may construct their nest low is shrubs or on a tree stump or fence post (Ehrlich et al. 1988; Terres 1980). In the southwestern portion of the species' range, two to three eggs are typically laid between March and October, and two or three broods may be reared per year (Terres 1980).

Threats to the Survival of the Common Ground-dove

Threats to the Common Ground-dove are primarily degradation or loss of lowland habitats due to land conversion, intense grazing, and burning (NMDGF 2008).

Potential for Occurrence in the Study Area

Common Ground-doves are likely to occur in the areas of suitable habitat in the southern portions of the study area.

Yellow-billed Cuckoo

Status

The Western United States DPS of the Yellow-billed Cuckoo (*Coccyzus americanus*) became a candidate species for listing as threatened or endangered under the ESA on October 30, 2001 (USFWS 2001a). It is a Forest Service sensitive species (USFS 2007a). The Yellow-billed Cuckoo is a USFWS BCC (2008c). The Yellow-billed Cuckoo is a State of New Mexico sensitive species, an AZGFD WSC and SGCN, and is a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004).

Distribution

The Western Yellow-billed Cuckoo was formerly widespread and locally common in California and Arizona; locally common in New Mexico, Oregon, and Washington; and local and uncommon along drainages in western Colorado, western Wyoming, Idaho, Nevada, and Utah (USWFS 2001a). The species may be extirpated from British Colombia, Washington, and Oregon, and has experienced significant declines elsewhere (Hughes 1999).

Habitat and Life History

The Western Yellow-billed Cuckoo prefers large stands of mature, dense willows, typically associated with riparian corridors, for nesting, and also prefers a multi-storied canopy and dense shrubby vegetation that provides adequate invertebrate prey and cover for foraging juveniles (Corman and Wise-Gervais 2005). Dense vegetation may also be important in maintaining humidity in the nesting area (Corman and Wise-Gervais 2005). Water is required near the nesting site (Corman and Wise-Gervais 2005; Floyd et al. 2007).

Yellow-billed Cuckoos forage primarily by gleaning insects from vegetation, but they may also capture flying insects (Ehrlich et al. 1988; Hughes 1999; Laymon 1998). They specialize on relatively large prey, including caterpillars, katydids, cicadas, grasshoppers, and tree frogs (Laymon 1998; Terres 1980). Their breeding season may be timed to coincide with outbreaks of insect species, particularly tent caterpillars (Ehrlich et al. 1988; Hughes 1999). They also consume some wild berries; take small lizards and frogs, and occasionally bird eggs and young (Hughes 1999; Terres 1980).

Western populations of Yellow-billed Cuckoos breed in dense riparian woodlands, primarily of cottonwood (*Populus fremontii*), willow (*Salix* spp.), and mesquite (*Prosopis* spp.), along riparian corridors in otherwise arid areas (Hughes 1999). Dense undergrowth may be an important factor in selection of nest sites (Ehrlich et al. 1988). Western Yellow-billed Cuckoos appear to require relatively large tracts of riparian woodland. Several studies have reported Western Yellow-billed Cuckoos nesting in tracts greater than 25 acres in size. Cuckoos in the

arid Southwest may be restricted to areas close to water because of humidity requirements for hatching eggs and rearing chicks (Laymon 1998).

Most Western Yellow-billed Cuckoos arrive on their breeding grounds in June (Laymon 1998). They construct an unkempt stick nest on a horizontal limb, often in shrubby vegetation (Ehrlich et al. 1988; Terres 1980). Nest heights range from 4.3 feet to as high as 98 feet above ground level, but average below 20 feet (Laymon 1998).

Threats to the Survival of the Yellow-billed Cuckoo

The primary threat to Western Yellow-billed Cuckoos is the loss or fragmentation of high quality riparian habitat suitable for nesting (Corman and Wise-Gervais 2005; Floyd et al. 2007). Much riparian habitat throughout the western United States has been modified or destroyed by dams, stream channelization, livestock grazing, groundwater pumping, invasive exotic plants (especially saltcedar), and conversion to agriculture and other uses (USFWS 2001a). The loss or modification of riparian habitat is estimated to be up to 90 percent in California (Hughes 1999).

Potential for Occurrence in the Study Area

Within the study area, a Pima County Tier 1 PCA is delineated for Cienega Creek. Tier 2 PCAs are delineated for the Sabino Canyon/Rillito Wash, Agua Caliente Wash-Tanque Verde Creek, and San Pedro River drainages (Pima County 2004). Yellow-billed Cuckoos are occasionally reported along the San Pedro River, mostly in the southern reaches closer to the Mexican border, with probable nesting occurrences in some years (Corman and Wise-Gervais 2005). They may occur within the study area along the San Pedro River, and are most likely to occur in the northern portion of the Project area where mature riparian vegetation with some dense understory is better developed. The species also occurs at Aravaipa Canyon in the north end of the Galiuro Mountains, just north of the study area (Sky Island Alliance 2005), and along the Rio Grande in New Mexico. A study conducted by the Bureau of Reclamation in 2006 revealed that the San Marcial reach of the Middle Rio Grande is one of the few significant remaining populations of this species in the Southwest (Johanson et al. 2006). The San Marcial reach of the river is from the southern boundary of Bosque del Apache NWR south to the Elephant Butte Reservoir dam. The Yellow-billed Cuckoo is present within the study corridor on Cienega Creek and along the Rio Grande.

<u>Mexican Spotted Owl</u>

Status

The Mexican Spotted Owl (*Strix occidentalis lucida*) was listed as threatened under the ESA on March 16, 1993 (USFWS 1993b). Critical habitat was designated on June 6, 1995 (USFWS 1995c). Critical habitat was subsequently revoked on March 25, 1998 (USFWS 1998). Critical habitat was designated again on February 1, 2001 (USFWS 2001b), revised, and the current critical habitat was designated on August 31, 2004 (USFWS 2004). A Recovery Plan was released on October 16, 1995 (USFWS 1995d), and a draft update to the Recovery Plan was released in 2011 (USFWS 2011b).The MSO is a State of New Mexico sensitive species and SGCN (BISON-M 2008). The Mexican Spotted Owl is an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

The Mexican Spotted Owl is a permanent resident in the interior mountain ranges of western North America, from southern Utah and central Colorado south through the mountains of Arizona, New Mexico, and extreme west Texas. Its range in Mexico includes mountainous regions from Sonora, Chihuahua, Coahuila, and Nuevo Leon south to Jalisco, Michoacán, and Guanajuato (AOU 1998).

Habitat and Life History

The Mexican Spotted Owl normally occupies old growth forest in mixed conifer, pine-oak woodland, deciduous riparian, or a combination of these habitats that will support a home range of 1,400 to 4,500 acres (Gutierrez et al. 1995; Ehrlich et al. 1988). Mexican Spotted Owls are usually found in steep canyons of old growth forest, but they may also be found in canyons with steep cliffs and relatively little forest habitat. Habitat typically also has a structured canopy, a perennial water source, and a rodent dominated prey base of adequate size (Gutierrez et al. 1995). They have been reported at elevations ranging from 3,700 feet to the subalpine transition (Ganey 1998; Gutierrez et al. 1995; Johnsgard 1988).

Spotted Owls are nocturnal ambush hunters that feed mainly on small mammals, usually composed primarily of rodents, with wood rats (*Neotoma* spp.) often the dominant component. Invertebrates make up a small portion of their prey, and they may supplement their diet with birds, bats, or lagomorphs (Ganey 1998; Gutierrez et al. 1995; Ehrlich et al. 1988). In Arizona, Mexican Spotted Owls feed on wood rats, White-footed Mice (*Peromyscus leucopus*), voles (*Microtus* spp.), rabbits, and pocket gophers (*Thomomys* spp.) (Ganey 1998).

Spotted Owls may construct nests in tree cavities (usually in live trees) or on platforms constructed on tree limbs. They may use abandoned raptor or corvid platform nests (Ehrlich et al. 1988; Terres 1980). They produce from 2-4 eggs per clutch, with the typical number being 2 (Gutierrez et al. 1995; Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Mexican Spotted Owl

The primary threats to the Mexican Spotted Owl are habitat destruction and fragmentation related to human activities, particularly timber harvest (Gutierrez et al. 1995; Ehrlich et al. 1988). Secondary human caused habitat impacts include losses associated with developments for urban or suburban expansion, and development for agriculture, reservoirs, mining, and fuel wood harvesting (Gutierrez et al. 1995).

Potential for Occurrence in the Study Area

National Forest lands were identified by the 2011 Recovery Plan as containing nearly all Mexican Spotted Owl sites in the study area, with several owl sites also known in the Rincon Mountains within Saguaro National Park (USFWS 2011b). However, individuals may occur elsewhere, primarily in riparian canyon habitat. Suitable habitat for the Mexican Spotted Owl is present in the study corridor in the north end of the Galiuro Mountains in the vicinity of Aravaipa Canyon, and in the southeast portion of the Magdalena Mountains in New Mexico. The

Mexican Spotted Owl is known to breed in Turkey Creek at the east end of Aravaipa Canyon (BLM 2009).

Cactus Ferruginous Pygmy-owl

Status

The Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) was previously listed as endangered under the ESA, but was delisted through a determination regarding its taxonomic status (USFWS 2006c). A 2008 90-day finding by the USFWS determined that re-listing of this species was possibly warranted due to recent research and additional taxonomic revisions. A 2011 USFWS 12-month finding on a petition to re-list the species found listing the species to be unwarranted due to invalidity of the taxon (USFWS 2011h). This species is an Arizona BLM sensitive species, a Forest Service sensitive species and a USFWS species of concern (BLM 2010; USFS 2007a). The Cactus Ferruginous Pygmy-owl is an AZGFD WSC and SGCN, and a Pima County PVS (AZGFD 2010a; 2006a; Pima County 2004).

Distribution

The Ferruginous Pygmy-owl (*G. brasilianum*) is a tropical species that is widespread through Mexico, Central America, and South America, and is abundant in much of its range (Terres 1980). It reaches the northern limit of its range in southern Arizona, where it is represented by the subspecies *G. b. cactorum*. This subspecies has apparently declined in numbers, and possibly range, since 1950, and it is now very rare in Arizona (Monson and Phillips 1981).

Genetic studies indicate that the North American populations (*G. ridgwayi*) of the owl may be a separate species from those in South America (*G. brasilianum*), and that the populations in Texas and Arizona may be separate subspecies (Proudfoot 2005). Under these revisions, *Glaucidium ridgwayi cactorum* was the population petitioned for listing (USFWS 2008d).

Habitat and Life History

Pygmy-owls are cavity-nesters, usually using nest cavities excavated and abandoned by woodpeckers. Most recent nests have been in cavities in saguaros, but historically these birds also used cavities in cottonwoods, willows, and mesquite (*Prosopis* spp.) (Cartron and Finch 2000). Nests have also been recorded in cavities in velvet ash (*Fraxinus velutina*) and eucalyptus (*Eucalyptus* sp.). Nest sites may be reused in subsequent years (Terres 1980).

Cactus Ferruginous Pygmy-owls will feed on a wide variety of prey items, including birds, small mammals, reptiles, insects (including caterpillars), and scorpions (Cartron and Finch 2000; Terres 1980). They typically hunt from a perch. They are most active at night, but they are also active at dawn and dusk, and occasionally during the day (Terres 1980).

The nesting season for Cactus Ferruginous Pygmy-owls in Arizona generally lasts from April to June (Cartron and Finch 2000). The incubation period is between 22 and 30 days, and the chicks fledge 21 to 30 days after hatching. Young birds will disperse from the nesting area approximately 8 weeks after fledging.

Threats to the Survival of the Cactus Ferruginous Pygmy-owl

The primary threat to Cactus Ferruginous Pygmy-owls in Arizona is the loss of suitable habitat. Main causes of habitat loss are cutting of riparian woodlands, livestock grazing, groundwater pumping, and urban development (Cartron and Finch 2000).

Potential for Occurrence in the Study Area

Very few Cactus Ferruginous Pygmy-owls remain in southern Arizona. They apparently no longer occur in most of the areas of suitable habitat in the northern parts of their range that they occupied within the last 30 years. Records of the species in the San Pedro Valley have historically been few, with the most recent being an unconfirmed report in 2001/2002, and near Aravaipa Creek in the early 1980s. Other recent records of the species in the general Project area include one in northwest Tucson and one near Red Rock (Richardson 2009). Suitable habitat for the species is present within the Project area of influence from the vicinity of the flanks of the Picacho Mountains east to the limits of saguaro habitat along the west and north flanks of the Tortolita Mountains, and southeast to Marana and the northern fringe of Tucson along the mountain base. Additional habitat is present in the San Pedro Valley through the full extent of the study area from south to north.

Within the study area in Pima County, there are both Tier 1 and Tier 2 PCAs for the Cactus Ferruginous Pygmy-owl. Tier 1 PCAs are delineated for the Altar Valley, the Town of Marana, and northeast Tucson along the front of the ranges comprising the Santa Catalina and Rincon mountain complex. Tier 2 PCAs are delineated for the area between the Marana and Tucson PCAs and between the Altar Valley and Marana PCAs. The latter Tier 2 PCA is also considered a critical landscape linkage for the species between the Altar Valley and Marana PCAs, and also extends to the northwest to the county line. Due to the lack of recent records of the species in the Project area, and the small number of birds that have historically occurred here, potential for the Cactus Ferruginous Pygmy-owl occurring within the Project area of influence is low.

<u>Elf Owl</u>

Status

The Elf Owl (*Micrathene whitneyi*) is a USFWS BCC and a State of New Mexico SGCN (BISON-M 2008; USFWS 2008c).

Distribution

The range of the Elf Owl is from central Arizona below the Mogollon Rim, and east-central New Mexico south to Baja California Sur and Oaxaca, Mexico (Henry and Gehlbach 1999; Terres 1980).

Habitat and Life History

The Elf Owl is the smallest owl in the world. In the United States, the Elf Owl is primarily associated with saguaro forests of the Sonoran Desert, where its populations are most robust. The species also inhabits semi-arid forested canyons up to about 7,000 feet elevation. Elf Owls are

cavity nesters in saguaro cacti and a variety of trees, and have even accepted next boxes in Texas where natural cavities are limited (Henry 1998; Henry and Gehlbach 1999). Elf Owls feed on arthropods, primarily insects, and occasionally take small reptiles, and juvenile kangaroo rats (*Dipodomys* spp.) (Henry 1998; Henry and Gehlbach 1999; Terres 1980). Typically two or three white eggs are laid between early May and early June (Ehrlich et al. 1988; Terres 1980). Eggs are typically laid on the bare bottom of a cavity, or may be on top of nesting materials from previous nesting efforts of other species (Henry and Gehlbach 1999).

Threats to the Survival of the Elf Owl

Primary threats to the species are from habitat loss and human disturbance, particularly during the nesting season (Henry and Gehlbach 1999).

Potential for Occurrence in the Study Area

Elf Owls are present in many areas of the study area, primarily in the saguaro deserts of the western portions of the alignment, but also occur within the New Mexico portion of the Project area west of the Rio Grande.

Western Burrowing Owl

Status

The Western Burrowing Owl (*Athene cunicularia hypugaea*) is a BLM sensitive species in Arizona and New Mexico, a Forest Service sensitive species, a USFWS species of concern and a BCC, and an SGCN in New Mexico and Arizona (AZGFD 2010a; 2006a; BLM 2010; USFS 2007a; USFWS 2008c). It is a Pima County PVS (BISON-M 2008; Pima County 2004).

Distribution

The Western Burrowing Owl breeds in North America from southern Alberta, Saskatchewan, and Manitoba south to Baja California and central Mexico, and east to western Minnesota, western Kansas, and western Texas (AOU 1998). Burrowing Owls can be found throughout New Mexico and Arizona in suitable habitat (deVos 1998; Haug et al. 1993).

Habitat and Life History

Burrowing Owls inhabit open areas in deserts, grasslands, and agricultural and range lands. They use well-drained areas with gentle slopes and sparse vegetation, and may occupy areas near human habitation such as golf courses and airports (Dechant et al. 2003; Ehrlich et al. 1988; Terres 1980,). Burrowing Owls often select burrows where surrounding vegetation is kept short by grazing, dry conditions, or burning (Dechant et al. 2003; Hjertaas et al. 1995). In Arizona, Burrowing Owls prefer grasslands, creosote bush/bursage desertscrub communities, and agricultural lands (deVos 1998).

Burrowing Owls are semi-colonial and usually occupy burrows excavated by small mammals, often at the edges of active colonies of prairie dogs (*Cynomys* spp.) or ground squirrels (*Spermophilus* spp.). In areas that lack colonial burrowing rodents, Burrowing Owls will use

excavations made by other mammals such as Badgers (*Taxidea taxus*), skunks, foxes, and Coyotes. They may also use natural cavities in rocks. In addition to the nest burrow, these owls may also use several satellite burrows. Satellite burrows may serve as protection from predators and parasites (Dechant et al. 2003). Occasionally Burrowing Owls may excavate their own burrows.

Burrowing Owls are opportunistic feeders, preying on a variety of arthropods and small vertebrates (Dechant et al. 2003; Hjertaas et al. 1995). They may forage during the day or night, but tend to forage closer to the nest during the day. Foraging habitat is variable, depending on prey availability and abundance. Migratory Burrowing Owls arrive on their breeding grounds in March or April (Dechant et al. 2003; Hjertaas et al. 1995). The owls may line their burrow with dry grass, weeds, feathers, or livestock dung (Ehrlich et al. 1988).

Threats to the Survival of the Western Burrowing Owl

Widespread declines in the range and abundance of Burrowing Owls have been attributed to habitat loss and fragmentation and to control and extermination of colonial burrowing mammals (Dechant et al. 2003; Hjertaas et al. 1995).

Potential nesting habitat for Burrowing Owls has also been reduced through conversion of land to agricultural and urban uses (Hjertaas et al. 1995). However, in Arizona, some agriculture areas have become a source of important habitat for the species. In addition to removing potential nest sites, habitat fragmentation may increase the density of predators such as foxes and Coyotes, and make it more difficult for unpaired burrowing owls to find mates (Haug et al. 1993). Increased urbanization may result in an increase in predation by domestic dogs (Haug et al. 1993).

Pesticides may harm burrowing owls through direct toxicity, secondary toxicity from ingesting poisoned prey, and reduction in the abundance of prey (Dechant et al. 2003).

Potential for Occurrence in the Study Area

Suitable habitat that might support Burrowing Owls is present in many areas within the study area. The Burrowing Owl was recently recorded within the study area near Las Cruces (Maliakal-Witt and Witt 2010). Pima County Tier 1 PCAs for Burrowing Owls are delineated within the study area for the Town of Marana, west and south of I-10, the Santa Cruz River corridor south to Sierrita, Arizona, and central Tucson, including Davis Monthan Air Force Base and Tucson International Airport (Pima County 2004).

Black Swift

Status

The Black Swift (*Cypseloides niger*) is a State of New Mexico sensitive species and SGCN (BISON-M 2008).

Distribution

The species winters in Mexico and northern South America, and breeds as small, widely dispersed populations in western North America in summer. Less than 100 nesting locations of the species have been documented worldwide (Roberson and Collins 2008). There are occasional records of the species in New Mexico in summer in the northern portion of the state (Hubbard 1970).

Habitat and Life History

This swift is usually found in mountainous areas, on sea cliffs, and in entrances to caves (Ehrlich et al. 1988). They are nest habitat-limited to cliffs behind or adjacent to permanent or semi-permanent waterfalls or steep cliffs near water (Roberson and Collins 2008). The Black Swift forages exclusively by capturing prey in flight, feeding mainly on ants, but also on caddis flies, mayflies, crane flies, flesh flies, midges, beetles, termites, aphids, bees, wasps, and spiders (Roberson and Collins 2008; Terres 1980). Although Black Swifts typically nest on cliffs, they may forage far from their nesting habitat (Ehrlich et al. 1988).

Threats to the Survival of the Black Swift

Nesting individuals in Southern California were found to feed nestlings almost exclusively on flying ants (Roberson and Collins 2008). If the species is indeed highly depended on such a limited food source, a collapse of the prey base could significantly affect nesting success of the species. The generally inaccessible nesting habitats of the species make impacts to habitat from most sources unlikely. Stream water diversion or drawdown could affect foraging habitat for the species.

Potential for Occurrence in the Study Area

Breeding Black Swifts in New Mexico are recorded only in the Jemez Mountains (Johnson 1990). Because of the limited distribution of this species in New Mexico, the birds are likely to occur in the Project area only occasionally, and potential for occurrence is very low.

<u>Costa's Hummingbird</u>

Status

Costa's Hummingbird (*Calypte costae*) is a State of New Mexico threatened species and SGCN, a Forest Service sensitive species, and is a USFWS BCC (BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

Costa's Hummingbird ranges from central California and southwestern Utah south to the states of Sinaloa and Nayarit in Mexico (AOU 1988). It occurs in southern Arizona and far southwestern New Mexico.

Habitat and Life History

Costa's Hummingbirds inhabit brushy foothills and desert washes in desert, semi-desert, and chaparral habitats (AOU 1988; Ehrlich et al. 1988; NGS 2002). Costa's Hummingbirds feed on nectar, airborne insects, and insects and spiders gleaned from vegetation (Baltosser and Scott 1996; Terres 1980). Costa's Hummingbirds construct small cup-shaped nests, constructed of various plant materials and secured with spider silk, in trees or large shrubs (Ehrlich et al. 1988; Terres 1980). They normally have two young between February and June (Terres 1980).

Threats to the Survival of the Costa's Hummingbird

The most significant threat to the species is habitat modification and loss resulting from conversion of lands to agriculture, grazing, and from development. Conversion of habitat in Mexico from planting of buffelgrass (*Pennisetum ciliare*) for grazing is resulting in decimation of large areas of Sonoran desert in northern Mexico (Baltosser and Scott 1996; NMDGF 2008).

Potential for Occurrence in the Study Area

Costa's Hummingbird occurs within the western portion of the Arizona segment of the study area. In New Mexico, it is primarily limited to the far southwestern portion of the state in Hidalgo County, where there are nesting records of the species in Guadalupe Canyon. The species may be expanding its range in New Mexico, but the potential for it occurring within the Project area of influence in New Mexico is very limited.

<u>Broad-billed Hummingbird</u>

Status

The Broad-billed Hummingbird (*Cynanthus latirostris*) is a State of New Mexico threatened species, a Forest Service sensitive species, and an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008; USFS 2007a).

Distribution

The Broad-billed Hummingbird ranges from the west coast of Mexico at Oaxaca where it is a year-round resident north into east central Mexico and the southwestern United States in southeastern Arizona and southwestern New Mexico (Powers and Wethington 1999).

Habitat and Life History

In the United States, the Broad-billed Hummingbird inhabits riparian areas and arid canyons that support broad-leaf deciduous vegetation or mesquite in southeast Arizona and southwest New Mexico. The birds are in the United States from about mid-March into September, during which time they typically have two broods. Nesting is timed to coincide with nectar food sources resulting from winter and summer rainy seasons. Nests are often constructed 3 to 4 feet off the ground in shrubbery on rocky north slopes. Like most hummingbirds, this species consumes primarily nectar of flowers and supplements its diet with small insects (Powers and Wethington 1999).

Threats to the Survival of the Broad-billed Hummingbird

Degradation and loss of riparian habitats is likely the most significant threat to the species in the United States.

Potential for Occurrence in the Study Area

The Broad-billed Hummingbird has a very limited presence in the southwestern United States, and there are few locations in the study area where the species may occur. The most likely location is the vicinity of Aravaipa Canyon in the Galiuro Mountains. The species may also occur in suitable habitat in the Santa Catalina and Peloncillo Mountains, and in some smaller ranges in Arizona, but is unlikely to occur within the Project area of influence. In New Mexico, the species is mostly relegated to the southern Peloncillo and Guadalupe Mountains near Sycamore Canyon. There are records of vagrant, non-breeding individuals from Doña Ana, Hidalgo and Sierra Counties. The species is unlikely to occur in the New Mexico portion of the Project area of influence.

Magnificent Hummingbird

Status

The Magnificent Hummingbird (*Eugenes fulgens*) is an SGCN in Arizona.

Distribution

The Magnificent Hummingbird has a somewhat discontinuous distribution from Panama north to the extreme southwestern United States, where it nests during summer. Nesting has been recorded in several mountain ranges in southeastern Arizona, including the Santa Catalina and Pinaleño ranges in the Project area. The species is recorded from the San Luis Mountains in Hidalgo County, New Mexico on the border with Chihuahua, Mexico. Vagrant animals are recorded as far north as northern Utah, the Grand Canyon in Arizona, and north-central Colorado (Powers 1996).

Habitat and Life History

In the United States, Magnificent Hummingbirds may be associated with riparian habitats, but are apparently not restricted to those environments. They are more common at middle to upper elevations where they are associated with pine-oak forests, but also occupy broad-leaf riparian habitats at lower elevations. The presence of the birds at high elevations in summer is likely due to the presence of more-dependable nectar resources. Like most hummingbirds, this species consumes flower nectar and invertebrates. There is some evidence that the Magnificent Hummingbird may be primarily an invertivore, but this is not conclusive. It is not known whether the species has one or two broods per year in the United States. The birds nest at higher elevations, generally above 6,000 feet, usually in riparian canyons, and most commonly select deciduous, broad-leaf trees for nesting. Nests are usually 20 feet or more above ground level (Powers 1996).

Threats to the Survival of the Magnificent Hummingbird

The Magnificent Hummingbird commonly occupies more remote, high-elevation habitats that are not regularly impacted by development. Threats to the species may include habitat degradation or loss. Logging and forest fires may have short-term impacts on habitats.

Potential for Occurrence in the Study Area

The Magnificent Hummingbird is generally unlikely to occur in the Project area of influence.

Elegant Trogon

Status

The Elegant Trogon (*Trogon elegans*) is a State of New Mexico endangered species, an AZGFD WSC, an SGCN in Arizona and New Mexico, and a USFWS BCC (AZGFD 2010a; BISON-M 2008; USFWS 2008c).

Distribution

Elegant Trogons have a discontinuous distribution from northwestern Costa Rica north to the extreme southwestern United States, where they are regular breeders in several mountain ranges near the Mexican border, including the Chiricahua, Atascosa, Santa Rita and Huachuca ranges in Arizona. Records in New Mexico are limited to the southern Peloncillo and Animas ranges (Kunzmann et al. 1998).

Habitat and Life History

The Elegant Trogon breeds in Arizona primarily in riparian woodland canyons bordered by pine-oak forest, up to about 7,500 feet elevation. The birds feed on a variety of fruits and insects. Elegant Trogons are a cavity-nesting species, occupying holes created by other birds or formed naturally in either live or dead trees.

Threats to the Survival of the Elegant Trogon

Threats to the species include habitat degradation or loss, and disturbance of birds during the nesting season by birders.

Potential for Occurrence in the Study Area

Elegant Trogons do not normally occur within the Project area, but there are infrequent records of the species at the Sweetwater Wetlands in Tucson. Trogons are also occasionally reported in the Aravaipa Canyon area. The species could potentially occur in any montane canyon in southern Arizona, but the birds are unlikely to occur in the Project area of influence. The birds are highly unlikely to occur in the New Mexico portion of the Project area of influence.

Belted Kingfisher

Status

The Belted Kingfisher (*Megaceryle alcyon*) is an AZGFD WSC (AZGFD 2010a).

Distribution

The Belted Kingfisher occurs from Alaska and much of Canada south to Venezuela and the Galapagos Islands (AOU 1998; Kelley et al. 2009). Belted Kingfisher nesting in the southwestern United States is very limited, and in Arizona breeding is sporadic and local, with most records in the central part of the state above and below the Mogollon Rim (Corman and Wise-Gervais 2005).

Habitat and Life History

Belted Kingfishers inhabit areas where perennial waters that support an adequate fish prey base are present. Waters need to be clear enough to allow successful fishing by the birds. Water sources used include ponds, marshes, lakes, streams, rivers, and in migration and winter they may use irrigation canals, earthen livestock tanks, and areas with dependable effluent discharge (Corman and Wise-Gervais 2005). The Belted Kingfishers are primarily piscivorous, but they also take amphibians, reptiles, rodents, young birds, crayfish, and other invertebrates (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Terres 1980). The Belted Kingfisher typically digs a horizontal burrow in an embankment near their fishing grounds, but may also nest in tree cavities. Burrows are typically 3 to 7 feet deep, and may take up to 3 weeks to construct. Six to 7 glossy white eggs are normally laid, with the young volant at about 4 weeks (Kelly et al. 2009; Terres 1980).

Threats to the Survival of the Belted Kingfisher

Belted Kingfishers are sensitive to human disturbance, particularly while nesting (AZGFD 2007a). There are no other significant threats recognized for the species (Kelly et al. 2009).

Potential for Occurrence in the Study Area

The birds are likely to occur along sections of the San Pedro River in winter (BLM 2009). They also occur at the Sweetwater Wetlands site on the Santa Cruz River in Tucson and could also occur at Picacho Reservoir.

Lewis's Woodpecker

Status

Lewis's Woodpecker (*Melanerpes lewis*) is a USFWS BCC and an SGCN in New Mexico (BISON-M 2008; USFWS 2008c).

Distribution

Lewis's Woodpecker ranges from southwestern Canada south to its wintering range along the United States/Mexican border in Arizona, New Mexico, and just into Baja California (Terres 1980; Tobalske 1997).

Habitat and Life History

Lewis's Woodpeckers typically occupy edge habitat of pine or pine-oak woodland that has a brushy understory and open foraging areas that include snags for perching. Logged or recently burned forests also commonly support the species, and they will also use riparian woodlands (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Terres 1980; Tobalske 1997). Lewis's Woodpecker eats primarily acorns, nuts, and fruit, but also commonly takes insects in flight or by gleaning limbs and trunks of trees (Ehrlich et al. 1988; Terres 1980; Tobalske 1997). Lewis's Woodpecker is a cavity nester in dead trees or in dead stubs of live trees. They will use naturally occurring cavities in trees, excavate their own hole, or reuse those created by other birds. Usually six to seven white eggs are laid between mid-April and June (Corman and Wise-Gervais 2005; Terres 1980; Tobalske 1997).

Threats to the Survival of the Lewis's Woodpecker

The species has exhibited a general non-cyclical population decline since the 1970s, and open ponderosa pine stands that support the species have been greatly reduced in Arizona in recent years due to climate change induced stress, bark beetle infestations, fires, and logging (Tobalske 1997). Pesticides may be an issue for birds foraging in orchards (Tobalske 1997).

Potential for Occurrence in the Study Area

Since Project alternatives would pass through little or no nesting habitat for the species, Lewis's Woodpeckers are generally unlikely to occur within the Project area of influence. Lewis's Woodpeckers do occasionally winter at low elevations, and have been recorded in urban Tucson.

<u>Gila Woodpecker</u>

Status

The Gila Woodpecker (*Melanerpes uropygialis*) is a State of New Mexico threatened species, an SGCN in New Mexico and Arizona, a Forest Service sensitive species, and a USFWS BCC (AZGFD 2006a; BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

The Gila Woodpecker ranges from southeastern California east through central Arizona and into southwestern New Mexico and south into Mexico as far as the states of Jalisco and Aguascalientes (AOU 1988). Gila Woodpecker distribution within New Mexico is limited to areas supporting mature broad-leafed riparian woodland, generally 50 acres or more in size, in southwestern Hidalgo County and the Lower Gila Valley in Hidalgo and Grant Counties (NMDGF 2008).

Habitat and Life History

The Gila Woodpecker is a resident of desertscrub, riparian habitats, and residential areas (AOU 1988; Ehrlich et al. 1988). They feed primarily on insects, but seasonally will consume fruit of saguaro and mistletoe berries, and rarely take eggs of small birds (Terres 1980). Gila Woodpeckers nest primarily in cavities in saguaros and occasionally in holes in other trees, including mesquite, cottonwood, and willow (Terres 1980). Three to four eggs are laid between early April and late May (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Gila Woodpecker

The primary threats to the Gila Woodpecker in Arizona include loss of Sonoran desert habitat to development and nest site competition from the Common Starling (*Sturnus vulgaris*) (Edwards and Schnell 2000). Habitat degradation or loss of significant cottonwood-sycamore woodlands from cutting, burning, or inundation is the primary threat to the species in New Mexico (NMDGF 2008).

Potential for Occurrence in the Study Area

The Gila Woodpecker is common in many areas in the Arizona portion of the study area. The species occurs in a very limited range in southwestern New Mexico, and is much less likely to be present in the New Mexico portion of the Project area of influence where the species is state-listed as threatened.

<u>Gilded Flicker</u>

Status

The Gilded Flicker (*Colaptes chrysoides*) is an Arizona BLM sensitive species, an SGCN in Arizona, and a USFWS BCC (Arizona 2006a; BLM 2010; USFWS 2008c).

Distribution

The Gilded Flicker is primarily a resident of the saguaro deserts of southwestern Arizona, northern Mexico and Baja California. A disjunct population of the species occurs in the Mojave Desert in extreme southern Nevada and southeastern California (Moore 1995; NGS 2002).

Habitat and Life History

Gilded Flickers inhabit low desert areas of the Southwest, primarily occurring in saguaro forests and excavate their nesting cavities in these plants. They begin nest cavities in saguaros very early in the season so that damaged plant tissue will callus over prior to the birds nesting. They also occur along riparian drainages where they may occasionally nest in cottonwoods or other riparian trees (Corman and Wise-Gervais 2005; Moore 1995). A small clutch of 3-5 eggs are laid (Corman and Wise-Gervais 2005). Gilded Flickers feed primarily on invertebrates that they glean from the ground, and also consume some fruits and seeds.

Threats to the Survival of the Gilded Flicker

Loss of saguaro desert habitat from development adversely affects the species. The birds do not do well in urban areas, even in the presence of saguaros. Habitat loss in the Sonoran desert resulting from invasive grass-fueled wildfires is a major ongoing threat to this species (Corman and Wise-Gervais 2005).

Potential for Occurrence in the Study Area

Gilded Flickers are present within the Project area wherever native saguaro stands are present.

Arizona Woodpecker

Status

The Arizona Woodpecker (*Picoides arizonae*) is an AZGFD SGCN and a USFWS BCC (AZGFD 2006a; USFWS 2008c).

Distribution

The Arizona Woodpecker ranges from southeastern Arizona and far southwestern New Mexico south through west-central Mexico to the State of Puebla (Johnson et al. 1999).

Habitat and Life History

The Arizona Woodpecker occupies open Madrean evergreen woodland and associated riparian habitats contained therein (Johnson et al. 1999). The Arizona Woodpecker feeds on larval and adult insects, particularly wood boring beetles, and on fruits and nuts (Johnson et al. 1999; Terres 1980). Nests are built in cavities excavated in oaks, sycamore, walnut or other trees, and occasionally in agave stalks (Johnson et al. 1999). Two to four white eggs are laid between mid-April and mid-May (Johnson et al. 1999; Terres 1980).

Threats to the Survival of the Arizona Woodpecker

There are no specific recognized threats to the species, but logging or removal of trees that could provide nesting habitat and impacts to riparian habitats could adversely affect the species.

Potential for Occurrence in the Study Area

There is potentially suitable habitat within the Arizona portion of the Project that may support small numbers of Arizona Woodpeckers, primarily in the Galiuro and Winchester mountains. The Project does not pass through suitable habitat for the species within its known range in New Mexico.

Williamson's Sapsucker

Status

Williamson's Sapsucker (*Sphyrapicus thyroideus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Williamson's Sapsucker ranges from south-central British Colombia to the state of Michoacán, Mexico, generally wintering south of the United States-Mexico border (Dobbs et al. 1997).

Habitat and Life History

Williamson's Sapsuckers primarily inhabit higher elevation spruce-fir or pine forests, often in or near aspen groves, but may also occur down to pine-oak woodlands (Corman and Wise-Gervais 2005; Dobbs et al. 1997; Ehrlich et al. 1988; Terres 1980). They feed principally on the sap and cambium of these trees at horizontal rows of pits they drill in the trees, and opportunistically feed on insects attracted to the sap pits, particularly ants. They glean some insects from bark and excavate wood boring insect larvae from trees, and consume some berries and fruits seasonally (Dobbs et al. 1997; Ehrlich et al. 1988; Terres 1980). Williamson's Sapsucker is a cavity nester, occupying existing or excavated holes in dead or partially decayed aspen, or sometimes in healthy aspen trees (Corman and Wise-Gervais 2005; Terres 1980). Four to 6 white eggs are laid between mid April and June (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Williamson's Sapsucker

Williamson's Sapsucker seems to be relatively tolerant of habitat disturbance and human intrusion, but the species may be affected by reductions of suitable habitat (Dobbs et al. 1997).

Potential for Occurrence in the Study Area

Since Project alternatives would pass through very limited potential habitat for the species, the potential for Williamson's Sapsucker occurring within the Project area of influence is very low.

Greater Pewee

Status

The Greater Pewee (*Contopus pertinax*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Greater Pewee is primarily a Mexican species that breeds in northern Mexico and the southwestern United States, and ranges as far south as northern Nicaragua (Chace and Tweit 1999; Corman and Wise-Gervais 2005).

Habitat and Life History

The Greater Pewee inhabits open pine-oak woodland with a mature, tall pine component (Chace and Tweit 1999; Corman and Wise-Gervais 2005). The diet of the species is not well documented, but is probably primarily insects and some berries (Chace and Tweit 1999; Ehrlich et al. 1988; Terres 1980). The deep cup nests are placed on horizontal branch forks, are constructed primarily of grasses, and are often well camouflaged with lichen and spider silk (Chace and Tweit 1999; Corman and Wise-Gervais 2005; Terres 1980). Two to 4 lightly-spotted cream to buff-white eggs are typically laid in May or July (Corman and Wise-Gervais 2005; Terres 1980).

Threats to the Survival of the Greater Pewee

There are no recognized threats to the Greater Pewee, but pesticides used in silviculture could affect prey consumed by the birds. Habitat loss from logging could potentially impact the species (Chace and Tweit 1999).

Potential for Occurrence in the Study Area

Since Project alternatives would pass through very limited suitable habitat for the species, the potential for the Greater Pewee occurring within the Project area of influence is very low.

Southwestern Willow Flycatcher

Status

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) was listed as endangered, without designated critical habitat, on February 27, 1995, primarily because of loss and modification of riparian habitats (USFWS 1995e). Critical habitat was later designated on July 22, 1997 (USFWS 1997a), and the Final Recovery Plan for the species was released in 2002 (USFWS 2002a). A court decision in 2001 resulted in a subsequent final rule on critical habitat on October 19, 2005 (USFWS 2005c). Extensive additions to critical habitat were proposed for the species in 2011 (USFWS 2011g). A 5-year review of the species was conducted by the USFWS in 2008 (USFWS 2008e). The Southwestern Willow Flycatcher is a State of New Mexico endangered species and SGCN (BISON-M 2008). The Southwestern Willow Flycatcher is an AZGFD WSC and SGCN and a Pima County PVS (AZGFD 2010a; 2006a; Pima County 2004).

Distribution

All subspecies of the Willow Flycatcher winter in Central America, from southwestern Mexico (Nayarit and Oaxaca) south to Panama and possibly northwestern Colombia (AOU 1998), but migration routes and wintering range of each subspecies are unclear (USFWS 2002a). During migration, other subspecies pass through the breeding range of the Southwestern Willow Flycatcher (AOU 1998; Sogge et al. 1997). The normal spring migration period is from early May through early June, and the fall migration may extend from late July through September (Phillips et al. 1964). Historic breeding records exist for Southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern

Mexico (USFWS 2002a). There is a significant population of the species along the Rio Grande at the inflow and upstream of Elephant Butte Reservoir (NMDGF 2008).

Habitat and Life History

Southwestern Willow Flycatchers are often found on willow-covered islands, brush along watercourses, beaver meadows, and mountain parks, always in close association with riparian or lentic waters (USFWS 2002a). They may be found as high as 7,875 feet, and they also follow willow or cottonwood-lined streams out into desert regions (Terres 1980). Southwestern Willow Flycatcher territories and nest sites are usually located near open water, cienegas, marshy seeps, or saturated soils (Sogge et al. 1997). In the semiarid and arid parts of the Southwest, hydrologic conditions can vary substantially both within a season and between years. Many sites have surface water or saturated soil only during the early part of the breeding season. Breeding habitat on the edge of a reservoir may have standing water during a wet year, or it may be further from surface water during dry conditions (Sogge et al. 1997).

Four specific habitat types have been described as suitable breeding areas for the Southwestern Willow Flycatcher (Sogge et al. 1997). The first of these types is monotypic high-elevation willow. This habitat is comprised of dense stands of willows 10 to 23 feet in height, with no distinct overstory. This community is often associated with sedges, rushes, or other herbaceous wetland plants. A second habitat type is monotypic exotic, with dense stands of salt cedar (*Tamarix* spp.) or Russian olive (*Elaeagnus angustifolia*) up to 33 feet in height. These species form a dense, closed canopy, with no distinct overstory layer (Sogge et al. 1997).

Native broadleaf-dominated riparian communities form a third habitat type. This habitat may be composed of a single species, such as Goodding willow (*Salix gooddingii*), but often contains other broadleaf tree and shrub species, including cottonwood (*Populus* spp.), other willows, boxelder (*Acer negundo*), ash (*Fraxinus* spp.), alder (*Alnus* spp.), and buttonbush (*Cephalanthus occidentalis*). The vegetation in this habitat type ranges in height from 10 to 49 feet. There are trees of various size classes, and there is often a distinct overstory. The final habitat type is a mixture of native and exotic species, including those listed above. Within any particular area, the native and exotic species may be dispersed as patches dominated by natives or exotics, or they may be more evenly distributed throughout the area (Sogge et al. 1997).

Regardless of the species composition, all of these habitats share common structural characteristics. Occupied habitats always have dense vegetation in the patch interior, and dense patches are often interspersed with small clearings, open water, or areas of sparse shrubs. Habitat patches can vary in size and shape, with some occupied areas being relatively dense, linear, contiguous stands, and others being large, irregularly shaped mosaics of dense vegetation intermingled with open areas. Patch sizes can range from as little as 2.0 acres to several hundred acres. Southwestern Willow Flycatchers have not been found nesting in narrow riparian habitats less than 33 feet wide (Sogge et al. 1997).

Migration and wintering habitat may differ from breeding habitat. During migration, riparian habitat along major southwestern drainages is commonly used, but a close association with water may not always exist. These areas might be considered stopover areas, and may be very important resources for the species (USFWS 2002a).

Southwestern Willow Flycatchers normally select nest sites in thickets of shrubs and trees between 4 to 23 feet in height, with dense foliage between ground level and 13 feet (Ehrlich et al. 1988; USFWS 1995e). The nest is an open, compact cup of plant bark, fiber, and grass, and it is lined with a thin layer of fine grass, and cottony and silky plant materials. There are frequently feathers in the rim, and the nest may have plant material dangling from the bottom (Baicich and Harrison 1997). Nest trees are often rooted in or near water. Plant species diversity in nest territories varies. The Southwestern Willow Flycatcher will nest in native riparian species where available, but it will also nest in monocultures of salt cedar (*Tamarix* sp.) or Russian olive (*Elaeagnus angustifolia*) (USGS 2008). Nest sites are commonly reported in Geyer willow (*Salix geyeriana*), Goodding willow (*S. gooddingii*), boxelder (*Acer negundo*), and live oak (*Quercus agrifolia*) (Sogge et al. 1997). Southwestern Willow Flycatchers usually spend only 3 to 4 months on their breeding grounds, spending the rest of the year in migration or at wintering grounds (USFWS 2002a). Females lay a clutch of three to four eggs (USFWS 2002a). Nestlings fledge after 12 to 15 days (Ehrlich et al. 1988, USFWS 2002a).

Like most other flycatchers, the Willow Flycatcher forages primarily by flying from a perch to capture flying insects (Ehrlich et al. 1988). It also will use gleaning techniques when foraging for spiders, millipedes, and other flightless arthropods, and also when feeding on berries (Sedgwick 2000; Terres 1980). Food preferences of the Willow Flycatcher are reported by Bent (1942), in documentation associated with the Alder Flycatcher. These were considered a single species at the time the data were collected, and the sample set included both species. In the sampled diets, animal material made up 96 percent, and vegetable material was only 4 percent. The vegetable part of the diet included elderberries (*Sambucus* spp.), blackberries or raspberries (*Rubus* spp.), dogwood berries (*Cornus* spp.), juniper berries (*Juniperus* sp.), and unidentified fruits and seeds.

Threats to the Survival of the Southwestern Willow Flycatcher

Two primary factors have been identified as serious threats to the continued existence of the Southwestern Willow Flycatcher. These threats are the degradation and loss of riparian habitat, and brood parasitism by Brown-headed Cowbirds (*Molothrus ater*). The primary causes for riparian alteration and degradation include urban and agricultural development, water diversion and impoundment, stream channelization, livestock grazing, off-road vehicles and other recreational activities, and hydrological changes resulting from these uses (USFWS 1995e).

The USFWS reports that the invasion of salt cedar is a factor in the loss and modification of habitat for the Southwestern Willow Flycatcher. Many other human activities, including livestock grazing, water diversion, channelization, and vegetation removal, in the riparian area tend to favor the spread of salt cedar. The spread of salt cedar coincides with the decline of the Southwestern Willow Flycatcher, although the flycatchers have been documented to breed in dense salt cedar stands (USFWS 1995e).

Cowbirds also are a threat to Southwestern Willow Flycatchers because of their reproductive strategy of brood parasitism. The spread of cowbirds into the range of the Southwestern Willow Flycatcher began in the late 1800s, with the increase in the human-population density and their associated livestock (USFWS 1995e). The Willow Flycatcher is a common host to cowbirds (Ehrlich et al. 1992; Sogge et al. 1997; USFWS 1995e). The flycatchers appear to be nearly

incapable of rearing their own young if a cowbird chick is in the nest, and parasitism almost always leads to a complete failure of the flycatcher brood (Sogge et al. 1997).

Potential for Occurrence in the Study Area

Approximately 23 miles of the Rio Grande is currently within designated critical habitat for the Southwestern Willow Flycatcher within the New Mexico portion of the study area. The river within Bosque del Apache NWR was not designated as critical habitat, as it was already being managed for the benefit of the species (USFWS 2005c), but has been included within the recently proposed additions to critical habitat for the species (USFWS 2011g).

Designated critical habitat for the Southwestern Willow Flycatcher on the San Pedro River is present within the study area except for approximately 4 miles of the southern portion of the river, near Benson, Arizona. This four-mile segment is included in the proposed critical habitat additions for the species. There is also a small portion (approximately 3 miles) of occupied habitat for the species in the lower portion of Aravaipa Creek at its confluence with the San Pedro River (USFWS 2005c). Within the study area, the northern portions of the San Pedro River support larger, contiguous segments of dense riparian vegetation that could be attractive to the species. Generally, riparian vegetation becomes less dense further south along the river within the study area, and is likely to be progressively less attractive to flycatchers. While all four potential crossings of the San Pedro River are within critical habitat, the southern two have lower potential for impacts to the Southwestern Willow Flycatcher.

Within the study area, Pima County Tier 1 PCAs are delineated along the San Pedro River north of Redington Road, and on upper Cienega Creek. No Tier 2 PCAs occur within the study area. The Southwestern Willow Flycatcher is present within the study corridor on the Rio Grande, and the potential for its occurrence in the Arizona portion of the study corridor is primarily along portions of the San Pedro River.

<u>Dusky-capped Flycatcher</u>

Status

The Dusky-capped Flycatcher (*Myiarchus tuberculifer*) is an SGCN in Arizona (2006a).

Distribution

The Dusky-capped Flycatcher ranges from northwestern Argentina north through Central America and the Sierra Madre Mountains of Mexico and into the southwestern United States in southeast and east central Arizona and far southwestern New Mexico. Their breeding range is north from the states of Sonora and Chihuahua, Mexico (Tweit and Tweit 2002).

Habitat and Life History

Dusky-capped Flycatchers inhabit low to middle-elevation oak and deciduous riparian habitats. The diet of the birds is comprised mainly of small insects and berries (Ehrlich et. al 1988; Tweit and Tweit 2002). The birds often hover while gleaning insects from foliage (Ehrlich et al. 1988).

The species is a cavity nester and produces 4-5 moderately-marked cream-colored eggs in a single brood annually (Ehrlich et al. 1988; Tweit and Tweit 2002).

Threats to the Survival of the Dusky-capped Flycatcher

The principle threat to the species is loss of deciduous riparian habitat.

Potential for Occurrence in the Study Area

There is little suitable habitat within the study corridor for the Dusky-capped Flycatcher, but the species may occur in montane canyons in the Galiuro, Santa Catalina, and Rincon mountains.

Northern Beardless-tyrannulet

Status

The Northern Beardless-tyrannulet (*Camptostoma imberbe*a) is a State of New Mexico endangered species, a USFS sensitive species, an SGCN in New Mexico, and a USFWS BCC species (BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

The Northern Beardless-tyrannulet ranges from Costa Rica north to the far southern reaches of the U.S. The species is present in New Mexico only in the very far southwestern portion of the state in Hidalgo County, with the bulk of its range in the United States occurring in southeastern Arizona as far north as the confluence of the Gila and San Pedro Rivers (Corman and Wise-Gervais 2005; Tenney 2000).

Habitat and Life History

The species inhabits open riparian woodland habitats, commonly near open water, but also occurs in drier situations provided vegetation is adequately dense. Most of the birds that breed in Arizona are migratory. The birds commonly construct their nest in or near clusters or old tent caterpillar webs in deciduous riparian trees. The birds lay one to three eggs in each of two or three nesting efforts in Arizona (Corman and Wise-Gervais 2005; Ehrlich et al. 1988). The birds are primarily insectivorous, but consume some berries and seeds (Ehrlich et al. 1988; Tenney 2000).

Threats to the Survival of the Northern Beardless-tyrannulet

The primary threat to the species is riparian habitat loss, particularly in the southern portions of its range in Mexico (Tenney 2000).

Potential for Occurrence in the Study Area

The species occurs within the study corridor and is recorded nesting along the San Pedro River and its tributaries, including Aravaipa Creek, at the Cluff Ranch south of Safford, Arizona, and on the Muleshoe Ranch Preserve (Corman and Wise-Gervais 2005).

Tropical Kingbird

Status

The Tropical Kingbird (*Tyrannus melancholicus*) is an AZGFD WSC (AZGFD 2010a).

Distribution

The Tropical Kingbird occurs from central Argentina and Peru north just into the United States in southern Texas and southeastern Arizona (AOU 1998; Stouffer and Chesser 1998).

Habitat and Life History

The Tropical Kingbird is typically a resident of riparian woodlands in Arizona, apparently preferring the periphery of such woodlands. They use high perches to watch for predators and for foraging in these areas (Corman and Wise-Gervais 2005). The diet of the Tropical Kingbird consists primarily of insects and berries (Ehrlich et al. 1988; Terres 1980). Tropical Kingbirds nest high in trees in May or June, producing 2-4 eggs, with the young fledging in about 18 days (Corman and Wise-Gervais 2005; Terres 1980).

Threats to the Survival of the Tropical Kingbird

There are no recognized threats to the species; it apparently is tolerant of human activity and some development (Stouffer and Chesser 1998).

Potential for Occurrence in the Study Area

Tropical Kingbirds could occur within the Project area along the San Pedro River between Dudleyville and Cascabel, Arizona. The species is infrequently recorded at Sweetwater Wetlands in Tucson (COT 2006).

Thick-billed Kingbird

Status

The Thick-billed Kingbird (*Tyrannus crassirostris*) is a State of New Mexico endangered species and SGCN, a Forest Service sensitive species, and an AZGFD WSC and SGCN (AZGFD 2010a; 2006a; BISON-M 2008; USFS 2007a).

Distribution

The Thick-billed Kingbird is primarily a resident of Mexico, and just enters the United States in southern Arizona and far southwestern New Mexico. The species occurs as far south as south-central Guatemala (AOU 1998; Lowther 2002; Terres 1980).

Habitat and Life History

The Thick-billed Kingbird is a resident of broad-leaf riparian gallery forests, especially those with sycamores, and tropical deciduous forest (south of the United States) (AOU 1998; Ehrlich

et al. 1988; Terres 1980). The birds feed in typical flycatcher fashion by aerial hawking for insects, and glean other invertebrates off vegetation (Ehrlich et al. 1988; Lowther 2002). The species is an uncommon, dispersed breeder in the southwestern United States (Lowther 2002). They build an untidy cup nest in the tops of broad-leaved riparian trees. The nests are so loosely constructed that twigs protrude from the structure, and the eggs are usually visible from below (Ehrlich et al. 1988; Terres 1980). Three to four eggs are laid (Ehrlich et al. 1988; Lowther 2002; Terres 1980).

Threats to the Survival of the Thick-billed Kingbird

The greatest threat to the Thick-billed Kingbird is degradation or loss of gallery riparian forest habitat from groundwater pumping, water diversion, overgrazing, and wood cutting (AZGFD 2001g).

Potential for Occurrence in the Study Area

There are records of the species nesting in gallery forest on the San Pedro River between Cascabel and Dudleyville, Arizona (AZGFD 2001g). The species is infrequently recorded at Sweetwater Wetlands in Tucson (COT 2006).

Sulphur-bellied Flycatcher

Status

The Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The Sulphur-bellied Flycatcher ranges from central Arizona and Nuevo Leon, Mexico south to Costa Rica (Lowther and Stotz 1999).

Habitat and Life History

Habitat for the species in Arizona is riparian gallery forest including sycamore, oaks, and walnut (Lowther and Stotz 1999). Sulphur-bellied Flycatchers take a variety of insects that they capture in flight and by gleaning on trees (Ehrlich et al. 1988; Lowther and Stotz 1999). They take more fruit outside the nesting season (Lowther and Stotz 1999). The species is a cavity nester, usually in sycamore trees, with the unlined nest constructed of small twigs, pine needles, or leaf petioles (Ehrlich et al. 1988; Lowther and Stotz 1999). Two to 4 white, cream, or buff eggs heavily marked with brown, olive, or lavender are laid between June and August (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Sulphur-bellied Flycatcher

There are no recognized threats to the species. Habitat degradation or loss, particularly of mature sycamore trees, could adversely affect the species.

Potential for Occurrence in the Study Area

Suitable canyon habitat with large trees that could provide nest cavities does not occur within the Project area of influence, and Sulphur-bellied Flycatchers are likely to occur only as non-nesting individuals or post-fledging juveniles.

Loggerhead Shrike

Status

The Loggerhead Shrike (*Lanius ludovicianus*) is a New Mexico BLM sensitive species, a USFS sensitive species, a USFWS species of concern and BCC, and a State of New Mexico sensitive species and SGCN (AZGFD 2010a; BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

The Loggerhead Shrike is widely distributed across the United States from coast to coast south to Oaxaca and Veracruz, Mexico (AOU 1998; Corman and Wise-Gervais 2005). The species ranges throughout Arizona and New Mexico (Corman and Wise-Gervais 2005; Hubbard 1970).

Habitat and Life History

The Loggerhead Shrike is found in a variety of habitats, which generally include open country on relatively flat terrain, thinly wooded or shrubby areas with clearings, desertscrub, grasslands, meadows, pastures, old orchards, and thickets along roadsides (AOU 1998; Corman and Wise-Gervais 2005; Hubbard 1970; Terres 1980). They require some tall vegetation such as trees or large shrubs that they use for hunting perches (Humple 2008). Loggerhead Shrikes feed primarily on large insects, but they frequently eat small birds, mice, lizards, amphibians, carrion, and other invertebrates (Ehrlich et al. 1988). They may stun small birds in flight with a strike of their beak (AZGFD 2004g). They often impale their prey on thorns or barbs on wire fences (AZGFD 2004g).

Threats to the Survival of the Loggerhead Shrike

Populations of this species appear to be declining almost everywhere throughout its range, with the probable causes being habitat loss, pesticides, and collisions with vehicles (AZGFD 2004g; Ehrlich et al. 1988; Humple 2008). Habitat loss resulting from development and conversion of lands to agriculture has adversely affected the species (AZGFD 2004g; Humple 2008). Invasive grass species, typically associated with livestock forage may alter habitat fire regimes and permanently convert habitats to denser, shrubby vegetation that are not suitable for Loggerhead Shrikes (AZGFD 2004g; Humple 2008).

Potential for Occurrence in the Study Area

This species is widespread throughout much of the Project area of influence, particularly at lower to moderate elevations.

Bell's Vireo

Status

Bell's Vireo (*Vireo bellii*) is a State of New Mexico threatened species and SGCN. Bell's Vireo is a USFWS BCC (USFWS 2008c). It is also a Pima County PVS (AZGFD 2010a; BISON-M 2008). Arizona Bell's Vireo (*V. bellii arizonae*) is a Forest Service sensitive species and an SGCN in Arizona (AZGFD 2006a; USFS 2007a).

Distribution

Bell's Vireo breeds in the central and southwestern United States and adjacent Mexico, and winters along the west coast of Mexico and south to Honduras (Brown 1993).

Habitat and Life History

Bell's Vireos inhabit dense, often thorny, shrubby vegetation along arroyos, streams, or woodland edges. In the southwest the species commonly inhabits such areas that include a mesquite component (Corman and Wise-Gervais 2005). Bell's Vireos eat primarily larger insects such as grasshoppers, beetles, bees, wasps, larvae of Lepidoptera, and a few spiders, which they glean from the ground or by hovering at ground level. They also occasionally take snails and wild fruit (Brown 1993; Terres 1980). Their hanging cup nests are placed at the fork of slender tree branches and are constructed of plant parts, leaves, and bark, and are lined with fine grasses, small feathers, or horsehair (Brown 1993; Terres 1980). Eggs are brown-spotted white; and 4 are typically laid between April and July (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Bell's Vireo

Populations of the Bell's Vireo have shown some recent declines in portions of their range, but for the most part the species is stable. Primary threats to Bell's Vireo are habitat loss from flood control measures and damming of rivers, and parasitism by Brown-headed Cowbirds (Corman and Wise-Gervais 2005).

Potential for Occurrence in the Study Area

Within the study area, Pima County Tier 1 PCAs for Bell's Vireo are delineated along the Canada del Oro, Sabino Canyon-Rillito Wash, Agua Caliente-Tanque Verde, Cienega Creek-Davidson Canyon-Pantano Wash, Agua Verde Creeks, and the San Pedro River (Pima County 2004). Bell's Vireos are not uncommon within the Arizona portions of the Project area of influence. Although Bell's Vireos nest along the lower Rio Grande, suitable brushy habitat near the proposed Project river crossings is limited. They birds are less likely to occur in the New Mexico portions of the Project area of influence.

Gray Vireo

Status

The Gray Vireo (*Vireo vicinior*) is a State of New Mexico threatened species and SGCN (BISON-M 2008), a USFWS species of concern, and a Forest Service sensitive species (USFS 2007a; USFWS 2011c). The Gray Vireo is a USFWS BCC (USFWS 2008c).

Distribution

The Gray Vireo occurs as a breeding resident in parts of six Southwestern states, with the bulk of its distribution in northeastern Arizona and western New Mexico. Disjunct populations occur in eastern Colorado, southeastern New Mexico, southwestern Texas, Southern California, Baja California, and northwestern Coahuila, Mexico (Barlow et al. 1999). Non-breeding residents occur in southern Arizona, southern Texas, Baja California Sur, and Sonora, Mexico.

Habitat and Life History

Across its range, the Gray Vireo occurs from desertscrub up into piñon-juniper and oak juniper associations. The Gray Vireo prefers dry slopes, and is unique among vireos in this respect (Terres 1980). The Gray Vireo is insectivorous and feeds primarily by ground gleaning (Ehrlich et al. 1988), but may also scratch the ground like a towhee (Bent 1950). They feed primarily on insects during the nesting season, but wintering birds in parts of Arizona and coastal Sonora, Mexico, Gray Vireos often feed on the fruit of one species of elephant tree (Russell and Monson 1998). The Gray Vireo uses a variety of nesting habitats, but primarily selects hot, semi arid, and shrubby areas (Bent 1950).

Threats to the Survival of the Gray Vireo

Threats to Gray Vireos are largely unknown, but are likely related to habitat disturbance, alteration, and fragmentation. Removal of piñon-juniper habitat for livestock grazing and for firewood has affected the species (Barlow et al. 1999). The Gray Vireo is a common host to cowbirds (Ehrlich et al. 1988), and reports vary regarding the ability of the vireos to cope with brood parasitism. Ehrlich et al. (1988) reported that a second floor may be built over the parasitized portion of a nest, resulting in the death of the eggs. Such behavior suggests an evolved behavioral response to the threat. The adults may also abandon a parasitized nest (Corman and Wise-Gervais 2005).

Potential for Occurrence in the Study Area

Much of the Project area is within the range of the Gray Vireo. A large area of suitable habitat within the Project area is present on Chupadera Mesa, with smaller areas primarily along flanks of desert mountain ranges. Where the Project passes through such habitat, Gray Vireos are likely to be present.

Pinyon Jay

Status

The Pinyon Jay (*Gymnorhinus cyanocephalus*) is a BLM sensitive species in Arizona, an SGCN in New Mexico and Arizona, and a USFWS BCC(AZGFD 2006a; BISON-M 2008; BLM 2010; USFWS 2008c).

Distribution

The Pinyon Jay is a resident of the Great Basin and Intermountain West, occurring outside the United States only in northern Baja California (Balda 2002).

Habitat and Life History

Pinyon Jays primarily inhabit piñon-juniper communities and ecotones with grasslands and ponderosa pine forest that contain piñon-juniper elements between 3,000 and 8,000 feet elevation (Corman and Wise-Gervais 2005; Terres 1980). They also range into sagebrush (*Artemisia* spp.), oak, and chaparral communities (Balda 2002). They commonly forage in large natal flocks of up to a few hundred birds, and in winter these groups may join in larger aggregations of up to 1,000 individuals (Balda 2002; Ehrlich et al. 1988; Terres 1980). Pinyon Jays are rather omnivorous, typically consuming piñon nuts and other pine seeds, grass seeds, insects, berries, fruits, small mammals, and occasionally eggs and/or young of small birds, lizards, or snakes (Balda 2002; Terres 1980). Foods are commonly cached. Pinyon Jays are colonial nesters, and up to three active nesting pairs have been documented in a single tree (Terres 1980). Nests are a rather large and bulky cup, and are usually constructed of three tiers of components, including an outer layer of sticks, overlain by a layer of grasses, and finished with an inner cup of finer materials (Balda 2002). Three to 5 brown-marked, greenish or bluish-white eggs are laid between February and June (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Pinyon Jay

The primary threat to the Pinyon Jay is habitat loss due to conversion of lands for livestock grazing, agriculture, and developments. Large-scale fires, the result of many years of fire suppression, have resulted in significant losses of Pinyon Jay habitat. Domestic cats and shooting are threats to birds living in proximity to human developments, where the birds are also occasionally struck by vehicles (Balda 2002).

Potential for Occurrence in the Study Area

Pinyon Jays are likely to occur on Chupadera Mesa, which contains the only substantial piñon-juniper woodland within the New Mexico portion of the Project area of influence.

Desert Purple Martin

Status

The Desert Purple Martin (*Progne subis hesperia*) is an Arizona BLM sensitive species, an AZGFD SGCN (AZGFD 2006a; BLM 2010).

Distribution

The Desert Purple Martin breeds in the low deserts of southern Arizona and southern Baja California south to south-central Sonora and northern Sinaloa, Mexico (Brown 1997).

Habitat and Life History

The Desert Purple Martin nests in large columnar cacti, particularly saguaros. The species is a strict insectivore, primarily taking its food in flight, but may rarely skim insects off of water, glean them off vegetation, or go to the ground to pick up prey (Brown 1997). Four to 5 white eggs are laid between March and July (Brown 1997; Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Desert Purple Martin

Loss of columnar cacti, particularly in Mexico where large areas of Sonoran Desert are being converted to grassland to support the livestock industry adversely affects the species. Pesticides could impact birds wintering in South America (Brown 1997).

Potential for Occurrence in the Study Area

There is a moderate potential for Desert Purple Martins occurring in saguaro forest habitat in the Arizona portions of the Project area of influence.

Bank Swallow

Status

The Bank Swallow (*Riparia riparia*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The breeding range of the Bank Swallow includes the northern half of North America, with wintering areas along the west-central coast of Mexico, and Panama. The species is also widespread in Europe and Asia, and winters in parts of Asia and Africa (Garrison 1999).

Habitat and Life History

Bank Swallows occur in a wide variety of habitats, generally anywhere suitable steep to vertical, naturally occurring or manmade embankments are present for nesting. They are most common where such habitat is associated with flowing water. (Ehrlich et al. 1988). New burrows, usually 2 to 3 feet in length, are excavated in the upper portions of embankments by the birds each breeding season. Bank Swallows are almost entirely insectivorous, taking food on the wing. The

poorly consolidated nests are constructed at the rear of the burrows, and are composed of a variety of materials available near the nest, including weeds, roots, twigs, grasses, leaves, pine needles, wool, horsehair, or feathers. Four to 5 unmarked white eggs are laid between April and July (Garrison 1999; Terres 1980).

Threats to the Survival of the Bank Swallow

The principal threat to the Bank Swallow is habitat loss resulting from bank stabilization or modification for erosion control, and cessation of gravel pit operations that provide fresh embankments for nesting.

Potential for Occurrence in the Study Area

Bank Swallows occur uncommonly at Bosque del Apache NWR. Bank Swallows may occasionally occur in small numbers elsewhere within the Project area of influence in New Mexico.

Juniper Titmouse

Status

The Juniper Titmouse (*Baeolophus ridgwayi*) is a State of New Mexico SGCN and a USFWS BCC (BISON-M 2008; USFWS 2008c).

Distribution

The Juniper Titmouse ranges from southern Oregon and southeastern Idaho south and east to the Oklahoma panhandle, south-central New Mexico, southeastern Arizona, and just enters northern Mexico in Sonora (Cicero 2000).

Habitat and Life History

Typical habitat for the Juniper Titmouse is dry, open woodlands, commonly dominated by junipers. The Juniper Titmouse gleans invertebrates from bark and foliage, and also consumes plant materials including leaf galls, piñon nuts, acorns, seeds of weeds, primarily in the fall (Cicero 2000; Corman and Wise-Gervais 2005; Terres 1980). The Juniper Titmouse is a cavity-nesting species, using natural cavities in trees or abandoned woodpecker holes. They will occasionally excavate a hole in a rotting snag of a living tree. Structural nest components include grasses, weed stems, and moss, shredded bark, twigs. The nests may be lined with cow hair, rabbit fur, or feathers (Cicero 2000; Terres 1980). Six to 8 white to faintly-marked eggs are laid between March and July (Cicero 2000; Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Juniper Titmouse

Populations of the Juniper Titmouse are mostly stable, though local impacts resulted from range conversion efforts in the 1960s and 1970s, and from cutting of juniper for firewood, rangeland management, and fence posts (Cicero 2000; Corman and Wise-Gervais 2005).

Potential for Occurrence in the Study Area

The Juniper Titmouse is expected to occur within the Project area of influence primarily in the northeastern portion of the Project near the proposed SunZia East Substation and west onto Chupadera Mesa.

Swainson's Thrush

Status

Swainson's Thrush (*Catharus ustulatus*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

Swainson's Thrush is a nearctic-neotropical migrant that breeds from Alaska and central Canada south to the northern Rocky Mountains in the United States. The birds winter in South America north to the coastal areas of central Mexico (Mack and Yong 2000).

Habitat and Life History

This species is primarily a high-elevation, spruce-fir forest inhabitant, but occurs in aspen forests or montane deciduous riparian habitats in the southern portion of its range. Important habitat elements generally include high tree density in a closed canopy with some understory cover and a conifer component (Corman and Wise-Gervais 2005; Mack and Yong 2000).

Swainson's Thrushes forage on or near the ground for insects and spiders during spring migration and the breeding season and switch to diet of mostly berries during fall migration and wintering periods (Ehrlich et al. 1988; Mack and Yong 2000).

Threats to the Survival of the Swainson's Thrush

The species is in decline range-wide although the causes for this are not well understood. Predation is an issue for the species and habitat degradation, fragmentation and loss, primarily due to logging, have likely contributed to the decline of the species. Other threats include collisions with buildings, windows, and tall towers (Mack and Yong 2000).

Potential for Occurrence in the Study Area

The Swainson's Thrush is recorded in annually varying numbers along the San Pedro River during migration.

Sage Thrasher

Status

The Sage Thrasher (*Oreoscoptes montanus*) is an SGCN in New Mexico (BISON-M 2008).

Distribution

The Sage Thrasher breeds from south-central British Columbia south to northern Arizona and New Mexico. The wintering range of the species extends south to montane central Mexico (Reynolds et al. 1999).

Habitat and Life History

The Sagebrush Thrasher is considered an obligate sage habitat species, but in portions of its range also occurs in greasewood (*Sarcobatus vermiculatus*) or bitterbrush (*Purshia tridentata*) communities (Reynolds et al. 1999; Terres 1980). Sage Thrashers forage on the ground for insects and their larvae, spiders, and other arthropods, and include berries in their diet in the fall (Reynolds et al. 1999; Terres 1980). Nests are normally constructed in larger bushes including sagebrush, rabbitbrush (*Chrysothamnus* spp.), greasewood, or occasionally in taller, thorny shrubs (Reynolds et al. 1999; Terres 1980). Nests may also be constructed on the ground beneath sagebrush (Ehrlich et al. 1988; Reynolds et al. 1999). Nests are constructed of coarse twigs, sage leaves, bark, and fine roots, and are lined with grasses, horsehair, sheep's wool, or fur (Reynolds et al. 1999; Terres 1980). Three to 5 heavily brown-spotted blue to green-blue eggs are laid between April and July (Ehrlich et al. 1988; Reynolds et al. 1999; Terres 1980).

Threats to the Survival of the Sage Thrasher

The principal threat to the Sage Thrasher is degradation or loss of sagebrush habitat from conversion for agriculture or residential development, fires, or colonization by nonnative grass species (Reynolds et al. 1999).

Potential for Occurrence in the Study Area

Sage Thrashers are present in the Project area of influence during winter.

<u>Bendire's Thrasher</u>

Status

Bendire's Thrasher (*Toxostoma bendirei*) is a USFWS BCC and a State of New Mexico SGCN (BISON-M 2008; USFWS 2008c).

Distribution

Bendire's Thrasher ranges from Southern California, Nevada, Utah, and southwestern Colorado south to northern Sinaloa, Mexico (England and Laudenslayer 1993). The species is a year-round resident in most of the Project area.

Habitat and Life History

Bendire's Thrashers inhabit desertscrub, desert grasslands or shrublands where cacti (*Cylindropuntia* spp.), yuccas, agaves, mesquite, catclaw (*Acacia* spp.), desert-thorn (*Lycium* spp.), or creosote bush occur (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; England and

Laudenslayer 1993). Bendire's Thrashers forage on the ground for invertebrates, their larvae and pupae, and to a lesser degree consume seeds and fruit (England and Laudenslayer 1993; Terres 1980). The bowl-shaped nests are built in shrubs or cacti, and are constructed of twigs, and lined with grasses, weeds, rootlets, feathers, wool, cotton, or other debris (England and Laudenslayer 1993; Terres 1980). Three to 4 spotted, off-white to very pale blue-green to gray-green eggs are laid between February and August (Ehrlich et al. 1988; England and Laudenslayer 1993; Terres 1980).

Threats to the Survival of the Bendire's Thrasher

Threats to Bendire's Thrasher include habitat loss or degradation due to urbanization, overgrazing, and OHV use (England and Laudenslayer 1993).

Potential for Occurrence in the Study Area

Bendire's Thrashers are present within much of the Project area of influence in New Mexico and Arizona.

LeConte's Thrasher

Status

Le Conte's Thrasher (*Toxostoma lecontei*) is an Arizona BLM sensitive species an AZGFD SGCN, and a USFWS BCC (AZGFD 2006a; BLM 2010; USFWS 2008c).

Distribution

Le Conte's Thrasher ranges from Southern California and Nevada south into central Baja California, east to south-central Arizona near Casa Grande, and south to coastal Sonora, Mexico (Sheppard 1996).

Habitat and Life History

Le Conte's Thrashers inhabit some of the driest deserts in the southwestern United States, where vegetation is usually sparse and there is seldom any available surface water. Vegetation commonly includes saltbush (*Atriplex*) species or scattered creosote bushes, and an important element of their habitat is the presence of at least a few taller plants for nesting such as chollas or yuccas. Like other thrashers, they forage on the ground among leaf litter for arthropods and some plant seeds, commonly digging shallow pits to expose these items. They also eat bird eggs and rarely take small lizards or snakes. They construct a double-lined, cup-shaped nest in chollas or other tall, dense vegetation in their habitat (Ehrlich et al. 1988; Sheppard 1996).

Threats to the Survival of Le Conte's Thrasher

Threats to Le Conte's Thrashers include habitat loss from development, unregulated OHV use, shooting, and pesticides (Sheppard 1996).

Potential for Occurrence in the Study Area

Le Conte's Thrashers may occur in valley bottoms surrounding the Picacho Mountains within the study area.

Sprague's Pipit

Status

Sprague's Pipit (*Anthus spragueii*) is a candidate species under the ESA and is a USFWS BCC (USFWS 2010e; 2008b). It is also an AZGFD WSC and SGCN and a State of New Mexico SGCN (AZGFD 2010a; 2006a; BISON-M 2008).

Distribution

Sprague's Pipit is a resident of northern and western South America and is migratory, primarily through the eastern Great Plains states to its breeding areas in southwestern Canada, the Dakotas, and northwestern Minnesota (Alsop 2001; AOU 1998). It winters in the United States in south-central and southeastern Arizona, southern New Mexico, Texas and Oklahoma, and throughout grasslands and the Chihuahuan Desert in northern Mexico (AOU 1998; Sibley 2000).

Sprague's Pipit winters in Cochise County, Arizona, where it inhabits short-grass prairie habitat and pastures or agricultural fields with grasses of medium height (Alsop 2001). It is also present in winter in the grasslands in the Sonoita, San Rafael and Sulphur Springs Valleys in southern Arizona (AZGFD 1996; BISON-M 2008).

Habitat and Life History

Sprague's Pipit is an endemic of northern North American grasslands, but there is very little knowledge of its behavior on its wintering grounds in the southern United States and northern Mexico. Pipits prefer open grassland habitats, and may use fallow agricultural fields during fall migration (Robbins and Dale 1999). Sprague's Pipits feed primarily on arthropods in summer, but do consume some seeds of grasses and forbs during fall migration (AZGFD 2001h; Ehrlich et al. 1988; Robbins and Dale 1999; Terres 1980). Nests consist of a cup-shaped structure of woven grasses, either in a hollow on the ground or in bunch grasses (Terres 1980). Sprague's Pipit is not a breeding species in the Project area.

Threats to the Survival of Sprague's Pipit

Loss of prairie nesting habitat, primarily through conversion to farmland, has been the greatest single cause of declines for the species (Robbins and Dale 1999). Overgrazing and resultant shrub invasion are the primary threats to the species in the southwestern United States. Urban and rural developments, including horse properties, homes, and roads, and OHV use adversely affect habitat for the species (AZGFD 2001h). Sprague's Pipits are also sensitive to landscape features, and avoid areas near trees or tall manmade structures when nesting (USFWS 2010e). This effect may not be as strong in wintering habitat, as the species does occur in Chihuahuan desertscrub with some tall plants.

Potential for Occurrence in the Study Area

Most of the habitat used by Sprague's Pipit in southern Arizona and New Mexico is located south of the Project area (AZGFD 2001h; Robbins and Dale 1999). The species is unlikely to regularly occur within the Project area of influence except during migration.

Black-throated Gray Warbler

Status

The Black-throated Gray Warbler (*Dendroica nigrescens*) is a USFWS BCC and a State of New Mexico SGCN (BISON-M 2008; USFWS 2008c).

Distribution

The Black-throated Gray Warbler breeds from southwestern British Columbia south to southeastern Arizona and northeastern Sonora, Mexico. The species winters as far south as Oaxaca, Mexico (Guzy and Lowther 1997).

Habitat and Life History

The Black-throated Gray Warbler breeds in dry coniferous or coniferous-deciduous forests, oak-piñon, or scrub habitats (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Guzy and Lowther 1997). Black-throated Gray Warblers feed primarily on insects, with a preference for larvae of butterflies and moths (Guzy and Lowther 1997; Terres 1980). Their cup-shaped nests, placed far out on horizontal branches are constructed of grass, moss, bark, and twigs (Ehrlich et al. 1988). Clutches of approximately 4 brown-marked white to cream-colored eggs are laid between May and July (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Black-throated Gray Warbler

Human effects on the Black-throated Gray Warbler are not well-documented, but habitat used by the species is not often significantly impacted by human activities, except for minor vegetation clearing of narrow swaths through habitat for energy projects.

Potential for Occurrence in the Study Area

Juniper woodlands and savanna that provide suitable habitat for the Black-throated Gray Warbler occur from the vicinity of the proposed SunZia East Substation west across Chupadera Mesa. The species may also occur in the Galiuro Mountains in the nesting season, and often winters in riparian woodlands, urban areas, and sometimes desertscrub in southern Arizona.

Yellow Warbler

Status

The Yellow Warbler (*Dendroica petechia*) is a USFWS BCC and an SGCN in New Mexico and Arizona (BISON-M 2008; USFWS 2008c).

Distribution

The Yellow Warbler breeds from northwest Alaska and the Aleutian Islands east to Newfoundland, and south through most of the northern half of the continental United States, and discontinuously south to central Arizona below the Mogollon Rim and central Mexico along the Sierra Madre Occidental as far south as northern Oaxaca. The winter range of the species extends south along the coasts of Mexico from southern Sonora and Tamaulipas south to northern Bolivia and central Peru (Lowther et al. 1999a).

Habitat and Life History

Yellow Warblers inhabit thickets of shrubby wetlands, riparian areas, woodlands, or scrub. A preference for moist habitats is likely due to the presence of preferred nesting trees, including willows (*Salix* spp.), alder (*Alnus* spp.), dogwood (*Cornus* spp.), or elderberry (*Sambucus* spp.) in such habitats (Corman and Wise-Gervais 2005; Lowther et al. 1999a). Yellow Warblers feed primarily on insects, with a demonstrated preference for moth larvae, many of which are significant tree-defoliating species. Yellow Warblers also take other arthropods, including spiders, and some berries (Ehrlich et al. 1988; Lowther et al. 1999a; Terres 1980). The sturdy, compact, cup-shaped nest is usually placed in an upright fork of a tree or shrub, and is constructed of weeds, fine grasses, lichens, and bark (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Lowther et al. 1999a; Terres 1980). Clutches of 4 to 5 marked, whitish to greenish eggs are laid between April and July (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Yellow Warbler

Impacts to Yellow Warbler habitat may occur from livestock grazing that affects willows or similar riparian vegetation (Lowther et al. 1999a). Yellow Warblers are a common host to the Brown-Headed Cowbird (Corman and Wise-Gervais 2005; Terres 1980).

Potential for Occurrence in the Study Area

The Yellow Warbler does not nest within the study area in New Mexico, although is a very common spring migrant along the Rio Grande. The San Pedro River in Arizona supports a large nesting population and is a major migratory corridor for the species.

<u>MacGillivray's Warbler</u>

Status

MacGillivray's Warbler (*Oporornis tolmiei*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

MacGillivray's Warbler breeds from central New Mexico and Arizona west to southern California and north through the Rocky Mountains to far southeastern Alaska). The birds winter from west-central Mexico south to Panama (Pitocchelli 1995).

Habitat and Life History

MacGillivray's Warblers are found in riparian habitats and adjacent forest comprised of mixed coniferous and deciduous trees and shrubs, and in second-growth and disturbed habitats in coniferous forests (Corman and Wise-Gervais 2005; Pitocchelli 1995). The birds require low profile dense undergrowth and moderate cover in its habitat for nesting and foraging. They construct a cup-shaped nest low in dense vegetation. The birds forage primarily for insects low in vegetation or on the ground, and glean insects from bark of trees, the inner reaches of dense vegetation, or among leaves on the ground (Pitocchelli 1995).

Threats to the Survival of the MacGillivray's Warbler

Some human disturbances of forest habitat such as mining activities and selective clearing of timber benefit the species by providing areas of additional suitable open habitats. Replanting of spruce-fir forest with pine removes habitat since dense pine stands do not allow for adequate shrubby understory grown the birds require. There are no significant threats identified for this species.

Potential for Occurrence in the Study Area

The MacGillivray's Warbler occurs along the San Pedro River during migration.

<u>Orange-crowned Warbler</u>

Status

The Orange-crowned Warbler (*Vermivora celata*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The Orange-crowned Warbler breeds from Western Alaska and most of Canada and south in the western United States to central Arizona and New Mexico. The birds winter in the southern United States south to Belize (Gilbert et al. 2010).

Habitat and Life History

In Arizona, Orange-crowned Warblers prefer valley and canyon bottom habitats with a dense understory. Nesting usually occurs at high elevations, often at or above 8,200 feet. Orange-crowned Warblers forage mostly among green foliage, primarily for invertebrates but also consume fruits and berries, and occasionally feed at sap flows on trees. Birds construct a well-concealed cup-shaped nest, usually on the ground at the base of a tree, on steep, shaded hillsides (Ehrlich et al. 1988; Gilbert et al. 2010).

Threats to the Survival of the Orange-crowned Warbler

Logging and grazing have deleterious effects on habitats occupied by Orange-crowned Warblers, but the birds are somewhat tolerant of human disturbance. Populations are in decline primarily due to degradation or loss of habitat (Gilbert et al. 2010).

Potential for Occurrence in the Study Area

Nesting Orange-crowned Warblers generally occur at elevations above the Project area of influence. Wintering and migratory Orange-crowned Warblers are common along low-elevation streams and desertscrub habitat in Arizona, including within the Project area of influence.

Lucy's Warbler

Status

Lucy's Warbler (*Vermivora luciae*) is a USFWS BCC and a State of New Mexico SGCN (BISON-M 2008; USFWS 2008c).

Distribution

Lucy's Warbler breeds from southwestern Colorado and southern Utah, along the Colorado River in Arizona, and south of the Mogollon Rim to south-central and southeastern Arizona, southwest New Mexico, and along the Rio Grande in Texas as far as Big Bend National Park. The species winters along the west coast of Mexico from southern Sonora to Oaxaca (Johnson et al. 1997).

Habitat and Life History

Lucy's Warbler inhabits areas of brushy vegetation along perennial or ephemeral drainages in desert habitats, primarily associated with mesquite (Corman and Wise-Gervais 2005; Ehrlich et al. 1988; Johnson et al. 1997). Lucy's Warbler is almost entirely insectivorous, but takes a few spiders (Ehrlich et al. 1988; Johnson et al. 1997; Terres 1980). Lucy's Warbler is a cavity-nesting species, using natural cavities in trees, old woodpecker holes, gaps beneath loose bark of trees, shallow cliffs or earth embankments, abandoned Cliff Swallow and Verdin nests, and among leaves of agaves or yuccas (Corman and Wise-Gervais 2005; Johnson et al. 1997; Terres 1980). Usually 4 or 5 finely-marked, white to cream-white eggs are laid between April and June (Ehrlich et al. 1988; Johnson et al. 1997; Terres 1980).

Threats to the Survival of the Lucy's Warbler

Degradation and loss of mesquite or riparian habitats due to groundwater pumping and firewood cutting have adversely affected Lucy's Warblers, including extirpation of localized populations, but have not reached a level threatening the species as a whole (Johnson et al. 1997). Lucy's Warblers are only occasionally a host to cowbirds. (Ehrlich et al. 1988).

Potential for Occurrence in the Study Area

Lucy's Warblers are likely to occur in summer along desert washes in the Arizona and the western portion of the New Mexico segments of the Project.

Abert's Towhee

Status

Abert's Towhee (*Pipilo aberti*) is a State of New Mexico threatened species, a USFS sensitive species, an SGCN in New Mexico and Arizona, and is a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; USFS 2007a).

Distribution

Abert's Towhee has a restricted distribution, occurring primarily in the southwestern half of Arizona, with small numbers of the birds present in southwestern Utah, southern Nevada, far southeastern California, and southwestern New Mexico in the eastern Gila River Watershed and at the San Simon Cienega (NGS 2002; Tweit and Finch 1994).

Habitat and Life History

Abert's Towhees inhabit riparian or xeroriparian habitats with cottonwood, willow, mesquite, or paloverde trees containing a dense understory component. They will also use dense stands of exotic tamarisk (Tweit and Finch 1994). Abert's Towhees forage primarily on the ground among leaf litter for insects and seeds.

Threats to the Survival of the Abert's Towhee

Habitat degradation and loss are the principle threats to the species (Tweit and Finch 1994).

Potential for Occurrence in the Study Area

Both Tier 1 and 2 PCAs are designated by Pima County for Abert's Towhee. Within the study area Tier 1 PCAs are delineated for reaches on the Santa Cruz River, all of the San Pedro River in Pima County, and Davidson Canyon and Cienega Creek. A single Tier 2 PCA is delineated for Sabino Canyon and the Tanque Verde Washes in the Tucson Valley (Pima County 2004). Abert's Towhees are likely to occur on Project alternatives near the San Pedro River, at Cienega Creek, and possibly at other areas with suitable habitat in the Arizona portion of the Project. Abert's Towhee is recorded in New Mexico only from the Gila River watershed and the San Simon Cienega, both outside of the Project area.

Botteri's Sparrow

Status

Botteri's Sparrow (*Peucaea* (*Aimophila*) *botterii*) is a BLM sensitive species in Arizona, a New Mexico sensitive species, an SGCN in Arizona, and a USFWS BCC (AZGFD 2006a; BISON-M 2008; BLM 2010; USFWS 2008c).

Distribution

Botteri's Sparrow ranges from Nicaragua and Central Mexico north to the southern United States where populations occur in far southeastern Arizona, small portions of southwestern New Mexico, and southern Texas (Webb and Bock 1996),

Habitat and Life History

In southern Arizona, the species prefers taller grassland habitats, commonly occurring in swales and floodplain bottoms where giant sacaton (*Sporobolus wrightii*) is present. They forage on low, grassy hillsides adjacent to these habitats. They also occur up into the lower reaches of open oak woodland (Corman and Wise-Gervais 2005; Webb and Bock 1996). The birds feed primarily on grasshoppers and other arthropods, but also consume some grass and forb seeds (Ehrlich et al. 1988; Webb and Bock 1996). They construct their nest within or at the base of moderately tall bunch clumps of bunch-grasses. They produce two to four unmarked bluish-white eggs per clutch (Ehrlich et al. 1988; Webb and Bock 1996).

Threats to the Survival of Botteri's Sparrow

The greatest threat to the species is from degradation of loss of habitat resulting from conversion of lands for livestock grazing, agriculture and development (Corman and Wise-Gervais 2005; Webb and Bock 1996).

Potential for Occurrence in the Study Area

Most of the populations of the species occur far south in southern Arizona near the Mexican border and the Project area is at the northern limits of the range of the species in the United States There is only a low potential for Botteri's Sparrows occurring within the study corridor.

<u>Rufous-winged Sparrow</u>

Status

The Rufous-winged Sparrow (*Aimophila carpalis*) is an SGCN in Arizona and a USFWS BCC (AZGFD 2006a; USFWS 2008c). It is also a Pima County PVS (Pima County 2004).

Distribution

The Rufous-winged Sparrow ranges from south-central Arizona south along the Pacific slope of Mexico to central Sinaloa (Lowther et al. 1999c).

Habitat and Life History

These sparrows are found in flat or gently sloping Sonoran Desertscrub and Sinaloan Thornscrub with scattered spiny trees and shrubs. Grasses are essential habitat components, and mesquite, hackberry, cholla, and paloverde are usually present as well. Territories commonly encompass some wash habitat. These birds are also found at higher elevations in oak savannahs (Pima County 2004).

Rufous-winged Sparrows feed primarily on arthropods, but supplement their diet seasonally with seeds of forbs and grasses (Ehrlich et al. 1988; Lowther et al. 1999c). They forage by pecking on the ground, but will glean foods from low vegetation (Lowther et al. 1999b). They construct their cup-shaped nest in the fork of branches of low shrubs, trees, or cholla cacti (Lowther et al. 1999b). They lay 2-4 pale green to pale bluish-white eggs (Ehrlich et al. 1988; Lowther et al. 1999b).

Threats to the Survival of the Rufous-winged Sparrow

The primary threats to the Rufous-winged Sparrow are degradation and loss of habitat from overgrazing and urban development (Lowther et al. 1999b).

Potential for Occurrence in the Study Area

The study area includes a portion of the range of the Rufous-winged Sparrow. A Tier 1 PCA is delineated within the study area in the east side of the Tucson Valley, and a Tier 2 PCA is delineated in north Tucson (Pima County 2004). Areas of potential habitat for the Rufous-winged Sparrow are limited within the Project area of influence, but a few birds may occur in these areas.

Sage Sparrow

Status

The Sage Sparrow (*Amphispiza belli*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Sage Sparrow breeds in west-central Washington and the central Rocky Mountains south to Baja California, northern Arizona and northwestern New Mexico. The winter range of the species extends south to the gulf coast of Baja California, northwest Sonora and northern Chihuahua, Mexico (Martin and Carlson 1998).

Habitat and Life History

Sage Sparrows inhabit sagebrush-dominated desertscrub or other plant communities with a similar structure (Corman and Wise-Gervais 2005; Martin and Carlson 1998). Sage Sparrows feed primarily on invertebrates, taking some spiders, and also consume seeds, small fruits, and some succulent vegetation (Ehrlich et al. 1988; Martin and Carlson 1998; Terres 1980). Nests are built in sagebrush or saltbush (*Atriplex* spp.), or sometimes in a depression on the ground. The open, cup-shaped nests are constructed with twigs and grasses, and are lined with shreds of bark, weeds, or animal hair or fur (Martin and Carlson 1998; Terres 1980). Clutches of 2 to 4 spotted, bluish-white to pale blue eggs are laid between March and July (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Sage Sparrow

Conversion of land for livestock grazing, agriculture, and residential development has resulted in loss of sagebrush habitat. The effects of fire have altered plant communities and allowed colonization by invasive grasses, which removes suitable Sage Sparrow habitat (Martin and Carlson 1998). Sage Sparrows are a frequent host to cowbirds (Ehrlich et al. 1988).

Potential for Occurrence in the Study Area

The Sage Sparrow is likely to occur only in winter, but could occur anywhere within the Project area of influence wherever suitable habitat is present.

Grasshopper Sparrow

Status

The Grasshopper Sparrow (*Ammodramus savannarum*) is a USFWS BCC, and an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008; USFWS 2008c).

Distribution

The nesting range of the Grasshopper Sparrow is centered in the Midwest, extending east to New England. Disjunct nesting areas are located in parts of the Rocky Mountains, eastern Washington, and California. The winter range of the species extends as far south as Costa Rica (Vickery 1996).

Habitat and Life History

The Grasshopper Sparrow inhabits semi-arid grasslands, prairies, meadows, pastures, fallow agricultural fields, and similar habitats with areas of patchy, bare ground (Corman and Wise-Gervais 2005; Terres 1980; Vickery 1996). Grasshopper Sparrows eat primarily invertebrates, particularly grasshoppers, and some seeds (Ehrlich et al 1988; Terres 1980; Vickery 1996). The cup-shaped nest is constructed in a depression on the ground and is normally concealed visually by overhanging grasses or other plants (Ehrlich et al. 1988; Vickery 1996). Nests are lined with grasses, rootlets, and sometimes horsehair (Terres 1980; Vickery 1996). Clutches of 4 to 5 brown-speckled, creamy-white eggs are laid between April and August (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Grasshopper Sparrow

Habitat degradation, fragmentation, and loss, primarily from conversion of habitat to agriculture, have historically had the greatest impacts on the Grasshopper Sparrow. Extensive grazing in habitat in the western United States has likewise had significant effects on the species (Vickery 1996).

Potential for Occurrence in the Study Area

There is some potential for the Grasshopper Sparrow to occur within the Project area of influence, but likely only during migration.

Arizona Grasshopper Sparrow

Status

The Arizona Grasshopper Sparrow (*Ammodramus savannarum ammolegus*) is a State of New Mexico endangered species (BISON-M 2008) and a Forest Service sensitive species (USFS 2007a). It is also an AZGFD SGCN and a USFWS BCC (AZGFD 2006a; USFWS 2008c).

Distribution

The Arizona Grasshopper Sparrow breeds from southeastern Arizona and southwestern New Mexico south to northern Sonora, Mexico. The wintering range extends as far south as Guatemala (Vickery 1996).

Habitat and Life History

The Arizona Grasshopper Sparrow inhabits grasslands and prairies that are moderately open and have patches of bare ground, but have some shrub cover. They feed on a variety of invertebrates, but primarily insects, and have a preference for grasshoppers. They also feed on seeds, which make up a large portion of their diet in fall. Nests are built by the female on the ground and are well hidden, with adjacent grasses forming a dome over the nest (Vickery 1996). Clutches of 4 to 5 brown-spotted creamy-white eggs are laid between April and August (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Arizona Grasshopper Sparrow

Habitat degradation, fragmentation, and loss are the primary recognized threats to the Grasshopper Sparrow in North America. Grazing on grasslands in the southwest tends to exclude Grasshopper Sparrows (Vickery 1996).

Potential for Occurrence in the Study Area

Arizona Grasshopper Sparrows occur widely in the Sulphur Springs Valley as far north as Willcox, Arizona (Corman and Wise-Gervais 2005). A few of the birds could be present in the Project area of influence north of Willcox in the Sulphur Springs Valley. There is a recent BLM record of the species from the San Simon Valley (BLM 2011).

Baird's Sparrow

Status

Baird's Sparrow (*Ammodramus bairdii*) is a State of New Mexico threatened species, a BLM sensitive species in New Mexico and Arizona, a USFW sensitive species, a USFWS species of

concern, an SGCN in New Mexico and Arizona and a USFWS BCC (AZGFD 2006a; BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

Baird's Sparrow breeds in south-central Canada and the north-central United States. The birds winter in northern Mexico and extreme southeastern Arizona, and occasionally in adjacent portions of New Mexico (Green et al. 2002).

Habitat and Life History

Baird's Sparrows occupy shortgrass prairie habitats, other grasslands, and weedy fields (Ehrlich et al. 1988; NGS 2002). When the birds are present in the Southwest during winter, they are found in grasslands dominated by bunchgrasses (particularly *Bouteloua* spp. and *Eragrostis* spp.), among scattered velvet mesquites or other woody vegetation (Green et al. 2002). The diet of Baird's Sparrows includes insects, spiders and grass and forb seeds (Ehrlich et al. 1988; Green et al. 2002).

Threats to the Survival of the Arizona Baird's Sparrow

Threats to the Baird's Sparrow are primarily from degradation or loss of grassland habitats within its breeding range. Causes include conversion of land for human use, habitat invasion by non-native plant species, and alteration of habitat by encroachment of shrubs due to fire suppression.

Potential for Occurrence in the Study Area

There is a low potential for Baird's Sparrows occurring in the study corridor in winter. However, the species migrates northward across the study corridor.

<u>Lincoln's Sparrow</u>

Status

Lincoln's Sparrow (*Melospiza lincolnii*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The breeding range of Lincoln's Sparrow is from Alaska east to the Maritime Provinces, south in the Cascade Range and the Rocky Mountains in the west, and to the Great Lakes in the east. The winter range of the species is the west coast of the United States and the southern plains states south to Honduras (Ammon 1995).

Habitat and Life History

Lincoln's Sparrows breed in high-latitude, boggy willow-sedge habitats or high-elevation montane woodlands that support dense shrubby vegetation. In Arizona, the species nests in high-elevation riparian thickets or wetlands, and winters in open habitats such as cultivated fields and

roadsides (Corman and Wise-Gervais 2005). They feed on grass and weed seeds and search for invertebrates by scratching on the ground among leaf litter (Ammon 1995; Ehrlich et al. 1988; Terres 1980). They construct a cup-shaped nest in a shallow depression in the ground; usually among grasses, but nests may be constructed low in shrubbery. Clutches of 4 to 5 brown-speckled pale green to greenish-white eggs are laid between May and July (Ehrlich et al. 1988; Terres).

Threats to the Survival of the Lincoln's Sparrow

Lincoln's Sparrows have been impacted by herbicide and pesticide use. Livestock grazing may affect nests, and disturbance from recreational activities may result in nest desertion (Ammon 1995).

Potential for Occurrence in the Study Area

Lincoln's Sparrow is common in brushy riparian habitats in winter in the Arizona portion of the Project area.

Savannah Sparrow

Status

The Savannah Sparrow (*Passerculus sandwichensis*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The Savannah Sparrow nests from Alaska and Canada south through most of the northern half of the United States, and as a disjunct population in central Mexico, wintering south of the breeding range as far as El Salvador (Wheelwright and Rising 2008).

Habitat and Life History

Savannah Sparrows inhabit a wide variety of open habitats, including open grasslands, cultivated fields, roadsides, and golf courses, where they prefer a cover of low, dense herbaceous or weedy vegetation (Corman and Wise-Gervais 2005; Wheelwright and Rising 2008). Savannah Sparrows feed primarily on insects and other invertebrates, but also consume seeds of grasses and other herbaceous plants (Ehrlich et a. 1988; Wheelwright and Rising 2008). The cup-shaped nests, constructed primarily of grasses, are placed on the ground and well-concealed among grasses (Wheelwright and Rising 2008). Clutches of 3 to 5 brown-speckled green-blue to off-white eggs are laid between March and July (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Savannah Sparrow

No specific threats are identified for the species. Savannah Sparrows can respond positively to land conversion to agriculture and are not highly sensitive to human presence. Frequent use of agricultural areas by the species results in a relatively high exposure to pesticides, although effects have been measured only infrequently (Wheelwright and Rising 2008).

Potential for Occurrence in the Study Area

Savannah Sparrows likely occur throughout much of the Project area of influence in Arizona. Some nesting may occur, but the species is most abundant in winter.

White-crowned Sparrow

Status

The White-crowned Sparrow (*Zonotrichia leucophrys*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The White-crowned Sparrow breeds from Alaska east through northern Canada to Labrador, and south along the northern Rocky Mountains west to north-central California. The wintering range includes much of the United States, except the northern Great Plains, New England, and the Atlantic Seaboard south to Florida (Chilton et al. 1995).

Habitat and Life History

White-crowned Sparrows breed in a variety of habitats, but generally require some thick shrubbery for roosting, cover, and nesting, grasses with areas of bare ground for foraging, and a readily available water source (Chilton et al. 1995; Terres 1980). They eat mostly seeds and grass, but also eat fruits and invertebrates. The percentage of invertebrates in their diet is greatly increased in the spring (Chilton et al. 1995; Ehrlich et al. 1988; Terres 1980). Nests are generally constructed on the ground, but may be in trees. Their nest is a bulky cup constructed of grass, weeds, and other plant parts, and is lined with animal hair, feathers, or grasses (Chilton et al. 1995; Terres 1980). Clutches of 3 to 5 dark-spotted pale blue to green eggs are laid between April and August (Chilton et al. 1995; Ehrlich et al. 1988).

Threats to the Survival of the White-crowned Sparrow

There are no specific recognized threats to the White-crowned Sparrow.

Potential for Occurrence in the Study Area

White-crowned Sparrows are known to occur within the study area.

Painted Bunting

Status

The Painted Bunting (*Passerina ciris pallidior*) is a State of New Mexico SGCN and a USFWS BCC (BISON-M 2008; USFWS 2008c).

Distribution

The Painted Bunting is separated into two subspecies with disjunct ranges. The eastern population, *P. c. ciris*, occurs in the Southeast, wintering in Florida. The western population, *P.*

c. pallidior, occurs in the south-central United States south into northeastern Mexico, with individuals recorded regularly in the Southwest (Lowther et al. 1999c).

Habitat and Life History

Habitats used by the species include open woodland with scattered brush, weedy or shrubby areas, and riparian thickets (Ehrlich et al. 1988; Lowther et al. 1999c). The diet of the Painted Bunting is primarily the seeds of grasses, but they also consume a variety of insects and spiders in spring and summer (Lowther et al. 1999b; Terres 1980). The nest is a well constructed deep cup, which is firmly attached either in thick brush, or in a tree. The nest is comprised primarily of twigs, stems, grasses, weeds, bark strips, leaves, and sometimes includes spider silk or horse hair (Lowther et al. 1999c; Terres 1980). Clutches of 3 to 4 brown-speckled pale bluish-white eggs are laid between March and July (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Painted Bunting

Habitat degradation and loss are the principal threats to the Painted Bunting. Loss of riparian areas in the southwestern United States, which were used as waypoints for molting by migrating birds, has adversely affected the species (Lowther et al. 1999c).

Potential for Occurrence in the Study Area

There are records of the Painted Bunting nesting on the lower Rio Grande as far north as Hatch, New Mexico (Hubbard 1970). Painted Buntings are likely to occur within the Project area of influence in New Mexico, but would not be common.

<u>Indigo Bunting</u>

Status

The Indigo Bunting (*Passerina cyanea*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The Indigo Bunting primarily occurs in eastern North America, but isolated breeding populations occur in Montana, Wyoming, Colorado, Utah, California, Arizona, New Mexico, and west Texas. The birds winter in Central America, from central Mexico south to Panama, in southern Florida, and the western Caribbean (Payne 2006).

Habitat and Life History

In the Southwest, Indigo Buntings most commonly occupy brushy habitat along drainages, generally in canyons. They feed on seeds of grasses and herbs, berries, and invertebrates (Ehrlich et al. 1988; Payne 2006). The nest is built by the female low in shrubby vegetation. The open cup nest is constructed of leaves, grasses, and other plant parts (Payne 2006). Clutches of 3 to 4 unmarked eggs are laid between May and August (Ehrlich et al. 1988; Terres 1980).

Threats to the Survival of the Indigo Bunting

Threats to the Indigo Bunting include collisions with tall structures such as buildings and towers, effects of pesticides, and conversion of lands for urban development. Birds nesting in vegetation along highways are commonly killed by vehicles. In their tropical wintering grounds, the birds are shot for food and sport, and are kept as pets (Payne 2006).

Potential for Occurrence in the Study Area

Small numbers of Indigo Buntings may occur within the study corridor in Arizona.

Varied Bunting

Status

The Varied Bunting (*Passerina versicolor*) is a State of New Mexico threatened species, a USFS sensitive species, an SGCN in New Mexico, and a USFWS BCC (BISON-M 2008; USFS 2007a; USFWS 2008c).

Distribution

Varied Buntings range throughout most of Mexico, and occur as far south as Guatemala as a disjunct population. They occur in the southern United States from southeastern Arizona to southern Texas (Corman and Wise-Gervais 2005; Groschupf and Thompson 1998). The breeding distribution of the species has been expanding in Arizona in recent years with records from the Boyce Thompson Arboretum near Superior and Aravaipa Canyon in the Galiuro Mountains north of Willcox (Corman and Wise-Gervais 2005).

Habitat and Life History

Varied Buntings inhabit thornscrub, brushy riparian edges, and other habitats where dense, scrubby vegetation provides nesting habitat, forage, and cover. In southern Arizona, the birds breed in brushy desert canyons from oak woodlands down to the upper elevations of Sonoran desertscrub (Corman and Wise-Gervais 2005; Groschupf and Thompson 1998).

The birds forage in low shrubs and on the ground for insects, seeds and prickly pear fruit. Cup-shaped nests are constructed low in dense shrubby vegetation along a wash or on adjacent slopes. A single clutch of three to four pale bluish-white eggs are produced each year (Ehrlich et al. 1988; Groschupf and Thompson 1998).

Threats to the Survival of the Varied Bunting

Principle threats to the species are habitat degradation and loss from conversion of land for agriculture in Texas, and urban development, mining, road development and border issues aggravating impacts to the species in southern Arizona (Groschupf and Thompson 1998).

Potential for Occurrence in the Study Area

The Varied Bunting is likely to occur in the study corridor, primarily in the San Pedro River Valley and canyon tributaries.

McCown's Longspur

Status

McCown's Longspur (*Calcarius mccownii*) is an AZGDF SGCN (AZGFD 2006a).

Distribution

McCown's Longspur breeds in west-central Canada south to north-central Colorado. The birds winter in Texas, southern Arizona and New Mexico and south into northern Mexico to the State of Durango (With 1994).

Habitat and Life History

McCown's Longspurs inhabit sparsely vegetated open ground. In their wintering areas in Arizona, they occur in livestock grazed grasslands, plowed fields, and dry playa lakebeds (With 1994). They feed primarily on seeds of grasses and forbs, but also consume some invertebrates, primarily insects (Ehrlich et al. 1988; Terres 1980; With 1994). The nest is an open cup flush with the ground, constructed of grasses and other plant parts and lined with fine grasses, hair and shredded plant parts (With 1994). Three to four darkly marked white, pinkish-white or pale green eggs are laid between May and July (Ehrlich et al. 1988; With 1994).

Threats to the Survival of the McCown's Longspur

Conversion of land for agricultural use, suppression of fire that maintains habitat, and pesticide poisoning are the principle threats to the species (With 1994).

Potential for Occurrence in the Study Area

A few McCown's Longspurs are likely to occur within the Project area of influence in winter, although the species is most common south of the Project area in the San Rafael and southern Sulphur Springs valleys.

Hooded Oriole

Status

The Hooded Oriole (*Icterus cucullatus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The breeding range of the Hooded Oriole extends from northwestern California, southern Nevada, and southwestern New Mexico south to Baja California and southern Sonora, Mexico. A separate breeding population occurs from south-central Texas, south along the Gulf Coast of

Mexico to Yucatan and Belize. Northern populations winter along the west coast of Mexico from Sinaloa south to Oaxaca (Corman and Wise-Gervais 2005; Pleasants and Albano 2001).

Habitat and Life History

Hooded Orioles inhabit areas where palms or deciduous riparian trees such as cottonwoods, sycamores, willows, walnut, and ash provide suitable nesting habitat (Corman and Wise-Gervais 2005; Pleasants and Albano 2001). Urban landscaping is often used. They also use mesquite and scrub habitats (Ehrlich et al. 1988). The diet of the Hooded Oriole is primarily insects and their larvae, but they regularly search out nectar of agaves, lilies, and other tubular flowers, and fruits (Ehrlich et al. 1988; Pleasants and Albano 2001; Terres 1980). The Hooded Oriole constructs a pendant nest, usually in deciduous riparian trees or palms. Nests are woven of grasses, or shredded palm or yucca fibers (Ehrlich et al. 1988). Clutches of 3 to 5 spotted or blotched, white, pale yellow or pale blue eggs are laid between April and August (Terres 1980).

Threats to the Survival of the Hooded Oriole

There are no currently recognized threats to the Hooded Oriole. Loss of palms or deciduous riparian trees suitable for nesting could adversely affect individuals of the species.

Potential for Occurrence in the Study Area

Hooded Orioles are likely to occur in some areas within the New Mexico portion of the Project area of influence.

1.8.1.3 Amphibians

<u>Arizona Tiger Salamander</u>

Status

The Arizona subspecies of the Tiger Salamander (*Ambystoma mavortium* (*tigrinum*) *nebulosum*) is an SGCN in New Mexico and Arizona(AZGFD 2006a; BISON-M 2008).

Distribution

The distribution of the Arizona Tiger Salamander includes most of Utah, western Colorado, New Mexico west of the Rio Grande, and most of Arizona except the dry western and southern desert areas (USGS 2006).

Habitat and Life History

Tiger Salamanders occur over a wide range of elevation, from desertscrub up to spruce-fir forest (Degenhardt et al. 1996). Nearby standing water with few predators is required by the species for breeding. Stock tanks and temporary pools of rainwater are commonly used.

Threats to the Survival of the Arizona Tiger Salamander

Modification or loss of wetland habitats and introduction of predatory fishes are the principal threats to the Tiger Salamander (Lannoo 2005).

Potential for Occurrence in the Study Area

There is a moderate potential for the Arizona Tiger Salamander to occur in the Project area of influence in the Rio Grande watershed wherever suitable habitat is present.

Western Chorus Frog

Status

The Western Chorus Frog (*Pseudacris triseriata*) is an SGCN in New Mexico (BISON-M 2008).

Distribution

The Western Chorus Frog occurs throughout much of the eastern two-thirds of North America north of Mexico, as far west as western Idaho, southwest Utah, central Arizona, and eastern Texas (Dixon 2000; Stebbins 2003).

Habitat and Life History

The Western Chorus Frog occurs in a variety of habitats, including montane lakes, shortgrass prairies, wet meadows, grassy pools, flooded fields, and roadside ditches (Degenhardt et al. 1996; Stebbins 2003). Western Chorus Frogs feed on a variety of invertebrates (Degenhardt et al. 1996). Juvenile frogs may take almost any prey they can capture, and adult frogs select larger prey that provide a greater reward for the capture effort (Christian 1982). The Western Chorus Frog commonly breeds in shallow, temporary pools, but will also breed in more permanent waters (Degenhardt et al. 1996; Stebbins 2003).

Threats to the Survival of the Western Chorus Frog

The species is generally considered stable, and no specific threats are recognized. Like many amphibian species, they are susceptible to habitat modification or loss, the effects of climate change, and exposure to pesticides.

Potential for Occurrence in the Study Area

The Western Chorus Frog occurs along the Rio Grande in Socorro County, and is present within the Project area of influence.

Plains Leopard Frog

Status

The Plains Leopard Frog (*Lithobates blairi*) is Forest Service sensitive species, an AZGFD WSC and SGCN, and is a State of New Mexico SGCN (AZGFD 2010a; 2006a; BISON-M 2008; USFS 2007a).

Distribution

The distribution of the Plains Leopard Frog extends through most of the central United States from southeast North Dakota south to central Texas, with disjunct populations occurring in portions of New Mexico and southeastern Arizona (Brennan and Holycross 2006; Stebbins 2003).

Habitat and Life History

The Plains Leopard Frog may live in temporary or permanent water sources, such as rivers and streams, ponds and marshes, rocky canyons, irrigation ditches, and cattle tanks from semidesert grassland to Madrean Evergreen Woodland (Brennan and Holycross 2006; Degenhardt et al. 1996). Adults feed on insects and other invertebrates. Breeding may occur between February and October, and egg masses, which are attached to aquatic vegetation in shallow water, may contain thousands of eggs (Brennan and Holycross 2006; Degenhardt et al. 2006). Post-breeding activity often finds the frogs moving away from breeding sites via irrigation canals or other waters, when they may be found in cultivated fields or meadows (Degenhardt et al. 1996).

Threats to the Survival of the Plains Leopard Frog

Primary threats to the species include habitat degradation and loss, and predation by American Bullfrogs (Lannoo 2005).

Potential for Occurrence in the Study Area

There are isolated records of the species occurring in the vicinity of the Elephant Butte Reservoir near Truth or Consequences, New Mexico (Degenhardt et al. 1996). The species is known on the Ladder Ranch in the Cuchillo and Palomas drainages (Kruse and Christman 2007). The two extant Arizona populations are located south of the study area.

Chiricahua Leopard Frog

Status

The Chiricahua Leopard Frog (*Lithobates chiricahuensis*) was listed threatened under the ESA on June 13, 2002 (USFWS 2002b), without critical habitat at the time of listing. Critical habitat was proposed for the species in March 2011 (USFWS 2011d). A 5-year review of the species was initiated in 2007 (USFWS 2007d) and released in 2011 (USFWS 2011e). A recovery plan for the Chiricahua Leopard Frog was released on June 4, 2007 (USFWS 2007e). The Chiricahua Leopard Frog is a State of New Mexico sensitive species and SGCN (BISON-M 2008). The

Chiricahua Leopard Frog is an AZGFD WSC and SGCN, and is a Pima County PVS (AZGFD 2010a; 2006a; Pima County 2004).

Distribution

The Chiricahua Leopard Frog is found in the mountains of central and southeastern Arizona and adjacent parts of southwestern New Mexico. It is also found in mountainous areas of northeastern Sonora and western Chihuahua in Mexico (Stebbins 2003). Populations in Arizona are found in several isolated mountain ranges in the southeastern part of the state and in the vicinity of the Mogollon Rim in the east-central part of the state (USFWS 2002b). This frog is currently found in relatively few of its known historic sites, and it appears to be extirpated from the Little Colorado River drainage, although it is present in other parts of the Mogollon Rim in streams that drain to the Verde and Salt rivers (USFWS 2002b).

Habitat and Life History

The Chiricahua Leopard Frog is highly aquatic, and it is usually found in rocky streams with deep pools surrounded by oak woodlands, mixed pine-oak woodlands, and pine forests, generally at elevations between 3,500 and 8,530 feet (Stebbins 2003). Occasionally this species will follow streams down into areas of chaparral, grasslands, or deserts. River overflow pools, oxbows, springs, ponds, and earthen stock tanks may also be occupied (Stebbins 2003).

Adult Chiricahua Leopard Frogs feed primarily on invertebrates, but tadpoles will eat algae, organic debris, plant tissue, and minute aquatic organisms (Degenhardt et al. 1986; Lannoo 2005; Stebbins 2003). Breeding is primarily from late May to August, although this season may be extended at lower elevations (Stebbins 2003).

Threats to the Survival of the Chiricahua Leopard Frog

The major threats to this species are habitat alteration, fragmentation, and destruction that result from water diversions, dredging, livestock grazing, mining, and groundwater pumping. Predation by nonnative species, including American Bullfrogs, Tiger Salamanders, crayfish, and game fish, may adversely impact populations (Lannoo 2005). Although livestock can have an adverse impact on these frogs and their habitat when allowed to graze in natural riparian vegetation, the stock tanks that are maintained for cattle may benefit the frogs by providing refugia (USFWS 2002b).

Potential for Occurrence in the Study Area

The Chiricahua Leopard Frog is recorded from the Project vicinity in the Galiuro, Winchester, and Pinaleño mountains in Arizona, but the current distribution of these populations is no closer than approximately 5 miles to the study area. The species occurs at numerous locations in southwestern New Mexico, nearest to the proposed Project on the Ladder Ranch in Sierra County. However, none occur within the Project area of influence in either New Mexico or Arizona. No proposed critical habitat occurs within the Project area of influence (USFWS 2011d).

Northern Leopard Frog

Status

The Northern Leopard Frog (*Lithobates pipiens*) is a Forest Service sensitive species, an AZGFD WSC, an SGCN in New Mexico and Arizona, and was reviewed for listing under the ESA (AZGFD 2006a; BISON-M 2008; USFS 2007a).

Distribution

The Northern Leopard Frog is a widespread frog, found throughout much of the northern United States and Canada. Once very common throughout its range, the species has declined notably in areas, including the western portion of its range. In central and southern New Mexico, the Northern Leopard Frog is primarily located along waters of the Rio Grande watershed (Degenhardt et al. 1996). The species does not occur within the Arizona portion of the study area (Brennan and Holycross 2006).

Habitat and Life History

The Northern Leopard Frog uses a variety of aquatic habitats including streams, intermittent washes, rivers, lakes, wetlands, irrigation ditches, and livestock tanks (Brennan and Holycross 2006; Degenhardt et al. 1996). In New Mexico, the species normally ranges from 3,700 to 10,000 feet elevation (Degenhardt et al. 1996). Breeding is aquatic and occurs in spring. The oval egg masses are usually attached to emergent vegetation, but may be placed on the substrate in slow-moving waters (Lannoo 2005). Tadpoles feed primarily on algae. Adults feed primarily on a wide variety of invertebrates, but larger individuals occasionally take small amphibians, and snakes (Brennan and Holycross 2006; Degenhardt et al. 1996; Lannoo 2005).

Threats to the Survival of the Northern Leopard Frog

Threats to the Northern Leopard Frog include habitat degradation or loss, predation by Bullfrogs (particularly in the arid West), introduced exotic fish, and the fungal disease Chytridiomycosis (Lannoo 2005).

Potential for Occurrence in the Study Area

There is a moderate potential for the Northern Leopard Frog occurring within the study area where the Project would cross the Rio Grande. Recent surveys have failed to detect the species within the study area, although it may occur undetected in Bosque del Apache NWR, where numerous historical records are known and some habitat remains (Christman 2009).

Lowland Leopard Frog

Status

The Lowland Leopard Frog (*Lithobates yavapaiensis*) is a State of New Mexico endangered species, a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, and a USFWS species of concern (BISON-M 2008; USFS 2007a). The Lowland Leopard Frog is

also an AZGFD WSC, an SGCN in both Arizona and New Mexico, and a Pima County PVS (AZGFD 2010a; Pima County 2004).

Distribution

Currently, the distribution of the Lowland Leopard Frog is primarily in Arizona below the Mogollon Rim. Historically, this species was found throughout the Lower Colorado River and its tributaries in Arizona, California, and Nevada, with the range extending just into southwestern New Mexico along the Arizona border (AZGFD 2006d; Degenhardt et al. 1996; Stebbins 2003).

Habitat and Life History

The Lowland Leopard Frog occurs from Sonoran Desertscrub up to Great Basin Conifer Woodland, and the lower portions of Madrean Evergreen Woodland. They are generally limited to elevations below 5,500 feet (Brennan and Holycross 2006; Degenhardt et al. 1996; Stebbins 2003). They usually stay close to water, and normally occur in permanent or semi-permanent aquatic habitats (Brennan and Holycross 2006; Stebbins 2003). They may occur in most freshwater aquatic habitats, including permanent pools of foothill streams, overflow ponds and side channels of major rivers, permanent springs, and permanent stock tanks. They can also tolerate brief drying of water sources by taking shelter in rodent burrows.

The Lowland Leopard Frog feeds primarily on invertebrates, but takes some small vertebrates (Brennan and Holycross 2006; Degenhardt et al. 1996). The Lowland Leopard Frog normally breeds between January and June, and again between September and early November. Eggs are laid in masses (Brennan and Holycross 2006; Stebbins 2003).

Threats to the Survival of the Lowland Leopard Frog

Chytridiomycosis is a readily transmissible, fatal infection of the skin of many frog and toad species. The pathogen is a fungus (*Batrachochytrium dendrobatidis*) in the phylum Chytridiomycota, and infection often results in mass mortality, extirpation, and extinction in some species. A number of North American ranid frog species are susceptible, including the Lowland Leopard Frog (Bradley et al. 2002). Other threats to the Lowland Leopard Frog include human alteration of its aquatic habitats such as through water diversion, groundwater pumping, and development of reservoirs. Predation by nonnative fishes, bullfrogs, and crayfish is also an important factor in the decline of the species (AZGFD 1996; Stebbins 2003).

Potential for Occurrence in the Study Area

Within the study area in Pima County, there are several PCAs designated for the Lowland Leopard Frog. Two of the Tier 1 PCAs are located partially within the study area, one along a segment of Cienega Creek and one within the San Pedro River Watershed. Tier 2 PCAs within the study area include Sabino Canyon, one along the base of the front range of the Santa Catalina Mountains in the Tucson valley, far eastern Tucson adjacent to the east unit of Saguaro National Park, and the intermontane area between the Rincon and Whetstone Mountains from the east Saguaro PCA east to the Cochise County line. Critical landscape linkages between PCAs and areas considered potential areas for restoration or enhancement are also present in eastern Pima County (Pima County 2004). The Lowland Leopard Frog is known to occur at several locations

in the Project vicinity, primarily associated with montane streams, but most of these localities are outside of the Project area of influence. The species is recorded at Cienega Creek and at an artesian spring in the San Pedro Valley. Both of these locations area within the Project area of influence.

Great Plains Narrow-mouthed Toad

Status

The Great Plains Narrow-mouthed Toad (*Gastrophryne olivacea*) is a State of New Mexico endangered species, an Arizona BLM sensitive species, a Forest Service sensitive species, a SGCN in New Mexico, and an AZGFD WSC (AZGFD 2010a; BISON-M 2008; USFS 2007a).

Distribution

The distribution of the Great Plains Narrow-mouthed Toad is from southeast Nebraska and Missouri west through most of Texas, and south to San Luis Potosi, Mexico. A rather extensive disjunct western population extends from south-central Arizona south to Nayarit, Mexico. The species is recorded from southeastern Maricopa County, southwestern Pinal County, much of central Pima County, and western Santa Cruz County in Arizona, and extreme southern Luna County, New Mexico (AZGFD 2003k; Brennan and Holycross 2006; Degenhardt et al. 1996).

Habitat and Life History

Great Plains Narrow-mouthed Toads inhabit flooded areas, earthen livestock catchments, streams, springs, and ponds from Lower Colorado River desertscrub up to Madrean Evergreen Woodland (Brennan and Holycross 2006; Stebbins 2003). In New Mexico, they are recorded from flooded, open mesquite-invaded grassland and flooded roadside ditches (Degenhardt et al. 1996). The species is secretive, spending much of its time under objects, in the ground, or in animal burrows. The species is nocturnal, and is active on the surface primarily during rainy seasons when soils are wet (Degenhardt et al. 1996). These toads feed primarily on ants and termites, but will take a variety of invertebrates (Degenhardt et al. 2006; Nigro and Rorabaugh 2008; Stebbins 2003). They are capable of exuding a potent toxin, which is thought to be defensive in nature (AZGFD 2003k).

Threats to the Survival of the Great Plains Narrow-mouthed Toad

Threats to the species are primarily habitat degradation and loss. The species is at the very northern limits of its range in the southwestern United States (AZGFD 2003k).

Potential for Occurrence in the Study Area

Within the study area, the Great Plains Narrow-mouthed Toad occurs in southwest Tucson along the Santa Cruz River. The New Mexico populations of the species occur only in far southern Luna County (Degenhardt et al. 1996), well outside of the study area.

1.8.1.4 Reptiles

Desert Box Turtle

Status

The Desert Box Turtle (*Terrapene ornata luteola*) is an Arizona BLM sensitive species, an Arizona and New Mexico SGCN and a Pima County PVS (AZGFD 2006a; BISON-M 2008; BLM 2010; Pima County 2004).

Distribution

The Desert Box Turtle occurs from southeastern Arizona, to Louisiana and from southern Wyoming south to Texas and north-central Mexico (Degenhardt et al. 1996). The Desert Box Turtle occurs throughout most of New Mexico below 6,900 feet elevation, but is absent from the northwestern portion of the state west of the Rio Grande Valley and north of the Gila River (Degenhardt et al. 1996).

Habitat and Life History

In New Mexico and Arizona, the Desert Box Turtle occurs primarily within Semidesert Grassland and Chihuahuan Desertscrub habitats. They generally do not occur in steep or rocky terrain, but prefer shallower slopes and valley bottoms where deeper, friable soils suitable for construction of burrows are present (Degenhardt et al. 1996; Stebbins 2003). Some populations modify existing rodent burrows, particularly those of kangaroo rats (*Dipodomys* spp.), but Box Turtles are capable of excavating their own burrows (Brennan and Holycross 2006; Degenhardt et al. 1996; Stebbins 2003). They are not dependent on free water, obtaining needed moisture primarily from their diet, but they are often found near water and are apparently good swimmers. The Desert Box Turtle is an opportunistic omnivore, with a preference for animal foods (Degenhardt et al. 1996; Stebbins 2003). They lay 1-8 eggs in shallow nests in friable, well draining soils (Brennan and Holycross 2006; Stebbins 2003).

Threats to the Survival of the Desert Box Turtle

The primary recognized threats to the Ornate Box Turtle (*Terrapene o. ornata*) are degradation and loss of grassland habitat, population declines from removal for the pet trade, and road mortality (Redder et al. 2006). These threats likely affect the Desert Box Turtle as well.

Potential for Occurrence in the Study Area

Tier 1 and 2 PCAs are established for the Ornate Box Turtle in Pima County, Arizona, but none occur within the study area (Pima County 2004). The Desert Box Turtle occurs in the study area in valley grassland habitats in both New Mexico and Arizona.

Western Painted Turtle

Status

The Western Painted Turtle (*Chrysemys picta bellii*) is an SGCN in New Mexico and Arizona (AZGFD 2006a; BISON-M 2008).

Distribution

The Western Painted Turtle occurs over much of western North America from southern Canada south to northern Chihuahua, Mexico (Degenhardt et al. 1996; Stebbins 2003). In New Mexico, the Western Painted Turtle occur along major rivers including the San Juan, Rio Grande, and Pecos (Degenhardt et al. 1996). In Arizona the species is limited to potentially native populations near St. Johns, and to introduced populations in Phoenix, Tucson, and elsewhere in ponds and irrigation canals (Brennan and Holycross 2006).

Habitat and Life History

The Western Painted Turtle inhabits permanent waters of ponds, lakes, wetlands, and slow-moving waters and backwaters of rivers (Brennan and Holycross 2006; Degenhardt et al. 1996). They will inhabit turbid or clear waters, with or without emergent vegetation (Degenhardt et al. 1996). They are diurnally active, spending much of the day basking in warm surface waters, on floating debris, or on shore, and typically spend the night beneath the surface (Degenhardt et al. 1996). They are omnivorous and opportunistic in their diet, and consume a variety of aquatic invertebrates, vertebrates, and plants. New Mexico populations nest from May until mid-July, producing two or three clutches of up to 20 eggs each per year (Brennan and Holycross 2006; Degenhardt et al. 1996).

Threats to the Survival of the Western Painted Turtle

The primary threat to the Western Painted Turtle is habitat degradation and loss.

Potential for Occurrence in the Study Area

The Western Painted Turtle occurs in New Mexico at both proposed locations where the Project would cross the Rio Grande.

Big Bend Slider

Status

The Big Bend Slider (*Trachemys gaigeae*) is a State of New Mexico sensitive species and SGCN (BISON-M 2008).

Distribution

The Big Bend Slider occurs along the Rio Grande from Bosque del Apache NWR south to Texas and Mexico, and on the Rio Concho in Chihuahua, Mexico (Degenhardt et al. 1996). There is a

historic record from the La Joya Waterfowl Management Area 20 miles north of Socorro, New Mexico, but the species has not been located there in recent years, and is considered no longer present in the area (BISON-M 2008).

Habitat and Life History

Big Bend Sliders inhabit rivers, lakes, ponds, and canals, often with significant aquatic vegetation. They are diurnally active and are thought to be omnivorous, although stomach content analyses have shown the presence only of aquatic vegetation (Degenhardt et al. 1996; Legler 1960). However, fecal analysis of an animal at Bosque del Apache NWR revealed remains of a crayfish (Morjan and Stuart 2001).

Threats to the Survival of the Big Bend Slider

Primary threats to the Big Bend Slider include habitat alteration or loss and shooting of individuals (BISON-M 2008).

Potential for Occurrence in the Study Area

The species is recorded from Bosque del Apache NWR, as wells as Elephant Butte and Caballo reservoirs (Degenhardt et al. 1996), and likely occurs along nearly all of the Rio Grande within the study area.

Yellow Mud Turtle

Status

The Yellow Mud Turtle (*Kinosternon flavescens*) is an AZGFD SGCN (AZGFD 2006a).

Distribution

The distribution of the Yellow Mud Turtle extends through the southern Plains States, including eastern New Mexico, a small part of southeastern Arizona, and south into the northern Mexican border states east of Sonora, and south along the Gulf Coast to the State of Veracruz (Degenhardt et al. 1996; Ernst and Lovich 2009).

Habitat and Life History

The Yellow Mud Turtle will occupy most quiet waters, including temporary waters such as earthen livestock catchments, which have a soft substrate and support emergent aquatic vegetation (Degenhardt et al. 1996; Ernst and Lovich 2009). In the Southwest, they occupy semi-arid grasslands and open woodlands (Degenhardt et al. 1996). They spend most of the year underground (Lannoo 2005). They are weak swimmers and tend to remain in shallow waters (Degenhardt et al. 1996). They feed on a wide variety of invertebrates and take some vertebrates including fish, amphibians, and occasionally birds. Adults reach reproductive capability at 6 or 7 years of age (Degenhardt et al. 1996). They go dormant as winter approaches, taking shelter in natural cavities or burying themselves in bottom sediments or deep in the soil beneath the freeze line (Degenhardt et al. 1996; Lannoo 2005).

Threats to the Survival of the Yellow Mud Turtle

Threats to the Yellow Mud Turtle include degradation or loss of aquatic habitats and surrounding areas used for estivation, nesting, and foraging.

Potential for Occurrence in the Study Area

The Yellow Mud Turtle may occur within the Project area of influence, most likely in the San Simon Valley in Arizona.

Sonora Mud Turtle

Status

The Sonoran Mud Turtle (*Kinosternon sonoriense sonoriense*) is an Arizona BLM sensitive species, and an SGCN in Arizona and New Mexico (AZGFD 2006a; BISON-M 2008; BLM 2010).

Distribution

The Sonoran Mud Turtle occurs in central and southeastern Arizona, southwestern New Mexico, and south into Mexico in the Rio Yaqui watershed and east to the Rio Casas Grandes near Nuevo Casas Grandes, Chihuahua. Other populations occur in the Big Sandy River in Arizona, and along the Lower Colorado River in California and Arizona north to the Bill Williams River (Degenhardt et al. 1996).

Habitat and Life History

The Sonoran Mud Turtle normally occupies shallow, clear, perennial waters of streams, ponds, springs, and irrigation ditches, but is known from ephemeral drainages in southern Arizona. Aquatic habitats usually have rocky or sandy bottoms and support aquatic vegetation. Sonoran Mud Turtles occupy habitats from Sonoran Desertscrub up to Petran Montane Conifer Forest at about 6,500 feet elevation (Brennan and Holycross 2006; Degenhardt et al. 1996). Unlike the Yellow Mud Turtle, the Sonoran Mud Turtle does not usually range far from its aquatic habitat, but does travel overland between bodies of water (Brennan and Holycross 2006). Sonoran Mud Turtles reach reproductive age between 4 and 8 years of age, but is dependent on size, and varies with elevation. Sonoran Mud Turtles are primarily carnivorous, but will consume vegetation when animal foods are not readily available. They forage while walking on the bottoms of their aquatic habitat, feeding primarily on a variety of invertebrates, but also taking fish and amphibian adults or larvae.

Threats to the Survival of the Sonoran Mud Turtle

Habitat modification and alteration particularly that associated with agricultural water irrigation and diversion may adversely affect the species. The species is susceptible to accumulated pesticides and heavy metal poisoning. American Bullfrogs will consume juvenile Sonoran Mud Turtles, and introduced crayfish may affect populations through competition or predation (Rosen 2008a, Schwalbe and Rosen 1988).

Potential for Occurrence in the Study Area

The Sonoran Mud Turtle occurs in Cienega Creek any many smaller drainages, particularly in the San Pedro River Valley.

Sonoran Desert Tortoise

Status

The Sonoran population of the Desert Tortoise (*Gopherus agassizii*) is a candidate for listing under the ESA (USFWS 2010f). It is also a Forest Service sensitive species, and an AZGFD WSC and SGCN (AZGFD 2010a; 2006a; USFS 2007a). Mitochondrial DNA evidence suggests that Desert Tortoises in the Mojave Desert, listed as threatened under the ESA, have been an independent lineage from Sonoran Desert Tortoises for at least 5 million years, and consideration of the two populations as separate species may be appropriate (Murphy et al. 2007).

Distribution

The Sonoran population of the Desert Tortoise is found in southern and western Arizona, south and east of the Colorado River. The northernmost records for these tortoises are at Pearce Ferry on Lake Mead, just west of the Grand Wash Cliffs. The northeasternmost records are at Roosevelt Lake on the Salt River, northwest of Globe, and the San Pedro River valley in Cochise County is the eastern limit of distribution. The Sonoran population is also found across the border in northern Sonora, Mexico (AZGFD 2001i).

Habitat and Life History

Sonoran population Desert Tortoises may be found in Mohave and Sonoran desertscrub plant communities. They commonly reside in creosote bush communities in the Mohave Desert and paloverde and saguaro communities in the Sonoran Desert (Ernst and Lovich 2009). They may also be present in ecotonal areas with elements of Sonoran desertscrub mixed with Mohave desertscrub, juniper woodland, interior chaparral, or semidesert grassland (AZGFD 2001i). These tortoises prefer rocky slopes and bajadas at the base of desert mountain ranges (AZGFD 2001i). They may be found at elevations from about 510 feet in Mohave desertscrub to about 5,300 feet in semidesert grassland and interior chaparral (AZGFD 2001i).

Desert Tortoises are primarily herbivores, consuming a wide variety of plant materials. In descending order of importance, Sonoran Desert Tortoises feed on dicot annuals, grasses, herbaceous perennials, trees and shrubs, subshrubs/woody vines, and succulents (AZGFD 2001i). In the springtime, they will concentrate on fresh spring annuals, but in the later summer they will eat dry spring annuals, summer annuals, and prickly pear fruit (Ivanyi et al. 2000). Tortoises may forage selectively, consuming plant species that provide more essential nutrients (Ernst and Lovich 2009). They also ingest rocks, bones, and soil, possibly to maintain intestinal bacteria, to provide additional minerals, or as gastroliths to aid digestion (Ernst and Lovich 2009; Ivanyi et al. 2000).

The annual cycle of the Desert Tortoise begins in February or March when they emerge from hibernation (AZGFD 2001i). Mating generally takes place in the spring, and eggs are laid in an

excavated nest near a shrub or burrow entrance between May and July. The Sonoran population has a single clutch of eggs per season. Young turtles emerge from the eggs after incubating for 90 to 120 days (Ernst and Lovich 2009).

Threats to the Survival of the Sonoran Desert Tortoise

Desert Tortoises are facing numerous threats to their survival. Livestock grazing, recreational off-highway-vehicle use, military training activities, urban development, road construction, agriculture and mineral development are all factors which can alter or destroy their habitat (Lovich 2010). Additional threats are takes of tortoises for commercial sale as pets, vandalism (shooting, crushing or mutilation) and for food (USFWS 1994c). The presence of livestock affects tortoise habitat in several ways. Tortoises and their eggs can be killed directly by trampling. Impacts from grazing are damaged soil crusts and subsequent increased erosion, decreased water infiltration from soil compaction, and an increase in exotic annual vegetation and associated fire fuel due to ground disturbance (USFWS 1994c).

Increasing populations of native predators, including the Common Raven (*Corvus corax*) and Coyotes may result in increased mortality of hatchlings and juvenile tortoises (Boarman 2002). Tortoises will urinate in response to harassment, and this jeopardizes their survival through the summer due to water loss. Highway mortality and illegal removal of adult tortoises for pets are also factors in the decreasing numbers of desert tortoises (Lovich 2010). Genetic contamination of wild tortoise populations by escaped or released captive tortoises is also a threat (AZGFD 1996).

Invasion by exotic plants can have a significant negative impact on tortoises when the native plant community structure is changed. Red brome (*Bromus rubens*), an introduced grass from Europe, competes with native perennial grasses, shrubs and annuals. Recurrent fires due to presence of red brome can reduce the abundance and diversity of native forbs on which the tortoises depend (Brooks and Pyke 2002).

Upper respiratory tract disease (URTD) has been found to be a factor in tortoise mortality. This disease occurs sporadically in the Sonoran population. URTD is caused by a bacterium (*Mycoplasma* sp.), and it may be aggravated by simultaneous infections with other bacteria. This disease has been reported from a variety of tortoise species from around the world. It is likely that it has been spread through the wild populations by the release of infected, captive tortoises (Jacobson 1992).

Potential for Occurrence in the Study Area

Sonoran Desert Tortoises are present within a large portion of the study area, and are present along several of the proposed Project alternatives. The only BLM Category 1 Desert Tortoise habitat within the limits of the study area is at the Picacho Mountains. The only BLM Category 2 habitat areas are north of the Picacho Mountains, and three areas on the east side of the San Pedro River. Only the section of Category 2 habitat near San Manuel, Arizona would be potentially crossed by one of the proposed Project alternatives, but the location is a long-term monitoring plot. Much of the remainder of proposed alternatives west of Benson, Arizona is within BLM Category 3 Desert Tortoise habitat.

Chuckwalla

Status

The Chuckwalla (*Sauromalus ater*) is a USFWS species of concern (AZGFD 2010a).

Distribution

The total geographic range of the Chuckwalla extends from southern Utah and Nevada south to the west coast of Sonora and most of the east coast of the Baja Peninsula in Mexico (AZGFD 2009c; Stebbins 2003). In Arizona, Chuckwallas occur in low desert areas of the Sonoran and Mojave Deserts in the southwestern and western portions of the state, including areas along the Colorado River in Glen Canyon and the Grand Canyon (Brennan and Holycross 2006).

Habitat and Life History

Chuckwallas occupy rocky terrain in a variety of habitats, including open chaparral, cottonwood-willow riparian, juniper woodland, canotia mixed shrub, mixed riparian scrub, and Sonoran desertscrub habitats, but are most typically associated with creosote bush communities (AZGFD 2009c; BISON-M 2008). They appear to prefer areas where large boulders are available. In Arizona, they may be found up to an elevation of 6,000 feet, in open flats, rocky outcrops, lava flows, and rocky hillsides (AZGFD 2009c). Chuckwallas are almost exclusively herbivores, browsing on leaves, buds, flowers, and fruit of a variety of desert annuals and perennials. They are reported to be particularly fond of yellow flowers, such as those on brittlebush, and they will occasionally trample the plant to get at the flowers. They will rarely take invertebrates (AZGFD 2009c; Stebbins 2003). Chuckwallas mate in May and June, and produce a clutch of 5-16 eggs between June and August.

Threats to the Survival of the Chuckwalla

The primary threats to Chuckwallas are collection for the pet trade and habitat alteration and destruction (AZGFD 2009c). Microhabitat destruction is being caused by collectors who use crowbars and hydraulic jacks to move or break rocks to expose lizards (Goode et al. 2005).

Potential for Occurrence in the Study Area

The only location within the study area that is likely to support Chuckwallas is the vicinity of the Picacho Mountains, but all proposed alternatives are located outside suitable habitat for Chuckwallas.

Eastern Collared Lizard

Status

The Collared Lizard (*Crotaphytus collaris auriceps*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Eastern Collared Lizard occurs through much of the central and southwestern United States south into Mexico as far as San Luis Potosi, and it occurs in suitable habitat throughout New Mexico (Degenhardt et al. 1996; Jones and Lovich 2009).

Habitat and Life History

Eastern Collared Lizards occur in a wide range of habitats over a large elevation range, where they occupy steep slopes or rocky areas but typically avoid valley flats or areas of sandy soils (Jones and Lovich 2009). They commonly station themselves on large boulders that provide good visibility. The diet of the Eastern Collared Lizard is comprised primarily of a wide variety of invertebrates, primarily insects, with an apparent preference for grasshoppers. Other lizard species, occasionally including juvenile Eastern Collared Lizards, are an important component in their diet, and they are known to occasionally engage in herbivory (Degenhardt et al. 1996; Jones and Lovich 2009).

Threats to the Survival of the Eastern Collared Lizard

Threats to the Eastern Collared Lizard include loss of habitat from urbanization and conversion of lands for agricultural uses, pesticide and herbicide poisoning, habitat-altering invasion of nonnative plants, increased habitat access from energy developments, and the impacts from removal of animals for the pet trade (NMDGF 2006).

Potential for Occurrence in the Study Area

The Eastern Collared Lizard occurs throughout the Project area in New Mexico, wherever suitable rocky habitat is present.

<u>Sonoran Collared Lizard</u>

Status

The Sonoran Collared Lizard (*Crotaphytus nebrius*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Sonoran Collared Lizard occurs south of the Gila River in southwestern Arizona and south into central Sonora, Mexico (Brennan 2008; Jones and Lovich 2009).

Habitat and Life History

Sonoran Collared Lizards occur in a wide range of habitats, generally below 4,500 feet elevation, where they occupy steep slopes or rocky areas but typically avoid valley flats or areas of sandy soils (Brennan 2008; Jones and Lovich 2009). They commonly station themselves on large boulders that provide good visibility. The diet of Collared Lizards is comprised of a wide variety of invertebrates, primarily insects, with an apparent preference for grasshoppers. Lizards, occasionally including juvenile Collared Lizards, are an important component in their diet, and

they are known to occasionally engage in herbivory (Degenhardt et al. 1996; Jones and Lovich 2009).

Threats to the Survival of the Sonoran Collared Lizard

Threats to the Sonoran Collared Lizard are the same as those listed for the Eastern Collared Lizard

Potential for Occurrence in the Study Area

The Sonoran Collared Lizard occurs in the study corridor only in the Tucson Mountains west of Tucson and south of Interstate 10.

Texas Horned Lizard

Status

The Texas Horned Lizard (*Phrynosoma cornutum*) is a BLM sensitive species in New Mexico, and a USFWS species of concern (AZGFD 2010a; BISON-M 2008).

Distribution

The Texas Horned Lizard has a wide range from the southern plains states of Kansas, Oklahoma and Texas west to include the southeast half of New Mexico, Cochise County, Arizona and into much of northeast Mexico (Brennan and Holycross 2006; Degenhardt et al. 1996; Stebbins 2003).

Habitat and Life History

The Texas Horned Lizard may be found between sea level and approximately 6,000 feet elevation (Degenhardt et al. 1996; Stebbins 2003). They inhabit open country with generally sparse plant cover on a variety of soil types. In habitat similar to that within portions of the study area, Whitford and Creusere (1977, as cited in Degenhardt et al. 1996) observed that the Texas Horned Lizard was common in *Yucca-Prosopis-Ephedra* associations around playas in southern New Mexico. The horned lizards have evolved as myrmecophagous (ant-eating) species, and have a dentition adapted for a diet that is predominantly composed of ants (Pianka and Parker 1975). The bulk of the diet (approximately 60 percent by volume) of this species is ants, particularly harvester ant (*Pogonomyrmex* spp.), but it is recorded taking other invertebrates, including isopods, grasshoppers, true bugs, termites, and beetles (Brennan and Holycross 2006; Degenhardt et al. 1996; Pianka and Parker 1975). Mating occurs in May and early June, and eggs are laid between late May and early August, with the average clutch size between 23 and 30 eggs (Degenhardt et al. 1996; Pianka and Parker 1975).

Threats to the Survival of the Texas Horned Lizard

The primary threat to the Texas Horned Lizard is the removal of the animals from their native habitat for the pet trade. Other impacts include loss of habitat due to conversion of lands for urbanization and agriculture, and pesticide exposure, often associated with control of the

introduced red fire ant (*Solenopsis invicta*) or other ants (AZGFD 2002k; Degenhardt et al. 1996).

Potential for Occurrence in the Study Area

The Texas Horned Lizard is widespread within the study area in New Mexico and Arizona.

Goode's Horned Lizard

Status

Goode's Horned Lizard (*Phrynosoma goodei*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

Goode's Horned Lizard occurs south of the Gila River in Arizona, south to western Sonora, Mexico, and east as far as the Avra Valley near Marana, Arizona (Jones and Lovich 2009).

Habitat and Life History

Goode's Horned Lizards inhabit the Lower Colorado River Valley subdivision of the Sonoran Desertscrub biome, where they are primarily associated with sandy substrates or dunes. They also sometimes occur on gravelly substrates, desert pavement, and near dry lakebeds (Brennan 2008; Jones and Lovich 2009). Their diet is comprised almost entirely of seed-harvesting ants (Young 2010). They may produce one or two clutches of two to ten eggs each (Jones and Lovich 2009).

Threats to the Survival of the Goode's Horned Lizard

Threats to the species include ground disturbances from OHV use, border control issues, and habitat loss from development. There may be some impact from collection for the pet trade. Conversion of low valley habitat (primarily for agriculture) in parts of Arizona may have resulted in loss of habitat for the species, as has apparently occurred for other wildlife species in the area that use this habitat type (Rosen 2008b).

Potential for Occurrence in the Study Area

Portions of the study corridor along I-10 between Marana and Picacho, Arizona are within the historic range of Goode's Horned Lizard. However, this is within the area largely converted to agriculture, and the species has not been recorded recently from within the study corridor despite extensive surveys (Rosen 2008b). The potential for the species occurring in the study corridor is low.

Regal Horned Lizard

Status

The Regal Horned Lizard (*Phrynosoma solare*) is an SGCN in both New Mexico and Arizona (AZGFD 2006a; BISON-M 2008).

Distribution

The Regal Horned Lizard is a resident of the Sonoran Desert, and occurs from Arizona south of the Mogollon Rim, exclusive of the low southwestern deserts, east to the far southwestern corner of New Mexico in Guadalupe Canyon, and south into Mexico in the states of Sonora and northern Sinaloa (Brennan and Holycross 2006; Degenhardt et al. 1996).

Habitat and Life History

The Regal Horned Lizard occurs in valleys and on rocky bajada slopes in saguaro and creosote bush desert habitats in areas with gravelly to sandy soils, up to about 4,200 feet elevation (Brennan and Holycross 2006; Degenhardt et al. 1996). Regal Horned Lizards feed almost exclusively on ants, primarily harvester ants (*Pogonomyrmex* spp.), but also occasionally take some other insects (Brennan and Holycross 2006; Degenhardt et al. 1996). The Regal Horned Lizard lays a clutch of about 20 (from 7-33) eggs in loose soils at the end of a short excavated burrow (Brennan and Holycross 2006; Degenhardt et al. 1996).

Threats to the Survival of the Regal Horned Lizard

Primary threats to the Regal Horned Lizard are habitat loss, collection for the pet trade, and road fatalities.

Potential for Occurrence in the Study Area

The Regal Horned Lizard is widespread in the study area in Arizona, but is not likely to occur in the New Mexico portion of the study area.

<u>Arizona Striped Whiptail</u>

Status

The Arizona Striped Whiptail (*Aspidoscelis arizonae*) was included in a 2007 petition to list 475 Southwestern species under the ESA that NatureServe considered imperiled (Forest Guardians 2007). The USFWS found that listing may be warranted for the species, and initiated a 12-month status review in December 2009 (USFWS 2009b). The Arizona Striped Whiptail is an Arizona BLM sensitive species and an AZGFD SGCN (AZGFD 2006a; BLM 2010).

Distribution

Arizona Striped Whiptails are currently known from three locations in southeastern Arizona (Sullivan 2009, Sullivan et al. 2005). The species was discovered in 1896, but not observed again until 1962 at a location approximately 40 miles distant from the type locality (Wright and Lowe 1965). The Willcox Playa area, including dunes and areas near Cochise Lakes south of the town of Willcox, is the southernmost extant population center for the species. A population is located near Bonita on the western slope of the Pinaleño Mountains, and another is located in the Whitlock Valley between the Whitlock Mountains and the western slope of the Peloncillo Mountains.

Habitat and Life History

Arizona Striped Whiptails are restricted to semiarid grasslands, generally dominated by alkali sacaton (*Sporobolus airoides*) and saltgrass (*Distichlis spicata*) (Rosen et al. 1998). The Arizona Striped Whiptail was for a time considered a subspecies of the Little Striped Whiptail (*A. inornatus*) (Wright and Lowe 1993), but has been raised to full species status again. Little Striped Whiptails, and presumably Arizona Striped Whiptails, benefit from cover provided by burrowing rodents in otherwise-open grasslands (Davidson et al. 2008).

Whiptails are diurnal lizards, and are active during high temperatures. Reproduction takes places from May to early July when oviposition begins, and young hatch during August (Lowe and Goldberg 1970). Clutch size is generally 1-3 eggs (Sullivan 2009). Adults enter hibernation in September, followed by juveniles slightly later in autumn (Lowe and Goldberg 1970). As with all small whiptail species, the Arizona Striped Whiptail is primarily insectivorous.

Threats to the Survival of the Arizona Striped Whiptail

In its restricted range, human land use has been the primary apparent cause of decline of the Arizona Striped Whiptail. Development and expansion of the town of Willcox has reduced habitat available near the Willcox Playa, as has increasing agriculture in the area. While development has not impacted the Whitlock Valley population, overgrazing and conversion from grassland to mesquite scrubland has apparently lowered success of the species in competition with the related Tiger Whiptail (*A. tigris*) and unisexual Desert Grassland Whiptail (*A. uniparens*) (Wright and Lowe 1993). The Arizona Striped Whiptail may now be extirpated from the site, or may persist on unsurveyed private lands (Sullivan et al. 2005). The trend of declines following shrub or tree encroachment into grassland has been observed elsewhere in closely related species (Persons 2005).

Potential for Occurrence in the Study Area

The Project area is within the known range of the Arizona Striped Whiptail, and suitable habitat is present. The potential for the Arizona Striped Whiptail occurring within the Project area of influence is moderate.

<u>Giant Spotted Whiptail</u>

Status

The Giant Spotted Whiptail (*Aspidoscelis burti stictogrammus*) is a State of New Mexico threatened species, a BLM sensitive species in New Mexico, a Forest Service sensitive species, a USFWS species of concern, an SGCN in Arizona and New Mexico, and a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004; USFS 2007a).

Distribution

The bulk of the range of the species is in Pima and Santa Cruz counties in Arizona. The species' range continues south into the state of Sonora, Mexico, and the species is recorded from Guadalupe Canyon in far southwestern New Mexico (AZGFD 2003l; Degenhardt et al. 1996).

Habitat and Life History

The Giant Spotted Whiptail inhabits mountain canyons and mesas, generally below 4,500 feet elevation, into lower desert areas along riparian corridors (Brennan and Holycross 2006; Stebbins 2003). They occur among dense, shrubby vegetation or open areas dominated by bunch grasses along perennial or intermittent streams. They typically occur in shaded areas within this habitat, among rocks and leaf litter beneath broadleaf riparian trees (AZGFD 2003l; Degenhardt et al. 1996). Primary foods are insects, spiders, and other terrestrial invertebrates (AZGFD 2003l; Degenhardt et al. 1996).

Threats to the Survival of the Giant Spotted Whiptail

Alteration or loss of riparian habitat could adversely affect the species.

Potential for Occurrence in the Study Area

There is suitable habitat for this species in the San Pedro Valley in riparian areas of canyons leading out of the Santa Catalina and Galiuro mountains, including Hot Springs, Redfield, and Buehman canyons. Additionally, Tier 1 and 2 PCAs for the Giant Spotted Whiptail are located within the study area in Pima County. Tier 1 PCAs are designated for portions of the east and west flanks of the Santa Catalina Mountains and along a reach of the Santa Cruz River southwest of Tucson. Tier 2 PCAs are located in Sabino Canyon in the Santa Catalina Mountains and in the north end of the Santa Rita Mountains. Critical landscape linkages are designated between some of these elements (Pima County 2004). The species may occur at any of the Project alternative crossings of the San Pedro River.

<u>Gila Spotted Whiptail</u>

Status

The Gila Spotted Whiptail (*Aspidoscelis flagellicauda*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Gila Spotted Whiptail occurs though much of the Mogollon Rim area and as isolated populations in the mountains of the southeastern part of Arizona (Jones and Lovich 2009).

Habitat and Life History

This lizard occurs primarily in Madrean evergreen woodland, piñon-juniper and chaparral habitats, occasionally extending down into upper semi-desert grassland habitat along riparian corridors. The lizards probably feed on a variety of arthropods. The species is one of the all-female species of *Aspidoscelis*, producing clutches of between 2 and 6 eggs in June or July (Brennan and Holycross 2006; Jones and Lovich 2009).

Threats to the Survival of the Gila Spotted Whiptail

Principle threats to the species include habitat degradation from the effects of invasion of non-native plant species, and habitat loss due to human developments.

Potential for Occurrence in the Study Area

There is a moderate potential for the species to occur within the study corridor in canyons draining the Santa Catalina, Galiuro and Pinaleño Mountains.

Madrean Alligator Lizard

Status

The Madrean Alligator Lizard (*Elgaria kingii*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Madrean Alligator Lizard occurs from the Mogollon Rim area of central Arizona east to the Gila River Watershed in New Mexico, and south into eastern Sonora, Mexico (Brennan and Holycross 2006; Degenhardt et al. 1996; Jones and Lovich 2009). There is a disjunct population of the species in some of the sky island mountain ranges in the vicinity of Deming and Las Cruces, New Mexico (Jones and Lovich 2009).

Habitat and Life History

The Madrean Alligator Lizard occurs in a wide variety of terrain including steep mountain slopes, talus in pine-oak woodland habitat, in riparian canyon bottoms below 8,800 feet elevation, and occasionally as low as creosote bush-dominated desertscrub (Degenhardt et al. 1996). The lizards are diurnal, foraging among leaf litter and debris beneath shrubby vegetation, and feed exclusively on invertebrates. The lizards breed in the fall and lay up to 15 eggs the following spring or early summer (Brennan and Holycross 2006; Jones and Lovich 2009).

Threats to the Survival of the Madrean Alligator Lizard

Threats identified for the species by the NMDGF include habitat conversion and wildfires (NMDGF 2006). Due to the remote nature of the habitat used by this species throughout most of its range, it is considered generally secure.

Potential for Occurrence in the Study Area

Because of a general lack of habitat within the Project area in New Mexico, the potential for this species occurring within the Project area of influence is low.

Reticulate Gila Monster

Status

The Reticulate Gila Monster (*Heloderma suspectum suspectum*) is a State of New Mexico endangered species, a Forest Service sensitive species, and an SGCN in both New Mexico and Arizona (AZGFD 2006a; BISON-M 2008; USFS 2007a).

Distribution

Within New Mexico, the Reticulate Gila Monster is limited to the southwest corner of the state, as far east as Doña Ana County (Degenhardt et al. 1996).

Habitat and Life History

The Gila Monster is most common from sea level to approximately 4,100 feet elevation (Beck 2005). Population densities are highest in the Arizona Upland subdivision of Sonoran desertscrub and semi-desert grassland, but Gila Monsters also occur in pine-oak forest, riparian woodlands, mesquite bosque, tropical deciduous forest, Mojave desertscrub, and Sinaloan thornscrub (BISON-M 2008). Gila Monsters seem to prefer undulating rocky foothills, bajadas, and canyons, and tend to avoid open sandy plains (Beck 2005). In New Mexico, the species occurs among rocky foothills and canyons in desertscrub, grassland, and occasionally up into the lower limits of open piñon-juniper and oak woodlands (Beck 2005; Degenhardt et al. 1996).

Gila Monsters feed on eggs of birds and reptiles, nestling birds and juvenile mammals, small lizards, insects, and carrion (Beck 2005; Brennan and Holycross 2006; Stebbins 2003). Gila monsters normally produce a clutch of eggs only every other year during the summer rainy season of July and August (Brennan and Holycross 2006). Clutches may contain up to 12 eggs (Brennan and Holycross 2006).

Threats to the Survival of the Reticulate Gila Monster

Habitat loss, particularly from urban development, threatens the Gila Monster over much of its range. Residential housing developments and road mortality reduces population density and isolates population segments (Beck 2005). Nonnative plants are threats in some areas, where they lead to more frequent burns and eventual changeover of plant communities. Succession of semi-desert grasslands to mesquite shrublands may have population-level effects on Gila monsters. Illegal collection for the pet trade may affect wild populations.

Potential for Occurrence in the Study Area

Project alternatives pass through the Peloncillo Mountains, where Gila Monsters may occur in the foothills of the range. The potential for the Reticulate Gila Monster occurring within the Project area of influence in New Mexico is low and is limited to the portion of its range in Hidalgo County.

Sonoran Coralsnake

Status

The Sonoran Coralsnake (*Micruroides euryxanthus*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Sonoran Coralsnake ranges from central Arizona and southwestern New Mexico south to southern Sinaloa, Mexico (Degenhardt et al. 1996).

Habitat and Life History.

Sonoran Coralsnakes occupy rocky or gravelly drainages and bajadas from Arizona Upland Desertscrub up to semi-desert grassland, and less commonly into the lower elevations of woodland habitats (Brennan 2008). This slender snake does not exceed two feet in length. It is mostly nocturnal, and is a venomous species. They feed primarily on a variety of small snakes, with threadsnakes (*Leptotyphlops* spp.) apparently being preferred, and for which with their slender bodies may be adapted to prey on (Brennan and Holycross 2006; Degenhardt et al. 1996). They apparently also include some lizards in their diet (Degenhardt et al. 1996).

Threats to the Survival of the Sonoran Coralsnake

Threats to the species include habitat degradation or loss resulting from human developments, roadkills and illegal collecting for the pet trade. Non-native invasive plant species, particularly buffelgrass (*Pennisetum ciliare*), present a habitat-altering threat to the species at lower elevations.

Potential for Occurrence in the Study Area

The Sonoran Coralsnake is present within the study corridor.

Tucson Shovel-nosed Snake

Status

The Tucson subspecies of the Western Shovel-nosed Snake (*Chionactis occipitalis klauberi*) is a candidate for listing under the ESA (USFWS 2010g). It is also a Pima County PVS (Pima County 2004).

Distribution

Four subspecies of the Western Shovel-nosed Snake are recognized, with three found in Arizona. *C. o. occipitalis* has a restricted range in the state north of the Bill Williams River, *C. o. annulata* is found in the Lower Colorado River Valley subdivision of Sonoran desertscrub throughout the southwestern ¼ of Arizona, and *C. o. klauberi* was found in parts of Maricopa County (extirpated), northern Pima County (possibly extirpated), with a small number of known populations persisting primarily in Pinal County (Mahrdt et al. 2001). However, a broad zone of

morphological intergrades exists between *C. o. annulata* and *C. o. klauberi* from near Casa Grande to west of Gila Bend in central Arizona (CBD 2004, Rosen 2003). Status of the Tucson Shovel-nosed Snake as a subspecies has been questioned, with Wood et al. (2008) recommending consideration of most Shovel-nosed Snakes across Arizona as part of a clade or single subspecies showing clinal variation based on mitochondrial DNA evidence. The Tucson subspecies then would represent the eastern end of that cline, adapted to cooler and more mesic habitats than snakes to the west, for instance in the Colorado River valley. Pending a more detailed examination of *Chionactis* relationships, the USFWS is retaining the current taxonomy with *C. o. klauberi* as a valid subspecies but did not consider the intergrade zone in their review of the subspecies (USFWS 2008f) and candidate finding.

Habitat and Life History

Across the range of the Western Shovel-nosed Snake, preferred soil types are generally sandy and often include active aeolian dune systems (Mahrdt et al. 2001). The species' morphology is highly modified for locomotion, respiration (Norris and Kavanaugh 1966), and feeding in sandy soils (Glass 1972). Shovel-nosed Snakes move below the surface of the sandy soils with a mode of locomotion called "sand-swimming", which requires loose, dry soils. Habitat selection of the Tucson subspecies has not been studied in great detail, but Rosen (2003) inferred from museum records and personal experience that sandy loam soils, sometimes with sparse gravel, were preferred. Vegetation associations were predominately creosote-bursage with some use of creosote-mesquite floodplains.

Shovel-nosed snakes feed on various arthropods including insects, spiders, centipedes, and primarily scorpions. Prey are usually subdued by the snake wrapping the anterior portion of its body around the prey and holding it to the ground until the snake can grasp the prey with its mouth. Prey are also taken by striking, but this seems less effective (AZGFD 2002l).

The breeding period for the Tucson Shovel-nosed Snake is generally accepted as May to June, when two to four eggs are laid (CBD 2004; Goldberg 1997). Little is known about dispersal in the species, particularly regarding movements across suboptimal habitat. Tucson Shovel-nosed Snakes have a very strong seasonal surface activity peak in May and early June, presumably for reproduction. Few snakes are seen active before mid-April or after early July (Rosen 2003).

Threats to the Survival of the Tucson Shovel-nosed Snake

Primary threats include loss of habitat from conversion of lands for agriculture or urban development. Construction of new roads results in high losses of this species as road kills and may result in habitat fragmentation (USFWS 2008f).

Potential for Occurrence in the Study Area

Suitable habitat for the species exists near the Pinal Central and Tortolita substations, near the western terminus of the Project. There are contemporary records for the species in the area, and south to the Santa Cruz Flats west of Picacho Peak. A single Pima County Tier 1 PCA is delineated for the Tucson Shovel-nosed Snake, within the study area in the northern Avra Valley in Marana, Arizona on the south side of I-10 (Pima County 2004). The potential for the Tucson

Shovel-nosed Snake occurring within the Project area of influence is moderate, and possibly high on the north bajada of the Picacho Mountains.

Variable Sandsnake

Status

The Variable Sandsnake (*Chilomeniscus stramineus*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The species occurs in central and southwestern Arizona, western Sonora and most of Baja California, Mexico (Stebbins 2003).

Habitat and Life History

The Variable Sandsnake is a resident of Arizona Upland Desertscrub habitat, where it is associated with dunes, sandy or gravelly substrates in arroyos, or leaf litter (Brennan and Holycross 2006; Rorabaugh 2010). This is a small, burrowing snake, less than one foot in length, which preys on a variety of invertebrates (Brennan and Holycross 2006).

Threats to the Survival of the Variable Sandsnake

Threats to the species include habitat loss and fragmentation resulting from human developments, road kills and illegal collecting.

Potential for Occurrence in the Study Area

The Variable Sandsnake occurs widely within the study corridor west and north of Tucson in Pima and Pinal counties.

Hooded Night Snake

Status

The Hooded Night Snake (*Hypsiglena* species novum) is an AZGFD SGCN (AZGFD 2006a).

Distribution

Recent genetic studies on the western North American Night Snake (*Hypsiglena torquata*) revealed a previously unrecognized clade of populations of these snakes in southeastern Arizona, the bounding regions of southwestern New Mexico and northern Mexico. This “Cochise” clade has been proposed as a distinct species, the Hooded Night Snake (Mulcahy 2008).

Habitat and Life History

The Hooded Night Snake is most common in desert and semi-desert habitats, but is not uncommon in grassland habitats, and up into Petran Montane Conifer Forest to an elevation of about 7,200 feet (Brennan and Holycross 2006; Degenhardt et al. 1996). They commonly occupy

rocky habitats, but commonly use other ground debris for cover. They feed mostly on lizards, other snakes, and amphibians, but also take insects and other invertebrates (Brennan and Holycross 2006; Degenhardt et al. 1996).

Threats to the Survival of the Hooded Night Snake

Threats to the Hooded Night Snake include road mortality and any ground-disturbing activities.

Potential for Occurrence in the Study Area

The Hooded Night Snake occurs in most of Cochise County, Arizona, with the northern limits of its range just reaching the Project area.

Saddled Leaf-nosed Snake

Status

The Saddled Leaf-nosed Snake (*Phyllorhynchus browni*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Saddled Leaf-nosed Snake occurs from south-central Arizona south to Sinaloa, Mexico (Stebbins 2003).

Habitat and Life History

This species primarily occupies alluvial soils of low bajadas and flats in the Arizona Upland subdivision of Sonoran desertscrub, generally below 3,000 feet. It is a nocturnal species that is most active in summer (Brennan 2008; Brennan and Holycross 2006). Some of the literature on the species indicates that they feed on lizard eggs, and possibly occasionally on lizards, but a recent study (Gardner and Mendelson 2003) showed an apparently exclusive diet of snake eggs.

Threats to the Survival of the Saddled Leaf-nosed Snake

Threats to the Saddled Leaf-nosed Snake include habitat loss from human developments and road kills.

Potential for Occurrence in the Study Area

There is a high potential for the Saddled Leaf-nosed Snake to occur within the study corridor.

Ground Snake

Status

The Ground Snake (*Sonora semiannulata*) is a Pima County PVS (Pima County 2004). The valley-bottom form in Arizona is also a WSC.

Distribution

The distribution of the Ground Snake extends from southeast Oregon and southwest Idaho south to Baja California Sur, north-central Mexico, and north and east to southwestern Missouri and east Texas. The species is mostly absent from northeastern Arizona and northwestern New Mexico (Stebbins 2003).

Habitat and Life History

Ground Snakes are found in desert grasslands, mesquite thickets, and in grassland up into encinal habitat. They occur in plains, valleys, and foothill habitats, but mostly near mountains with higher slopes and poorly drained soils (Degenhardt et al. 1996; Pima County 2004). Vegetation can vary from sparse creosote bush to dense riparian communities, but drainageways, floodplains, streambeds, and terraces appear to be important elements of their habitat (Pima County 2004). They feed on a wide variety of arthropods and take a few small lizards. The species is oviparous, laying 3 to 6 eggs in June or July (Brennan and Holycross 2006; Degenhardt et al. 1996).

Threats to the Survival of the Ground Snake

Degradation and loss of habitat are the primary threats to the species. Ground-disturbing activities may allow colonization by invasive nonnative plant species that may compete with native vegetation and result in alteration of plant communities and the local fire regime.

Potential for Occurrence in the Study Area

The Ground Snake is present within the Project area of influence.

<u>Sonoran Whipsnake</u>

Status

The Sonoran Whipsnake (*Masticophis bilineatus*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Sonoran Whipsnake occurs from south central and southeastern Arizona east just into New Mexico in southwestern Hidalgo County, and south to Oaxaca, Mexico (Brennan 2008; Degenhardt et al. 1996).

Habitat and Life History

The Sonoran Whipsnake occupies rocky habitats with dense vegetation, and commonly occur in canyon bottoms where water is present. They are adept at moving quickly through shrubby vegetation and are commonly encountered low in trees (Degenhardt et al. 1996). They range from the Arizona Upland subdivision of Sonoran Desertscrub up into Great Basin Conifer Woodland. The snakes take a variety of prey including other snake species, lizards, amphibians, birds and bats (Brennan and Holycross 2006; Degenhardt et al. 1996).

Threats to the Survival of the Sonoran Whipsnake

There are no major species-wide threats to the Sonoran Whipsnake, but habitat loss, vehicle traffic, and other anthropogenic threats may have local effects.

Potential for Occurrence in the Study Area

There is a high potential for the Sonoran Whipsnake to occur within the study corridor.

California Kingsnake

Status

The California Kingsnake (*Lampropeltis getula californiae*) is a State of New Mexico sensitive species and a New Mexico SGCN (BISON-M 2008).

Distribution

This subspecies of the Common Kingsnake occurs from southwestern Oregon, through most of California and Baja California in Mexico, the southern half of Nevada, portions of southern Utah, the western two-thirds of Arizona, and far southwestern Colorado less than 2 miles from the New Mexico border. It has a limited presence in the San Juan Valley of northwestern New Mexico, where the species was recorded in 1997 (BISON-M 2008). The southeastern extent of the range of the subspecies in Arizona reaches approximately to Cochise County, where specimens apparently intergrade between *L. g. californiae* and the Desert Kingsnake (*L. g. splendida*) (Stebbins 2003). The species is also reported from the lower elevations of the Peloncillo Mountains in Hidalgo County New Mexico, but this record may represent another subspecies (BISON-M 2008).

Habitat and Life History

The Common Kingsnake is present through a wide range of habitats and elevation from sea level to near 7,000 feet (Degenhardt et al. 1996; Stebbins 2003). In desert habitats, it uses rock shelters, animal burrows or man-made structures to escape high temperatures and low humidity (Degenhardt et al. 1996). Kingsnakes feed primarily on other snake species, but also consume lizards, frogs, birds and eggs of reptiles and birds (Degenhardt et al. 1996; Stebbins 2003). The species is oviparous, laying between 2 and 24 eggs, with egg production reflective of the size of the individual animal (Degenhardt et al. 1996).

Threats to the Survival of the California Kingsnake

Threats to the California Kingsnake are primarily from habitat loss and collecting.

Potential for Occurrence in the Study Area

The potential for the California Kingsnake occurring within the Project area of influence in New Mexico is low.

Milk Snake

Status

The Milk Snake (*Lampropeltis triangulum*) is an AZGFD and New Mexico SGCN (AZGFD 2006a; BISON-M 2008).

Distribution

The Milk Snake occurs primarily east of the Rocky Mountains. Populations in the western United States are mostly disjunct in distribution. In Arizona, the species occurs in Plains and Great Basin Grassland habitats in the north-central and north eastern portions of the state. There is a disjunct population in southeastern Arizona in Cochise County (Brennan and Holycross 2006; Stebbins 2003). In New Mexico, the species occurs in the Rio Grande Valley and most of the eastern part of the state in areas of suitable habitat (Degenhardt et al. 1996; Stebbins 2003).

Habitat and Life History

In New Mexico and in much of the range of the species further east, the species may occur in a variety of habitats including; desertscrub, short grass prairie, piñon-juniper, and river valleys such as the Rio Grande (Degenhardt et al. 1996; Stebbins 2003). The species may occur up to an elevation of nearly 7,800 feet. Snakes may take shelter under almost any kind of surface debris, and commonly use animal burrows (Degenhardt et al. 1996). From 3-24 eggs are laid in May to July (Degenhardt et al. 1996; Stebbins 2003). Diet of the species includes primarily reptile eggs, lizards, small snakes, small mammals, and occasionally birds or their eggs, amphibians, and invertebrates including insects and earthworms (Brennan and Holycross 2006; Degenhardt et al. 1996; Stebbins 2003).

Threats to the Survival of the Milk Snake

Threats to the Milk Snake include loss of habitat from urbanization, highway mortality, and loss of individuals to the pet trade (NMDGF 2008).

Potential for Occurrence in the Study Area

The Milk Snake is present in much of the study area in New Mexico, but only occurs south of the study area in Arizona.

Northern Mexican Garter Snake

Status

The Northern Mexican Garter Snake (*Thamnophis eques megalops*) is a candidate for listing under the ESA, and a State of New Mexico endangered species. It is a New Mexico BLM sensitive species, a Forest Service sensitive species, an Arizona and New Mexico SGCN, an AZGFD WSC, and a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004; USFS 2007a).

Distribution

In Arizona, populations are mostly disjunct, occurring in areas of the Mogollon Rim, the White Mountains, in Cienega Creek east of Tucson, and near the Mexican border in Pima, Santa Cruz, and Cochise Counties. The New Mexico populations occur in western Grant County, and on the Gila River in northern Hidalgo County. The New Mexico populations are outside of the Project area.

Habitat and Life History

The Northern Mexican Garter Snake occurs along rivers, streams, and in cienegas and ponds from Arizona Upland Sonoran Desertscrub up to Petran Montane Conifer Forest habitats (Brennan and Holycross 2006; Degenhardt et al. 1996). The species forages in dense vegetation along aquatic habitats, and often seeks escape in the water. They feed on small fish, juvenile and adult frogs and toads, and occasionally take lizards and small mammals. Clutch size averages about a dozen young. Young are born from early June to early July (Brennan and Holycross 2006; Degenhardt et al. 1996).

Threats to the Survival of the Northern Mexican Garter Snake

Threats to the species include habitat loss from urbanization, overgrazing and lowering of groundwater tables from over pumping, and predation by introduced bullfrogs and fish (AZGFD 2001j).

Potential for Occurrence in the Study Area

Within the study area, a Pima County Tier 1 PCA is delineated for Cienega Creek, and critical landscape linkages are assigned to mainstem drainages downstream of the Tier 1 PCA to the Santa Cruz River confluence, and an approximately 20 mile reach of the Santa Cruz south of Tucson (Pima County 2004). The Northern Mexican Garter Snake is known to occur within the study area in Cienega Creek east of Tucson. There is a recent record of the species in the Upper San Pedro River, and there is therefore some potential for occurrence within the San Pedro Valley. Potential in the San Pedro Valley within the Project area of influence is very low, given the distance from any recent records of the species.

<u>New Mexico Garter Snake</u>

Status

The New Mexico Garter Snake (*Thamnophis sirtalis dorsalis*) is a BLM sensitive species in Arizona and is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The New Mexico Garter Snake occurs primarily in New Mexico and northern Chihuahua, Mexico (Degenhardt et al. 1996; Stebbins 2003). The species occurs in New Mexico primarily along the Rio Grande, with outlier populations present on the Pecos River (Stebbins 2003). The

range of the species barely extends into west Texas near El Paso on the Rio Grande (Dixon 2000).

Habitat and Life History

In New Mexico, the species is mostly restricted to wet habitats with abundant vegetation along rivers, ponds, marshy areas, and irrigation canals (Degenhardt et al. 1996). Mating typically occurs in March or April, and typically about 16 young are born in late summer (Degenhardt et al. 1996). The species is opportunistic in its feeding, taking a variety of vertebrate and invertebrate species including; frogs and toads, salamanders, reptiles, fish, birds and their eggs, small mammals, leeches, and earthworms (Degenhardt et al. 1996; Stebbins 2003).

Threats to the Survival of the New Mexico Garter Snake

The principle threats to the New Mexico Garter Snake include loss of wetland habitat and impacts from nonnative predators (NMDGF 2008).

Potential for Occurrence in the Study Area

The New Mexico Garter Snake is present in the study area along the Rio Grande.

<u>Desert Massasauga</u>

Status

The Desert Massasauga (*Sistrurus catenatus edwardsii*) is an AZGFD WSC and SGCN and a State of New Mexico SGCN (AZGFD 2010a; 2006a; BISON-M 2008).

Distribution

In Arizona, the only remaining population occurs on the divide between the San Simon and San Bernardino Valleys west of Rodeo, New Mexico (Brennan and Holycross 2006). Confirmed records in New Mexico are from central and eastern areas of the state, including the central Rio Grande Valley (Degenhardt et al. 1996).

Habitat and Life History

The Desert Massasauga occurs primarily in areas with sandy soils in shortgrass prairies up to oak woodlands, from about 3,035 to 6,890 feet elevation (Degenhardt et al. 1996). In southeast Arizona, it is most common in semidesert grassland dominated by tobosa grass (*Hilaria mutica*) (Brennan and Holycross 2006; Goldberg and Holycross 1999; Stebbins 2003). These snakes are primarily nocturnal and crepuscular, but may occasionally be active in the daytime. They are often encountered near rodent burrows where there is a source of prey, and they may use the burrows for shelter. The Desert Massasauga feeds on a variety of vertebrate prey, which includes other snake species, frogs, lizards, shrews, mice and other small mammals. There is one record of this species having taken a centipede (Degenhardt et al. 1996; Stebbins 2003). Little is known about breeding in the species in the wild (Degenhardt et al. 1996). Captive individuals have bred

in spring and fall (Goldberg and Holycross 1999), and young in Arizona were born in August or September (Brennan and Holycross 2006).

Threats to the Survival of the Desert Massasauga

Threats to the species include habitat loss from land conversion to agriculture, the results of overgrazing on native grasses, and high mortality on highways (AZGFD 2001k).

Potential for Occurrence in the Study Area

The known Arizona population is approximately 40 miles south of the study area. Within the study area in New Mexico, suitable habitat for the species occurs in the valley between Nutt and Lake Valley, and along the Rio Grande near San Antonio, New Mexico (Degenhardt et al. 1996).

Western Diamondback Rattlesnake

Status

The Western Diamondback Rattlesnake (*Crotalus atrox*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Western Diamondback Rattlesnake has a wide distribution in the southwestern United States and Mexico from Southern California and Nevada east to central Arkansas, south to northern Sinaloa, east to the Sierra Madre Occidental, and south to Oaxaca (Castoe et al. 2006). It occurs throughout most of New Mexico except the far northern and northwestern portion of the state (Degenhardt et al. 1996). In Arizona, it occurs in most of the state below the Mogollon Rim area (Brennan and Holycross 2006).

Habitat and Life History

The Western Diamondback Rattlesnake uses a wide variety of habitats, generally below 5,000 feet elevation (Degenhardt et al. 1996). They are most commonly encountered in Arizona Upland Sonoran Desert or Chihuahuan Desertscrub habitats where they occur in generally dry, brushy, lowlands, foothills, and along drainages (Brennan and Holycross 2006).

Threats to the Survival of the Western Diamondback Rattlesnake

Threats to the Western Diamondback Rattlesnake in New Mexico include highway mortality, indiscriminate killing of animals, development that includes increased access to habitat, and collection for the pet trade (NMDGF 2008).

Potential for Occurrence in the Study Area

The Western Diamondback Rattlesnake potentially occurs nearly everywhere in the Project area.

Arizona Black Rattlesnake

Status

The Arizona Black Rattlesnake (*Crotalus cerberus*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The range of the Arizona Black Rattlesnake is almost entirely within Arizona. It occurs outside of Arizona only in the far west-central portion of New Mexico. The range of the species is centered in the Mogollon Rim portion of central Arizona (Brennan and Holycross 2006).

Habitat and Life History

The Arizona Black Rattlesnake extends over a rather wide elevation range, primarily from Interior Chaparral up to Petran Montane Conifer Forest (Flesch et al. 2010), and sometimes occurs at elevations as low as 4000 feet in the upper reaches of the Arizona Upland Desertscrub biome. They inhabit canyon bottoms, dry, rocky hillsides and talus. They feed on a variety of small mammals, lizards and birds (Brennan and Holycross 2006).

Threats to the Survival of the Arizona Black Rattlesnake

Because the Arizona Black Rattlesnake generally occurs in rugged, montane habitats, the principle threat to the species is likely from over-collection of animals for the pet trade. Development of utility corridors through suitable habitat may affect individual animals.

Potential for Occurrence in the Study Area

There are a few records of the species in the collection at the University of Arizona from the project area including the Santa Catalina, Galiuro, Rincon, and Pinaleño Mountains. The species may occur within the study corridor, including in the Galiuro Mountains and in canyons flowing into the San Pedro River.

Banded Rock Rattlesnake

Status

The Banded Rock Rattlesnake (*Crotalus lepidus klauberi*) is an SGCN in both New Mexico and Arizona (AZGFD 2006a; BISON-M 2008).

Distribution

In New Mexico, the Banded Rock Rattlesnake is mostly confined to the southwestern quarter of the state, and as far north as Socorro County. A disjunct population of the Mottled Rock Rattlesnake (*C. l. lepidus*) occurs only in southeastern Otero and southwestern Eddy counties in New Mexico (Degenhardt et al. 1996). The species also occurs in southern and western Texas and south in to Mexico (Stebbins 2003).

Habitat and Life History

Rock Rattlesnakes inhabit steep, rocky terrain including talus and rocky canyons in Madrean evergreen woodland and Petran montane conifer forest (Brennan and Holycross 2006; Degenhardt 1996). Rock Rattlesnakes prey on large centipedes, lizards, snakes, frogs, and occasionally small mammals or birds (Brennan and Holycross 2006; Degenhardt et al. 1996; Stebbins 2003). Rock Rattlesnakes are live-bearing, with the young born in late July or August, and the average brood size being 9 (Degenhardt et al. 1996).

Threats to the Survival of the Banded Rock Rattlesnake

Ground-disturbing activities such as wood cutting, road development, and mining are important threats to the species. Illegal collecting has a significant negative impact on this species (AZGFD 2001l).

Potential for Occurrence in the Study Area

Because of a general lack of suitable habitat within the Project area, the potential for the Banded Rock Rattlesnake occurring within the Project area of influence in New Mexico is very low.

Tiger Rattlesnake

Status

The Tiger Rattlesnake (*Crotalus tigris*) is an SGCN in Arizona (AZGFD 2006a).

Distribution

The Tiger Rattlesnake is distributed primarily from south central Arizona south through central Sonora to the Gulf of California in Mexico (Stebbins 2003). There is a small disjunct population of the species in the far southeastern corner of Arizona in the southern Peloncillo Mountains (Brennan and Holycross 2006).

Habitat and Life History

The Tiger Rattlesnake typically inhabits brushy and rocky slopes of desert mountain foothills in Arizona Upland Desertscrub, but is occasionally found in Interior Chaparral and up into lower Madrean Evergreen Woodland (Brennan and Holycross 2006). The species may be active both in the daytime and at night and feeds on small mammals and lizards (Brennan and Holycross 2006; Stebbins 2003).

Threats to the Survival of the Tiger Rattlesnake

The primary threats to the Tiger Rattlesnake are from vehicle traffic and illegal collecting for the pet trade. Development of utility corridors through suitable habitat may affect individual animals.

Potential for Occurrence in the Study Area

The Tiger Rattlesnake is present in the study corridor in the southern Rincon Mountains and may also occur on Project alternatives in other areas, including the Black Mountain area and any other rocky areas north and west of Tucson.

1.8.1.5 Fish

Apache Trout

Status

The Apache Trout (*Oncorhynchus apache*) was originally listed as endangered on March 11, 1967, but was downlisted to threatened status on July 16, 1975 (USFWS 1975; 1967). No critical habitat has been designated for this species. The Apache Trout is also an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

Historically, the Apache Trout inhabited the headwaters of the Salt and Little Colorado rivers in Arizona. Currently, the species remains in the White Mountains of east-central Arizona and as several introduced populations in the Pinaleño Mountains. Most extant populations of the species occur above about 5,784 feet elevation (AZGFD 2001m; Minckley and Marsh 2009).

Habitat and Life History

Remaining populations are restricted to small, cold, higher-elevation streams. The species spawns between March and May, producing up to 600 eggs. Eggs are covered with gravels and incubated in place for 4 to 6 weeks (Lee et al. 1980; Minckley 1973). Adult fish may reach a length of 8 inches in streams and 16 inches in lakes (Lee et al. 1980; Minckley 1973).

Threats to the Survival of the Apache Trout

Threats to the Apache Trout include habitat degradation or loss resulting from damming of waters, timber harvesting, grazing, and water diversion. Additional threats include hybridization with other trout species and competition and predation by introduced nonnative fishes (AZGFD 2001m; Minckley and Marsh 2009).

Potential for Occurrence in the Study Area

The Apache Trout was introduced to several high-elevation perennial streams in the Pinaleño Mountains southwest of Safford, Arizona in the 1960s. Viable populations of the species remain in the Grant, Ash, Marijilda, and Big Creek drainages (Porath et al. 2010). No permanent flow in those drainages occurs at lower elevations where the Project would be located.

Longfin Dace

Status

The Longfin Dace (*Agosia chrysogaster*) is a BLM sensitive species in Arizona and New Mexico, a Forest Service sensitive species, a USFWS species of concern, and an AZGFD SGCN (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; USFS 2007a). The Longfin Dace is a Pima County PVS (Pima County 2004).

Distribution

The Longfin Dace is native to the watersheds of the Gila and Bill Williams rivers in Arizona, western New Mexico, and a few drainages in eastern Sonora, Mexico (AZGFD 2006e; Lee et al. 1980). There are introduced populations in New Mexico in the Rio Grande at Bosque del Apache, below Elephant Butte Reservoir, and in the Mimbres River north of Deming, New Mexico (AZGFD 2006e; BISON-M 2008; Sublette et al. 1990).

Habitat and Life History

The Longfin Dace can tolerate a wide range of habitats, from sand-bottomed desert streams to cool, clear creeks in the lower mountains (Minckley 1973). These fish can persist in water less than 7 inches deep, prefer moderate velocities around 1.1 feet per second, and are found at elevations between 1,360 and 6,740 feet (AZGFD 2006e). They have the ability to move into new areas in response to flooding, and they can begin reproducing within a few days (AZGFD 2006e). They often persist at the downstream edges of intermittent flows where they take temporary refuge in algal mats or detritus (Sublette et al. 1990). Longfin Dace typically feed on filamentous algae, zooplankton, aquatic insects, and detritus (Lee et al. 1980; Minckley 1973; Sublette et al. 1990). The species spawns from December through at least July. Nests may be tightly clustered, and young normally hatch in less than 4 days (Minckley 1973).

Threats to the Survival of the Longfin Dace

Primary threats to the Longfin Dace include flood control and irrigation projects that alter the flow or quality of water. Other threats are predation by and competition from nonnative fish and crayfish (AZGFD 2006e).

Potential for Occurrence in the Study Area

Tier 1 PCAs for the Longfin Dace occur within the study area in Buehman Canyon, a tributary to the San Pedro River, and two reaches of Cienega Creek. There are no Tier 2 PCAs delineated for the species (Pima County 2004). The Longfin Dace occurs in the San Pedro River, and there is a moderate probability that it could occur within the Project area of influence in the San Pedro Valley. A proposed Project alternative also crosses upper reaches of the Aravaipa Creek watershed, although the fish occurs only where permanent water begins approximately 8 miles downstream. In New Mexico, the species is likely to occur at the proposed crossings of the Rio Grande. The Mimbres River population is likely to remain upstream of the study area, except during larger flow events.

Gila Chub

Status

The Gila Chub (*Gila intermedia*) was listed as endangered with critical habitat under the ESA on November 2, 2005 (USFWS 2005d). A 5-year review of Southwestern species including the Gila Chub was initiated by the USFWS in 2009 (USFWS 2009a). The Gila Chub is a State of New Mexico endangered species, an SGCN, and a New Mexico BLM sensitive species (BISON-M 2008). The Gila Chub is also an AZGFD WSC and SGCN (AZGFD 2010a; 2006a). The Gila Chub is a Pima County PVS (Pima County 2004).

Distribution

The Gila Chub historically occurred in springs, cienegas, and small streams in the upper Gila River basin in southern Arizona, southwestern New Mexico, and northeastern Sonora, Mexico (Minckley 1973). The Gila Chub persists in small, remnant populations in the Verde, Santa Cruz, San Pedro, San Francisco, and Agua Fria drainages, but has been extirpated elsewhere (Minckley and Marsh 2009).

Habitat and Life History

Gila Chub are found in smaller creeks, cienegas, and springs of the Gila River Basin (AZGFD 2002m; Minckley 1973). The Gila Chub is a secretive species, using a variety of habitats depending on season and age, with the adults typically inhabiting deeper waters, or areas with cover. The Gila Chub is omnivorous, but feeds primarily on insects and algae (AZGFD 2002m; Minckley 1973). Reproduction occurs in late spring and summer (Minckley 1973).

Threats to the Survival of the Gila Chub

Threats to the Gila Chub include degradation and loss of habitat from overgrazing, pesticides, dredging, water diversion, and groundwater withdrawal. Predation and competition by nonnative fish, bullfrogs, and crayfish also threaten the species. While populations of the Gila Chub increase or decrease depending on season and climatic events, the overall trend for the species is downward, and the species is evidently in decline (AZGFD 2002m).

Potential for Occurrence in the Study Area

A single Tier 1 PCA is designated for the Gila Chub in Pima County, on upper Cienega Creek. The downstream (northern) portion of this PCA is just outside of the study area. A single Tier 2 PCA is designated for Sabino Canyon in the Santa Catalina Mountains (Pima County 2004). The Gila Chub is present just downstream of the Cienega Creek Project crossing alternatives. The potential for the species occurring along the San Pedro River portions of the Project is low. The species does not occur within the area of influence of the New Mexico portion of the Project.

Roundtail Chub

Status

The Lower Colorado River Basin DPS of the Roundtail Chub (*Gila robusta*) is a candidate for listing under the ESA and a State of New Mexico endangered species. It is a BLM sensitive species in New Mexico, a Forest Service sensitive species, an AZGFD WSC, and an SGCN in both Arizona and New Mexico (AZGFD 2010a; 2006a; BISON-M 2008; USFS 2007a; USFWS 2009c).

Distribution

Extant populations of the Lower Colorado River Basin DPS of the Roundtail Chub currently remain in central and eastern Arizona and in the Gila River watershed of southwest New Mexico. Historic records of the species included the Glenn Canyon area of the Colorado River and the upper reaches of the San Pedro River watershed in southern Arizona and northern Sonora, Mexico (Minckley and Marsh 2009).

Habitat and Life History

The Roundtail Chub inhabits deep pools in the middle of medium to large-sized streams and rivers. Roundtail Chubs are omnivorous, and include invertebrates, fish and other small invertebrates, detritus and plant materials in their diet (Minckley and Marsh 2009).

Threats to the Survival of the Roundtail Chub

Stream diversion, pollution, groundwater pumping, and predation by invasive nonnative fish are the principle threats to the Roundtail Chub (AZGFD 2002n).

Potential for Occurrence in the Study Area

A proposed Project alternative crosses upper reaches of the Aravaipa Creek watershed, although the Roundtail Chub occurs only where permanent water begins approximately 8 miles downstream. The Roundtail Chub does not occur in the New Mexico portion of the study area.

Rio Grande Silvery Minnow

Status

The Rio Grande Silvery Minnow (*Hybognathus amarus*) was listed as endangered under the ESA on July 20, 1994 (USFWS 1994c). Critical habitat for the species was designated in 1999 (USFWS 1999b; USFWS 1999c), and modified in 2003 (USFWS 2003c). A draft recovery plan was released in 2007 (USFWS 2007f), which was amended in 2009 (USFWS 2010h). The Rio Grande Silvery Minnow is a State of New Mexico endangered and SGCN (BISON-M 2008).

Distribution

The sole remaining natural population of the Rio Grande Silvery Minnow occurs in the Rio Grande in New Mexico between the Cochiti Dam to the headwaters of the Elephant Butte Reservoir north of Truth or Consequences, New Mexico (Sublette et al. 1990). The species originally occupied nearly 2,400 miles of habitat in New Mexico and Texas in the Rio Grande and Pecos rivers (USFWS 2007f). A non-essential experimental population is being re-established in the Big Bend reach of the Rio Grande by the USFWS under Section 10 (j) of the ESA (USFWS 2008g).

Habitat and Life History

The Rio Grande Silvery Minnow lives in medium to large rivers, and normally uses habitats where flows are of low to moderate velocity over mud, silty, sandy, or gravel substrates, at depths less than 20 inches (8 inches in summer). These fish typically use eddies formed by debris, or occur in pools and occasionally in backwaters. The Rio Grande Silvery Minnow is herbivorous, and likely feeds primarily on algae (Sublette et al. 1990; USFWS 2007f).

The Rio Grande Silvery Minnow spawns when water temperatures are between 68 and 75 degrees Fahrenheit. Spawning is usually associated with a high-flow event such as spring runoff, dam releases, or summer rainstorm events. The species produces non-adhesive, semi-buoyant eggs that mature as they drift, suspended in the water column, down the river (USFWS 2007f).

Threats to the Survival of the Rio Grande Silvery Minnow

Threats to the species include alteration or loss of habitat from diversions of surface waters, drawdown of aquifers, water impoundments, river channelization, water quality degradation, and competition from and predation by nonnative species (USFWS 2007f).

Potential for Occurrence in the Study Area

The Rio Grande Silvery Minnow is present in the Rio Grande north of Elephant Butte Reservoir. Designated critical habitat for the species is present in the study area along the Rio Grande north of Elephant Butte Reservoir, although portions of the river within Bosque del Apache and Sevilleta National Wildlife Refuges are not designated critical habitat. The Project would cross the river within critical habitat.

<u>Smallmouth Buffalo</u>

Status

The Smallmouth Buffalo (*Ictiobus bubalus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Historically the species is known as far north as the San Luis Valley in Colorado, and at Santa Fe, where remains of the species were dated from the late 17th Century. The Smallmouth Buffalo is currently limited to the portions of the Rio Grande in Sierra and Doña Ana Counties and the

Pecos River downstream of Sumner Reservoir. The Smallmouth Buffalo occurs at Bosque del Apache NWR (BISON-M 2008; Sublette et al. 1990).

Habitat and Life History

The Smallmouth Buffalo inhabits large pools with silt bottoms within slow-flowing large river systems. Spawning occurs during periods of high water, usually between April and September. The species is primarily a bottom-feeder, consuming insects, crustaceans, mollusks, and other invertebrates along with algae and other plant materials (Minckley and Marsh 2009; Sublette et al. 1990).

Threats to the Survival of the Smallmouth Buffalo

Commercial fishing and use of fish toxicants (primarily chlordane) in the 1960s reduced the numbers of the species (BISON-M 2008; Eisler et al. 1985-1996).

Potential for Occurrence in the Study Area

The Smallmouth Buffalo is known to occur in the Rio Grande near both proposed Project river crossings.

Spikedace

Status

The Spikedace (*Meda fulgida*) was listed as threatened under the ESA on October 28, 1986 (USFWS 1986b), and a recovery plan was released in 1990 (USFWS 1990a). The Spikedace was petitioned to be relisted as endangered on two occasions, with a finding of warranted-but-precluded in 1994 and 2006 (USFWS 2006d). Critical habitat was designated for the Spikedace together with the Loach Minnow in 2000, was revised following litigation, and a final critical habitat designation was published on March 21, 2007 (USFWS 2007g). A proposed revision of Spikedace critical habitat and a proposal to uplist the species to endangered was released in 2010 (USFWS 2010i). The final rule revising critical habitat and listing the Spikedace as endangered was published in 2012 (USFWS 2012c). The Spikedace is a State of New Mexico endangered species and an SGCN (BISON-M 2008). The Spikedace is also an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

The Spikedace is endemic to the upper Gila River basin in Arizona and New Mexico and was reported from the upper San Pedro River in Sonora, Mexico. The species is currently restricted to several isolated populations within the Gila River drainage. Spikedace occur within Arizona in the Verde River, Aravaipa Creek, and Eagle Creek, but appear to be largely extirpated from the Gila River itself. In New Mexico, the Spikedace is restricted primarily to the upper Gila River (Minckley and Marsh 2009).

Habitat and Life History

The Spikedace is a small fish of shallow pools and riffles in mid-elevation streams, from approximately 2,950 to 4,920 feet. Habitat use varies among populations, and may be controlled by the presence of nonnative fish (Rinne 1991). Larger fish tend to use deeper water with a higher velocity. Spikedace reproduce during spring runoff, depositing adhesive eggs into the water column or onto the substrate of riffles (Minckley and Marsh 2009). Young reproduce at 1 year of age, and live 1 to 3 years. Spikedace are predators of aquatic invertebrates, primarily insects, feeding on available insect larvae but may opportunistically take other prey, including fish fry (BISON-M 2008; Sublette et al. 1990).

Threats to the Survival of the Spikedace

Loss of Spikedace from major portions of its historic range, particularly in the lower, larger portions of the Gila River and major tributaries, was driven by multiple factors, each of which independently would have been sufficient to extirpate the species. Large portions of free-flowing rivers in the Gila River basin were hydrologically manipulated, leading either to drying of long stretches of stream flow or impoundment and formation of reservoirs. Dispersed activities within the Gila River Watershed such as grazing, logging, and mining may also negatively impact habitat quality for the species through increased erosion and sedimentation or contamination of streams with toxins (Sublette et al. 1990; USFWS 1990a).

The introduction of nonnative fish, both large predatory game fish and smaller baitfish, can exclude Spikedace in most systems as well. Human-altered streams or reservoirs in particular support introduced fish to the exclusion of Spikedace, and physical degradation of stream habitat and bank side vegetation associated with livestock grazing may cause Spikedace population decreases. Conversely, natural stream flow regimes with intermittent flow spikes (flash floods) tend to displace nonnative, non-stream-adapted fish but do not affect natives to the same degree (Meffe and Minckley 1987). Direct competition with related, ecologically similar, but nonnative minnows appears to occur as well (Rinne 1991). Introduced crayfish directly degrade aquatic habitat used by Spikedace by consuming much of the invertebrate prey base and vegetation in streams, as well as altering the substrate (Johnson et al. In press; Usio and Townsend 2004).

Ongoing threats to remaining populations include groundwater drawdown in watersheds supporting the remaining reduced areas of stream habitat used by Spikedace, as well as further introductions or reintroductions of nonnative aquatic species in sites where management or natural processes may have removed them.

Potential for Occurrence in the Study Area

One of the Project alternatives would pass through the north end of the Galiuro Mountains and would cross Aravaipa Creek upstream from the designated Aravaipa Creek CHU. Multiple alternative Project alignments in the lower San Pedro River valley would also cross the river or pass very near to it upstream from the confluence of Aravaipa Creek with the San Pedro River. The portion of the San Pedro River designated as critical habitat was proposed for removal in 2010, as low flows and introduced predators prevent successful Spikedace recovery in the river (USFWS 2010i). Portions of Hot Springs Canyon and Redfield Canyon, tributaries of the San

Pedro River, were designated as critical habitat, and would be crossed by one of the Project alternatives downstream from the critical habitat. Both streams are ephemeral at the point of crossing and downstream. The Spikedace does not occur within the New Mexico portion of the Project area of influence.

Speckled Dace

Status

The Speckled Dace (*Rhinichthys osculus*) is a BLM sensitive species and an SGCN in New Mexico and Arizona (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010).

Distribution

The Speckled Dace is native to all major western river drainages from the Columbia River south to the state of Sonora, Mexico (AZGFD 2002o). In Arizona, it is widespread but does not occur in the low desert. The New Mexico populations occur outside of the study area in the Gila River watershed and tributaries of the San Juan River (Lee et al. 1980; Sublette et al. 1990).

Habitat and Life History

The Speckled Dace is generally a bottom dweller, in rocky riffles, runs and pools of headwaters, creeks, and small to medium rivers (AZGFD 2002o; Sublette et al. 1990). These fish are usually in water less than 1.6 feet deep with moderate velocities around 1.3 feet per second, and they prefer elevations between 6,560 and 9,840 feet (AZGFD 2002o). Speckled dace are omnivorous, feeding primarily on benthic insects, other aquatic invertebrates, and on algae and detritus (Minckley 1973; Sublette et al. 1990). In years where summer rains are adequate, there may be two breeding periods for the species, in spring and late summer. Spawning in *Rhinichthys* spp. is usually by single pairs of fish (Minckley 1973).

Threats to the Survival of the Speckled Dace

This species is generally widespread and abundant, but it could be threatened by the presence of nonnative fish (AZGFD 2002e).

Potential for Occurrence in the Study Area

The species may be present in tributaries to the San Pedro River (AZGFD 2002o). A proposed Project alternative also crosses upper reaches of the Aravaipa Creek watershed, although the fish occurs only where permanent water begins approximately 8 miles downstream.

Loach Minnow

Status

The Loach Minnow (*Tiaroga cobitis*) was listed as threatened under the ESA on October 28, 1986 (USFWS 1986b), and a recovery plan was released in 1990 (USFWS 1990b). The Loach Minnow was petitioned to be relisted as endangered on two occasions, with a finding of

warranted-but-precluded in 1994 and 2006 (USFWS 2006d). Critical habitat was designated for the Loach Minnow together with the Spikedace in 2000, was revised following litigation, and a final critical habitat designation was published on March 21, 2007 (USFWS 2007g). A proposed revision of Loach Minnow critical habitat and a proposal to uplist the species to endangered was released in 2010 (USFWS 2010i). The final rule revising critical habitat and listing the Loach Minnow as endangered was published in 2012 (USFWS 2012c). The Loach Minnow is a State of New Mexico endangered species and SGCN (BISON-M 2008). The Loach Minnow is an AZGFD WSC and SGCN (AZGFD 2010a; 2006a).

Distribution

The Loach Minnow is endemic to the Gila River basin of New Mexico and Arizona, and was reported from the upper San Pedro River in Sonora, Mexico. Populations in the Verde and San Pedro rivers appear to be extirpated. Loach Minnows currently persist in the upper Salt River and smaller tributaries of the Gila River in Arizona, and the upper Gila River itself in New Mexico (Minckley and Marsh 2009).

Habitat and Life History

Loach Minnows are a benthic stream fish, found in mid-elevation tributaries of the Gila River from approximately 1,080 to 6,560 feet. Loach Minnows are strongly associated with riffles, preferring algae mats in upper riffles with coarse exposed sediments. Loach Minnows are invertebrate predators. Larval Diptera are an important food source, and are generally captured directly from the substrate rather than as dislodged invertebrates entrained in the stream flow. Loach Minnows also feed on mayflies, stoneflies, and caddisflies (Sublette et al. 1990).

Loach Minnows generally spawn in early to mid-spring although fall reproduction does occur, perhaps in response to summer flooding (Vives and Minckley 1990). The species appears to modify downstream-facing cavities under rocks to form nests. Adherent eggs are deposited on the surface of nest cavities, and are guarded by the male. The nests are located within the same riffle habitat preferred by adult fish. Loach Minnows mature within 1 year, and live 1 to 3 years.

Threats to the Survival of the Loach Minnow

Loss of Loach Minnows from major portions of its historic range, particularly in the lower, larger portions of the Gila River and major tributaries, was driven by multiple factors, some of which would have independently been sufficient to extirpate the species. Large portions of free-flowing rivers in the Gila River basin were hydrologically manipulated, leading either to drying of long stretches of stream flow or impoundment and formation of reservoirs. Dispersed activities within the Gila River Watershed such as grazing, logging, and mining may also negatively impact habitat quality for the species through increased erosion and sedimentation or contamination of streams with toxins (USFWS 1990b). The Loach Minnow is particularly sensitive to sedimentation due to its preference for exposed coarse gravel and cobble in riffles.

The introduction of nonnative fish, both large predatory game fish and smaller baitfish, can exclude Loach Minnows in most systems as well. Human-altered streams or reservoirs in particular support introduced fish to the exclusion of Loach Minnows, and physical degradation of stream habitat and bank side vegetation associated with livestock grazing may cause Loach

Minnow population decreases. Conversely, natural stream flow regimes with intermittent flow spikes (flash floods) tend to displace nonnative, non-stream-adapted fish but do not affect natives to the same degree (Meffe and Minckley 1987). Introduced crayfish directly degrade aquatic habitat used by Loach Minnows by consuming much of the invertebrate prey base and vegetation in streams, as well as altering the substrate (Fernandez and Rosen 1996).

Ongoing threats to remaining populations include groundwater drawdown in watersheds supporting the remaining reduced areas of stream habitat used by Loach Minnows, as well as further introductions or reintroductions of nonnative aquatic species in sites where management or natural processes may have removed them.

Potential for Occurrence in the Study Area

A proposed Project route passing through the north end of the Galiuro Mountains would cross Aravaipa Creek upstream from the designated Aravaipa Creek CHU. Multiple Project alternatives through the lower San Pedro River valley would also cross the river or pass very near to it upstream from the confluence of Aravaipa Creek and the San Pedro River. The San Pedro River is not designated as critical habitat for the Loach Minnow, but fish may disperse downstream from Aravaipa Creek and could occur below areas potentially affected by the Project. Portions of Hot Springs Canyon and Redfield Canyon, tributaries of the San Pedro River, were designated as critical habitat, and would be crossed by one of the Project alternatives downstream from the critical habitat. Both streams are ephemeral at the point of crossing. The Loach Minnow does not occur in the New Mexico portion of the study area.

<u>Desert Sucker</u>

Status

The Desert Sucker (*Catostomus clarki*) is a BLM sensitive species in Arizona and New Mexico, a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an SGCN in both Arizona and New Mexico (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; USFS 2007a). The Desert Sucker is a Pima County PVS (Pima County 2004).

Distribution

The Desert Sucker occurs in tributaries of the Lower Colorado River Basin below the Grand Canyon in eastern Nevada, southwest Utah, and Arizona, including the White River, Meadow Valley Wash, and Virgin River. It occurs in tributaries of the Bill Williams River, but is most abundant in the Gila River drainage in Arizona and western New Mexico (Lee et al. 1980; Minckley 1973). The New Mexico populations of the species are outside of the study area.

Habitat and Life History

The Desert Sucker occurs in small to moderately large streams with riffles and flowing pools (Lee et al. 1980; Sublette et al. 1990). Juveniles of this species normally feed on midge larvae, while the adults feed on periphyton by scraping the detritus, diatoms and algae from rocks (AZGFD 2002p; Minckley 1973; Sublette et al. 1990). Spawning in riffles normally occurs in late winter and early spring (Minckley 1973).

Threats to the Survival of the Desert Sucker

Primary threats to this species include construction of reservoirs and alteration of historic flow patterns (AZGFD 2002p).

Potential for Occurrence in the Study Area

A single Tier 1 PCA is designated for the Desert Sucker in Pima County, Arizona. This is along an upper reach of Cienega Creek, and is just upstream of the study area (Pima County 2004). The Desert Sucker may occur in the San Pedro River and its tributaries (AZGFD 2002p), and could occur in the Project area of influence where the transmission line crosses the San Pedro River. A proposed Project alternative also crosses upper reaches of the Aravaipa Creek watershed, although the fish occurs only where permanent water begins approximately 8 miles downstream. The New Mexico populations of the species are outside of the Project area of influence.

Sonora Sucker

Status

The Sonora Sucker (*Catostomus insignis*) is a BLM sensitive species in Arizona and New Mexico, a Forest Service sensitive species, a USFWS species of concern, a State of New Mexico sensitive species, and an SGCN in both Arizona and New Mexico (AZGFD 2010a; 2006a; BISON-M 2008; BLM 2010; USFS 2007a). The Sonora Sucker is also a Pima County PVS (Pima County 2004).

Distribution

The Sonora Sucker is found in the Bill Williams River and the Gila River drainage basin, and in northern Sonora, Mexico (AZGFD 2002q).

Habitat and Life History

This species is present in a variety of habitats from warm water rivers to trout streams, usually in gravelly or rocky pools or relatively deep, quiet water (AZGFD 2002q). The Sonora Sucker appears to be intolerant of lake or reservoir conditions (Minckley 1973). Juveniles of this species normally feed on midge larvae (Diptera: Chironomidae), crustaceans, and protozoans while the adults feed on detritus and by scraping diatoms and algae from rocks (AZGFD 2002q; Minckley 1973). Spawning may occur from January to early July (Minckley 1973).

Threats to the Survival of the Sonora Sucker

Primary threats to this species include construction of reservoirs and alteration of historic flow patterns (AZGFD 2002q).

Potential for Occurrence in the Study Area

A single Tier 1 PCA is designated for the Sonora Sucker in Pima County, Arizona. This is along an upper reach of Cienega Creek, and is just upstream of the study area (Pima County 2004). The

Sonora Sucker occurs in tributaries of the San Pedro River (Lee et al. 1980), and may occur within the Project area of influence if the transmission alignment crosses occupied drainages. A proposed Project alternative also crosses upper reaches of the Aravaipa Creek watershed, although the fish occurs only where permanent water begins approximately 8 miles downstream. The potential for occurrence of the species within the Project limits of influence is moderate.

Rio Grande Sucker

Status

The Rio Grande Sucker (*Catostomus plebeius*) is a Forest Service sensitive species, a USFWS species of concern and a State of New Mexico SGCN (BISON-M 2008; USFS 2007a).

Distribution

The Rio Grande Sucker is native to the Rio Grande watershed in southern Colorado, northern New Mexico, and six major drainages in northern Mexico. It also occurs in the Mimbres River north of Deming, New Mexico (BISON-M 2008).

Habitat and Life History

The Rio Grande Sucker occurs in tributaries of small to large streams with gravel or cobble bottoms relatively free of sediment, at elevations ranging from approximately 5,500 to 9,500 feet. They sometimes inhabit pools at the base of riffle runs, and side channels and backwaters close to the main channel. The Rio Grande Sucker is a benthic omnivore adapted to scraping streambed gravels for periphyton (algae, aquatic macroinvertebrates, and other nutrients) (BISON-M 2008; Sublette et al. 1990). The species spawns over gravels between early spring and early summer, often during peak spring runoff, but conditions vary locally with stream size, flow regime, and water temperature. A second spawning may occur in the fall (BISON-M 2008).

Threats to the Survival of the Rio Grande Sucker

Threats to the Rio Grande Sucker include activities that affect water quality, particularly pollution and sedimentation from livestock overgrazing, logging, road construction, and improper OHV use (BISON-M 2008).

Potential for Occurrence in the Study Area

The Rio Grande Sucker occurs in segments of the Rio Grande within the Project area of influence, including Bosque del Apache NWR. Permanent water in the Mimbres River is restricted to Grant County, approximately 27 miles upstream from the nearest Project alternative. Fish of the Mimbres River population are likely to occur within the Project area only during large floods, but could not persist in the absence of perennial flow (BISON-M 2008).

Blue Catfish

Status

The Blue Catfish (*Ictalurus furcatus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Blue Catfish is native to the Mississippi, Missouri, and Ohio River watersheds of the central and southern United States, south to northern Guatemala (Lee et al. 1980; Whiteside et al. 2009). The species does not occur naturally in Arizona, but is raised commercially in the state for stocking of urban fisheries (Minckley and Marsh 2009). The Blue Catfish is recorded in New Mexico from the Rio Grande downstream of Bernalillo County and on the Pecos River downstream of Puerto de Luna (Sublette et al. 1990). Remains of the species dating to the late 17th Century indicate that the species occurred as far north as Santa Fe, New Mexico at that time (Sublette et al. 1990).

Habitat and Life History

The Blue Catfish typically inhabits swift, turbid waters of larger rivers, but does well in open waters of large reservoirs and ponds (Sublette et al. 1990; Whiteside et al. 2009). Spawning occurs in pools and backwaters during late spring and early summer (Sublette et al. 1990). The Blue Catfish is primarily carnivorous, with larger individuals preying on fish, and occasionally frogs, and juveniles consuming primarily aquatic invertebrates (Whiteside et al. 2009). The species is a nocturnal bottom-feeding scavenger (Sublette et al. 1990).

Threats to the Survival of the Blue Catfish

Potential impacts to the Blue Catfish are likely primarily from chemicals from urban and agricultural runoff. Chemicals that have been demonstrated to impact the species include toxaphene, chlordane, zinc, and planar PCBs (Eisler et al. 1985-1996).

Potential for Occurrence in the Study Area

The Blue Catfish is known to occur at either location where the Project would cross the Rio Grande.

Desert Pupfish

Status

The Desert Pupfish (*Cyprinodon macularius*) is listed as endangered under the ESA, is an AZGFD WSC and SGCN, and is a Pima County PVS (AZGFD 2010a; 2006a; Pima County 2004).

Distribution

There are no native populations of the Desert Pupfish remaining in Arizona. Extant native populations remain only in Southern California, where three populations persist in the Salton Sea and its tributaries and in connected agricultural waters, at several locations on the Colorado River delta in Sonora, Mexico, and in northern Baja California, Mexico (Minckley and Marsh 2009; USFWS 2010j). There are numerous, mostly small populations of mixed genetic stock in private ponds and aquaria in Southern California, Arizona, and New Mexico (AZGFD 2001n; USFWS 2010j).

Habitat and Life History

The Desert Pupfish inhabits shallow waters of desert springs, small streams, and marshes. The species is tolerant of high water salinity and high water temperatures associated with thermal springs. The fish live 1 to 2 years. Habitats usually have clear waters and soft substrates.

Pupfish are essentially omnivorous, consuming algae, detritus, and taking invertebrates (Minckley and Marsh 2009; USFWS 2010j).

Threats to the Survival of the Desert Pupfish

Impacts to aquatic habitats and the introduction of nonnative fishes have had the greatest impacts on the species (Minckley and Marsh 2009).

Potential for Occurrence in the Study Area

The species is present within the study area primarily as small, captive populations of various genetic stocks. Reintroductions have occurred at several localities in Arizona, including the Aravaipa Creek watershed and the Muleshoe Ranch Preserve north of Willcox, Arizona (The Nature Conservancy 2011; USFWS 2005e). Pupfish have also been translocated to the Turkey Creek watershed, which is crossed at its uppermost boundary by a proposed Project alternative.

<u>Gila Topminnow</u>

Status

The Gila Topminnow (*Poeciliopsis occidentalis*) is listed as endangered under the ESA, is a State of New Mexico endangered species, an SGCN in Arizona and New Mexico, an AZGFD WSC, and a Pima County PVS (AZGFD 2010a; 2006a; BISON-M 2008; Pima County 2004).

Distribution

Historically, the species inhabited nearly all waters in the Gila River Basin below 5,000 feet elevation (Desert Fishes Team 2006). Naturally occurring extant populations of the Gila Topminnow remain only in isolated segments of streams in the southern portions of the Gila basin in Arizona and northern Sonora, Mexico. There have been many translocations of the species in Arizona, including into the Aravaipa Creek watershed (AZGFD 2001o; Minckley and Marsh 2009; USFWS 2005e).

Habitat and Life History

The Gila Topminnow inhabits low to mid-elevation streams with slow, shallow waters and small pools. The species historically co-occurred with the Desert Pupfish over much of its range. Gila Topminnows are omnivorous, feeding primarily on detritus, but also consuming algae and invertebrates (Minckley and Marsh 2009).

Threats to the Survival of the Gila Topminnow

Threats to the species include habitat degradation and loss from overgrazing and agricultural development, changes in hydrology of occupied waters, and particularly the introduction of nonnative fish species (Minckley and Marsh 2009).

Potential for Occurrence in the Study Area

Within the study area, Gila Topminnows occur in the Aravaipa Creek watershed and in Cienega Creek, the upper reaches of which is designated a Tier 1 PCA in the Sonoran Desert Conservation Plan (Pima County 2004).

1.8.1.6 Invertebrates

<u>Florida Mountainsnail</u>

Status

The Florida mountainsnail (*Oreohelix florida*) is a New Mexico endangered species and a USFWS species of concern (BISON-M 2008).

Distribution

This species was originally described based on recent shells from the Florida Mountains south of Deming, New Mexico. Fossil shells of the species are recorded from the Cooke's Range, Tres Hermanas and Santa Rita mountains, and the Apache Hills. The species is possibly extinct (BISON-M 2008).

Habitat and Life History

Natural history of the species is unknown, as no live specimens have been recovered, but is presumed to be similar to other *Oreohelix* species, which are herbivorous, feeding on live, decaying, and dead plant materials (Metcalf and Smartt 1997).

Threats to the Survival of the Florida Mountainsnail

While the species is thought to be extinct; potential threats to remaining populations include prescribed burns, logging and mining, with natural threats including climate change, fire, and movement of talus (NMDGF 2006).

Potential for Occurrence in the Study Area

The Florida mountainsnail is presumed to be a middle to high-elevation species. Within its historic range, proposed Project alignments are unlikely to cross areas that support this species.

Socorro Mountainsnail

Status

The Socorro mountainsnail (*Oreohelix neomexicana*) is a State of New Mexico sensitive species and SGCN (BISON-M 2008).

Distribution

The Socorro mountainsnail occurs as disjunct populations in the central mountains of New Mexico from Mesa de los Viejos in Rio Arriba County south to the Sacramento Mountains east of Alamogordo (Metcalf and Smartt 1997).

Habitat and Life History

The Socorro mountainsnail occurs from foothills to higher elevations in a variety of situations, but all contain the basic habitat elements necessary for the species, including vegetation, cover and moisture. The species occurs from lush, forested canyons to apparently arid bedrock exposures, as at Sandia Crest and the west slope of the Oscura Mountains. However, even the more desolate-appearing habitats typically have moisture retained in bedrock crevices, beneath larger rocks or in talus. The species has been found under sparse stones among rich leaf litter. In some situations the cover available would seem minimal (Metcalf and Smartt 1997). Species of *Oreohelix* feed on fungi, decaying vegetation, and young green plant shoots seasonally (Hoffman 1990). The genus *Oreohelix* is live-bearing (Bequaert and Miller 1973; Metcalf and Smartt 1997).

Threats to the Survival of the Socorro Mountainsnail

Most sites where the Socorro mountainsnail occurs are in remote, rugged terrain and there are few threats to the species. Habitat loss could result from road building, and linear utility developments. Warming resulting from climate change could dry habitats at lower elevations, forcing populations upward in elevation. Populations in low mountain ranges would be unable to disperse to higher elevations, and could be extirpated.

Potential for Occurrence in the Study Area

The only area within the study area where this species has potential to occur is the north end of the Oscuro Mountains south of Bingham, New Mexico. The potential for the Socorro Mountain Snail occurring within the Project area of influence is very low.

Ovate Vertigo Snail

Status

The ovate vertigo snail (*Vertigo ovata*) is a USFWS species of concern and a State of New Mexico SGCN (BISON-M 2008).

Distribution

The ovate vertigo snail is widespread in North America, from Alaska and Canada south to California and Florida. However, distribution of the species in the southwestern United States is widely disjunct, with only 6 records from Arizona. The only record from New Mexico is from Blue Springs near Carlsbad. However, the species may occur in suitable habitat elsewhere in the state (Metcalf and Smart 1997).

Habitat and Life History

The ovate vertigo snail inhabits saturated soils associated with springs (Metcalf and Smartt 1997). The disjunct populations of the ovate vertigo snail in the southwestern United States apparently represent relictual populations of the species that persisted following desertification of the region (Metcalf and Smartt 1997).

Threats to the Survival of the Ovate Vertigo Snail

Threats to the ovate vertigo snail include groundwater withdrawal from excessive pumping, overgrazing and any other human activities resulting in degradation or loss of spring habitats (NMDGF 2008).

Potential for Occurrence in the Study Area

Due to the very limited distribution of this species in Arizona and New Mexico, the potential for the species occurring within the Project area of influence is very low.

Succineid Snails

Status

All snails in the family Succineidae are considered sensitive species by the Arizona BLM (BLM 2010).

Distribution

Succineid snails are worldwide in their distribution, and three genera occur in the Southwest: *Succinea*, *Catinella* and *Oxyloma* (Metcalf and Smartt 1997; Pilsbry 1948). As documented by abundant fossil materials, these snails were much more common in the region prior to aridification that occurred 10,000 to 12,000 years before present. Most records of succineids from Arizona and New Mexico are fossil records from the Late Pleistocene (Bequaert and Miller 1973; Metcalf and Smartt 1997).

Habitat and Life History

Succineid snails are small, ovate-shaped snails with thin shells (Pilsbry 1948). They are air-breathing land snails that are associated with vegetation in a variety of wet habitats including springs, streams and rivers and their floodplains, wet meadows, and along irrigation canals (Meretsky et al. 2002). More xeric-tolerant species do exist, some associated with alkaline or saline waters, but most species occur in wetter situations (Pilsbry 1948).

Threats to the Survival of Succineid Snails

Threats to these snails primarily include degradation or loss of habitat. Water drawdown may affect springs and other aquatic habitats supporting the snails. Pesticides from agricultural runoff can adversely affect water quality. Trampling of aquatic habitats by livestock can affect habitat and water quality.

Potential for Occurrence in the Study Area

Succineid snails have a wide distribution, but individual species may be endemic to single springs or other habitats. There are few species of these snails in the Southwest, and their ecology, taxonomy and distribution are poorly known (Metcalf and Smartt 1997). There is a low potential for these snails occurring within the study area.

Hydrobiid Snails

Status

All hydrobiid springsnails in the genus *Pyrgulopsis* are Arizona BLM sensitive species (BLM 2010).

Distribution

The bulk of the available information on the genus *Pyrgulopsis* in Arizona is based on the original work of Hershler and Landye (Hershler 1994; Hershler and Landye 1988), in which they identified 12 species of these snails widely distributed within the state. Species are known at springs along the Black, Verde, Gila and Virgin rivers, and at isolated springs in west-central Arizona and the mountains of the southeastern portion of the state.

Habitat and Life History

Hydrobiid snails inhabit spring-fed pools, streams, and cienegas, and occur over a wide elevation range wherever springs provide suitable habitat (Hershler and Landye 1988). *Pyrgulopsis* feed on periphyton and detritus (Brown et al. 2008; Thorp and Covich 2001).

Threats to the Survival of Hydrobiid Snails

Spring and outfall habitats occupied by these species are often small and susceptible to a variety of impacts including trampling by livestock, unregulated use of OHVs, groundwater pumping or

surface diversion that may affect water levels, and introduction of exotic animals such as nonnative fish, crayfish and gastropods (Brown et al. 2008).

Potential for Occurrence in the Study Area

Several species of springsnails occur within the study area at several locations on the Gila River downstream of Safford, Arizona. Other species may be present within the study area at springs in mountain ranges in southern Arizona, but most Project alignments will not pass through montane habitat with springs likely to support these species.

Socorro Springsnail

Status

The Socorro Springsnail (*Pyrgulopsis neomexicana*) was listed as endangered without designated critical habitat under the ESA on September 30, 1991 (USFWS 1991). A draft recovery plan for the species was prepared in 1993 and finalized in 1994 (USFWS 1994e). A 5-year review of the species was completed in 2008 (USFWS 2008h). The Socorro Springsnail is a State of New Mexico endangered species and SGCN (BISON-M 2008).

Distribution

The Socorro Springsnail is apparently extinct (as of 1987) at its type locality at Willow Spring, a thermal spring about 18 miles south-southwest of Socorro, New Mexico. It also apparently no longer occurs at the springs about 3 miles southwest of Socorro where the species was originally sampled (Taylor 1987). The species apparently survives only at Torreon Spring, about 15 miles southwest of Socorro in the foothills of the southeast flank of the Magdalena Mountains. While the springsnails at Torreon Spring appear to be *P. neomexicana*, their identity remains uncertain due to a lack of comparative specimens (Taylor 1987).

Habitat and Life History

Hydrobiid snails (including *Pyrgulopsis* spp.) are a large and diverse group of snails that inhabit freshwater, brackish, and marine environments (Thorp and Covich 2001). In the Southwest, species of *Pyrgulopsis* are often endemic to a few or single spring localities, making them highly susceptible to extinction due to habitat alteration or loss. The original Willow Springs habitat is probably representative of typical habitat for the species; with multiple sources of thermal waters emerging among pebbles and cobbles with sand, mud and aquatic plants (Taylor 1987). Hydrobiid snails require flowing water as a key element of their habitat, and occur in such habitats on stones, pieces of dead wood, and on vegetation.

Threats to the Survival of the Socorro Springsnail

Because the Torreon Spring complex may represent the sole remaining viable population of the Socorro Springsnail, the species it is highly vulnerable to extinction. Torreon Spring is privately-owned, and no access has been granted since 1994 (USFWS 2008h). Current status of the population is unknown, but threats are assumed to be similar to those cited in the listing rule. Alteration or loss of habitat could result in severe impacts or removal of the population. Erosion

caused by grazing could affect water quality and flow parameters of the springs. A drop in the local water table from extraction for agriculture or other uses could result in reduction or cessation of spring flow and has already resulted in loss of springsnail habitat and populations (USFWS 1994e). Development of the springs could permanently alter the spring habitat, possibly removing key habitat elements necessary for species survival.

Potential for Occurrence in the Study Area

Link A161b passes within 500 feet of Torreon Spring, the only known site where the species occurs. The transmission line may pass over the downstream portion of the outfall of Torreon Spring. Since the species was originally known from other springs in the Socorro area, there is a small possibility that the species may exist undiscovered at nearby springs.

Talussnails

Status

All talussnails in the genus *Sonorella* are included on the Pima County PVS list (Pima County 2004). Additionally, the Center for Biological Diversity has recently petitioned the USFWS to review two *Sonorella* species, the Rosemont and Sonoran talussnails (*S. rosemontensis* and *S. magdalenensis*), for listing as threatened or endangered species under the ESA (CBD 2010).

Distribution

Species of *Sonorella* occur within the Madrean Archipelago and adjacent regions. More specifically, they occur throughout most of the higher elevations in Arizona, southwest New Mexico, far west Texas, and north-central Mexico (Bequaert and Miller 1973).

Habitat and Life History

Most species of *Sonorella* are colored pinkish-buff, and have shoulder bands that are medium to dark brown. They inhabit talus, bedrock crevices, boulder piles, and cave entrances, generally on north-facing slopes of hills or rocky canyons. Many species are only known from limestone substrates. Their range is typically limited to small areas, and their mobility is considered highly limited. Their ecology is poorly known, but they are probably primarily detrital feeders (Pima County 2004).

Threats to the Survival of Talussnails

Threats to talussnails are primarily limited to habitat degradation or loss.

Potential for Occurrence in the Study Area

Populations of *Sonorella* are known to occur within the study area. The Pima County SDCP identifies 54 current or historic locations for these snails within Pima County, several of which are within the limits of the study area. No PCAs are designated for any *Sonorella* species (Pima County 2004).

Moore's Fairy Shrimp

Status

Moore's fairy shrimp (*Streptocephalus moorei*) is a State of New Mexico sensitive species and SGCN (BISON-M 2008).

Distribution

Moore's fairy shrimp was originally known only from southeastern Chihuahua, Mexico, but has been found at four sites in the United States since 2005. The species occurs at two earthen livestock tanks near Columbus in Luna County, Cedar Lake Playa in Sierra County, at a natural depression in a roadside playa in Doña Ana County, and at Isaack Lake in Doña Ana County (BISON-M 2008; Maeda-Martinez et al. 2005).

Habitat and Life History

Fairy shrimps (Branchiopod crustaceans of the Order Anostraca) are small, elongated animals that have eleven pairs of swimming legs and stalked eyes (Borror et al. 1989). Most species are freshwater inhabitants of temporary pools in arid regions that normally do not support fish, which are significant predators of these species (Thorp and Covich 2001). Many species are tolerant of waters with high salinity, low oxygen levels, and high temperatures (Thorp and Covich 2001). The resting eggs of fairy shrimp can enter diapauses and remain viable in the soil for many years, awaiting suitable conditions for hatching and completion of their life cycle. Fairy shrimp are moved between locations by their eggs being ingested and subsequently excreted by waterfowl. Fairy shrimp are filter-feeders on algae and smaller animals, and swim and feed in an inverted orientation (Thorp and Covich 2001).

Threats to the Survival of the Moore's Fairy Shrimp

Because of their often small range, and the typically small and temporary nature of their habitat, fairy shrimp are particularly vulnerable to modifications or loss of habitat. Fouling of waters by livestock or pesticides can have significant adverse effects on aquatic invertebrates in general, and this is particularly true for the small volume of water often present in habitats that support fairy shrimp.

Potential for Occurrence in the Study Area

There are no records of the species within the study area, but considering the known range of the species in the Rio Grande Valley, and that there is potentially suitable habitat present at earthen livestock tanks, there is still some potential for occurrence of the species in the Project area.

Bowman's Fairy Shrimp

Status

Bowman's fairy shrimp (*Streptocephalus thomasbowmani*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Bowman's fairy shrimp is known only from the Lordsburg Playa, about 10 miles west of Lordsburg, New Mexico, within which it is known from no more than five locations (Maeda-Martinez et al. 2005). This area is within the BLM-Lordsburg Playa Special Management Area and Natural Resource Area (U.S. Army Corps of Engineers 2007).

Habitat and Life History

Fairy shrimp (*Streptocephalus* spp.) inhabit ephemeral pools of interior draining valleys. They are filter feeders on algae, diatoms, bacteria, and small aquatic invertebrates. Many species of fairy shrimps are tolerant of high water salinity and low oxygen contents (Thorp and Covich 2001).

Threats to the Survival of the Bowman's Fairy Shrimp

Potential threats to the species include habitat degradation or loss, climate variability that may affect hydroperiod, and contamination of waters (NMDGF 2008).

Potential for Occurrence in the Study Area

Bowman's fairy shrimp is present at the Lordsburg Playa. Link B150a would cross the Lordsburg Playa.

<u>Lynch Tadpole Shrimp</u>

Status

The Lynch tadpole shrimp (*Lepidurus lemmoni*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Lynch tadpole shrimp is recorded from scattered locales between Alberta and Saskatchewan, Canada south to Baja California, Mexico, including Arizona, California, Nevada, Washington, Montana and Wyoming (Lynch 1966; Rogers 2001). The only Arizona record is from near Springerville, and the sole record of the species in New Mexico is at the BLM-managed Lordsburg Playa Special Management Area and Natural Resource Area (U.S. Army Corps of Engineers 2007).

Habitat and Life History

The Lynch tadpole shrimp inhabits temporary pools and alkaline playas of interior draining valleys.

Threats to the Survival of the Lynch Tadpole Shrimp

Potential threats to the species include habitat degradation or loss, climate variability that may affect hydroperiod, and contamination of waters (NMDGF 2008).

Potential for Occurrence in the Study Area

The Lynch tadpole shrimp is present at the Lordsburg Playa. Project Link B150a would cross the Lordsburg Playa

Slate Millipede

Status

The slate millipede (*Comanchelus chihuanus*) is a New Mexico BLM sensitive species, a USFWS species of concern, and a State of New Mexico SGCN (BISON-M 2008; NMDGF 2006).

Distribution

The species is currently known from several locations in New Mexico, including Petroglyph National Monument near Albuquerque, at Tome Hill in Valencia County, at Picacho Peak northwest of Las Cruces, and from locations in southeastern Arizona, including Sabino Canyon in the Santa Catalina Mountains, and from west Texas, and Chihuahua, Mexico (Medrano 2009). However, modeled habitat compiled from merging vegetation and soil types at the known localities shows that there are several additional areas of potential habitat for the species in New Mexico (Slate Millipede Project 2002).

Habitat and Life History

Most millipede species are scavengers, and will feed on almost any dead plant or animal materials. Other species attack live plants, and may be of agricultural importance in greenhouse settings. Fewer species are predaceous (Borror et al. 1989). Millipedes lay their eggs in summer, usually in damp places, and some species construct earthen cells to hold the eggs. Hatchlings have only three pairs of legs, and additional pairs are added with each molt (Borror et al. 1989).

Threats to the Survival of the Slate Millipede

Threats to the survival of the Slate Millipede are probably primarily from habitat alteration or loss.

Potential for Occurrence in the Study Area

Portions of the study area are within the known range of the slate millipede, and suitable habitat is widespread.

Bleached Skimmer Dragonfly

Status

The bleached skimmer dragonfly (*Libellula composita*) is a Forest Service sensitive species (USFS 2007a).

Distribution

The species occurs in scattered localities in the arid Great Basin from Oregon to New Mexico and in Kansas and Texas (AZGFD 2002r). The species is recorded from four counties in the Project area including Cochise and Graham counties in Arizona and Sierra and Socorro counties in New Mexico (Abbott 2007).

Habitat and Life History

The bleached skimmer dragonfly is associated with springs, ponds and streams in open, arid country where the nymphs develop among bottom sediments and feed on invertebrates. Adults may forage in the vicinity of the aquatic habitat but also range over adjacent upland habitats (AZGFD 2002r).

Threats to the Survival of the Bleached Skimmer Dragonfly

Threats to this dragonfly include trampling of habitat and over-grazing of emergent vegetation by livestock (AZGFD 2002r) and possibly predation by fish or competition with other dragonflies (USFS 2007a).

Potential for Occurrence in the Study Area

Considering the wide distribution of this species in the Project area there is some potential for it to occur at various aquatic sites.

<u>Grasshopper 1</u>

Status

Aeoloplides rotundipennis is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Aeoloplides rotundipennis occurs only in New Mexico, where it has been recorded from Bernalillo, Sandoval, Otero, Socorro, Sierra, and Valencia Counties (USDA 2010a).

Habitat and Life History

Aeoloplides rotundipennis is a member of the short-horned grasshopper family Acrididae. Acridid grasshoppers are plant feeders. Most acridid grasshoppers lay their eggs in the ground and the species overwinter in this stage (Borror et al. 1989). Other species of *Aeoloplides* are known to feed on members of plant family Chenopodiaceae, including species of saltbush (*Atriplex* spp.) and Russian thistle (*Salsola* spp.) (Alexander and Hilliard 1969; Otte and Joern 1976). Species of *Aeoloplides* are adapted as foliage mimics, which likely provides some level of protection from predators (Otte and Joern 1976).

Threats to the Survival of Aeoloplides rotundipennis

The principle threat to this species is habitat degradation or loss. Agricultural developments have been cited as a potential impact (NMDGF 2008).

Potential for Occurrence in the Study Area

There is a moderate potential for *Aeoloplides rotundipennis* to occur within the Project area of influence in grassland habitats.

Hebard's Blue-Winged Desert Grasshopper

Status

Hebard's blue-winged desert grasshopper (*Anconia hebardi*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The distribution of the Hebard's blue-winged desert grasshopper extends from southern New Mexico and west Texas south to central Mexico. It is recorded in New Mexico only from Otero County (USDA 2010b).

Habitat and Life History

Hebard's blue-winged desert grasshopper is a member of the short-horned grasshopper family Acrididae. Acridid grasshoppers are plant feeders. Most acridid grasshoppers lay their eggs in the ground and the species overwinter in this stage (Borror et al. 1989). The species lives on alkaline flats and playas where it likely feeds on plants in the family Chenopodiaceae. It is a rare species that is not of economic importance (USDA 2010b).

Threats to the Survival of Hebard's Blue-Winged Desert Grasshopper

The principle threat to this species is habitat degradation or loss.

Potential for Occurrence in the Study Area

There is a moderate potential for Hebard's blue-winged desert grasshopper occurring within the Project area of influence in areas where the Project crosses playa habitats.

Grasshopper 3

Status

Melanoplus magdalenae is a State of New Mexico SGCN (BISON-M 2008).

Distribution

In New Mexico, *Melanoplus magdalenae* has been recorded only from Socorro County (USDA 2010c).

Habitat and Life History

Melanoplus magdalenae is a member of the short-horned grasshopper family Acrididae. Acridid grasshoppers are herbivorous. Most acridid grasshoppers lay their eggs in the ground and overwinter in this stage (Borror et al. 1989). *Melanoplus magdalenae* is a high-elevation species, about which little is known (USDA 2010c).

Threats to the Survival of Melanoplus magdalenae

The principle threat to this species is habitat degradation from poor grazing practices (NMDFG 2008).

Potential for Occurrence in the Study Area

This is a montane species, and there is a very low potential for it occurring within the Project area of influence.

Shotwell's Range Grasshopper

Status

Shotwell's range grasshopper (*Shotwellia isleta*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Shotwell's range grasshopper is known from three localities in New Mexico, in Bernalillo, Cibola, and Doña Ana counties, and from the states of Durango and Zacatecas, Mexico. Populations of the species appear to be localized and disjunct (USDA 2010d).

Habitat and Life History

Shotwell's range grasshopper is a member of the short-horned grasshopper family Acrididae. Acridid grasshoppers are herbivorous. Most acridid grasshoppers lay their eggs in the ground and the species overwinter in this stage (Borror et al. 1989). The species inhabits non-saline playa lakes (USDA 2010d).

Threats to the Survival of Shotwell's Range Grasshopper

The principle recognized threat to Shotwell's range grasshopper is habitat degradation from poor grazing practices; particularly at earthen stock tanks (NMDGF 2008).

Potential for Occurrence in the Study Area

The potential for *Shotwellia isleta* occurring within the Project area of influence is low.

Grasshopper 4

Status

Trimerotropis salina is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Trimerotropis salina has a rather wide range from Oregon and California southeast to Nebraska and Texas. It is recorded from Bernalillo, Chaves, Cibola, Eddy, Otero, Roosevelt, Sandoval, and Torrance Counties in New Mexico (USDA 2010e).

Habitat and Life History

Trimerotropis salina is a member of the short-horned grasshopper family Acrididae. Acridid grasshoppers are herbivorous. Most acridid grasshoppers lay their eggs in the ground and the species overwinter in this stage (Borror et al. 1989). The species occurs on salt flats, alkaline drainages, and seeps, where it is typically associated with saltgrass species (*Distichlis* ssp.) (USDA 2010e).

Threats to the Survival of Trimerotropis salina

The principal threat to this species is habitat degradation or loss.

Potential for Occurrence in the Study Area

The potential for *Trimerotropis salina* occurring within the Project area of influence is high.

Maricopa Tiger Beetle

Status

The Maricopa tiger beetle (*Cicindela oregona maricopa*) is a USFWS species of concern (AZGFD 2010a).

Distribution

The range of the Maricopa tiger beetle is from southeast Nevada generally southeast in a broad band of habitat-limited populations to southwestern Chaves County in New Mexico (Pearson and Wismann 1995).

Habitat and Life History

Habitat for the Maricopa tiger beetle consists of open sand or mud flats and stone terraces along streams as well as near temporary and permanent ponds and occasionally in open soil some

distance from water. It is not found in areas with dense low vegetation or along stream banks that consist mostly of cobbles. It is found in riparian areas from upper Sonoran desertscrub to grassland and juniper-chaparral at elevations from 1,092 to 6,880 feet (Pearson and Wismann 1995). Tiger beetles of the genus *Cicindela* are strong fliers and aggressive predators and will take a variety of insect prey. Breeding habitat is restricted to moist sand and clay substrates, usually near riparian areas. Females insert individual eggs several millimeters deep in the soil. Once the larvae emerge from the eggs, they make burrows in the soil. Larvae are active from February to November, depending on elevation (Pearson and Wismann 1995).

Threats to the Survival of the Maricopa Tiger Beetle

Principle threats to the species include trampling of riparian habitat by livestock, irresponsible OHV use, sand and gravel operations, and damming of waters, which affects habitat by altering flow regimes and reducing sediment deposition (AZGFD 2001p).

Potential for Occurrence in the Study Area

Records of the species in the Project vicinity include the Gila River at Safford, Aravaipa Canyon, and the San Pedro River north of Dudleyville, Arizona (Pearson and Wismann 1995). All of these locations are outside of the Project area of influence. The species is likely to still occur at these localities, and it could potentially occur within the study area on the San Pedro River in the northern portion of the study area. There are unlikely to be any other locations within the Project area that contain suitable habitat for this species. The potential for occurrence within the Project area of influence is very low.

Desert Viceroy Butterfly

Status

The desert viceroy butterfly (*Limenitis archippus obsoleta*) is a USFWS species of concern and a State of New Mexico SGCN (BISON-M 2008).

Distribution

The desert viceroy butterfly occurs through much of southern Arizona and New Mexico along riparian habitats that traverse low-elevation desert habitats.

Habitat and Life History

The desert viceroy butterfly is primarily a species of riparian corridors where poplars (*Populus* spp.) and willows (*Salix* spp.) provide food for their larvae. It also occurs in open areas adjacent to these habitats (BISON-M 2008; Opler et al. 2010a; Stewart et al. 2001). Early in the year when there are few flowers available, the adults feed on the honeydew exudations of aphids, on carrion, dung, and decaying fungi. Later in the year they prefer flowers of the Compositae (Opler et al. 2010a).

Threats to the Survival of the Desert Viceroy Butterfly

The primary threats to the species are from developments, water impoundments, and invasive saltcedar (*Tamarix ramosissima*), which replaces native vegetation the species depends upon (Opler et al. 2010a).

Potential for Occurrence in the Study Area

The species is likely to occur along many reaches of the Rio Grande in New Mexico where cottonwood and willow provide larval food resources. The species is also likely in the vicinity of Aravaipa Canyon and some segments of the San Pedro River in Arizona.

Southwestern Oak Hairstreak

Status

The southwestern oak hairstreak (*Satyrium* [*Fixsenia*] *favonius ilavia*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The bulk of the distribution of this species is in Arizona, where it occurs in scrub oak habitat over much of the state, except the low deserts and northeast plains, where there is little or no suitable habitat. In New Mexico, it is recorded only from Grant County (Opler et al. 2010b).

Habitat and Life History

The species primarily occurs in oak woodlands, but may occur in habitats that contain juniper or cacti. The larvae feed on leaves, buds, and male flowers of scrub oak (*Quercus turbinella*) and the adults obtain nectar from flowers (Opler et al. 2010b; Stewart et al. 2001).

Threats to the Survival of the Southwestern Oak Hairstreak

Threats to the survival of this species primarily result from impacts to or loss of scrub oak habitat.

Potential for Occurrence in the Study Area

The study area includes a very small area of potentially suitable habitat for the species in the Big Burro Mountains northeast of Lordsburg, New Mexico, but Project alignments are at elevations below scrub oak habitat.

Sandia Hairstreak Butterfly

Status

The Sandia hairstreak butterfly (*Callophrys* [*Sandia*] *mcfarlandi*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The bulk of the range of the Sandia hairstreak is in New Mexico and north-central Mexico (Opler et al. 2010c). The species tends to be narrowly distributed (Opler et al. 2010c), and is probably primarily limited by larval food plant distribution, which is discontinuous within the sky island mountain ranges of the southwest. However, Sandia hairstreaks can be very abundant locally (Holland 1974).

Habitat and Life History

The Sandia hairstreak inhabits yucca–agave desert habitats between about 3,000 and 6,000 feet elevation that support species of beargrass (*Nolina* spp.). Larvae of the Sandia hairstreak feed on the flowers and fruits of beargrass, and adults obtain nectar from the flowers of the plants (Opler et al. 2010c).

Threats to the Survival of the Sandia Hairstreak Butterfly

Threats to the species are primarily associated with habitat impacts or loss. Vegetation clearing could remove food plants and may allow colonization by invasive weed species. Nonnative weeds may compete with native plants for resources and may also affect the local fire regime.

Potential for Occurrence in the Study Area

The Sandia hairstreak is recorded from several counties through which proposed Project alignments would pass, some of the alternatives would pass through areas of suitable habitat, and potential for occurrence of the species in the study area is high.

<u>Xami Hairstreak Butterfly</u>

Status

The Xami hairstreak butterfly (*Callophrys* [*Xamia*] *xami*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Xami hairstreak ranges from Guatemala through central Mexico north to Arizona, New Mexico, and central Texas (Opler et al. 2010d). The species is recorded in New Mexico only from Grant County (Opler et al. 2010d).

Habitat and Life History

The species frequents rocky canyons and shaded cliffs that support host plants, succulent species of the stonecrop family Crassulaceae (*Sedum* spp. and *Graptopetalum* (*Escheveria*) spp.) (Opler et al. 2010d). Eggs are laid singly on the underside of plant leaves, and the larvae feed on the leaves. Adults frequent flowers to obtain nectar (Opler et al. 2010d).

Threats to the Survival of the Xami Hairstreak Butterfly

Threats to the species are primarily associated with habitat impacts or loss associated with vegetation removal or other ground-disturbing activities that could affect larval host plants.

Potential for Occurrence in the Study Area

Potential for the species occurring in the study area is low. Project alternatives are unlikely to impact areas that support larval food plants.

Spalding's Blue Butterfly

Status

Spalding's blue butterfly (*Euphilotes spaldingi*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The range of Spalding's blue butterfly is limited to the south-central Rocky Mountains, including northwestern New Mexico, and includes records of the species only for Socorro and Torrance counties within the study area (Opler et al. 2010e).

Habitat and Life History

Spalding's blue butterfly inhabits piñon-juniper habitat where the larval host plant (redroot buckwheat, *Eriogonum racemosum*) occurs. Adults forage for nectar at flowers, including other buckwheat species (Opler et al. 2010e).

Threats to the Survival of Spalding's Blue Butterfly

Threats to the species are primarily associated with habitat impacts or loss associated with vegetation removal or other ground-disturbing activities that could affect larval host plants.

Potential for Occurrence in the Study Area

Spalding's blue butterfly may occur in piñon-juniper woodland and savannah on Chupadera Mesa and in the vicinity of the proposed SunZia East Substation.

Boisduval's Blue Butterfly

Status

Boisduval's blue butterfly (*Plebejus* (*Icaricia*) *icarioides* is an SGCN in Arizona (AZGFD 2006a).

Distribution

Boisduval's blue butterfly ranges over much of the United States west of the Great Plains (Opler et al. 2010p).

Habitat and Life History

The species ranges over a wide variety of habitats wherever suitable larval food plants (*Lupinus* spp.) area present. Larvae feed on leaves, flowers and seeds of the host plants. The larvae receive some level of protection from predators from ants that are attracted to sugary exudates that the larvae produce. Adults obtain nectar from a variety of flowers (Opler et al. 2010p; Steward et al. 2001). The adults are on the wing in Arizona between mid-June and mid-August depending on habitat (Steward et al. 2001)

Threats to the Survival of Boisduval's Blue Butterfly

Threats to the species include habitat loss from human development and habitat degradation from invasion by non-native invasive plant species.

Potential for Occurrence in the Study Area

There is a moderate potential for the species occurring within the study corridor.

<u>Buchholz's Blue Butterfly</u>

Status

Buchholz's blue butterfly (*Plebejus* [*Icaricia*] *icarioides buchholzi*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The species (*Plebejus icarioides*) ranges throughout most of the western United States west of the Great Plains. The subspecies, *P. i. buchholzi*, is recorded in New Mexico only from Catron, Grant, Sierra, Otero, and Lincoln counties (Opler et al. 2010f; BISON-M 2008).

Habitat and Life History

The larvae of *P. icarioides* feed on various species of lupines (*Lupinus* spp.), consuming leaves, flowers, and ultimately seed pods. Adults frequent flowers for nectar, and are recorded visiting buckwheats (*Eriogonum* spp.) and composites.

Threats to the Survival of Buchholz's Blue Butterfly

Threats to the species are primarily ground-disturbing activities that degrade or remove habitat. Ground disturbance may allow colonization by invasive non-native plant species that may compete with native vegetation for resources, and may result in changes to the local plant community and fire regime.

Potential for Occurrence in the Study Area

The potential for Buchholz's blue butterfly occurring within the study area is high.

Four-spotted Skipperling

Status

The four-spotted skipperling (*Piruna polingii*) is a Forest Service sensitive species and a State of New Mexico SGCN (BISON-M 2008; USFS 2007a).

Distribution

The four-spotted skipperling ranges from Arizona and southwestern New Mexico south to central Mexico (Opler et al. 2010g).

Habitat and Life History

The four-spotted skipperling inhabits mountain meadows and streamside habitats that support lush vegetation. The larval food plant(s) are unknown, but are likely grasses, rushes, or sedges (Opler et al. 2010g; Stewart et al. 2001). Adults obtain nectar from flowers.

Threats to the Survival of the Four-spotted Skipperling

Threats to the four-spotted skipperling include habitat degradation and loss. Ground-disturbing activities that affect aquatic habitats through erosion or removal of vegetation may impact habitat used by the species.

Potential for Occurrence in the Study Area

Due to a general lack of suitable habitat, potential for presence of the four-spotted skipperling within the study area is low. The greatest potential likely occurs along the Rio Grande.

Cassus Roadside Skipper

Status

The Cassus roadside skipper (*Amblyscirtes cassus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Cassus roadside skipper ranges from Arizona and New Mexico south to west Texas and northern Mexico (Opler et al. 2010h).

Habitat and Life History

The species inhabits middle to high-elevation open woodlands and washes (Opler et al. 2010h; Stewart et al. 2001). The larvae feed on grasses, including bulb panicgrass (*Panicum bulbosum*)

(Opler et al. 2010h; Stewart et al. 2001). Adults visit a variety of flowers for nectar, including milkweeds (*Asclepias* spp.) and mints (Lamiaceae, especially *Monarda* spp.) (Opler et al. 2010h).

Threats to the Survival of the Cassus Roadside Skipper

Threats to the species include habitat degradation or loss. Ground-disturbing activities may allow colonization of invasive nonnative plants that may compete with native vegetation, and may alter the local plant community and fire regime.

Potential for Occurrence in the Study Area

Much of the study area is within the known range of the species, but little of the proposed alignment alternatives would pass through suitable habitat. Potential for occurrence is low.

Texas Roadside Skipper

Status

The Texas roadside skipper (*Amblyscirtes texanae*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Texas roadside skipper ranges from southern Arizona, southern New Mexico, and Texas south into northern Mexico. There are scattered records of the species over much of Texas. Populations of the species tend to be localized (Opler et al. 2010i).

Habitat and Life History

The Texas roadside skipper occupies low-elevation open woodland and xeric wash habitats. The species is commonly associated with habitats containing limestone-derived soils. The larvae feed on bulb panicgrass and possibly other grass species (Opler et al. 2010i; Stewart et al. 2001). Adults visit flowers to obtain nectar.

Threats to the Survival of the Texas Roadside Skipper

Threats to the species include habitat degradation or loss. Ground-disturbing activities may allow colonization of invasive non-native plants that may compete with native vegetation, and that may alter the local plant community and fire regime.

Potential for Occurrence in the Study Area

Potential for the Texas roadside skipper occurring within the study area is moderate.

Deva Skipper

Status

The Deva skipper (*Atrytonopsis deva*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The Deva skipper ranges from central and southeastern Arizona and southwestern New Mexico south into Mexico. Populations tend to be localized (Opler et al. 2010j).

Habitat and Life History

The Deva skipper occupies montane canyons, open desert woodland, and streamside habitats. The larval foods are unknown, but are likely grasses. Adults obtain nectar from a variety of flowers, including thistles (*Cirsium* spp.) and ragworts (*Senecio* spp.) (Opler et al. 2010j; Stewart et al. 2001).

Threats to the Survival of the Deva Skipper

Threats to the species include habitat degradation or loss. Ground-disturbing activities may allow colonization of invasive nonnative plants that may compete with native vegetation, and which may alter the local plant community and fire regime.

Potential for Occurrence in the Study Area

The potential for the Deva skipper occurring within the study area is low.

Orange Giant Skipper

Status

The orange giant skipper (*Agathymus neumoegeni neumoegeni*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The orange giant skipper ranges from central Arizona east to west-central and southern New Mexico and west Texas (Opler et al. 2010k).

Habitat and Life History

The orange giant skipper is integrally associated with Parry's agave (*Agave parryi*), and the species' range approximates the range of the plant. Larvae burrow within and consume pulp of the leaves of the plants. Adult females are reported not to feed, and males obtain moisture and likely minerals from mud and manure (Opler et al. 2010k).

Threats to the Survival of the Orange Giant Skipper

The orange giant skipper is dependent on *A. parryi*, and impacts to the species are directly associated with any impacts to this plant. Ground-disturbing activities, particularly clearing of vegetation, may remove existing plants and directly affect the resource available to populations of the orange giant skipper.

Potential for Occurrence in the Study Area

Parry's agave has a limited distribution within the study area, and is a middle-elevation species. Project alternatives may not pass through habitat that supports this species, and the potential for the orange giant skipper occurring in the study area is low.

Poling's Giant Skipper

Status

Poling's giant skipper (*Agathymus polingi*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

Poling's giant skipper ranges from southern Arizona and far southwestern New Mexico south into northwestern Mexico (Opler et al. 2010l).

Habitat and Life History

Poling's giant skipper inhabits dry hills and open woodlands that support one of two agave species upon which the larvae feed (Schott's agave (*A. schottii*) and the Toumey agave (*A. toumeyana*) (Opler et al. 2010l; Stewart et al. 2001). The range of Poling's giant skipper approximates the range of these two agave species. Adults do not feed, and apparently do not go to water (Opler et al. 2010l; Stewart et al. 2001).

Threats to the Survival of Poling's Giant Skipper

Threats to Poling's giant skipper are limited to effects to host plants. However, plants respond well to ground disturbance and generally recover quickly after fires. Impacts to Poling's giant skipper are likely to be limited to removal of large portions or entire localized populations of the host plants.

Potential for Occurrence in the Study Area

Toumey agave does not occur in New Mexico, and the range of Schott's agave just encroaches on the southern portion of the study area in the north end of the Pyramid Mountains south of Lordsburg, New Mexico. Project alternatives would be unlikely to pass through habitat that supports Schott's agave.

Ursine Giant Skipper

Status

The ursine giant skipper (*Megathymus ursus ursus*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The ursine giant skipper ranges from southern Arizona and New Mexico and southwest Texas south into northern Mexico (Opler et al. 2010m).

Habitat and Life History

The ursine giant skipper feeds on a variety of species of yucca, including banana, Schott's, and Torrey's yuccas (*Y. baccata, Y. schottii,* and *Y. torreyi*). Larvae burrow into and feed on the pulp of leaves. Adults apparently do not feed, but males have been recorded at mud, where they may obtain water and/or minerals (Opler et al. 2010m).

Threats to the Survival of the Ursine Giant Skipper

Threats to the species are limited to effects to the food plants. Impacts to the ursine giant skipper are limited to removal of large portions or entire localized populations of the host plants.

Potential for Occurrence in the Study Area

Potential for the ursine giant skipper occurring within the study area is moderate.

Zephyr Eyed Silkmoth

Status

The zephyr eyed silkmoth (*Automeris zephyria*) is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The zephyr eyed silkmoth has a limited range in the mountains of central New Mexico and west Texas (Opler et al. 2010n).

Habitat and Life History

The larvae of the zephyr eyed silkmoth feed on willows (*Salix* spp.), and possibly other plants. Adult moths of the family Saturniidae have vestigial mouthparts and do not feed (Opler et al. 2010n; Borror et al. 1989).

Threats to the Survival of the Zephyr Eyed Silkmoth

Threats to the survival of the zephyr eyed silkmoth include degradation or loss of habitat that support larval food plants. Use of high-intensity lights, particularly in rural areas, attracts many moth species. This often places the moths at great distances from their larval food plants and may result in death of the moths prior to their reproducing (BISON-M 2008).

Potential for Occurrence in the Study Area

The zephyr eyed silkmoth is very likely to occur within the study area, but Project alignments are unlikely to cross through habitat that supports the species. Potential for the zephyr eyed silkmoth occurring within the Project area of influence is very low.

Buck Moth Species

Status

Hemileuca artemis is a State of New Mexico SGCN (BISON-M 2008).

Distribution

The distribution of this species is quite limited, with records from northeastern Colorado (Opler et al. 2010o), and Bernalillo, Otero, Sierra, and Doña Ana counties in New Mexico (BISON-M 2008), including near Las Cruces, New Mexico (Packard 1893).

Habitat and Life History

The food plant of this species is unknown, but at least one buck moth (*Hemileuca peigleri*) from central Texas feeds on species of oak (*Quercus* spp.). Adults of the species do not feed (Opler et al. 2010o).

Threats to the Survival of Hemileuca artemis

Threats to the survival of *Hemileuca artemis* include degradation or loss of habitat that support larval food plants. Use of high intensity lights, particularly in rural areas, attracts many moth species. This often places the moths at great distances from their larval food plants and may result in death of the moths prior to their reproducing (BISON-M 2008).

Potential for Occurrence in the Study Area

The species likely feeds on oaks, which occur at moderate elevations. Project alternatives are unlikely to pass through oak woodlands within the range of this species.

1.8.1.7 Plants

Parish's Indian Mallow

Status

The Parish's Indian mallow (*Abutilon parishii*) is an Arizona BLM sensitive species, a Forest Service sensitive species, and a USFWS species of concern (AZGFD 2010a; BLM 2010; USFS 2007b).

Distribution

Parish's Indian mallow occurs primarily in south-central Arizona, and is also known from Sonora, Mexico (Arizona Rare Plant Committee [ARPC], no date).

Habitat

The Parish's Indian mallow occurs among rocks and boulders on steep slopes and in canyon bottoms from desertscrub habitats up to semi-desert grassland between approximately 1,700 and 4,900 feet elevation (ARPC, no date; AZGFD 2000b). Plants typically occur on south-facing slopes and are fully exposed (AZGFD 2000b).

Threats to the Survival of the Parish's Indian Mallow

Because of its habit of growing in steep, rocky terrain, the species is not considered to be subject to significant impacts from grazing. Loss of habitat and plants could occur from any ground-disturbing activities where plants are present. Invasive plant species, particularly buffelgrass may compete with the plants for resources, crowding plants out of habitat, and increase fire potential, which could extirpate resident populations (AZGFD 2000b).

Potential for Occurrence in the Study Area

The Parish's Indian mallow is known to occur within the study area in Pinal and Pima counties in areas of suitable habitat. Since most Project alternatives avoid rocky canyon habitats, the potential for this species occurring in the Project area of influence is low.

Fugate's Bluestar

Status

Fugate's bluestar (*Amsonia fugatei*) is a New Mexico BLM sensitive species, a USFWS species of concern, and a State of New Mexico Species of Concern (New Mexico Rare Plant Technical Council [NMRPTC] 1999a).

Distribution

Fugate's bluestar is known from the vicinity of San Antonio in Socorro County, New Mexico (McLaughlin 1985).

Habitat

Fugate's bluestar is a perennial herb from a woody caudex to about 20 inches in height that produces cream-colored flowers in spring. The plants occur on rocky and gravelly slopes in habitats that are ecotonal between Chihuahuan desert and desert grassland habitats at an elevation of about 4,900 feet (McLaughlin 1985).

Threats to the Survival of Fugate's Bluestar

Threats to Fugate's bluestar include habitat loss and ground-disturbing activities such as development and improper OHV use, and illegal collecting.

Potential for Occurrence in the Study Area

A population of this species occurs within the study corridor near U.S. Route 380 east of San Antonio, New Mexico (McLaughlin 1985), partially within a BLM-administered Special Management Area. Proposed Project alternatives would cross suitable habitat in the vicinity of this population. The species could occur elsewhere in the northern portion of the study area in New Mexico in areas of suitable habitat.

Gypsum Hotspring Aster

Status

The gypsum hotspring aster (*Arida blepharophylla*) is a New Mexico BLM sensitive species, a USFWS species of concern, and a State of New Mexico species of concern (NMRPTC 1999b)

Distribution

The gypsum hotspring aster is recorded from a single locality in Chihuahua, Mexico, two sites in Presidio County, Texas, and in New Mexico from a single specimen collected during the 1851 United States/Mexico boundary survey (NMRPTC 1999e).

Habitat

The gypsum hotspring aster occurs on alkaline or sandstone derived soils associated with perennial springs and seeps in Chihuahuan desertscrub habitat (Poole et al. 2007; NMRPTC 1999b). The springs at the locality in Chihuahua are thermal (Poole et al. 2007).

Threats to the Survival of the Gypsum Hotspring Aster

Any impacts to springs, seeps, or alkaline playa habitats could impact individuals of the species or suitable habitat.

Potential for Occurrence in the Study Area

Considering that there is only a single, historic record for the species from New Mexico, and that the species is presumed to be extirpated in the state (BISON-M 2008), the potential for the gypsum hotspring aster occurring within the Project area of influence is very low.

Chiltepin

Status

The chiltepin (*Capsicum annuum* var. *glabriusculum*), also known as tepin, chile pequin, or bird pepper, is a Forest Service sensitive species (USFS 2007b). Considered to be the progenitor of most cultivated chiles, the Coronado National Forest and Native Seeds/SEARCH established the Wild Chile Botanical Area for the conservation of this species, in part due to its agronomic and cultural significance (Nevala 1999; USFS 2010).

Distribution

Although *Capsicum annuum* is widely cultivated as an ornamental and food plant, the wild variety of *C. annuum* is considerably less common, found in only a few localities in southern Arizona and New Mexico, although it is more widespread in Texas.

Habitat

Chiltepin grows in mesquite and oak woodlands within canyons and slopes between 3,600 and 4,400 feet elevation, typically beneath some type of shade tree (AZGFD 2003m).

Threats to the Survival of the Chiltepin

Chiltepin is threatened by livestock grazing and human collecting.

Potential for Occurrence in the Study Area

Potential for occurrence of this species within the Project area of influence is very low.

Griffith's Saltbush

Status

Griffith's saltbush (*Atriplex griffithsii*) is a New Mexico BLM sensitive species, and a State of New Mexico species of concern (NMRPTC 1999c).

Distribution

Griffith's saltbush is known from southeast Arizona (primarily in the vicinity of Willcox), southwest New Mexico on the Lordsburg Playa, and near Deming, New Mexico (AZGFD 2004h).

Habitat

Griffith's saltbush occurs on saline, alkaline soils on playa margins between about 4,100 and 4,800 feet elevation. It is one of the largest species of saltbush. It occurs in association with seepweed (*Suaeda* spp.), tobosa grass (*Pleuraphis mutica*), and alkali sacaton (*Sporobolus airoides*) (AZGFD 2004h).

Threats to the Survival of Griffith's Saltbush

Threats to Griffith's saltbush are primarily from loss of habitat and improper use of OHVs. Sediment deposition due to fluctuating water levels on the Lordsburg Playa may be adversely affecting those populations (AZGFD 2004h).

Potential for Occurrence in the Study Area

The species occurs at several locations within the study area; west of Safford, Arizona, near Willcox, Arizona, and near Lordsburg and Deming, New Mexico (SEINet 2010). Suitable habitat for the species is present within the Project area of influence on the Lordsburg Playa, which would be crossed by one proposed Project alternative, and possibly in the vicinity of Willcox, Arizona.

Giant Sedge

Status

The giant sedge (*Carex spissa* var. *ultra*) is an Arizona BLM sensitive species and a USFS sensitive species (BLM 2010; USFS 2007b).

Distribution

Disjunct populations of the giant sedge occur from southern Yavapai County in Arizona south in the mountains through the southeastern portions of the state to extreme southwestern New Mexico and northeastern Sonora and the state of Coahuila, Mexico. It also occurs in coastal Southern California and Baja California, Mexico (ARPC no date; AZGFD 2000c).

Habitat

Giant sedge occurs on saturated soils of perennial streams and at springs and seeps, between elevations of 2,500 and 6,000 feet. Plants flower between late March and September. This is the largest sedge species occurring in Arizona, and may reach 6.5 feet in height (ARPC no date).

Threats to the Survival of the Giant Sedge

Threats to the giant sedge include habitat degradation or loss (AZGFD 2000c). Livestock access to springs may adversely affect the species' habitat.

Potential for Occurrence in the Study Area

Project alignments will mostly avoid habitats that support this species, and the potential for the giant sedge occurring within the Project area of influence is very low.

Saguaro (crested form)

Status

The crested form of the saguaro cactus (*Carnegiea gigantea*) is an ADA highly safeguarded variety of the saguaro cactus.

Distribution

These cacti do not have a distinct habitat, but apparently occur randomly in very low numbers within saguaro forest desert habitat. Occasionally there will be small numbers of the plants in a relatively small area, but more often they occur as individual plants.

Habitat

The crested forms may occur anywhere saguaro cacti occur in the Sonoran Desert. The cause of this growth form of the saguaro is poorly understood, and there is little agreement among researchers on a cause.

Threats to the Survival of the Crested Saguaro

The primary threats to the crested saguaro are theft of plants. Habitat loss from development and vandalism of plants are also problematic.

Potential for Occurrence in the Study Area

Some crested saguaros are almost certainly present within the study area in areas where saguaros occur.

Playa Spider Plant

Status

The playa spider plant (*Peritoma* [*Cleome*] *multicaulis*) is a State of New Mexico endangered species and a USFWS species of concern (AZGFD 2010a; NMRPTC 1999d).

Distribution

The playa spider plant has a disjunct distribution, with populations known from the Willcox Playa and San Bernardino NWR in Arizona, southwestern New Mexico, central Colorado, Southern Wyoming (ARPC, no date), western Texas (Poole et al. 2007), and south to central Mexico (AZGFD 2001q). The single record from New Mexico was taken along the Mimbres River during the Mexican Boundary Survey in 1851, and the species has not been observed in New Mexico since that time (Poole et al. 2007). The two populations in Arizona are also historic records (ARPC, no date; AZGFD 2001q), with no known plants currently extant at these locations.

Habitat

The playa spider plant is recorded from wet, saline, or alkaline soils of playas, springs, meadows, or old lake beds (ARPC, no date; Poole et al. 2007).

Threats to the Survival of the Playa Spider Plant

The primary threat to this species is the loss of habitat. Groundwater pumping or other water diversion activities that affect wetlands could adversely affect this species (AZGFD 2001q).

Potential for Occurrence in the Study Area

There is a small chance this species could occur on the shores of the playa at Lordsburg, New Mexico. The potential for this species to occur within the Project area of influence is very low.

Pima Pineapple Cactus

Status

The Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) was listed as endangered without critical habitat on September 23, 1993 (USFWS 1993c). A 5-year review for the species was completed in 2007 with a recommendation to retain the current listing status (USFWS 2007h). The Pima pineapple cactus is an ADA highly safeguarded species and a Pima County PVS (AZGFD 2010a; Pima County 2004).

Distribution

The known range of the Pima pineapple cactus is the Altar Valley southwest of Tucson, Arizona, and the Santa Cruz Valley south of Tucson, south into Sonora, Mexico. The range extends southeast of Tucson (north of the Santa Rita Mountains) as far as State Highway 83 (ARPC no date; Pima County 2004).

Habitat and Life History

The Pima pineapple cactus is found along ridges in Semidesert Grassland and alluvial fans in the Arizona Upland Subdivision of Sonoran Desertscrub. It can also occur in the lower edge of southwestern oak woodland. It is usually found on flat ridge tops with little slope and in soils that are mostly rocky loams at elevations of 2,300 to 5,000 feet (AZGFD 2001r; Pima County 2004). These plants reproduce during the summer rainy season. Flowering usually occurs 5 to 7 days after the first summer rains of at least 0.1 inch, and continues with several flushes of blooms through the monsoon season (Pima County 2004).

Threats to the Survival of the Pima Pineapple Cactus

Threats to the Pima pineapple cactus include loss of individual plants and habitat from development. Ground-disturbing activities, particularly vegetation removal may provide suitable habitat for colonization by nonnative invasive plant species that may compete with the Pima pineapple cactus for resources. Invasive plant species can alter the fire regime and adversely

affect the native plant community. The level of threat for the species from illegal collection of the plants for the private collection trade is not well-understood.

Potential for Occurrence in the Study Area

The Pima County SDCP lists four Tier 1 PCAs for the Pima pineapple cactus, one of which is within the study area. This area is near the intersection of I-10 and Arizona State Highway 83. No Tier 2 PCAs are delineated for the species (Pima County 2004). The species may occur from approximately the Cienega Creek Natural Preserve to southern portions of urbanized Tucson.

Metcalfe's Ticktrefoil

Status

Metcalfe's ticktrefoil (*Desmodium metcalfei*) is a Forest Service sensitive species, a USFWS species of concern, and a State of New Mexico species of concern (NMRPTC 1999e; USFS 2007b).

Distribution

Metcalfe's ticktrefoil occurs in Arizona and southwestern New Mexico, and in Sinaloa, Mexico (NMRPTC 1999e).

Habitat

Metcalfe's ticktrefoil occurs on rocky slopes and in canyons of grassland, oak-piñon/juniper woodland, and riparian habitats. The species is recorded between 4,000 and 6,500 feet elevation (NMRPTC 1999e).

Threats to the Survival of Metcalfe's Ticktrefoil

Metcalfe's ticktrefoil has a limited distribution and there are no recognized threats to the species (NMRPTC 1999e). Ground-disturbing activities could have impacts to populations of plants, their seed bank, or habitat suitable for the species.

Potential for Occurrence in the Study Area

There are few records of the species within its known range, but its rather wide distribution may imply the species is more common than is currently understood. The potential for Metcalfe's ticktrefoil occurring within the Project area of influence is low.

Acuña Cactus

Status

The Acuña cactus (*Echinomastus erectocentrus* var. *acunensis*) is a candidate for listing under the ESA, is considered a highly safeguarded species by the ADA, and is a Pima County PVS (AZGFD 2010a; Pima County 2004).

Distribution

The Acuña cactus occurs in two disjunct regions of Arizona, each with multiple small populations. A southern Arizona population center includes cacti in the Sauceda and Sand Tank mountains and other small ranges largely within Organ Pipe Cactus National Monument and the Barry M. Goldwater Air Force Range. The cactus also occurs in central Arizona in two populations east of Florence, north and south of the Gila River. The southernmost of the central Arizona populations occurs in the Ninetysix Hills and around the adjacent Box O Wash area, in proximity to links C620 and C690-C693. Suitable habitat may be present within the study corridor.

Habitat

The Acuña Cactus occurs on low hills and gravel ridges on granitic or andesite-derived soils in the Arizona Upland subdivision of Sonoran Desertscrub habitat (ARPC, no date).

Threats to the Survival of the Acuña Cactus

Threats to the species include illegal collecting, habitat loss from mining and land development and livestock grazing (AZGFD 2004i).

Potential for Occurrence in the Study Area

The southernmost of the central Arizona populations occurs in the Ninetysix Hills and around the adjacent Box O Wash area, in proximity to links C620 and C690-C693. Suitable habitat may be present and there is a moderate potential the species may occur within the study corridor.

<u>Needle-spined Pineapple Cactus</u>

Status

The needle-spined pineapple cactus (*Echinomastus* (*Sclerocactus*; *Neolloydia*) *erectocentrus* var. *erectocentrus*) is a USFWS species of concern, and a Pima County PVS (AZGFD 2010a; Pima County 2004).

Distribution

The needle-spined pineapple cactus occurs in southeastern Arizona (ARPC, no date; AZGFD 2003n).

Habitat

The needle-spined pineapple cactus usually occurs on limestone substrates, and is associated with low bajada slopes and alluvial fans in desert grassland habitats at elevations between 3,000 and 4,300 feet (ARPC, no date).

Threats to the Survival of the Needle-spined Pineapple Cactus

Threats to the species include illegal collecting, trampling by livestock, OHV use, and habitat loss.

Potential for Occurrence in the Study Area

Designated Tier 1 and 2 PCAs for the species are located within the study area. Tier 1 PCAs are located near the intersection of I-10 and State Highway 83 and in the Cienega Creek watershed. Tier 2 PCAs are delineated for the Vail, Arizona area, and an area in the foothills on the northeast side of the Santa Catalina Mountains (Pima County 2004). The needle-spined pineapple cactus is present within the study area.

Arid Throne Fleabane

Status

The Arid throne fleabane (*Erigeron arisolius*) is a Forest Service sensitive species (USFS 2007b; AZGFD 2010a).

Distribution

The Arid throne fleabane is restricted to southern Arizona, possibly southwestern New Mexico, and Sonora, Mexico. Within Arizona, it is found in Cochise, Pima, and Santa Cruz counties. The majority of identified herbarium collection locations are well south of the Project area, primarily in Santa Cruz county and southern Pima County.

Habitat

This plant occupies rocky soils in grasslands and grassy oak woodland openings, often in moist areas, primarily between 4,265 and 5,650 feet elevation (AZGFD 2001s).

Threats to the Survival of the Arid Throne Fleabane

Threats to arid throne fleabane are livestock grazing and the species' limited distribution.

Potential for Occurrence in the Study Area

Suitable habitat occurs across much of the Arizona portion of the study area. However, only a single record of the species is from north of I-10, and the potential for the species occurring in the Project area of influence is very low.

Fish Creek Fleabane

Status

The Fish Creek fleabane (*Erigeron piscaticus*) is an Arizona BLM sensitive species and a USFS sensitive species (AZGFD 2010a; BLM 2010). A 2007 petition to the USFWS that included the

Fish Creek Fleabane resulted in a 90-day finding that listing of this species under the ESA may be warranted, and the species is under review for future listing (USFWS 2009b).

Distribution

The Fish Creek fleabane occurs at only a few locations in Arizona, including the Superstition Mountains, and Turkey and Oak Grove Canyons in the Galiuro Mountains (ARPC no date; AZGFD 2001t).

Habitat

The Fish Creek fleabane occurs on sandy floodplain terrace soils as an understory species beneath riparian trees in moist canyon bottoms of perennial streams (ARPC no date; AZGFD 2001t).

Threats to the Survival of the Fish Creek Fleabane

The small populations are susceptible to natural stochastic events. The Galiuro populations are in areas that are used for recreation, which may adversely affect populations. Grazing and other activities in the watershed may adversely affect habitat for the species (AZGFD 2001t).

Potential for Occurrence in the Study Area

The known populations of the Fish Creek fleabane in the north end of the Galiuro Mountains are approximately 6 miles north of the nearest Project alternative. The potential for the species occurring within the area of influence of the Project is very low.

<u>San Carlos Buckwheat</u>

Status

The San Carlos buckwheat (*Eriogonum capillare*) is a New Mexico BLM sensitive species and a USFWS species of concern (AZGFD 2010a; NMRPTC 1999f).

Distribution

The San Carlos buckwheat is primarily an Arizona species, with most populations occurring in the San Carlos, San Pedro, and Gila River watersheds. The only known locality for the species in New Mexico is near the Arizona border in northern Hidalgo County (AZGFD 2003o; NMRPTC 1999f).

Habitat

The San Carlos buckwheat normally occurs along larger ephemeral desert washes and on open, adjacent slopes. The plants often grow in floodplain alluvium where few other plants are present to compete for resources. The species is also recorded from disturbed soils along roadways and road cuts (AZGFD 2003o).

Threats to the Survival of the San Carlos Buckwheat

Potential threats to the survival of the San Carlos buckwheat include habitat degradation or loss resulting from livestock grazing, and off-road vehicle traffic. Construction of the San Carlos Reservoir may have caused the loss of some populations of this species. Stochastic flooding events may adversely affect populations (AZGFD 2003o), but may be part of the natural ecology of the species.

Potential for Occurrence in the Study Area

There are three records of the San Carlos buckwheat within the study area. All three sites are near Mammoth, Arizona (SEINet 2010).

<u>San Pedro River Buckwheat</u>

Status

The San Pedro River buckwheat (*Eriogonum terrenatum*) is an Arizona BLM sensitive species (AZGFD 2010a).

Distribution

The San Pedro River buckwheat is an Arizona endemic species that is known from only two areas; a site in eastern Pima County southeast of Vail, Arizona, and a couple of populations in the San Pedro River Valley near Fairbank, Arizona in the San Pedro Riparian National Conservation Area (AZGFD 2006f; Makings 2005).

Habitat

The San Pedro River buckwheat occurs in creosote bush/white-thorn acacia habitat on residual Tertiary lakebed deposits (AZGFD 2006f). The Vail population occurs on mudstones of the Oligocene Pantano Formation and the Fairbank populations on Plio-Pleistocene St. David Formation (Anderson no date).

Threats to the Survival of the San Pedro River Buckwheat

Threats to the San Pedro River buckwheat include ground-disturbing activities that may impact plants, affect the seed bank, and provide habitat suitable for colonization by nonnative invasive plant species that could compete with the plants for resources and alter the local fire regime. Grazing activity could trample plants and accelerate erosion that could remove soils the species depend on.

Potential for Occurrence in the Study Area

The potential for the San Pedro River buckwheat occurring within the Project area of influence is moderate.

Orcutt Pincushion Cactus

Status

The Orcutt pincushion cactus (*Escobaria orcuttii* var. *macraxina*) is a USFWS and State of New Mexico species of concern (NMRPTC 1999g).

Distribution

The Orcutt pincushion cactus is recorded from Cochise County, Arizona, southwestern New Mexico, and south into central Chihuahua, Mexico (Benson 1982; NMRPTC 1999g).

Habitat

Orcutt pincushion cactus occurs on rocky soils or cracks in bedrock in Chihuahuan desertscrub, grassland, or oak woodland habitats between 4,000 and 6,000 feet elevation (Benson 1982; NMRPTC 1999g).

Threats to the Survival of the Orcutt Pincushion Cactus

Ground-disturbing activities including development, mining, and livestock grazing are the primary threats to the Orcutt pincushion cactus (NMRPTC 1999g).

Potential for Occurrence in the Study Area

The potential for the Orcutt pincushion cactus occurring within the Project area of influence is moderate.

Sandberg Pincushion Cactus

Status

The Sandberg pincushion cactus (*Escobaria sandbergii*), also known as the San Andres Mountain foxtail cactus, is a New Mexico BLM sensitive species, a USFWS species of concern, and a State of New Mexico species of concern (NMRPTC 1999h).

Distribution

The Sandberg pincushion cactus is a narrow endemic that is known to occur only within the San Andres and Fra Cristobal mountains of New Mexico (NMRPTC 1999h).

Habitat

Sandberg pincushion cactus occurs on rocky soils from Chihuahuan desertscrub up to juniper woodland habitats, within an approximate elevation range of 4,200 to 7,400 feet (NMRPTC 1999h).

Threats to the Survival of the Sandberg Pincushion Cactus

The Sandberg pincushion cactus is common within its currently understood range, and there are no recognized threats to the species (NMRPTC 1999h). Ground-disturbing activities could impact individual plants, localized populations, or suitable habitat for the species.

Potential for Occurrence in the Study Area

None of the currently proposed Project alternatives occur within the documented range of the species, but some do pass through potentially suitable habitat in other mountain ranges in the region.

Todsen's Pennyroyal

Status

Todsen's pennyroyal (*Hedeoma todsenii*) was listed as an endangered species with designated critical habitat under the ESA on January 19, 1981 (USFWS 1981). Critical habitat was designated to include the entire area on the White Sands Missile Range (WSMR) where the plant was known to occur at the time of listing. The critical habitat designation was not updated after the discovery of additional populations in the Sacramento Mountains. A recovery plan for the species was approved in 1985, and a revised recovery plan for the species was released in 2001 (USFWS 2001c). Todsen's pennyroyal is a State of New Mexico endangered and New Mexico BLM sensitive species (NMRPTC 1999i; USFWS 2001c).

Distribution

Todsen's pennyroyal is currently known only from the San Andres and Sacramento mountains in south-central New Mexico (USFWS 2001c). Three known populations exist on the west slope of the San Andres Mountains within the WSMR. Several scattered populations are located in two areas of the Sacramento Mountains east of Tularosa, New Mexico, in the Lincoln National Forest.

Habitat

Todsen's pennyroyal is a resident of piñon-juniper habitat on north facing slopes with a loose, gypseous-limestone substrate (USFWS 2001c).

Threats to the Survival of the Todsen's Pennyroyal

Most populations of Todsen's pennyroyal are in relatively inaccessible areas, and receive some protection from their isolation. Livestock grazing may adversely affect populations by trampling of plants and causing soil erosion within plant habitat. Ground-disturbing activities associated with development of mineral extraction, oil and gas development, and linear developments including pipelines and transmission line corridors could adversely affect local populations. A low number of populations of the species along with poor seed production and dispersal abilities limit the recovery abilities of this species. Most reproduction is asexual through rhizomes (USFWS 2001c).

Potential for Occurrence in the Study Area

Project alternatives do not pass through areas known to support this species, but the dispersed nature of the known populations and likely incomplete coverage of surveys in the rugged topography preferred by the species suggests that unknown populations may exist. The recovery plan for the species suggests undocumented populations may exist on Chupadera Mesa (USFWS 2001c), an area that would be crossed by the Project.

Arizona Alum Root

Status

Arizona (Chiricahua Mountain) alum root (*Heuchera glomerulata*) is a Forest Service sensitive species (USFS 2007b; AZGFD 2010a).

Distribution

This species is known from the mountains of southeastern Arizona: the Pinaleño, Santa Theresa, Galiuro, Santa Catalina, Chiricahua, and Pinal mountains. In the vicinity of the study area, the majority of herbarium specimen records are from the Pinaleño Mountains. A few of those were collected within 1.5 miles of Link B153a (SEINet 2010).

Habitat

Habitat for the Arizona alum root consists of shady, rocky, primarily north-facing slopes in humus soil of moist areas such as seeps, streams, and riparian areas. Overstory vegetation is oak, pine-oak, or piñon-juniper woodlands, or ponderosa pine and mixed conifer forests between 4,000 and 9,000 feet elevation.

Threats to the Survival of the Arizona Alum Root

Because this species is found in wetland habitats, it is vulnerable to a number of threats to such habitats, including livestock grazing and trampling, and recreational use.

Potential for Occurrence in the Study Area

The Arizona alum is recorded from within the study corridor.

Huachuca Water-umbel

Status

The Huachuca water-umbel (*Lilaeopsis schaffneriana* var. *recurva*) was listed as endangered without critical habitat under the ESA on January 6, 1997 (USFWS 1997b). Critical habitat for the species was designated in 1999 (USFWS 1999d). A 5-year review of this species was initiated in 2009 (USFWS 2009a). The Arizona Department of Agriculture (ADA) lists the Huachuca water-umbel as a highly safeguarded species (AZGFD 2010a). The Huachuca water-umbel is a Pima County PVS (Pima County 2004).

Distribution

The Huachuca water-umbel is known from several localities in Pima, Santa Cruz, and Cochise counties in Arizona, and from the Rio Sonora and Rio Bavispe drainages in Sonora, Mexico (ARPC, no date).

Habitat

The Huachuca water-umbel is a semi-aquatic perennial species that occurs in shallow, slow, flowing waters and adjacent saturated soils associated with springs, seeps, and streams. Known populations occur between 4,000 and 6,500 feet elevation (ARPC, no date).

Threats to the Survival of the Huachuca Water-umbel

The two most serious threats to this species are modification or loss of habitat resulting from water diversions, impoundments, and groundwater pumping, and habitat impacts associated with livestock grazing. The species is susceptible to scouring floods, but may rapidly recolonize areas where such flooding has removed competing vegetation (AZGFD 2003p).

Potential for Occurrence in the Study Area

At the time of listing and critical habitat designation, the Huachuca water-umbel was only known from sites in the upper drainages of the San Pedro and Santa Cruz rivers and several sites in the Huachuca Mountains. In 2001, a disjunct population of the plant was discovered in Bingham Cienega (Titus and Titus 2008), a natural wetland managed by The Nature Conservancy and Pima County Flood Control District. The Bingham Cienega Natural Preserve is located in the San Pedro valley north of the town of Redington, Arizona. The Bingham Cienega population has not been included in the critical habitat designation. The species has also been recorded in the Cienega Creek Natural Preserve. Tier 1 PCAs are delineated by Pima County for the Huachuca water-umbel at the Bingham Cienega and Cienega Creek. The Bingham Cienega site and the northern (downstream) portion of the Cienega Creek PCA are within the study area.

<u>Lemmon's Cloak Fern</u>

Status

The Lemmon's cloak fern (*Notholaena lemmoni*) is a USFWS species of concern (AZGFD 2010a).

Distribution

The Lemmon's cloak fern occurs from southeastern Arizona south through Sonora, Mexico, and as far south as southern Baja California. Most localities of the species in Arizona are in the Santa Catalina, Rincon, Atascosa, and Tumacacori mountains (AZGFD 2003q).

Habitat

The Lemmon's cloak fern inhabits steep slopes, cliffs, and rocky areas in shaded canyons. Occupied substrates are derived from a variety of parent materials including limestone and igneous rock between 2,840 and 6,000 feet elevation (AZGFD 2003q).

Threats to the Survival of the Lemmon Cloak Fern

Drought and climate change appear to be the primary threats to the survival of the species.

Potential for Occurrence in the Study Area

The Lemmon's cloak fern has been recorded from the Santa Catalina and Rincon mountains in the study area. However, all records are at elevations well above any proposed Project alternatives

<u>Sand Prickly-pear</u>

Status

The sand prickly-pear (*Opuntia arenaria*) is a State of New Mexico endangered species and a USFWS species of concern (Poole et al. 2007; NMRPTC 1999j).

Distribution

Sand prickly-pear occurs in southern Luna and Doña Ana Counties in New Mexico, in adjacent west Texas, and in Chihuahua, Mexico (Benson 1982; NMRPTC 1999j).

Habitat

Sand prickly-pear occurs on deep, loose, or semi-stabilized dune areas, or in sandy floodplains in Chihuahuan desertscrub habitat between elevations of approximately 3,800 and 4,300 feet elevation (NMRPTC 1999j; Poole et al. 2007).

Threats to the Survival of the Sand Prickly-pear

The bulk of the populations occur along the Rio Grande, and much of the former habitat of the species has been lost to development and agriculture (NMRPTC 1999j; Poole et al. 2007). OHV use in sand prickly-pear habitat could impact populations of the species and their habitat. Recent observations of populations of this species in the Project region indicate a substantial population decrease resulting from the effects of drought and disease (Howard 2011).

Potential for Occurrence in the Study Area

A record of the species in Socorro County, New Mexico, is located near the proposed Rio Grande crossings. However, the specimen may have been misidentified (NMRPTC 1999j). No other populations of the species are known near proposed Project alternatives.

Chihuahua Scurf-pea

Status

The Chihuahua scurf-pea (*Pediomelum pentaphyllum*) is a State of New Mexico endangered species, a BLM sensitive species in New Mexico and Arizona, a Forest Service sensitive species, and a USFWS species of concern (AZGFD 2010a; BLM 2010; NMRPTC 1999k; USFS 2007b). A 2007 petition to the USFWS that included this species resulted in a 90-day finding that listing of this species under the ESA may be warranted, and the species is under review for future listing (USFWS 2009b).

Distribution

The species is recorded from Graham, Santa Cruz, and Cochise Counties in Arizona, Hidalgo County, New Mexico, and in northern Mexico (AZGFD 2001u; NMRPTC 1999k; USDA 2009). Recent surveys for the species in Arizona and New Mexico have increased the known numbers of plants, rediscovered a population thought extirpated, and somewhat expanded the range of the species (Howard 2011). The Hidalgo County, New Mexico population in the Hachita Valley is the most robust known population with over 1,000 plants within a 15 square mile area. A population southeast of Safford, Arizona contains about 160 plants within 10 square miles. A population near Sunizona, Arizona contains over 200 plants within a 20-square mile area.

Habitat

The Chihuahua scurf-pea is primarily a desert grassland species, typically inhabits areas of bare ground between vegetation in desert grassland or desertscrub dominated by creosote bush (NMRPTC 1999k; WildEarth Guardians 2008), and is apparently also associated with mesquite (*Prosopis* sp.) in New Mexico. Soils where the plants occur are usually sandy or gravelly loam (AZGFD 2001u).

Threats to the Survival of the Chihuahua Scurf-pea

Potential threats to this species include degradation or loss of habitat associated with ground-disturbing activities, which may include energy development and grazing. It is not known whether this species is tolerant of competition from invasive plant species but considering the species appears to occur in open areas, incursion of invasive plant species can be anticipated to have a detrimental effect.

Potential for Occurrence in the Study Area

The species occurs on private land in the southern Sulphur Springs Valley near Sunizona, Arizona and west of Chiricahua National Monument, and there is a population centered about 15 miles southeast of Safford (Howard 2011; Welsh and Licher 2010; WildEarth Guardians 2008). None of the known populations occur within the study area. Suitable habitat for this species is probably intermittently present over a wide area within the study area in southeastern Arizona and southwestern New Mexico as far east as Gage, New Mexico (Howard 2011).

Night-blooming Cereus

Status

The night-blooming cereus (*Peniocereus greggii* var. *greggii*) is a State of New Mexico endangered species, a New Mexico BLM sensitive species, and a USFWS species of concern (AZGFD 2010a; NMRPTC 1999l).

Distribution

The night-blooming cereus is a Chihuahuan desert species, occurring in far southeastern Arizona, southern New Mexico, west Texas, and north-central Mexico (Benson 1982). There are several records of the species within the study area in New Mexico (NMRPTC 1999l).

Habitat

The night-blooming cereus occurs in Chihuahuan desertscrub, where it may occur along washes or in flat areas, and usually grows among vegetation, often creosote bushes, which it uses for support of its stems (Benson 1982; Kearney and Peebles 1960; NMRPTC 1999l).

Threats to the Survival of the Night-blooming Cereus

Threats to the species include loss of habitat from conversion of land to agriculture and over-collecting of wild plants (NMRPTC 1999l).

Potential for Occurrence in the Study Area

Because of the presence of suitable habitat and the presence of several records of the species within the study area, the potential for the night-blooming cereus occurring within the Project area of influence is high.

Catalina Beardtongue

Status

The Catalina beardtongue (*Penstemon discolor*) is a Forest Service sensitive species and an ADA highly safeguarded species (AZGFD 2010a; USFS 2007b).

Distribution

The Catalina beardtongue is recorded from the Atascosa, Dragoon, Galiuro, Santa Catalina, Santa Teresa, Tumacacori and Winchester mountains in southern Arizona (ARPC no date).

Habitat

Catalina beardtongue inhabits cracks and shallow soil-filled depressions in granitic bedrock or whitish volcanic tuff deposits between about 4,400 and 7,200 feet elevation in chaparral or pine-oak woodland (ARPC no date).

Threats to the Survival of the Catalina Beardtongue

Habitat degradation or loss may adversely affect the Catalina beardtongue. Ground-disturbing activities, particularly vegetation removal, may provide suitable habitat for colonization by nonnative invasive plant species that could compete with the Catalina beardtongue for resources. Invasive plant species can adversely affect the native plant community and alter the local fire regime.

Potential for Occurrence in the Study Area

The study area occurs within the range of the Catalina beardtongue, but it is unlikely that any Project alternative would pass through habitat that supports the plants. Potential for occurrence of this species within the Project limits of influence is very low.

Sivinski's Scorpionweed

Status

Sivinski's scorpionweed (*Phacelia sivinskii*) is a USFWS and State of New Mexico species of concern (NMRPTC 1999m).

Distribution

Sivinski's scorpionweed is known to occur in Cibola, Sandoval, Valencia, and Socorro counties in New Mexico (NMRPTC 1999m).

Habitat

The more northern populations of the species occur only on gypseous soils of the Todilto Formation, and southern populations (Valencia and Socorro counties) on the Yeso Formation. They all inhabit areas ecotonal between desertscrub and juniper habitats (NMRPTC 1999m).

Threats to the Survival of Sivinski's Scorpionweed

Impacts to the species include ground-disturbing activities, including mining (NMRPTC 1999m). Other ground-disturbing activities could impact individual plants, local populations, or habitat.

Potential for Occurrence in the Study Area

The potential for Sivinski's scorpionweed occurring in the Project area of influence is low.

Broadleaf Groundcherry

Status

The broadleaf groundcherry (*Physalis latiphysa*) is a Forest Service sensitive species (USFS 2007b; AZGFD 2010a).

Distribution

Broadleaf groundcherry is a southern Arizona endemic, known from the San Bernardino Valley in Cochise County, the vicinity of Arivaca Creek in Pima County, and a few other locations in Graham and Santa Cruz counties (AZGFD 2004j).

Habitat

Broadleaf groundcherry grows on granitic, gravelly soils of desertscrub or grassland washes, often in the shade of shrubs or boulders. Vegetative communities where the species has been found include Fremont cottonwood and Goodding willow riparian forest understory, Chihuahuan desertscrub, and mixed shrub and grassland (AZGFD 2004j).

Threats to the Survival of the Broadleaf Groundcherry

Threats to broadleaf groundcherry are livestock grazing and its extreme rarity.

Potential for Occurrence in the Study Area

Although the species has an extremely limited distribution with few known localities, there is at least one record of occurrence within 1 mile of a proposed Project alternative.

<u>Aravaipa Sage</u>

Status

Aravaipa sage (*Salvia amissa*) is an Arizona BLM sensitive species, a Forest Service sensitive species, and a USFWS species of concern (BLM 2010; USFS 2007b).

Distribution

The Aravaipa sage is endemic to Arizona. Historical records include areas in east-central Arizona including the Santa Catalina, Galiuro (Aravaipa Canyon), and Superstition mountains. The only known extant populations are in the Galiuro Mountains (ARPC, no date; AZGFD 2002s).

Habitat

Aravaipa sage occurs on floodplains in the understory of broad-leaf riparian trees, along stream banks, or in moist meadows in full sun or partial shade. Plants are usually associated with intermittent or perennial streams. Alluvial substrates typically consist of gravel, sand, and/or silt. The known elevation range of the species is between 1,500 and 5,000 feet (ARPC, no date; AZGFD 2002s).

Threats to the Survival of the Aravaipa Sage

Principal potential impacts include any impacts to riparian canyon bottom habitat including, but not limited to overgrazing and OHV use (AZGFD 2002s).

Potential for Occurrence in the Study Area

Suitable habitat for the Aravaipa sage may occur where the Project would cross some canyons draining the Santa Catalina or Galiuro mountains. However, the permanent or near-surface water preferred by the sage is restricted to a small number of sites, possibly including Buehman and Hot Springs canyons.

Plank's Campion

Status

Plank's campion (*Silene plankii*) is a New Mexico BLM sensitive species and a State of New Mexico species of concern (NMRPTC 1999n).

Distribution

Plank's campion is restricted to mountain ranges that flank the Rio Grande in New Mexico and El Paso County, Texas (NMRPTC 1999n).

Habitat

Plank's campion inhabits cliffs and rocky outcrops on igneous substrates from approximately 5,000 to 9,200 feet elevation.

Threats to the Survival of Plank's Campion

Plank's campion occurs in habitats that are generally steep and remote, and typically does not occur in areas where human impacts are an issue for the species. Utility easements traversing steep country could potentially occur in such habitats, but are typically avoided due to cost of construction.

Potential for Occurrence in the Study Area

Due to its typically remote habitat, the potential for Plank's campion occurring within the Project area of influence is low.

Porter's Globemallow

Status

Porter's globemallow (*Sphaeralcea procera*) is a New Mexico BLM sensitive species and a State of New Mexico species of concern (NMRPTC 1999o).

Distribution

Porter's globemallow is known only from the type specimen, collected approximately 20 miles northeast of Deming, New Mexico. The species has never been relocated, and may be extirpated. The description also may have been based on an aberrant individual of a previously-described species (*S. polychroma*: La Duke 1985).

Habitat

The type specimen was collected along a sandy arroyo in Chihuahuan desert grassland habitat (NMRPTC 1999o).

Threats to the Survival of Porter's Globemallow

Threat to Porter's globemallow could include any ground-disturbing activities that may impact plants, their seedbank, or suitable habitat.

Potential for Occurrence in the Study Area

Even though one of the Project alignments passes close to the type locality for the species, the potential for impacts to this species are remote considering the species has never been relocated and is likely extinct or an invalid taxon.

Wright's Globemallow

Status

Wright's globemallow (*Sphaeralcea wrightii*) is a USFWS and State of New Mexico species of concern (NMRPTC 1999p).

Distribution

Wright's globemallow occurs in southeastern Arizona, Luna County, New Mexico, El Paso County, Texas, and in the state of Chihuahua, Mexico (Kearney and Peebles 1960; NMRPTC 1999p).

Habitat

Wright's globemallow occurs on rocky slopes in Chihuahuan desertscrub or grassland habitats (NMRPTC 1999p).

Threats to the Survival of Wright's Globemallow

This species is not well-known, and due to a general lack of information on populations, no threats have been identified (NMRPTC 1999p). Activities that involve ground disturbance could impact local populations or habitat suitable for Wright's globemallow.

Potential for Occurrence in the Study Area

Wright's globemallow has been recorded from numerous but widely scattered locations in or near the study corridor. Locations in New Mexico include the vicinity of Socorro, Truth or Consequences, and Deming. The species has been recorded in Arizona near Link B153a, in the eastern foothills of the Pinaleño Mountains.

Aravaipa Woodfern

Status

The Aravaipa woodfern (*Thelypteris puberula* var. *sonorensis*) is an Arizona BLM sensitive species and a Forest Service sensitive species (AZGFD 2010a; BLM 2010; USFS 2007b).

Distribution

The Aravaipa woodfern occurs in northwest and south-central Arizona, southwestern California, and western Mexico (AZGFD 2004k; USDA 2009).

Habitat

The Aravaipa woodfern grows in moist soil in the shade of boulders in mesic canyons between about 2,200 and 4,500 feet elevation. Known populations occur on granitic substrates. The plants are found on riverbanks, in seepage areas, and in meadow habitats (AZGFD 2004k).

Threats to the Survival of the Aravaipa woodfern

Potential impacts to the Aravaipa woodfern include destruction of plants and disturbance of habitat resulting from any ground-disturbing activities. Areas of disturbed ground can provide habitat for colonization by nonnative invasive plant species that may affect the local fire regime or compete with the Aravaipa woodfern for resources.

Potential for Occurrence in the Study Area

The only records of the species within the study area are from canyons in the north end of the Galiuro Mountains, including the Aravaipa Canyon watershed, and in the western (Alamo Canyon) (SEINet 2010). The potential for the species occurring within the Project area of influence is very low.

Tumamoc Globeberry

Status

The Tumamoc globeberry (*Tumamoca macdougalii*) is an Arizona BLM sensitive species, a Forest Service sensitive species, and a Pima County PVS (AZGFD 2010a; BLM 2010; Pima County 2004; USFS 2007b).

Distribution

The range of the Tumamoc globeberry includes the Tucson Mountains, Avra Valley, Puerto Blanco Mountains, Santa Catalina Mountains, Santa Cruz Valley, Vekol Valley, Santa Rosa Valley, Santa Rita Mountains, and Silverbell Mountains in Arizona (ARPC, no date).

Habitat

This plant can be found along arroyos and sandy washes in desert grassland, Sonoran desertscrub, Sinaloan thornscrub, and upland Sonoran desert. The plants occur below 3,000 feet elevation. The Tumamoc globeberry is a perennial vine that grows onto bushes. The plant is dormant during the winter and early spring. The plants flower between July and August, and fruits are present in August or September (ARPC, no date; AZGFD 2004l).

Threats to the Survival of the Tumamoc Globeberry

Threats to the species include habitat loss from conversion of land for agriculture and development, overgrazing, OHV use, recreation, and pesticide use associated with agriculture (AZGFD 2004l).

Potential for Occurrence in the Study Area

Suitable habitat for the Tumamoc globeberry is present in the western portion of the Project area, primarily near Tucson, the Santa Cruz River, and the Tortolita Mountains.

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APPENDIX B – BIOLOGICAL RESOURCES

APPENDIX B1 –BIOLOGICAL TECHNICAL REPORT ADDENDUM

UPDATES TO SPECIES STATUS AND INFORMATION

Introduction

This addendum provides updates regarding changes or corrections to the status of any special-status species since publication of the Draft EIS. The biological information provided in Appendix B1 is current. Details regarding status changes have been addressed in the Final EIS, as applicable, and in the Biological Assessment.

Corrections to Special-status Species Information

The following rare plants were listed as BLM sensitive species in New Mexico in Table 1 of Appendix B1 of the Draft EIS, but are not on the current list of BLM sensitive species:

- Sacramento Pricklypoppy (*Argemone pinnatisecta*)
- Gypsum Hotspring Aster (*Arida blepharophylla*)
- Kerr's Milkvetch (*Astragalus kerrii*)
- Griffith's Saltbush (*Atriplex griffithsii*)
- Organ Mountains Paintbrush (*Castilleja organorum*)
- Swale Paintbrush (*Castilleja ornata*)
- Sacramento Mountains Thistle (*Cirsium vinaceum*)
- Kuenzler's Hedgehog Cactus (*Echinocereus fendleri* var. *kuenzleri*)
- San Carlos Buckwheat (*Eriogonum capillare*)
- Orcutt's Pincushion Cactus (*Escobaria orcuttii* var. *macraxina*)
- Organ Mountain Foxtail Cactus (*Escobaria organensis*)
- San Andres Mountain Foxtail Cactus (*Escobaria sandbergii*)
- Sneed's Pincushion Cactus (*Escobaria needii* var. *sneedii*)
- Todsen's Pennyroyal (*Hedeoma todsenii*)
- Pecos (Paradox) Sunflower (*Helianthus paradoxus*)
- Shining Coralroot (*Hexalectris nitida*)
- Chiricahua Mudwort (*Limosella pubiflora*)
- Hairy Muhly (*Muhlenbergia villiflora* var. *villosa*)
- Organ Mountains Evening Primrose (*Oenothera organensis*)
- New Mexico Rock Daisy (*Perityle staurophylla* var. *staurophylla*)
- Pinos Altos Fame Flower (*Phemeranthus humilis (humile)*)
- Mescalero Milkwort (*Polygala rimulicola* var. *mescalerorum*)
- Plank's Campion (*Silene plankii*)
- Wright's Campion (*Silene wrightii*)
- Porter's Globemallow (*Sphaeralcea procera*)

The majority of Birds of Conservation Concern that may occur in the Project area were addressed in Appendix B1. The following Birds of Conservation Concern are also anticipated to occur in the Project area:

- Allen's Hummingbird (*Selasphorus sasin*)
- Black-chinned Sparrow (*Spizella atrogularis*)
- Brewer's Sparrow (*Spizella breweri*)
- Calliope Hummingbird (*Selasphorus calliope*)
- Canyon Towhee (*Pipilo fuscus*)
- Cassin's Sparrow (*Aimophila cassinii*)
- Chestnut-collared Longspur (*Calcarius ornatus*)
- Lark Bunting (*Calamospiza melanocorys*)
- Lawrence's Goldfinch (*Carduelis lawrenci*)
- Lesser Yellowlegs (*Tringa flavipes*)
- Phainopepla (*Phainopepla nitens*)
- Prairie Falcon (*Falco mexicanus*)
- Rufous Hummingbird (*Selasphorus rufus*)
- Short-eared Owl (*Asio flammeus*)
- Virginia's Warbler (*Vermivora virginiae*)

Table B1-1 provides updates and reference information for changes in the ESA listing status since publication of the Draft EIS, including two taxonomic changes.

See Table B1-2 for the potential effects to these species, and see Appendix B3 for information on distribution within the Project area.

Table B1-1. Updates to Special-status Species Information.		
Common Name ***Scientific name***	**Change in status**	**Citation**
Jaguar *Panthera onca*	Critical habitat was proposed for the Jaguar in 2012.	USFWS. 2012. Designation of critical habitat for Jaguar. FR 77 (50214-50242).
Southwestern Willow Flycatcher *Empidonax traillii extimus*	Designated critical habitat was modified in 2013, and includes the BLM preferred alternative at the San Pedro River.	USFWS. 2013. Designation of critical habitat for the Southwestern Willow Flycatcher. FR 78 (2): 344-534.
Chiricahua Leopard Frog *Lithobates chiricahuensis*	Critical habitat was designated for the Chiricahua Leopard Frog in 2012.	USFWS. 2012. Listing and designation of critical habitat for the Chiricahua Leopard Frog. FR 77 (54): 16324-16424.
Sonoran Desert Tortoise *Gopherus morafkai*	The Sonoran Desert Tortoise was described as a separate species from the Mojave Desert Tortoise (*G. agassizii*).	Murphy, R.W., K.H. Berry, T. Edwards, A.E. Leviton, A. Lathrop, and J.D. Riedle. 2011. The dazed and confused identity of Agassiz's land tortoise, *Gopherus agassizii* (Testudines, Testudinidae) with the description of a new species, and its consequences for conservation. ZooKeys 113: 39-71.
Desert Massasauga *Sistrurus catenatus edwardsii*	The Desert Massasauga is under review for ESA listing.	USFWS. 2012. 90-day finding on a petition to list Desert Massasauga as endangered or threatened and to designate critical habitat. FR 77 (154): 47583-47587.
Chupadera Springsnail *Pyrgulopsis chupaderae*	The Chupadera Springsnail was listed as endangered with designated critical habitat in 2012.	USFWS. 2012. Determination of endangered status for the Chupadera Springsnail and designation of critical habitat. FR 77 (134): 41088-41106.
Rosemont Talussnail *Sonorella rosemontensis*	The Rosemont Talussnail was subsumed into the Santa Rita Talussnail (*S. walkeri*) and is no longer a candidate for ESA listing.	USFWS. 2013. 12-month finding on a petition to list the Rosemont Talussnail as endangered or threatened. FR 78 (60): 18936-18938.
Cochise (Giant) Sedge *Carex ultra* (syn: *C. spissa var. ultra*)	The Cochise Sedge is now considered a distinct species from the Giant Sedge.	USDA. 2013. PLANTS Database. Available at: http://plants.usda.gov/java. Accessed April 23, 2013.
Acuña Cactus *Echinomastus erectocentrus* var. *acunensis*	The Acuña Cactus was proposed for listing with critical habitat in 2012.	USFWS. 2012. 12-month finding for the Lemmon Fleabane, endangered status for the Acuña Cactus and the Fickeisen Plains Cactus and designation of critical habitat, proposed rule. FR 77 (192): 60510-60579.
Lemmon's Fleabane *Erigeron lemmonii*	The Lemmon's Fleabane is no longer a candidate for ESA listing.	USFWS. 2012 12-month finding for the Lemmon Fleabane, endangered status for the Acuña Cactus and the Fickeisen Plains Cactus and designation of critical habitat, proposed rule. FR 77 (192): 60510-60579.

POTENTIAL EFFECTS TO SPECIAL-STATUS SPECIES

Introduction

This portion of the addendum presents a summary of potential effects of the proposed Project to all special-status species addressed in Appendix B1. The focus is on direct and indirect effects that are typically associated with the construction and operation of a high-voltage transmission line. Site-specific mitigation planning for each species, if applicable, will be determined during the process of engineering and development of the final POD. All mitigation (including standard and selective mitigation measures), avoidance of sensitive sites such as rare plant locations, preconstruction clearance survey needs, and monitoring will be conducted as needed and as a condition of the right-of-way grant and notice to proceed.

Effect Categories

Table B1-2 lists the following categories of potential effects of the Project.

Construction and Maintenance Effects

The following effects may occur as a result of construction of the Project or during maintenance activities. Noise from recreational traffic would have similar effects to construction noise. Table B1-2 includes the following effects in this category:

- Construction, maintenance, and recreation noise
- Ground disturbance
- Excavations and worksite hazards
- Loss of vegetation cover
- Loss of nests and nest sites (birds only)

Aquatic Effects

Aquatic systems may be affected through erosion or accidental spills that may affect water quality, or through the process of erosion physically altering the stream bed. Table B1-2 includes the following effects in this category:

- Water quality
- Sedimentation and stream structure

Vegetation Community Effects

Vegetation communities and the species dependent on them would be affected through any type of ground-clearing activities, and throughout the process of reclamation. Table B1-2 includes the following effects in this category:

- Invasive plants (competition)

- Invasive plants (fire risk)
- Vegetation type conversion

Structure and Road Effects

The presence of new transmission lines and new access roads would alter the physical environment, creating potential hazards and sources of disturbance for wildlife. Table B1-2 includes the following effects in this category:

- Structure avoidance
- Predator augmentation
- Collision risk
- Dispersal barriers and road mortality

<u>Direct and Indirect Effects</u>

Table B1-2 uses the following symbols to represent how the proposed Project may affect each species. The text accompanying each symbol provides examples of the anticipated intensity of each effect, or the sensitivity of each species to the effect.

▬	Effect is not anticipated to occur within suitable habitat for the species Effect may be separated spatially or temporally from the species Effect is anticipated to occur infrequently, be of short duration, or occur at a low intensity
● Direct Effects ○ Indirect Effects	Reasonable potential for effect to occur and cause a negative response from the species Effect may be largely mitigated through standard mitigation measures Effects may occur to individuals, but population-level effects are unlikely
▲ Direct Effects △ Indirect Effects	Effect may be likely to occur Effect may contribute to known, primary causes for species declines Species may be particularly susceptible to effect

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Mammals														
Mexican Opossum *Didelphis virginiana californica*	●	●	●	○	—	—	—	—	●	○	—	●	—	▲
Cockrum's Desert Shrew *Notiosorex cockrumi*	●	▲	▲	Δ	—	—	—	—	●	○	—	—	—	●
California Leaf-nosed Bat *Macrotus californicus*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Mexican Long-tongued Bat *Choeronycteris mexicana*	●	—	—	Δ	—	—	—	—	Δ	Δ	—	—	—	—
Lesser Long-nosed Bat *Leptonycteris curasoae yerbabuenae*	●	—	—	Δ	—	—	—	—	Δ	Δ	—	—	—	—
Mexican Long-nosed Bat *Leptonycteris nivalis*	●	—	—	Δ	—	—	—	—	Δ	Δ	—	—	—	—
California Myotis *Myotis californicus*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Yuma Myotis *Myotis yumanensis*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Small-footed Myotis *Myotis ciliolabrum*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Fringed Myotis *Myotis thysanodes*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Cave Myotis *Myotis velifer*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Western Pipistrelle *Pipistrellus hesperus*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Western Red Bat *Lasiurus blossevillii*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Western Yellow Bat	●	—	—	○	—	—	—	—	○	○	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Lasiurus xanthinus														
Spotted Bat *Euderma maculatum*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Allen's Big-eared Bat *Idionycteris phyllotis*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Pale Townsend's Big-eared Bat *Corynorhinus townsendii pallescens*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Big Free-tailed Bat *Nyctinomops macrotis*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Pocketed Free-tailed Bat *Nyctinomops femorosaccus*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Greater Mastiff-bat *Eumops perotis californicus*	●	—	—	○	—	—	—	—	○	○	—	—	—	—
Spotted Ground Squirrel *Spermophilus spilosma*	●	▲	▲	○	—	—	—	—	●	○	—	▲	—	▲
Gunnison's Prairie Dog *Cynomys gunnisoni*	●	▲	▲	○	—	—	—	—	●	○	—	▲	—	▲
Mearns Pocket Gopher *Thomomys bottae mearnsii*	●	▲	▲	○	—	—	—	—	●	○	—	●	—	●
Hispid Pocket Mouse *Chaetodipus hispidus*	●	▲	▲	○	—	—	—	—	●	○	—	●	—	▲
Plains Harvest Mouse *Reithrodontomys montanus*	●	▲	▲	○	—	—	—	—	●	○	—	●	—	▲
American Beaver *Castor canadensis*	●	—	—	Δ	—	○	○	—	○	○	—	—	—	●
Mesquite Mouse *Peromyscus merriami*	●	▲	▲	Δ	—	—	—	—	●	○	—	●	—	▲
Northern Pygmy Mouse	●	▲	▲	○	—	—	—	—	●	○	—	●	—	▲

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Baiomys taylori ater														
Desert Pocket Gopher *Geomys arenarius arenarius*	●	▲	▲	○	—	—	—	—	●	○	—	●	—	●
Yellow-nosed Cotton Rat *Sigmodon ochrognathus*	●	▲	▲	○	—	—	—	—	●	○	—	●	—	▲
Meadow Jumping Mouse *Zapus hudsonius luteus*	●	▲	▲	Δ	—	○	○	—	●	—	—	●	—	●
Mexican Gray Wolf *Canis lupus baileyi*	●	●	—	○	—	—	—	—	—	—	—	—	—	●
Red Fox *Vulpes vulpes*	●	●	●	○	—	—	—	—	●	○	—	—	—	▲
Ringtail *Bassariscus astutus*	●	●	●	○	—	—	—	—	●	○	—	—	—	▲
Western Spotted Skunk *Spilogale gracilis*	●	●	●	○	—	—	—	—	●	○	—	—	—	▲
Hooded Skunk *Mephitis macroura milleri*	●	●	●	○	—	—	—	—	●	○	—	—	—	▲
Common Hog-nosed Skunk *Conepatus leuconotus*	●	●	●	○	—	—	—	—	●	○	—	—	—	▲
Jaguar *Panthera onca*	●	—	—	Δ	—	—	—	—	—	—	—	—	—	●
Ocelot *Leopardus* (*Felis*) *pardalis*	●	—	—	Δ	—	—	—	—	—	—	—	—	—	●
Jaguarundi *Herpailurus yaguarondi tolteca*	●	—	—	Δ	—	—	—	—	—	—	—	—	—	●
Mule Deer *Odocoileus hemionus*	●	—	—	Δ	—	—	—	—	—	○	—	—	—	●
Desert Bighorn Sheep	▲	—	—	○	—	—	—	—	—	○	—	—	—	●

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Ovis canadensis mexicana														
Birds														
Eared Grebe *Podiceps nigricollis*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Double-crested Cormorant *Phalacrocorax auritus*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Neotropic Cormorant *Phalacrocorax brasilianus*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Great Egret *Ardea alba*	—	—	—	○	●	○	○	—	—	—	—	—	▲	—
Cattle Egret *Bubuculus ibis*	—	—	—	○	●	○	○	—	—	—	—	—	▲	—
American Bittern *Botaurus lentiginosus*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Snowy Egret *Egretta thula*	—	—	—	○	●	○	○	—	—	—	—	—	▲	—
Least Bittern *Ixobrychus exilis*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
White-faced Ibis *Plegadis chihi*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Black-bellied Whistling-duck *Dendrocygna autumnalis*	—	—	—	○	●	○	○	—	—	—	—	—	▲	—
Northern Pintail *Anas acuta*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
American Wigeon *Anas americana*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Northern Shoveler *Anas clypeata*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Blue-winged Teal *Anas discors*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Canvasback *Aythya valisineria*	—	—	—	○	—	○	○	—	—	—	—	—	▲	—
Mississippi Kite *Ictinia mississippiensis*	—	—	—	○	●	—	—	—	○	○	—	—	▲	—
Northern Harrier *Circus cyaneus*	—	—	—	○	—	—	—	—	○	○	—	—	▲	—
Osprey *Pandion haliaetus*	—	—	—	○	—	○	○	—	○	○	—	—	▲	—
Bald Eagle (Sonoran Desert DPS) *Haliaeetus leucocephalus*	—	—	—	○	—	○	○	—	○	○	—	—	▲	—
Bald Eagle (Wintering Population) *Haliaeetus leucocephalus*	—	—	—	○	—	○	○	—	○	○	—	—	▲	—
Golden Eagle *Aquila chrysaetos*	—	—	—	○	▲	—	—	—	○	○	—	—	▲	—
Zone-tailed Hawk *Buteo albonotatus*	—	—	—	○	●	○	○	—	○	○	—	—	▲	—
Common Black-hawk *Buteogallus anthracinus*	—	—	—	○	●	○	○	—	○	○	—	—	▲	—
Northern Gray Hawk *Buteo* (*Asturina*) *nitidus maximus*	—	—	—	○	●	○	○	—	○	○	—	—	▲	—
Swainson's Hawk *Buteo swainsoni*	—	—	—	○	●	—	—	—	○	○	—	—	▲	—
Ferruginous Hawk *Buteo regalis*	—	—	—	○	●	—	—	—	○	○	—	—	▲	—
Prairie Falcon *Falco mexicanus*	—	—	—	○	●	—	—	—	○	○	—	—	▲	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Peregrine Falcon *Falco peregrinus anatum*	—	—	—	○	●	—	—	—	○	○	—	—	▲	—
Northern Aplomado Falcon *Falco femoralis septentrionalis*	—	—	—	○	▲	—	—	—	○	○	—	—	●	—
Crested Caracara *Caracara cheriway*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Montezuma Quail *Cyrtonyx montezumae*	—	—	—	○	●	—	—	—	●	○	—	—	●	—
Scaled Quail *Callipepla squamata*	—	—	—	○	●	—	—	—	●	○	—	—	●	—
Yuma Clapper Rail *Rallus longirostris yumanensis*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Sandhill Crane *Grus canadensis canadensis*	—	—	—	○	—	○	○	—	—	○	—	—	▲	—
Western Snowy Plover *Charadrius alexandrinus nivosus*	—	—	—	○	—	○	○	—	—	○	—	—	▲	—
Piping Plover *Charadrius melodus*	—	—	—	○	—	○	○	—	—	○	—	—	▲	—
Mountain Plover *Charadrius montanus*	—	—	—	○	—	—	—	—	—	○	—	—	▲	—
Long-billed Curlew *Numenius americanus americanus*	—	—	—	○	●	○	○	—	—	○	—	—	▲	—
American Avocet *Recurvirostra americana*	—	—	—	○	●	○	○	—	—	○	—	—	▲	—
Lesser Yellowlegs *Tringa flavipes*	—	—	—	○	—	○	○	—	—	○	—	—	▲	—
Wilson's Phalarope *Phalaropus tricolor*	—	—	—	○	—	○	○	—	—	○	—	—	▲	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Black Tern *Chlidonias niger*	—	—	—	○	—	○	○	—	—	○	—	—	●	—
Band-tailed Pigeon *Patagioenas* (*Columba*) *fasciata*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Mourning Dove *Zenaida macroura*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Common Ground Dove *Columbina passerina pallescens*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Yellow-billed Cuckoo *Coccyzus americanus*	—	—	—	○	▲	—	○	—	Δ	Δ	—	—	●	—
Short-eared Owl *Asio flammeus*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Mexican Spotted Owl *Strix occidentalis lucida*	●	—	—	○	—	—	—	—	○	○	—	—	●	—
Cactus Ferruginous Pygmy-owl *Glaucidium brasilianum cactorum*	—	—	—	○	▲	—	—	—	Δ	Δ	—	—	●	—
Elf Owl *Micrathene whitneyi*	—	—	—	○	▲	—	—	—	Δ	Δ	—	—	●	—
Western Burrowing Owl *Athene cunicularia hypugaea*	—	▲	—	○	▲	—	—	—	○	—	—	—	●	—
Black Swift *Cypseloides niger*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Allen's Hummingbird *Selasphorus sasin*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Rufous Hummingbird *Selasphorus rufus*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Calliope Hummingbird *Selasphorus calliope*	—	—	—	○	—	—	—	—	○	○	—	—	●	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Costa's Hummingbird *Calypte costae*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Elegant Trogon *Trogon elegans*	—	—	—	○	—	—	—	—	○	—	—	—	●	—
Belted Kingfisher *Megaceryle alcyon*	—	—	—	○	—	○	○	—	—	—	—	—	●	—
Lewis's Woodpecker *Melanerpes lewis*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Gila Woodpecker *Melanerpes uropygialis*	—	—	—	○	●	—	—	—	Δ	○	—	—	●	—
Arizona Woodpecker *Picoides arizonae*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Williamson's Sapsucker *Sphyrapicus thyroideus*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Greater Pewee *Contopus pertinax*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Southwestern Willow Flycatcher *Empidonax traillii extimus*	—	—	—	○	▲	—	—	—	Δ	○	—	—	●	—
Tropical Kingbird *Tyrannus melancholicus*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Thick-billed Kingbird *Tyrannus crassirostris*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Sulphur-bellied Flycatcher *Myiodynastes luteiventris*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Loggerhead Shrike *Lanius ludovicianus*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Bell's Vireo *Vireo bellii*	—	—	—	○	●	—	—	—	○	○	—	—	●	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Gray Vireo *Vireo vicinior*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Pinyon Jay *Gymnorhinus cyanocephalus*	—	—	—	○	●	—	—	—	○	Δ	—	—	●	—
Western Purple Martin *Progne subis arboricola*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Desert Purple Martin *Progne subis hesperia*	—	—	—	○	●	—	—	—	Δ	Δ	—	—	●	—
Bank Swallow *Riparia riparia*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Juniper Titmouse *Baeolophus ridgwayi*	—	—	—	○	●	—	—	—	○	Δ	—	—	●	—
Sage Thrasher *Oreoscoptes montanus*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Bendire's Thrasher *Toxostoma bendirei*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
LeConte's Thrasher *Toxostoma lecontei*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Sprague's Pipit *Anthus spragueii*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Phainopepla *Phainopepla nitens*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Black-throated Gray Warbler *Dendroica nigrescens*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Yellow Warbler *Dendroica petechia*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Orange-crowned Warbler *Vermicora celata*	—	—	—	○	●	—	—	—	○	○	—	—	●	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Virginia's Warbler *Vermivora virginiae*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Lucy's Warbler *Vermivora luciae*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Canyon Towhee *Piplo fuscus*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Abert's Towhee *Pipilo aberti*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Rufous-winged Sparrow *Aimophila carpalis*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Cassin's Sparrow *Aimophila cassinii*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Sage Sparrow *Amphispiza belli*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Black-chinned Sparrow *Spizella atrogularis*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Brewer's Sparrow *Spizella breweri*	—	—	—	○	—	—	—	—	○	Δ	—	—	●	—
Grasshopper Sparrow *Ammodramus savannarum*	—	—	—	○	—	—	—	—	○	Δ	—	—	●	—
Baird's Sparrow *Ammodramus bairdii*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Lincoln's Sparrow *Melospiza lincolnii*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Savannah Sparrow *Passerculus sandwichensis*	—	—	—	○	—	—	—	—	○	Δ	—	—	●	—
Lark Bunting *Calamospiza melanocorys*	—	—	—	○	—	—	—	—	○	○	—	—	●	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
White-crowned Sparrow *Zonotrichia leucophrys*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Painted Bunting *Passerina ciris pallidior*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Indigo Bunting *Passerina cyanea*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
McCown's Longspur *Calcarius mccownii*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Chestnut-collared Longspur *Calcarius ornatus*	—	—	—	○	—	—	—	—	○	○	—	—	●	—
Hooded Oriole *Icterus cucullatus*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Lawrence's Goldfinch *Carduelis lawrencei*	—	—	—	○	●	—	—	—	○	○	—	—	●	—
Amphibians														
Barred Tiger Salamander *Ambystoma tigrinum mavortium*	—	●	●	—	—	Δ	—	—	○	—	—	—	—	▲
Canyon Treefrog *Hyla arenicolor*	—	●	●	○	—	Δ	Δ	—	○	—	—	—	—	●
Western Chorus Frog *Pseudacris triseriata*	—	●	●	○	—	Δ	Δ	—	○	—	—	—	—	●
Plains Leopard Frog *Lithobates blairi*	—	●	●	○	—	Δ	Δ	—	○	—	—	—	—	▲
Chiricahua Leopard Frog *Lithobates chiricahuensis*	—	●	●	○	—	Δ	Δ	—	○	—	—	—	—	●
Northern Leopard Frog *Lithobates pipiens*	—	●	●	○	—	Δ	Δ	—	○	—	—	—	—	●
Lowland Leopard Frog	—	●	●	○	—	Δ	Δ	—	○	—	—	—	—	●

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Lithobates yavapaiensis														
Great Plains Narrow-mouthed Toad *Gastrophryne olivacea*	●	●	●	—	—	Δ	—	—	○	—	—	—	—	▲
Reptiles														
Desert Box Turtle *Terrapene ornata luteola*	—	▲	▲	○	—	○	○	—	●	○	—	—	—	▲
Western Painted Turtle *Chrysemys picta bellii*	—	—	—	—	—	●	○	—	—	—	—	—	—	▲
Big Bend Slider *Trachemys gaigeae*	—	—	—	—	—	●	○	—	—	—	—	—	—	▲
Yellow Mud Turtle *Kinosternon flavescens*	—	—	—	—	—	●	○	—	—	—	—	—	—	▲
Sonora Mud Turtle *Kinosternon sonoriense sonoriense*	—	—	—	—	—	●	○	—	—	—	—	—	—	▲
Sonoran Desert Tortoise *Gopherus agassizii*	—	▲	▲	○	—	—	—	—	▲	Δ	—	●	—	▲
Chuckwalla *Sauromalus ater*	—	●	●	○	—	—	—	—	○	○	—	●	—	●
Collared Lizard *Crotaphytus collaris auriceps*	—	▲	▲	○	—	—	—	—	●	—	—	—	—	▲
Sonoran Earless Lizard *Holbrookia elegans thermophila*	—	▲	▲	○	—	—	—	—	●	—	—	—	—	▲
Texas Horned Lizard *Phrynosoma cornutum*	—	▲	▲	○	—	—	—	—	●	○	—	—	—	▲
Greater Short-horned Lizard *Phrynosoma hernandesi*	—	▲	▲	○	—	—	—	—	●	—	—	—	—	▲
Regal Horned Lizard *Phrynosoma solare*	—	▲	▲	○	—	—	—	—	●	○	—	—	—	▲

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Arizona Striped Whiptail *Aspidoscelis arizonae*	—	▲	▲	○	—	—	—	—	●	Δ	—	—	—	●
Giant Spotted Whiptail *Aspidoscelis burti stictogrammus*	—	▲	▲	○	—	—	—	—	—	—	—	—	—	●
Madrean Alligator Lizard *Elgaria kingii*	—	▲	▲	○	—	—	—	—	—	—	—	—	—	▲
Reticulate Gila Monster *Heloderma suspectum suspectum*	—	▲	▲	○	—	—	—	—	●	—	—	—	—	▲
New Mexico Threadsnake *Leptotyphlops dissectus*	—	▲	▲	○	—	—	—	—	●	—	—	—	—	▲
Tucson Shovel-nosed Snake *Chionactis occipitalis klauberi*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Desert Night Snake *Hypsiglena chlorophaea chlorophaea*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Smith's Black-headed Snake *Tantilla hobartsmithi*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Plains Black-headed Snake *Tantilla nigriceps*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Ground Snake *Sonora semiannulata*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
California Kingsnake *Lampropeltis getula californiae*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Milk Snake *Lampropeltis triangulum*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Eastern Patch-nosed Snake *Salvadora grahamiae*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Western Black-necked Garter Snake *Thamnophis cyrtopsis cyrtopsis*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Northern Mexican Garter Snake *Thamnophis eques megalops*	—	—	—	○	—	○	○	—	—	—	—	—	—	●
New Mexico Garter Snake *Thamnophis sirtalis dorsalis*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Desert Massasauga *Sistrurus catenatus edwardsii*	—	▲	▲	○	—	—	—	—	○	Δ	—	—	—	▲
Western Diamondback Rattlesnake *Cr otalus atrox*	—	▲	▲	○	—	—	—	—	○	○	—	—	—	▲
Banded Rock Rattlesnake *Crotalus lepidus klauberi*	—	▲	▲	○	—	—	—	—	○	—	—	—	—	▲
Fish														
Apache Trout *Oncorhynchus apache*	—	—	—	—	—	—	—	—	Δ	—	—	—	—	—
Longfin Dace *Agosia chrysogaster*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Gila Chub *Gila intermedia*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Roundtail chub *Gila robusta*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Rio Grande Chub *Gila pandora*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Rio Grande Silvery Minnow *Hybognathus amarus*	—	—	—	○	—	▲	●	—	Δ	—	—	—	—	—
Smallmouth Buffalo *Ictiobus bubalus*	—	—	—	○	—	▲	●	—	Δ	—	—	—	—	—
Spikedace *Meda fulgida*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Speckled Dace	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Rhinichthys osculus														
Loach Minnow *Tiaroga cobitis*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Desert Sucker *Catostomus clarki*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Sonora Sucker *Catostomus insignis*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Rio Grande Sucker *Catostomus plebeius*	—	—	—	○	—	▲	●	—	Δ	—	—	—	—	—
Razorback Sucker *Xyrauchen texanus*	—	—	—	○	—	▲	●	—	Δ	—	—	—	—	—
Blue Catfish *Ictalurus furcatus*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Desert Pupfish *Cyprinodon macularius*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Gila Topminnow *Poeciliopsis occidentalis*	—	—	—	○	—	▲	▲	—	Δ	—	—	—	—	—
Invertebrates														
Florida mountainsnail *Oreohelix florida*	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Socorro mountainsnail *Oreohelix neomexicana*	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ovate vertigo snail *Vertigo ovata*	—	—	—	—	—	▲	▲	—	—	—	—	—	—	—
Hydrobiid springsnails *Pyrgulopsis* spp.	—	—	—	—	—	▲	▲	—	—	—	—	—	—	—
Socorro springsnail *Pyrgulopsis neomexicana*	—	—	—	—	—	▲	▲	—	—	—	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.

Category of Effect	Construction and Maintenance					Aquatic		Plant Community			Structures and Roads			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Talussnails *Sonorella* spp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Moore's fairy shrimp *Streptocephalus moorei*	—	●	—	—	—	▲	▲	—	—	—	—	—	—	—
Bowman's fairy shrimp *Streptocephalus thomasbowmani*	—	●	—	—	—	▲	▲	—	—	—	—	—	—	—
Lynch tadpole shrimp *Lepidurus lemmoni*	—	●	—	—	—	▲	▲	—	—	—	—	—	—	—
Slate millipede *Comanchelus chihuanus*	—	●	●	○	—	—	—	—	○	○	—	—	—	●
Bleached Skimmer Dragonfly *Libellula composita*	—	●	—	○	—	▲	▲	—	—	○	—	—	—	—
Grasshopper 1 *Aeoloplides rotundipennis*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Hebard's Blue-Winged Desert Grasshopper *Anconia hebardi*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Grasshopper 3 *Melanoplus magdalenae*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Shotwell's Range Grasshopper *Shotwellia isleta*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Grasshopper 4 *Trimerotropis salina*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Mayfly *Homoeoneuria alleni*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Maricopa tiger beetle *Cicindela oregona maricopa*	—	●	●	○	—	●	●	—	○	○	—	—	—	—
Desert viceroy butterfly	—	●	—	○	—	—	—	—	○	○	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Limenitis archippus obsoleta														
Southwestern oak hairstreak butterfly *Satyrium* [*Fixsenia*] *favonius ilavia*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Sandia hairstreak butterfly *Callophrys* [*Sandia*] *mcfarlandi*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Xami hairstreak butterfly *Callophrys* [*Xamia*] *xami*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Spalding's blue butterfly *Euphilotes spaldingi*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Buchholz's blue butterfly *Plebejus icarioides buchholzi*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Four-spotted skipperling *Piruna polingii*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Cassus roadside skipper *Amblyscirtes cassus*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Texas roadside skipper *Amblyscirtes texanae*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Deva skipper *Atrytonopsis deva*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Orange giant skipper *Agathymus neumoegeni neumoegeni*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Poling's giant skipper *Agathymus polingi*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Ursine giant skipper *Megathymus ursus ursus*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Zephyr Eyed Silkmoth *Automeris zephyria*	—	●	—	○	—	—	—	—	○	○	—	—	—	—
Buck Moth Species	—	●	—	○	—	—	—	—	○	○	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Hemileuca artemis														
Plants														
Pima Indian mallow *Abutilon parishii*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Fugate's blue-star *Amsonia fugatei*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Chiltepin *Capsicum annuum* var. *glabriusculum*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Griffith's saltbush *Atriplex griffithsii*	—	▲	—	○	—	—	—	●	—	○	—	—	—	—
Giant sedge *Carex spissa* var. *ultra*	—	●	—	—	—	●	●	▲	—	—	—	—	—	—
Playa spider plant *Cleome multicaulis*	—	▲	—	○	—	—	—	●	▲	○	—	—	—	—
Pima pineapple cactus *Coryphantha scheeri* var. *robustispina*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Metcalfe's ticktrefoil *Desmodium metcalfei*	—	▲	—	○	—	—	—	●	▲	○	—	—	—	—
Kuenzler's hedgehog cactus *Echinocereus fendleri var. kuenzleri*	—	▲	—	○	—	—	—	●	●	—	—	—	—	—
Acuña cactus *Echinomastus erectocentrus* var. *acunensis*	—	▲	—	○	—	—	—	●	▲	○	—	—	—	—
Needle-spined Pineapple Cactus *Echinomastus erectocentrus* var. *erectocentrus*	—	▲	—	○	—	—	—	●	▲	○	—	—	—	—
Arid Throne Fleabane *Erigeron arisolius*	—	▲	—	○	—	—	—	●	▲	○	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Fish Creek fleabane *Erigeron piscaticus*	—	●	—	○	—	—	—	●	●	—	—	—	—	—
San Carlos wild-buckwheat *Eriogonum capillare*	—	●	—	○	—	—	—	●	●	—	—	—	—	—
San Pedro River wild buckwheat *Eriogonum terrenatum*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Orcutt pincushion cactus *Escobaria orcuttii* var. *macraxina*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Sandberg pincushion cactus *Escobaria sandbergii*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Todsen's pennyroyal *Hedeoma todsenii*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Arizona Alum Root *Heuchera glomerulata*	—	▲	—	○	—	—	—	●	●	Δ	—	—	—	—
Huachuca water-umbel *Lilaeopsis schaffneriana* var. *recurva*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Lemmon Cloak Fern *Notholaena lemmoni*	—	●	—	—	—	●	●	▲	—	—	—	—	—	—
Three-nerved scurf-pea *Pediomelum pentaphyllum*	—	▲	—	○	—	—	—	●	●	—	—	—	—	—
Night-blooming cereus *Peniocereus greggii* var. *greggii*	—	▲	—	○	—	—	—	●	●	Δ	—	—	—	—
Catalina beardtongue *Penstemon discolor*	—	▲	—	○	—	—	—	●	▲	Δ	—	—	—	—
New Mexico rock daisy *Perityle staurophylla* var. *staurophylla*	—	●	—	○	—	—	—	●	●	○	—	—	—	—
Sivinski's scorpionweed	—	●	—	○	—	—	—	●	●	—	—	—	—	—

Table B1-2. Potential Effects of the Project to Special-status Species.														
Category of Effect	**Construction and Maintenance**					**Aquatic**		**Plant Community**			**Structures and Roads**			
Type of Effect	**Construction, Maintenance, and Recreation Noise**	**Ground Disturbance**	**Excavations and Worksite Hazards**	**Loss of Vegetation Cover**	**Loss of Nests and Nest Sites (Birds Only)**	**Water Quality**	**Sedimentation and Stream Structure**	**Invasive Plants (Competition)**	**Invasive Plants (Fire Risk)**	**Vegetation Type Conversion**	**Structure Avoidance**	**Predator Augmentation**	**Collision Risk**	**Dispersal Barriers and Road Mortality**
Phacelia sivinskii														
Broadleaf Ground Cherry *Physalis latiphysa*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Aravaipa Sage *Salvia amissa*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Plank's campion *Silene plankii*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Porter's globe mallow *Sphaeralcea procera*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Wright's globe mallow *Sphaeralcea wrightii*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Aravaipa woodfern *Thelypteris puberula* var. *sonorensis*	—	▲	—	○	—	—	—	●	●	○	—	—	—	—
Tumamoc globeberry *Tumamoca macdougalii*	—	▲	—	○	—	—	—	●	●	—	—	—	—	—
Pima Indian mallow *Abutilon parishii*	—	▲	—	○	—	—	—	●	▲	○	—	—	—	—