MANAGEMENT INDICATOR SPECIES REPORT
ROSEMONT COPPER PROJECT
CORONADO NATIONAL FOREST
PIMA COUNTY, ARIZONA

Prepared for

U.S. Forest Service
Coronado National Forest
300 West Congress Street
Tucson, Arizona 85701
(520) 388-8300

Prepared by

SWCA Environmental Consultants
343 West Franklin Street
Tucson, Arizona 85701
www.swca.com

December 2013

Contents

Tables

Introduction

This report is an analysis of the effects of the proposed Rosemont Copper Project (project) on U.S. Forest Service (Forest Service) management indicator species (MIS). Forest Service land use plans, policies, and regulations have the primary jurisdiction over land use activities within the project area. The "Coronado National Forest Land and Resource Management Plan" (forest plan), as amended (Forest Service 1986) guides the long-term management of National Forest System lands on the Coronado National Forest. The forest plan provides for integrated multiple use and sustained yield of goods and services from the Coronado National Forest in a way that maximizes long-term net public benefits in an environmentally sound manner (Forest Service 1986:1).

The role of MIS in National Forest planning is described in the 1982 implementation regulations for the National Forest Management Act of 1976 (36 Code of Federal Regulations [CFR] 219.19(a)(1)). Forest Service Manual 2620.5 defines MIS as "plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (Forest Service 1991:6). These regulations require that certain vertebrate and/or invertebrate species present in the area be identified as MIS within the planning area (Coronado National Forest) and that these species be monitored, as "their population changes are believed to indicate the effects of management activities" (36 CFR 219.19(a)(1)).

Standard and Guideline No. 1 for Wildlife and Fish within the forest plan (Forest Service 1986:31-1) directs the Coronado National Forest (the Coronado) to "maintain or improve occupied habitat of . . . listed threatened and endangered species, and Management Indicator Species through mitigation of Forest activities." Standard and Guideline No. 11 for Wildlife and Fish within the forest plan (Forest Service 1986:32) further states that it is necessary to conduct an "evaluation through consultation with Arizona Game and Fish Department [AGFD], New Mexico Department of Game and Fish and Natural Resources, along with other wildlife and plant-oriented groups where appropriate, [of the] population viability of Management Indicator Species through determination of: 1) amount of suitable habitat; 2) distribution of suitable habitat; 3) number of individuals that support regional population goals; and 4) likelihood of continued existence." Population and habitat trends of MIS are documented as part of forest plan monitoring.

In order to meet the intent of planning regulations, 33 MIS in 8 groups (Cavity Nesters, Riparian Species, Species Needing Diversity, Species Needing Herbaceous Cover, Species Needing Dense Canopy, Game Species, Special Interest Species, and Threatened and Endangered Species) were identified in appendix G of the forest plan (Forest Service 1986:128–129). All 33 MIS and cavity-nesting birds identified for the Coronado are listed by group in table 1. Forest-wide trends for all MIS have been assessed and are reported in the latest Coronado National Forest–wide status report for MIS (Forest Service 2011).

For details regarding the project and analysis areas, project figures, the action alternatives, activities associated with the action alternatives, the ecological setting of the affected environment, more detailed discussion of impacts from all alternatives, cumulative effects, and mitigation measures, refer to the biologists' report (SWCA Environmental Consultants (SWCA) 2013a).

Table 1. Coronado National Forest management indicator species groups

Group	Species Validity as Recognized by Integrated Taxonomic Information System
Cavity Nesters	Elegant trogon (*Trogon elegans*) Sulphur-bellied flycatcher (*Myiodynastes luteiventris*) Other primary and secondary cavity nesters*
Riparian Species	Gray hawk (*Buteo nitidus*) Blue-throated hummingbird (*Lampornis clemenciae*) Elegant trogon Rose-throated becard (*Pachyramphus aglaiae*) Thick-billed kingbird (*Tyrannus crassirostris*) Sulphur-bellied flycatcher Northern beardless-tyrannulet (*Camptostoma imberbe*) Bell's vireo (*Vireo bellii*) Black bear (*Ursus americanus*)
Species Needing Diversity	White-tailed deer (*Odocoileus virginianus*) Merriam's turkey (*Meleagris gallopavo merriami*) Elegant trogon Sulphur-bellied flycatcher Buff-breasted flycatcher (*Empidonax fulvifrons*) Black bear
Species Needing Herbaceous Cover	White-tailed deer Montezuma quail (*Cyrtonyx montezumae*) Pronghorn (*Antilocapra americana*) Desert massasauga (*Sistrurus catenatus edwardsii*) Baird's sparrow (*Ammodramus bairdii*)
Species Needing Dense Canopy	Bell's vireo Northern beardless-tyrannulet Gray hawk
Game Species	White-tailed deer Montezuma quail Pronghorn Bighorn sheep (*Ovis canadensis*) Merriam's turkey Black bear
Special Interest Species	Montezuma quail Gray hawk Blue-throated hummingbird Elegant trogon Rose-throated becard Thick-billed kingbird Sulphur-bellied flycatcher Buff-breasted flycatcher Northern beardless-tyrannulet Five-striped sparrow (*Aimophila quinquestriata*)

Group	Species Validity as Recognized by Integrated Taxonomic Information System
	Bighorn sheep Gray hawk American peregrine falcon (*Falco peregrinus anatum*) Blue-throated hummingbird Elegant trogon Rose-throated becard Thick-billed kingbird Sulphur-bellied flycatcher Buff-breasted flycatcher Northern beardless-tyrannulet Bell's vireo Baird's sparrow Five-striped sparrow Mexican stoneroller (*Campostoma ornatum*) Apache trout (*Oncorhynchus gilae apache*) Gila topminnow (*Poeciliopsis occidentalis*) Gila chub (*Gila intermedia*) Sonora chub (*Gila ditaenia*) Desert massasauga Twin-spotted rattlesnake (*Crotalus pricei*) Ridge-nosed rattlesnake (*Crotalus willardi willardi*) Sonoran tiger salamander (*Ambystoma mavortium stebbinsi*) Tarahumara frog (*Lithobates tarahumarae*) Western barking frog (*Craugastor augusti cactorum*) Spikedace (*Meda fulgida*) Arizona treefrog (*Hyla wrightorum*) Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) Gould's turkey (*Meleagris gallopavo mexicana*)

Source: Forest Service (2011a).

Notes:

Primary Cavity Nesters

Ladder-backed woodpecker, Arizona woodpecker, northern flicker, Gila woodpecker, acorn woodpecker, hairy woodpecker .

Secondary Cavity Nesters

American kestrel (*Falco sparverius*), elf owl (*Micrathene whitneyi*), flammulated owl (*Otus flammeolus*), whiskered screech-owl (*Megascops trichopsis*), western screech-owl (*Megascops kennicottii*), northern pygmy-owl (*Glaucidium gnoma*), Mexican spotted owl (*Strix occidentalis lucida*), elegant trogon, eared quetzal (*Euptilotis neoxenus*), sulphur-bellied flycatcher, brown-crested flycatcher (*Myiarchus tyrannulus*), ash-throated flycatcher (*Myiarchus cinerascens*), dusky-capped flycatcher (*Myiarchus tuberculifer*), cordilleran flycatcher (*Empidonax occidentalis*), violet-green swallow *(Tachycineta thalassina*), juniper titmouse (*Baeolophus ridgwayi*), bridled titmouse (*Baeolophus wollweberi*), brown creeper (*Certhia americana*), white-breasted nuthatch (*Sitta carolinensis*), red-breasted nuthatch (*Sitta canadensis*), pygmy nuthatch (*Sitta pygmaea*), house wren (*Troglodytes aedon*), Bewick's wren (*Thryomanes bewickii*), eastern bluebird (*Sialia sialis*), European starling (*Sturnus vulgaris*), Lucy's warbler (*Oreothlypis luciae*).

* Threatened and endangered species in the context of MIS is a term applied by the Forest Service to species that are either rare or not well distributed in the United States. There is no relationship to the terms "threatened" and "endangered" under the Endangered Species Act, although three MIS are also federally listed.

Species Identification

Of the 33 total MIS and 1 group of cavity-nesting birds on the Coronado National Forest, 13 species and the group of cavity nesters (indicated by shaded rows in table 2) were selected for further detailed analysis at the project level based on their known occurrence or presence of suitable habitat within or near the project area (see table 2). Two MIS, Gila chub (*Gila intermedia*) and Gila topminnow (*Poeciliopsis occidentalis*), have been evaluated in greater detail in the biological assessment (Forest Service and SWCA 2013; SWCA 2012a, 2012b) and biological evaluation (SWCA 2013b) and are therefore not included for analysis in the MIS report. The remaining 19 species were eliminated from consideration in this analysis because either their known distributions are well outside the project area on Forest Service lands or the project area on Forest Service lands does not contain suitable habitats for those species, as explained in table 2.

It is important to note that some of the 19 species excluded from further detailed analysis in this report may still be indirectly impacted by project activities, but these impacts are expected to occur off Forest Service lands; therefore, these impacts are not discussed within the context of this report, which only discusses population-level impacts to MIS on Forest Service lands. Because of this, some of the 19 species are evaluated in greater detail in the biologists' report (SWCA 2013a), biological assessment (SWCA 2012a, 2012b; Forest Service and SWCA 2013), biological evaluation (SWCA 2013b), and/or migratory bird analysis (SWCA 2013c).

Table 2. Coronado National Forest MIS and occurrence in the proposed project area

Species	Evaluation for Analysis
American peregrine falcon (*Falco peregrinus anatum*)	No aeries known from the project area on Forest Service lands; potential use by wintering or migrating birds may occur. Foraging habitat is present within the project area on Forest Service lands for birds from nearby aeries. This species was not observed by Russell et al. (n.d. [1977]), a comprehensive survey of birds in the Rosemont area.
Apache trout (*Oncorhynchus gilae apache*)	This species is native only to the White Mountains in Arizona (AGFD 2001e).
Arizona ridge-nosed rattlesnake (*Crotalus willardi willardi*)	The ridge-nosed rattlesnake typically occurs in oak woodland to pine-fir forests near rock crevices on forest and woodland floors in extreme southeastern Arizona in the Huachuca, Santa Rita, Patagonia, and Whetstone Mountains and the Canelo Hills at elevations ranging between 4,800 and 9,000 feet above mean sea level (amsl) (AGFD 2001d). Suitable habitat occurs within the project area on Forest Service lands.
Arizona treefrog (*Hyla wrightorum*)	Not thought to occur within the project area on Forest Service lands, as this species is only known from the Huachuca Mountains and Canelo Hills in southeastern Arizona (Brennan and Holycross 2006).
Baird's sparrow (*Ammodramus bairdii*)	Occurrences are considered unlikely as this species is known to winter in tall, dense grassland patches with sufficient herbaceous cover, which is lacking within the proposed project footprint. Additionally, it is thought that this species avoids grazed rangelands This species was not observed by Russell et al. (n.d. [1977]) in their comprehensive survey of birds in the Rosemont area.
Bell's vireo (*Vireo bellii*)	This species inhabits lowland riparian areas containing willows, mesquite, and seepwillows, preferring dense, low, shrubby vegetation below 3,500 feet amsl in the lower Sonoran zone within desert riparian communities (AGFD 2002a). This species may be impacted within downstream portions of the analysis area off of Forest Service lands, and possibly within lower Barrel Canyon on Forest Service lands. This species was observed by Russell et al. (n.d. [1977]).
Bighorn sheep (*Ovis canadensis*)	This species does not occur within the analysis area. This species is not known from the Santa Rita Mountains. The Silver Bell Mountains near Tucson maintain the last endemic Bighorn Sheep population from what was likely a population complex that included the Santa Rita, Santa Catalina, and Rincon Mountains (AGFD 2013b).

Species	Evaluation for Analysis
Black bear (*Ursus americanus*)	Occurs within the project area on Forest Service lands; suitable foraging habitat is present in the analysis area (AGFD 2013a). Scat and paw prints have been observed during at least one visit to the project site by a trained SWCA biologist.
Blue-throated hummingbird (*Lampornis clemenciae*)	Not thought to occur within the project area on Forest Service lands. Corman and Wise-Gervais (2005) report that this species has only been observed within Madera and Florida Canyons (and possibly in upper Gardner and Cave Canyons as well) in the Santa Rita Mountains, areas that would not be impacted by this project. This species was not observed by Russell et al. (n.d. [1977]).
Buff-breasted flycatcher (*Empidonax fulvifrons*)	Not thought to occur within the analysis area, as no suitable pine forest habitat above 6,000 feet amsl is present in the project area on Forest Service lands (AGFD 2003a). This species was not observed by Russell et al. (n.d. [1977]).
Desert massasauga (*Sistrurus catenatus edwardsii*)	Not thought to occur within the project area on Forest Service lands. The desert massasauga is currently known from only two localized populations in extreme southeastern Arizona in San Bernardino and Sulphur Springs Valleys (Brennan and Holycross 2006).
Elegant trogon (*Trogon elegans*)	Not thought to occur within the project area on Forest Service lands, as there is no suitable habitat. In riparian areas of 11 canyons in the Huachuca and Santa Rita Mountains, individuals selectively used oak-pine and pine-oak vegetation (AGFD 2001a), vegetation types that would not be impacted by this project. This species was not observed by Russell et al. (n.d. [1977]).
Five-striped sparrow (*Aimophila quinquestriata*)	Not thought to occur within the project area on Forest Service lands, as this species is typically observed in thornscrub associations near permanent water and has only been recently reported in Madera Canyon within the Santa Rita Mountains (Corman and Wise-Gervais 2005). This species was not observed by Russell et al. (n.d. [1977]).
Gila chub (*Gila intermedia*)	There is no habitat, or known occurrences of this species, within the project area, and surveys for this species have not been conducted within the analysis area for the purposes of the proposed project. The regulatory mechanism of MIS only includes Forest Service lands, so this species will not be discussed within the MIS report; however, see the biological evaluation and biological assessment for further explanation.
Gila topminnow (*Poeciliopsis occidentalis*)	There is no habitat, or known occurrences of this species, within the project area, and surveys for this species have not been conducted within the analysis area for the purposes of the proposed project. The regulatory mechanism of MIS only includes Forest Service lands, so this species will not be discussed within the MIS report; however, see the biological evaluation and biological assessment for further explanation.
Gould's turkey (*Meleagris gallopavo mexicana*)	Historic occurrences in the Santa Rita Mountains, along with reestablished populations adjacent to the project area. Suitable oak-grassland-riparian habitat exists on Forest Service lands within the project area. This species was not observed by Russell et al. (n.d. [1977]); however, several populations have been released into the Santa Rita Mountains since that survey effort was conducted.
Gray hawk (*Buteo nitidus*)	This species typically occurs in riparian woodlands with large trees (cottonwoods), usually near mesquite forests (AGFD 2000), and so is not expected to occur within the analysis area on Forest Service lands. It may be impacted downstream on non–Forest Service lands within portions of Cienega Creek included in the analysis area (see the biological evaluation [SWCA 2013b]). Although this species was not observed by Russell et al. (n.d. [1977]), it has recently been observed in the analysis area (eBird 2013).
Merriam's turkey (*Meleagris gallopavo merriami*)	Historic occurrence records exist in the Santa Rita Mountains, but the species has not been recently documented from project area on Forest Service lands (Corman and Wise-Gervais 2005). Thought to be extirpated from the Santa Rita Mountains. This species was not observed by Russell et al. (n.d. [1977]).
Mexican stoneroller (*Campostoma ornatum*)	This species is only known to occur at one location in the Chiricahua Mountains and in San Bernardino Creek (AGFD 2003b).
Montezuma quail (*Cyrtonyx montezumae*)	Known to occur within the project area on Forest Service lands; suitable grassland and Madrean evergreen woodland habitats are present in the project area on Forest Service lands. This species was observed by Russell et al. (n.d. [1977]).

Species	Evaluation for Analysis
Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*)	Does not occur within the project area; endemic to the Pinaleño Mountains. No suitable habitat is present, as this species is only found in mixed-conifer and subalpine forests at elevations above 8,700 feet amsl in the Pinaleño Mountains (AGFD 2011).
Northern beardless-tyrannulet (*Camptostoma imberbe*)	May occur within the project area on Forest Service lands. This species has been observed fairly regularly in wooded foothill drainages of the Santa Rita Mountains (Corman and Wise-Gervais 2005). This species was not observed by Russell et al. (n.d. [1977]).
Primary and secondary cavity nesters	Occur within the project area on Forest Service lands; suitable habitat (cavities in trees) is available. Numerous owls, woodpeckers, and flycatchers known to nest in cavities may be present in the project area on Forest Service lands. Many of these species were observed by Russell et al. (n.d. [1977]).
Pronghorn (*Antilocapra americana*)	Not thought to occur within the project area on Forest Service lands. This species is primarily found in treeless grasslands, sage scrub or chaparral, and desert; requires open cover to avoid predation (AGFD 2002c, 2002d).
Rose-throated becard (*Pachyramphus aglaiae*)	Not thought to occur within the project area on Forest Service lands. Suitable habitat for this species, low-elevation sycamore riparian habitats in extreme southern Arizona near flowing water (AGFD 2001b), would not be impacted by this project on Forest Service lands. This species was not observed by Russell et al. (n.d. [1977]).
Sonora chub (*Gila ditaenia*)	The range of this species is limited to Sycamore Creek and Peñasco Canyon in the Atascosa Mountains and California Gulch in Santa Cruz County (AGFD 2001f).
Sonoran tiger salamander (*Ambystoma mavortium stebbinsi*)	This species breeds in stock tanks at about 50 sites located within a 19-mile radius of Lochiel, Arizona, within the headwaters of the Santa Cruz and San Pedro Rivers and include the San Rafael Valley and the foothills of the Patagonia and Huachuca Mountains, in Santa Cruz and Cochise Counties, Arizona, and Sonora, Mexico, at elevations between 4,000 and 6,300 feet amsl (U.S. Fish and Wildlife Service 2013).
Spikedace (*Meda fulgida*)	This species is only known from a 15-mile reach of Aravaipa Creek in Graham and Pinal Counties, Eagle Creek in Greenlee County, and a 35-mile reach of the Verde River in Yavapai County (AGFD 2002e).
Sulphur-bellied flycatcher (*Myiodynastes luteiventris*)	Not thought to occur on Forest Service lands within the project area, as this species typically occurs in riparian canyons in association with sycamores for nest tree and walnuts for nest material or pine-oak communities (Corman and Wise-Gervais 2005; Lowther and Stotz 1999). This species was not observed by Russell et al. (n.d. [1977]).
Tarahumara frog (*Lithobates tarahumarae*)	Extirpated from the United States, but former range is outside the project area, as this species requires perennial lotic waters with plunge pools in rugged canyons (Brennan and Holycross 2006). Reintroduced into the Santa Rita Mountains approximately 10 to 15 miles south of the project area starting in 2004.
Thick-billed kingbird (*Tyrannus crassirostris*)	Not thought to occur within the project area on Forest Service lands. Suitable habitat for this species, sycamore riparian habitats dominated by cottonwood, willow, and mesquite (AGFD 2010), would not be impacted by this project on Forest Service lands, and this species is not known from the Cienega Creek watershed. This species was not observed by Russell et al. (n.d. [1977]).
Twin-spotted rattlesnake (*Crotalus pricei*)	Not thought to occur within the project area on Forest Service lands. This snake is found in the Chiricahua, Pinaleño, Huachuca, and Santa Rita Mountain ranges of southeastern Arizona at elevations ranging from 6,000 to 11,000 feet amsl in Petran Subalpine Conifer Forest and Petran montane conifer forest communities (Brennan and Holycross 2006).
Western barking frog (*Craugastor augusti cactorum*)	May occur within the project area on Forest Service lands. Limited suitable habitat, rock crevices on hillsides within Madrean evergreen woodland (AGFD 2009), occurs in the project area on Forest Service lands.
White-tailed deer (*Odocoileus virginianus*)	Known to occur within the project area on Forest Service lands; widespread suitable habitat (oak woodland and oak woodland/grassland) is present in the project area (AGFD 2013a) on Forest Service lands.

Analysis of Effects

In order to determine the level of impact that each of these MIS may incur on a forest-wide level, analysis was completed to determine the percentage of each species' occupied habitat across the Coronado National Forest that may be impacted (lost or altered) by implementation of any of the action alternatives. Please note that for each of these species for which an estimate was made of the percent of occupied habitat potentially impacted by this project, the numbers are expected to be higher than actual, as all "suitable habitat" was considered to be equivalent to "occupied habitat" in this analysis since species-specific surveys were not conducted for any MIS. A quantitative analysis using geographical information systems (GIS) was conducted to estimate the acreage of possible habitat for special status species within the analysis area. For each species, information about habitat needs in terms of vegetation types (Brown 1994; Pima County 2013) and elevation (U.S. Geological Survey 2013b) (as described in each species' narrative in this section) was used to conduct a quantitative assessment of special status species' habitat in the analysis area.

American Peregrine Falcon (*Falco peregrinus anatum*)

Habitat and Population Trends across the Coronado National Forest

The American peregrine falcon is included in the "Threatened and Endangered Species" MIS group for the Coronado. This falcon breeds in Arizona wherever sufficient prey is available near cliffs, such as those associated with the Mogollon Rim, Grand Canyon, and Colorado Plateau. Optimum nesting habitat is generally considered to be steep, sheer cliffs overlooking woodlands, riparian areas, or other areas that support an abundance of avian prey species; the presence of an open expanse is critical (Glinski 1998b). However, these falcons have been observed breeding in less optimal habitats (small broken cliffs in ponderosa pine (*Pinus ponderosa*) forest or large, sheer cliffs in very xeric areas) as human development expands in Arizona (AGFD 2002b). In Arizona, these falcons return to breeding areas from mid-February to mid-March, although year-round resident birds are not uncommon. Nesting sites (also called aeries) usually consist of a shallow depression scraped into a ledge on the side of a cliff. Peregrine falcons feed almost exclusively on birds, but bats are also taken. In Arizona, these birds use areas of Sonoran, Mohave, and Great Basin desertscrub up through areas of Rocky Mountain and Madrean montane conifer forest from around 400 feet above mean sea level (amsl) along the lower Colorado River to 9,000 feet amsl along the Mogollon Rim.

The forest plan gives no data for acres of occupied habitat on the Coronado National Forest (Forest Service 1986:130), nor does it identify desired habitat conditions for this species. However, peregrine falcons are capable of rapid, long-distance flight, and it is unlikely that the entire forest, including the project area, could provide suitable hunting habitat. For the purposes of this analysis, occupied habitat is defined as a combination of suitable nesting habitat and adjacent hunting areas. No specific monitoring method is identified in the forest plan for this species other than "measurements of appropriate habitat components" (Forest Service 1986:94). This species was not observed by Russell et al. (n.d. [1977]) in their comprehensive survey of birds in the Rosemont area. There are no known active aeries in the project area and optimal nesting habitat is limited. However, peregrine falcons nest elsewhere in the Santa Rita Mountains (at least three sites are known), and the project area may be used by peregrines from nearby active aeries throughout the year. Although the forest plan does not specifically require monitoring for this species, known aeries have been identified and monitored periodically for many years by Forest Service personnel. Twenty-nine peregrine falcon territories have been identified on the Coronado National Forest, and 14 of these have been identified for continued long-term monitoring as a condition of delisting the species (Abbate 2006; U.S. Fish and Wildlife Service 2003). In 2006, 12 of the 14 sites on the Coronado National Forest were occupied, producing a total of 11 young (Abbate 2006). No forest-wide trends are discernible. Nationwide, the peregrine falcon population is considered secure and has

been increasing for the past 30 years (U.S. Fish and Wildlife Service 2003). Breeding Bird Survey data for this species show population trend of a 3.2 percent increase in Arizona from 1966 to 2011 and a 7.0 percent increase from 2001 to 2011 (Sauer et al. 2012). Forest-wide habitats are considered secure and sufficient to allow the species to be well distributed across the forest (Forest Service 2011).

Evaluation of Effects

Because the species is not known to nest in the proposed project footprint, no direct effects are anticipated. However, the removal or burial of vegetation would result in indirect effects in the form of reductions in avian prey species abundance. The proposed project is unlikely to cause a detectable change in peregrine falcon populations, as this species is not known to breed in the project area. Although there are no data on the acres of currently occupied habitat for this species on the Coronado National Forest (Forest Service 1986), the project is expected to result in a loss of suitable foraging habitat for this species. All action alternatives would result in the removal of vegetation of all sizes and age classes and would change the rate of recruitment of trees, shrubs, and other vegetation. Changes in vegetation would result in corresponding reductions in food species diversity and abundance (i.e., songbirds). Furthermore, groundwater drawdown could impact local prey population through the elimination of springs and seeps in and adjacent to the project area.

Any individuals present in the analysis area outside of the mine footprint may experience indirect effects from noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area to suitable habitat, including a decrease in its prey base and habitat conversion. The magnitude of these impacts are uncertain but are expected to decrease as the distance from the mine increases. Thus, all action alternatives are anticipated to result in potential indirect impacts to individual peregrine falcons. No direct effects on peregrine falcons are anticipated to result from this project as this species is not known to nest in the proposed project footprint; however, birds from nearby territories are likely to hunt over the project area.

Thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of American peregrine falcon or to result in a loss of occupied habitat for this species.

Arizona Ridge-nosed Rattlesnake (*Crotalus willardi willardi*)

Habitat and Population Trends across the Coronado National Forest

The ridge-nosed rattlesnake is in the "Threatened and Endangered" MIS group in the forest plan. The ridge-nosed rattlesnake occurs in oak woodland to pine-fir forests, typically thought to be a pine-oak specialist, near rock crevices on forest and woodland floors in extreme southeastern Arizona in the Huachuca, Santa Rita, Patagonia, and Whetstone Mountains and the Canelo Hills at elevations ranging between 4,800 and 9,000 feet amsl (AGFD 2001d). It is also found in mesic canyon bottoms with canopies of alder (*Alnus* spp.), box elder (*Acer negundo*), maple (*Acer* spp.), oak (*Quercus* spp.), and other broadleaf deciduous trees and is infrequently found in high grassland bordering the woodlands. This rattlesnake preys on various rodents, lizards, snakes, birds, and arthropods, including centipedes.

On a global scale, the Arizona ridge-nosed rattlesnake is considered demonstrably secure, with more than 100 occurrences. On a state scale, the species is apparently uncommon or restricted with 21 to 50 occurrences (AGFD 2001d). Regional trend information for the Arizona ridge-nosed rattlesnake is not available, and no systematic surveys are conducted for the species. A "general feeling" exists that it may be less common locally in the Huachuca Mountains than 25 years ago. No systematic surveys are

conducted for Arizona ridge-nosed rattlesnake; thus, the population trend for this species on the Coronado National Forest is unknown (Forest Service 2011).

Evaluation of Effects

Although it is very unlikely that this species occurs in the analysis area, as it is typically thought to be a pine-oak specialist, distribution data are unclear for this species because it is hard to detect through surveys, so it is still evaluated here. It is estimated that this species occupies 28,175 acres within the Coronado National Forest (Forest Service 1986), and there is a total of 22,713 acres of suitable habitat for this species (i.e., Madrean evergreen woodland and riparian vegetation types) on Forest Service lands within the analysis area. However, it is unlikely that all 22,713 acres within the project area actually support Arizona ridge-nosed rattlesnake. The proposed project would result in impacts to this species through the removal of approximately 2,306 to 2,579 acres of suitable habitat above 4,800 feet (depending on which action alternative is selected). Therefore, the proposed project has the potential to directly impact up to 8 to 9 percent of this species' occupied habitat across the Coronado National Forest.

All action alternatives would result in the removal of vegetation of all sizes and age classes and would change the rate of recruitment of trees, shrubs, and other vegetation, resulting in corresponding reductions in prey species diversity and abundance. Any individuals present within the footprint of the mine infrastructure (including the pit, buildings, roads, tailings or waste piles, etc.) or in the path of either the water or transmission lines would be expected to be crushed or trampled as a result of project activities. Any individuals present in the analysis area outside of the mine footprint may experience indirect effects from noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area to suitable habitat, including a decrease in its prey base and habitat conversion. The magnitude of these impacts is uncertain but is expected to decrease as the distance from the mine increases. Thus, all action alternatives could result in potential direct and indirect impacts to individual Arizona ridge-nosed rattlesnakes.

It is expected that this project will directly impact no more than 9 percent of the suitable habitat present for this species across the Coronado National Forest; thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of Arizona ridge-nosed rattlesnake.

Baird's Sparrow (*Ammodramus bairdii*)

Habitat and Population Trends across the Coronado National Forest

Baird's sparrow is included in the "Species Needing Herbaceous Cover" indicator group. The species was selected as a MIS due to its association with tall, dense tobosa (*Pleuraphis* spp.)/grama (*Bouteloua* spp.) grasslands (Forest Service 1986). The Baird's sparrow breeds in the mixed-grass prairies of the northern Great Plains, including Montana, North Dakota, and South Dakota, with incidental observations in Minnesota, Wisconsin, and extreme western Ontario. The species winters in the Southwest from southeastern Arizona to southwest Texas, and south into Mexico (Sonora, Chihuahua, Durango, and Zacatecas) (Green et al. 2002).

In southeastern Arizona, these sparrows are present from approximately August through late February, and they prefer desert and overgrown grasslands at 4,100 to 4,900 feet (AGFD 2001c). Structure of the grassland may be more important than species composition. The species apparently avoids overgrazed rangeland and most agricultural land. In Arizona, Baird's sparrows can be sporadic in numbers and distribution (Whetstone 1995).

Baird's sparrows are omnivores, consuming grass and forb seeds, as well as insects. These sparrows are ground-nesters, building woven grass nests that are then lined with finer grasses and moss (AGFD 2001c). Males are territorial, though vegetation and size of territory are unclear. Some evidence exists that males may also form winter home ranges. Females lay 3 to 5 eggs that are incubated for 11 to 12 days. Eight to 10 days after hatching, young may leave the nest, and first flight takes place at approximately 13 days post-hatching.

On a state scale, the species is rare, with 6 to 20 occurrences in Arizona or few individuals or acres (AGFD 2001c). Breeding Bird Survey data indicate a 2.5 percent decline in Baird's sparrow populations from 1966 to 2011 but a 0.2 percent increase from 2001 to 2010; no information specific to Arizona is available (Sauer et al. 2012). The decline appears to be related to agricultural practices in nesting habitats, specifically conversion of native prairie to agriculture. On wintering grounds, threats include overgrazing and urban development, but only a small percentage of suitable habitat is found on the Coronado National Forest. Whetstone (1995) conducted an extensive inventory of potential habitats for the species on the Coronado National Forest. He identified the San Rafael Valley as the most significant wintering area for the bird on the Coronado National Forest; however, the Coronado National Forest is in the northwest corner of the winter range for the species. The majority of occupied habitat for this species occurs off-forest on lower-elevation State and private grasslands. Baird's sparrows use a narrow band of grassland habitat, apparently preferring areas with grasses that are 4 to 8 inches tall (Forest Service 2011). Baird's sparrows have been documented during Christmas Bird Counts (National Audubon Society 2012) in the lower elevations of Ramsey Canyon and near Patagonia, Arizona. Locations occurred outside the analysis area. The forest plan gives no data for acres of occupied habitat on the Coronado National Forest. It is the only non-breeding species selected as a MIS (Forest Service 1986).

Evaluation of Effects

There are no data on the acres of currently occupied habitat for Baird's sparrows on the Coronado National Forest (Forest Service 1986); however, Baird's sparrows have not been documented within the analysis area. Historic survey data indicate that the analysis area does not represent occupied habitat for this species, and as such, no alternative will represent a loss of habitat quantity. Changes in vegetation and localized air quality could result in corresponding reductions in diversity and abundance of insect prey in areas outside the analysis area, resulting in indirect impacts to Baird's sparrows and their habitat quality.

It is likely that air quality changes could impact the quality of occupied habitat for this species on the Coronado National Forest; all action alternatives are expected to contribute to the existing slight downward trend in the Coronado National Forest–wide population of Baird's sparrows.

Bell's Vireo *(Vireo bellii)*

Habitat and Population Trends across the Coronado National Forest

Bell's vireo is included in the "Riparian Species," "Species Needing Dense Cover," and "Threatened and Endangered" MIS groups for the Coronado National Forest. This species builds nests in low, dense vegetation usually less than 5 feet above the ground, often located near openings within thickets and near water (AGFD 2002a). Cowbird nest parasitism affects up to 70 percent of all nests (the vireo abandons the nest if parasitized, and reproductive success is lowered); severe weather and predation also affect productivity. Bell's vireo is an insectivore (also known to occasionally eat fruit), feeding on caterpillars, beetles, bees, wasps, and small spiders, moving about slowly as it takes food from branches and leaves in dense underbrush and shrubs. This species inhabits lowland riparian areas that contain willows (*Salix* spp.), mesquite (*Prosopis* spp.), and seep willows (*Baccharis salicifolia*), preferring dense, low, shrubby vegetation below 3,500 feet amsl in the lower Sonoran zone in desert riparian communities. In Arizona,

Bell's vireo is associated with dense, shrubby vegetation and woodland edges, especially those with a mesquite component (Corman and Wise-Gervais 2005).

Bell's vireo occurs in Arizona, California, Nevada, and New Mexico, and south into Mexico (NatureServe 2010); it is ranked by NatureServe as G5T4 (Globally Apparently Secure), N4B (Nationally Apparently Secure), and S4 (Apparently Secure) in the state of Arizona. This bird occurs across central, southeastern, and southwestern Arizona (NatureServe 2010). Bell's vireo is threatened by the loss and degradation of riparian habitat through human and human-induced activities, nest parasitism by the brown-headed cowbird (*Molothrus ater*), water projects, severe flooding as a result of water releases from dams, clearing of land for development and agriculture, pesticides, human disturbance, fire in riparian habitat, off-highway vehicles, livestock impacts to tree saplings, and invasion of nonnative plants (AGFD 2002a).

This species was detected by the University of Arizona/ANAMAX surveys of the 1970s as being "uncommon in summer in lower wash (i.e., near the confluence of Barrel Canyon wash with State Route 83) where it may breed" (Russell et al. n.d. [1977]:184). No systematic surveys are conducted specifically for Bell's vireos on the Coronado National Forest; however, a high relative abundance for the species was noted where it was breeding in Florida Canyon in 1994 (Forest Service 2011). This species is regularly detected during breeding bird surveys in southeastern Arizona, and populations in Arizona and northern Mexico are considered stable overall based on North American Breeding Bird Survey data. According to Breeding Bird Survey population trend data, this species shows a 0.2 percent increase in Arizona for the period 1996 to 2010 and a 0.2 percent increase for 2000 to 2010 (Sauer et al. 2012), Overall, the habitat and population trend for this species on the Coronado National Forest appears to be stable, even though this species is expected to rarely use Forest Service lands because of the lack of suitable lower-elevation mesquite thickets available.

Evaluation of Effects

There are no data on the acres of currently occupied habitat for this species on the Coronado National Forest (Forest Service 1986); however, the project area lacks suitable lowland riparian areas containing willows, mesquite, and seep willows. Because necessary habitat elements are currently lacking within the project analysis area, the area does not represent occupied or suitable habitat for this species. Effects on Bell's vireo are not expected.

None of the action alternatives are expected to alter the Forest-wide habitat or population trends for Bell's vireo on the Coronado National Forest.

Black Bear (*Ursus americanus*)

Habitat and Population Trends across the Coronado National Forest

Black bears are included in the "Riparian Species," "Species Needing Diversity," and "Game Species" MIS groups in the forest plan. Black bears are wide-ranging habitat generalists that prefer areas of dense cover and high vegetative diversity. They will use riparian areas for cover and as travel corridors.
In Arizona, Black bears are found in a variety of habitats, including subalpine and montane conifer forests, riparian forests, evergreen woodlands, and chaparral (AGFD 2013a). Individuals establish home ranges but are capable of moving great distances (100 miles) in response to climatic conditions or food availability. They often return long distances after being moved.

Most Arizona black bears hibernate from November through March, during which time they reduce their body temperature, heart rate, and metabolic function while still remaining somewhat conscious in the den (AGFD 2013a). They are normally solitary animals, the exception being family groups (mother and cubs),

breeding pairs, and congregations at feeding sites. Bears will establish and defend territories, a behavior that tends to limit population densities in any given area. They feed on a variety of items, including berries, acorns, grass, insects, mesquite beans, and carrion. Grass has been shown to be a very important component of the diet in the spring. Prickly-pear cactus fruits are seasonally important in some years. In general, the diet consists of approximately 90 percent plant material and only 10 percent animal matter, primarily in the form of insects. They can be effective predators and have been known to take livestock, especially calves, on occasion. Black bears may attempt to exploit sources of food at the mine site, potentially becoming a nuisance wherever mine employees eat, discard, or store food.

Normal reproductive cycles in Arizona black bears may be adversely affected by drought and/or poor physiological condition (AGFD 2013a). Although bears are generally most active in the early morning and late evening, they may alter their activity pattern to exploit sources of artificial food, becoming nocturnal nuisances at campgrounds and dumpsites. AGFD data from game management unit 34a show a small increase in the number of black bears taken in the area recently (only one taken in 2003 and 2004; two harvested in 2005; four harvested in 2006; and five in 2007).

Black bears are both wide-ranging and secretive and thus are difficult to census with any degree of accuracy (Forest Service 2011). As a result, no attempts are made to survey for bears on the Coronado National Forest. Across the forest, habitat is of sufficient quality and abundance to allow the species to be well distributed across Federal lands. Historic habitats remain occupied, although the population fluctuates within occupied habitats based on the availability of forage. No population trends can be detected, although it is generally believed that poor mast crops over the past several years have led to a decrease in the carrying capacity for bears on the Coronado National Forest. A current forest-wide population estimate is not available, but the range of the species on the Coronado National Forest has not changed significantly since 1986, and the population trend for this species on the forest appears to be stable.

Evaluation of Effects

The project is expected to result in a loss of suitable foraging habitat for black bear, as this species is known to use lands in and adjacent to the project area. The mine could be expected to impact movement routes commonly used by black bear. The project area falls in or adjacent to three different linkages identified by the Arizona Wildlife Linkages Assessment Workgroup (2006): (1) Linkage 92: San Xavier-Sierrita-Santa Rita, (2) Linkage 94: Rincon-Whetstone-Santa Rita, and (3) Linkage 95: Santa Rita-Empire Complex. Black bear is identified as a species using all three of these linkage zones, and as reported in Beier et al. (2007), was one of the focal species selected for this detailed analysis.

It is estimated that this species occupies 641,113 acres within the Coronado National Forest (Forest Service 1986), and there is a total of 42,077 acres of habitat (all vegetation communities) on Forest Service lands within the analysis area. All action alternatives would result in the removal of vegetation of all sizes and age classes and would change the rate of recruitment of trees, shrubs, and other vegetation. Changes in vegetation would result in corresponding reductions in food species' diversity and abundance for black bears, and so all action alternatives could result in potential direct and indirect impacts to this species. The proposed project would result in the removal of approximately 3,635 to 4,450 acres of habitat for this species (depending on which action alternative is selected). Therefore, the proposed project has the potential to directly impact approximately 0.6 percent of this species' occupied habitat across the Coronado National Forest, and it is expected that there is sufficient suitable habitat available for this species outside the area of impact. Groundwater drawdown could indirectly impact local populations through the elimination of springs and seeps in and adjacent to the project area. Noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area also could reduce use of areas adjacent to the mine. The magnitude of these impacts are uncertain but are expected to decrease as the

distance from the mine increases. Thus, all action alternatives could result in potential direct and indirect impacts to individual black bears.

It is expected that this project will impact less than 1 percent of the suitable habitat present for this species across the Coronado National Forest; thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of black bear.

Gould's Turkey (*Meleagris gallopavo mexicana*)

Habitat and Population Trends across the Coronado National Forest

This MIS is also a Forest Sensitive species; it is included in the "Threatened and Endangered Species" MIS group and was selected as such within the forest plan because it inhabits oak-grassland-riparian associations with trees of sufficient size for roosting, free water, and herbaceous material and insects during the breeding season.

Gould's turkey is distributed throughout northern Mexico and into the southwestern United States. In Mexico, populations appear to be stable and well distributed (Heffelfinger et al. 2000), but in Arizona the species occurs only in isolated pockets in the Chiricahua, Galiuro, Santa Catalina, Huachuca, Peloncillo, Santa Rita, and Pinaleño Mountains because of the reestablishment of populations in those ranges. The native turkey population on the Coronado National Forest is believed to have been extirpated during the early 1900s (with the possible exception of a small population within the Peloncillo Mountains). While no taxonomic records exist, it is likely that these birds were the Gould's subspecies (*M. g. mexicana*), based on the proximity to and connectivity between existing Gould's turkey habitats in northern Mexico and mountain ranges on the Coronado National Forest. A small but apparently stable population of Gould's turkeys has persisted in the Peloncillo, Animas, and San Luis Mountains in southeastern New Mexico. In the 1980s, agency efforts focused on the establishment of the Gould's subspecies into suitable habitats on the Coronado National Forest throughout southeastern Arizona.

This species was not observed by Russell et al. (n.d. [1977]). In 1983 and 1987, 21 turkeys were released into the Huachuca Mountains. After some initial mortality, this population has increased in numbers and distribution to the point that it appears to be self-sustaining. In 1994 and 1997, 67 turkeys trapped in Mexico were released in the Galiuro Mountains, but the released birds suffered high mortality. In March 2000, these efforts to reestablish Gould's turkeys were formalized under the auspices of the "Southeastern Arizona Turkey Management Plan," a cooperative effort among the Coronado, AGFD, Bureau of Land Management, Fort Huachuca, and the National Wild Turkey Federation. The goal of this plan is to establish self-sustaining populations of Gould's turkeys throughout southeast Arizona (Heffelfinger et al. 2000). Recent releases include 38 turkeys in the Santa Rita Mountains and 15 turkeys in the Pinaleño Mountains (National Wild Turkey Federation 2006).

Beginning in 2005 and again in 2008, Gould's turkeys were released into the Santa Rita Mountains, and these birds appear to be surviving well (Forest Service 2011). Gould's turkey populations on the Coronado National Forest have increased since 1986, and increases since 1990 have been the result of natural reproduction and ongoing transplant efforts. Habitat on the Coronado National Forest is of sufficient quality and distribution to allow the population to increase. Breeding Bird Survey population trend data are not available for this species (Sauer et al. 2012); however, the population trend for this species on the Coronado National Forest appears to be upward due to recent release efforts (Forest Service 2011).

Evaluation of Effects

There are no data on the acres of currently occupied habitat for this species on the Coronado National Forest (Forest Service 1986); however, the Santa Rita Mountains represent only one of seven occupied mountain ranges on the Coronado National Forest. Because turkeys have become more widespread on the Coronado National Forest since releases occurred, it is likely that at least a portion of the analysis area represents occupied habitat for Gould's turkeys. All action alternatives would result in the removal of vegetation of all sizes and age classes and would change the rate of recruitment of trees, shrubs, and other vegetation. Changes in vegetation (particularly to the oak-grassland and riparian communities) would result in corresponding reductions in food species diversity and abundance. Furthermore, groundwater drawdown could indirectly impact the reestablished local population of Gould's turkey through the elimination of springs and seeps in and adjacent to the project area, which in turn could negatively impact reproductive success. Noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area also could reduce use of areas adjacent to the mine. The magnitude of these impacts are uncertain but are expected to decrease as the distance from the mine increases. Thus, all action alternatives could result in potential direct and indirect impacts to individual Gould's turkeys.

It is likely that all action alternatives could be expected to result in locally detectable changes in the population of Gould's turkey; the analysis area represents a portion of one out of the seven occupied mountain ranges available Forest-wide. As such, it is likely that effects on Gould's turkey habitat would be too small to alter Forest-wide habitat and population trends.

Gray Hawk (*Asturina nitida maxima* [=*Buteo plagiatus*])

Habitat and Population Trends across the Coronado National Forest

Gray hawks are included in the "Riparian Species," "Species Needing Dense Canopy," and "Special Interest Species" indicator groups. The species was selected because of its need for "cottonwood (*Populus* spp.) and sycamore (*Platanus* spp.) galleries with adjacent mesquite bosques or uplands." It was considered "sensitive to grazing, fuelwood harvest, and concentrated recreation use such as off- road vehicles and campgrounds." The analysis of the management situation for the forest plan (Forest Service 1986) estimated the Forest-wide population as two breeding pairs and gave an estimate of 567 acres of occupied habitat, including 207 acres of desert grasslands and 180 acres each of broadleaf evergreen woodlands and dry desert riparian vegetation communities.

Southern Arizona serves as the northernmost edge of this species' range. Historically, gray hawks may have nested as far north as the Gila River, but in low numbers. They occur in Arizona and are distributed south throughout Central America, and into South America (Bibles et al. 2002). Gray hawks primarily feed on lizards such as whiptails (*Cnemidiphorus* spp.) and spiny lizards (*Sceloporus* spp.), but they will also take birds and small mammals as prey. Foraging primarily occurs in mesquite and cottonwood-willow forests. Nesting generally occurs in riparian trees, including cottonwood; also willow, Arizona walnut (*Juglans major*), ash (*Fraxinus* spp.), and Arizona white oak (*Quercus arizonica*) (Bibles et al. 2002). Sites on the Coronado National Forest also include more open stands of cottonwood, sycamore, and Madrean oaks with adjacent mesquite uplands (Forest Service 2011). Nests are fairly small, constructed mainly of live, leafy twigs and filled with green leafy materials. One to four eggs are laid and incubated for 32 to 34 days. Young begin to move around and outside the nest at approximately 42 days post-hatching, and fledging takes place soon after (Bibles et al. 2002).

Gray hawks nest in very low numbers on the Coronado National Forest. No organized survey protocol is in place, but known nest sites are visited on an annual basis and nesting activity is reported. Between 1999 and 2005, an estimated four to six occupied nests were documented on the Nogales Ranger

District (Forest Service 2011). Nesting activity is tracked through the Arizona Heritage Data Management System. While the number of nesting birds is too small to make any meaningful assessment of population trend, it appears that the limited suitable habitat on the Coronado National Forest is occupied and that more birds are nesting on the Coronado National Forest than in 1986 (Forest Service 2011). Corman and Wise-Gervais (2005) indicate that while gray hawk numbers in Arizona declined in the early 1900s, by the mid-1900s numbers were increasing and gray hawks were once again considered fairly common by 1970. From 1993 to 2000, Breeding Bird Surveys indicated that gray hawk numbers in Arizona continued to rise, and their distribution spread farther north, as far as Pinal Creek in Gila County.

The background information for the forest plan does not indicate how the quantity of occupied habitat was derived, so it is difficult to determine changes in habitat quantity for the species. According to the Breeding Bird Survey, population trend data are not available for this species (Sauer et al. 2012), but based on the apparent increase in nesting birds on the Coronado National Forest, habitat trends are presumed to be stable or improving (Forest Service 1986). Glinski (1998a) estimated 80 breeding pairs of gray hawks in Arizona. On a global scale, the gray hawk is considered demonstrably secure with more than 100 occurrences.

Evaluation of Effects

Preferred habitats for gray hawks are generally found in lower-elevation river valleys like the San Pedro River, Sonoita Creek, and the Santa Cruz River. There is little potential for these types of habitats to exist on the Coronado National Forest, except in isolated pockets at lower elevations (Forest Service 2011). Bibles et al. (2002) indicate that gray hawks generally use areas in Arizona that fall between 1,960 and 4,590 feet in elevation, which is below the majority of the project area elevation range (4,340 to 6,610 feet).

It is estimated that this species occupies 567 acres within the Coronado National Forest (Forest Service 1986), and there is a total of 555 acres of hydroriparian vegetation type on Forest Service lands within the analysis area. It is very likely that not all 555 acres within the project area actually support gray hawks, due to its exceeding desired elevations, its plant composition, and the possibility that hawks nesting near Coronado National Forest lands use small portions of drainages, rather than having their entire territories on-Forest. However, a review of county maps, Forest maps, and Arizona Breeding Bird Survey data (Corman and Wise-Gervais 2005) indicates that the majority of documented breeding of gray hawks occurs in Santa Cruz County, rather than Pima County. Block locations indicate that there may be 2 breeding pairs located within or near the project area, while there are likely 10 to 12 pairs within the Santa Cruz County portion of the Nogales Ranger District and into the nearby Huachuca Mountains.

Direct impacts on the northern gray hawk are not anticipated as a result of the proposed project or the construction of the connected actions for all action alternatives because there are no known occurrences of this species within these areas. The proposed project would result in the removal of approximately 105 to 181 acres of habitat for this species (depending on which action alternative is selected). Therefore, the proposed project has the potential to directly impact approximately 18 to 32 percent of this species' occupied habitat across the Coronado National Forest; however, it is unlikely that all these areas are occupied. Due to these potential effects, there is a possibility of a detectable change in local populations; however, due to the occurrences of this species in several mountain ranges and an overall increasing population in Arizona, it is likely that the Forest-wide population will remain stable.

It is possible that this project would impact 18 to 32 percent of the suitable habitat present for this species across the Coronado National Forest; however, it is unlikely that all these areas are occupied. While localized population changes may occur, none of the action alternatives are expected to result in detectable changes in the Coronado National Forest–wide population of gray hawks.

Montezuma Quail (*Cyrtonyx montezumae*)

Habitat and Population Trends across the Coronado National Forest

Montezuma quail are an indicator for the "Species Needing Herbaceous Cover" and "Game Species" MIS groups in the forest plan. Montezuma quail are the largest and most secretive of Arizona's quail species (AGFD 2013a). It forms fall and winter coveys that are likely to remain in the same general area where they were raised. Montezuma quail prefer oak woodlands and oak savannas in the southeastern portions of the state, where grass cover is abundant. The maintenance of grass height over 6 inches is necessary to provide sufficient cover for the birds to hide from predators. Although Montezuma quail populations are considered to be highly correlated with the amount and timing of summer precipitation, high levels of grazing or other activities that decrease herbaceous production, especially during the growing season, have also been shown to have negative impacts to the Montezuma quail as a result of the decrease in cover (Brown 1982).

Montezuma quail nest only after the monsoon and often postpone breeding until after the summer solstice, when the days start getting shorter (AGFD 2013a). They generally demonstrate high hatching success, and their highly fluctuating numbers are determined largely by how many birds survive the winter, as this species typically experiences relatively high winter mortality. Since 1979, harvested quail numbers and hunter interest have decreased, causing some hunters and wildlife managers to wonder whether a long-term decline in quail numbers may have occurred. This species was observed by Russell et al. (n.d. [1977]:184), who described this species as a "common resident of oak-juniper woodland; breeds. Usually encountered in flocks of 10-12, apparently family groups. One flock of young birds . . . in oak-juniper woodland. Census data do not accurately reflect abundance or presence of this species due to secretive habits (tendency to flush only when approached within several meters, and flocking behavior)."

Effective techniques for measuring Montezuma quail abundance are lacking, and unlike Gambel's, scaled, and masked bobwhite quail, Montezuma quail cannot be reliably censused using breeding season call counts (Forest Service 2011). AGFD has collected harvest data from quail hunters in selected canyons since approximately 1980, and since 1987, harvest data have been collected annually by AGFD via a small-game mail questionnaire. Harvests have fluctuated widely, with no discernible long-term trend. According to the Breeding Bird Survey, population trend data are not available for this species Sauer et al. (2012); however, the population trend for this species on the Coronado National Forest appears to be stable (Forest Service 2011).

Evaluation of Effects

It is estimated that this species occupies 225,410 acres within the Coronado National Forest (Forest Service 1986), and there is a total of 17,141 acres of habitat (all vegetation types) on Forest Service lands between elevations of 3,500 to 5,500 feet within the analysis area. All action alternatives would result in the removal of vegetation of all sizes and age classes and would change the rate of recruitment of trees, shrubs, and other vegetation. The proposed project would result in the removal of approximately 1,346 to 2,146 acres of habitat for this species (depending on which action alternative is selected). Therefore, the proposed project has the potential to directly impact approximately 0.6 to 1.0 percent of this species' occupied habitat across the Coronado National Forest. Changes in vegetation would result in corresponding reductions in food species' diversity and abundance. Further, groundwater drawdown could indirectly impact the local population of Montezuma quail through the elimination of springs and seeps in and adjacent to the project area, which in turn could negatively impact reproductive success. Noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area also could reduce use of areas adjacent to the mine. The magnitude of these impacts are uncertain but are expected to decrease as the distance from the mine increases. All action alternatives could result in

potential direct and indirect impacts to individual Montezuma quail; however, it is expected that there is sufficient suitable habitat available for this species outside the area of impact.

It is expected that this project will impact no more than 1.0 percent of the suitable habitat present for this species across the Coronado National Forest; thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of Montezuma quail.

Northern Beardless-Tyrannulet (*Camptostoma imberbe*)

Habitat and Population Trends across the Coronado National Forest

This species is included in the "Riparian Species," "Species Needing Dense Canopy," "Special Interest Species," and "Threatened and Endangered Species" MIS groups for the Coronado National Forest. Northern beardless-tyrannulet inhabits relatively open riparian woodland and heavily wooded dry washes in southeastern Arizona (Corman and Wise-Gervais 2005). During the research period for the "Arizona Breeding Bird Atlas," they were reported primarily from lowland riparian woodlands with Fremont cottonwood (*Populus fremontii*) and Goodding's willow (*Salix gooddingii*) stands, but they also were found fairly regularly in intermittent foothill drainages and dry washes with stands of tall netleaf hackberry (*Celis laevigata* var. *reticulata*). Most tyrannulets are migratory and return to breeding areas in early to mid-March, with the earliest nest building reported on April 12. Peak nesting for this species is early May through late June at elevations from 1,920 to 4,600 feet. They were found nesting along the San Pedro River and its tributaries, Arivaca Creek, Sonoita Creek, upper Santa Cruz River, and in wooded foothill drainages of the Baboquivari, Atascosa, Santa Rita, and Santa Catalina Mountains. This species was observed in lower Barrel Canyon in the Rosemont area during surveys (using transect methods) conducted by Russell et al. (n.d. [1977]).

On a global scale and state scale, the northern beardless-tyrannulet is considered demonstrably secure, with more than 100 occurrences, although it could be considered quite rare in some areas (Forest Service 2010). Population trend data are not displayed for this species in the North American Breeding Bird Survey database (Sauer et al. 2012). The general breeding distribution has changed little since the 1990s (Corman and Wise-Gervais 2005). There are not sufficient data to determine population trends on the Coronado National Forest, but optimal habitats are very limited, primarily because much of the forest is above the elevational range of the species (Forest Service 2011).

Evaluation of Effects

It is estimated that this species occupies 1,270 acres within the Coronado National Forest (Forest Service 1986), and there is a total of 524 acres of riparian habitat (all riparian vegetation types) on Forest Service lands at elevations ranging from 1,920 to 4,600 feet within the analysis area. All action alternatives would result in the removal of vegetation of all sizes and age classes within riparian areas and would change the rate of recruitment of trees and large shrubs in riparian areas. The proposed project would result in the removal of between 21 and 34 acres of habitat for this species (depending on which action alternative is selected); therefore, the proposed project has the potential to directly impact between 1.6 and 2.7 percent of this species' occupied habitat across the Coronado National Forest. Further, groundwater drawdown could indirectly impact the local population of northern beardless-tyrannulets through the elimination of springs and seeps in and adjacent to the project area, which in turn could negatively impact reproductive success. Noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area also could reduce use of areas adjacent to the mine. The magnitude of these impacts are uncertain but are expected to decrease as the distance from the mine increases. All action alternatives could result in potential direct and indirect impacts to individual northern beardless-tyrannulets; however, it is expected that there is sufficient suitable habitat available for this species outside the area of impact.

It is expected that this project will impact less than 3 percent of the suitable habitat present for this species across the Coronado National Forest; thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of northern beardless-tyrannulet.

Primary and Secondary Cavity Nesters

Habitat and Population Trends across the Coronado National Forest

Primary and secondary cavity nesters may potentially occupy oak trees in the project area. In general, cavity nesters require large, older age class trees and snags (and columnar cacti where they occur). Activities that affect cavity nesters are those that change the rate of regeneration of cavity-forming trees. Although much of the project area contains few trees of sufficient size to provide potentially suitable cavities, owls, woodpeckers, flycatchers, and other birds known to nest in cavities may be present in the project area on Forest Service lands. Many of these species (including the western screech owl (*Megascops kennicottii*), elf owl (*Micrathene whitneyi*), flicker, Gila woodpecker (*Melanerpes uropygialis*), American kestrel (*Falco sparverius*), and ash-throated flycatcher (*Myiarchus cinerascens*)) were observed by Russell et al. (n.d. [1977]).

No monitoring of cavity nesting birds as a group occurs on the Coronado National Forest (Forest Service 2011). North American Breeding Bird Survey information for the Cavity Nester group in Arizona from 1966 to 2011 show statistically insignificant declines for mountain bluebird (*Sialia currucoides*), Gila woodpecker, Bewick's wren (*Thryomanes bewickii*), northern flicker (*Colaptes auratus*), and ladder-backed woodpecker (*Picoides scalaris*); statistically significant declines for purple martin (*Progne subis*), gilded flicker (*Colaptes chrysoides*), and American kestrel; statistically insignificant increases for the juniper titmouse (*Baeolophus ridgwayi*), white-breasted nuthatch (*Sitta carolinensis*), violet-green swallow (*Tachycineta thalassina*), Lucy's warbler (*Oreothlypis luciae*), ash-throated flycatcher, and western bluebird (*Sialia mexicana*); and statistically significant increases for house wren (*Troglodytes aedon*), brown-crested flycatcher (*Myiarchus tyrannulus*), and acorn woodpecker (*Melanerpes formicivorus*) (U.S. Geological Survey 2013a). Data were not available for all other primary or secondary cavity nesters in Arizona for this time frame. There has also been a substantial, but unquantified, increase noted in potential habitats (snags) for high-elevation cavity-nesters across the Coronado National Forest (Forest Service 2011).

Evaluation of Effects

Due to the diversity of species and habitat requirements within this species group, there are no data on the acres of currently occupied habitat for this group on the Coronado National Forest (Forest Service 1986). Due to the recent history of large wildfires affecting the Coronado National Forest, including the Aspen (2003) and Bullock (2002) fires, Nuttall Complex (2004), Horseshoe Fire (2011), and the Murphy Fire (2011), as well as periodic insect outbreaks, there is widespread presence of snags across the Coronado National Forest. All action alternatives would result in the removal of vegetation of all sizes and age classes containing snags and other cavities that would result in a decrease in the density and numbers of oaks and other large, woody plants in the project area. All action alternatives also would change the rate of recruitment of trees and large shrubs, resulting in potential direct and indirect impacts to any cavity-nesting species that may occur in the analysis area. Although the mining plan calls for mitigation and reclamation options, none of these would provide cavity-bearing trees for at least 20 years.

The acreage of occupied habitat for these species on the Coronado National Forest is unknown because of a lack of data; however, due to natural processes such as wildfire and insect outbreaks, it is highly unlikely that the presence of snags is a limiting factor for this MIS species group. As a result, the action alternatives may result in localized population-level changes for primary and secondary cavity nesters, but alteration of Coronado National Forest–wide populations is not expected.

Western Barking Frog (*Craugastor augusti cactorum*)

Habitat and Population Trends across the Coronado National Forest

This species is included in the "Threatened and Endangered" MIS group in the forest plan. In Arizona, the western barking frog is typically found on limestone, rhyolite, granite, and other rock outcrops or caves on the hillsides of canyons within Madrean evergreen woodland and woodland-grassland ecotones (AGFD 2009). It is sometimes also found in yucca-covered hills, brushy woodlands, open pine forests, juniper-live oak woodland, and low, dense clumps of cactus (Stebbins 2003). It occurs in Cochise and extreme southern Pima and Santa Cruz Counties (Quinlan, Santa Rita, Patagonia, Huachuca, and Pajarito Mountains) at elevations between 4,200 and 6,200 feet (AGFD 2009). It is not known whether any recent surveys have been conducted within or adjacent to the project area. These secretive, terrestrial frogs are nocturnal, spending the day under rocks or in mines, wells, caves, or fissures (Stebbins 2003). Permanent water is not necessary, even for breeding, as the species lacks an aquatic larva. In Arizona, they call from their hiding spots (e.g., crevices) for only 2 to 4 weeks on rainy nights after the start of the summer monsoons in late June or July (AGFD 2009). Their diet consists of a variety of invertebrates, including crickets, scorpions, silverfish, centipedes, kissing bugs, grasshoppers, spiders, ant lions, and katydids.

On a global scale, the western barking frog is considered apparently secure, with more than 100 occurrences, although it could be quite rare in some areas (Forest Service 2011). On a state scale, the species is very rare, with one to five occurrences in Arizona (Forest Service 2010). Limestone and rhyolite rock outcrops are common and well distributed throughout the Coronado National Forest, although no attempts have been made to quantify their extent (Forest Service 2011). These habitats are not affected to any degree by management activities and are assumed to be present in the same amount as in 1986. The few known populations appear to be persisting, although small and isolated, so stochastic events could threaten their persistence.

Evaluation of Effects

The proposed project may impact the western barking frog as a result of destruction or alteration of rocky outcrop habitat. It is estimated that this species occupies 891 acres within the Coronado National Forest (Forest Service 1986), and there is a total of approximately 29 acres of talus slopes and rock outcrops within the analysis area. The proposed project would result in the removal of between 5 and 6 acres of habitat for this species (depending on which action alternative is selected); therefore, the proposed project has the potential to directly impact approximately 0.6 to 0.7 percent of this species' occupied habitat across the Coronado National Forest. All action alternatives could result in potential direct and indirect impacts to western barking frogs. Individual frogs may be crushed during mine construction and operations, especially in the area proposed for the open pit or on roadways. All action alternatives would result in the removal and disturbance of rock outcrops, and these changes would result in corresponding reductions in food species' diversity and abundance (i.e., invertebrates). Noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area also could reduce use of areas adjacent to the mine. The magnitude of these impacts are uncertain but are expected to decrease as the distance from the mine increases.

It is expected that this project will directly impact less than 1 percent of the suitable habitat present for this species across the Coronado National Forest; thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of western barking frog.

White-tailed Deer (*Odocoileus virginianus*)

Habitat and Population Trends across the Coronado National Forest

White-tailed deer are included in the "Species Needing Diversity" and "Game Species" MIS groups in the forest plan. White-tailed deer are most common in the state's southeastern mountains. They require areas of predictable summer precipitation and are most abundant in oak woodlands and chaparral-covered hillsides with oaks and pines (AGFD 2013a). While more resilient than mule deer to hunting pressure, white-tailed deer is less drought tolerant. In Arizona's southern mountain ranges, they are generally found at higher elevations and in rougher country than mule deer. White-tailed deer will use a variety of habitats but prefer areas of thicker cover with freestanding water; thus, they likely benefit from the current presence of stock tanks and springs in the project area. Large-scale vegetation removal prior to and during the fawning period reduces hiding cover and may reduce fawn survival and recruitment (Ockenfels et al. 1991). Unlike mule deer, white-tailed deer rarely form herds, and most observations are of fewer than six animals (AGFD 2013a). Shrubs constitute the majority of the diet, although forbs are seasonally important.

The project area falls within AGFD game management unit 34A, which includes all of the Forest Service lands within the Santa Rita Mountains and surrounding lands from Sahuarita Road south to Nogales and west to Interstate 19 and east to State Routes 82 and 83 (AGFD 2013a). AGFD (2013a) data from game management unit 34a show an increase in the number of white-tailed deer taken in the area for 2007, compared with data from 2003 through 2006 (43 bucks, does, and fawns taken in 2003; 22 total in 2004; 31 total harvested in 2005; 5 in 2006; and 62 total in 2007).

The data are collected on the basis of a game management unit, but the majority of white-tailed deer habitat in southeastern Arizona is found on the Coronado National Forest (Forest Service 2011). The forest plan identifies 1,430,071 acres of occupied habitat for white-tailed deer (Forest Service 1986), and the amount of occupied habitat has not changed significantly since 1986. The white-tailed deer statewide population trended slightly downward through the mid-1990s but has recovered somewhat since then. This trend is thought to be related primarily to changes in the amount and timing of precipitation since the mid-1990s and the subsequent effects on fawn survival. White-tailed deer on the Coronado National Forest have followed this trend. Harvest levels (a rough surrogate for population levels) have trended upward since approximately 2001.

Evaluation of Effects

All action alternatives could result in potential direct and indirect impacts to white-tailed deer. The project may result in a loss of important foraging and fawning habitat for this species. It is possible that groundwater drawdown could indirectly impact the local population of white-tailed deer through the elimination of springs and seeps in and adjacent to the project area, which in turn could negatively impact reproductive success. It is estimated that this species occupies 1,430,071 acres within the Coronado National Forest (Forest Service 1986), and there is a total of 42,077 acres of habitat within the analysis area. The proposed project would result in the removal of approximately 3,635 to 4,450 acres of habitat for this species (depending on which action alternative is selected). Therefore, the proposed project has the potential to directly impact approximately 0.3 percent of this species' occupied habitat across the Coronado National Forest.

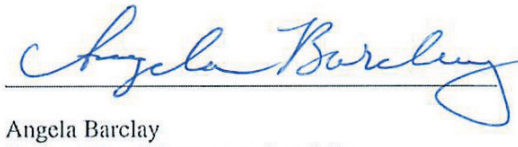
Noise, vibration, artificial night lighting, dust and air pollutants, and increased traffic on roads resulting from mine construction and operation, transportation, and connected actions within the analysis area also could reduce this species' use of areas adjacent to the mine. The mine could be expected to impact movement routes commonly used by white-tailed deer. The project area falls in or adjacent to three different linkages identified by the Arizona Wildlife Linkages Assessment Workgroup (2006):

(1) Linkage 92: San Xavier-Sierrita-Santa Rita, (2) Linkage 94: Rincon-Whetstone-Santa Rita, and (3) Linkage 95: Santa Rita-Empire Complex. White-tailed deer is identified as a species using Linkages 94 and 95, and as reported in Beier et al. (2007), white-tailed deer was one of the focal species selected.

It is expected that this project will directly impact approximately 0.3 percent of the suitable habitat present for this species across the Coronado National Forest; thus, all action alternatives are not expected to result in detectable changes in the Coronado National Forest–wide population of white-tailed deer.

This page intentionally left blank.

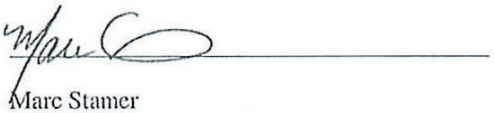
Prepared By:



Date: 12/13/2013

Angela Barclay
Senior Natural Resources Specialist
SWCA Environmental Consultants

Reviewed and Approved By:



Date: 12/13/2013

Marc Stamer
Wildlife and Rare Plant Program Manager
Coronado National Forest

This page intentionally left blank.

Literature Cited

Abbate, D. 2006. *Peregrine Falcon Nest Site Monitoring in Arizona: 2006 Breeding-Season Results*. Submitted to U.S. Fish and Wildlife Service. Phoenix, Arizona: Arizona Game and Fish Department, Research Branch. October.

Arizona Game and Fish Department (AGFD). 2000. *Buteo nitidus maximus*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2001a. *Trogon elegans*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2001b. *Pachyramphus aglaiae*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2001c. *Ammodramus bairdii.* Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2001d. *Crotalus willardi willardi*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2001e. *Oncorhynchus apache.* Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2001f. *Gila ditaenia.* Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2002a. *Vireo bellii arizonae*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2002b. *Falco peregrinus anatum*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2002c. *Antilocapra americana mexicana*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2002d. *Antilocapra americana sonoriensis*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2002e. *Meda fulgida*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2003a. *Empidonax fulvifrons pygmaeus*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2003b. *Campostoma ornatum*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2009. *Craugastor augusti cactorum.* Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2010. *Tyrannus crassirostris*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2011. *Tamiasciurus hudsonicus grahamensis*. Unpublished abstract compiled and edited by the Heritage Data Management System.

———. 2013a. Hunting in Arizona. Available at: http://www.azgfd.gov/h_f/hunting.shtml. Accessed July 17, 2013.

———. 2013b. Helping a Remnant Bighorn Sheep Population Survive. Available at: http://www.azgfd.gov/w_c/research_silverbell_bighorn.shtml. Accessed July 17, 2013.

Arizona Wildlife Linkages Assessment Workgroup. 2006. *Arizona's Wildlife Linkages Assessment*.

Beier, P., D. Majka, and T. Bayless. 2007. *Arizona Missing Linkages: Rincon–Santa Rita–Whetstone Linkage Design*. Rev. Submitted to Arizona Game and Fish Department. School of Forestry, Northern Arizona University. May 30.

Bibles, B.D., R.L. Glinski, and R.R. Johnson. 2002. Gray Hawk (*Buteo plagiatus*), The Birds of North America Online. (A. Poole, Ed.). Available at: http://bna.birds.cornell.edu/bna/species/652/articles/introduction. Accessed August 5, 2013.

Brennan, T.C., and A.T. Holycross. 2006. *A Field Guide to Amphibians and Reptiles in Arizona*. Phoenix, Arizona: Arizona Game and Fish Department.

Brown, D.E. (ed.). 1994. *Biotic Communities: Southwestern United States and Northwestern Mexico*. Salt Lake City, UT: University of Utah Press.

Brown, R.L. 1982. Effects of livestock grazing on Mearns quail in southeastern Arizona. *Journal of Range Management* 35(6):727–732.

Corman, T.E., and C. Wise-Gervais. 2005. *Arizona Breeding Bird Atlas*. Albuquerque: University of New Mexico Press.

eBird. 2013. Gray Hawk. Available at: http://ebird.org/ebird/map/gryhaw2?neg=true&env.minX=-111.10168211441555&env.minY=31.633757975901105&env.maxX=-110.22277586441555&env.maxY=32.003086157805086&zh=true&gp=false&mr=1-12&bmo=1&emo=12&yr=1900-2013&byr=1900&eyr=2013. Accessed June 10, 2013.

Glinski, R.L. 1998a. Gray Hawk: *Buteo nitidus*. In *The Raptors of Arizona,* edited by R.L. Glinski. Tucson, Arizona: The University of Arizona Press.

———.1998b. Peregrine Falcon: *Falco peregrinus*. In *The Raptors of Arizona*, edited by R.L. Glinski. Tucson, Arizona: The University of Arizona Press.

Green, M.T., P.E. Lowther, S.L. Jones, S.K. Davis, and B.C. Dale. 2002. Baird's Sparrow (Ammodramus bairdii), The Birds of North America Online. (A. Poole, Ed.). Available at: http://bna.birds.cornell.edu/bna/species/638/articles/introduction. Accessed August 5, 2013.

Heffelfinger, J., B. Wakeling, J. Millican, S. Stone, T. Skinner, M. Fredlake, and M. Adkins. 2000. *Southeastern Arizona Wild Turkey Management Plan*. Tucson and Sierra Vista, Arizona: Arizona Game and Fish Department, Fort Huachuca, Coronado National Forest, Bureau of Land Management, National Wild Turkey Foundation. March.

Lowther, P.E., and D.F. Stotz. 1999. Sulphur-bellied flycatcher (*Myiodynastes luteiventris*). Available at: http://bna.birds.cornell.edu/bna/species/475. Accessed December 22, 2009.

National Audubon Society. 2012. Christmas bird counts, results and analysis. Available at: http://netapp.audubon.org/CBCObservation/Historical/ResultsBySpecies.aspx?1. Accessed December 13, 2013.

National Wild Turkey Federation. 2006. State Agency, Conservation Group Restoring Wild Turkeys. Available at: http://www.nwtf.org/nwtf_newsroom/press_releases.php?id=11832. Accessed April 11, 2011.

NatureServe. 2010. Bell's Vireo. Available at: http://www.natureserve.org/explorer/servlet/NatureServe?init=Species. Accessed April 13, 2011.

Ockenfels, R.A., D.E. Brooks, and C.H. Lewis. 1991. *General Ecology of Coues White-tailed Deer in the Santa Rita Mountains: a Final Report*. Technical Report No. 6. Phoenix, Arizona: Arizona Game and Fish Department, Research Branch. August.

Pima County. 2013. GIS Layer: Riparian Habitat/IRA Underlying Classifications MapGuide. Tucson, AZ: Pima County Information Technology Department.

Russell, S.M., G.S. Mills, and J.R. Silliman. n.d. [1977]. An inventory of the birds of the Rosemont area. In *An Environmental Inventory of the Rosemont Area in Southern Arizona,* vol. 1: *The Present Environment*, edited by R. Davis and J.R. Callahan. Tucson: University of Arizona.

Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski Jr., and W.A. Link. 2012. The North American Breeding Bird Survey, Results and Analysis 1966-2011. Version 07.03.2013. Available at: http://www.mbr-pwrc.usgs.gov/bbs/. Accessed August 20, 2013.

Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians*. 2nd ed., rev. Boston: Houghton Mifflin Company.

SWCA Environmental Consultants (SWCA). 2012a. *Biological Assessment, Rosemont Copper Company Project, Santa Rita Mountains, Nogales Ranger District*. Project No. 11204. Prepared for U.S. Forest Service, Coronado National Forest. Submitted to U.S. Fish and Wildlife Service. Tucson, Arizona: SWCA Environmental Consultants. June.

———. 2012b. *Supplement to the Biological Assessment Proposed Rosemont Copper Mine Santa Rita Mountains Coronado National Forest*. Project No. 11204. Prepared for U.S. Forest Service, Coronado National Forest. Submitted to U.S. Fish and Wildlife Service. Tucson, Arizona: SWCA Environmental Consultants. October.

———. 2013a. *Biologists' Report on the Affected Environment and Identification of Species for Disclosure of Effects, Rosemont Copper Mine Project, Pima County, Arizona*. Prepared for U.S. Forest Service, Coronado National Forest. Tucson, Arizona: SWCA Environmental Consultants. December.

———. 2013b. *Biological Evaluation, Rosemont Copper Project, Santa Rita Mountains, Nogales Ranger District*. Prepared for U.S. Forest Service, Coronado National Forest. Tucson, Arizona: SWCA Environmental Consultants. December.

———. 2013c. *Migratory Bird Analysis, Proposed Rosemont Copper Mine, Nogales Ranger District, Coronado National Forest*. Tucson, Arizona: SWCA Environmental Consultants. December.

U.S. Fish and Wildlife Service. 2003. *Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act.* Portland, Oregon: Divisions of Endangered Species and Migratory Birds and State Programs, U.S. Fish and Wildlife Service. December.

———. 2013. Special Status Species List: Santa Cruz County. Available at: http://www.fws.gov/southwest/es/arizona/Documents/CountyLists/SantaCruz.pdf. Accessed September 3, 2013.

U.S. Forest Service (Forest Service). 1986. *Coronado National Forest Land and Resource Management Plan*. Albuquerque: Forest Service, Southwest Region.

———.1991. Forest Service Manual 2620.5. Available at: http://www.fs.fed.us/im/directives/fsm/2600/2620.txt. Accessed December 22, 2009. Manual dated July 19, 1991.

———. 2010. *Coronado National Forest Monitoring and Evaluation Report Trends Analysis: 1986 to 2010.* U.S. Forest Service, Coronado National Forest.

———. 2011. *Coronado National Forest Management Indicator Species Population Status and Trends*. Revised May 2011. U.S. Forest Service Southwestern Region, Coronado National Forest.

U.S. Forest Service, and SWCA Environmental Consultants (Forest Service and SWCA). 2013. *Supplement to the Biological Assessment Proposed Rosemont Copper Mine Santa Rita Mountains, Pima County, Arizona, Nogales Ranger District*. Submitted to U.S. Fish and Wildlife Service. Tucson, Arizona: U.S. Forest Service, Coronado National Forest and SWCA Environmental Consultants. February.

U.S. Geological Survey. 2013a. North American Breeding Bird Survey Species Group Summary Results - Species Group is Cavity Nesting, Period: 1966-2011, Region is ARI. Available at: http://www.mbr-pwrc.usgs.gov/cgi-bin/guild11.pl. Accessed December 17, 2013.

———. 2013b. The National Map. Available at: http://nationalmap.gov/. Accessed May 3, 2013.

Whetstone, J. 1995. *Baird's Sparrow Winter Habitat Assessment on the Grasslands of Coronado National Forest*. Sierra Vista, Arizona: U.S. Department of Interior, Bureau of Land Management. Unpublished report.