

Overview

Many species—including birds, amphibians, fish, and mammals—rely in some way on the habitat that could be impacted by the proposed action or alternatives. This habitat is important for forage, mating, protective cover, nesting and denning, and travel. Some species in the area have special protection, such as under the Endangered Species Act or the Migratory Bird Treaty Act, and other species have been given special status by the Forest Service. Wildlife impacts can occur not just from habitat loss and fragmentation, but also from artificial lighting, noise, vibration, traffic, loss of water sources, or changes in air or water quality or quantity.

3.8 Wildlife and Special Status Wildlife Species

3.8.1 Introduction

This section documents and analyzes the occurrence and distribution of wildlife species within the analysis area, including wildlife movement corridors, general wildlife, and special status wildlife species. Special status wildlife species are those listed under the ESA, and Tonto National Forest Sensitive species, as well as BLM Sensitive species, migratory birds, other species that are afforded protection within the analysis area, and species that AGFD focuses on for conservation efforts. A description of vegetation communities that serve as habitat are included in Section 3.3, Soils and Vegetation.

This section includes descriptions of the affected environment, including the occurrence and distribution of general wildlife and game species, descriptions of special habitat areas (such as important bird areas, caves, and springs), wildlife connectivity across the larger landscape, special status wildlife species, and management indicator species (which are a specific Forest Service concern). Impacts analyzed include general impacts on wildlife occurring from construction, operation, and reclamation and closure, additional impacts that are specific to wildlife groups (mammals, birds, reptiles, amphibians, and invertebrates), and impacts on special status wildlife species. Some aspects of the analysis are briefly summarized in this section. Additional details not included are captured in the project record (Newell 2018j).

3.8.2 Analysis Methodology, Assumptions, and Uncertain and Unknown Information

3.8.2.1 Analysis Area

The analysis area covers the project footprint plus a 1-mile buffer, as well as areas along Queen Creek and Devil's Canyon where groundwater drawdown or reductions in surface water could change habitat (figure 3.8.2-1). Much of the impact on species and habitat is caused by direct disturbance of the land and vegetation. The 1-mile buffer and areas of Queen Creek and Devil's Canyon was determined by using the areas where the noise analyses, water analyses (i.e., groundwater and surface water quantity/quality analyses), fugitive dust distance affecting air quality, and noxious weed introduction and spread (Foxcroft et al. 2007) indicate the potential for impacts.

According to the air quality analysis, ambient air quality standards would be achieved at the project footprint boundaries; therefore, any potential air quality impacts are encompassed within the 1-mile buffer. The noise modeling shows that for all action alternatives, noise levels at 1 mile would be at or below the level of normal human conversation; as such, the 1-mile buffer is sufficient to address potential impacts from noise-producing activities. We also expect light associated with project construction and facilities to increase night-sky brightness from 1 to 9 percent (Dark Sky Partners LLC 2018). Light impacts would occur across the landscape but available research suggests any substantial impacts would occur within the

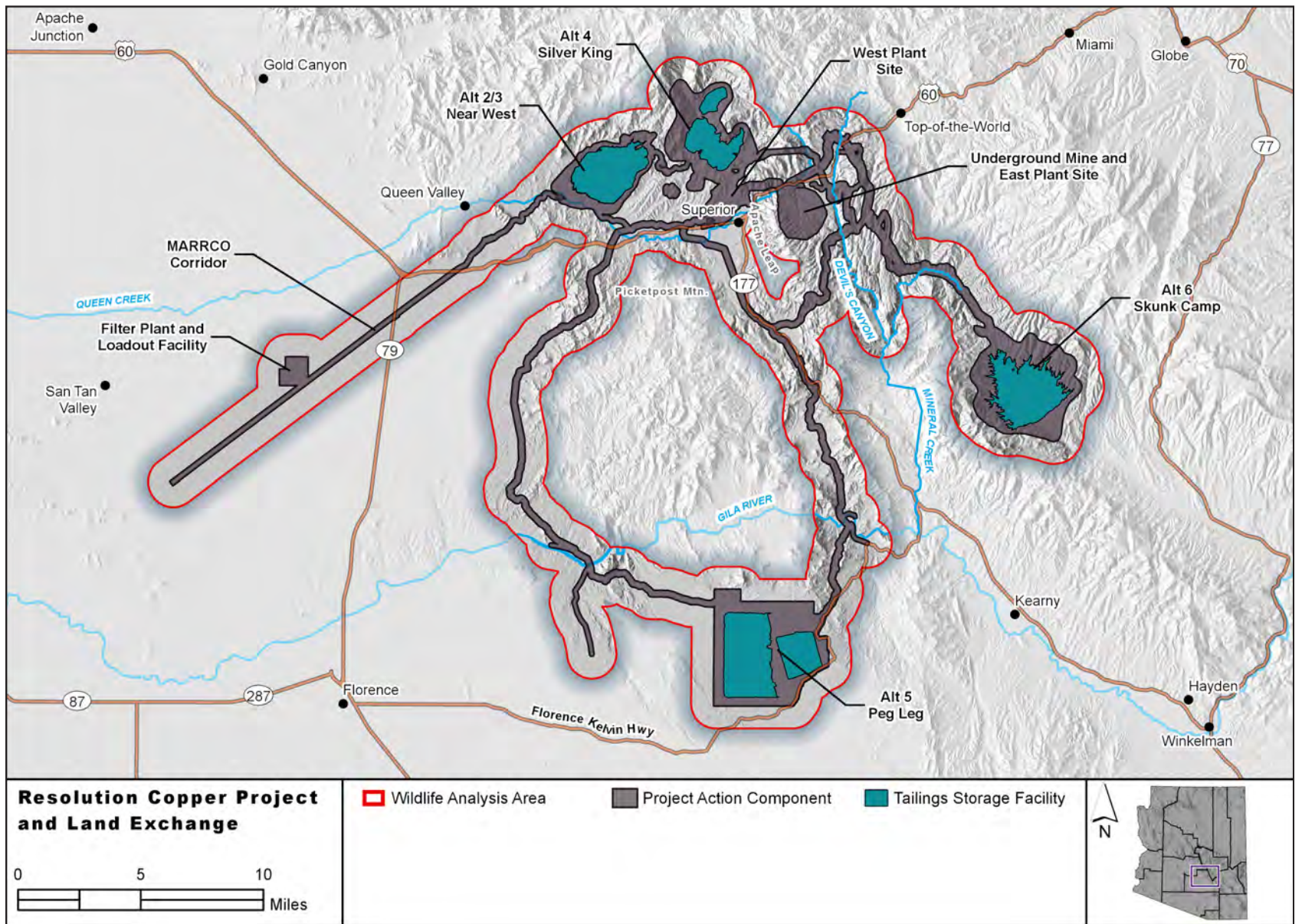


Figure 3.8.2-1. Wildlife analysis area

1-mile buffer (Newell 2018j). Species' movement corridors include areas outside the 1-mile buffer; we address potential impacts on those corridors at a landscape level.

AGFD is a cooperating agency and made species records and other information available to the Forest Service for use in the analysis. AGFD searched for records within the project footprint plus a 5-mile buffer; this information was used to determine the likelihood of occurrence of each species. This search area is greater than the analysis area and thus errs on the side of including more species records rather than less. Although the analysis area is a 1-mile buffer, data provided by the AGFD was within a 5-mile buffer and could not be clipped to the 1-mile buffer. This larger 5-mile buffer is clearly noted when it has been used.

The temporal parameters for this analysis involved the time frames for (1) construction: mine years 1 through 9, (2) operation: mine years 6 through 46, and (3) post-closure/reclamation: mine years 46 through 51 to 56, plus any additional years that are identified in other resource analysis (e.g., the groundwater analysis used to inform this section predicts out to 200 years). Construction activities would overlap operations activities for approximately 6 years.

3.8.2.2 Analysis Methodology

The goal of this analysis is to identify the potential impacts on wildlife and special status wildlife species and their habitats, from all activities associated with each project alternative. Several elements constitute the core of this analysis: (1) the factors for analysis identified during the NEPA scoping process, (2) survey and records data provided as part of this project, and (3) a scientific examination using current literature on species and how environmental changes (human or natural) affect species and their habitat.

Additional information and details, including analysis methods, species accounts, occurrence records, etc., on wildlife resources discussed in this

section can be found in the background documentation (see appendix A in Newell (2018j)). The uncertainties and unknown information, as well as assumptions, of this analysis include (1) limitations in the use of GIS data (e.g., mapping data may have inaccuracies and calculations could be an over- or underestimation); (2) lack of current scientific data on how certain environmental changes affect species; and (3) reliance on other resource analyses also furthers the assumptions, uncertainties, and unknown information stated in those sections into this analysis.

3.8.3 Affected Environment

3.8.3.1 Relevant Laws, Regulations, Policies, and Plans

The primary Federal, State, and local policies, regulations, and guidelines used to analyze potential impacts on wildlife in the project analysis area are shown in the accompanying text box and further detailed in Newell (2018j).

3.8.3.2 Existing Conditions and Ongoing Trends

General Wildlife

A wide variety of general wildlife and associated habitats is found in or within 5 miles of the analysis area of all action alternatives. Section 3.3, Soils and Vegetation, describes the associated habitats. Many of the non-game wildlife species are considered by AGFD to be Species of Greatest Conservation Need (SGCN).⁵⁷ These species mostly overlap species with Federal special status (ESA, Tonto National Forest, or BLM) and are included under the “Special Status Wildlife Species” section. Several SGCN species that do not otherwise overlap Federal special status wildlife species are also included in the “Special Status Wildlife Species” section. We used biological surveys, as well as observations pulled from the AGFD’s Heritage Data Management System data, to determine which SGCN species have occurrence records within 5 miles of the action alternatives. We then evaluated SGCN for their likelihood of occurrence in Alternatives 2 and 3 (39 known to occur, 9 possible to occur); Alternative 4 (13 known to occur, 29 possible to occur); Alternative 5 (20 known to occur, 31 possible to occur); and Alternative 6 (19 known to occur, 30 possible to occur).

Laws, Regulations, Policies, and Guidelines Used in the Wildlife Effects Analysis

- Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)
- Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703–711)
- National Forest Management Act implementing regulations (36 CFR 219.19(a)(1))
- Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668–668c)
- Bureau of Land Management – Phoenix Resource Management Plan, Las Cienegas National Conservation Area Resource Management Plan, and San Pedro Riparian National Conservation Area Resource Management Plan
- Arizona Game and Fish Department determinations of Species of Greatest Conservation Need (SGCN) occurring within the wildlife analysis area

Game Species

A wide variety of Species of Economic and Recreational Importance (SERI), game species, and associated habitat occur within 5 miles of the action alternatives and are primarily addressed in the “Recreation” and “Socioeconomics” resource sections of this chapter. Section 3.3, Soils and Vegetation, shows the associated habitats. The footprint of the analysis area is located within AGFD’s Game Management Unit (GMU) 24A and 24B, where nine game species are present. Those species

57. Species of Greatest Conservation Need is a designation used by AGFD, as a means to focus planning and conservation efforts, particularly in the State Wildlife Action Plan.

include Gambel's quail (*Callipepla gambelii*), javelina (*Pecari tajacu*), cottontail (*Sylvilagus* spp.), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), mountain lion (*Puma concolor*), bighorn sheep (*Ovis canadensis*), and tree squirrel (*Sciurus* spp.). Elk (*Cervus canadensis*) is also present in GMU 24A, but not in the portion of the GMU near or within the analysis area. Additionally, there are 10 SERI species with predicted occurrences within 5 miles of the project footprint. These species include mule deer, white-tailed deer, javelina, elk, black bear, mountain lion, Gambel's quail, mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), and band-tailed pigeon (*Patagioenas fasciata*).

Special Habitat Areas

Special habitat areas include wildlife waters; Important Bird Areas; caves, mines, and karst features; and springs (figure 3.8.3-1). More information on caves/mines/karst features and springs is available in the "Geology, Minerals, and Subsidence" and "Groundwater Quantity and Groundwater-Dependent Ecosystems" sections of this chapter, respectively, and the habitats are described by biotic community in the "Soils and Vegetation" section. The Boyce Thompson Arboretum/Arnett-Queen Creeks Important Bird Area is located within 5 miles of the action alternatives but is only within the footprint of pipeline corridor options associated with Alternative 5 (see figure 3.8.3-1).

There are 15 wildlife waters (waters built or improved specifically for wildlife such as stock tanks and wildlife guzzlers) within 5 miles of the project footprint. Of these 15 wildlife waters, three would be within the project footprint. These wildlife waters include the Benson Spring, which would be within the footprint of the tailings facility for Alternatives 2 and 3; Silver King, which would be within the tailings facility area for Alternative 4; and Mineral Mountain, which would be within the west pipeline option for Alternative 5. Additionally, the Florence #1 wildlife water is about 50 feet south of the footprint for the south pipeline option of Alternative 6.

Caves, abandoned mines, and karst features in the analysis area may provide suitable roosting habitat for bat species. There are four caves,

two mines, and four karst features within 5 miles of the project footprint. Only one of these, the Bomboy Mine, is within the project footprint. It is located within the footprint of the proposed tailings facility for Alternatives 2 and 3 (see figure 3.8.3-1). All of the remaining features are within 5 miles of all action alternatives and include the Umbrella Cave and the Superior High School Cave. Some of these features have been closed and bat gates have been installed to allow bat use of the features.

There are 338 springs mapped within 5 miles of the project footprint (see figure 3.8.3-1). This includes 24 springs and several stream segments that are considered to be groundwater dependent with the potential to be impacted by the project (see table 3.7.1-2); the specific list of groundwater-dependent ecosystems, including springs, perennial waters, and riparian areas that are believed to have a connection to regional aquifers and could potentially be impacted by the action alternatives, is the focus of the "Groundwater Quantity and Groundwater-Dependent Ecosystems" section of this chapter. Unlike the subset of springs analyzed in the "Groundwater Quantity and Groundwater-Dependent Ecosystems" section, the vast majority of springs shown in figure 3.8.3-1 were identified from available databases or literature sources and may or may not be physically present on the landscape, or they represent local seeps or springs without persistent water or a connection to regional aquifers. The wider springs inventory is included in this section because these water sources are still important to wildlife; however, many of these springs would not be impacted by project activities unless directly within the project footprint.

Wildlife Connectivity

Through resource management planning in recent years, agencies, organizations, stakeholders, academia, private citizens, and non-profit organizations all aided in identifying the important wildlife movement corridors throughout the state. During the development of the 2006 "Arizona's Wildlife Linkages Assessment" (Arizona Wildlife Linkages Workgroup 2006) and the 2013 "Pinal County Wildlife Connectivity Assessment: Report on Stakeholder Input" (Arizona Game and Fish

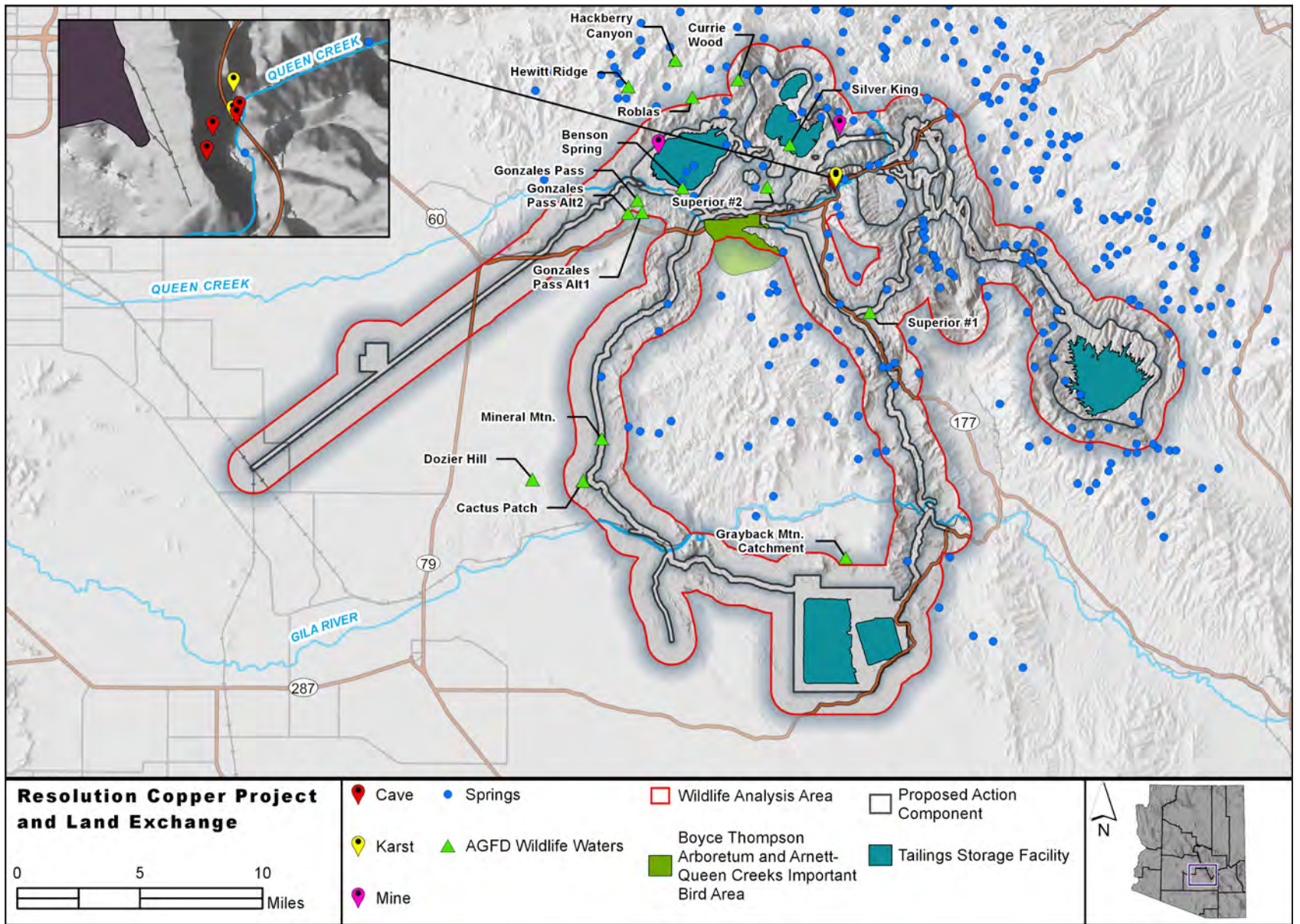


Figure 3.8.3-1. Special habitat areas, caves, mines, springs, and karst features

Department 2013), stakeholders identified numerous wildlife movement corridors, as well as natural topographic features such as canyons and washes that are used as animal movement corridors, as important to the conservation of species and their populations. Other researchers further analyzed and modeled some of these animal movement corridors to refine the best biological corridors (Beier et al. 2007). Additionally, habitat block areas were identified statewide as areas important for wildlife movement and landscape-scale connectivity. Category 1 blocks are the most intact and have no measurable human modification; Category 2 blocks are intact but may have some feature running through (Perkl 2013). Figure 3.8.3-2 depicts details of wildlife movement corridors within the vicinity of the analysis area and their geographical placement in the surrounding region. Figure 3.8.3-3 depicts landscape integrity in the vicinity of the analysis area. Additional detail can be found in the background documentation (see the “Wildlife Connectivity” section in Newell (2018j)).

Special Status Wildlife Species

For each action alternative, Federal and State special status wildlife species lists were analyzed, including the following:

- Federal
 - Endangered Species Act wildlife species listed in Pinal and Gila Counties
 - Migratory Bird Treaty Act (MBTA) species
 - Bald and Golden Eagle Protection Act (BGEPA) species
 - Tonto National Forest
 - Sensitive species
 - Migratory Bird Species of Concern
 - Management indicator species (MIS)
 - Bureau of Land Management

- Sensitive species for the Tucson Field Office
- State
 - Arizona Game and Fish Department
 - Species of Greatest Conservation Need, if they had other status listings; two SGCN-only species were addressed at the request of the cooperating agency.

Additional detail regarding which species are known to occur or may possibly occur in the analysis area can be found in the background documentation (see table 3 in Newell (2018j)).

Management Indicator Species

The Forest Service is required to maintain viable populations of native and desired non-native species by evaluating a project’s effects on selected MIS as set forth in the National Forest Management Act. Management indicator species are defined as follows: “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” (FSM 2620.5) (U.S. Forest Service 1991).

In order to meet the National Forest Management Act requirement to maintain viable populations of native and desired non-native species, MIS were selected based on a variety of criteria. In general, MIS were selected to serve as barometers of management effects on other species with similar habitat requirements. The Tonto National Forest has 30 MIS, which consist mostly of birds, to represent 30 habitat features (see table 4 in Newell (2018j)). Section 3.8.4 represents an analysis of current habitat and population trends of each MIS population within the Tonto National Forest, conducted as an interpretation of changes in populations and habitat trends since implementation of the 1985 forest plan for potential effects on MIS resulting from implementation of Tonto National Forest–approved projects. A forest-wide assessment titled

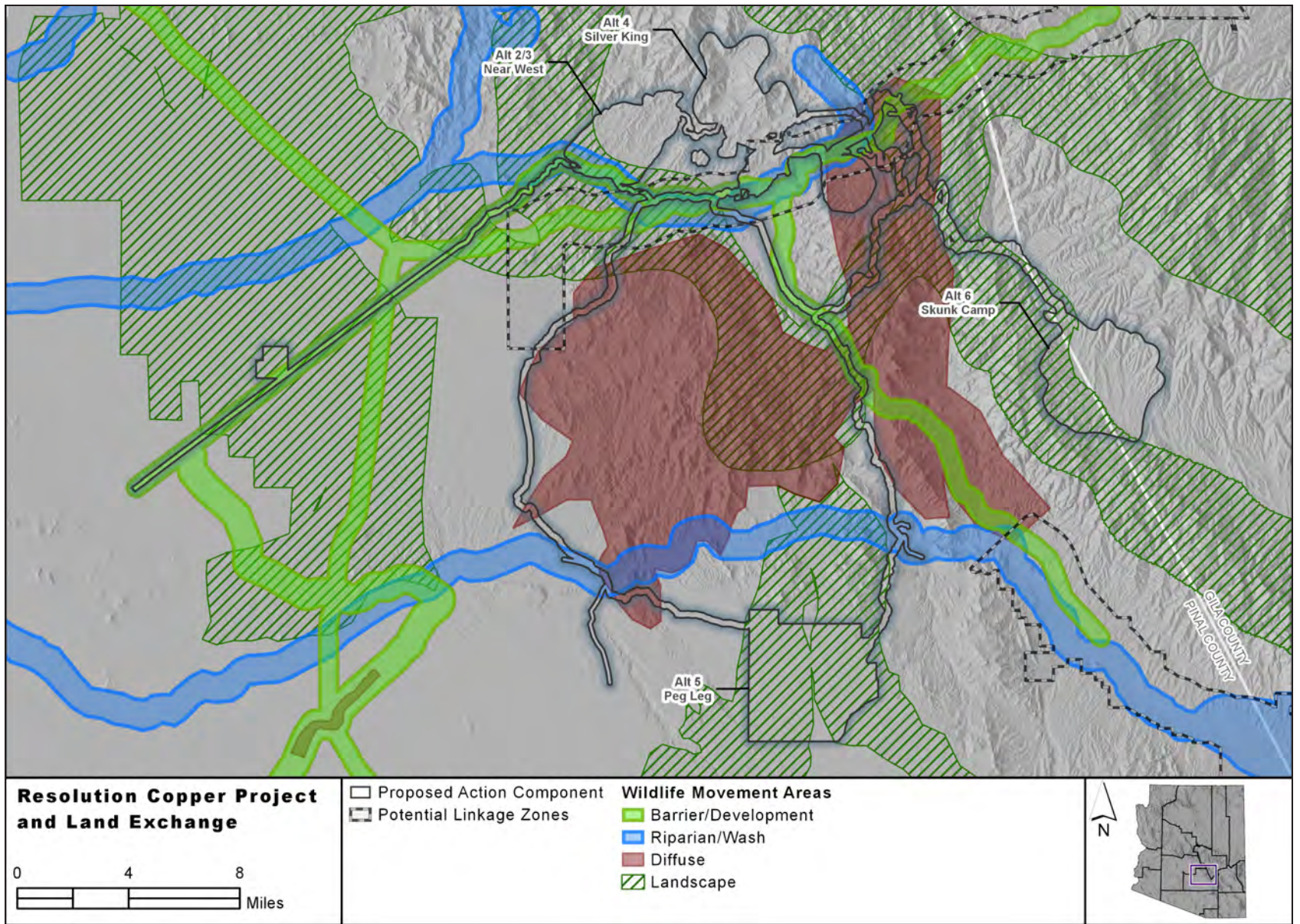


Figure 3.8.3-2. Wildlife movement areas

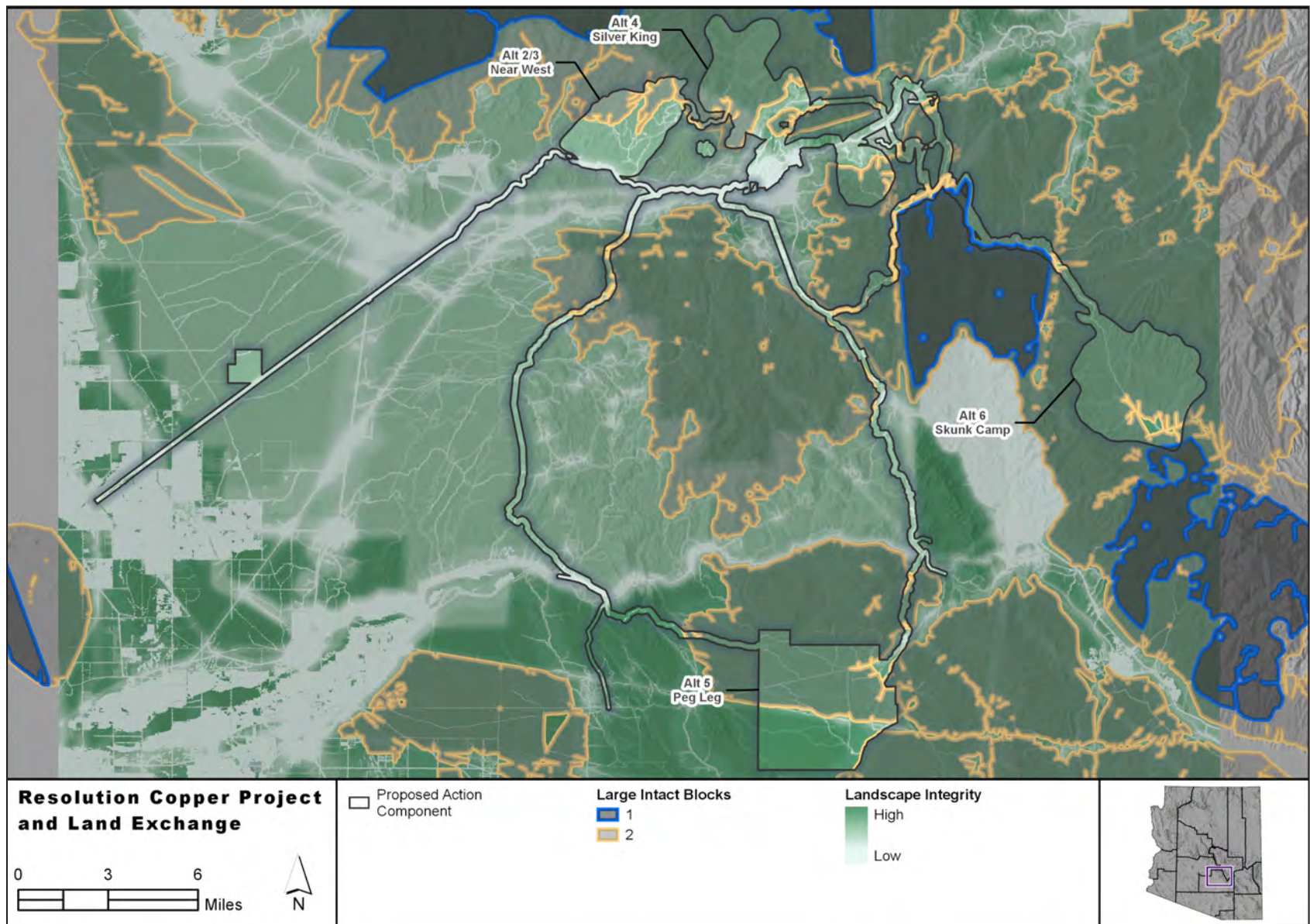


Figure 3.8.3-3. Landscape integrity

“Tonto National Forest Management Indicator Species Status Report” (Klein et al. 2005) summarizes current knowledge of population and habitat trends for MIS on the Tonto National Forest.

Habitats for a number of the Tonto National Forest MIS occur in the project area. As most MIS are not rare species, it is assumed that some individuals of each MIS associated with the habitat types in the project area are also present. Additionally, we expect that individuals of MIS associated with habitat not present within the project area have the potential to occur.

Additional detail regarding which MIS species are associated with each vegetation type or series, species trends, total acres on Tonto National Forest, and acres within the analysis area can be found in the background documentation (see table 4 in Newell (2018j)).

3.8.4 Environmental Consequences of Implementation of the Proposed Mine Plan and Alternatives

3.8.4.1 Alternative 1 – No Action Alternative

Under the no action alternative, the proposed project would not be constructed and potential impacts on wildlife resources (species and habitat) would not occur. Impacts on wildlife resources from existing disturbances (e.g., recreation, livestock grazing, mining and development, wildfires) would continue.

3.8.4.2 Impacts Common to All Action Alternatives

Effects of the Land Exchange

The selected Oak Flat Federal Parcel would leave Forest Service jurisdiction. The role of the Tonto National Forest under its primary authorities in the Organic Administration Act, Locatable Regulations (36 CFR 228 Subpart A), and Multiple-Use Mining Act is to ensure that mining activities minimize adverse environmental effects on National Forest System surface resources; this includes effects on the wildlife

resources that may occur on the Oak Flat Federal Parcel. The removal of the Oak Flat Federal Parcel from Forest Service jurisdiction negates the ability of the Tonto National Forest to regulate effects on these resources or manage them to achieve desired conditions.

The offered lands would come under Federal jurisdiction. Specific management of the wildlife resources of those parcels would be determined by the agencies to meet desired conditions or support appropriate land uses. In general, these parcels contain a variety of ecosystems similar to those that support wildlife species in the analysis area, including riparian, xeroriparian, semi-desert grassland, and desert ecosystems, that would come under Federal jurisdiction.

Effects of Forest Plan Amendment

The Tonto National Forest Land and Resource Management Plan (1985b) provides guidance for management of lands and activities within the Tonto National Forest. It accomplishes this by establishing a mission, goals, objectives, and standards and guidelines. Missions, goals, and objectives are applicable on a forest-wide basis. Standards and guidelines are either applicable on a forest-wide basis or by specific management area.

A review of all components of the 1985 forest plan was conducted to identify the need for amendment due to the effects of the project, including both the land exchange and the proposed mine plan (Shin 2019). Of all resources, wildlife have the greatest number of standards and guidelines identified in the forest plan for consideration (37). None of these standards and guidelines were found to require amendment to the proposed project, either on a forest-wide or management area-specific basis. For additional details on specific rationale, see Shin (2019).

Summary of Applicant-Committed Environmental Protection Measures

A number of environmental protection measures are incorporated into the design of the project that would act to reduce potential impacts on

wildlife. These are non-discretionary measures and their effects are accounted for in the analysis of environmental consequences.

In the GPO, Resolution Copper has committed to a variety of measures to reduce potential impacts on wildlife, including those outlined in Section 4.7, “Wildlife,” and Appendix X, “Wildlife Management Plan,” of the GPO (Resolution Copper 2016c).

- Electric power transmission and distribution line towers (power poles) that serve the Resolution Copper Project facilities will be designed and constructed to avoid raptor electrocutions.
- Some additional non-lethal harassment and scare devices to deter and disperse wildlife from the PAG tailings, non-contact and contact stormwater catchment basins, and process water ponds may also be considered and could include the following:
 - Plastic ball covers, vehicle lights and horns, motion-sensor lights, flags, perch deterrents, shell crackers, bird bangers, screamers, distress cries/electronic noise systems, bird scare balloons, propane cannons, and mylar scare tape.
 - A bird hazing protocol would be developed for Resolution Copper employees and would include a combination of harassment techniques. Additional hazing techniques may be adjusted or added as necessary based on field observations and ongoing research efforts. The protocol would include an inspection schedule, acceptable harassment techniques, a field log procedure, and incident reporting procedures. Resolution Copper staff responsible for implementing the bird hazing program would be trained on the protocol prior to its initiation.
- Vegetation growth within the contact and non-contact stormwater catchment basins and process water ponds would be monitored and periodically removed as often as necessary to further discourage the presence of wading birds.

Other applicant-committed environmental protection measures by Resolution Copper to reduce impacts on wildlife include measures adapted from previous investigations on the Tonto National Forest:

- Conducting pre-construction surveys for Sonoran desert tortoise (*Gopherus morafkai*) and Gila monster (*Heloderma suspectum*) before surface ground-disturbing activities start. A biological monitor would monitor for Sonoran desert tortoise and Gila monster during construction activities. The monitor would flag Sonoran desert tortoise and Gila monster shelter sites/burrows. These flagged areas would be inspected, and any Gila monsters and tortoises discovered would be relocated outside of project activity areas;
- Informing project crews of the potential to encounter Sonoran desert tortoise and Gila monster within the surface project area. Work crews would be instructed to check below equipment prior to moving, and to cover and/or backfill holes that could potentially entrap these species. If these species are observed, work crews would stop work until the biological monitor has relocated these species out of harm’s way; and
- Establishing tortoise crossings for concentrate and tailings pipeline corridors in areas containing habitat.

General Construction Impacts

Potential construction-related impacts from all action alternatives common to all wildlife groups, including special status wildlife species, would involve the loss, degradation, and/or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with and crushing by construction vehicles; loss of burrowing animals in burrows in areas where grading would occur; increased invasive and noxious weed establishment and spread; increased edges of vegetation blocks; and impacts from increased noise/vibration levels. Proposed construction activities would include the loss, degradation, and fragmentation of habitat for wildlife and special status wildlife species

during ground-clearing activities. Ground-clearing activities include construction of access roads, pipeline corridors, tailings facilities, and other project facilities. Construction activities would also affect adjacent habitats and connectivity between habitats as project features would create barriers to wildlife movement and dispersal.

Ground disturbance associated with construction activities may increase the potential for the introduction and colonization of disturbed areas by noxious and invasive plant species. This may lead to changes in vegetation communities and thus habitat for wildlife, including a possible shift over time to more wildfire-adapted non-native vegetation. These potential changes would impact species as habitat is modified and degraded and could decrease suitability of areas to support breeding, rearing, foraging, and dispersal of wildlife and special status wildlife species.

Temporary impacts associated with the presence of workers and equipment may cause species to avoid using work areas or adjacent habitats during construction activities. Some construction activities would overlap operations for approximately 6 years, during which noise- and vibration-producing activities would be ongoing. Potential impacts related to noise and vibration would be temporary and would diminish with the completion of construction activities.

Noise and vibration associated with construction activities may temporarily change habitat use patterns for some species. Many wildlife species rely on meaningful sounds for communication, navigation, finding food, and to avoid danger (Federal Highway Administration 2004). Some individuals would likely move away from the source(s) of the noise/vibration to adjacent or nearby habitats, which may alter or affect competition for resources within these areas. Noise/vibration and other disturbances may also lead to increased stress on individuals, impacting their overall fitness due to increased metabolic expenditures.

Additional noise and vibration impacts may include decreased immune response, hearing damage, diminished intraspecific communication, increased predation risk, and reduced reproductive success (NoiseQuest 2011; Pater et al. 2009; Sadlowski 2011). These effects would be temporary and of short duration and would diminish with the completion

of construction activities. Some species could see impacts on local populations in the action area, but no regional population level impacts are likely.

The proposed project would increase the amount of edge habitat along areas to be disturbed, especially along linear features such as pipeline corridors, electrical distribution lines, and access roads. Effects from increased amounts of edge would include decreased habitat block size. Decreased habitat block size may negatively impact those species that require large blocks of contiguous habitat and benefit other species that use edge habitats or have more general habitat requirements. In areas where there is higher vegetation density, the potential impacts from habitat fragmentation and edge effects would be greatest.

Artificial lighting associated with the construction phase of the proposed project is less defined but is assumed to be less intense than associated with the operations phase, and to vary in location and intensity through the 1- to 9-year time period. Specific impacts would be similar to those describe in the “General Operations Impacts” section; impacts on species groups are discussed in subsequent sections.

General Operations Impacts

Potential impacts on wildlife and special status wildlife species during the operations phase of all action alternatives would be associated with subsidence; potential reduction in surface water flows and groundwater availability to support riparian habitats; habitat changes from ongoing noxious and invasive weed establishment and spread; and the ongoing presence of workers and equipment.

During the operations phase of the proposed mine, there would be impacts on wildlife and special status wildlife species from subsidence. Subsidence of the ground surface is anticipated to occur at approximately 6 years after initiation of mining activities and is anticipated to continue until 41 years after initiation of mining activities (see Section 3.2, Geology, Minerals, and Subsidence).

Within the cave limit, the development of a subsidence area would change the slope, aspect, surface water flow direction and rate; surface

elevation; and would impact habitat on approximately 1,329 acres. This could lead to mortality of wildlife species individuals within the subsidence area during caving/fracture events. Within the fracture limit (1,579 acres) the potential impacts would be similar to the cave limit; however, the intensity would be decreased as this area would have reduced surface impacts. The continuous subsidence limit (1,687 acres) would have limited potential for localized impacts on vegetation communities as it would have minimal surface impacts. The entire subsidence area would be fenced for public safety and would remove the subsidence area as habitat for some wildlife and special status wildlife species. Smaller species and avian species would be able to use the subsidence area as habitat.

Potential water usage associated with operation of all action alternatives would reduce water in the regional aquifer and may reduce surface water and groundwater levels downstream of the mine in Devil's Canyon and Queen Creek. Surface water amounts would be reduced, and timing/persistence of surface water would decrease. These potential decreases in groundwater and surface water would occur over a long period of time but could cause changes in riparian vegetation extent or health, and the potential reduction in stream flow could impact species that use these riparian areas during portions of their life cycle. Potential impacts may reduce or remove available habitat for wildlife and special status wildlife species and impact individuals in localized areas along Devil's Canyon and Queen Creek, or around springs. These impacts are not anticipated to affect flow regimes or riparian habitat along the Gila River (see section 3.7.1 for a more detailed discussion of impacts on groundwater-dependent ecosystems and riparian areas).

We do not anticipate any impacts on wildlife or special status wildlife species from water quality impacts at any of the tailings locations during operations, as any stormwater that comes in contact with the tailings piles would be contained in the tailings facilities or in seepage ponds downstream. It is possible that avian species could use the seepage ponds. We expect concentrations of some constituents in the seepage ponds to be above chronic exposure limits and some acute exposure limits from some constituents under all action alternatives (cadmium, copper, nickel, selenium, zinc, and silver). This could lead to short- and

long-term impacts on some avian species if they are exposed to water from the seepage ponds; the potential to impact these species would be greatest if they were exposed over an extended period of time. See the "Screening of Geochemistry Predictions for Effects on Wildlife Process Memorandum" for more information (Newell 2018k).

Potential impacts on wildlife and special status wildlife species habitat from increased noxious and invasive weed establishment and spread would be similar in nature to those described above for construction; however, as ground-disturbing activities would be reduced during operations, the magnitude of potential impacts would be reduced.

Potential impacts on wildlife and special status wildlife species from the presence of workers and equipment would be similar in nature to those described above for construction. However, the magnitude of impacts would be reduced as the numbers of workers and equipment would be less than during the construction phase.

Lighting associated with the operations phase of the proposed project may lead to changes in the interaction between pollinators and some plant species (Bennie et al. 2016). This may lead to decreases in forage resources for some species. Light may attract insects and increase the density of forage for some insectivorous bat species. These impacts would be greatest near light sources and would decrease with distance from the sources.

Artificial lighting associated with the operations phase of the proposed project would increase overall brightness in the night sky by 1 percent to 9 percent; therefore, impacts on wildlife species may occur. However, these impacts are not well understood or researched in current literature since much of the literature focuses on non-LED lights. Additionally, the potential impacts, if realized, would be associated within the direct vicinity of the main operations areas, i.e., where the most lights are concentrated to increase overall night-sky brightness. The potential impacts from light would reduce with distance from the light source and could lead to changes in migration or dispersal behavior including species avoiding the lighted area. It is likely that species would be avoiding the lit areas for multiple reasons, such as loss or degradation

of habitat and human presence. Specific impacts on species groups are provided in subsequent sections.

General Closure and Reclamation Impacts

Closure and reclamation activities would increase vegetative cover in areas of project-related disturbance to some extent, depending on reclamation success (discussed in more detail in Section 3.3, Soils and Vegetation). Within reclaimed/revegetated areas there would be a greater potential for an improvement in habitat conditions from the increase in vegetative cover, native vegetative cover, and a reduction in soil erosion potential. While vegetative cover would likely increase, there are constraints that make it unlikely to fully meet desired conditions for the landscape, or for pre-project conditions to be achieved through reclamation/revegetation activities. Wildlife and special status wildlife species habitat in these areas would not return to pre-project conditions.

Additional Impacts Specific to Wildlife Groups

MAMMALS

Small mammals that shelter underground would be susceptible to being crushed or struck by construction equipment.

Artificial night lighting can increase the risk of predation and decrease food consumption for small, herbivorous, nocturnal mammals. Circadian rhythm and melatonin production in mammals are likely affected by artificial night lighting. Increased artificial night lighting may also increase roadkill and disrupt mammalian dispersal movements and wildlife corridor use (Beier 2006). Project-related light may attract insects and increase the density of forage for some insectivorous bat species. These impacts would be greatest near light sources and would decrease with distance from the sources. The proposed use of LED lights may impact fast-flying species—like Brazilian free-tailed bats (*Tadarida brasiliensis*), California leaf-nosed bat (*Macrotus californicus*), and spotted bat (*Euderma maculatum*)—more than slower flying species, like cave myotis (*Myotis velifer*) (Stone et al. 2012). The increased

artificial lighting at night may result in a lower food intake for some bat species and possibly lower reproductive success for some species of aerial-hawking bats (i.e., prey is pursued and caught in flight). Conversely, there is the potential that increased artificial night lighting may be beneficial to some bat species, for at least some aspects of their natural history (Fenton and Morris 1976). Moth capture rate may increase since the moth's bat detection system is turned off in light (Frank 2006; Rydell 2006).

Bat species could experience effects from removal of foraging habitat and impacts on roosts and breeding activities by noise and vibration from blasting activities (Siemers and Schaub 2011). Potential impacts on bat species may include causing adult bats to leave maternity roosts during daytime hours. This could lead to infant bats being dropped or knocked to the ground, resulting in mortalities.

BIRDS

Additional impacts on special status bird species would include temporary disturbance from noise as well as changes to habitat use. Noise-related construction activities could affect nesting, roosting, and foraging activities. Changes to behavior could include increased alertness, turning toward the disturbance, fleeing the disturbance, changes in activity patterns, and nest abandonment. Raptors could be especially susceptible to noise disturbance early in the breeding season, through nest abandonment and reduction in overall success.

Potential impacts from operations and maintenance would be from potential electrocution of birds and from striking electrical distribution lines. While some individuals could be impacted, these impacts would be minor and long term and unlikely to reach population levels. Small and mobile bird species would be anticipated to have a very low potential for collisions. The presence of electrical distribution poles would provide perches (for perching and foraging) as well as nesting habitat for some species and could increase impacts on prey species nearby. Unintentional take from these impacts would not significantly impact local, regional, or overall populations of migratory birds.

The increased amount of edge habitat created by the proposed project would allow for an increase in species potential for nest parasitism and depredation due to increased diversity of species and less nest concealment in the edge habitat (Paton 1994; Winter et al. 2000). Other species that use edge habitats or have more general habitat requirements would benefit from the increased amount of edge habitat. In areas where there is higher vegetation density, the potential impacts from habitat fragmentation and edge effects would be greatest. This would change the species composition near project facilities and impact species that use larger blocks of habitat, as they would be subject to increased predation and potential for nest parasitism. Unintentional take from these impacts would not significantly impact local, regional, or overall populations of migratory birds.

Impacts on migrating birds from artificial light increases at night can range from death or injury from collisions with structures, to reduced energy stores due to delays or altered routes, and delayed arrival at breeding grounds (Gauthreaux Jr. and Belser 2006). Unintentional take from these impacts would not significantly impact local, regional, or overall populations of migratory birds.

For all impacts on migratory birds from construction, operations, and maintenance activities of each alternative, unintentional take would likely impact local migratory bird populations, yet would vary by species due to life history traits and habitat use. However, impacts on regional and overall migratory bird populations would likely be negligible. The potential acreages of impacts on migratory bird priority habitats are provided in table 3.8.4-2 later in this section. Additionally, the Boyce Thompson Important Bird Area (see figure 3.8.3-1) is located within the analysis area.

FISH

Additional impacts on fish species include mortality from loss or modification of habitat due to changes in surface water levels or flows, including changes due to changes in groundwater elevation and contribution to surface flows. These impacts would occur for all action alternatives and would have the greatest potential to impact fish species

along areas of Devil's Canyon and Queen Creek that currently have surface flows. Any impacts would be to non-native fish populations as no native fish are known to occur in sections of Devil's Canyon and Queen Creek that have surface flows. This is not anticipated to impact habitat for longfin dace (*Agosia chrysogaster*) and other species in Mineral Creek (WestLand Resources Inc. 2018a) as no reductions in flows from the proposed project are anticipated.

Artificial light increases at night are not likely to impact fish since lighting is unlikely to increase in the analysis area near their habitats; however, the exact project lighting layout is not yet known. Potential impacts on fish from artificial light could include breakdowns in niche partitioning, changes in migratory patterns, temporary blindness, alternations of predator-prey relations, and changes to foraging behavior (Nightingale et al. 2006).

REPTILES

Reptile species that shelter underground would be susceptible to being crushed by construction equipment. Construction-related trash may attract reptile predators such as ravens (*Corvus corax*) and other predators. The presence of the electrical distribution lines and poles could provide perching and nesting habitat for ravens and other species, which may increase raven and other reptile predator numbers along electrical distribution lines. Knowledge of potential negative effects from artificial light on most reptile species, other than sea turtles, is limited and somewhat speculative. Potential impacts include an extended photoperiod, which can also be positive for some species like geckos and possibly the Bezy's night lizard (*Xantusia bezyi*) (Perry and Fisher 2006).

AMPHIBIANS

Amphibian species would also be affected by changes to water quality and quantity. These impacts would occur for all action alternatives and would have the greatest potential to impact amphibian species along areas of Devil's Canyon and Queen Creek that currently have

perennial surface flows that would be reduced by changes in runoff or groundwater contribution. Artificial light increases at night are not likely to impact amphibians since lighting is unlikely to increase in the analysis area near their habitats; however, the exact project lighting layout is not yet known. Possible impacts could include changes to predator–prey relationships, changes in reproduction, and inter-specific (between different species) competition and intra-specific (between individuals of same species) competition for prey (Buchanan 2006).

INVERTEBRATES

Potential impacts on invertebrates from the proposed project would include those described earlier in this section as “Impacts Common to All Action Alternatives.” Aquatic invertebrate species would also be affected by changes to water quality and quantity. These impacts would occur for all action alternatives and would have the greatest potential to impact aquatic invertebrate species along areas of Devil’s Canyon and Queen Creek that currently have surface flows. Invertebrates that use vibrational communication systems would also be affected by increases in ground-borne vibrations through substrates and soils. These impacts would occur for all action alternatives near any blasting and heavy machinery operations. Artificial light at night may lead to changes in the interaction between pollinators and some plant species, such as cacti (Bennie et al. 2016). This may lead to decreases in forage resources for some species in all groups. In addition, artificial light may increase moth (Order Lepidoptera) predation by bats and birds (Frank 2006).

Wildlife Connectivity

Impacts on animal movement corridors from any of the action alternatives would include direct effects due to a long-term loss of movement habitat from construction and mining activities and/or the construction of project facilities within those corridor areas, as well as a long-term movement habitat loss along pipeline corridors since vegetation would be expected to eventually reestablish in the disturbed areas but would be unlikely to return to pre-construction conditions. Project activities could potentially change predator–prey interactions and

would increase the degree of habitat fragmentation within the species’ ranges, which in turn can disrupt localized and long-distance dispersal and migration events. In addition, increased human presence in the region from mining activities would lead to temporary disturbances of individual species, affecting movement patterns. Furthermore, indirect impacts on gene flow and biodiversity could occur from any of the action alternatives; however, these impacts would be temporary and insignificant since these biological processes occur over multi-generational time periods, which are typically longer for most species than the proposed life of the mine (Brown Jr. and Gibson 1983; Slatkin 1987). Some of these alternatives would result in minor impacts with others resulting in major impacts. Potential impacts on habitat blocks are given in table 3.8.4-1 and are broken out by alternative and project components.

Differences Between Alternatives 2 through 6

Potential impacts on wildlife species from the action alternatives would generally be as described earlier in this section. Table 3.8.4-2 presents special status wildlife species that potentially occur within the analysis area of each action alternative. (The directions in the alternative options [i.e., “West,” “East,” “South,” and “North” in table 3.8.4-2] refer to the proposed pipeline corridor alignments under consideration for each alternative.) These impacts are discussed more in the next section, “Impacts on Special Status Wildlife Species.”

Table 3.8.4-3 provides the MIS species trends, total acres on Tonto National Forest, and acres associated with each action alternative. (The directions in the alternative options [i.e., “East,” “West,” “South,” and “North” in table 3.8.4-3] refer to the proposed pipeline corridor alignments under consideration for each alternative.) The action alternatives are not anticipated to change the current MIS species trends based on the low percentage of acres that would be impacted.

Table 3.8.4-1. Acres of habitat blocks potentially affected for all action alternatives

Alternative	Alternative Component	Habitat Block 1 Acres Affected	Habitat Block 2 Acres Affected
2	East Plant Site/Subsidence areas	–	1,226
2	Near West fence line	–	487
2	Tailings facility	–	789
2	Near West tailings corridor	–	56
2	West Plant Site	–	20
3	East Plant Site/Subsidence areas	–	1,226
3	Fence and tailings storage facility	–	1,275
3	Near West fence line	–	457
3	Tailings facility	–	819
3	Near West tailings corridor	–	56
3	West Plant Site	–	20
4	East Plant Site/Subsidence areas	–	1,226
4	Silver King tailings corridor	–	24
4	Silver King fence line	–	2,880
4	Tailings facility	–	1,849
4	West Plant Site	–	20
5 east option	East Peg Leg tailings corridor	–	118
5 east option	East Plant Site/Subsidence areas	–	1,226
5 east option	Peg Leg fence line	–	2,843
5 east option	Tailings facility	–	3,264
5 east option	West Plant Site	–	20
5 west option	East Plant Site/Subsidence areas	–	1,226
5 west option	Peg Leg fence line	–	2,843
5 west option	Tailings facility	–	3,264
5 west option	West Peg Leg tailings corridor	–	295
5 west option	West Plant Site	–	20
6 north option	Access roads	3	44
6 north option	North Skunk Camp tailings corridor	60	966
6 north option	Skunk Camp transmission line corridor	22	320
6 north option	Skunk Camp fence line	59	5,827
6 north option	East Plant Site/Subsidence areas	–	1,226
6 north option	Tailings facility	–	3,750

continued

Table 3.8.4-1. Acres of habitat blocks potentially affected for all action alternatives (cont'd)

Alternative	Alternative Component	Habitat Block 1 Acres Affected	Habitat Block 2 Acres Affected
6 north option	West Plant Site	–	20
6 south option	Access roads	3	41
6 south option	Skunk Camp transmission line corridor	22	320
6 south option	Skunk Camp fence line	59	5,827
6 south option	South Skunk Camp tailings corridor	60	941
6 south option	East Plant Site/Subsidence areas	–	1,226
6 south option	Tailings facility	–	3,750
6 south option	West Plant Site	–	20

Source: Morey (2018a)

Table 3.8.4-2. Acres of modeled habitat for special status wildlife species that potentially would be impacted under each action alternative

Common Name (Scientific Name)	Status	Alternative 2	Alternative 3	Alternative 4	Alternative 5 West Pipeline Option	Alternative 5 East Pipeline Option	Alternative 6 South Pipeline Option	Alternative 6 North Pipeline Option
Amphibians								
Lowland leopard frog (<i>Lithobates yavapaiensis</i>)	TNF: S AGFD: SGCN 1A	139,011	151,795	153,738	277,160	288,425	268,300	252,059
Birds								
Northern goshawk (<i>Accipiter gentilis</i>)	TNF: S, MBSC AGFD: SGCN 1B MBTA: Yes	0	0	545	0	0	9,962	9,962
Western burrowing owl (<i>Athene cunicularia hypugaea</i>)	BLM: S AGFD: SGCN 1B MBTA: Yes	150,167	150,829	150,280	223,443	160,847	145,064	144,532
Golden eagle (<i>Aquila chrysaetos</i>)	TNF: MBSC AGFD: SGCN 1B MBTA: Yes BGEPA: Yes	169,976	182,775	184,327	305,938	299,168	298,884	282,643
Juniper titmouse (<i>Baeolophus ridgwayi</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	90,252	92,912	105,271	84,679	106,106	188,677	178,356
Ferruginous hawk (<i>Buteo regalis</i>)	BLM: S AGFD: SGCN 1B MBTA: Yes	63,718	63,739	70,094	79,557	71,092	113,242	113,490
Swainson's hawk (<i>Buteo swainsoni</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	23,076	23,076	29,451	25,555	30,459	72,609	72,857
Common black hawk (<i>Buteogallus anthracinus</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	45,492	51,126	46,368	44,552	46,346	73,813	73,813
Costa's hummingbird (<i>Calypte costae</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	254,041	267,466	259,021	434,175	406,218	366,813	350,571
Northern beardless- tyrannulet (<i>Camptostoma imberbe</i>)*	TNF: MBSC AGFD: N/A MBTA: Yes	8,517	8,517	9,348	16,023	15,664	15,803	15,334
Western yellow-billed cuckoo (Distinct Population Segment) (<i>Coccyzus americanus</i>)	ESA: T (All Arizona counties) TNF: MBSC AGFD: SGCN 1A MBTA: Yes	18,804	18,860	19,177	50,948	54,785	43,101	43,101

continued

Table 3.8.4-2. Acres of modeled habitat for special status wildlife species that potentially would be impacted under each action alternative (cont'd)

Common Name (Scientific Name)	Status	Alternative 2	Alternative 3	Alternative 4	Alternative 5 West Pipeline Option	Alternative 5 East Pipeline Option	Alternative 6 South Pipeline Option	Alternative 6 North Pipeline Option
Gilded flicker (<i>Colaptes chrysoides</i>)	TNF: MBSC AGFD: SGCN 1B MBTA: Yes BLM: S	240,199	252,812	241,561	420,375	392,419	340,300	323,811
Olive-sided flycatcher (<i>Contopus cooperi</i>)*	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	503	1,006	611	590	646	1,420	1,324
Broad-billed hummingbird (<i>Cyananthus latirostris</i>)	AGFD: SGCN 1B MBTA: Yes BLM: S	195,997	209,318	199,917	375,907	347,951	314,209	297,967
Cordilleran flycatcher (<i>Empidonax occidentalis</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	0	0	0	0	0	9,749	9,749
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	ESA: E (All AZ counties except Navajo) AGFD: SGCN 1A MBTA: Yes BLM: S	32,605	34,233	46,463	125,488	146,541	151,143	138,834
Gray flycatcher (<i>Empidonax wrightii</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	56,471	60,690	61,494	96,201	108,705	132,158	127,975
Prairie falcon (<i>Falco mexicanus</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	8,517	8,517	9,348	16,023	15,664	15,803	15,334
American peregrine falcon (<i>Falco peregrinus anatum</i>)	TNF: S, MBSC AGFD: SGCN 1A MBTA: Yes	259,841	273,266	274,192	439,319	411,363	388,746	372,504
MacGillivray's warbler (<i>Geothlypis tolmiei</i>)*	TNF: MBSC AGFD: SGCN 1B MBTA: Yes	8,331	16,660	7,889	15,750	15,408	7,625	7,168
Pinyon jay (<i>Gymnorhinus cyanocephalus</i>)*	TNF: MBSC AGFD: SGCN 1B MBTA: Yes	0	0	0	0	0	2	22

continued

Table 3.8.4-2. Acres of modeled habitat for special status wildlife species that potentially would be impacted under each action alternative (cont'd)

Common Name (Scientific Name)	Status	Alternative 2	Alternative 3	Alternative 4	Alternative 5 West Pipeline Option	Alternative 5 East Pipeline Option	Alternative 6 South Pipeline Option	Alternative 6 North Pipeline Option
Bald eagle (<i>Haliaeetus leucocephalus</i>)	TNF: MBSC AGFD: SGCN 1A MBTA: Yes BGEPA: Yes	206,000	218,910	219,310	258,082	272,946	330,810	318,662
Lewis's woodpecker (<i>Melanerpes lewis</i>)*	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	7,955	15,909	7,509	15,356	15,015	7,187	6,748
Gila woodpecker (<i>Melanerpes uropygialis</i>)	TNF: MBSC AGFD: SGCN 1B MBTA: Yes	254,994	267,606	266,142	435,079	407,122	374,336	358,095
Canyon towhee (<i>Melospiza fusca</i>)	TNF: MBSC MBTA: Yes	8,517	8,517	9,347	16,023	15,664	15,803	15,334
Elf owl (<i>Micrathene whitneyi</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	251,610	264,222	256,590	431,743	403,787	366,909	350,668
Lucy's warbler (<i>Oreothlypis luciae</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	259,841	273,266	274,192	439,319	411,363	384,321	368,079
Phainopepla (<i>Phainopepla nitens</i>)*	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	7,955	15,909	7,509	15,357	15,015	7,187	6,748
Desert purple martin (<i>Progne subis hesperia</i>)	TNF: MBSC AGFD: SGCN 1B MBTA: Yes	238,577	252,002	253,304	418,431	390,475	365,426	349,184
Flammulated owl (<i>Psiloscops flammeolus</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	0	0	0	0	0	9,962	9,962
Black-throated gray warbler (<i>Setophaga nigrescens</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	9,347	9,347	8,517	16,023	15,664	15,803	15,334
Yellow warbler (<i>Setophaga petechia</i>)	TNF: MBSC AGFD: SGCN 1B MBTA: Yes	164,318	177,476	177,930	219,315	233,585	259,434	247,906
Red-naped sapsucker (<i>Sphyrapicus nuchalis</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	72,919	74,408	89,410	100,948	106,449	167,307	167,840

continued

Table 3.8.4-2. Acres of modeled habitat for special status wildlife species that potentially would be impacted under each action alternative (cont'd)

Common Name (Scientific Name)	Status	Alternative 2	Alternative 3	Alternative 4	Alternative 5 West Pipeline Option	Alternative 5 East Pipeline Option	Alternative 6 South Pipeline Option	Alternative 6 North Pipeline Option
Black-chinned sparrow (<i>Spizella atrogularis</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	92,698	95,358	107,717	88,994	108,945	196,103	185,249
Bendire's thrasher (<i>Toxostoma bendirei</i>)*	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	6,907	13,812	7,576	14,317	13,937	12,250	11,805
Arizona Bell's vireo (<i>Vireo bellii arizonae</i>)	TNF: MBSC AGFD: SGCN 1B MBTA: Yes	226,931	240,317	241,282	376,364	374,734	355,528	339,287
Gray vireo (<i>Vireo vicinior</i>)	TNF: MBSC AGFD: SGCN 1C MBTA: Yes	94,700	99,713	109,719	86,104	108,197	197,403	187,251
Fish								
Gila longfin dace (<i>Agosia chrysogaster</i>)	AGFD: SGCN 1B	18,848	20,252	24,618	61,308	69,802	58,380	47,108
Gila chub (<i>Gila intermedia</i>)	ESA: E (Cochise, Coconino, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz, and Yavapai Counties) BLM: S AGFD: SGCN 1A	1,323	1,323	1,323	1,148	1,334	1,416	1,369
Insects								
Monarch butterfly (<i>Danaus plexippus</i> pop. 1)*	TNF: OSI BLM: S	8,380	16,760	9,217	15,807	15,472	15,566	15,109
Mammals								
Pale Townsend's big-eared bat (<i>Corynorhinus townsendii pallascens</i>)	TNF: S AGFD: SGCN 1B	259,841	273,266	274,192	439,319	411,363	388,746	372,504
Spotted bat (<i>Euderma maculatum</i>)	TNF: S AGFD: SGCN 1B	259,841	273,266	274,192	434,871	409,139	386,522	370,280

continued

Table 3.8.4-2. Acres of modeled habitat for special status wildlife species that potentially would be impacted under each action alternative (cont'd)

Common Name (Scientific Name)	Status	Alternative 2	Alternative 3	Alternative 4	Alternative 5 West Pipeline Option	Alternative 5 East Pipeline Option	Alternative 6 South Pipeline Option	Alternative 6 North Pipeline Option
Greater western mastiff bat (<i>Eumops perotis californicus</i>)	BLM: S AGFD: SGCN 1B	259,841	273,266	274,192	439,319	411,363	388,746	372,504
Allen's lappet-browed or big-eared bat (<i>Idionycteris phyllotis</i>)	TNF: S AGFD: SGCN 1B	5,914	5,914	9,809	5,524	5,524	6,275	6,505
Western red bat (<i>Lasiurus blossevillii</i>)	TNF: S AGFD: SGCN 1B	120,106	128,252	132,605	160,078	176,133	214,056	211,036
Lesser long-nosed bat (<i>Leptonycteris curasoae yerbabuena</i>)	BLM: S AGFD: SGCN 1A	259,298	272,723	264,428	438,824	410,867	378,219	361,978
California leaf-nosed bat (<i>Macrotus californicus</i>)	AGFD: SGCN 1B	247,233	260,658	250,771	416,698	399,455	354,650	338,161
Cave myotis (<i>Myotis velifer</i>)	BLM: S AGFD: SGCN 1B	259,841	273,266	274,192	439,319	411,363	388,746	372,504
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>) [†]	SGCN 1B	259,841	273,266	274,192	439,319	411,363	388,746	372,504
Reptiles								
Sonoran Desert tortoise (<i>Gopherus morafkai</i>)	TNF: S AGFD: SGCN 1A BLM: S	240,569	253,991	252,751	420,098	392,699	362,054	345,812
Bezy's night lizard (<i>Xantusia bezyi</i>)	TNF: S AGFD: SGCN 1B	122,542	128,630	136,893	122,956	154,511	244,038	227,966

Status Definitions

Tonto National Forest (TNF):

S=Sensitive. Species identified by a Regional Forester for which population viability is a concern, as evidenced by: a) significant current or predicted downward trends in population number or density; b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

OSI = Other Species of Interest. A plant or animal that was included in the analysis for which there are concerns about potential impacts in the region.

MBSC = Migratory Bird Species of Concern

Endangered Species Act (ESA):

E = Endangered. Endangered species are those in imminent jeopardy of extinction. The ESA specifically prohibits the take of a species listed as endangered. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.

T = Threatened. Threatened species are those that are likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Arizona Game and Fish Department (AGFD):

SGCN 1A = Species of Greatest Conservation Need Tier 1A; Species for which the AGFD has entered into an agreement or has legal or other contractual obligations or warrants the protection of a closed season.

SGCN 1B = Species of Greatest Conservation Need Tier 1B; Vulnerable species.

SGCN 1C = Species of Greatest Conservation Need Tier 1C; Species for which insufficient information is available to fully assess the vulnerabilities and therefore need to be watched for signs of stress.

Bureau of Land Management (BLM):

S = Sensitive. Species that could easily become endangered or extinct in the state.

Note: Although the analysis area is a 1-mile buffer, data provided by the AGFD were for a 5-mile buffer and could not be calculated for the 1-mile buffer.

* AGFD was unable to provide data for this species so analysis was conducted based on available data about species' habitat requirements.

† Not all SGCN-listed species are addressed as part of this analysis; however, this species was added to the analysis at the request of the AGFD, a cooperating agency.

Table 3.8.4-3. Tonto National Forest vegetation type, trends, and acreages for management indicator species

Vegetation Type	Acre on Tonto National Forest	1985–2005 Vegetation Trend	Alternative 2 acres (% change)	Alternative 3 acres (% change)	Alternative 4 acres (% change)	Alternative 5 East acres (% change)	Alternative 5 West acres (% change)	Alternative 6 South acres (% change)	Alternative 6 North acres (% change)
Ponderosa pine/ Mixed conifer	283,204	Static	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Pinyon/Juniper (woodland)	1,155,722	Static	16.9 0.001	16.9 0.001	58.9 0.01	37.1 0.003	20.3 0.002	44.8 0.004	42.0 0.004
Chaparral	265,480	Static	1,017.5 0.4	1,017.5 0.4	1,089.2 0.4	957.7 0.4	957.7 0.4	1,186.3 0.5	1,416.5 0.5
Desert grassland	316,894	Upward/ Static	51.2 0.02	51.2 0.02	1,372.3 0.4	51.4 0.02	47.8 0.02	69.5 0.02	69.8 0.02
Desertscrub	774,220	Downward/ Static	7,025.3 0.9	7,025.3 0.9	5,568.3 0.7	1,783.4 0.2	1,754.9 0.2	1,922.0 0.3	1,485.9 0.2
Riparian (low elevation)	41,379	No change	4.5 0.01	4.5 0.01	21.8 0.05	2.0 0.01	2.2 0.01	2.0 0.01	0.4 0.001
Aquatic	29,000	Not applicable*	14.6 0.05	14.6 0.05	14.6 0.05	14.7 0.05	14.7 0.05	14.7 0.05	14.7 0.05

Source: Data used for these calculations were a crosswalk between the Forest Service Potential Natural Vegetation metadata and the SWReGAP vegetation metadata.

* Vegetation trend not applicable, but see also analysis of aquatic trends in Devil’s Canyon (Garrett 2019d), which indicates static trends in Devil’s Canyon between roughly 2003 and 2017.

Impacts on Special Status Wildlife Species

ENDANGERED SPECIES ACT–LISTED WILDLIFE SPECIES

Yellow-billed Cuckoo (*Coccyzus americanus*)

The yellow-billed cuckoo, listed as threatened with proposed critical habitat for the western distinct population segment, has the potential to occur within the analysis area for all action alternatives along Devil’s Canyon and Mineral Creek north of the existing Ray Mine. The species may also occur where the two Alternative 5 pipeline option routes would cross the Gila River. Proposed critical habitat for yellow-billed cuckoo is present at the proposed pipeline corridor crossings of the Gila River in the project footprint (figure 3.8.4-1).

Potential impacts on the species include a loss or modification of habitat under all action alternatives along Devil’s Canyon and Mineral Creek (downstream of Devil’s Canyon) north of the existing Ray Mine. These potential impacts include changes to riparian habitat from reduced surface flows due to the upstream watershed decreasing in size as well as potential reductions in inputs of groundwater from project-related pumping. Potential habitat changes include loss of riparian habitat and a conversion of habitat to a drier, xeroriparian habitat. This could cause habitat to become unsuitable for nesting by the species.

Under Alternative 5, habitat for the yellow-billed cuckoo and proposed critical habitat would be removed as needed where the proposed pipeline routes would cross the Gila River. Potential impacts on habitat and proposed critical habitat would occur on up to 17.9 acres of the 2,232.1 acres of proposed critical habitat within the analysis area. The primary constituent elements (PCEs) of the proposed critical habitat include the following (U.S. Fish and Wildlife Service 2014):

1. Primary Constituent Element 1—Riparian woodlands. Riparian woodlands with mixed willow-cottonwood vegetation, mesquite-thorn forest vegetation, or a combination of these that contain habitat for nesting and foraging in contiguous or nearly contiguous patches that are greater than 100 m (325 feet)

in width and 81 hectares (200 acres) or more in extent. These habitat patches contain one or more nesting groves, which are generally willow-dominated, have above-average canopy closure (greater than 70 percent), and have a cooler, more humid environment than the surrounding riparian and upland habitats.

2. Primary Constituent Element 2—Adequate prey base. Presence of a prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies) and tree frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.
3. Primary Constituent Element 3—Dynamic riverine processes. River systems that are dynamic and provide hydrologic processes that encourage sediment movement and deposits that allow seedling germination and promote plant growth, maintenance, health, and vigor (e.g., lower gradient streams and broad floodplains, elevated subsurface groundwater table, and perennial rivers and streams). This allows habitat to regenerate at regular intervals, leading to riparian vegetation with variously aged patches from young to old.

The proposed removal of vegetation and impacts from workers and equipment being present could lead to avoidance of the disturbed area and vicinity by the species. In addition, potential impacts on proposed critical habitat include removal of riparian woodlands, including potentially suitable nesting, foraging, and dispersal habitat and a corresponding localized reduction in the prey base for the species.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher is listed as endangered with designated critical habitat and has the potential to occur within the analysis area where the two Alternative 5 pipeline option routes would cross the Gila River. Designated critical habitat for the species is present

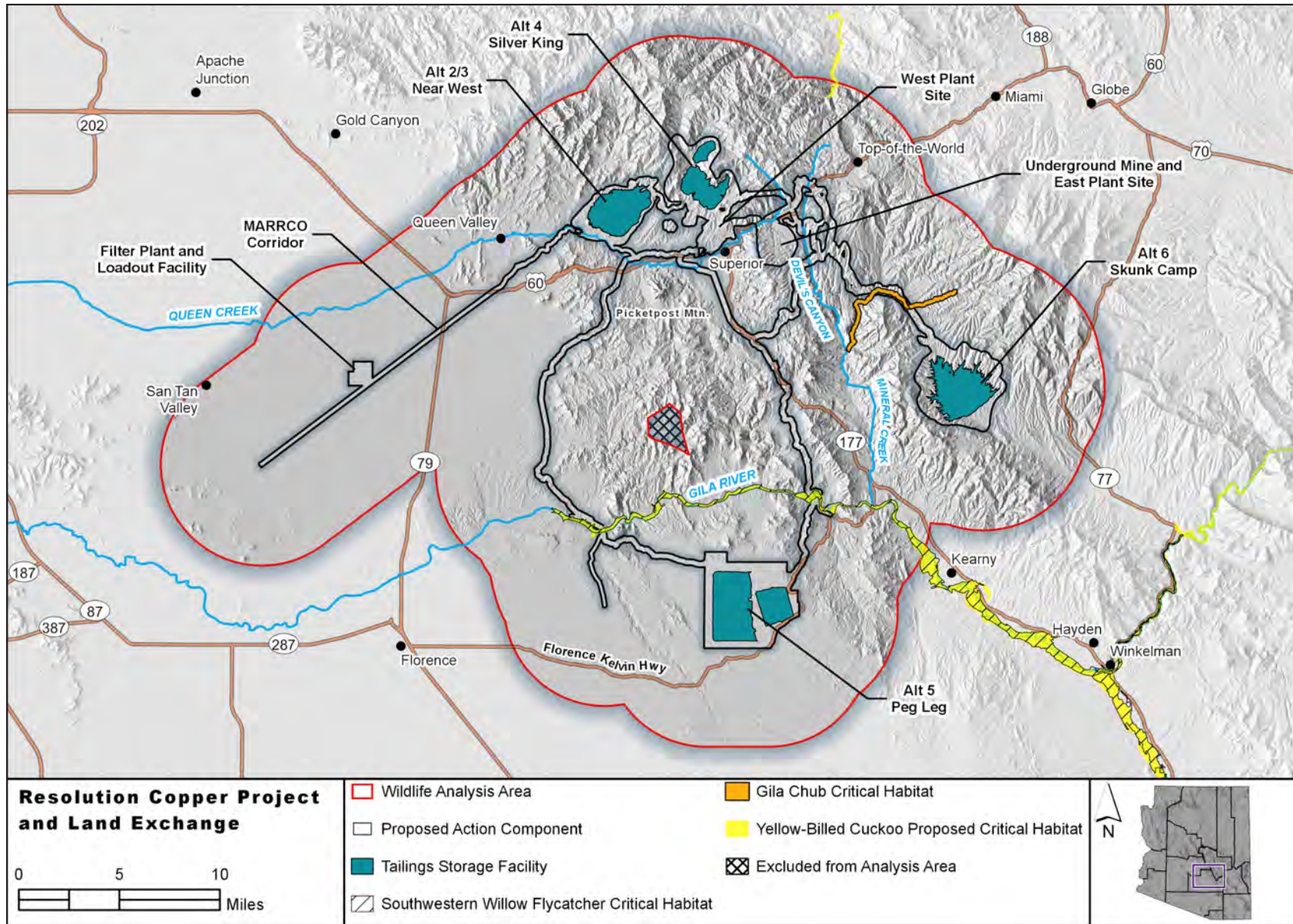


Figure 3.8.4-1. Critical habitats

at the proposed pipeline corridor crossings of the Gila River in the project footprint (see figure 3.8.4-1).

Under Alternative 5, habitat for the southwestern willow flycatcher and designated critical habitat would be removed where the proposed pipeline routes would cross the Gila River. Potential impacts on habitat and proposed critical habitat would occur on up to 12.8 acres of the 2,234.0 acres of designated critical habitat within the analysis area. The PCEs for southwestern willow flycatcher critical habitat include the following (U.S. Fish and Wildlife Service 2013):

- Primary Constituent Element 1—Riparian vegetation. Riparian habitat along a dynamic river or lakeside, in a natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that comprises trees and shrubs and some combination of:
 - Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 2 to 30 m (about 6–98 feet). Lower stature thickets (2–4 m or 6–13 feet tall) are found at higher elevation riparian forests, and tall-stature thickets are found at middle- and lower elevation riparian forests; and/or
 - Areas of dense riparian foliage at least from ground level up to approximately 4 m (13 feet) aboveground or dense foliage only at the shrub or tree level as a low, dense canopy; and/or
 - Sites for nesting that contain a dense (about 50–100 percent) tree or shrub (or both) canopy; and/or
 - Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 hectare (0.25 acre) or as large as 70 hectares (175 acres).
- Primary Constituent Element 2—Insect prey populations. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies, moths, and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

The proposed removal of vegetation and impacts from workers and equipment being present could lead to avoidance of the disturbed area and vicinity by the species. In addition, potential impacts on critical habitat could include removal of riparian vegetation, including potentially suitable nesting, foraging, and dispersal habitats and a corresponding localized reduction in insect prey populations used by the species.

Gila Chub (*Gila intermedia*)

Designated critical habitat for the Gila chub is found along Mineral Creek above the confluence with Devil’s Canyon. The PCEs for Gila chub critical habitat include the following (U.S. Fish and Wildlife Service 2005):

- Perennial pools, areas of higher velocity between pool areas, and areas of shallow water among plants or eddies all found in small segments of headwaters, springs, or cienegas of smaller tributaries.
- Water temperatures for spawning ranging from 20 degrees Celsius (°C) to 26.5°C with sufficient dissolved oxygen, nutrients, and any other water-related characteristics needed.
- Water quality with reduced levels of contaminants or any other water quality characteristics, including excessive levels of sediments, adverse to Gila chub health.
- Food base consisting of invertebrates, filamentous (threadlike) algae, and insects.

- Sufficient cover consisting of downed logs in the water channel, submerged aquatic vegetation, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs.
- Habitat devoid of nonnative aquatic species detrimental to Gila chub or habitat in which detrimental nonnatives are kept at a level which allows Gila chub to continue to survive and reproduce. For example, the Muleshoe Preserve Gila chub and the Sabino Canyon Gila chub populations are devoid of nonnative aquatic species. The O'Donnell Canyon Gila chub population has continued to survive and reproduce despite the current level of nonnative aquatic species present.
- Streams that maintain a natural unregulated flow pattern including periodic natural flooding. An example is Sabino Canyon that has experienced major floods. If flows are modified, then the stream should retain a natural flow pattern that demonstrates an ability to support Gila chub.
- 300-foot riparian zone adjacent to each side of the stream.

The AGFD surveyed this area and found Gila chub in Mineral Creek in 2000; however, additional surveys in 2002, 2006, 2007, 2009, and 2013 found no Gila chub. Therefore, AGFD assumed the creek to be fishless in 2007 (Robinson 2007; Robinson et al. 2010). Additionally, WestLand Resources surveyed Mineral Creek in 2017 but did not find any Gila chub (WestLand Resources Inc. 2018a). As this area is not currently occupied habitat, potential impacts on surface water and groundwater would have no potential impact on the species. Potential impacts on critical habitat include reduction of perennial pools and a conversion of vegetation toward xeroriparian species; however, groundwater modeling for the action alternatives does not indicate that impacts from groundwater drawdown would significantly impact Mineral Creek in the area of designated critical habitat.

TONTO NATIONAL FOREST SENSITIVE WILDLIFE SPECIES

Potential impacts on Tonto National Forest Sensitive Wildlife Species would be as described earlier in this section in “Impacts Common to All Action Alternatives.” The acres of potential impacts on modeled habitat for these species is given in table 3.8.4-2. The project-related disturbance would decrease available habitat for these species. However, given that the proposed project would impact a small portion of the overall habitat in the project vicinity for these species under all action alternatives, the proposed project may adversely impact individuals, but is not likely to result in a loss of viability in the analysis area, nor cause a trend toward federal listing of these species as threatened or endangered.

BLM SENSITIVE SPECIES

Potential impacts on BLM Sensitive Species would be as described earlier in this section in “Impacts Common to All Action Alternatives.” The acres of potential impacts on modeled habitat for these species is given in table 3.8.4-2. The project-related disturbance would decrease available habitat for these species. However, given that the proposed project would impact a small portion of the overall habitat in the project vicinity for these species under all action alternatives, the proposed project may adversely impact individuals, but is not likely to result in a loss of viability in the analysis area, nor cause a trend toward federal listing of these species as threatened or endangered.

3.8.4.3 Cumulative Effects

The Tonto National Forest has identified the following list of reasonably foreseeable future actions as likely to occur in conjunction with development of the Resolution Copper Mine. The projects described below are expected, or have potential, to contribute to incremental changes in wildlife or habitat conditions near the Resolution Copper Mine. As noted in section 3.1, past and present actions are assessed as part of the affected environment; this section analyzes the effects

of any RFFAs, to be considered cumulatively along with the affected environment and Resolution Copper Project effects.

- *Pinto Valley Mine Expansion.* The Pinto Valley Mine is an existing open-pit copper and molybdenum mine located approximately 8 miles west of Miami, Arizona, in Gila County. Pinto Valley Mining Corporation is proposing to expand mining activities onto an estimated 1,011 acres of new disturbance (245 acres on Tonto National Forest land and 766 acres on private land owned by Pinto Valley Mining Corporations) and extend the life of the mine to 2039. EIS impact analysis is pending; however, this project would cause approximately 1,011 acres of existing wildlife habitat to be lost. Some portions of these areas may later be successfully reclaimed and revegetated, but other areas would remain permanently altered.
- *Ripsey Wash Tailings Project.* Mining company ASARCO is planning to construct a new tailings storage facility to support its Ray Mine operations. The environmental effects of the project were analyzed in an EIS conducted by the USACE and approved in a ROD issued in December 2018. As approved, the proposed tailings storage facility project would occupy an estimated 2,574 acres and be situated in the Ripsey Wash watershed just south of the Gila River approximately 5 miles west-northwest of Kearny, Arizona, and would contain up to approximately 750 million tons of material (tailings and embankment material). ASARCO estimates a construction period of 3 years and approximately 50 years of expansion of the footprint of the tailings storage facility as slurry tailings are added to the facility, followed by a 7- to 10-year period for reclamation and final closure. Effects on wildlife would include the direct loss of existing habitat, as well as habitat fragmentation. Impacts on threatened, endangered, and sensitive species such as southwestern willow flycatcher (endangered) and the yellow-billed cuckoo (threatened) would be expected to be indirect and minor. Cumulative effects would be most noticeable in the vicinity of Alternative 5 – Peg Leg, as both the Ripsey Wash Tailings Project and the Resolution Copper Project would remove large portions of habitat from the same general area.
- *Wildlife Water Source Improvements.* Two key projects geared toward improving wildlife access to water sources include the Government Springs Pipeline Project and the AGFD Wildlife Water Catchment Improvement Project. The Government Springs Pipeline Project would replace about 12,000 linear feet of pipeline between two existing water storage tanks and would charge the system with well water instead of an inconsistently wet spring. The stored water would be available for wildlife such as elk and deer. The AGFD water catchment project includes construction of four discrete catchments at various locations on the Tonto National Forest, with functional lifespans of about 35 years. Each catchment would include a water storage tank, a large “apron” to gather and direct precipitation to the storage tank, a drinking trough, and fencing, and would disturb no more than 0.5 acre. The AGFD catchments would be designed primarily to benefit mule deer, although they would also benefit other species such as elk, javelina, and Gambel’s quail.
- *Herbicide Treatments to Control Vegetation.* There are two primary vegetation management programs proposing to use herbicides in the vicinity of Resolution Copper Mine: APS’s herbicide use within their right-of-way on NFS lands, and ADOT’s vegetation treatment along various road rights-of-way. APS is proposing to include Forest Service–approved herbicides as a vegetation management tool on its existing rights-of-way within five National Forests: Apache-Sitgreaves, Coconino, Kaibab, Prescott, and Tonto National Forests. If approved, the use of herbicides would become part of the APS’s Integrated Vegetation Management approach. An EA with a FONSI was published in December 2018. The EA determined that environmental resource impacts would be minimal, and the use of herbicides would prevent and/or reduce fuel build-up that would otherwise result from rapid, dense regrowth

and sprouting of undesired vegetation. ADOT plans annual herbicide treatments using EPA-approved herbicides. ADOT would apply herbicides to contain, control, or eradicate noxious, invasive, and native plant species that pose safety hazards or threaten native plant communities on road easements and NFS lands up to 200 feet beyond road easement on the Tonto National Forest. Herbicide application could have short- and long-term, indirect, minor adverse impacts and short- and long-term, direct, negligible adverse impacts on the Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher, yellow-billed cuckoo, narrow-headed gartersnake (*Thamnophis rufipunctatus*), and northern Mexican gartersnake (*Thamnophis eques megalops*) and their respective habitats.

- *Bighorn Sheep Capture and Relocation.* The Tonto National Forest is intending to capture and relocate bighorn sheep over the next 3 to 5 years in order to improve forest-wide health and genetic viability of the species. The project would involve the use of helicopters and occur in five wilderness areas within the Tonto National Forest: Four Peaks, Hellsgate, Mazatzal, Salt River Canyon, and Superstition. Endangered, threatened, candidate, and proposed ESA species identified within this project area include Mexican spotted owl, Sonoran desert tortoise, bald eagle (*Haliaeetus leucocephalus*), and golden eagle (*Aquila chrysaetos*). Impacts on protected wildlife species would occur as the result of helicopter use, but effects would be minor and short-term. The overall effect on bighorn sheep would be positive, as sheep translocation would help control the population of bighorn sheep to densities less likely to succumb to communal diseases.
- *Ray Land Exchange and Proposed Plan Amendment.* ASARCO is also seeking to complete a land exchange with the BLM by which the mining company would gain title to approximately 10,976 acres of public lands and federally owned mineral estate located near ASARCO's Ray Mine in exchange for transferring to the BLM approximately 7,304 acres of private lands, primarily in northwestern Arizona. It is known that at some

point ASARCO wishes to develop a copper mining operation in the "Copper Butte" area west of the Ray Mine. Under the proposed action, there would likely be total loss of existing wildlife habitat in areas where high and moderate habitat potential intersect with foreseeable mining uses. BLM sensitive species would no longer be assessed on the selected lands. BLM would acquire new potential wildlife habitat through the offered lands.

- *Tonto National Forest Travel Management Plan.* The Tonto National Forest is currently in the process of developing a Supplemental EIS to address certain court-identified deficiencies in its 2016 Final Travel Management Rule EIS. This document and its implementing decisions are expected within the next 2 years. This document will have substantial impacts on current recreational uses of NFS lands and transportation routes, which in turn would have some impact on disturbance of soils and vegetation for new road construction or decommissioning of other roads. On the Tonto National Forest as a whole, these changes should be beneficial to wildlife species, as one focus of travel management is avoidance of sensitive habitat; however, short-term disturbances would occur and potentially be cumulative with disturbances from the Resolution Copper Project.
- *Silver Bar Mining Regional Landfill and Cottonwood Canyon Road.* A private firm, Mineral Mountain LLC, is proposing to develop a landfill on land the company owns approximately 6 miles southeast of Florence Junction and 4 miles due east of SR 79. This private land lies entirely within an area of BLM-administered lands and cannot be accessed without crossing Cottonwood Canyon Road, located on BLM lands. The company received Master Facility Plan Approval for the proposed landfill from ADEQ in 2009, and a BLM right-of-way grant in 2017. The firm's proposed construction on Cottonwood Canyon Road and on the landfill property may increase the potential for introduction and/or spread of noxious weeds and invasive plants. Approximately 4 acres of creosotebush-bursage

vegetation and 11 acres of Arizona upland desertscrub would be removed to expand Cottonwood Canyon Road. Development of the landfill would result in the clearing of 350 acres of vegetation on private lands. This is some distance from Resolution Copper Project impacts, except for the Alternative 5 west pipeline option, but on a landscape scale it would contribute to loss of habitat and be cumulative with Resolution Copper Project impacts.

- *LEN Range Improvements.* This range allotment is located near Ray Mine. Under the proposed action, upland perennial sources of water would be provided to supplement the existing upland water infrastructure on the allotment. The supplemental water sources would provide adequate water facilities for existing authorized grazing management activities and would be beneficial to wildlife as well. While beneficial, these water sources are located in a different geographic area than the GDEs potentially impacted by the Resolution Copper Project.
- *Millsite Range Improvements.* This range allotment is located 20 miles east of Apache Junction, on the southern end of the Mesa Ranger District. The Mesa Ranger District is proposing to add three new 10,000-gallon storage tanks and two 600-gallon troughs to improve range condition through better livestock distribution and to provide additional wildlife waters in three pastures on the allotment. Water developments are proposed within the Cottonwood, Bear Tanks, and Hewitt pastures of the Millsite grazing allotment. These improvements would be beneficial for providing water on the landscape and are within the same geographic area where some water sources could be lost (Alternatives 2 and 3); they may offset some loss of water that would result because of the Resolution Copper Project tailings storage facility construction.

Other future projects not yet planned, such as large-scale mining, pipeline projects, power transmission line projects, and future grazing permits, are expected to occur in this area of south-central Arizona

during the foreseeable future life of the Resolution Copper Mine (50–55 years). These types of unplanned projects would contribute to changes in wildlife and their respective habitats by either reducing available habitats areas, reducing habitat quality, or acting to fragment existing habitats.

3.8.4.4 Mitigation Effectiveness

The Forest Service is in the process of developing a robust mitigation plan to avoid, minimize, rectify, reduce, or compensate for resource impacts that have been identified during the process of preparing this EIS. Appendix J contains descriptions of mitigation concepts being considered and known to be effective, as of publication of the DEIS. Appendix J also contains descriptions of monitoring that would be needed to identify potential impacts and mitigation effectiveness. As noted in chapter 2 (section 2.3), the full suite of mitigation would be contained in the FEIS, required by the ROD, and ultimately included in the final GPO approved by the Forest Service. Public comment on the EIS, and in particular appendix J, will inform the final suite of mitigations.

This section contains an assessment of the effectiveness of mitigation and monitoring measures found in appendix J that are applicable to wildlife.

Mitigation Measures Applicable to Wildlife

Follow AGFD and FWS guidance for mitigation of impacts on wildlife (GP-125): Follow guidance from the AGFD and FWS regarding avoidance, minimization, and mitigation measures for wildlife. The AGFD's Heritage Data Management System (HDMS) and Project Evaluation Program work together to provide current, reliable, objective information on Arizona's plant and wildlife species to aid in the environmental decision-making process. The information can be used to guide preliminary decisions and assessments for the Resolution Copper Project. Similarly, the FWS provides guidance for planning for wildlife. This measure would be noted in the ROD/Final Mining Plan of Operations and would be required by the Forest Service.

Implement a wildlife management plan for stormwater ponds, including wildlife exclusion fencing (GP-131). This measure would be noted in the ROD/Final Mining Plan of Operations and would be required by the Forest Service.

Reptile and Sonoran Desert Tortoise (ESA-CCA) Plan (CA-191):

Implement conservation actions detail in the Candidate Conservation Agreement. The Candidate Conservation Agreement would be a formal agreement between the FWS and Resolution Copper to address the conservation needs of proposed or candidate species, or species likely to become candidates, before they become listed as endangered or threatened. Resolution Copper would voluntarily commit to conservation actions that would help stabilize or restore the species with the goal that listing would become unnecessary. This measure would be noted in the ROD/Final Mining Plan of Operations and would be required by the Forest Service.

Mitigate for loss of abandoned mine or cave habitats for bats

(CA-172): Mitigate impacts on bat habitat by conducting pre-closure surveys over multiple years and multiple visits per year, to document species presence/absence and develop appropriate closure methods in coordination with AGFD, Bat Conservation International, and Forest Service biologists; implement wildlife exclusion measures pre-closure to minimize wildlife entrapment and mortality during closure; consider seasonal timing of closure on any sites with suitable maternity roosts; and identify mines, adits, and/or shafts with known bat roosting areas. If activities are adjacent to bat roosting/maternity sites, develop best management practices to reduce human encroachment. This measure would only be applicable to Alternatives 2, 3, and 4. It would be noted in the ROD/Final Mining Plan of Operations and required by the Forest Service via 36 CFR 228.8 (Forest Service Authority to regulate mining to minimize adverse environmental impacts on NFS resources).

Maintain or replace access to stock tanks and AGFD wildlife waters

(CA-175): Resolution Copper would maintain or replace access to stock tanks and AGFD wildlife waters impacted by the project. Stock tanks are used to provide drinking water for livestock. AGFD constructs wildlife water developments to support a variety of wildlife, including game

species. Benefits of AGFD wildlife water developments include a long lifespan; year-round, acceptable water quality for wildlife use; require no supplemental water hauling, except in rare or exceptional circumstances; minimal visual impacts and blends in with the surrounding landscape; accessible to and used by target species and excludes undesirable/feral species to the greatest extent possible; and minimized risk of animal entrapment and mortality. This measure would be applicable to all alternatives, noted in the ROD/Final Mining Plan of Operations, and required by the Forest Service. Additional ground disturbance would not be required, as it is within the disturbance disclosed in the DEIS.

Use of best management practices during pipeline construction and operations (CA-176):

Resolution Copper would adhere to best management practices during pipeline construction and operation. During pipeline construction, Resolution Copper would cover open trenching; inspect trenches routinely for entrapped wildlife and remove; provide wildlife escape ramps; inspect under construction equipment prior to use and remove any wildlife seeking cover. Resolution Copper would also include wildlife crossing structures along the pipeline corridor (overpass or underpass) and coordinate with AGFD to determine the location, frequency, and design of wildlife crossing structures. This measure would be applicable to all alternatives, noted in the ROD/Final Mining Plan of Operations, and required by the Forest Service. No additional ground disturbance is required as it is within the disturbance disclosed in the DEIS.

Mitigation Effectiveness and Impacts

Mitigation would be effective at reducing or offsetting some impacts on wildlife. Most water sources potentially impacted by the project would be replaced, impacts on cave habitat would be minimized, and impacts from ground disturbance, traffic, noise, and light would be minimized through best practices but not eliminated. However, overall a large acreage of habitat would be impacted. This loss of habitat would not be replaced in the immediate project area, though it would be offset by the exchanged lands and some mitigation proposals being developed

through the Clean Water Act permitting program (see Section 3.7.2, Surface Water Quantity).

Unavoidable Adverse Impacts

Biological resources would be impacted by direct surface disturbance, noise, vibration, light, dust, air pollutants, and traffic. Adverse impacts that cannot be avoided or completely mitigated include changes in cover, changes in foraging efficiency and success, changes in reproductive success, changes in growth rates of young, changes in predator-prey relationships, increased movement, habitat fragmentation and disruption of dispersal and migration patterns through animal movement corridors, and increased roadkill.

3.8.4.5 Other Required Disclosures

Short-Term Uses and Long-Term Productivity

Impacts on wildlife and wildlife habitat would primarily be short term and would include destruction of habitat for mine construction, disturbance from mining and associated activities, and direct mortality from increased mine-related vehicle traffic. Disturbance and direct mortality would cease at mine closure, and reclamation would eventually allow wildlife habitat to reestablish itself. However, this could take many decades or longer. Portions of the tailings storage facility landform may never return to pre-mining conditions, and the effects of reduced quality of habitat would be long term or permanent. Impacts on wildlife and aquatic habitat due to drawdown that affects streams and springs would represent a permanent loss in productivity.

Irreversible and Irretrievable Commitment of Resources

The direct loss of productivity of thousands of acres of various habitat from the project components would result in both irreversible and irretrievable commitment of the resources that these areas provide for

wildlife (i.e., breeding, foraging, wintering, and roosting habitat; animal movement corridors, etc.). Some habitat could reestablish after closure, which would represent an irretrievable commitment of resources, but portions of the tailings storage facility landform may never return to pre-mining conditions, and the effects of reduced quality of habitat would likely be irreversible.