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In reply refer to:
AESO/SE
02EAAZ00-2019-F-0564

August 20, 2020

Mr. Justin White, Biology Program Manager
Arizona Department of Transportation
Environmental Planning
1611 West Jackson Street
Phoenix, Arizona 85007

RE: Federal Highway Administration (FHWA) File # 366-A(202)T
Arizona Department of Transportation (ADOT) File # 366 GH 118 F0191 01C
SR 366 Flood and Fire Repairs

Dear Mr. White:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). We received your request, dated December 11, 2019, the same day. At issue are effects that may result from road repairs needed following the Frye Fire and post-fire flooding along State Route (SR) 366, in the Pinaleño Mountains, Graham County, Arizona.

You concluded that the proposed action "may affect, and is likely to adversely affect" the endangered Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) (hereafter squirrel or red squirrel) and the threatened Mexican spotted owl (*Strix occidentalis lucida*) (owl or spotted owl) and its designated critical habitat.

You also determined that the action would have "no effect" on designated red squirrel critical habitat. "No effect" determinations do not require our review and we will not address it further.

We base this Biological Opinion (BO) on information provided in the Biological Evaluation (BE) and its appendices, email correspondence, telephone conversations, and field investigations. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern; effects from fire, floods, road construction and repairs; or other subjects considered in this BO. A complete administrative record of this consultation is on file at this office.

Consultation History

December 11, 2019	We received your request for formal consultation and the BE.
December 19, 2019	We sent a 30-day letter indicating that all information required to initiate consultation was in the BE or otherwise available for our reference.
June 26, 2020	You requested formal consultation for designated Mexican spotted owl critical habitat.
June 26-30, 2020	Arizona Department of Transportation (ADOT), Coronado National Forest (CNF), Archaeological Consulting Services (ACS), and FWS modified the project schedule and conservation measures through email exchanges and conference calls.
August 20, 2020	We coordinated with you on the draft final document and sent you the final BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Regulations implementing the Act (50 CFR 402.02) define "action" as all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies of the United States or upon the high seas. The Federal Highway Administration (FHWA) will largely fund and ADOT will construct the project.

Project Objectives

The purpose of the project is to repair the roadway, upgrade its facilities, and assure public safety and the reliability of SR 366 following the 2017 Frye Fire and subsequent post-fire flood damage. Planned actions will reduce tree fall hazards along SR 366, repair damages to the roadway and related facilities, and resolve erosion, drainage, and rock fall risks. Since the high-severity fire in 2017, increased runoff and erosion have altered flow patterns across SR 366, scoured stream banks, overwhelmed pipe culverts, eroded and destabilized mountain slopes, damaged roadway surfaces and other facilities, and undermined trees (burned and unburned) in areas where the fire perimeter and SR 366 overlapped.

Project Location

All project-related activities will occur along a 21.2-mile segment of SR 366, from milepost (MP) 118.0, seven miles south of the City of Safford, to MP 139.2, just past Grant Creek. Nearly all activities will occur within ADOT's existing 200-foot-wide right-of-way (ROW)/CNF easement. The affected segment of SR 366, also known as Swift Trail, begins at milepost (MP) 118.0, approximately seven miles south of the City of Safford, and ends just west of Grant Creek, at MP 139.2 (Figure 1). Areas where project work will occur outside ADOT's easement include: 1) parts of hazard tree areas (defined below) that will extend beyond the easement, and 2) a 0.30-acre staging and stockpile area on Forest Road (FR) 861, 0.3 mile north of SR 366 near MP 119.7.

Definitions

In this BO, we use terminology included from ADOT's BE. These terms are described in this section.

The *construction footprint* includes all surface and subsurface construction activities required to complete the scope of work, as described in the following sections.

ADOT's *easement* extends laterally 100 feet away from the SR 366 centerline, in both directions. Because SR 366 has a 12-foot-wide paved travel lane on both sides of the centerline, the easement extends 88 feet beyond the edge of the paved roadway.

The *roadway prism* is the existing paved SR 366 roadway and its paved and unpaved shoulders, vehicle turnouts, cut banks, fill slopes and drainage facilities (ADOT 2018, Appendix B). ADOT has paved SR 366 up to MP 136.0. Beyond that point (MPs >136.0), SR 366 is graveled.

Hazard trees are dead or dying trees standing on slopes above the SR 366 roadway that burned during the Frye Fire or undercut by increased runoff after the fire and are now at risk of falling onto the roadway (see Figure 2).

Hazard tree areas are designated areas in ADOT's easement where work crews will remove standing trees that may fall on the SR 366 roadway. Planned actions include removal of all hazard trees from four designated hazard tree areas (Table 1).

Hazard tree stockpiles will be sections of designated staging and stockpiling areas where a proportion of trees removed from hazard tree areas will be stacked into decks and offered to the public as firewood.

Scope of Work

- Removal and disposal of approximately 4,575 hazard trees from four hazard tree areas (Table 1, Figure 1).
- Replacement of pipe culverts with box culverts at Big Creek (MP 137.3) and Grant Creek (MP 139.1), including reconstruction of channel transitions and placement of rip-rap erosion control.
- Erosion control repairs at Wet Canyon Bridge (MP 123.5).
- Gabion buttress wall, slope and rock fall containment, and shoulder ditch repairs at the Arrow Tree Site (MP 132.66 to MP 132.90).
- Complete replacement of the roadway pavement (including subgrade) from MP 124 to MP 125 and MP 129 to MP 131.
- Spot repair pavement as needed and chip seal pavement from MP 118 to MP 136.
- Re-establish pavement striping as needed.

Staging and Stockpiling

Staging and stockpiling of construction equipment and materials will occur at up to six locations inside ADOT's easement. They include the Wet Canyon vehicle turnout at MP 123.5; the entrance road to Twilight Campground at MP 128.4; Lady Bug Saddle at MP 131.0; a roadside pullout at MP 134.0; the Shannon Campground turnout at MP 135.8; and the Forest Road 507 turnout at MP 136.1. Work crews may also use the roadway shoulders and possibly one lane of SR 366 for staging and stockpiling at the Arrow Tree Site, Big Creek, and Grant Creek.

Removal of Hazard Trees

Crews will remove hazard trees from ADOT's easement at four locations where the Frye Fire burned at high-intensity and killed large numbers of trees (Figure 1, Table 1). Nearly all of the trees ADOT will remove are dead or severely damaged by the fire (Figure 2). One site, Hazard Tree Area 1, experienced only 50% crown scorching and includes live, unburned trees mixed in with those that are dead or dying. ADOT's aim is to remove all hazard trees from these areas and because of the high erosion potential at the four sites (Table 1), this will include live trees. However, the contractor will have some discretion regarding removal of healthy trees, and crews may leave unburned trees less than 9-inches in diameter-at-breast height (dbh) in place. The contractor may also remove trees outside ADOT's easement boundary if they pose a safety

hazard. Nearly all hazard trees are on slopes above the roadway, but work crews will also remove trees on the downhill-side shoulders that also may be hazardous to public safety, as necessary (Figure 2). ADOT provided data regarding burn severity, crown scorch, erosion hazard, size of the burn, and a tree count for each hazard tree area (Table 1).

Crews will use chainsaws to cut hazard trees to a stump height of four to six inches and heavy machinery to yard trees from the hillsides. Crews will use machinery (e.g., excavator, bulldozer, or front-end loader) from the road to lift felled logs or drag logs attached to a chain. The contractor may also consider more mechanized approaches to tree removal.

Disposing of Hazard Trees

After cutting trees, crews will use equipment to lift or skid logs to the roadway or landing. Trees 5 to 18 inches dbh that have minimal scorch into 8- to 12-foot lengths, load them onto logging trucks, and transport them to six stockpile areas. Crews will stack trees into decks for public use as firewood. Five of the six stockpiles will be the same locations identified above for staging. Crews may also stack trees within a 0.3-acre vehicle pullout 0.3 mile north of SR 366 on Forest Road (FR) 861, near MP 119.7 (Figure 1). An average deck will be 8-12 feet wide (the length of each log), up to 30 feet long, and 4 feet high.

Work crews will burn all other trees (those not stockpiled) using air curtain burners. This device consists of a dumpster-like burn chamber with an attached diesel-powered fan. The air curtain burner pushes smoke, particulate matter, and glowing embers back into a chamber eliminating most of the smoke and fire risk (Schapiro 2002). Before operation of air curtain burners, ADOT will obtain the necessary air quality permits from the Arizona Department of Environmental Quality (ADEQ).

Crews will burn up to 1,870 tons of wood producing approximately 37.4 tons of ash (about 2% of the original mass), using air curtain burners. Crews will transport burners to the field by trailer and operate the burners 24 hours a day over staggered periods of 3-5 days each—as opposed to running the burners continuously over long periods. Up to 78 burn days may be required to dispose of all logs and woody debris. Work crews will operate burners at established staging and stockpiling areas.

Big Creek and Grant Creek Culvert Replacement

Work crews will remove existing corrugated metal pipe culverts that convey Big Creek (MP 137.3) and Grant Creek (MP 139.2) under SR 366 and replace them with larger concrete box culverts. Larger drainage structures will accommodate increased flows originating from upstream areas destabilized by the Frye Fire.

Culvert replacements will involve the use of excavators, bulldozers, front-end loaders, graders, backhoes, and possibly a crane, to remove the existing pipes, excavate a trench for the culverts, lower the new box culverts into place, construct wing walls and rock mattresses, backfill and grade around the new structures, and re-establish the roadway. Both culvert replacement sites are west of MP 136, thus the roadway is unpaved at both sites.

ADOT anticipates that the contractor will remove the existing pipe culverts and install box culverts in phases so that flows through the drainage and one lane of traffic can occur throughout construction. Access to the stream channels will be possible via local dirt roads and crews will need to do minimal grading to establish access. Crews will work from the top of the stream embankments to the extent possible. During construction, the contractor will apply all necessary erosion, runoff, and sediment control measures to minimize sediment discharges into Big Creek and Grant Creek. Approximately 0.2 acre of ground disturbance will occur at each culvert construction site, for a total of 0.4 acre.

Wet Canyon Erosion Repairs

Erosion control measures at Wet Creek will occur within a 0.1-acre area west of the SR 366/Wet Creek Bridge at MP 123.5 (Figure 1). ADOT plans to install a gabion buttress wall along the northern bank of Wet Creek near the edge of an existing parking area adjacent to the creek. Work crews will excavate the existing stream bank and stack riprap gabions surfaced with high survivability filter fabric to form a wall parallel to the channel. Crews will backfill the embankment with gravel and compact the gravel on both sides of the stacked gabions. The new embankment will slope toward the creek's low-flow channel. In addition, crews will fill an existing void beneath the northwestern abutment of the new bridge with riprap. All work within Wet Canyon will occur from atop the stream banks. Crews will not alter stream flows during construction and no water diversions will be required. Crews will use an excavator, bulldozer, loader, and backhoe to excavate and place the buttress wall and riprap.

Arrow Tree Site Erosion and Rock Fall Repairs

Erosion and rock fall mitigation at this site will occur within ADOT's easement along approximately 0.24 mile of SR 366 from MP 132.66 to MP 132.90.

To eliminate erosion issues undermining the SR 366 roadway, construction crews will install approximately 300 linear feet of 9- to 13-foot-tall gabion buttress walls in two sections. Crews will position the walls 5-10 feet below the road to assure the top of the wall and the roadway are level. During construction, crews will remove trees and other woody vegetation using chainsaws, possibly facilitated with a boom lift. They will then use excavators or backhoes, operated from the road, to excavate a trench for anchoring the wall. Crews will then stack riprap gabions to form the wall, backfill and compact the area above the wall with gravel and native spoils from the trench, and reinforce the wall with wire mesh or polymer geogrid sheets. Finally, an area of at least five feet in front of the gabion wall will be graded to level and any pavement disturbed or removed during the project replaced.

To prevent rock fall from damaging the roadway and new gabion wall, and to assure public safety, ADOT will implement containment measures on the steep, rocky slopes above SR 366. Crews working on foot or from a boom lift will remove trees and other vegetation from above the roadway along approximately 1,200 feet of SR 366, and will remove old wire mesh containment features and their rebar anchors. Working with hand tools or earthmoving equipment operated from the roadway, crews will then scale and trim loose rock from the hillside to create a rounded crest along the upper edge of the rock fall area and a uniform 1:1 slope down to the road. New anchored wire mesh or wire rope with erosion control revegetation matting under the mesh will be installed using rock drills and anchor bolts. Crews will remove sediments

that have collected in roadside ditches since the fire, spoils from the rock fall work, and regrade the ditches to maintain positive drainage to existing culverts.

Pavement Replacement and Repair

ADOT will repair or replace sections of pavement along SR 366 damaged by heavy equipment during and after the Frye Fire. Work crews will replace the pavement from MP 124 to MP 125 and from MP 129 to MP 131. Along these stretches, crews will remove the existing pavement, apply and compact new subgrade, followed by fresh asphaltic pavement. Crews will spot repair cracks, joints, potholes, and depressions on the roadway as needed throughout the remaining paved portions of SR 366 by routing and clearing loose, deteriorated pavement and applying new pavement. Following pavement repairs, crews will apply a chip seal to the entire paved portion between MP 118 and MP 136. To apply the chip seal, workers will spray the roadway with asphalt, apply a thin layer of gravel or crushed stone, followed by a layer of sealant. These operations will require the use of excavators, backhoes, bobcats, dump trucks, graders, milling machines, and drum rollers.

Project Schedule

ADOT anticipates construction will begin in late 2020 or early 2021 and expects the project to take 15 to 24 months to complete, depending on weather and other scheduling limitations (J. White, ADOT Biology Program Manager, personal communication, July 3, 2020). Each planned action will likely require 2-4 months to complete, with the exception of hazard tree removal at MP 134.0, which may require up to 10 months. Scheduling limitations and commitments include:

- Given high elevations in the construction footprint (9,000 feet at the project high point near MP 136), it may not be feasible to work at higher elevations during winter.
- All vegetation removal, including removal of hazard trees, will occur outside the Mexican spotted owl's breeding period (see *Conservation Measures* below). Thus, vegetation removal will occur only from September 1 to February 28 each year.
- Repaving and chip sealing the roadway must occur in warm, dry weather, in late spring or summer.
- Removing log decks from hazard tree stockpiles will occur each spring before the fire season begins. Returning log decks to the stockpile can occur any time after the fire season ends.

Other than these limitations, the contractor will have wide discretion to schedule and complete planned actions, and is likely to complete some work (in addition to the pavement work mentioned above) during spring and summer months.

Applicable Design Standards and Best Management Practices

Mitigation measures include design standards and best management practices (BMPs) to avoid negative effects to soils and water quality during construction, to minimize the spread of invasive and noxious weeds, and to rehabilitate disturbed areas after construction.

- Because project activities would result in greater than one acre of ground disturbance, ADOT will prepare a Storm Water Pollution Prevention Plan as required under the Arizona Pollutant Discharge Elimination System.
- Project activities will result in the discharge of fill material into several waters of the U.S. subject to regulation under Section 404 of the Clean Water Act, including Wet Creek, Big Creek, and Grant Creek. ADOT anticipates the U.S. Army Corps of Engineers will authorize such discharges under their Regional General Permit No. 96. ADOT will notify the U.S. Army Corps of Engineers of proposed effects to waters of the U.S. via a Pre-Construction Notification.
- ADOT will obtain a water quality certification from the ADEQ in compliance with that agency's requirements under Section 401 of the Clean Water Act.
- To minimize offsite transport of sediments during construction, the contractor shall apply standard erosion control measures such as construction of temporary sediment basins and use of sediment wattles and logs.
- The contractor shall develop a Noxious and Invasive Plant Species Treatment and Control Plan in accordance with the requirements in the contract documents. The plan and associated treatments shall include all areas within the project ROW and easements as shown on the project plans. ADOT's contractor will submit the treatment and control plan to the Engineer for the ADOT Construction Professional Landscape Architect for review and approval prior to implementation.
- Prior to the start of ground-disturbing activities and throughout the duration of construction and any landscape re-establishment period, the contractor shall arrange for and perform the control of noxious and invasive species in the project area.
- To prevent the introduction of invasive species into the action area, work crews will wash and inspect all earthmoving, hauling, and construction equipment, and remove all attached debris, including plant parts, soil and mud, prior to entering the construction site.
- To prevent invasive species seeds from leaving the action area, the work crews will inspect all construction and hauling equipment and remove all debris, including plant parts, soil and mud, prior to leaving the construction site.
- ADOT will include standard specifications designed to minimize noise in the construction contract. These specifications will require the contractor to comply with all local sound control and noise level rules, regulations, and ordinances that apply to any work performed pursuant to the contract. Each internal combustion engine the contractor uses for any purpose during specified or related work will be equipped with a muffler of a type recommended by the manufacturer. Work crews will operate no internal combustion engine without a muffler that is in good working condition.
- After construction, disturbed areas not otherwise stabilized by permanent structures (e.g., riprap or gabion walls) will be re-contoured and graded as necessary to return them to as near their original condition as possible, and will be reseeded with appropriate native seed mixes.

Conservation Measures

Conservation measures represent commitments made by ADOT to minimize effects of the proposed action on listed species and their habitats, including designated critical habitats.

Environmental Awareness Training

- Before ground-disturbing activities occur, a qualified biologist will present an environmental awareness program to on-site project personnel, including but not limited to contractors, contractors' employees, supervisors, inspectors, and subcontractors. The program will contain, at a minimum, information concerning Mount Graham red squirrel and Mexican spotted owl identification and biology; their occurrence and distribution in the action area; and measures to avoid effects to the two species. The biologist should emphasize the Mount Graham red squirrel's critically endangered status and describe middens, feeding scatters, and nests.

Fire Risk Reduction

- The contractor shall submit a fire prevention plan for ADOT's approval prior to construction.
- In coordination with the CNF and ADOT's Southeast District (District), the contractor shall completely remove all tree decks from hazard tree stockpiles as described in the project specifications between June 1 and September 1of any given year or as otherwise directed by the engineer. The District will coordinate with CNF to obtain the most recent fire risk information so stockpiled tree decks do not occur during the fire season or any period of high fire danger.

Mount Graham Red Squirrel

- The contractor shall comply with all components of the environmental awareness program and shall endeavor to prevent harm to red squirrels and to avoid their middens, feeding scatters, and known nests during construction to every possible extent.
- Other than what is specified in the project description (i.e., hazard tree removal outside the easement boundary if trees pose a safety hazard), no work or activity will occur within red squirrel habitat outside ADOT's easement.
- If the contractor or any construction crew member detects any previously unidentified red squirrel middens, or encounters an injured or dead red squirrel, work shall stop immediately at that location and FWS and CNF shall be contacted immediately for guidance.

Mexican Spotted Owl

- The contractor shall comply with all components of the environmental awareness program to prevent harm to Mexican spotted owls and to avoid core areas, known nests, roosts, and perch sites during construction to every possible extent.
- Other than what is specified in the project description (i.e., hazard tree removal outside the easement boundary if trees pose a safety hazard), no work or activity will occur within Mexican spotted owl PACs outside ADOT's easement.

- No vegetation removal, including tree cutting in hazard tree areas, will occur during the Mexican spotted owl breeding period (March 1 – August 31). Tree cutting will be restricted to September 1 to February 28 of any given year.
- If the contractor or any construction crew member detects any previously unidentified owl nests, or encounters an injured or dead owl, work shall stop immediately at that location and FWS and CNF shall be contacted for guidance.
- ADOT will not use the vehicle turnout at Shake Canyon Trailhead (MP 132.4) for air curtain burner operations or staging and stockpiling of materials, equipment, or hazard tree decks, because it is only 300 feet from the 2019 Pitchfork Canyon PAC nest site.

Action Area

FWS defines the action area as all areas to be affected directly or indirectly by the proposed action, and not merely the immediate area involved in the action (50 FR § 402.02). In delineating the action area, we evaluated the furthest reaching physical, chemical, and biotic effects of the action on the environment, focusing on, but not exclusive to, the SR 366 roadway in the southeastern portion of the Pinaleño Mountains.

The action area for this project includes the SR 366 construction footprint and the adjacent areas where noise and elevated disturbance levels from project activities may affect red squirrels and owls. The road and culvert improvements, erosion control, and rock fall containment activities are focused along SR 366 between MP 118 and 139.2 (Figure 1). The hazard tree removal actions will occur at four separate burned areas adjacent to SR 366 that together are approximately 5 acres in size (Figure 2). Noise and disturbance from the proposed actions along the roadway and hazard tree removal will extend into the forest toward spotted owl PAC boundaries and red squirrel habitat for up to 0.25 mile from the ROW, unless topographic barriers prevent noise from travelling that far.

The SR 366 action area occurs within the Pinaleño Mountains of southern Arizona, which are part of the Madrean Sky Islands, also known as the Madrean Archipelago. The sky islands are high, isolated mountain ranges separated by broad, flat lowlands. Elevation within the action area ranges from 4,000 feet near MP 118 to 9,000 feet near MP 136.

Major drainages in the action area include Jacobson Creek, Noon Creek, and Wet Creek, all of which the Arizona Department of Water Resources (ADWR) classifies as intermittent, and Big Creek and Grant Creek, which are perennial (ADWR 2009). The BE indicates that Wet Creek, which occurs in Wet Canyon, is perennial where it crosses SR 366.

Biotic communities within the action area transition from Semi-desert Grasslands in low elevation areas east of MP 122, to Madrean Evergreen Woodlands at intermediate elevations between MP 122 and MP 125, to Petran Montane Conifer Forest in the higher elevations west of MP 125 (Brown 1994).

The action area is mostly undeveloped and the 2017 Frye Fire has burned much of the forest. The Mount Graham Wilderness Study Area is located south and north of SR 366, but does not include areas in close proximity to the highway. Recreation facilities, including picnic areas, campgrounds, and hiking trails occur at several locations along the affected portion of SR 366,

and the Turkey Flat Summer Homes, a light residential area, is located at MP 128.3. East of MP 136.0, SR 366 has 2 paved, 12-foot-wide travel lanes. West of that milepost, SR 366 is a 2-lane gravel road. Average daily traffic along paved sections of SR 366 is 196 vehicles per day (range 29-1,402) (Chen and Koprowski 2015). Currently, ADOT maintains SR 366 up to the international observatory access road, including grading the unpaved section West of MP 136.0 and clearing snow in the winter.

STATUS OF THE SPECIES

Mount Graham Red Squirrel

Legal Status

We listed the Mount Graham red squirrel as endangered in 1987 (52 FR 20994) (USFWS 1987). The final rule concluded that the red squirrel was endangered because its range and habitat were reduced and its habitat was threatened by a number of factors, including a proposed astrophysical observatory near Mount Graham (now in operation), occurrences of high-severity wildland fires, proposed road construction and improvements, and recreational developments at high elevations on the mountain. The rule noted that the subspecies might also suffer from competition with the introduced Abert's squirrel. In 1990, we designated critical habitat for the red squirrel (55 FR 425) (USFWS 1990). We finalized the first Recovery Plan for the subspecies in 1993 (USFWS 1993), and that plan has been undergoing revision since 2011 (USFWS 2011).

Habitat

The red squirrel inhabits a narrow range of habitats in high-elevation areas of the Pinaleño Mountains, including areas dominated by Engelmann spruce (*Picea engelmanii*) and corkbark fir (*Abies lasiocarpa* var. *arizonica*); mixed-conifer stands dominated by Douglas fir (*Pseudotsuga menziesii*), with white fir (*Abies concolor*) and Mexican white pine (*Pinus strobiformis*) as sub-dominants; and in the ecotone between these two communities. Red squirrels apparently do not inhabit pure stands of ponderosa pine (*Pinus ponderosa*) (USFWS 1993).

Red squirrels are highly territorial (C. Smith 1968) and create middens within their territories consisting of piles of cone scales in which squirrels cache live, unopened cones as an over-winter food source and for use during times of cone failure (M. Smith 1968, Finley 1969, Steele and Koprowski 2001). Red squirrels tend to place middens on gentler, non-southerly-facing slopes in healthier, older forests with higher canopy closure, basal area, and numbers of large live trees than surrounding forests (Finley 1969, Zugmeyer and Koprowski 2009, Hatten 2014). This allows the maintenance of specific moisture levels within the midden, creating prime storage conditions for cones and other food items, including mushrooms, acorns, and bones (Finley 1969, Brown 1984, USFWS 1993, Zugmeyer and Koprowski 2009). Red squirrels also seem to prefer areas with snags, piles and tangles of downed timber, and a higher volume of logs that provide cover and safe travel routes, especially in winter, when open travel across snow exposes them to increased predation. Wood *et al.* (2007) determined that midden site selection occurs not only at the microclimate level (where conditions are appropriate for cone storage), but also on a larger scale that encompass areas with a high numbers of healthy trees and correspondingly high seed fall. There appears to be no differentiation in selection of middens based on sex (Alanen *et al.* 2009).

Within their territories, red squirrels build nests in hollow trees, hollow snags, hollow logs, outside trees in nests of grass or foliose lichens (called dreys or bolus nests), or in holes in the ground (C. Smith 1968, Leonard and Koprowski 2009). Nests may occur in natural hollows or abandoned cavities made by other animals, such as woodpeckers (USFWS 1993). Stand composition, particularly density of corkbark fir and the presence of mature (large) trees and decaying logs strongly influence nest site selection (Merrick *et al.* 2007). Preferred nesting locations include large snags and cavity-containing trees, especially aspen (Merrick *et al.* 2007).

Distribution, Abundance, and Population Trends

Red squirrels occur only in the high-elevation forests of the Pinaleño Mountains (Hoffmeister 1986) in the Safford Ranger District of the Coronado National Forest. The subspecies inhabits upper elevation, mature to old-growth associations in mixed conifer and spruce-fir woodlands above approximately 2,425 m (8,000 ft). As recently as the 1960s, the species may have ranged as far east as Turkey Flat and as far west as West Peak, but now only occurs west to Clark Peak. A local extirpation occurred on West Peak, possibly due to a fire in the mid-1970s that isolated the West Peak subpopulation from the rest of the range and destroyed red squirrel habitat. Suitable habitat may be available on West Peak (Hatten 2009), but systematic surveys have not occurred there.

Since 1986, an interagency team has estimated and tracked the population size of the red squirrel throughout its range. Due to changes in analysis, population estimates before and after 1990 may not be comparable. Midden surveys show increasing numbers of MGRS into 1998-2000, with peaks over 500, after which the population declined due to a decrease in habitat from multiple insect outbreaks and wildfires (see *Threats*, below). Population estimates dropped 42% in 2001 as compared to 1998-2000; from then until 2017, population estimates remained fairly stable, varying from 199 to 346 individuals.

In summer 2017, the Frye Fire burned through the majority of the squirrel's habitat—86% of what remained in 2016 by one estimate (USFS 2017)—and led to an immediate and marked decline in the red squirrel population, from an estimate of 252 individuals in 2016, to 35 in 2017, the lowest count since red squirrel surveys began in 1986. Squirrel numbers improved somewhat in 2018 and 2019 (AGFD 2018, 2019). The 2019 survey resulted in a conservative estimate of 78 individuals.

Diet

Red squirrels eat seeds and store live cones from Englemann spruce, white fir, Douglas-fir, corkbark fir, and white pine (Rushton *et al.* 2006). Midden surveys indicate that Engelmann spruce and Douglas-fir are the most common tree species supplying food for red squirrels. Squirrels also readily consume false truffles and other fungi, which appear during spring snowmelt and after summer rains (Brown 1984, Froehlich 1990). These food items may be dried and stored if squirrels do not eat them immediately (Brown 1984).

Threats

In recent years, forests in the Pinaleño Mountains have experienced ecological changes, many of which are detrimental to the survival of the Mount Graham red squirrel. A large amount of MGRS habitat, that ecologists modeled and determined was relatively stable from 1986 to 1995, gradually declined in quality from 1996 to 2003 (Hatten 2014). This decline corresponds with the 1996 Clark Peak Fire and multiple outbreaks of forest insects (described below). From 2004 to 2006, a rapid decline in habitat occurred, corresponding with the 2004 Nuttall Complex Fire, followed by a low trough of available habitat between 2007 and 2009 (Hatten 2014). The large, stand-replacing fires in 1996 and 2004, affected approximately 35,000 acres of forested area, which reduced survivorship of individual squirrels with middens inside the fire boundary (Koprowski *et al.* 2006). In 2017, the Frye Fire affected the majority of habitat within the red squirrel's range and researchers are still assessing the effects of this fire.

The Pinaleño Mountains currently are not experiencing the drought conditions that have affected most of Arizona, and no drought or abnormally dry conditions are expected over the long-term (Arizona Department of Water Resources website; accessed May 1, 2020). Extended drought creates severe physiological stress on trees, especially in higher elevation forests. Although the current drought in Arizona is apparently within historical levels of variation (Swetnam and Betancourt 1998), carbon dioxide emission scenarios suggest that by the end of the 21st century average global temperatures will increase 0.3-4.8 °C (0.5-8.6 °F), with the greatest warming expected over land (IPCC 2014). Localized projections suggest the southwestern U.S. may experience the greatest temperature increase of any area in the lower 48 states (Intergovernmental Panel on Climate Change [IPCC] 2007). Increasing temperatures in turn may accompany a more arid climate (Seager *et al*. 2007), increasing insect outbreaks in southwestern forests, and increasing wildfires (Betancourt 2004).

The Arizona Game and Fish Department introduced the non-native Abert's squirrel into the Pinaleño Mountains in the 1940s, and since then, Abert's squirrel have likely adversely affected red squirrels through competition for food resources (Hutton *et al.* 2003, Edelman 2004, Edelman and Koprowski 2005), nest sites (Edelman and Koprowski 2006), and dispersal territory (Steele and Koprowski 2001). Introduction of Abert's squirrel may also have increased predator density by providing an additional food source, leading to higher predation rates for red squirrels (Goldstein *et al*. 2018). Conversely, Abert's squirrels could decrease per capita predation on red squirrels by serving as an additional food source for predators. Rushton *et al.* (2006) determined competition with Abert's squirrels has the potential for a much greater effect on red squirrel population size when compared to plausible increases in predation, and suggested further research into and monitoring of the effects of competition and predation on red squirrels.

Recovery Planning

The objective of the Mount Graham Red Squirrel Recovery Plan (USFWS 1993) is "to increase and stabilize the existing Mt. Graham red squirrel population by protecting existing habitat and restoring degraded habitats." The Recovery Plan does not contain recovery criteria for the squirrel, as the goal of the plan is first to increase and stabilize the population by providing sufficient habitat to maintain a population of squirrels that never fluctuates below 300 adults and is distributed throughout the Pinaleño Mountains. The actions needed to stabilize the population include: 1) protect and monitor the existing population and habitat; 2) determine life history and habitat parameters; 3) reclaim previously occupied habitat; and 4) integrate species and habitat

protection actions for the Pinaleño Mountains. The Recovery Plan, first revision (USFWS 2011) remains in draft form.

Critical Habitat

We designated approximately 1,900 acres of the Pinaleño Mountains as red squirrel critical habitat (55 FR 425). Critical habitat includes areas above elevations of 10,000 feet surrounding Hawk and Plain View peaks and a portion above 9,800 feet; the north-facing slopes of Heliograph Peak above 9,200 feet; and the east-facing slope of Webb Peak above 9,700 feet.

The main attribute of designated critical habitat is the existence of dense stands of mature (approximately 300-year-old) spruce-fir forest. The Mount Graham Red Squirrel Refugium, established by the Arizona-Idaho Conservation Act (1988), has the same boundary as that of designated critical habitat surrounding Hawk and Plain View peaks (about 1,700 acres), but does not include critical habitat on Heliograph or Webb Peaks. Unfortunately, wildland fire and insect damage has affected most habitat in the Refugium and other designated critical habitat areas.

Previous Consultations

Within Arizona, 14 projects have undergone formal section 7 consultation for effects to the Mount Graham red squirrel. They are available on the Arizona Ecological Services Office section 7 website.

Mexican Spotted Owl

We listed the Mexican spotted owl as threatened in 1993 (58 FR 14248) and designated critical habitat for the species in 2004 (69 FR 53182). We appointed the Mexican spotted owl Recovery Team in 1993 (USFWS 1993), which produced the Recovery Plan for the Mexican spotted owl in 1995 (USFWS 1995). We released the final Mexican spotted owl Recovery Plan, first revision in December 2012 (USFWS 2012).

Description and Life History

The Mexican spotted owl is a medium-sized owl without ear tufts. Spotted owls have mottled feathers with irregular white spots on a brown abdomen, back, and head. Mexican spotted owls nest in caves, in stick nest built by other birds, on debris platforms in trees, and in tree cavities. Mexican spotted owls have distinct annual breeding periods, with courtship beginning in March. Owls typically lay eggs in late March or early April, with eggs hatching approximately 30 days later. Nestling owls generally fledge in early to mid-June. A detailed account of the taxonomy, biology, and reproductive characteristics of the Mexican spotted owl is found in the Final Rule listing the owl as a threatened species (58 FR 14248), the original Recovery Plan (USFWS 1995), and in the revised Recovery Plan (USFWS 2012). We include the information provided in those documents by reference.

Habitat Requirements and Distribution

The spotted owl occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico (Figure B.1 *in* USFWS 2012). The owl ranges from Utah, Colorado,

Arizona, New Mexico, and the western portions of Texas south into several states in Mexico. Although the owl's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, the owl occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known owl locations in forested habitats indicate that the species has an affinity for older, uneven-aged forests, and the species inhabits a physically diverse landscape in the southwestern United States and Mexico.

In the Recovery Plan (USFWS 2012), the Recovery Team defined specific forest cover types (mixed conifer and pine-oak) and rocky-canyon habitats that provide nesting, roosting, and foraging habitat for Mexican spotted owls (USFWS 2012). The availability of habitat used for nesting/roosting of Mexican spotted owls in forested and rocky-canyon environments limits owl distribution (meaning the nesting and roosting habitat is a limiting factor for spotted owls). Habitat used for nesting/roosting also provides adequate conditions for foraging and dispersal activities. Thus, sustaining nesting/roosting habitat meets other survival and recovery requirements. Based on the specific forest cover type and rocky-canyon definitions, the Recovery Plan (USFWS 2012) focuses management recommendations on two categories of owl habitat: PACs and "recovery habitat" (the Recovery Team previously called recovery habitat "restricted habitat" in the 1995 Recovery Plan; the terms are synonymous).

PACs are intended to sustain and enhance areas that are presently, recently, or historically occupied by breeding Mexican spotted owls (USFWS 2012). Minimum PAC area is 600 acres and is based on the median size of the adaptive kernel contour enclosing 75% of the foraging locations for 14 pairs of radio-marked owls (595 ac) (Ganey and Dick 1995). Thus, PACS protect activity centers used by owls rather than entire home ranges. Consequently, there is no upper limit for PAC sizes; managers may create larger PACs if appropriate. The FWS and land managers establish PACs around owl sites (as defined in the Recovery Plan). All PACS should contain a designated 100-acre nest/roost core area, designed to offer additional protection to the nest or primary roost areas. The Recovery Plan (USFWS 2012) emphasizes protection of habitat used for nesting and roosting within PACs because the owls are most selective for such habitat (Ganey and Dick 1995, USFWS 2012 [Appendix B]) and these forest conditions are most limited across the landscape. These areas also provide resources to meet other life-history needs of the owl. Therefore, designating PACs protects and maintains occupied owl habitat.

Recovery habitat occurs in forest types and rocky canyons used by owls for roosting, foraging, dispersal and other life history needs; however, recovery habitat occurs outside of PACs. Recovery habitat is intended to: 1) provide protection for areas that may be used by owls; 2) foster creation of nest/roost habitat; 3) simultaneously provide managers with greater management flexibility than is allowed in PACs; and, 4) facilitate development and testing of management strategies that could be applied in PACs (USFWS 2012). Areas not classified as either PACs or recovery habitats, are classified as "Other Forest and Woodland Types" and "Other Riparian Forest Types" (USFWS 2012). These areas, which nesting owls rarely use, but owls may use for foraging and dispersal, generally include pure ponderosa pine forest, pinyon/juniper woodland, or other habitat types. Given their relatively limited importance to nesting owls, the Recovery Plan (USFWS 2012) contains no owl-specific recommendations in "Other Forest and Woodland Types" and "Other Riparian Forest Types".

In addition to this natural variability in habitat influencing owl distribution, human activities also vary across the owl's range. The combination of natural habitat variability, human influences on owls, international boundaries, and logistics of implementation of the Recovery Plan necessitates subdivision of the owl's range into smaller management areas. The 1995 Recovery Plan subdivided the owl's range into 11 "Recovery Units" (RUs): six in the United States and five in Mexico. In the revision of the Recovery Plan (USFWS 2012), we renamed RUs as "Ecological Management Units" (EMUs) to be in accord with current FWS guidelines. The Recovery Team divided the owl's range within the United States into five EMUs: Colorado Plateau (CP), Southern Rocky Mountains (SRM), Upper Gila Mountains (UGM), Basin and Range-West (BRW), and Basin and Range-East (BRE) (USFWS 2012). The Recovery Team delineated five EMUs in México: Sierra Madre Occidental Norte, Sierra Madre Occidental Sur, Sierra Madre Oriental Norte, Sierra Madre Oriental Sur, and Eje Neovolcanico.

Threats

We cited two primary reasons for the original listing of the Mexican spotted owl in 1993: (1) the historical alteration of its habitat as the result of timber-management practices; and, (2) the threat of these practices continuing. We also identified the danger of stand-replacing fire as a looming threat at that time. Since publication of the original Recovery Plan (USFWS 1995), the FWS and Recovery Team acquired new information on the biology, threats, and habitat needs of the owl. Threats to its population in the U.S. (but likely not in Mexico) have transitioned from commercial-based timber harvest to the risk of stand-replacing wildland fire (USFWS 2012). Recent forest management has moved away from a commodity focus, such as commercial-based timber harvest, and now emphasizes sustainable ecological function and a return toward pre-settlement fire regimes, both of which have potential to benefit the spotted owl. However, as stated in the revised Recovery Plan (USFWS 2012), there is much uncertainty regarding thinning and burning treatment effects and the risks to owl habitat with or without forest treatment.

Southwestern forests have experienced larger and more severe wildland fires from 1995 to the present, than prior to 1995 (Westerling 2016). Climate variability combined with unhealthy forest conditions (i.e., too many trees; high levels of insects and disease; excessive fuel loads; etc.) also synergistically result in increased negative effects to habitat from fire (Fulé *et al.* 2004, Littell *et al.* 2009). The intensification of natural drought cycles and the ensuing stress placed upon overstocked forested habitats could result in even larger and more severe fires in owl habitat (Jones *et al.* 2016, Ganey *et al.* 2017). Currently, high-severity, stand-replacing fires are influencing the persistence of ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Wildland fire is likely the greatest threat to the Mexican spotted owl within the action area and fire severity and size have been increasing (USFWS 2012). Landscape level wildland fires, such as the Rodeo-Chediski Fire (2002), the Wallow Fire (2011), and the Whitewater-Baldy Complex (2012) have resulted in the loss of tens of thousands of acres of occupied and potential nest/roost habitat across significant portions of the owl's range. Although owls will forage in severely burned areas, habitat is often lacking for nesting and roosting in these areas, particularly when high severity fire affects large patches of habitat (Jones *et al.* 2016).

Fuels reduction treatments, though critical to reducing the risk of severe wildland fire, can have short-term adverse effects to owls through habitat modification and disturbance. As the human population grows in the southwestern United States, small communities within and adjacent to

wildlands are being developed. This trend may have detrimental effects to spotted owls by further fragmenting habitat and increasing disturbance during the breeding season.

Global climate variability may also be a threat to the owl. Changing climate conditions may interact with fire, management actions, and other factors discussed above, to increase affects to owl habitat. Studies have shown that since 1950, the snowmelt season in some watersheds of the western U.S. has advanced by about 10 days (Dettinger and Cayan 1995, Dettinger and Diaz 2000, Stewart *et al.* 2004). Researchers think such changes in the timing and amount of snowmelt are signals of climate-related change in high elevations (Smith *et al.* 2000, Reiners *et al.* 2003). The effect of climate change is the intensification of natural drought cycles and the ensuing stress placed upon high-elevation montane habitats (IPCC 2007, Cook *et al.* 2004, Breshears *et al*. 2005, and Mueller *et al.* 2005). The increased stress put on these habitats is likely to result in long-term changes to vegetation, and to invertebrate and vertebrate populations within coniferous forests and canyon habitats that affect ecosystem function and processes.

Historical and current anthropogenic uses of Mexican spotted owl habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (*e.g.*, timber, oil, gas), and development. These activities have the potential to reduce the quality of owl nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing is prevalent throughout the range of the owl and can have an adverse effect on the availability of grass cover for prey species. Recreation effects are increasing throughout the Southwest, especially in meadow and riparian areas. There is anecdotal information and research that indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior.

Several fatality factors have been identified as particularly detrimental to the Mexican spotted owl, including predation, starvation, accidents, disease, and parasites. For example, West Nile Virus also has the potential to effect the owl. We have not documented the virus in spotted owls in Arizona, New Mexico, and Colorado, but preliminary information suggests that owls may be highly vulnerable to this disease (Courtney *et al.* 2004). Unfortunately, due to the secretive nature of spotted owls and the lack of intensive monitoring of birds that we have banded, we will most likely not know when owls contract the disease or the extent of its effect to the owl rangewide.

<u>Population Status and Process of Delisting</u>

The recovery objective stated in the Recovery Plan (USFWS 2012) is "to support the Mexican spotted owl throughout its range into the foreseeable future, and to maintain the habitat conditions necessary to provide roosting and nesting habitat for the Mexican spotted owl." In addition, the FWS and Recovery Team developed two recovery (or delisting) criteria (addressing listing factors A, C, and E) that we must meet before the owl can be delisted. These criteria are:

1. Owl occupancy rates must show a stable or increasing trend after 10 years of monitoring.
2. Indicators of habitat conditions (key habitat variables) are stable or improving for 10 years in roosting and nesting habitat.

Once we demonstrate these two criteria are met, we would review the regulations and known Mexican spotted owl distribution (the spatial arrangement across its range) to determine if the

delisting process should proceed. At this time, we cannot describe the future desired distribution of owls across their range because changes in the species' range may occur due to factors such as climate change, which could result in shifts in the owl population to the northern portion of its range. In addition to meeting the delisting criteria, to delist the Mexican spotted owl, we must be able to demonstrate, using the best scientific information, that Federal, state, and tribal land managers have moderated and/or regulated anthropogenic and non-anthropogenic threats to the Mexican spotted owl (USFWS 2012). We derive the best scientific information from research, management experiments, and monitoring conducted at the appropriate scales and intensity. We must also conduct an analysis of the five listing factors to verify that threat levels are acceptable for likely persistence of owl populations into the future.

The Recovery Team identified two types of monitoring recommended for the Mexican spotted owl (USFWS 2012). The first is surveying for individual owls by using the Mexican spotted owl survey protocol (USFWS 2012 [Appendix D]). These are surveys conducted to locate individual owls (which allows land managers and us to designate PACs) and to monitor the status of owls associated with known PACs (to locate nests and roosts, and determine their reproductive status in a given year). Mexican spotted owl surveys conducted since the 1995 Recovery Plan have increased our knowledge of owl distribution, but not necessarily of owl abundance. Population estimates, based upon owl surveys, recorded 758 owl sites from 1990 to 1993, and 1,222 owl sites from 1990 to 2004 in the United States. The Recovery Plan (USFWS 2012) lists 1,324 known owl sites in the United States. An owl site is an area used by a single owl or a pair of adult or subadult owls for nesting, roosting, or foraging. The increase in number of known owl sites is mainly a product of agencies completing new owl surveys within previously unsurveyed areas (*e.g.*, several National Parks within southern Utah, Guadalupe National Park in West Texas; Guadalupe Mountains in southeastern New Mexico and West Texas; Dinosaur National Monument in Colorado; and the Cibola and Gila NFs in New Mexico). Thus, we cannot infer an increase in abundance in the species range-wide from these data (USFWS 2012). However, the Recovery Team and FWS do assume that an increase in the number of occupied sites is a positive indicator regarding owl abundance.

In addition to this survey protocol for individual owls, the Recovery Team also developed and recommended a methodology for conducting Mexican spotted owl population monitoring, using an occupancy (presence/absence) model to determine the population trend (stable, increasing, decreasing) of owls range-wide (USFWS 2012 [Appendix E]). We are currently working with the Southwestern Region of the Forest Service to conduct the population monitoring recommended in the Recovery Plan (USFWS 2012 [Appendix E]) on National Forest Service (NFS) lands in Arizona and New Mexico. The effort to conduct this work has occurred during the 2014-2019 breeding seasons (six years). The Recovery Team, USFS, FWS, and the Bird Conservancy of the Rockies (BCR, contractor) are continuing to collect data on NFS lands. There are approximately 200 quadrats sampled each year on NFS lands in Arizona and New Mexico. We are developing a strategy for incorporating additional lands (*e.g.*, National Park Service, Bureau of Land Management, and Department of Defense) into the monitoring. It is important to state that delisting criteria in the Recovery Plan (USFWS 2012) require that monitoring occur across the range of the owl, not just across an individual land management entity (*e.g.*, must include lands managed by all entities, *i.e.*, not just NFS lands). Currently, based on the work conducted by the Forest Service and BCR, we have further developed the

process for conducting rangewide population monitoring as described in Appendix E of the Recovery Plan (USFWS 2012).

It is important to note that the entire range of Mexican spotted owls covers area in five U.S. states (Arizona, Colorado, New Mexico, Texas, and Utah) and a large area of Mexico. Within the United States, Region 3 (Southwestern) NFS lands are located in Arizona and New Mexico, which is only a portion of the range of the Mexican spotted owl. Occupancy monitoring conducted on National Forests in Region 3 alone may not allow us to meet rangewide-delisting criteria, but it will allow the Forest Service and us to assess population trends on Region 3 NFS lands in Arizona and New Mexico. The spatial scale at which this monitoring is occurring allows for interpretation of owl population trends for all Region 3 NFS lands. However, we (BCR, the Forest Service and the FWS) did not design the current NFS occupancy sampling scheme to scale down to monitor owl occupancy trends on any individual NF within the Southwestern Region. We did not design it to meet this smaller scale objective because the objective is to develop a trend for all NFS lands in Region 3, not for each individual forest.

Designated Critical Habitat

We designated critical habitat for the Mexican spotted owl in 2004 on approximately 8.6 million acres (3.5 million hectares) of Federal lands in Arizona, Colorado, New Mexico, and Utah (USFWS 2004). Within the designated boundaries, critical habitat includes only those areas defined as protected habitats (defined as PACs and unoccupied slopes >40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted (now called "recovery") habitats (unoccupied owl foraging, dispersal, and future nest/roost habitat) as defined in the 1995 Recovery Plan (USFWS 1995). The PCEs for Mexican spotted owl critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USFWS 1995). Since owl habitat can include both canyon and forested areas, we identified PCEs for both areas. The PCEs identified for the owl within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing are:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 to 45 percent of which are large trees with dbh (4.5 ft above ground) of 12 inches or more;
- A shade canopy created by the tree branches covering 40 percent or more of the ground;
- Large, dead trees (snags) with a dbh of at least 12 inches.
- High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and,
- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

The PCEs are usually present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These PCEs may also occur in younger stands, especially when the stands contain remnant large trees or patches of large trees. Certain forest management practices may also enhance tree growth and mature stand characteristics where the older, larger trees persist.

Steep-walled rocky canyonlands occur typically within the Colorado Plateau EMU, but also occur in other EMUs. Owls use canyon habitat for nesting, roosting, and foraging, and includes landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to 1.2 miles (2 kilometers) in width (from rim to rim), with canyon reaches often 1.2 miles (2 kilometers) or greater, and with cool north-facing aspects. The PCEs related to canyon habitat include one or more of the following:

- Presence of water (often providing cooler and often higher humidity than the surrounding areas);
- Clumps or stringers of mixed-conifer, pine-oak, piñon-juniper, and/or riparian vegetation;
- Canyon walls containing crevices, ledges, or caves; and,
- High percent of ground litter and woody debris.

Overall, the status of the owl and its designated critical habitat has not changed significantly range-wide in the U.S. (which includes Utah, Colorado, Arizona, New Mexico, and extreme southwestern Texas); based upon the information we have, since issuance of the 2012 Land Resource Management Plan BOs for the National Forests in the Southwestern Region of the Forest Service (USFWS 2012b). The distribution of owls continues to cover the same area, and critical habitat is continuing to provide for its life history needs throughout all of the EMUs located in the U.S. We do not have detailed information regarding the status of the Mexican spotted owl in Mexico, so we cannot make inferences regarding its overall status.

However, this is not to say that substantial changes have not occurred within the owl's U.S. range. Wildland fire has resulted in the greatest loss of PACs and critical habitat relative to other actions (e.g., such as forest management, livestock grazing, recreation, etc.) throughout the U.S. range of the Mexican spotted owl. These wildland fire effects have mainly affected Mexican spotted owls within the Upper Gila Mountain EMU (e.g., Slide and Schultz Fires on the Coconino NF, Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves NF and Whitewater-Baldy Complex on the Gila NF) and Basin and Range -West (BR-W) EMU (e.g., Horseshoe 2 Fire on the Coronado NF); but other EMUs have been affected as well (Southern Rocky Mountain EMU, the Santa Fe NF by the Las Conchas Fire, Colorado Plateau EMU by the Warm Fire). However, we do not know the extent of the effects of these wildland fires on actual owl numbers.

Previous Consultations

Given the wide-range of the Mexican spotted owl in Arizona, several Federal actions affect this species every year. A complete list of formal consultations affecting this species is located on our Arizona Ecological Services Office website (section 7 consultations).

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action.

The environmental baseline includes the past and present effects of all Federal, State, or private actions and other human activities in the action area, the anticipated effects of all proposed Federal projects in the action that have already undergone formal or early section 7 consultation, and the effect of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

Status of the Species in the Action Area

Mount Graham Red Squirrel

The 2017 Frye Fire led to a marked decline in the squirrel population: in 2016 the estimate was 252 squirrels, whereas only 35 remained post-fire in 2017, which increased to 75 in 2018, and 78 in 2019 (Arizona Game and Fish Department 2019). Post-Frye Fire, there are fewer squirrels and less habitat compared to pre-fire conditions; however, squirrels are still present in areas of low-intensity burn, are sometimes found in areas not known to be previously occupied, and are demonstrating new behaviors, like ground-caching, to adapt to midden loss. Squirrels might continue to be sensitive to additional changes to habitat, but they also have shown behavioral adaptability to persist post-fire and still occur in areas that experienced low-intensity fire effects. The 2017 Frye Fire has altered squirrel forested habitat, distribution, and abundance throughout the action area due to the loss of cover, shelter, and food.

Red Squirrel Distribution in the Action Area

The distribution of red squirrels in the action area has shown a distinct bimodal pattern, with two densely populated areas east and west of a large central region with no squirrels, bounded by MP 131 and MP 135 (Figure 3). The central region with no squirrels is an area that lacks the elevation, aspect, and slope characteristics required by red squirrels (Hatten 2009).

Interagency Team Midden Surveys

An interagency team conducts an annual survey of red squirrel middens based on a random sample of approximately 40 percent of all recently occupied middens, stratified by forest type (e.g., mixed conifer, spruce-fir) (USFWS 2011). The 2019 sample included 43 middens in the action area (T. Snow, AGFD, personal communication, July 17, 2020), and 13 of these were within 200 feet of the SR 366 roadway, placing them partly inside or just outside the construction footprint (Figure 3).

ACS Surveys

On August 29-30, 2019, Archaeological Consulting Services (ACS) conducted a pre-construction survey to check for middens missed during annual monitoring and to document squirrel use at hazard tree areas (the Arrow Tree Site and the SR 366 crossings at Big and Grant creeks). Wet Creek is below the 8,000-foot-elevation threshold for red squirrel occurrence and was not checked (ACS 2019).

ACS personnel observed one red squirrel at a known midden near Treasure Park and found 16 squirrel feeding scatters (cones, scales, and cobs) west of MP 134. Five scatters were inside the construction footprint (Figure 3), and many of the cobs were completely denuded of scales to the core, a characteristic feeding pattern of the red squirrel, but not exclusive to the species (i.e., some scatters possibly were left by Abert's squirrel (T. Snow, AGFD, pers. comm.).

New Squirrel Midden Detections

On August 18, 2020, we learned the USFS found new middens between MP 128 and MP 131, alongside the switchback between Turkey Flat and Ladybug Peak (M. Alanen, FWS, pers. comm.). Previously, we knew of six middens in this section within 200 feet of the roadway. The new information indicates that now approximately 28 middens occur in this area. Squirrel biologists will still need to verify these middens to determine the actual number and we currently do not have their exact proximity to the roadway.

Mexican Spotted Owl

The Pinaleño Mountains support 46 owl PACs, 14 of which are located within the action area (B. Woods, USFS, pers. comm.) (Figure 4). These PACs form a contiguous block along SR 366 south and west of MP 123. The 1996 Clark Peak, the 2004 Nuttall Complex, and 2017 Frye wildfires all burned large areas on Mount Graham, including large portions of these PACs. Biologists assessed the status of 13 PACs in 2019 and the Bear Canyon PAC in 2018. Observers found MSO activity in all but the Treasure Park PAC in 2019. In 2019, active MSO nests were present within the boundaries of 7 of the 13 assessed PACs, all located west of MP 131: Grant Hill, Hagen's Point, Heliograph Peak, Upper Cunningham, Lower Cunningham, Lower Turkey Flat, and Pitchfork Canyon. Three additional pairs without nests occurred in the Hagen's Point, Upper Cunningham, and Upper Turkey Flat PACs, all located west of MP 127 (two pairs occurred at Hagen's Point and Upper Cunningham. However, by definition, we consider all PACs occupied.

There is recovery habitat located near Jacobson Canyon and on the lower slopes of Grant Hill (abutting SR 366). In 2017, the Frye Fire severely burned portions of recovery habitat at Grant Hill. However, there are not project activities that will affect recovery habitat, so we will not discuss it further in this document.

Factors Affecting the Species in the Action Area

Mount Graham Red Squirrel

The Mount Graham red squirrel is primarily habitat limited, and the single greatest factor currently threatening and limiting the subspecies is wildfire (USFWS 2011). The 2017 Fry Fire burned the majority of the red squirrel's remaining habitat and caused a marked decline in the red squirrel population.

Before the Frye Fire, there were approximately 6,427 acres of red squirrel habitat in the Pinaleño Mountains, as measured from 2008 satellite imagery data (USFWS 2019). After the fire, USFS scientists used fire intensity mapping (Rapid Assessment of Vegetation Condition after Wildfire or RAVG) to quantify vegetation losses from the fire. Of 6,427 acres of potential

red squirrel habitat modeled in 2008, 22% burned with high intensity during the Frye Fire, 32% burned with moderate intensity, 32% burned with low intensity, and 14% remained unburned. This acreage has decreased since the USFS study, and current research is ongoing to update the estimate of remaining red squirrel habitat.

Mexican Spotted Owl

The action area consists primarily of the ADOT ROW and surrounding National Forest System (NFS) lands, and there are few State, tribal, or private actions affecting the Mexican spotted owl or its critical habitat. Key factors that have affected the owl within the action area are stand-replacing wildfire, fuels reduction and forest restoration projects, fire and fuels management, maintenance of vegetation along roads and utility corridors, lands projects involving infrastructure repair/maintenance and management of permitted private inholdings, and recreation.

The overall project area is of high scenic, cultural, wildlife, and recreational value. Public use of the project area is moderate, with uses including non-motorized trails, recreation residences, and camping. The area also has religious significance to several Native American tribes in the region.

Historically, logging was a significant human activity affecting owl habitat in the Pinaleño Mountains. By 1973, the Forest Service cut most accessible and marketable timber, affecting the age structure and density of many stands (USFWS 1993). Since that time, commercial logging ceased, but the action area contains summer-home permittees, and recreational use by hikers, campers, birders, wildlife and plant collectors, fuel wood collectors, and hunters, as well as use by researchers and biological monitoring. The 1996 Clark Peak, the 2004 Nuttall Complex, and the 2017 Frye wildfires and their associated suppression activities resulted in loss and modification of owl habitat and disturbance effects to owls within the action area.

The Forest Service began implementing treatments under the Pinaleño Ecological Restoration Project (PERP) within six PACs prior to the 2017 Frye Fire (Grant Vista, Moonshine Creek, Grant Hill, Upper Cunningham, Treasure Park, and Lower Cunningham PACs). The Forest Service completed treatment on approximately 98 acres, and operators have recently treated 203 PAC acres within the PERP project area. The 48,300-acre Frye Fire resulted in high-severity fire effects to thousands of acres of owl habitat in the Pinaleño Mountains. The Forest Service and contractors are completing yearly surveys of MSO in the area.

EFFECTS OF THE ACTION

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat caused by the proposed action, including the consequences of all other activities that the proposed action causes. The proposed action causes a consequence if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see §402.17).

Mount Graham Red Squirrel

Effects Overview

The elevated noise and disturbance levels from the proposed action will adversely affect Mount Graham red squirrel behavior. In particular, we expect the elevated noise from replacing the pavement along SR 366 between MP 129 and 131 (Turkey Flat to Lady Bug Creek switchback) will disrupt squirrel behavior. Reducing the severity of the effects is the timing of the project (after breeding and before fall/winter), the relatively short 2-3 week project duration, and the baseline exposure to SR 366 vehicle activity.

We anticipate the remaining SR 366 projects such as road chip sealing and striping; hazard tree removal, stockpiling, and air curtain burning; rock fall containment, culvert replacement, erosion control, and associated vehicle traffic will not adversely affect squirrels or squirrel habitat.

Removal of Hazard Trees

Hazard tree removal will occur at four work areas, however hazard trees areas 1 and 2 are not in locations considered to be squirrel habitat (Figure 3):

- Hazard Tree Area 1 (MP 132.89 to MP 132.91)
- Hazard Tree Area 2 (MP 133.69 to MP 134.06)
- Hazard Tree Area 3 (MP 135.30 to MP 135.36)
- Hazard Tree Area 4 (MP 136.24 to MP 136.26)

We anticipate any effects to red squirrels and its habitat from removing approximately 600 dead and dying hazard trees at two different sites (totaling about 0.80 acre) will be insignificant. These dead and dying trees no longer serve any essential squirrel life history functions, such as cover or food. Squirrels that may occur adjacent to work sites may temporarily become agitated or distracted by hazard tree removal noise or activity. Based upon the relatively small sites (0.21 and 0.56 acre) and short duration of work, we expect any squirrel behavior alteration from noise will be insignificant. Because we do not expect squirrels to rely upon the burned areas for food or cover and they typically are reluctant to use or cross open ground (Chen and Koprowski 2016), we expect that creating these open spaces will not likely increase the risk of avian predation. There could be some increased drying of neighboring habitat by removing hazard trees and creating open space; however, we expect that with ongoing drought, climate change, effects from the Frye Fire, and the relatively small size of the removal area, any effects to adjacent habitat will be indiscernible and insignificant.

Staging and Stockpiling

Staging and stockpiling of equipment and supplies will occur at six pullouts, turnouts, or roads; therefore, no squirrel habitat alteration will occur at these areas. The staging/stockpiling sites all occur along roads where existing baseline traffic persists and will be ongoing. We anticipate that because staging/stockpiling activity and noise is similar to ongoing baseline traffic disturbance, squirrel behavior will not likely be altered, and any behavioral changes that may occur are likely to be insignificant.

Disposal of Hazard Trees

Crews will stack trees into decks and stockpile them at the same roadside locations used for staging. Similarly, because of their location at roadside areas with ongoing baseline traffic, decking and stockpiling will not affect any squirrel habitat and any squirrel behavior alteration will be insignificant.

Air curtain burning will also occur along similar roadside locations where staging and stockpiling occur with similar insignificant effects to squirrel habitat and behavior. Crews will operate air curtain burning along roadside spots where squirrel habitat does not occur. Unlike some of the other activities at these locations, burning can occur all day and night for consecutive days. These locations, with the exception of MP 135.7, are not located in close proximity to squirrel middens. Existing topography between two middens and air curtain burner operation at MP 135.7 will help to shield these squirrels and attenuate any additional noise from air curtain burners, resulting in insignificant effects to squirrel behavior.

Big and Grant Creek Culvert Replacement

We anticipate the installation of new box culverts at Big and Grant creeks will not substantially alter squirrel behavior or habitat. Construction crews will remove herbaceous cover and shrubs but no trees from 0.2-acre at each location, for a total of 0.4 acre of disturbance. Excavations required for the installations will be up to 12 feet deep but will be restricted to the roadway and roadway embankments. The new box culverts will extend out from the roadway about the same distance as the corrugated pipes. Crews will then construct rock mattresses on the streambed that will fan out from the culvert inlets and outlets about 60 feet. After backfilling, re-contouring, grading, and reseeding disturbed areas, conditions at both sites will be similar to conditions before the Frye Fire, except for the addition of the rock blankets for scour protection and the increased culvert capacity. Biologists found feeding scatters, but no middens in and near the Big and Grant Creek work areas. We anticipate that squirrels may temporarily avoid these feeding areas while work is occurring. The small area of each work site, location at the roadway, and no removal of trees leads us to conclude that any temporary effects to squirrel behavior or habitat from culvert replacement will be insignificant.

Wet Canyon Bridge Erosion and Arrow Tree Site Erosion and Rockfall Repairs

The Wet Canyon Bridge erosion and Arrow Tree Site Erosion and Rockfall Repair locations occur where squirrels and squirrel habitat are not present. As a result, we anticipate these repairs will not affect squirrels or squirrel habitat.

Pavement Replacement and Repairs

We do not anticipate pavement repairs, resurfacing, or chip sealing between MP 129 and 131 will adversely affect squirrel habitat. Road surfacing, chip sealing, and pavement repairs/striping will be confined to the roadway and not alter squirrel habitat. Therefore, due to the absence of squirrel habitat within the roadway, we expect any effects to squirrel habitat from these activities to be insignificant.

Pavement re-surfacing with heavy equipment that requires removing the existing surface, milling, and repaving will adversely affect squirrel behavior between MP 129 and 131. The pavement machines will operate and generate noise beyond the existing baseline for a two to three week period during late June and early July. We expect road repairs noise will disrupt, to some degree, squirrel foraging, caching, midden building, dispersal, territory defense and other behaviors, especially with the latest information there are now approximately 28 middens near this section of road. Yet, we recognize these squirrels have persisted and increased their number in an area where traffic and associated noise is ongoing. In addition, these road repairs will occur during an advantageous time of the year where squirrels have completed nesting and prior to focused resource acquisition for the upcoming fall/winter. Weighing these factors, we are unable with any certainty, especially with the increase in squirrel abundance with ongoing road traffic noise, and the timing and short duration of the project, to determine that the effects will have greater consequences than temporary behavior alterations.

We do expect that the subsequent chip sealing and surfacing that follows pavement resurfacing between MP 129 and 131, and the rest of the project areas between MP 118 and 136, will have an insignificant effect to squirrel behavior and habitat. Chip sealing and other road finishing activities, including re-striping, will have similar noise and disturbance levels comparable to everyday traffic and will be restricted to the roadway where squirrel habitat does not occur.

Additional roadway replacement with louder equipment, between MP 124 and 125, and subsequent chip sealing, repair, and re-striping will not affect squirrels or squirrel habitat. Squirrels do not occur in this portion of project and the project will be restricted to roadway, without affecting squirrel habitat.

Vehicle Activity

From the time of the red squirrel's listing in 1987, and completion of the first revision of the Recovery Plan in 2011, managers reported only eight road-killed red squirrels. We expect the actual number of road-killed squirrels was higher, because people were not detecting or reporting squirrels, or scavengers removed them. However, the overall low number and lack of recent records suggests the red squirrel is not particularly susceptible to road kill. Red squirrel middens in the action area occur along both sides of SR 366 in considerable numbers, and at least 13 middens are within 200 feet of the roadway. Other middens are within 300-400 feet of SR 366 (Figure 3). Chen and Koprowski (2016) reported no vehicle strikes over a four year-period along 2.4 miles of road populated with middens on both sides. The USFS, University of Arizona, and Mount Graham International Observatory employees that travel SR 366 frequently during winter have reported no kills. Chen and Koprowski (2016) discussed the apparent reluctance of red squirrels to cross roads, woodland clearings, any other kinds of open ground, and concluded that gap avoidance plays an important role in this forest dependent species.

We expect that the change in vehicle volume and traffic patterns from the project causing a squirrel fatality is low. During the approximate two years of construction, we expect the vehicle count will be construction traffic plus a baseline mean annual daily volume of 196 vehicles (range 29-1,402) (Chen and Koprowski 2015). Construction vehicles by workers will commute to the areas and park. Large vehicles will arrive with heavy equipment a single time, off load the equipment and depart, returning to pick up the equipment when done. During construction

activities, normal non-project traffic will likely be slower than normal due to the ongoing roadwork and traffic control. Therefore, due to the squirrels long time occurrence along SR 366, the historical low number of vehicle caused fatalities, and anticipated reduced speeds of traffic, we expect construction related traffic and the change in traffic pattern is not likely to adversely affect squirrels.

Summary

The Mount Graham red squirrel, its limited habitat and distribution, and its recovery, has been substantially affected by recent wildfires. Squirrels continue to persist and numbers have increased since the 2017 Frye Fire. Any action that significantly reduces the likelihood of completing recovery actions and achieving recovery criteria is likely to cause it to pass the tipping point for recovery. The Mount Graham Red Squirrel Recovery Plan (USFWS 1993) does not contain recovery criteria, but describes the actions needed to stabilize the population, including:

1) Protect and monitor the existing population and habitat;
2) Determine life history and habitat parameters;
3) Reclaim previously occupied habitat; and
4) Integrate species and habitat protection actions for the Pinaleño Mountains.

The proposed action, focused on the SR 366 roadway, is not likely to affect its continued recovery or recovery potential, and therefore is not likely to cause the squirrel to reach the tipping point for recovery, for the following reasons:

1) The proposed action is focused on improving the function and safety of the SR 366 roadway and does not incidentally take squirrels or adversely affect squirrel habitat, and therefore will not preclude the ability to protect and monitor the existing squirrel population and habitat.
2) Aside from limited periods of time when lane closures on SR 366 may delay traffic during the proposed action, researchers will be able to continue to conduct studies to determine life history and habitat parameters.
3) Hazard tree removal areas are small individually and collectively and removing burned trees that do not provide squirrel habitat will not preclude (and could accelerate) habitat succession and improvement toward vegetated conditions more beneficial for squirrel foraging and cover. We expect culvert replacement will improve water flow and may reduce erosion of squirrel habitat.
4) The proposed action does not preclude the integration of species and habitat protection actions within the action area or for the broader Pinaleño Mountains,

Mexican Spotted Owl

There are 14 PACs within the action area for this project (Table 2). The proposed action may affect the Mexican spotted owls associated with some of these PACs through noise disturbance, and it will affect key habitat components within PACs and critical habitat PCEs. We describe the effects of each of the project components to the owl and its habitat below.

As described in the Environmental Baseline, much of the only live forest habitat left in most of these PACs following multiple high-severity fires is in the nest/roost cores; therefore, the 0.25 mile from the known core area and nest/roost sites is a good indicator of where owls are likely to be during the day within PACs. Typically, we would look at disturbance buffers around the entire PAC because the owls could be nesting and/or roosting throughout most PACs; however, high-severity fire substantially reduced the areas spotted owls are likely to be nesting and/or roosting.

Like most birds, spotted owls will flush from a perch or the nest in response to a loud noise or sudden disturbance. If such events are infrequent, they may have little effect to owls (Delaney *et al.* 1999a; Swarthout and Steidl 2001, 2003). However, owls have more sensitive hearing than other birds (Bowles *et al*. 2002), and if noise causes repeated flushing it may deplete an owl's energy reserves, increase its vulnerability to predators, and could lower its ability to survive and reproduce. Repeated flushing of adults from a nest (or in some instances, a single event) may cause desertion of eggs or young, egg breakage, egg predation, cooling and overheating of eggs or newly hatched young, trampling of young by agitated adults, and futile and often fatal premature flights from the nest by older nestlings. Many factors influence how sound affects owls, including the baseline noise level (what the birds are used to), habituation, the relative increase in noise, e.g., from a particular project, distance to the noise source, noise type and duration, season (breeding vs. winter), habitat type, and topography (Delaney *et al.* 1999a,b; Delaney and Grubb 2004). Noises close to nests or roosts are likely to be more disruptive than noises further away, and birds will flush more to loud sounds than to quieter ones (Delaney *et al.*1999a).

Because almost all activities will be within or adjacent to a PAC, we used 69 dBA as the noise level at or above which spotted owls will flush at least 60 percent of the time (hereafter the flush threshold). The Mexican spotted owl recovery plan, first revision (USFWS 2012) established this threshold for determining if breeding season restrictions are warranted for proposed actions that would occur inside or adjacent to PACs, which by definition are occupied. Specifically, the plan recommends breeding season restrictions for any activity that result in noise above 69 dBA within 165 feet of a nest site or within the PAC boundary, if the nest site is unknown. Therefore, to assess potential adverse effects of the proposed action to owls from noise disturbance, we considered noise and activity levels from the proposed action to owls in each PAC in the action area and determined if project activities would likely exceed 69 dBA inside the PAC, in the PAC's Core Area (if identified), and at the nearest known nest or roost if their locations were available (Table 2).

<u>Staging and Stockpiling</u>

Staging and stockpiling of equipment and supplies will occur at six locations within seven PACs and could occur during the owl-breeding season (March 1 – August 31). The staging areas are existing pullouts, turnouts, or roads; therefore, no owl habitat will be modified to use these areas. Because the staging/stockpiling sites are all greater than 0.25 mile from nest cores and/or nest/roost sites, the proposed action will not result in disturbance to breeding owls in the these PACs.

<u>Removal of Hazard Trees</u>

Removal of hazard trees will occur along SR 366 within four areas in three PACs. Area I includes 0.25 acre within Pitchfork Canyon PAC; Area II is 4 acres and is within Hagen's Point PAC; and, Areas III and IV are within the Treasure Park PAC. All tree removal will occur outside the owl-breeding season (March 1 – August 31), so there will be no disturbance to breeding owls from the hazard tree removal component of the project. Because the areas where tree removal will occur all burned at moderate to high-intensity with high burn severity, there will be no effects to potential nest/roost habitat within these PACs. The removal of all trees, including live trees from these areas will alter foraging habitat by removing all perching and hunting trees from these areas. However, because the action will affect only 5.02 acres within three PACs and only severely burned areas adjacent to SR 366, we expect this effect will not affect individual owls.

Disposal of Hazard Trees

Crews will stack trees into decks for public use as firewood. Five of the six stockpiles will be the same locations identified above for staging, but will not add any additional effect to owls beyond what we analyzed for hazard tree removal. Crews may also stack trees within a 0.3-acre vehicle pullout 0.3 mile north of SR 366 on FR 861, near MP 119.7. This location is not within or adjacent to a PAC or recovery habitat.

Big Creek and Grant Creek Culvert Replacement

The Big Creek culvert replacement (MP 137.3) is located adjacent to the Treasure Park PAC nest core, and the Grant Creek culvert replacement (MP 139.2) occurs adjacent to two PACs, but is greater than 0.25 mile from the Grant Creek and Upper Cunningham core areas within the PACs. Habitat alterations is minor at each of these locations, limited to ground disturbance and low growing vegetation alteration at small work sites. We anticipate insignificant effects from these culvert replacement projects due to their distance from owl PACs, nest cores, and minor habitat alteration.

Wet Canyon Bridge Erosion Repairs

The Wet Canyon Bridge erosion repairs project is located on the boundary of the Wet Canyon and Jacobsen Creek PACs, but much greater than 0.25 mile from the core areas of either PAC. Therefore, due to the lack of nest/roost habitat within 0.25 mile of the PAC boundaries, we do not expect any noise disturbance to owls to occur from the actions associated with the erosion repairs.

Arrow Tree Site Erosion and Rockfall Repairs

The Arrow Tree Site Erosion and Rockfall Repair action falls within the Pitchfork Canyon PAC and the 2019 nest tree is approximately 400 feet from SR 366. Crews will remove trees, shrubs, and ground cover alongside the roadway where excavations for the buttress walls and cable nets will occur. Construction crews may move into and out of the Pitchfork Canyon PAC sporadically up to five times, for periods ranging from a day to several months. Noise levels will exceed 69 dBA for much of that time, and may approach or exceed 87 dBA on occasion. Noise

levels throughout much of the core area will be well over 69 dBA for a minimum of 2-3 months. Therefore, it is likely that the proposed action will affect owl occupancy and reproduction within the Pitchfork PAC.

Pavement Replacement and Repairs

Pavement replacement and repairs will occur adjacent to the Arcadia Campground, Jacobsen Creek, Lower Turkey Flat, Upper Turkey Flat, and Bear Canyon PACs. SR 366 is greater than 0.25 mile from the Arcadia Campground, Jacobsen Creek, and Bear Canyon PACs. The pavement repairs will occur adjacent to the Lower Turkey Flat and Upper Turkey Flat PACs. Since activities will only occur during daylight hours, this should not result in noise disturbance to potentially breeding owls and will not disturb foraging owls at night.

Following pavement repairs, ADOT will chip seal and stripe SR 366 from MP 118 to 136. The contractors will complete this action in stages during portions of the spotted owl-breeding season in late spring or summer adjacent to and within all PACs along 18 miles of SR 366. Action's involving pavement work must occur under warm, dry conditions, between approximately May and September of a given year, which will include much of the spotted owl's breeding period. Chip sealing through 2.2 miles of roadway adjacent to the Pitchfork Canyon, Lower Turkey Flat, and Upper Turkey Flat PAC core areas may take no more than 1-2 weeks. Re-striping the roadway may take no more than a few hours. The relatively short duration of these activities and the potential for it to occur later in the breeding season (June-August) should reduce the potential for noise disturbance to affect breeding owls. In addition, these nest cores are all down below the road prism and sound travels upward, so the topography and location of these cores should help attenuate noise associated with this action, causing disturbance to be insignificant.

Vehicle Collision

We do not anticipate altered traffic patterns generated by the project will adversely affect owls through collisions. Traffic patterns will change through the additions of work vehicles, existence of heavy equipment, and roadwork along SR 366, but not during evening hours when owls are most active. These vehicle activities will occur during the daylight hours when nocturnal owls are mostly inactive, roosting, and not seeking food. Therefore, we do not expect that any changes in vehicle activity will increase the likelihood for collisions with owls.

Summary of Effects

Based on the proposed action, we conclude that noise levels in 12 of 14 PACS will exceed 69 dBA at some point during implementation. Except for the Pitchfork Canyon PAC, we expect location, topographic features, and distance from all activities will attenuate the noise level within PACs, preventing adverse effects. We anticipate adverse effects to owl occupancy and reproduction at the Pitchfork Canyon PAC from noise caused by the duration and proximity of the Arrow Tree erosion and rockfall containment activities to the owl nest core.

We expect hazard tree removal, disposal, stockpiling, culvert replacement, Wet Canyon Bridge erosion repairs, vehicle use, and pavement repair activities will not adversely affect owls or their habitat based upon previously burned habitat, timing, short duration, location along a road,

and/or distance from owls and PACs. However, we do expect the removal of all hazard snags and some live trees across all work sites totaling about 6.3 acres will alter owl foraging habitat.

Effects on Spotted Owl Critical Habitat

In our analysis of the effects of the action on critical habitat, we consider whether a proposed action will result in the destruction or adverse modification of critical habitat. In doing so, we must determine if the proposed action will result in effects that appreciably diminish the value of critical habitat for the recovery of a listed species. To determine this, we analyze whether the proposed action will adversely affect any of the PCEs that were the basis for determining the habitat to be critical. To determine if an action results in adverse modification of critical habitat, we must also evaluate the current condition of all designated CHUs, and the PCEs of those units, to determine the overall ability of all designated critical habitat to support recovery. Further, we must consider the functional role of each of the CHUs in recovery because, collectively, they represent the best available scientific information as to the recovery needs of the species.

Below, we describe the PCEs related to forest structure and maintenance of adequate prey species and the effects from implementation of the proposed actions. We did not analyze the PCEs for steep-walled rocky canyonlands in this BO because this habitat does not occur within the proposed action area. There are 107,838 acres of Mexican spotted owl designated critical habitat in the Pinaleño Mountains on the Safford Ranger District, Coronado National Forest, through which SR 366 is located. The proposed action will affect less than 10 acres of PAC habitat and no recovery habitat, both of which are critical habitat, per the final rule (USFWS 2004).

Primary Constituent Elements and effects to forest structure:

PCE: A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with dbh of 12 inches or more.

Effect: Crews will remove hazard trees from ADOT's easement adjacent to SR 366 at four locations where the Frye Fire burned at high-intensity and killed large numbers of trees. Nearly all of the trees that ADOT will remove were killed or severely damaged by the fire. ADOT plans to remove all hazard trees from these four areas (total of 5.02 acres) because of the high erosion potential at the four sites, and this will include removing live trees. However, the contractor will have some discretion regarding removal of healthy trees, and crews may leave unburned trees less than 9 inches dbh. The contractor may also remove trees outside ADOT's easement boundary if they pose a safety hazard.

Because hazard tree removal will occur in severely burned area only, this project will have minimal effects to the range of live tree species within the project area. Approximately 5.02 acres of torched hazard trees, including some live trees will be removed from the project area. However, these trees are all within the ROW easement and are no longer contributing to the persistence of this PCE. By leaving healthy trees on site, there will continue to be a seed source for conifer regeneration. Therefore, the proposed action will not compromise the function and conservation role of this PCE in the action area.

PCE: A shade canopy created by the tree branches covering 40 percent or more of the ground.

Effect: The proposed action will not affect the shade canopy because almost all of the hazard trees to be removed from the 5.02 acres across four areas are dead with no canopy left, following the 2017 Frye Fire. Therefore, the proposed action will not compromise the function and conservation role of this PCE in the action area.

PCE: Large, dead trees (snags) with a dbh of at least 12 inches.

Effect: The proposed action will result in the loss of large snags following the clearing of 5.02 acres of hazard trees, most of which are snags. This will result in the loss of approximately 4,575 snags (some are live trees) from the project area. The 2017 Frye Fire, the 1996 Clark Peak and 2004 Nuttall Complex wildfires all burned large areas on Mount Graham and resulted in high-severity fire effects that killed many conifers and have resulted in many dead trees (snags) across the mountain. Therefore, there is an abundance of snags throughout the action area and adjacent areas on Mount Graham and this action removing snags from 5.02 acres in four areas will not compromise the function and conservation role of this PCE in the action area.

Primary Constituent Elements related to maintenance of adequate prey species:

PCE: High volumes of fallen trees and other woody debris.

Effect: The proposed action will reduce the amount of woody debris across 5.02 acres by cutting and removing standing dead and live trees within this area. However, the area ADOT will remove hazard trees from is within or just adjacent to their road easement and will have an insignificant effect on the amount of woody debris present within and immediately adjacent to the action area. Therefore, the proposed action will not compromise the function and conservation role of this PCE in the action area.

PCE: A wide range of tree and plant species, including hardwoods.

Effect: We expect that the proposed action would positively affect this PCE. Plant species richness would increase within the 5.02 acres where ADOT is removing hazard trees because more sunlight will reach the ground and herbaceous and shrubby plant species will likely thrive in these four, small, cleared areas. Therefore, the clearing of 5.02 acres will allow for plant growth and likely result in discountable effects to function and conservation role of this PCE.
PCE: Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

Effect: The project will have minimal effects to residual plant cover and will not affect plant regeneration. There will be a temporary and small loss of about 1.3 acres of vegetative cover from construction associated with the culvert work at Big Creek and Grant Creek and actions at the Arrow Tree Site and Wet Creek project areas. However, this will result in insignificant and temporary effects to residual plant cover at these sites. Work crews will rehabilitate and reseed disturbed areas with native species at all four sites. In addition, the clearing of 5.02 acres of snags and some live trees from the hazard tree removal project will not affect the areas ability to

provide for plant cover and ADOT will take efforts to minimize ground disturbance. Therefore, the proposed action will not compromise the function and conservation role of this PCE within the action area.

Effects of the action on the role of critical habitat in recovery

We do not expect adverse effects of the proposed action to diminish the conservation contribution of critical habitat to the recovery of the Mexican spotted owl. Designated critical habitat includes all PAC and recovery habitat (unoccupied suitable spotted owl habitat) within the project area.

Although we expect the proposed action will result in measurable adverse effects to PCEs, particularly the removal of snags across the 5.02 acres within Mexican spotted owl critical habitat, we do not expect this project to modify the habitat to the extent that we would no longer consider it suitable PAC or recovery habitat. Over the long-term, these actions should decrease erosion potential within the project area and aid in stabilizing severely burned areas adjacent to SR 366. In addition, the areas most affected by the proposed action are adjacent to the roadway and are not capable of supporting the PCEs (shade canopy, range of live trees) that are most associated with nest/roost habitat. Therefore, we do not expect that implementation of this project will diminish the conservation contribution of critical habitat to the recovery of the Mexican spotted owl.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area considered in this biological opinion (50 CFR 402.02).

The Forest Service manages nearly all lands in the Pinaleño Mountains and administers projects and permits on those lands; thus, almost all activities that could potentially affect red squirrels or spotted owls in the action area are Federal activities subject to section 7 consultation.

The action area contains summer-home Forest Service permittees, and recreational use of Forest Service lands by hikers, campers, birders, wildlife and plant collectors, fuel wood collectors, and hunters, as well as use by researchers and biological monitoring.

Climate change, in combination with drought cycles, is likely to exacerbate existing threats to southwestern U.S. forest habitat, now and into the near future (USFWS 2012). Increased and prolonged drought associated with changing climatic patterns will adversely affect forests through increased drought, increased ambient temperatures, and reduced winter precipitation, which is likely to result in the death of large and smaller diameter trees, an increase in abiotic and biotic forest stressors (e.g., bark beetles, drought stress), and even vegetation type conversion. The continued warming and drying of forested habitats will likely alter vegetation structure and composition, and reduce the amount and quality of owl and squirrel habitat in the action area.

Currently, the use of prescribed fire and mechanical treatments to manipulate structure and fuels, is likely the most important tactic we have available to sustain fire as ecological process in frequent-fire adapted forests and attempt to increase their resilience to climate-induced stressors. Because most of these actions occur on federally managed lands, we expect that most activities that may affect owls and squirrels, we will evaluate under section 7(a)(2) of the ESA.

JEOPARDY AND ADVERSE MODIFICATION ANALYSIS

Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

Jeopardy Analysis Framework

Our jeopardy analysis relies on the following:

"Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The following analysis relies on four components:

1) Status of the Species, which evaluates the range-wide condition of the listed species, the factors responsible for that condition, and the species' survival and recovery needs;
2) Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species;
3) Effects of the Action (including those from conservation measures), which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the species; and,
4) Cumulative Effects, which evaluates the effects of future, non-federal activities in the action area on the species.

The jeopardy analysis in this biological opinion emphasizes the range-wide survival and recovery needs of the listed species and the role of the action area in providing for those needs. We evaluate the significance of the proposed Federal action within this context, taken together with cumulative effects, for making the jeopardy determination.

Destruction/Adverse Modification Analysis Framework

The final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" became effective on March 14, 2016 (81 FR 7214). The revised definition states: "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.

Similar to our jeopardy analysis, our adverse modification analysis of critical habitat relies on the following four components:

1) The Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat in terms of PCEs, the factors responsible for that condition, and the intended recovery function of the critical habitat overall;
2) The Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area;
3) The Effects of the Action, which determine the direct and indirect effects of the proposed federal action and the effects of any interrelated or interdependent activities on the PCEs and how they will influence the recovery role of affected critical habitat units; and,
4) Cumulative Effects, which evaluate the effects of future, non-federal activities in the action area on the PCEs and how they will influence the recovery role of affected critical habitat units.

CONCLUSIONS

The conclusions of our biological and conference opinions are based on full implementation of the project as described in the *Description of the Proposed Action* section of this document, including the conservation measures that were incorporated into the project design.

After reviewing the current status of listed species in the action area, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of listed species. We base these conclusions on the following reasons:

Mount Graham Red Squirrel

- The proposed action will help to reduce future damage to squirrel habitats by flash floods, debris flows, and increased storm water runoff due to the Frye Fire.
- We anticipate the project will adversely affect squirrel behavior between MP 129 and 131 for a two-three week period, but are unable to conclude effects will be substantial.
- Hazard tree removal in squirrel habitat will overall be a small amount (about 0.80 acre) and consist of burned trees from the Frye Fire. As a result, hazard tree removal will not adversely affect squirrel habitat.
- Ongoing road repairs, hazard tree removal, erosion and rockfall containment, culvert replacements, and vehicle traffic will not adversely affect squirrels or its habitat.

Mexican Spotted Owl

- We anticipate disturbance to owls from construction activities during the breeding season will not result in permanent territory abandonment. The reduction or loss of owl productivity from a territory will be restricted to the two breeding seasons associated with project duration.

- The removal of hazard trees (5 acres) and habitat at other construction sites with critical habitat PCEs will be small in area (totaling approximately 6.3 acres in BHU BR-8), but will continue to serve the function and conservation role of critical habitat for the Mexican spotted owl. Over the long-term, these actions should decrease erosion potential and aid in stabilizing severely burned areas adjacent to SR 366.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 FR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined (50 FR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

Mount Graham Red Squirrel

We anticipate squirrel behavior will be adversely affected at MP 129-131 due to noise from road pavement replacement, but are unable to conclude that these effects rise to the level of incidental take.

Mexican Spotted Owl

For the purpose of evaluating incidental take of Mexican spotted owls from the action under consultation, incidental take can be anticipated as either the direct fatality of individual birds or the alteration of habitat that affects behavior (e.g., breeding or foraging) of birds only temporarily, or to such a degree that the birds are considered lost as viable members of the population and thus "taken." Birds experiencing only temporary or short-term effects may fail to breed, fail to successfully rear young, or raise less fit young; longer-term disturbance may result in owls deserting the area because of chronic disturbance or because habitat no longer meets the owl's needs.

We anticipate that the proposed action is reasonably certain to result in incidental take of Mexican spotted owls. However, it is difficult to quantify the number of individual owls potentially taken because: (1) dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; (2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat; and (3) the

species is secretive and we rarely have information regarding the number of owls occupying a PAC and/or their reproductive status. For these reasons, we will attribute incidental take at the PAC level. This fits well with our current section 7 consultation policy, which provides for incidental take if an activity compromises the integrity of an occupied PAC to an extent that we are reasonably certain that incidental take occurred (USFWS 1996). Actions outside PACs will generally not result in incidental take because we are not reasonably certain that Mexican spotted owls are nesting and roosting in areas outside of PACs. We may modify this determination in cases when areas that may support spotted owls are not adequately surveyed and we are reasonably certain spotted owls are present.

We anticipate that the proposed action is reasonably certain to result in incidental take of Mexican spotted owls. However, it is difficult to quantify the number of individual owls taken because: 1) dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; 2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat; and 3) the species is secretive and we do not always have information regarding the number of owls occupying a PAC and/or their reproductive status. For these reasons, we will attribute incidental take at the PAC level. This fits well with our current section 7 consultation policy, which provides for incidental take if an activity compromises the integrity of an occupied PAC to an extent that we are reasonably certain that incidental take occurred (USFWS 1996). Actions outside PACs will generally not result in incidental take because we are not reasonably certain that Mexican spotted owls are nesting and roosting in areas outside of PACs. We may modify this determination in cases when areas that may support spotted owls have not been adequately surveyed and we are reasonably certain spotted owls are present.

Based upon analysis in this BO, we anticipate the incidental take for actions implemented under the SR 366 Flood and Fire Repairs Project will be in the forms of short-term harassment. Owls experiencing short-term harassment (e.g., as part of rock fall mitigation) may fail to rear young successfully in one or more breeding seasons, but will not likely desert the area because of a short-term disturbance (Delaney *et al*. 1999). We measure harassment as owls taken associated with a specific number of PACs.

Using available information as summarized within this document, we have identified conditions of incidental take for the Mexican spotted owl associated with implementation of the SR 366 project.

- We anticipate the incidental take of Mexican spotted owls and/or associated eggs/juveniles in the form of harassment, causing displacement, and reduced productivity as a result of noise and increased activity levels during construction to owls in the Pitchfork PAC due to non-habitat altering action that disrupts or is likely to disrupt owl behavior within the PACs for up to two breeding seasons. The disturbance generated by activities associated with the proposed action is likely to interrupt, impede, or disrupt normal behavior patterns to the point that breeding and feeding activities are affected over the course of one to two breeding seasons. Incidental take is exceeded if owls associated within this PAC are harassed beyond the 2022 breeding season (two years).

EFFECT OF THE TAKE

Mount Graham Red Squirrel

In this biological opinion, we determine that the disturbance to squirrels is not likely to rise to the level of incidental take, and as a result is not likely to result in jeopardy to the species. Although the proposed action is likely to adversely affect red squirrel behavior during road re-pavement activities, the proposed action will not result in effects to red squirrel habitat or red squirrel harassment, harm, death, or injury.

Mexican Spotted Owl

In this biological opinion, we determine that the level of anticipated take as described above is not likely to result in jeopardy to the species. Although the proposed action is likely to adversely affect the owl through harassment of individuals during construction; the proposed action will not result in the permanent loss of the owl population in the action area.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

No reasonable and prudent measures will be required of ADOT for this project. All appropriate measures to reduce and minimize effects are included in the project description. ADOT has included in its conservation measures reporting incidents of listed species detections.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species, initial notification must be made to the U.S. Fish and Wildlife Service, Office of Law Enforcement, (Resident Agent in Charge), 4901 Paseo del Norte NE, Suite D, Albuquerque, New Mexico, 87113, telephone: 505/248-7889, within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Office of Law Enforcement, with a copy to this office. Care must be taken in handling sick or injured animals, to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We have identified the following additional conservation recommendations for the proposed action.

- We recommend hazard tree stockpiles be placed at no more than three pullouts. We note that the stockpile on FR 861, near MP 119, is the largest of the six proposed stockpiles, is well away from spotted owl and red squirrel habitat, and is much nearer to Safford, the nearest city center, than any of the stockpiles. It would reduce effects to listed species to place most or all of the tree decks at this location.

- We recommend ADOT coordinate with us toward relocating the air curtain burner at MP 135.7 to a location farther away from listed species.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in your consultation request. As provided in 50 FR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The FWS appreciates efforts by ADOT to identify and minimize effects to listed species from this project. We encourage you to coordinate the review of this project with AGFD. We also appreciate your ongoing coordination during implementation of this program. In keeping with our trust responsibilities to American Indian Tribes, we are providing copies of this biological and conference opinion to the Bureau of Indian Affairs and are notifying affected Tribes.

For further information please contact Robert Lehman (602) 889-5950 or Greg Beatty (602) 889-5941. In all future correspondence on this project, please refer to consultation number 02EAAZ00-2019-F-0564.

Sincerely,

Greg Beatty for JAH

Jeffrey A. Humphrey
Field Supervisor

cc: (electronic)
Fish and Wildlife Biologists, U.S. Fish and Wildlife Service, Flagstaff and Tucson, AZ (Attn: Shaula Hedwall, Marit Alanen)
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Supervisor, Region 5, Arizona Game and Fish Department, Tucson, AZ
Wildlife Biologists, ADOT, Phoenix, Tucson, AZ (Attn: J. Fife, A. Navarro, K. Gade)
District Ranger. Safford Ranger District, Coronado National Forest, Safford, AZ (Attn: George Garcia)

Wildlife Biologist, Safford Ranger District, Coronado National Forest, Safford, AZ (Attn: B Wood)
Environmental Coordinator, Bureau of Indian Affairs, Phoenix, AZ (Attn: Chip Lewis)
Director, Historic Preservation and Archaeology Department, San Carlos, AZ
Director, Cultural Resources, White Mountain Apache Tribe, Whiteriver, AZ
Executive Director, Inter-Tribal Council of Arizona

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Appendix A – Tables and Figures

Milepost and No.	Area	Side of SR 666	Total Tree Density (Basal Area)	Fire Severity	Percent of Crown Scorch	PAC Name	Number of Trees to be Removed
I 132.89 - 132.91	0.25 acre	East	5.6 trees/1,000 square feet	Medium	50%	Pitchfork Canyon	61
II 133.69 - 134.06	4.00 acres	East	22.5 trees/1,000 square feet	High	Crown consumed	Hagen's Point	3,915
III 135.30 - 135.36	0.56 acre	East	22.5 trees/1,000 square feet	High	100%	Treasure Park	548
IV 136.24 - 136.26	0.21 acre	North-east	5.6 trees/1,000 square feet	High	90%	Treasure Park	51
						TOTAL	**4,575**

Table 1. Hazard tree data for four locations in the SR 366 easement, from the BE. Crown scorch categories represent the proportion of a conifer's foliage that is dead, but remains on the tree. A tree with 100% crown scorch retains its foliage but none of it is green. If the crown is consumed, the tree retains blackened limbs only (there is no living or dead foliage).

PAC Name	Core Area[1]	Miles of SR 366 in PAC	Noise ≥69 dBA in PAC[1,3]	Noise ≥69 dBA in Core Area[1,2,3]	Activity (Noise Source)[4]	Relative Impact [5]
Jacobsen Creek	Y	0	$Y_{0.04}$	$Y_{0.12}$	PR, CS, RS	Low
Arcadia Campground	Y	3.0	Y	$N_{0.29}$	PR, GW, CS, RS	Low
Lower Turkey Flat	Y	2.2	Y	IN[2]	SS, CS, RS	Moderate (reduced by topography)
Upper Turkey Flat	Y	2.7	Y	IN[2]	PR, SS, CS, RS	Moderate (reduced by topography)
Bear Canyon	Y	0	$Y_{0.04}$	$N_{0.21}$	PR, SS, CS, RS	Low
Wet Canyon	Y	0	$Y_{0.12}$	$N_{0.62}$	SS, CS, RS	Low
Pitchfork Canyon	Y	1.7	Y	IN[2]	GW, RF, CS, RS	High
Hagen's Point	N	1.7	Y	No core	SS, CS, RS	Low
Heliograph Peak	Y	0.4	Y	$N_{0.37}$	SS, CS, RS	Low
Treasure Park	Y	2.5	Y	$Y_{0.04}$	CR, SS, CS, RS	Low
Marijilda Canyon	N	0	$N_{0.54}$	No effect	No effect	No effect
Grant Hill	Y	0	$N_{0.21}$	$N_{0.70}$	No effect	No effect
Upper Cunningham	Y	1.4	Y	$N_{0.17}$	CR	Low
Lower Cunningham	Y	0.4	Y	$N_{0.37}$	CR	Low

Table 2. Attributes of PACs in the action area used to assess noise and disturbance effects of the project on spotted owls.

[1] Y=Yes, N=No. If Y, distance measures (subscripts) are <0.15 mile (<800 feet). [2] IN=noise source is **in** Core Area or on border. [3] Subscripts are distances (in miles) from the nearest noise source to PAC or Core Area border, nest, or roost. [4] **CS**=chip seal. **CR**=culvert replacement. **GW**=gabion wall. **PR**=pavement replacement. **RF**=rock fall mitigation. **RS**=road striping. **SS**=staging and stockpiling (including air curtain burning, hazard tree deck deployments). [5] A subjective, relative measure of effects to owls: Low=noise sources confined to the roadway prism,, low mileage of SR 366 in the PAC, distance from noise source to Core Area is >__; Moderate=noise sources not confined to the roadway prism and distance to nearest noise source; High=noise source is in or borders the Core Area, or distance from noise source to the Core Area is <800 feet (0.15 mile) and the PAC will be exposed to ≥4 noise sources.

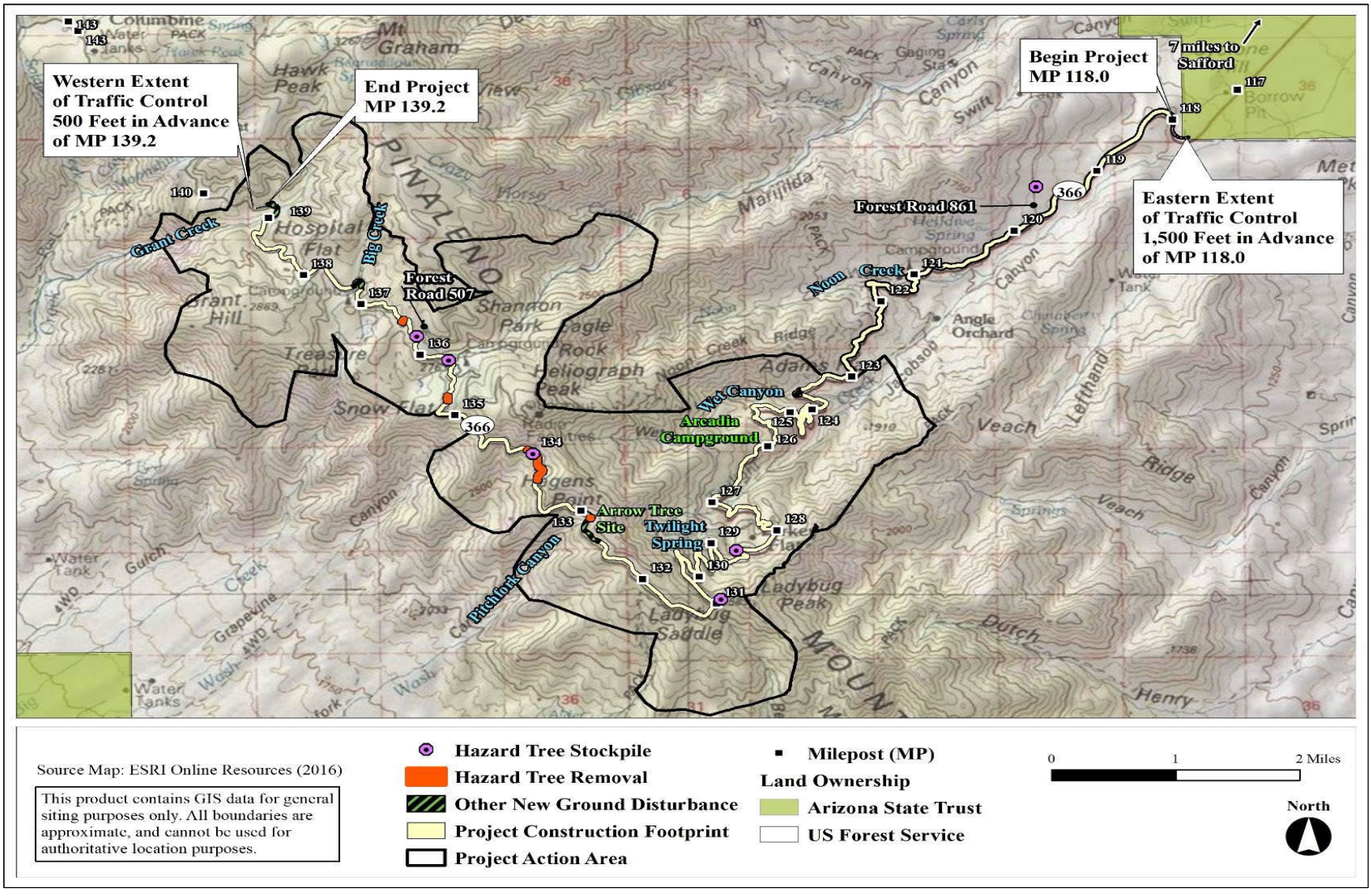

Figure 1. Project map for the SR 366 Emergency Flood Repairs project showing the construction footprint, action area, landownership, hazard tree areas, hazard tree stockpiles, and other areas of ground disturbance.

Figure 2. The 4-acre hazard tree area from MP 133.69 to MP 134.06. Landscape architects at the Wheat Design Group, Tucson, Arizona classified the level of crown scorch at this site as "crown consumed" (see Table 1 for crown scorch category definitions). To assure public safety, work crews will remove all, or nearly all, standing trees above the roadway, up to the boundary of ADOT's easement with Coronado National Forest. The easement extends laterally 100 feet from the roadway centerline in both directions (uphill and downhill). Approximately 3,900 dead trees are likely to be removed above the roadway. Tree removal on the downhill (west) side of the highway will be limited to those near the road that could fall on the road. The view is from MP 134.0 looking south.

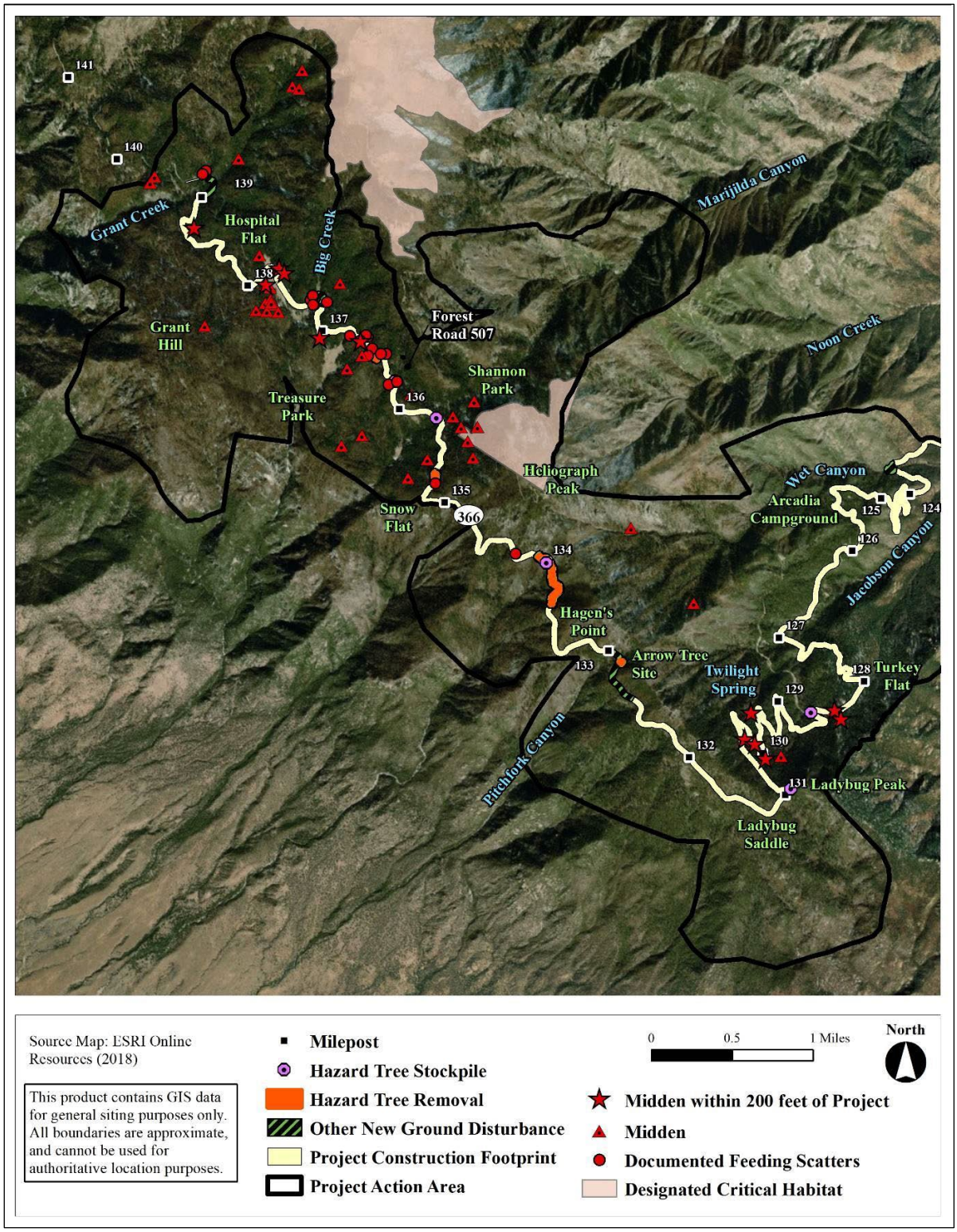

Figure 3. Project map showing Mount Graham red squirrel middens (including middens within 200 feet of the construction footprint), documented feeding scatters, and designated critical habitat.

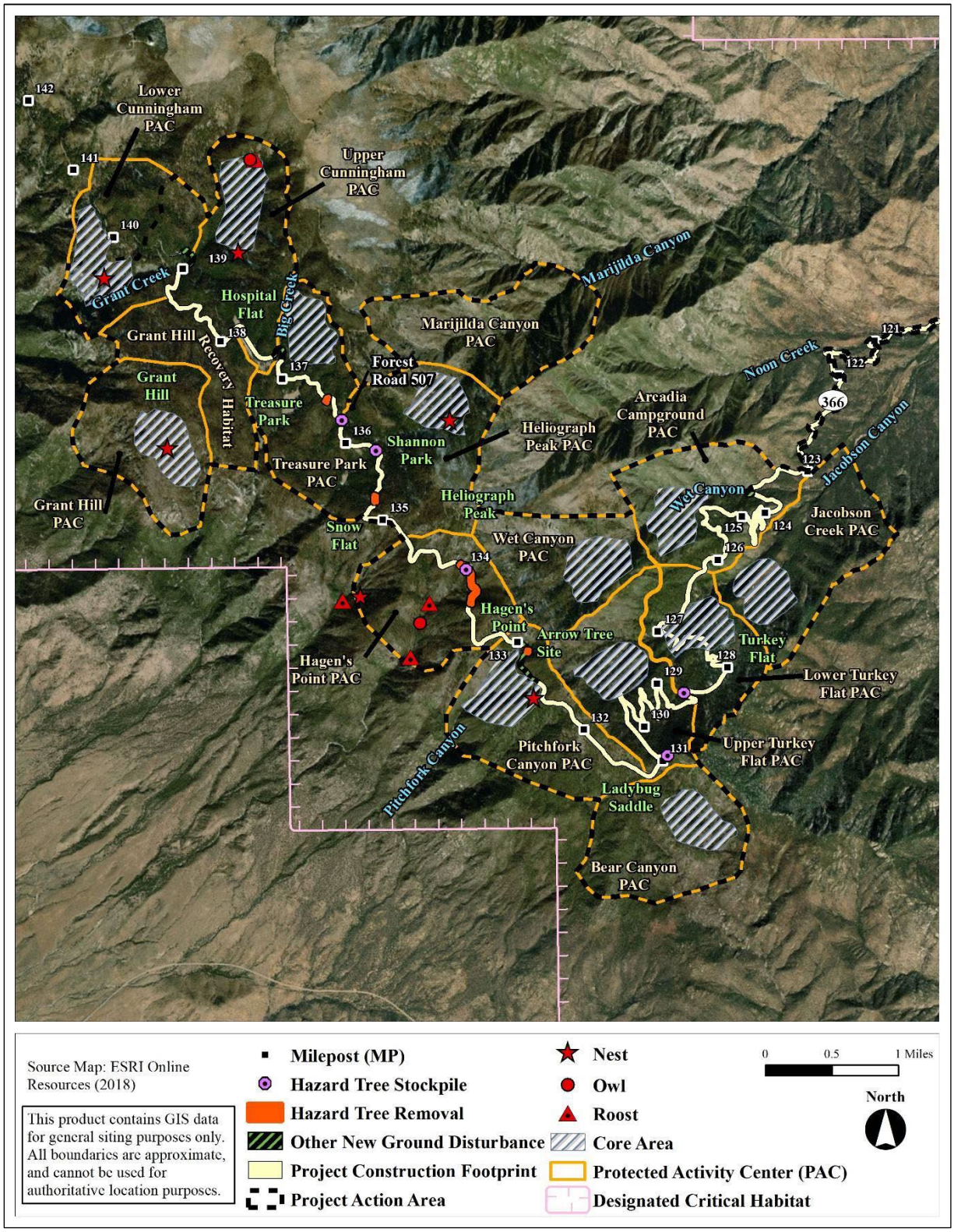

Figure 4. Project map showing Mexican spotted owl Protected Activity Centers (PACs), core areas, and locations of individual owls, owl nests, and owl roosts.