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In Reply Refer To:
AESO/SE
22140-2011-F-0145

October 20, 2014

Mr. M. Earl Stewart and Mr. Michael R. Williams
Forest Supervisors
Coconino and Kaibab National Forests
1824 South Thompson Street
Flagstaff, Arizona 86001-3600

RE: Biological Opinion – Four Forest Restoration Initiative, Phase 1

Dear Mr. Stewart and Mr. Williams:

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). Your request and biological assessment (BA) were dated February 14, 2014, and received by us on February 24, 2014. This consultation concerns the potential effects of mechanical thinning and burning activities implemented as part of the Four Forest Restoration Initiative Project (4FRI) on the Coconino and Kaibab National Forests (NFs) in Coconino and Yavapai Counties, Arizona. The Forest Service has determined that the proposed action may affect the threatened Mexican spotted owl (*Strix occidentalis lucida)* and its designated critical habitat.

You also requested our concurrence that the proposed project may affect, but is not likely to adversely affect, the threatened narrow-headed gartersnake (*Thamnophis rufipunctatus*) and its proposed critical habitat, spikedace (*Meda fulgida*) critical habitat, loach minnow (*Tiaroga cobitis*) critical habitat, and the candidate roundtail chub (*Gila robusta*). In addition, you requested our concurrence with your determination that the project "may impact individuals, but is not likely to cause a trend toward federal listing or loss of viability" for the candidate conservation species Arizona bugbane (*Cimicifuga arizonica*). We concur with your determinations. The basis for our concurrences is found in Appendix B.

The BA also requested that we provide our technical assistance with respect to compliance with the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) for bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). Our documentation of the Forest Service's implementation of minimization measures to reduce the likelihood of take is included in Appendix C.

This biological opinion (BO) is based on information provided in the February 14, 2014, BA, the February 2013 Draft Environmental Impact Statement (DEIS), meetings, and other sources of information. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern, forest management and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Details of the consultation history are summarized in Table 1.

Table 1. Summary of Consultation History

Date	Event
2007 – Present	We have worked with stakeholders and the Forest Service on development of the Small Diameter Wood Supply Study, 4FR Initiative and Project and associated landscape level analyses.
2011 – February 2014	We met with, discussed, and prepared information for the 4FRI Project (including BA development) with Forest Service staff and 4FRI Team.
March 25, 2013	We received your letter dated March 21, 2013, requesting comments on the 4FRI DEIS.
April 19, 2013	We received your letter dated April 16, 2013, offering a 60-day formal comment period for the 4FRI DEIS.
May 29, 2013	We provided comments on the DEIS through the Office of the Secretary, U.S. Department of the Interior.
February 24, 2014	We received your February 14, 2014, request for formal consultation and the Final BA.
March 14, 2014	We issued a thirty-day letter initiating formal consultation.
June 17, 2014	We requested an additional 30 days to complete our draft BO.
June 19, 2014	You agreed to our request for additional time.
August 8, 2014	We submitted a draft BO to the Forest Service for review.
August 26, 2014	We received your comments on the draft BO.
September 2, 2014	We met with the Forest Service to discuss comments on the BO, Mexican spotted owl monitoring plan, and Arizona bugbane document.
September 24, 2014	We submitted a second draft BO to the Forest Service for review.
September 30, 2014	We received your comments on the second draft BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The complete description of the proposed action and effects analysis can be found in your February 2014, BA and other supporting information in the administrative record. These documents are included herein by reference.

The 4FRI is a planning effort designed to restore ponderosa pine forest resiliency and function across four national forests in Arizona, including the Coconino, Kaibab, Apache-Sitgreaves, and Tonto. This 4FRI project is considered to be "Phase I" and has a project area approximately 988,674 acres in size that includes sizable portions of the Coconino and Kaibab NF. Within this larger planning area, the Coconino and Kaibab NFs are proposing to conduct a suite of forest restoration activities on approximately 586,110 acres over a 10-year period. Although 4FRI is planned as a 10-year project, because it could take up to 15 years to complete the work, this consultation will remain in effect for the length of time it takes to complete the proposed action if less than 15 years, or up to 15 years.

The purpose of the project is to re-establish and restore forest structure and pattern, forest health, and vegetation composition and diversity within the ponderosa pine forest. The 4FRI Project area is located on the Flagstaff, Mogollon Rim, and Red Rock Ranger Districts of the Coconino NF and the Tusayan and Williams Ranger Districts of the Kaibab NF. Flagstaff, Arizona is centrally located within the project boundary, which extends from the southern boundary of Grand Canyon National Park south to the Mogollon Rim (see Figures 1 and 2 in the BA, pp. 13-14). Up to 45,000 acres of vegetation would be mechanically thinned annually and 40,000 to 60,000 acres of prescribed fire would be implemented annually across the project area. Up to two prescribed fires would be conducted on all acres proposed for burning over the 10-year period. A single prescribed fire may include burning piles and a follow-up broadcast burn. Prescribed fire would be implemented as indicated by monitoring data to augment wildfire acres, with the expectation that desired conditions would require a fire return interval of about 10 years. Initial and subsequent maintenance burns would be conducted on all acres proposed for thinning over the course of the project.

Restoration activities across the entire action area include:

- Mechanically cut trees on approximately 431,049 acres.
- Conduct low-severity prescribed fire only on approximately 155,061 acres.
- Construct about 520 miles of temporary roads for haul access and decommission when treatments are complete (no new permanent roads would be constructed). If an existing road is not part of the official forest system road network, it is considered a temporary road. Many of the temporary roads identified as necessary for implementing the 4FRI already exist on the landscape but would still be decommissioned at the end of the project.
- Reconstruct up to 40 miles of existing, open roads along their original alignments for safety and for resource protection; no new permanent roads would be constructed. Up to 30 miles of road would be improved to allow for hauling materials (primarily widening corners to improve turn radiuses) and about 10 miles of road would be relocated out of

stream channels. Relocated roads would include rehabilitation of the moved road segment.

- Decommission about 726 miles of existing system and unauthorized roads on the Coconino NF and about 134 miles of unauthorized roads on the Kaibab NF.
- Restore 74 springs and construct up to 4 miles of protective fencing.
- Restore about 39 miles of ephemeral channels.
- Improve or restore about 1,471 acres of aspen. This will include construction of up to 82 miles of protective fencing.
- Improve or restore about 59,426 acres of grassland habitat.

Restoration activities specifically within Mexican spotted owl habitat include the actions listed below. These acreages are a sub-set of the total acreages listed above.

- Mechanical thinning of trees up to 18 inches diameter-at-breast height (dbh) within 18 Mexican spotted owl protected activity centers (PACs) on 12,587 acres.
- Thin and burn 6,712 acres in target and 1,976 acres of threshold restricted habitat.
- Thin (group select) and burn in 65,139 acres of restricted habitat.
- Conduct low-severity prescribed fire within 28,066 acres of Mexican spotted owl habitat (including meadows, aspen, and pinyon-juniper inclusions within owl habitat). This includes 24,575 acres of PAC habitat within 70 PACs and 54 nest core areas; 836 acres of protected habitat on slopes greater than 40%; 217 acres of target restricted habitat; 84 acres of threshold habitat; and, 2,354 acres of restricted habitat.
- Construct 75 miles of temporary roads in Mexican spotted owl habitat for haul access. Many of these roads already exist on the ground. Roads will be decommissioned post-treatment.
- Decommission approximately 153.3 miles of system and unauthorized roads in Mexican spotted owl habitat.
- Restore 17 springs in Mexican spotted owl habitat.
- Restore approximately 4.1 miles of ephemeral channel in Mexican spotted owl habitat (including the Clark and Lucida PACs that do not have any other activities proposed under 4FRI).
- Improve or restore 1,177 acres of aspen in Mexican spotted owl habitat.
- Improve or restore approximately 35 acres of meadow habitat within Mexican spotted owl PACs.

The Forest Service BA states that the proposed action is being conducted under the original Land and Resource Management Plans (LRMPs) for the Coconino and Kaibab NFs (1987 and 1985, respectively), including the 1996 Region-wide Amendment. The 1996 Forest Plan Amendment incorporated specific language from the 1995 Mexican spotted owl Recovery Plan (USFWS 1995) into standards and guidelines for both LRMPs. In 2012, the FWS issued the Revised Recovery Plan for the Mexican Spotted Owl (USFWS 2012), which includes the best available science and management recommendations concerning the owl, and under which we recommend actions are planned. The Forest Service recently completed the Revised Kaibab NF LRMP and is in the process of revising the Coconino NF LMRP. The Forest Service has proposed two amendments to the Coconino and Kaibab 1987 and 1985 LRMPs that include changes to standards and guidelines for the Mexican spotted owl which would allow the project to be more

consistent with the Revised Recovery Plan. These amendments now only apply to the 1987 Coconino NF LRMP:

- Amendment 1 would add language to allow for mechanical treatments up to 18 inches dbh in order to improve nesting and roosting habitat structure in 18 PACs. The amendment would also allow low-severity prescribed fire within 54 PAC core areas and remove plan language that limits PAC treatments in the recovery unit to 10% and requires the selection of an equal number of untreated PACs as controls. The amendment also removes language referencing monitoring (pre- and post-treatment population and habitat monitoring) and replaces it with language that defers owl monitoring to the FWS BO for the project. In restricted pine-oak habitat, this would allow 6,444 acres of restricted target and threshold habitat to be managed for a minimum range of 110 to 150 square feet per acre (sq. ft./ac) basal area as recommended in the Revised Recovery Plan (USFWS 2012a). A definition of target and threshold habitat would be included.

Although the Forest Service also proposed a similar amendment to the 1985 Kaibab NF LRMP, the Forest Service issued a Record of Decision for the revised Kaibab NF LRMP on February 3, 2014, which replaces the 1985 LRMP. FWS issued a biological opinion on this revised plan on September 10, 2013 (AESO file number 22410-2009-F-0329). Therefore, this consultation is conducted under our 2013 programmatic BO for the revised Kaibab NF LRMP and will consider the effects of the Forest Service actions as proposed for the 4FRI Project, but not the proposed Amendment 3 to the 1985 Kaibab NF LRMP.

Because the Kaibab NF has revised their Forest Plan to incorporate the Revised Recovery Plan, but the Coconino NF is still using their 1987 LRMP (as amended in 1996), the language regarding Mexican spotted owl habitat is different. The Revised Recovery Plan recommends that protected habitat only include PACs, but the 1995 Recovery Plan and 1987 LRMP refer to protected habitat as including PACs and steep slopes where timber harvest has not occurred in 20 years. In addition, what we formerly referred to as “restricted habitat” (unoccupied owl habitat) is now called “recovery habitat” and the subsets of these restricted/recovery areas to be managed for future nest/roost habitat is now called “replacement nest/roost habitat” where formerly it was called “target” or “threshold” habitat depending upon the existing forest structure. Most of the description and analysis in the BA uses the 1995 Recovery Plan language, but where appropriate and where we can be accurate, we will try to use the language from both the 1995 and 2012 Recovery Plans (e.g., restricted/recovery habitat) in order to facilitate use of this document by both the Kaibab and Coconino NFs.

Conservation Measures

- All mechanical thinning and prescribed fire treatments in Mexican spotted owl PACs will occur outside the breeding season (the owl breeding season is March 1 to August 31).
- Implementation of 4FRI will be phased across the landscape so as to reduce effects, spatially and temporally, to Mexican spotted owls.
- All stands in PACs identified for mechanical treatment will be marked by hand and marking will be coordinated with the FWS.
- Fire line construction associated with preventing fire from entering PACs and/or core areas will be constructed outside the breeding season.

- Known nest trees will be protected during burning activities.
- Prescribed burning will be coordinated spatially and temporally to limit smoke impacts to owls during the breeding season.
- Mexican spotted owl surveys will be conducted in areas of proposed activity within the project area during the year of implementation or one year prior to determine owl occupancy in established and new areas.
- Pre- and post-treatment Mexican spotted owl habitat monitoring would occur as specified in the monitoring plan developed by the FWS and Forest Service.
- Spring restoration, ephemeral drainage restoration, and road construction, obliteration, relocation, and maintenance activities within Mexican spotted owl PACs will not occur during the breeding season unless protocol surveys fail to elicit a response within the respective PAC during the season of proposed activity.
- Hauling will not occur within PACs during the breeding season unless protocol surveys fail to elicit a response within the respective PAC during the season of proposed activity. Exceptions to this measure would occur in the Woods PAC, where the haul road is greater than 0.25 mile from the core area, and within Dairy Springs and Clark PACs where haul routes are located less than 0.25 mile from nest core areas, but topographic features would minimize noise disturbance.
- Haul trucks will not exceed 25 miles per hour (mph) in PACs.
- No new wire fencing will be used to construct protective fencing for spring, aspen, and ephemeral drainage restoration exclosures in Mexican spotted owl PACs.
- No eddy covariance towers built for the Ecological Restoration Institute's watershed research study would be erected within designated PACs. Tower design would not include guywires.
- No trees greater than 24 inches dbh would be removed in restricted habitat and no trees greater than 18 inches dbh would be removed in PACs.
- The Forest Service will manage for snags ≥12 inches dbh (with an emphasis on maintaining snags ≥18 inches dbh) and down logs ≥12 inches at midpoint diameter. Trees ≥18 inches dbh with dead tops, cavities, and lightning strikes will be retained where possible.
- The Forest Service will manage for the protection of snags and logs through site prep, implementation planning, green tree selection, ignition techniques, and placement of landings in existing openings or areas devoid of these key habitat components.
- Gambel oak, juniper, and piñon tree species would only be cut when necessary to facilitate logging operations (i.e., to create skid trails and landings).
- The Slide Fire burned through part of the 4FRI project area in May/June 2014. The Forest Service will re-assess the acres affected by the Slide Fire to see if treatments proposed pre-fire are still warranted.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components in our evaluation for each species: (1) the *Status of the Species*, which evaluates the

species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *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) the *Effects of the Action*, 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.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this BO places an emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

In accordance with policy and regulation, the adverse modification analysis in this BO relies on four components: 1) the *Status of Critical Habitat*, which evaluates the range-wide condition of designated critical habitat for the species in terms of primary constituent elements (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 determines the direct and indirect impacts 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 (CHUs); and, 4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how they will influence the recovery role of affected CHUs.

For purposes of the adverse modification determination, the effects of the proposed Federal action on each species' critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the species.

STATUS OF THE SPECIES AND CRITICAL HABITAT

In 1993, the FWS listed the Mexican spotted owl (hereafter, referred to as Mexican spotted owl, spotted owl, and owl) as threatened under the Act. The FWS 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). The FWS released the final Mexican spotted owl Recovery

Plan, First Revision (Recovery Plan) in December 2012 (USFWS 2012a). Critical habitat was designated for the spotted owl in 2004 (USFWS 2004).
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 (USFWS 1993), the original Recovery Plan (USFWS 1995), and in the revised Recovery Plan (USFWS 2012a). The information provided in those documents is included herein by reference.

The spotted owl occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico (Gutiérrez et al. 1995). It ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several States of 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 Mexican spotted owl occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known owl locations indicate that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

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, we renamed RUs as "Ecological Management Units" (EMUs) to be in accord with current FWS guidelines. We divide the Mexican spotted 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) (Appendix A, Figure 1). Within Mexico, the Revised Recovery Plan delineated five EMUs: Sierra Madre Occidental Norte, Sierra Madre Occidental Sur, Sierra Madre Oriental Norte, Sierra Madre Oriental Sur, and Eje Neovolcanico.

Mexican spotted owl surveys 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 2012a) lists 1,324 known owl sites in the United States. An owl site is an area used by a single 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 new owl surveys being completed within previously unsurveyed areas (e.g., several National Parks within southern Utah, Grand Canyon National Park in Arizona, Guadalupe National Park in West Texas, Guadalupe Mountains in southeastern New Mexico and West Texas, Dinosaur National Monument in Colorado, Cibola NF in New Mexico, and Gila NF in New Mexico). Thus, an increase in abundance in the species range-wide cannot be inferred from these data (USFWS 2012a). However, we do assume that an increase in the number of areas considered to be occupied is a positive indicator regarding owl abundance.

We are currently working with the Southwestern Region of the Forest Service to conduct a pilot study for the population monitoring recommended in the Revised Recovery Plan (USFWS 2012a). The effort to conduct this work occurred during the 2014 breeding season and we will

be meeting with the Recovery Team, Forest Service, and the Rocky Mountain Bird Observatory (contractor) to analyze and discuss the results of the pilot effort in the fall of 2014. This information will be used to develop a strategy for conducting rangewide population monitoring using the occupancy modeling framework and begin assessing Mexican spotted owl population trends.

Two primary reasons were cited 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. The danger of stand-replacing fire was also cited as a looming threat at that time. Since publication of the original Recovery Plan (USFWS 1995), we have acquired new information on the biology, threats, and habitat needs of the Mexican spotted 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 2012a). Recent forest management has moved away from a commodity focus 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 as well. Therefore, efforts to reduce fire risk to owls should be designed and implemented to evaluate the effects of treatments on owls and retention of or movement towards desired conditions.

Southwestern forests have experienced larger and more severe wildland fires from 1995 to the present, than prior to 1995. Climate variability combined with unhealthy forest conditions may also synergistically result in increased negative effects to habitat from fire. 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. Several fatality factors have been identified as particularly detrimental to the Mexican spotted owl, including predation, starvation, accidents, disease, and parasites.

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 is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts 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. 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.

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 adversely impact the Mexican spotted owl. The virus has been

documented in Arizona, New Mexico, and Colorado, and 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 banded birds, we will most likely not know when owls contract the disease or the extent of its impact to the owl range-wide.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, high-severity, stand-replacing wildland fire is probably the greatest threat to the Mexican spotted owl within the action area. As throughout the West, fire severity and size have been increasing within this geographic area. 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 Mexican spotted owl's range.

Finally, 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 impacts 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). Such changes in the timing and amount of snowmelt are thought to be signals of climate-related change in high elevations (Smith et al. 2000, Reiners et al. 2003). The impact 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, 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.

Critical habitat

The FWS 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, PCEs were identified in 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 feet 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 listed above usually are 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 be observed 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 are allowed to persist.

Steep-walled rocky canyonlands occur typically within the Colorado Plateau EMU, but also occur in other EMUs. Canyon habitat is used by owls 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 LRMP BO for the Coconino NF (USFWS 2012b) and 2013 LRMP BO for the Kaibab NF (USFWS 2013). What we mean by this is that the distribution of owls continues to cover the same area, and critical habitat is continuing to provide for the life history needs of the Mexican spotted owl 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 significant 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 impacts have mainly impacted Mexican spotted owls within the UGM 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 BRW EMU (e.g., Horseshoe 2 Fire on the Coronado NF); but other EMUs have been impacted as well (SRM EMU, the Santa Fe NF by the Las Conchas Fire, CP EMU by the Warm Fire). However, we do not know the extent of the effects of these wildland fires on actual owl numbers.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation. The environmental baseline descriptions provided below are a summary of the available information. A complete description of the environmental baseline for each species can be found in the administrative record for this consultation.

The project area is dominated by ponderosa pine forest, including ponderosa pine and Gambel oak (pine-oak) communities. Approximately 68% of the treatment or project area is ponderosa pine (396,511 acres), with pine-oak forest constituting approximately 19% (108,847 acres) of the treatment area. Inclusions of aspen, meadows, ephemeral drainages, and springs also occur across the landscape. Southwestern ponderosa pine forest is a fire-adapted ecosystem with relatively frequent fire return intervals dominated by low severity surface fire.

Description of the action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR section 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. The action area for this BO is defined as the areas proposed for mechanical thinning, prescribed burning, and other restoration treatments (collectively the "treatment area") and anywhere outside of this treatment footprint that other project-related effects could spread (such as smoke effects or sedimentation impacts, as analyzed in the BA).

A. Status of the species and critical habitat within the action area

The 4FRI Project Phase 1 analysis area lies entirely within the UGM EMU. Within the 4FRI project area, there are approximately 35,019 acres of Mexican spotted owl protected habitat including 70 PACs (~ 34,183 acres) (USFS 2014, p.38). There are 18 PACs proposed for mechanical thinning and burning and 51 proposed for prescribed burning. A subset of these PACs may also receive treatments to restore springs, ephemeral drainages, aspen, and meadows. One PAC that is only listed in spring restoration is the Lucida PAC. The Clark PAC is not located within the 4FRI treatment areas, but effects from hauling to this PAC were analyzed in the BA, for a total of 71 PACs discussed in the BA. The remaining protected habitat (836 acres) occurs on steep slopes where timber harvest has not occurred in the previous 20 years. There are approximately 73,828 total acres of restricted/recovery habitat. This includes the subset of the restricted/recovery pine-oak habitat (10%) to be managed toward nest/roost replacement habitat (6,713 acres of target and 1,976 acres of threshold habitat). We reviewed data in our files to determine current owl occupancy in the 69 PACs proposed for treatment (Table 2).

Table 2. Summarized occupancy data for PACs to be treated or analyzed under 4FRI.

PAC Name	Most Recent Occupancy Information
Archies	No information/surveys conducted for 13 years (pair occupancy 1995)
Bar M	No information/surveys conducted in last 12 of 13 years; owls not located during surveys in 2008
Bear Seep	Pair with young in 2009; no surveys conducted from 2003-2008 or 2010-2014
Blade Tank	No information/surveys conducted 2002 to 2013
Bonita Tank	Male owl located 2004; no information/surveys conducted 2005-2014
Boondock	Pair with young 2013; no information/surveys conducted 2002-2010; surveys in 2011 and 2012 did not locate owls;
Bridge[1]	Pair with young located 2012; no information/surveys conducted in 2013
Bristow Tank/Limpios	No information/surveys conducted 2002-2007, 2009-2014; surveys in 2008 did not locate owls
Casner	No information/surveys conducted 2002-2007, 2009-2014; surveys in 2008 located a single owl
Casner Cabin[1]	No information/surveys conducted from 1994-2014
Cave Springs[1]	Pair occupancy 2002; no information/surveys conducted 2003-2014
Clark[2]	Pair occupancy 2008-2009, 2011 and single male in 2010; no information/surveys conducted 2012
Coulter Ridge	Male owl located 2012; no information/surveys conducted 2002-2011, 2013-2014
Coyote Park	Pair occupancy 2012; male owl in 2001-2003, 2008; no information/surveys conducted in intervening years
Crater Spring Tank	Pair occupancy 2001-2002; no information/surveys conducted 2003-2014.
Crawdad	Male owl located 2008; no information/surveys conducted 2009-2014
Dairy Spring	Pair occupancy 2012-2013 (and during demography study)
Fain Mountain	Pair occupancy 2008 and during demography study; no information/surveys conducted since 2008

Fisher Point	When surveyed, either pair or single owls located; no information/surveys conducted 2008-2013
Foxhole	Pair occupancy 2000; surveys conducted in 2001 and 2008 did not locate owls; no surveys conducted in the interim.
Frank	Male owl last located in 1994; surveys only conducted in 1995 and 2011 since that time and no owls detected
Frog Tank	Pair occupancy 2000; no information/surveys conducted 2001-2014
Fry	Female owl located 2010 and pair occupancy 2005-2006; no information/surveys conducted 2011-2014
Gash Mountain	Pair occupancy 2006, owls not located in 2010; no information/surveys conducted in intervening years or since 2010
Girdner	Pair occupancy 2002, 2004 and male owl 2008; no information/surveys conducted 2009-2014
Harding Point[1]	No information/surveys conducted 1997-2014
Holdup	Except for 2008 when a pair of owls were located, surveys have not been conducted since 2001 (when it was also occupied by a pair)
Howard Mountain	No owls located during surveys conducted in 2002; no information/surveys conducted 2003-2014
Iowa Camp	No information/surveys conducted 2002-2014
Iris Tank	Pair occupancy 1998-2001, 2004, 2008; no surveys conducted since 2008
James Canyon	Pair occupancy 2010; no information/surveys conducted 2011-2014
Jeep	Pair occupancy 1994; no information/surveys conducted 1995-2014
Kelly	Pair occupancy 2010 (one adult found dead on I-17); no information/surveys conducted 2011-2014
Kendrick	Pair occupancy 2012
Knob	No information/surveys conducted 2002-2010, 2012-2014; surveys in 2011 did not locate owls
Lake #1/Seruchos	Pair with young 2011-2014
Lee Butte	Male owl located 2003; no surveys conducted 2004-2014
Lockwood	Pair occupancy 2011, 1995-2006; no information surveys conducted 2007-2010, 2012-2013
Lucida[3]	No information/surveys conducted 2000-2014; last pair occupancy noted in 1998, 1999
Mayflower Tank	Pair with young 2011, 2013; no information/surveys conducted in 2012
MB Smith	No information/surveys conducted 2002-2014
Meadow Tank	Pair occupancy 2013; male owl found in 2011 and 2012
Milos Butte	Pair occupancy 2002, 2004 and no owls found in 2008; no information/surveys conducted 2005-2007, 2009-2014

Mint Spring	Pair occupancy 2002; no information/surveys conducted 2003-2014
Moore Well/Rock Dike	Pair occupancy 1989, 1993-1995, 1999-2002, and 2013 (no young); no information from 2003-2012; single owl detected 1988, 1990-1992 and 1996-1998.
Mustang	Pair occupancy 2002, 2004-2005, 2007-2008; single owls 2009, 2010; No information/surveys conducted 2011-2014
Nestor	Pair occupancy 2000-2002, 2004-2007; no information/surveys conducted 2003, 2008-2014
O'Leary Peak	Pair occupancy 1988; no information/surveys conducted 1989-2014
Orion Spring	Pair occupancy 2013
Pierce Tank	Pair occupancy 2002; No information/surveys conducted 2003-2014
Powerline Tank	Pair occupancy 2012, male owl 2011; no information/surveys conducted 2002-2010, 2013
Pumphouse Wash	Pair occupancy 2002; no information/surveys conducted 2003-2014
Racetrack Tank	Pair occupancy 2001, male owl 2004; owls not located on surveys in 2008; no surveys conducted 2002-2003, 2005-2007, 2009-2014
Rattlesnake	Pair occupancy 2010, 2006-2008; no information/surveys conducted 2011-2014
Red Hill	Male owl 1994 and pair in 2011,2013; no information/surveys conducted for intervening years
Red Raspberry	Pair occupancy 1987-2001; no surveys conducted 2002-2012; surveys in 2013 did not locate owls
Rock Top	No information/surveys conducted 2002-2010, 2012-2014; surveys in 2011 did not locate owls
Roundup	Pair occupancy 2010, 2007-2008; no information/surveys conducted 2011-2014
Sawmill Springs	No information/surveys conducted 2002-2011, 2013-2014; surveys in 2012 did not locate owls
Spruce Tank	Male owl 2012; no information/surveys conducted 2002-2011, 2013
Sterling[1]	Pair occupancy 2000-2001; no information/surveys conducted 2002-2014
Stock Tank	No information/surveys conducted 2003-2014; pair occupancy in 1994 and no owls located in 2002
TBird	No information/surveys conducted 2002-2007, 2009-2014; surveys conducted in 2008 did not detect owls
T-Six Tank	No information/surveys 2002-2007, 2009-2014; surveys in 2008 did not locate owls
Two Holes	No information/surveys conducted 2002-2007, 2009-2014; surveys conducted in 2008 did not detect owls

Upper West Fork[1]	Pair with young 2012; no information/surveys conducted 1998-2011, 2013
Volunteer	Pair with young 2012 (pair location is on Camp Navajo)
Walnut 33	Pair occupancy 1999 and mail owl in 2008; no information/surveys conducted 2000-2007, 2009-2014
Weatherford 2	Pair with young 2013; pair occupancy 2014
Weimer Springs	Pair occupancy 2013; no information/surveys conducted 2002-2012
Weir	Pair occupancy in 2007 and 2008; owls absent or PAC unoccupied in 2000, 2001, and 2010; no information/surveys conducted 2002-2006, 2009, 2011-2013
Woods	Surveys conducted in 2002 and 2011 did not detect owls; no information/surveys conducted 2003-2010, 2012-2013

[1]PAC affected by May 2014 Slide Fire.
[2]Clark PAC is not located within the 4FRI treatment area, but is adjacent to project area.
[3]Lucida PAC is included in spring restoration work.

Critical Habitat

The 4FRI analysis area includes all or portions of six Mexican spotted owl CHUs (UGM 11, 12, 13, 14, 15 and 17). These CHUs encompass approximately 488,974 total acres, but not all of this area is considered to be critical habitat. Only Federal lands that meet the definition of protected or restricted/recovery habitat within these areas are considered to be critical habitat, unless otherwise exempted. Within the 4FRI treatment area, there are approximately 88,143 acres of protected and restricted/recovery habitat within CHUs.

B. Factors affecting the species and critical habitat within the action area

The action area consists primarily of National Forest System lands, and there are few State, tribal, or private actions impacting the Mexican spotted owl or its critical habitat. Key factors that have affected the owl within the action area are vegetation removal activities associated with fuels reduction and forest restoration projects, fire and fuels management, maintenance of vegetation along utility corridors, lands projects involving infrastructure repair/maintenance, recreation, and wildfire. The projects have all included conservation measures to minimize effects to the owl and its habitat.

Most recently, the Slide Fire burned within the western portion of the 4FRI project area. All or part of twelve PACs are located within the fire perimeter, six of which (Bridge, Casner Cabin, Cave Springs, Harding Point, Sterling, and Upper West Fork) were proposed for prescribed burning treatments as a part of 4FRI (Table 3). Vegetation burn severity was assessed using Rapid Assessment of Vegetation Condition (RAVG) data, and soil burn severity was assessed using Burned Area Reflectance Classification (BARC) data. The Slide Fire burned about 800 acres with high-severity effects within the 4FRI project area, including about 442 acres within six PACs.

Table 3. 4FRI Treatment PACs affected by the 2014 Slide Fire.

PAC Name	Total PAC Acres	PAC Acres burned	PAC Acres w/in 4FRI	% PAC Burned Total (4FRI)	Total High Severity Acres in PAC	Total Moderate Severity Acres in PAC	Total Low Severity Acres in PAC[1]
Bridge	637	605	251	95 (39)	11	256	338
Casner Cabin	610	610	171	100 (28)	2	118	490
Cave Springs	788	788	204	100 (26)	116	243	429
Harding Point	653	653	134	100 (21)	81	266	306
Sterling	795	622	259	78 (33)	232	278	112
Upper West Fork	658	7	<1	1 (<0.01)	0	0	7

[1]For this table, we combined the "low severity" and "burned but unchanged" acres reported to us by the Forest Service.

In addition, 21, 293 acres of critical habitat within UGM CHU 14 was within the Slide Fire boundary. Approximately 3,114 acres burned at high severity, 7,035 acres at moderate severity, 9,945 acres at low severity, and 1,199 acres were unburned. Approximately 7,884 acres burned within the 4FRI project area. About 787 acres within the treatment area burned with high-severity effects, 2,327 acres at moderate severity, 4,407 acres at low severity, and 363 acres were unburned. The Forest Service will re-assess acres burned by the Slide Fire to determine if and what treatments may be warranted in these areas.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Effects of the action on the Mexican spotted owl and its habitat

The 4FRI Project will implement several different restoration actions in Mexican spotted owl habitat. These actions will include mechanical thinning and prescribed fire; spring and ephemeral channel restoration; aspen restoration; and meadow restoration. All of these activities will affect habitat composition at multiple scales, but could also result in disturbance to owls from noise and even possibly smoke. In addition, roads will be used, constructed, and decommissioned across this vast area in order to implement this project. Based on the extensive increase in activity, not only could these road-related activities result in additional noise to owls, but they could also result in an increased opportunity for vehicular-owl collisions. We will summarize the potential effects from these actions to the owl and its habitat.

Mechanical Thinning & Prescribed Burning

Under the proposed action, mechanical thinning (81,456 acres) and burning treatments (108,846 acres) would occur in restricted/recovery habitat and PACs, including core areas and protected steep-slope habitat (Table 4). The minimum post-treatment basal area goal for nesting/roosting habitat (which could be developing this condition in target habitat or within PACs) would be 110 sq. ft. per ac. Tree groups (i.e., 2 or more trees with interlocking or nearly interlocking crowns) with diameters averaging 18 inches dbh or greater would not be cut for regeneration openings within Mexican spotted owl habitat (see BA, pg. 63), and no trees ≥24 inches dbh would be cut. There are a few general treatment types that will be used in Mexican spotted owl habitat: group selection and intermediate thinning, plus low-severity prescribed burning. Group selection thinning treatments are planned in restricted/recovery habitat and are intended to create new age classes by removing trees in groups or patches to allow seedlings to become established in the new openings. Intermediate thinning treatments are planned for all spotted owl habitat types. Intermediate thinning is the cutting of trees to improve the composition, structure, condition, and growth of the remaining trees. Besides the thinning, the Forest Service is proposing to conduct two low-severity prescribed fire treatments within the project timelines (10 to 15 years) on all acres. No thinning or burning activities will occur during the Mexican spotted owl breeding season (March 1 – August 31).

The goal of mechanical thinning and prescribed burning in Mexican spotted owl protected and restricted/recovery habitat is to develop a mosaic of uneven-aged forest and increased herbaceous understory by diversifying the current homogeneous conditions of similar size and age ponderosa pine trees with little understory that occurs on the landscape. Treatments in owl habitat will focus on the removal of small to mid-sized trees (<9 to 18 inches dbh) to reduce competition and increase nutrients for larger trees, create gaps and openings in the canopy, and reduce fire risk to functioning nest/roost habitat. Thinning dense forests, particularly in the face of climate change and long-term drought, also reduces the risk of fatality to large groups of trees from insect and disease outbreaks. Over time, treatments are expected to promote the growth, resiliency, and retention of larger ponderosa pine and Gambel oak trees. Thinning and prescribed burning will also improve understory vegetation abundance and diversity and reduce the risk of high-severity wildfire. While the proposed actions are expected to have long-term benefits to the key habitat components of Mexican spotted owl habitat, short-term adverse effects from these and other associated activities are likely to occur to owls and their habitat as a result of implementing this project.

Table 4. Mechanical thinning and prescribed fire treatments in Mexican spotted owl habitat.

Treatment Type	Protected Habitat[1]	Restricted/ Recovery Habitat	Threshold Habitat	Target Habitat	Total Acres
Intermediate thinning <18 inches dbh + Prescribed fire	10,284				10,284
Group Selection and Intermediate Thinning + Prescribed fire		62,785			62,785
Intermediate Thinning + Prescribed Fire			1,892	6,495	8,387
Prescribed Fire	24,735	2,354	84	217	27,390
No Proposed Treatments	244	1,280			1,524
Total Analysis Acres	**35,263**	**66,419**	**1,976**	**6,712**	**110,370**

[1]Includes PAC and protected steep-slope habitat.

A total of 70 PACs are proposed for mechanical thinning and/or prescribed burning or some other restoration activity. There are 18 PACs that will be mechanically thinned and burned under the proposed action (Table 5). Seventy PACs would be treated with low-severity prescribed fire, including some nest core areas if they are pine-oak and occur within the 4FRI treatment area (Tables 5 and 6). Note that 2 additional PACs would have a total of 0.38 miles of ephemeral stream restoration. Based upon our field review of the habitat in these PACs, we agree that PACs could benefit in the long-term from thinning and/or burning activities in order to improve habitat conditions over time (not all beneficial effects will occur in the short-term). However, survey data for many of these PACs is not sufficient to determine current occupancy. In some PACs we may be able to determine how treatments affect future occupancy of the PAC, but for most of these PACs, survey data is out of date or absent. The monitoring plan will include a provision to update occupancy data as well as monitor changes to habitat and potentially the effects of the actions on owls.

Mechanical treatments would occur on approximately 73,827 acres of the 75,111 acres of restricted/recovery habitat in the treatment area and would include all target-threshold/nest-roost replacement habitats. The goal is to treat, on average, 7,383 acres of restricted/recovery habitat per year (or 10% of the total). The Forest Service would aim to exceed this average number of restricted/recovery acres treated about half the time (pers. comm. B. Noble, September 26, 2014). Treatment will maintain threshold/nest roost replacement and enhance target/nest roost replacement habitat in order to manage for future nest/roost sites.

Table 5. PACs to receive mechanical thinning and prescribed burn treatments under 4FRI.

PAC Name	Total PAC Acres	Total Core Acres	Mechanical Treatments		Prescribed Burning	
			% of PAC Treated	% of Core Treated	% of PAC Treated	% of Core Treated
Archies	599	104	83	0	100	100
Bar M	645	112	83	0	100	100
Bear Seep	713	107	85	0	85	0
Bonita Tank	896	100	89	0	100	100
Crawdad	740	102	39	0	95	100
Foxhole	642	105	70	0	91	100
Frank	701	115	83	0	100	100
Holdup	723	102	74	0	88	100
Iris Tank	699	103	84	0	100	100
Knob	766	101	87	0	100	100
Lake #1/Seruchos	927	104	26	0	28	22
Lee Butte	867	104	35	0	100	100
Mayflower Tank	768	100	80	0	87	0
Red Hill	863	173	78	0	100	100
Red Raspberry	870	130	76	0	85	7
Rock Top	875	103	86	0	100	100
Sawmill Springs	629	113	82	0	100	100
T-Six Tank	784	104	87	0	100	100

Direct and indirect effects from the thinning actions within the PACs and restricted/recovery habitat should be short-term in terms of loss of key habitat components. Over the long-term (by the year 2050 as modeled by the Forest Service), these actions are predicted to maintain and/or enhance desirable habitat components such as large trees, large snags and logs, and at least 40% canopy cover. We do expect adverse effects to occur to habitat from implementation of the proposed action as structure and composition of the forest is modified within nest/roost habitat and across the landscape in restricted/recovery habitat. These effects are likely to be most noticeable over the life of this biological opinion (15 years). However, we do not know how treatments that increase openings, modify patch size and location, and create other landscape level changes will influence owl use (foraging and dispersal as well as nesting and roosting) of the 4FRI area over this period of time. The monitoring plan developed by the FWS and Forest Service should provide information on how the treatments affect owl occupancy during the life of this project in several PACs. We expect the results of this monitoring effort to inform this and future projects.

Table 6. PACs to receive prescribed burning treatments under 4FRI.

PAC Name	Total PAC Acres	Total Core Acres	Prescribed Burning	
			% of PAC Treated	% of Core Treated
Blade Tank	610	111	93	62
Boondock	665	101	47	12
Bridge[1]	637	100	45	1
Bristow Tank/Limpios	656	107	100	100
Casner	622	129	100	100
Casner Cabin[1]	610	0[2]	28	0
Cave Springs[1]	788	0[2]	26	0
Coulter Ridge	671	116	100	100
Coyote Park	643	119	100	100
Crater Spring Tank	838	115	8	0
Dairy Spring	698	134	29	0
Fain Mountain	673	134	57	63
Fisher Point	831	110	15	5
Frog Tank	637	101	100	100
Fry	649	102	20	0
Gash Mountain	634	102	99	100
Girdner	727	129	100	100
Harding Point[1]	653	na[3]	21	0
Howard Mountain	649	107	100	100
Iowa Camp	672	147	100	100
James Canyon	727	103	75	55
Jeep	680	127	36	72
Kelly	659	108	100	100
Kendrick	827	104	21	0
Lockwood	687	106	39	0
MB Smith	621	100	92	51
Meadow Tank	701	132	19	33
Milos Butte	661	109	100	100
Mint Spring	617	136	97	100
Mustang	659	102	100	100
Nestor	626	100	74	100
O'Leary Peak	742	106	62	0
Orion Spring	604	125	41	0
Pierce Tank	617	123	66	18
Powerline Tank	633	108	58	48
Pumphouse Wash	606	100	97	100
Racetrack Tank	674	111	100	100
Rattlesnake	810	151	83	30

Roundup	633	119	87	100
Spruce Tank	604	106	79	61
Sterling[1]	795	na[3]	na[3]	33
Stock Tank	682	109	16	20
TBird	603	114	100	100
Two Holes	622	117	100	100
Upper West Fork[1]	657	119	42	33
Volunteer	620	114	69	71
Walnut 33	684	99	17	25
Weatherford	666	103	24	8
Weimer Springs	674	101	14	11
Weir	610	123	62	23
Woods	853	101	100	100

[1]PAC affected by May 2014 Slide Fire; Forest Service to re-assess treatment potential.
[2]No core area designated as roosts/nest sites are located in the canyons or above the rim outside of treatment areas.
[3]Acres not available

Prescribed fire, the deliberate application of fire to reduce forest fuels and reestablish fire as a process, as stated above, is also part of the proposed action. Effects from prescribed burning in restricted/recovery and PAC habitats are difficult to quantify due to the uncertainty inherent in prescribed fire. Design features are in place to minimize the loss or modification of large trees, snags, and logs during all prescribed burning treatments. However, one of the stated goals of the 4FRI project is to significantly reduce the risk of high-severity crown fire in protected and restricted/recovery habitats by treating both inside and outside of Mexican spotted owl habitat across approximately 586,110 acres over a 10-year period. In the process of applying fire deliberately to this landscape, past experience and research have shown that large logs, snags, large trees, and Gambel oaks – all key habitat components of Mexican spotted owl habitat - may be lost or damaged during these activities (Horton and Mannan 1988).

Randall-Parker and Miller (2002) monitored the effects of prescribed fire in ponderosa pine forest on snags, down logs, Gambel oaks, and old ponderosa pine trees at five sites on two national forests (Coconino and Kaibab) and a national monument (Walnut Canyon). All burns were conducted in the fall. At all sites except one, some snags were lined (i.e., duff and debris raked away from the base of the dead tree). Results included the following:

- Twenty-one percent of all snags monitored were consumed by fire or converted to logs and the range of loss across sites was 12 to 38 percent. Nine snags were also created by fire: six of these were old-growth trees that were converted from live to dead trees and two were Gambel oaks.
- Fifty-three percent of all logs monitored were consumed by fire (lost). Log loss did not differ by species.
- Six percent of the 282 Gambel oaks greater than ten inches dbh were lost, and loss ranged from zero to nine percent across the five sites.
- Old growth tree loss across the sites ranged from zero to six percent.

Another study conducted as part of the Birds and Burns Network (Saab et al. 2006), also evaluated the magnitude of change in the quantities of downed wood, snags, and trees within one year after prescribed burn treatments in the Southwest. Study areas were located in ponderosa pine forests in six treatment units located on the Apache-Sitgreaves, Coconino, Kaibab, and Gila NFs. Although few of the results were statistically significant at $p \leq 0.05$, results included the following:

- Nearly half of large downed wood (≥9 inch large end diameter) was consumed by prescribed fire. The authors surmised that drought conditions, followed by low wood moistures prior to fire treatments, may have contributed to the large loss of downed wood.

- Overall tree densities were also significantly reduced after fire treatments. However, the greatest reduction in tree densities was in the smallest size classes (< 3 inches dbh and ≥3 to <9 inches dbh), with little change in larger (≥9 inches dbh) tree densities. Small diameter trees tend to function as ladder fuels in dense stands and can carry flames into the crowns of mature trees; therefore, the removal of these smaller trees is likely to reduce the likelihood of stand-replacing fire, which is one goal of the proposed action. Large tree (≥9 inches dbh) densities changed relatively little.

- Smaller snag (<9 inches dbh) densities increased 30 to 60 percent. With time, these dead trees could contribute to increased risk of spot fires.

The Coconino NF's monitoring data from previously implemented projects in ponderosa pine forest also has shown losses of key habitat components following prescribed burns. Microhabitat monitoring from burns implemented on the Happy Jack Urban Interface Project on the Mogollon Rim Ranger District through late 2004 showed an eight percent loss of trees greater than 18 inches dbh, a 21percent loss of snags (based on a pre-treatment count), a 71percent loss of logs, and a 47 percent loss of Gambel oak trees greater than five inches dbh. In addition, prescribed burns conducted along Highway 87 and Forest Highway 3 (2005-2006) appear to have had loss of canopy cover and basal area. These areas did not include PAC habitat, but they did include restricted/recovery habitat, so the results are applicable to this discussion.

In summary, prescribed burning is expected to reduce the risk of wildfire by reducing accumulations of fuels, but it will also modify and/or result in the loss of the key habitat components that comprise Mexican spotted owl habitat, both in restricted/recovery habitat and within PACs. Design features/conservation measures will be implemented in an attempt to minimize these losses, but it is difficult to reduce and protect fuels on the same piece of ground. We do think that fire staff involved in implementing the project have gained experience over the years and will use best management practices to ensure that low severity fire effects are achieved. However, based upon the sheer number of acres proposed for burning each year, and because the intention is to apply prescribed fire to most PACs, nest-roost replacement/target-threshold acres, and recovery/restricted habitat twice in 10 to 15 years, we think that there is a likelihood that key habitat components will be unintentionally lost to fire and that this could result in short-term adverse effects to Mexican spotted owls.

<u>Spring and Ephemeral Channel, Aspen, and Meadow Restoration</u>

Twenty-three springs are proposed for restoration in Mexican spotted owl habitat, including both PAC and restricted/recovery habitats. Eighteen springs proposed for restoration are in restricted/recovery habitat: 10 springs are on the Coconino NF and 8 springs are on the Kaibab NF. Five springs are proposed for restoration in PACs, and all restoration in PACs would occur on the Coconino NF: 2 springs are in meadows (Red Raspberry and Weimer Springs PACs) and 3 springs are in pine-oak forest (Rock Top [2 springs] and Sawmill Springs PACs). Work would include the use of chainsaws to thin small conifers, fence construction to protect springs from ungulates (non-wire fence will be used in PACs), and site monitoring.

Approximately 5.75 miles of ephemeral stream channel restoration is proposed within Mexican spotted owl habitat. Approximately 3.3 miles of ephemeral channel restoration would occur in restricted/recovery habitat; nearly 1.7 miles of ephemeral channel restoration is planned in six PACs; and, about 0.75 mile of channel restoration is in target-threshold/nest-roost replacement habitat on the Coconino NF. All channel restoration in PACs would occur on the Coconino NF (Bear Seep, Clark, Coulter Ridge, Holdup, Lucida, and Meadow Tank). Proposed restoration reaches in PACs would average about 0.28 miles in length with a range of 0.02 to 0.72 miles. Only Holdup PAC has riparian vegetation within the ephemeral stream reach, but no woody vegetation is present. Bulldozers, bobcats, and dump trucks would be used to conduct this work. Re-vegetating sites would require seeding with a hydromulcher and water tender. Site work could also include placement of erosion mats to provide mulch for seeding and/or planting grass and woody riparian vegetation plugs. Protection of the site would be accomplished through fence construction as described above for spring restoration.

There are aspen inclusions that occur within pine-oak forest, including within PACs, in the 4FRI treatment area. Aspen treatments in PACs would consist of prescribed burn-only treatments on about 219 acres within 8 PACs, including 7 PACs on the Coconino NF (Jeep, Mayflower, Mint Spring, Nestor, Pierce Tank, Red Raspberry, and Weatherford 2) and 1 PAC on the Kaibab NF (Kendrick). Burn-only aspen treatments range from 2 to 61 acres within PACs for a total of 219 acres. All aspen treatments in PACs would occur outside the nesting season. All aspen treatments would include fencing, but as stated above no wire fencing would be used for new fences in PACs. Instead, other fence designs such as double-welded pipe rail would be used. Fencing decisions would be made in collaboration with the FWS. If an affordable and acceptable option cannot be identified, no vegetation work would occur in aspen stands within PACs.

Up to 958 acres of aspen treatment are proposed within restricted/recovery habitat (about 648 acres on the Coconino NF and about 310 acres on the Kaibab NF). These treatments are dispersed across the landscape, occurring in five CHUs (UGM-11, UGM-13, UGM-14, UGM-15, and UGM-17). Treatment objectives in restricted/recovery habitat vary from burn-only aspen improvements to mechanical thinning with prescribed burning intended to restore the long-term function of aspen habitat. Aspen restoration would include mechanical removal of encroaching post-settlement pine, scarifying soils to stimulate aspen suckering, and increasing surface fuels to better carry fire within 100 feet of aspen clones.

Approximately 131 acres of meadow restoration treatments are proposed in 11 PACs on the Coconino NF, including both burn-only (about 97 acres) and thin and burn (35 acres) treatments

(Table 7). All meadow treatments in PACs would occur outside the nesting season. Burn-only treatments would occur in eight PACs. The goal is to move fire through the stand to burn in neighboring ponderosa pine habitat and avoid constructing fire line between forest stands and non-pine areas, which will reduce the habitat disturbance associated with implementing prescribed fire. In addition, burning would improve understory production and potentially kill young, encroaching conifers. Burning in PACs would be designed to minimize effects to the overstory. The combination of mechanical treatments and prescribed burning in three PACs would focus on mechanically removing encroaching post-settlement trees in addition to burning. Treatment design would retain pre-settlement trees, if present, and retain large post-settlement trees where evidence (e.g., stumps, logs) indicates past harvest of pre-settlement trees. The combination of thinning and burning would stimulate grass-forb vegetation in the short-term and improve conditions over the long-term by reducing conifer competition and tree seed sources.

Table 7. Meadow treatments within PACs.

PAC	Acres Treated
Prescribed Fire Only	
Frog Tank	10
Howard Mountain	1
Meadow Tank	28
Nestor	8
Powerline Tank	14
Racetrack Tank	15
Two Holes	14
Volunteer	6
Total Acres	**96**
Mechanical and Prescribed Fire	
Bear Seep	10
Iris Tank	9
Red Raspberry	16
Total Acres	**35**
Total Acres for both Treatments	**131**

The planned spring, ephemeral drainage, aspen, and meadow restoration should result in mostly positive effects to Mexicans spotted owls and their habitat. All of these actions are proposed to be conducted outside the owl breeding season (during the period September 1 to February 28), which will reduce disturbance to owls. Fences built to protect these restoration sites will not use wire fencing in PACs, which should aid in protecting owls or other birds from being injured on new fencing. Most importantly, the site-specific variability that springs, ephemeral drainages, aspen and meadows represent are important to owl prey species because these areas can provide understory vegetation that is limited or lacking at larger scales. Understory vegetation provides the food and cover that supports Mexican spotted owl prey species habitat. Improvements to springs, ephemeral channels, and meadows should improve habitat for prey species and in turn, provide benefits to foraging Mexican spotted owls.

Transportation and Roads

Maintaining, using, and constructing a transportation system to move people, equipment, and forest products on and off the Coconino and Kaibab NFs in order to implement 4FRI will result in effects to owls. Effects from road maintenance and construction, high volumes of traffic, and decommissioning can result in minor impacts to habitat (widening, tree removal, fill and grading), noise disturbance to owls in the presence of large amounts of traffic, and possible death from collisions of owls and vehicles. Temporary road construction/maintenance and road decommissioning within PACs will be conducted outside the Mexican spotted owl breeding season, so disturbance from these activities to known breeding owls will be reduced. However, there is still likely to be noise from these activities that affects owls in PACs.

The 4FRI project proposes a maximum of 431,049 acres of mechanical treatment. Traffic volume and needed infrastructure (such as roads) are directly related to total acres treated. The proposed action states that approximately 45,000 acres of mechanical tree harvest could occur each year for 10 to 15 years. Approximately 2.67 truck trips are required per acre of treatment, which would be about 120,150 truck trips annually. On average, if we assume that there a 276-day hauling season (May 1 – January 31), this would total ~435 truck trips per day across the 4FRI project area. While we know that the actual daily number would vary, the BA describes the assumptions that went into this number to produce a conservative (i.e., high) estimate that is expected to represent the likely maximum number of truck trips per day.

Our assessment of potential disturbance to Mexican spotted owls and their habitat from road-related activities goes beyond the level of occupied habitat or total owl habitat. The risk of collisions extends well-beyond where owls nest and roost, and also includes all areas they could be foraging, seasonally migrating, or dispersing through. The BA includes a conservation measure that states haul trucks will not exceed 25 mph and that there would not be hauling in PAC's during the breeding season. As a general rule, logging trucks usually begin their trip out to the harvest site pre-dawn and run until dark, particularly during summer months. The no haul timing restriction in PAC's during the breeding season is expected to minimize the potential impact, but it does not totally remove the potential effect across the project area in owl habitat. Additionally, the potential for collision in PAC's would increase outside of the breeding season because hauling would occur within PAC's at this time. In the winter, we would also expect that trucks would run when temperatures are coldest and road surfaces are frozen, which is typically in the pre-dawn and dusk hours. Mexican spotted owls are vulnerable to collisions with trucks because they are active in the late afternoon (two hours or so pre-sunset) to early morning (two hours or so post-sunrise) when they are actively foraging and defending their territories. Overall, we do not have information regarding how frequently owl-vehicle collisions might occur. However, there is potential risk from implementation of this project due to the level of truck traffic that will occur in Mexican spotted owl habitat.

Disturbance

Activities that could result in disturbance to nesting, roosting, and foraging Mexican spotted owls include transporting and operating harvest machinery, hauling harvested forest materials, building fire line, managing prescribed burns, smoke, personnel in the field, and road maintenance and construction. The 4FRI proposes a maximum of 431,049 acres of mechanical treatment. More acres could be added under a variety of potential situations. Throughout the BA, the Forest Service states that all thinning and prescribed burning, spring and ephemeral drainage restoration, aspen restoration, meadow restoration, temporary road maintenance, and road decommissioning in PACs will occur outside the breeding season. Therefore, the analysis in the BA determined that there will be minimal effects to breeding Mexican spotted owls from noise associated with these activities.

There are a growing number of studies attempting to describe and quantify the impacts of non-lethal disturbance on the behavior and reproduction of wildlife, and Mexican spotted owls in particular. Delaney et al. (1997) reviewed literature on the response of owls and other birds to noise and concluded the following: 1) raptors are more susceptible to disturbance-caused nest abandonment early in the nesting season; 2) birds generally flush in response to disturbance when distances to the source are less than approximately 200 feet and when sound levels are in excess of 95 dBA; and 3) the tendency to flush from a nest declines with experience or habituation to the noise, although the startle response cannot be completely eliminated by habituation. Delaney et al. (1999) found that ground-based disturbances elicited a greater flush response than aerial disturbances. Our guidance is to limit potentially disturbing activities to areas ≥0.25 mile from Mexican spotted owl nest sites during the breeding season (March 1 - August 31). This corresponds well with the Delaney et al.'s (1999) 0.25 mile threshold for alert responses to helicopter flights. In addition, Delaney et al. (1999) found that Mexican spotted owls did not flee from helicopters when caring for young at the nest, but fled readily during the post-fledgling period. This may be a result of optimal fleeing decisions that balance the cost-benefit of fleeing. Frid and Dill (2002) hypothesize that this may be explained using predator risk-disturbance theory and perhaps the cost of an adult spotted owl fleeing during the nestling period may be higher than during the post-fledgling period.

Our analysis of the 4FRI analysis area and PAC location information indicates that even if actions do not occur within PACs during the breeding season as is proposed, project-related noise adjacent to and within 0.25 mile of PACs could affect owls during the breeding season. Noise generated during thinning activities adjacent to PACs could result in disturbance to breeding owls, interfering with nesting and foraging activities pre- and post-fledging. Some PACs likely have topographic screening from adjacent thinning units (e.g., within a drainage, over a ridge, etc.), which could result in reduced noise impacts in some areas, but many Mexican spotted owls will experience greater noise and activity levels within the 4FRI project area than they have likely experienced in the past.

Burning in PACs will occur outside the Mexican spotted owl breeding season (during the period September 1 – February 28) and would include core areas, eliminating the need to build fire lines inside most PACs. In addition to possible habitat effects, burning could potentially disturb owls due to smoke emissions. Smoke tends to settle into low-lying areas during the nighttime and could potentially affect owls associated with PACs located in and adjacent to the project area

during the breeding season when spring burns are conducted. Smoke effects would be short-term (3 to 5 days), but initial burns may generate significant smoke due to current fuel loads. In order to reduce this effect, the Forest Service worked with us to identify areas outside of, but upwind and in proximity of PACs (based upon predicted air flow, not distance) across the project area. These buffer areas were identified as exclusion zones where burning would only occur outside the breeding season in order to minimize the risk of heavy concentrations of smoke settling into downwind PACs for extended periods of time during first entry burns. Maintenance burns should result in less smoke (and less impact) as there would be less fuel to burn on these second entry burns. In addition, we identified opportunity zones outside of PAC habitat that could be burned during the breeding season because smoke is unlikely to affect downwind PACs.

Summary

The 4FRI Project is a remarkable step forward in attempting to restore forest structure, composition and resiliency by conducting thinning and burning across almost half a million acres of ponderosa pine forest. The project has also done a good job of including measures to protect the Mexican spotted owl and its habitat by deferring management activities in core areas and PACs during the breeding season, planning for low severity fire effects in PACs, and attempting to avoid breeding season disturbance to Mexican spotted owls from all associated activities.

Even with these efforts, however, the 4FRI Project has the potential to negatively affect the owl and its habitat when implemented, particularly due to the size and scope of the action. There is likely to be short-term disturbance to breeding owls (even with the substantial efforts included to minimize these effects), some loss of key habitat components (large trees, snags, and logs), and some degree of potential for direct fatality from vehicular collisions. Implementation of the project should result in benefits to the owl through habitat enhancement and fire risk reduction. The jointly developed monitoring plan will assist in tracking the effects of the action to owls and their habitat. Because there currently is uncertainty regarding treatment effects and risks to owl habitat with or without forest treatment until rigorous monitoring results from projects such as 4FRI have been compiled and analyzed, we will continue to struggle with how to conduct thinning and burning activities in occupied and suitable owl habitat. Therefore, the 4FRI project gives us a unique opportunity to learn about treatment effects to Mexican spotted owl and its habitat, as recommended in the Revised Mexican spotted owl Recovery Plan (USFWS 2012).

Effects of the action on Mexican spotted owl critical habitat

In our analysis of the effects of the action on critical habitat, we consider whether or not 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 modify 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, the functional role of each of the CHUs in recovery must also be considered

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 4FRI. The PCEs for steep-walled rocky canyonlands are not analyzed in this BO because this habitat does not occur within the action area.

All critical habitat acres (88,143 acres) within the 4FRI treatment area are proposed for prescribed burning. About 69 percent of the acres (61,128 acres) are proposed for thinning.

Primary Constituent Elements related 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: Actions implemented under the proposed project are expected to retain the range of tree species (i.e., conifers and hardwoods associated with Mexican spotted owl habitat) and would not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by owls. Some loss of trees of all types and dbh size classes would occur during mechanical thinning and prescribed fire activities. However, actions implemented under the 4FRI project are expected to maintain a range of tree species and sizes needed to maintain this PCE in PACs and restricted/recovery habitat across the treatment area because the Forest Service is implementing the Recovery Plan guidelines that strive to retain large trees, canopy cover appropriate for owl habitat, and a diverse range of tree species (such as Gambel oak in pine-oak forests). Removal of trees and various tree species may also occur as part of the spring, ephemeral channel, meadow, and aspen restoration activities; but these effects should be small in extent and intensity. Therefore, the function and conservation role of this PCE would not be compromised by the proposed action.

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

Effect: We expect that tree shade canopy would be reduced following thinning and burning treatments implemented. However, we do not expect canopy cover in Mexican spotted owl forested habitat to be reduced below 40 percent because the Forest Service has adopted the Recovery Plan recommendations that include managing for higher basal area and increased canopy cover in Mexican spotted owl habitat versus pure ponderosa pine or other forest and woodland habitats. We would expect that some reduction in existing canopy cover (5 to 10 percent) may actually aid in increasing understory herbaceous vegetation and forb production, which could benefit Mexican spotted owl prey species. The function and conservation role of this PCE would not be compromised by the proposed action.

PCE: Large, dead trees (snags) with a dbh of at least 12 inches.
Effect: Large snags could be both created and lost following proposed prescribed burning (Horton and Mannan 1988, Randall-Parker and Miller 2002). Snags would be created as large and small trees are killed through prescribed burning. This may benefit Mexican spotted owls,

particularly their prey species as most snags created through the prescribed fire are likely to be ≤9 inches dbh (Saab et al. 2006). Snags used by Mexican spotted owls for nesting are typically very old, large dbh, highly decayed snags with cavities. Snags with these characteristics tend to be limited in ponderosa pine and mixed conifer forests in northern Arizona (Ganey and Vojta 2004). In individual burning projects, the Forest Service would attempt to minimize loss of these large snags through conservation measures (such as lining or using lighting techniques to avoid snags). Conservation measures/design features will be implemented to protect the largest and oldest snags. Therefore, although we anticipate there would be a measurable loss of snags due to implementation of the 4FRI project, efforts to protect this rare resource would be made to minimize this loss, and the function and conservation role of this PCE would not be compromised by the proposed action.

Primary Constituent Elements related to maintenance of adequate prey species:

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

Effect: Fallen trees and woody debris would likely be reduced by the proposed burning treatments (broadcast, piling, and maintenance burning) as reduction of coarse woody debris is a large component of the proposed action. Research and monitoring indicates that prescribed burning could reduce logs by as much as 30 to 50 percent (Randall-Parker and Miller 2002, Saab et al. 2006). The loss of larger logs could result in short-term adverse effects to this primary constituent element and could result in localized impacts to prey species habitat. However, across the treatment area, it is likely that prescribed burning would also create fallen trees and woody debris as trees are killed post-burn and fall. In fact, based upon current data for many of these areas, there is an excess supply of coarse woody debris due to the exclusion of frequent, low-severity fire, which can increase the likelihood of high-severity fire within recovery habitat. Therefore, some removal of woody debris would result in an overall benefit to the function and conservation role of this PCE, though short-term adverse effects would likely occur within some project areas.

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

Effect: We expect this PCE would be positively affected by the actions taken under the 4FRI Project. Plant species richness would increase following thinning and/or burning treatments that result in small, localized canopy gaps. The 4FRI project includes conservation measures that focus on retaining Gambel oaks and other hardwood and coniferous species but some level of short-term loss could occur during logging operations, prescribed fires, or road construction/maintenance. However, current levels Gambel oak are estimated to be above historical levels and the function and conservation role of this PCE would not be compromised by the proposed action.

In addition, although aspen is not a cover type known to be used by Mexican spotted owls, it occurs in inclusions within PAC and restricted/recovery habitat. Up to 958 acres of aspen treatment are proposed within critical habitat. These treatments are dispersed across the landscape, occurring in five CHUs (UGM-11, UGM-13, UGM-14, UGM-15, and UGM-17). These treatments will enhance Mexican spotted owl prey species habitat, albeit in localized areas, within these CHUs.

PCE: Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

Effect: Short-term decreases in plant cover would result from prescribed burning. We expect long-term increases in residual plant cover because fire treatments would provide conditions suitable for increased herbaceous plant growth by removing a thick layer of dead plant debris within treated areas. The mosaic effect created by burned and unburned areas and by opening up small patches of forest within protected habitat is also expected to increase herbaceous plant species diversity (Jameson 1967, Moore et al. 1999, Springer et al. 2001) and, in turn, assist in the production and maintenance of the Mexican spotted owl prey base. The combination of low-intensity prescribed burns and thinning during restoration projects would most likely result in only short-term effects to the Mexican spotted owls with regard to modifying prey habitat within treatment areas. In frequent-fire landscapes, herbaceous understory response and plant regeneration tends to be positive following tree removal and prescribed fire (Springer et al. 2001). There is the potential for wild and domestic ungulates to have adverse effects on the production of plant cover post-burning if ungulates were allowed to graze burned areas too soon following fire. However, the revised Kaibab LRMP and the Coconino LRMP include desired conditions and guidelines to maintain healthy levels of forage and for managing livestock following prescribed fire. Therefore, the function and conservation role of this PCE across the 4FRI Project area would not be compromised by the proposed action.

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

Adverse effects and associated incidental take from the 4FRI Project are not expected to negatively affect Mexican spotted owl recovery or further diminish the conservation contribution of critical habitat to the recovery of the Mexican spotted owl. The 4FRI Project includes objectives and species protection measures in accordance with the Recovery Plan (USFWS 2012). These actions were identified by the Recovery Team as being necessary to recover the Mexican spotted owl, and the 4FRI Project will implement these actions in designated critical habitat. Designated critical habitat includes all protected (PACs) and restricted/recovery habitat (unoccupied spotted owl habitat) within CHUs. These actions include the following:

- The Forest Service within the project area has and continues to designate 600 acres surrounding known Mexican spotted owl nesting and roosting sites. PACs are established around owl sites and are intended to protect and maintain occupied nest/roost habitat. Nesting and roosting habitat is rare across the range of the Mexican spotted owl, and by identifying these areas, which are also critical habitat, for increased protection, the Forest Service is aiding in recovery.

- The 4FRI Project has identified and is managing pine-oak forests that have potential for becoming Mexican spotted owl replacement nest-roost habitat, or are currently providing habitat for foraging, dispersal, or wintering habitats. As stated above, nesting and roosting habitat is a limiting factor for the owl throughout its range. By managing critical habitat for future replacement nest/roost habitat, the Forest Service is aiding in recovery.

- The 4FRI Project's intent is to integrate the best available recovery habitat management objectives where possible into forest restoration and/or fuels reduction projects with the overall goal to protect owl PACs from high-severity wildland fire and to conduct actions to improve forest sustainability (e.g., thinning and prescribed burning). This management will ensure that Mexican spotted owl habitat continues to exist on the forest and that critical habitat will continue to retain its function for conservation and recovery.

Over the long-term, these actions should increase the sustainability and resiliency of Mexican spotted owl habitat (particularly through fuels management and forest restoration actions). Therefore, implementation of the 4FRI Project is not expected to further diminish the conservation contribution of critical habitat to the recovery of the Mexican spotted owl.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Climate change, in combination with drought cycles, is likely to exacerbate existing threats to all these species' habitats in the Southwestern U.S., now and into the foreseeable future. Increased and prolonged drought associated with changing climatic patterns will adversely affect streams and riparian habitat by reducing water availability and altering food availability and predation rates. The continued warming and drying of forested habitats will likely alter vegetation structure and composition and reduce the amount and quality of nesting and roosting habitat for Mexican spotted owls in the action area. However, implementation of forest restoration projects such as 4FRI should help to mitigate some of the long-term effects of climate change on Mexican spotted owl habitat.

The main non-Federal activities that may impact the Mexican spotted owl habitat are loss of habitat through development of private inholdings for home sites and related disturbance at these properties. Within these private lands, there is the potential for activities that create disturbance or removal of Mexican spotted owl habitat components on private lands, such as roads, grazing, mining, recreation activities, and fuel treatments. Mexican spotted owl critical habitat has not been designated on non-Federal lands; there are no anticipated cumulative effects to Mexican spotted owl critical habitat from non-Federal actions.

CONCLUSION

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.[1]

[1] See December 27, 2004, memo from Acting Director Fish and Wildlife Service. This analysis is also consistent with our proposed definition of "destruction or adverse modification of critical habitat" published in the *Federal Register* on May 12, 2014 (79 FR 27060).

Mexican spotted owl and critical habitat

After reviewing the current status of the Mexican spotted owl and its critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that implementation of the 4FRI Project will not jeopardize the continued existence of the Mexican spotted owl, and will not destroy or adversely modify its designated critical habitat. We base our conclusion on the following:

1. The 4FRI Project will strive to implement the Recovery Plan (USDI FWS 2012) and manage for Mexican spotted owl recovery on the Coconino and Kaibab NFs.

2. Desired conditions and guidelines in the 4FRI Project recognize the need to reduce the potential for landscape level, stand-replacing fire in ponderosa pine-Gambel oak forests that the Mexican spotted owl occupies. These efforts to improve forest condition and sustainability should reduce the risk of high severity fire and subsequently, reduce the loss of owl habitat.

3. Based on the discussion provided in the Effects to Mexican Spotted Owl Critical Habitat section above, the CHUs (UGM 11, 12, 13, 14, 15, and 17) affected by the 4FRI Project will continue to serve the function and conservation role of critical habitat for the Mexican spotted owl.

The conclusions of this BO are based on full implementation of the project as summarized in the "Description of the Proposed Action" section of this document, including the standards and guidelines that apply to the action and serve as conservation measures that were incorporated into the project design.

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 further defined (50 CFR 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 CFR 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.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to an applicant/permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest

Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [see 50 CFR 402.14(i)(3)].

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 have not been adequately surveyed and we are reasonably certain spotted owls are present.

Amount of Take

Based upon analyses of the effects of Forest Service projects within previous forest restoration BOs, we anticipate the majority of incidental take for actions implemented under the 4FRI proposed action will be in the form of short-term harassment. Owls experiencing short-term harassment may fail to successfully rear young in one or more breeding seasons, but will not likely desert the area because of a short-term disturbance (Delaney et al. 1999); harassment is measured as owls taken associated with a specific number of PACs. Incidental take in the form of harm is also anticipated, albeit at a lesser amount than take from harassment and is measured as the number of owls taken. For this project harm would be the direct fatality of individual birds.

There are at least 70 PACs that could be affected by 4FRI. Eighteen PACs will be mechanically thinned and prescribe burned, and 52 PACs will have burn-only treatments. In addition, the Clark and Lucida PACs will only have ephemeral channel restoration activities within them, but this work will occur outside the breeding season and habitat will not be modified such that we think there would be incidental take as a result of the proposed action in these two 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 4FRI Project. Based upon the potential for incidental take to occur as part of implementation of the project, we anticipate the following incidental take for the proposed action, which is in addition to previously authorized incidental take resulting from ongoing projects or projects that have yet to be implemented:

- We anticipate the take of one pair of Mexican spotted owls and/or associated eggs/juveniles in the form of harassment in up to four PACs per year due to a single (one breeding season) or short-term (one to three breeding seasons) disturbance (non-habitat altering action that disrupts or is likely to disrupt owl behavior within the PACs) or habitat alteration (e.g., short-term loss of key habitat components) associated with implementation of the proposed action. We do not expect that each year owls associated with four PACs may be taken as a result of short-term disturbance and/or habitat alteration; however, we think the potential is there in any given year. The disturbance and short-term habitat modification generated by activities associated with 4FRI is likely to interrupt, impede, or disrupt normal behavior patterns to the point that breeding and feeding activities are impacted over the course of one to three breeding seasons. Incidental take is exceeded if owls associated within an individual PAC are harassed over the course of more than three breeding seasons or if owls associated with more than four PACs are harassed in one year as a result of this project. We expect this incidental take to occur on the Coconino NF as there is currently only one PAC on the Kaibab NF portion of this project (Kendrick PAC) and therefore, less opportunity for disturbance and/or habitat alteration to occur. This incidental take tiers to (is included within) the amount of take anticipated under the 2012 BO for the Coconino NF Land and Resource Management Plan and the 2013 BO for the Kaibab NF Land and Resource Management Plan.

- In addition, we anticipate the incidental take of three Mexican spotted owls in the form of harm and/or direct fatality due to vehicular collision on average once every five years, for a fifteen-year period. Following the discovery of three fatalities, we will re-assess the project with the Forest Service and determine how to reduce fatalities. This incidental take is within the number of owls anticipated to be incidentally taken (harmed) under the 2012 BO for the Coconino NF Land and Resource Management Plan and the 2013 BO for the Kaibab NF Land and Resource Management Plan.

EFFECT OF THE TAKE

In this BO, the FWS determines that this level of anticipated take is not likely to result in jeopardy to the Mexican spotted owl. We have based this determination on the number of PACs with anticipated take from mechanical thinning and burning projects to be implemented under

4FRI that could have short-term adverse effects, but long-term benefits to the Mexican spotted owl, and direct fatality that could occur from vehicular collisions.

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize the effects of take of Mexican spotted owls.

1. Minimize adverse effects to Mexican spotted owls affected by the 4FRI Project.
2. Minimize adverse effects to Mexican spotted owl habitat affected by the 4FRI Project.
3. Monitor the impacts of mechanical thinning, prescribed burning, and associated actions to the Mexican spotted owl affected by the 4FRI Project.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures listed above and outline reporting/monitoring requirements. These terms and conditions are non-discretionary. The FWS may approve deviation from these terms and conditions through site-specific project consultation. Examples warranting deviation from these terms and conditions may include, but are not limited to instances where site-specific conditions dictate that full compliance with the condition is not necessary to avoid incidental take; the Forest Service lacks discretionary authority to implement the condition; or, deviation from the condition is needed to meet the purpose and need of a project.

Mexican spotted owl

The following terms and conditions will implement reasonable and prudent measure 1:

1.1 The Forest Service shall avoid activities within 0.25 mile of PACs during the breeding season (March 1 to August 31) that could result in disturbance to nesting owls. If the Forest Service determines through protocol surveys that spotted owls are not nesting the year of the proposed project or locates a nest and is able to buffer the breeding owls from noise throughout the breeding season, then this restriction would not apply. Other options include documenting topographic buffers in specific PACs or using noise tampering technology to reduce noise impacts.

1.2 Forest Service management activities within PACs and restricted/recovery habitat shall be coordinated and implemented to reduce potential disturbance to Mexican spotted owls. For example, where possible, prescribed burning associated with aspen restoration or earth moving associated with channel restoration will be coordinated with overall PAC burning activities in order to minimize the frequency and duration of operations within and immediately adjacent to these areas.

1.3 The Forest Service, in coordination with the FWS, shall develop contingency plans in the event of new PACs being established or PAC boundary modifications due to owl movement or habitat changes. Flexibility shall be built into the project (including task orders) so that as owls move or new sites are located, project activities can be modified to accommodate these situations.

1.4 The Forest Service shall ensure that all contractors associated with thinning and burning activities, transportation of equipment and forest products, research, or restoration activities are briefed on the Mexican spotted owl, know to report sightings and to whom, avoid harassment of the owl, and are informed as to who to contact and what to do if a Mexican spotted owl is incidentally injured, killed, or found injured or dead on the Coconino and/or Kaibab NF. If an owl fatality is discovered, the FWS Mexican spotted owl lead will be contacted as soon as possible.

The following terms and conditions will implement reasonable and prudent measure 2:

2.1 The Forest Service shall coordinate management activities within PACs and restricted/recovery habitat in order to reduce effects to habitat from multiple entries that can disturb owls and result in adverse effects to habitat.

2.2 The Forest Service shall meet annually with the FWS to discuss the upcoming year's thinning and burning plans in Mexican spotted owl habitat and review the past year's thinning and burning activities in owl habitats.

The following terms and conditions will implement reasonable and prudent measure 3:

3.1 The Forest Service shall monitor the effects of mechanical thinning and prescribed burning on owl occupancy and reproduction, and key habitat components (as defined in the Revised Mexican spotted owl Recovery Plan, table C.2) in three treatment and three reference PACs. The Forest Service shall also monitor the effects of prescribed fire only treatments on owl occupancy and reproduction, and key habitat components in six treatment and six reference PACs. Owl occupancy and reproductive data shall be collected for at least two years prior to treatment and two years post-treatment. Vegetation data should be collected pre-treatment and at defined intervals post-treatment. The specific plan development, selection of PACs, and monitoring framework, shall be developed in coordination with the FWS and Forest Service District Staff to ensure coordination with other projects and monitoring efforts. This monitoring plan shall be designed and implemented to evaluate the effects of thinning and prescribed fire on owl occupancy and reproduction, and retention of or movement toward desired habitat conditions within PACs, as defined in the Recovery Plan (USFWS 2012).

3.2 The Forest Service shall monitor the impacts of incidental take resulting from implementation of the proposed action and report these findings to the FWS. Incidental take monitoring shall include information such as when the project was implemented, whether the project was implemented as proposed and analyzed in this BO (including conservation measures and best management practices), breeding season(s) over which the project occurred, relevant owl survey information, and any other pertinent information about the project's effects on the species.

3.3 Annual reports will describe actions taken under this proposed action and impacts to the owl and its critical habitat. The annual report shall be sent to the Flagstaff FWS Ecological Services field office and the Mexican spotted owl species lead by March 1st of each year.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Forest Service must immediately provide an explanation of the causes of the taking and review with the Arizona Ecological Services Office the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 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 Law Enforcement Office 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.

Certain project activities may also affect species that are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA). The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the FWS. BGEPA prohibits anyone, without a permit issued by the FWS, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you believe migratory birds will be affected by the project, we recommend you contact our Migratory Bird Permit Office, P.O. Box709, Albuquerque, NM 87103, (505) 248-7882, or permitsR2mb@fws.gov. For more information regarding the MBTA, please visit the following websites: http://www.fws.gov/migratorybirds and http://www.fws.gov/migratorybirds/mbpermits.html.

For information on protections for bald eagles under the BGEPA, please refer to the FWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) that were published in the Federal Register on June 5, 2007. Existing take authorizations for bald eagles issued under the Act became covered under the BGEPA via a final rule published in the Federal Register on May 20, 2008 (73 FR 29075). Our office is also available to provide technical assistance to help you with compliance.

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.

1. We recommend that the Forest Service work with us to conduct Mexican spotted owl surveys over the next several years to attempt to determine how owls modify their territories in response to wildland fires on the Coconino and Kaibab NFs. This information will aid us in understanding the short- and long-term impacts of fire on the owl, and its subsequent effect on the status of the species in the UGM EMU. Surveys should be coordinated with the FWS prior to implementation of any project.

2. We recommend that the Forest Service continue to work with us to design forest restoration treatments across the Coconino NF that protects existing nest/roost habitat from high-severity, stand-replacing fire, and enhance existing or potential habitat to aid in sustaining Mexican spotted owl habitat across the landscape. PACs can be afforded substantial protection from wildland fire by emphasizing fuels reduction and forest restoration in surrounding areas outside of PACs and nest/roost habitat.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in your request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required when 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.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to continue to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this biological opinion, are notifying affected Tribes of its completion. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

We appreciate the Forest Service's efforts to identify and minimize effects to listed species from this project. For further information please contact Shaula Hedwall (928-556-2118) or Brenda Smith (928-556-2157).

Please refer to the consultation number, 22410-2011-F-0145, in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc (electronic):
Four Forest Restoration Team Leader, Coconino National Forest, Flagstaff, AZ
Four Forest Restoration Team Wildlife Biologist, Coconino National Forest, Flagstaff, AZ
District Ranger, Flagstaff Ranger District, Coconino National Forest, Flagstaff, AZ
District Ranger, Mogollon Rim Ranger District, Coconino National Forest, Blue Ridge, AZ
District Ranger, Red Rock Ranger District, Coconino National Forest, Sedona, AZ
District Ranger, Williams Ranger District, Kaibab National Forest, Williams, AZ
Forest Biologist, Coconino National Forest, Flagstaff, AZ
Forest Biologist, Kaibab National Forest, Williams, AZ
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
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Linda Otero, Director, Aha Makav Cultural Society Fort Mojave Indian Tribe, Mohave Valley, AZ
Rex Tilousi, Chairperson, Havasupai Tribe, Peach Springs, AZ
Leigh J. Kuwanwisiwma, Director, Hopi Cultural Preservation Office, Kykotsmovi, AZ
Loretta Jackson-Kelly, Director, Cultural Resources Department, Hualapai Tribe, Peach Springs, AZ
Alan Downer, Director, Historic Preservation Department, Navajo Nation, Window Rock, AZ
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Ramon Riley, Director, Cultural Resources, White Mountain Apache Tribe, Whiteriver, AZ
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Linda Ogo, Director, Cultural Research Program, Yavapai-Prescott Indian Tribe, Prescott, AZ
Kurt Dongoske, Director, Zuni Heritage and Historic Preservation Office, Zuni, NM
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APPENDIX A - FIGURES

Figure 1. Ecological Management Units for the Mexican spotted owl in the southwestern United States.

APPENDIX B – CONCURRENCES

This appendix contains our concurrences with your "may affect, not likely to adversely affect" determinations for the threatened narrow-headed gartersnake (*Thamnophis rufipunctatus*) and its proposed critical habitat, spikedace (*Meda fulgida*) critical habitat, loach minnow (*Tiaroga cobitis*) critical habitat, and the candidate roundtail chub (*Gila robusta*). In addition, this appendix also contains our concurrence with your determination that the project "may impact individuals, but is not likely to cause a trend toward federal listing or loss of viability" for the candidate conservation species Arizona bugbane (*Cimicifuga arizonica*).

Narrow-headed gartersnake and proposed critical habitat

Narrow-headed gartersnakes occur in upper and middle Oak Creek and critical habitat is proposed for most of Oak Creek. Mechanical thinning and prescribed fire treatments will not occur in Oak Creek, but are planned for areas within 6th code HUC watersheds above Oak Creek.

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the threatened narrow-headed gartersnake and its proposed critical habitat. We base this concurrence on the following:

- There will be no direct effects to narrow-headed gartersnakes as there will be no activities from the proposed action in or adjacent to Oak Creek.

- Conservation measures and best management practices will be implemented to minimize potential sedimentation from project activities to aquatic habitats. Therefore, the possible increase in sedimentation as a result of implementing the 4FRI Project on Oak Creek is likely to be very minor, and therefore, insignificant and discountable to narrow-headed gartersnake habitat.

- Conservation measures and best management practices will also serve to minimize effects to primary biological factors defined in the 2014 proposed critical habitat rule for narrow-headed gartersnake critical habitat (78 FR 41550). Any effects to proposed critical habitat would be insignificant and discountable because residual effects to water quality and quantity, temperature, habitat and flows in proposed critical habitat would not be measurable.

- The proposed vegetation treatments and prescribed fire activities will reduce wildfire risk and improve watershed function within the Oak Creek watershed where the narrow-headed gartersnake occurs.

Spikedace and Loach minnow critical habitat

Within the analysis area, critical habitat exists in the middle and lower portions of Oak Creek. Mechanical thinning and prescribed fire treatments will not occur in Oak Creek, but are planned for areas within 6th code HUC watersheds above Oak Creek.

We concur with your determination that the proposed action may affect, but will not likely adversely affect, designated spikedace and loach minnow critical habitat. We base our concurrence on the following:

- Conservation measures and best management practices will be implemented to minimize potential sedimentation from project activities to aquatic habitats. Therefore, the possible increase in sedimentation as a result of implementing the 4FRI Project on Oak Creek is likely to be very minor, and therefore, insignificant and discountable to these species' critical habitat.

- Conservation measures and best management practices will also serve to minimize effects to primary biological factors defined in the 2012 critical habitat rule for spikedace and loach minnow critical habitat (75 FR 66482). Any effects to critical habitat would be insignificant and discountable because residual effects to water quality and quantity, temperature, habitat and flows in designated critical habitat in Oak Creek would not be measurable.

- The proposed vegetation treatments and prescribed fire activities will reduce wildfire risk and improve watershed function within the Oak Creek watershed and in critical habitat for the spikedace and loach minnow.

Roundtail Chub

Within the analysis area, roundtail chub occur in the lower portions of Oak Creek. Mechanical thinning and prescribed fire treatments will not occur in Oak Creek, but are planned for areas within 6th code HUC watersheds above Oak Creek.

We concur with your determination that the proposed action may affect, but will not likely adversely affect, the candidate roundtail chub. We base our concurrence on the following:

- There will be no direct effects to roundtail chub as there will be no activities from the proposed action in or adjacent to Oak Creek.

- Conservation measures and best management practices will be implemented to minimize potential sedimentation from project activities to aquatic habitats. Therefore, the possible increase in sedimentation as a result of implementing the 4FRI Project on Oak Creek is likely to be very minor, and therefore, insignificant and discountable to roundtail chub habitat.

- The proposed vegetation treatments and prescribed fire activities will reduce wildfire risk and improve watershed function within the Oak Creek watershed.

Arizona Bugbane

The occurrences of Arizona bugbane addressed in this analysis are limited to the Coconino NF where it occurs in canyons such as West Fork Oak Creek Canyon, Pumphouse Wash, and James

Canyon. There is one documented population on Bill Williams Mountain on the Kaibab NF, but effects to this population are being considered in a separate project analysis.

We concur with your determination that the project "may impact individuals, but is not likely to cause a trend toward federal listing or loss of viability" for the candidate conservation species Arizona bugbane. We base our concurrence on the following:

- There are no known occurrences of Arizona bugbane in areas where mechanical thinning, road construction, road decommissioning, hauling, or spring, ephemeral drainage, or aspen restoration will occur. Therefore, there will be no effects to individual plants or their habitat from these activities.

- Prescribed burning may occur in or near some populations of Arizona bugbane. Effects to bugbane could include death of individual plants from fire and the loss of shade canopy to bugbane populations if surrounding trees die from fire effects. These effects will be minimized by the use of low intensity fire in and around bugbane populations in order to protect the plants and surrounding canopy.

- Because we have limited information regarding the long-term effects of fire to Arizona bugbane, the Forest Service is collaborating with the FWS to finalize a strategy to monitor the impacts of prescribed fire on a population of Arizona bugbane in West Fork Oak Creek. Monitoring results will be used to modify prescribed fire treatments, as necessary, to further protect and enhance Arizona bugbane populations.

APPENDIX C – TECHNICAL ASSISTANCE

This appendix contains recommendations to the Forest Service to reduce the likelihood of take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) from implementation of the 4FRI Project.

The final rule to remove the bald eagle from the Federal List of Threatened and Endangered Species was published in the Federal Register on July 9, 2007, and took effect on August 8, 2007. However, bald and golden eagles continue to be protected by the Bald and Golden Eagle Protection Act (Eagle Act). The Eagle Act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking eagles, including their parts, nests, or eggs. "Take" is defined under the Eagle Act as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" eagles. Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based upon the best scientific information available: (1) injury to an eagle; (2) a decrease in an eagle's productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or, (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior (USDI 2007).

FWS and the Forest Service jointly developed the following conservation measures to minimize impacts to bald and golden eagles in the project area. These measures are consistent with the strategies identified in the Conservation Assessment and Strategy for the Bald Eagle in Arizona (Driscoll et al 2006). We agree that implementation of the following measures will reduce the likelihood of take.

Bald eagles

- Breeding areas and winter roosts will be protected from noise and human disturbance.

- No vegetation treatments will occur within 0.5 mile (2,500 feet), of an occupied bald eagle nest during the breeding season, unless noise effects would be mitigated by topography. The Forest Service will coordinate with the FWS and AGFD to ensure that bald eagle nest location data are updated annually or as new data are collected.

- Prescribed burning will be coordinated spatially and temporally to limit smoke impacts to bald eagle breeding areas during the breeding season (if occupied).

Golden eagles

- Known nest trees and nest sites will be protected from disturbance.

- No vegetation treatments will occur within 0.5 mile (2,500 feet), of an occupied golden eagle nest during the breeding season, unless noise effects would be mitigated by topography. The Forest Service will coordinate with the FWS and AGFD to ensure that golden eagle nest location data are updated annually or as new data are collected.

- The Forest Service and FWS identified 6 of the known 29 golden eagle nests within the project area where smoke from prescribed fires could settle. These six nests will be

monitored to determine if they are occupied and/or active prior to first-entry burns occurring in the area. Prescribed burning will be coordinated spatially and temporally to limit smoke impacts to nesting golden eagles.

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