



United States Department of the Interior

U.S. Fish and Wildlife Service

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In reply, refer to:

AESO/SE

22140-2011-F-0233

May 5, 2015

Mr. Michael R. Williams, Forest Supervisor
Kaibab National Forest
800 South Sixth Street
Williams, Arizona 86046-2899

RE: Biological Opinion – Bill Williams Mountain Restoration Project

Dear 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, dated November 17, 2014, and received by us on November 17, 2014, included a November 13, 2014, biological assessment (BA). On February 13, 2015, we received an addendum to the BA (Addendum) (Williams Ranger District undated). This consultation concerns the potential effects of the proposed Bill Williams Mountain Restoration Project on the Kaibab National Forest in Coconino County, Arizona. The Forest Service determined that the proposed action may affect the threatened Mexican spotted owl (*Strix occidentalis lucida*) and its designated critical habitat.

The Arizona bugbane (*Cimicifuga arizonica*), a species covered under a Conservation Agreement with the U.S. Forest Service, occurs in the project area. Your request did not include a request for technical assistance for this species; however, we recommend continuing to consider potential effects and to apply appropriate conservation measures to the species and its habitat during implementation of the project.

This biological opinion (BO) is based on information provided in the BA, 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

Major events of the consultation history of the project are summarized in Table 1.

Table 1. Major events of the consultation history.

<i>Date</i>	<i>Event</i>
January 19, 2011	Informal consultation began with a meeting with the Forest Service.
January 24, 2011	We received information regarding the Mexican spotted owl.
February to December 2011	We participated in meetings with the Forest Service and provided information regarding the Mexican spotted owl.
August 27, 2012	We provided comments on a draft environmental impact statement.
August to October 2012	We participated in meetings with the Forest Service and provided information and recommendations regarding the project.
November 5, 2012	We received a draft biological assessment.
December 19, 2012	We provided comments on a draft biological assessment.
December 13, 2013	We provided comments on a revised draft environmental impact statement.
February 10, 2014	We met with the Forest Service about the project.
September 24, 2014	We received a revised draft biological assessment
October 20, 2014	We provided comments on the draft biological assessment.
November 4, 2014	We met with the Forest Service about the draft biological assessment.
November 19, 2014	We received a request for formal consultation.
December 16, 2014	We requested additional information necessary to initiate formal consultation.
January 27, 2015	We met with the Forest Service to discuss the request for additional information.
February 13, 2015	We received an addendum to the biological assessment.
April 8, 2015	We issued a draft biological opinion for review.
April 27, 2015	We received comments on the draft biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

A description of the proposed action is in the BA and is included herein by reference. Additional information was provided in the Addendum.

The purpose of the proposed Bill Williams Mountain Restoration Project is to improve the health and sustainability of forested conditions on and surrounding Bill Williams Mountain by reducing hazardous fuels and moving vegetation conditions in the project area toward desired conditions. The project is intended to improve the watershed conditions contributing to the City of Williams water supply; reduce the risk of high severity, stand-replacing wildfires; reintroduce fire into the ecosystem; improve the motorized transportation system; and provide forest and wood products; among other purposes.

The Kaibab National Forest proposes to thin forests on and surrounding Bill Williams Mountain with mechanized equipment and prescribed fire. A combination of commercial timber harvest treatments and non-commercial mechanical treatments is proposed on approximately 15,060

acres. In some areas, only non-commercial treatments will be implemented. Mechanized treatments include hand felling, ground-based thinning systems (which include steep slope thinning techniques using new technologies), and helicopters to remove material. Prescribed fire is also proposed on approximately 15,146 acres of the project area. In some areas, prescribed fire will be used in conjunction with mechanical treatments. In other areas where operability is limited and more costly, only prescribed burning may be used to meet resource objectives. The proposed action includes the following components.

Mechanical Treatments

Conventional Treatment

Ground-based logging systems (i.e., hand thinning, mechanical equipment, heavy mechanical equipment on slopes below 40 percent) will be used to thin up to 11,110 acres with non-commercial thinning for fuels reduction. Treatments will be limited to occur on slopes less than 40 percent.

Helicopters

Helicopters will be used to remove trees on 1,060 acres of steep slopes.

Steep Slope Mechanical

Up to 2,400 acres of steep slope (40 to 60 percent slope) ground-based thinning will be conducted using harvester/forwarders and steep slope excavators (spiders) for fuels reduction. Harvesters and forwarders are capable of operating on slopes of up to 65 percent, and spiders can operate on extremely steep slopes.

No Mechanized Equipment

Approximately 500 acres will receive non-commercial thinning using hand thinning (chainsaws) for fuels reduction.

Post-Mechanical Treatments

Activity slash treatments will include whole-tree skidding, machine piling, hand piling, mulching, crushing, commercial/personal use fuel wood sales, lop and scatter, and/or prescribed burning. Steep slope equipment will be used to pile or remove smaller stems.

Strategic Fuels Treatments

Strategic fuel treatments designed specifically to enhance control lines will be implemented. Treatments will reduce surface, ladder, and canopy fuels up to 300 feet from both sides of control lines. The treatments will thin from below with large tree retention. Some large snags will be removed for operator safety. Approximately 2,500 acres will receive non-commercial thinning treatments, and trees will be removed by hand-felling techniques.

Prescribed Fire

Prescribed fire will be conducted on approximately 15,146 acres of the project area. In most areas (except in the core area of the Bill Williams Mexican spotted owl protected activity center [PAC]), prescribed fire will be used in conjunction with mechanical treatments and dependent on implementation of the strategic fuel treatments designed to enhance control lines. Prescribed fire may be implemented across the project area either prior to or following the mechanical treatments, with the exception of areas on steep slopes requiring the strategic fuels treatments. Areas to be burned will be grouped into several burn units using natural and constructed features such as roads, trails, and natural rock stringers for control lines. The size, location, timing, and sequence of burning will consider impacts such as smoke and risk of fire escape. A combination of firing techniques, including ground and aerial ignitions, will be conducted. Maintenance burning will be required.

Transportation

The proposed action includes constructing approximately 15 miles of new permanent roads for ground-based treatments and approximately 16 miles of temporary roads that will be obliterated after use, and obliterating approximately 23 miles of poorly located roads.

Other Project Components

- Priority pre-settlement patches were identified. A small number of snags on the perimeter of the patches may need to be removed for safety purposes.
- Mechanical operations are an option in dead aspen areas that would not otherwise be safe for hand falling.
- Mechanical falling using an OSHA-approved falling object protective structure (FOPS) cab will allow for retention of a greater percentage of high quality snags.
- Almost all treatment methods (thinning and burning) will occur outside of the Mexican spotted owl breeding season (March 1 through August 31) in the PAC and within a 0.25 mile buffer around the PAC. Haul routes within 0.25 mile of the PAC will restrict speeds to 15 miles per hour or less. If no Mexican spotted owls are detected using the FWS survey protocol, implementation could begin at the discretion of the south zone wildlife biologist and district ranger in coordination with the FWS.
- Within the proposed units where helicopters will remove material, some snags may be removed for safety reasons, and other snags will be retained.

The following components are also part of the proposed action (Addendum):

- Initial treatments consist of thinning followed by prescribed fire and burn only units.
- The PAC core area will only receive prescribed fire.
- All yellow pines, Gambel oak, and aspen in the project area will be retained.
- Thinning will occur in a range of size classes leading to an uneven-aged condition.
- Slash will be machine- and rough-piled and burned, or lopped and scattered and burned.
- Maintenance burning will occur at intervals of 3 to 15 years for up to 40 years.

- Current snags and down logs will be retained or their numbers will move toward Kaibab National Forest Land and Resource Management Plan (USFS 2014) (Forest Plan) requirements at the mid-scale (i.e. averaged over 100 acres).
- In frequent fire mixed conifer, the Forest Service will maintain an average of 3 snags (including green snags) larger than 18 inches dbh per acre.
- Within forested areas, the Forest Service will maintain an average of 3 downed logs (larger than 12 inches in diameter at mid-point and longer than 8 feet) per acre.
- Coarse woody debris, including down logs, will range from 5 to 15 tons per acre post-thinning and burning.
- In ponderosa pine including pine/oak stands, the Forest Service will maintain an average of 1 to 2 snags and green snags larger than 18 inches dbh per acre. There will be an average of 3 downed logs per acre, and coarse woody debris will range from 3 to 10 tons per acre.

Resource Protection Measures

Resource protection measures directly related to the Mexican spotted owl that are part of the proposed action include:

- On areas where prescribed fire is to be implemented, retain approximately 3 to 7 tons per acre of coarse woody debris in ponderosa pine and pinyon pine stands to be left on-site after the prescribed burns and fuelwood gathering

Conservation Measures

Conservation measures directly related to the Mexican spotted owl that are part of the proposed action include:

- Retain an average of at least 3 snags greater than 18" inches in diameter at breast height dbh per acre, 5 downed logs (greater than 12 inches in diameter at midpoint) per acre, and 10 to 15 tons of woody debris per acre (including downed logs) in mixed conifer forest and any forested habitat within the Bill Williams PAC.
- Retain an average of at least 2 snags per acre, 3 downed logs per acre, and 3 to 10 tons of woody debris per acre (including downed logs) in ponderosa pine (including pine-oak) forest.
- Retention of snags will emphasize those that were created from trees that have decayed over a long time period ("soft" snags), versus those that died quickly (i.e., by high-severity fire). However, in order maximize the wildlife benefits, a variety of snags will be maintained.
- Snags greater than 24 inches dbh will only be removed when they are hazardous to operators.
- Design helicopter and logging units to maintain groups and clumps of snags greater than 18 inches dbh in the forested matrix outside pre-settlement patches.
- In Mexican spotted owl protected and recovery habitat, attributes that have the potential to provide future nesting habitat will be maintained or encouraged to develop through management where they occur at low levels. Those attributes include large Gambel oaks, large conifers, large snags, large down logs, and a canopy cover that maintains 40 percent or more ground shading.

- Helicopter flights in the Mexican spotted owl PAC and within 0.25 mile of the PAC will occur outside of the Mexican spotted owl breeding season (March 1 through August 31).
- Hand thinning will occur in the PAC and within 0.25 mile of the PAC outside of the Mexican spotted owl breeding season (March 1 through August 31).
- Forest Road 45 is adjacent to the PAC and is within 0.25 mile of the core area, and there is potential for vehicle-related disturbance to nesting owls. If product material from the Bixler Basin area cannot be removed within three consecutive seasons, then seasonal restrictions will limit hauling to outside of the Mexican spotted owl breeding season
- Prescribed fire will not occur in the PAC core area March 1 through August 31. Burning will also be restricted during the Mexican spotted owl breeding season in areas that may create smoke impacts to the PAC and core area.

The proposed action will be initiated in 2015. Treatments will continue for ten years and maintenance burning will continue for up to 40 years.

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: (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 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). 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 National Forest in New Mexico, and Gila National Forest 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 National Forest (USFWS 2012b) and 2013 LRMP BO for the Kaibab National Forest (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 National Forest, Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves National Forest and Whitewater-Baldy Complex on the Gila National Forest) and BRW EMU (e.g., Horseshoe 2 Fire on the Coronado National Forest); but other EMUs have been impacted as well (SRM EMU, the Santa Fe National Forest 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 can be found in the administrative record for this consultation.

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).

The project area occurs on Bill Williams Mountain and vicinity southwest of Williams, Arizona. It contains the mixed conifer, ponderosa pine-Gambel oak, ponderosa pine, aspen, and grassland cover types.

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

The 15,200 acre Bill Williams Mountain Restoration project area is within the Mexican spotted owl UGM EMU. The Bill Williams Mexican spotted owl PAC is located entirely within the project area on the northwest side of Bill Williams Mountain. The PAC consists of mixed conifer, ponderosa pine, and other forest and woodland types (primarily oak woodlands). A 103-acre PAC core area was designated based on historic detections and habitat evaluation. Most of the core area is situated on a side slope with a ridge on the south side and steep upslope drainage with heavily vegetated mixed conifer on a north slope.

The northern portion of the Twin Vegetation Management Project area, which overlaps this project area, was surveyed in 1994 and 1995. One Mexican spotted owl was detected in 1994. A daytime follow-up and extensive nest searches were conducted. No nest was found and there were no other detections.

In 2008-2011, 2013, and 2014, surveys were conducted within the Bill Williams PAC and the project area. A male Mexican spotted owl was detected in the core area on May 21, 2014. Follow-up visits did not locate owls.

Approximately 1,018 acres within the analysis area is located within the Bill Williams PAC, including the designated 103 acre core area. Outside of the PAC and within the project area, there are 1,756 acres of nest/roost replacement recovery habitat; 1,207 acres of that total is mixed conifer and 549 acres is pine-oak. Outside of the PAC and the nest/roost habitat but within the analysis area, there are 4,349 acres of pine-oak recovery habitat.

Critical Habitat

Within the Bill Williams Mountain Restoration analysis area, there are 6,100 acres of Mexican spotted owl critical habitat within critical habitat unit UGM-13 (Addendum).

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.

Except for areas of Bill Williams Mountain that occur on slopes greater than 40 percent, the project area overlaps with the project areas of the City and Twin Vegetation Management Projects (BA). The Clover High project is also a part of the City project. A biological opinion addressing the effects of the City and Twin projects on the Mexican spotted owl and its critical habitat was issued in 2005. Those projects have been or are being implemented.

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 Bill Williams Mountain Restoration Project will implement several actions in Mexican spotted owl habitat (BA). The actions will include conventional thinning (hand thinning or mechanical equipment); steep slope mechanical thinning; helicopters to remove material; no mechanized equipment thinning; fuel breaks; road construction, transportation, and maintenance; and prescribed fire. All of those activities will affect habitat composition at multiple scales, but could also result in disturbance to owls from noise and possibly smoke. Treatment methods that will occur in Mexican spotted owl habitat are summarized in Table 2.

Table 2. Treatment methods that will occur in Mexican spotted owl habitat categories.

<i>Habitat category</i>	<i>Conventional thinning</i>	<i>Steep slope mechanical</i>	<i>Helicopter removal</i>	<i>No mechanical</i>	<i>Burn only</i>	<i>Total</i>
Protected	177	393	333	12	103	1,018
Mixed conifer nest/roost replacement	204	703	265	35	0	1,207
Pine-oak nest/roost replacement	155	347	47	0	0	549
Pine-oak recovery	4,181	80	88	0	0	4,349

Treatment within the PAC and recovery habitat will follow the Forest Plan, which follows recommendations for treatment from the Recovery Plan (BA). The desired conditions for Mexican spotted owl habitat, based upon those in the Recovery Plan, are summarized in Table 3.

Table 3. Desired conditions for Mexican spotted owl habitat.

<i>Habitat Category</i>	<i>Acres</i>	<i>Desired Conditions</i>
Pre-settlement patches in PAC	247	<p>Uneven-aged forest characteristics.</p> <p>Diversity of age/size tree classes.</p> <p>Groups of all ages occur throughout the area.</p> <p>Groups are comprised of a diversity of seral stages with many groups dominated by trees larger than 18 inches dbh.</p> <p>Groups dominated by large trees have interlocking crowns and high canopy cover over time.</p> <p>Canopy cover within groups averages 60 percent.</p> <p>Basal area averages 80 square feet/acre with group-level basal area ranging from 60 to 160 square feet/acre.</p> <p>Openings range from 0.1 to 2 acres.</p>
PAC outside of pre-settlement patches	771	Matrix around pre-settlement patches will have lower basal area.
PAC core area	103	<p>Horizontal and vertical heterogeneity with species diversity.</p> <p>Diverse composition of native herbaceous and shrub species.</p> <p>Openings of 0.1 to 1 acre.</p> <p>Diversity of tree sizes with trees greater than 16 inches dbh contributing more than 50 percent of the basal area.</p> <p>Minimum basal area of 120 square feet/acre.</p> <p>Retain key habitat components (large trees, snags, large hardwoods).</p> <p>Low severity cool season fire effects.</p>
Mixed conifer nest/roost replacement recovery	1,207	<p>Multiple age classes of trees, maintenance of species diversity.</p> <p>Strive to retain trees 18 inches dbh and larger.</p> <p>Basal area will be a minimum of 120 square feet/acre.</p> <p>Canopy cover within groups will be 60 percent or greater.</p>
Pine-oak nest/roost replacement recovery	549	<p>Uneven-aged management.</p> <p>Basal area is a minimum of 110 square feet/acre.</p> <p>Canopy cover in groups is 60 percent or greater.</p> <p>Strive to retain trees 18 inches dbh and larger.</p>
Pine-oak recovery	4,349	<p>More open than existing with uneven-aged management.</p> <p>Shade cover greater than 40 percent.</p> <p>Trees larger than or equal to 24 inches dbh are retained.</p> <p>Average basal area depends on pre-settlement conditions.</p>

Seventeen treatment prescriptions will be used in Mexican spotted owl habitat (Addendum). Descriptions of the prescriptions are summarized in Table 4; acres treated with each prescription are in Table 5.

Table 4. Prescriptions (Rx) that will be used in Mexican spotted owl (MSO) habitat.

<i>Rx</i>	<i>Description</i>
MSO 1	<p><i>For steep slopes that do not currently meet mixed conifer nest/roost recovery habitat requirements.</i></p> <p>Treatments will maintain an average basal area of 80 square feet per acre. Horizontal structure will consist of forested patches 2.5 to 30 acres in size with spaces in between. A density of 60 to 160 square feet per acre will be maintained in forested patches. Spaces between forested patches will be approximately 1 to 3 chains in width with single trees and/or small clumps of trees. Lower densities of trees will be maintained by prescribed fire. Larger patches will have larger spaces. Thinning first will allow implementation of prescribed fire to meet desired conditions. Prescribed fire will increase or maintain the number of large snags and downed logs. The minimum canopy cover will be 60 percent in mixed conifer. There will be a diversity of tree sizes with trees larger than 16 inches dbh contributing more than 50 percent of the stand basal area.</p>
MSO 2	<p><i>For mixed conifer habitat on steep slopes that currently meet the nest/roost recovery habitat minimum requirements.</i></p> <p>Thin conifers to an average basal area of 120 square feet per acre. Prescribed fire will reduce the amount dead and down material, increase the canopy base height, and maintain tree regeneration. Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as those in MSO 1.</p>
MSO 3	<p><i>For the PAC core area.</i></p> <p>Treat with low intensity prescribed fire only. Prescribed fire will reduce the amount dead and down material, increase the canopy base height, and maintain tree regeneration.</p>
MSO 4	<p><i>For mixed conifer habitat on low slopes that do not meet nest/roost recovery habitat requirements.</i></p> <p>Thin from below in mixed conifer on low slopes and follow with prescribed fire. Maintain an average basal area of 155 square feet per acre. Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as for MSO 1.</p>
MSO 5	<p><i>For mixed conifer habitat on low slopes that currently meet the nest/roost recovery habitat requirements.</i></p> <p>Thin from below in low slope mixed conifer and followed with prescribed fire. Treatments will maintain an average basal area of 80 square feet per acre. Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as for MSO 1.</p>
MSO 6	<p><i>For mixed conifer habitat on low slopes that do not meet nest/roost recovery habitat requirements and have moderate to high levels of dwarf mistletoe.</i></p> <p>Irregular shelterwood harvest will be followed by prescribed fire. The treatments will maintain an average basal area of 80 square feet per acre in areas with low dwarf mistletoe infection.</p>

	<p>The mistletoe infection intensity will be reduced or the current or historical extent of mistletoe will be maintained.</p> <p>Trees larger than 24 inches dbh will not be removed unless they pose a safety risk.</p> <p>Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as for MSO 1.</p>
MSO 7	<p><i>For pine oak habitat on steep slopes that do not meet nest/roost recovery habitat requirements.</i></p> <p>Thinning will result in an average basal area of 80 square feet per acre followed by prescribed fire.</p> <p>Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as for MSO 1.</p>
MSO 8	<p><i>For pine oak habitat on steep slopes that meet nest/roost recovery habitat requirements.</i></p> <p>Thinning will result in an average basal area of 110 square feet per acre followed by prescribed fire.</p> <p>Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as for MSO 1.</p>
MSO 9	<p><i>For pine oak habitat on low slopes that currently meet nest/roost recovery habitat requirements.</i></p> <p>The prescription is the same as MSO 8 but will occur on a low slopes.</p>
MSO 10	<p><i>For pine oak habitat on low slopes that do not meet nest/roost recovery habitat requirements.</i></p> <p>Treatments will maintain an average basal area of 100 square feet per acre.</p> <p>Horizontal forest structure, density, vertical diversity in patches, and spaces will be the same as for MSO 1.</p>
MSO 11	<p><i>For pine oak habitat on low slopes outside of nest/roost recovery habitat.</i></p> <p>Thinning will result in an average basal area of 40 square feet per acre followed by prescribed fire.</p> <p>One to three trees will be left per pre-settlement evidence.</p> <p>More trees per evidence will be retained on north and east exposures, within drainages, and highly productive sites.</p> <p>Will maintain/promote 40 percent shading.</p> <p>Will develop uneven-aged structure and a mosaic of openings and tree groups of varying sizes.</p>
MSO 12	<p><i>For pine-oak habitat on low slopes outside of nest/roost recovery habitat managed for a higher forest density than MSO 11.</i></p> <p>All of the higher concentration yellow pine will be retained.</p> <p>Thinning will result in an average basal area of 100 square feet per acre followed with prescribed fire.</p>
MSO 13	<p><i>For pine-oak habitat on low slopes that do not meet nest/roost recovery habitat requirements and have moderate to high levels of dwarf mistletoe.</i></p> <p>Irregular shelterwood harvest will be followed with prescribed fire.</p> <p>Thinning will maintain an average basal area of 75 square feet per acre in areas with low dwarf mistletoe infections.</p> <p>The mistletoe infection intensity will be reduced or the current or historical extent of mistletoe will be maintained.</p> <p>Trees larger than 24 inches dbh will not be removed.</p>

MSO 14	<p><i>For pine oak habitat on low slopes outside of nest/roost recovery habitat managed for a higher forest density than MSO 13.</i></p> <p>Group selection harvest will be followed with prescribed fire. Treatments will maintain an average basal area of 64 square feet per acre (83 percent of the area at 75, and 17 percent at 10, square feet). Will develop uneven-aged structure and a mosaic of tree groups of varying sizes.</p>
MSO 15	<p><i>For PAC forested stands dominated by aspen.</i></p> <p>Thin from below in a stand dominated by aspen followed by prescribed fire. Thinning of conifers will result in an average basal area of 80 square feet per acre and will be followed with prescribed fire. Hardwoods larger than 10 inches in diameter at root crown will be retained.</p>
MSO 16	<p><i>For PAC forested stands dominated by Gambel oak in a small portion on the north east portion of the PAC.</i></p> <p>Thin from below in a 1-acre oak and pinon-juniper stand and follow with prescribed fire. Treatments will maintain an average basal area of 25 square feet per acre.</p>
MSO 17	<p><i>For areas where Mexican spotted owl habitat and the Arizona bugbane botanical area overlap.</i></p> <p>Fuel reduction thin from below to 12 inches dbh followed by prescribed fire.</p>

Table 5. Acres of Mexican spotted owl habitat that will be treated with each prescription.

Rx	PAC	PAC Core	Mixed conifer nest/roost recovery	Pine-oak nest/roost recovery	Pine-oak recovery	Critical habitat
MSO 1	395		918			1,313
MSO 2	9		2			11
MSO 3		104				104
MSO 4			22			22
MSO 5			45			45
MSO 6			69			69
MSO 7	71			337		408
MSO 8	10			40		50
MSO 9				27		27
MSO 10				146		146
MSO 11					3,360	2,716
MSO 12					257	257
MSO 13					176	176
MSO 14					542	405
MSO 15	84					84
MSO 16	1					1
MSO 17	344		151		15	509
Total	914	104	1,207	550	4,350	6,343

Protected Habitat

A total of 915 acres of the 1,018-acre PAC will be thinned. Of that total, 107 acres will be thinned using conventional methods, 393 acres will be thinned using steep slope mechanical equipment, 333 acres will be thinned using helicopters, and 12 acres will be thinned with “no mechanical” means such as hand crews.

Seven prescriptions (MSO 1, 2, 3, 7, 8, 15, 16, and 17) will be used in protected habitat. Outside of the core area, trees 1 to 18 inches dbh will be thinned with the majority of the trees removed being less than 12 inches dbh. Twenty acres that currently meet nesting/roosting characteristics will be treated using the MSO 2 and 8 prescriptions. The 20 acres are on the edge of the helicopter and steep slope treatment boundaries and will be deferred from helicopter logging.

Approximately 344 acres within the Arizona bugbane conservation area will be treated under the MSO 17 prescription. The 344 acres contain several presettlement patches and are within helicopter, steep slope, and conventional treatment areas. The presettlement patches within the helicopter unit will be treated with patch cuts to avoid effects to snags. In helicopter units outside of the presettlement patches, removal of snags will occur at the lower end of the minimum amount required by the Forest Plan. The remaining PAC acres will be treated with either conventional or steep slope treatments, and existing snags that are not a safety concern will be retained. Some, particularly smaller, snags will be lost during prescribed fire.

Approximately 466 acres of mixed conifer or ponderosa pine/oak stands in protected habitat do not currently meet nest/roost habitat structure. Those 466 acres will be treated under the MSO 1 and 7 prescriptions. Presettlement patches will be treated to retain higher basal area and openings around the patches. Most of the areas will be treated with either conventional or steep slope treatments, but a few areas are proposed for helicopter logging. The effects of helicopter logging described above will occur within and outside presettlement patches.

Approximately 85 acres are neither mixed conifer nor pine-oak and will be treated with the MSO 15 and 16 prescriptions. The 103-acre core area will receive only prescribed fire only when conditions allow for low-intensity fire.

Nest/Roost Replacement Recovery Habitat

Thinning will occur in 1,207 acres of mixed conifer nest/roost, 549 acres of pine-oak nest/roost, and 4,349 acres of pine-oak, recovery habitat with the MSO 1, 2, 4, 5, and 6 prescriptions. Conventional methods will be used to treat 204 acres of mixed conifer nest/roost and 155 acres of pine-oak nest/roost habitat. Steep slope mechanical equipment will be used to treat 703 acres of mixed conifer nest/roost and 347 acres of pine-oak nest/roost habitat. Helicopters will be used for thinning of 265 acres of mixed conifer nest/roost 32 acres of pine-oak nest/roost habitat. Thinning with non-mechanical means such as hand crews with chainsaws will occur on 35 acres of mixed conifer nest/roost recovery habitat. Trees from 1 inch to 18 inches dbh will be thinned with the majority of the trees removed being less than 12 inches dbh.

There are 23 acres of mixed-conifer nest/roost recovery habitat that currently meet minimum nest/roost characteristics. Those 23 acres will be treated with the MSO 2 and 5 prescriptions.

Approximately 1,184 acres of mixed conifer do not currently meet nest/roost habitat structure. Those 1,184 acres will be treated with the MSO 1, 4, 6, and 17 prescriptions.

There are 40 acres of pine-oak nest/roost recovery habitat that currently meet minimum nest/roost characteristics. Those 40 acres will be treated with the MSO 8 prescription. Approximately 510 acres of pine-oak do not currently meet nest/roost habitat structure. Those 510 acres will be treated with the MSO 7, 9, and 10 prescriptions.

Helicopters will be used to remove material from 312 acres (approximately 18 percent of the total nest/roost recovery habitat in the project area). Patch cuts will be used in the helicopter units to avoid effects to snags. In helicopter units outside of nest/roost recovery, removal of snags will occur down to the lower end of the minimum amount required by the Forest Plan.

The remaining 1,444 acres will be treated with conventional thinning (359 acres), steep slope mechanical (1,050 acres), and “no mechanical” (35 acres). Existing snags that are not a safety concern will be retained, but some, particularly smaller, snags will be lost due to prescribed fire.

Other Recovery Habitat

Thinning will occur in 4,349 acres of pine-oak. The MSO 11 through 14 prescriptions will be used in pine-oak recovery habitat. Conventional methods will be used to treat 4,181 acres of pine-oak recovery habitat. Helicopters will be used for thinning 88 acres of pine oak recovery habitat. Trees from 1 inch to 24 inches dbh will be thinned with the majority of the trees removed being less than 12 inches dbh. The MSO 11 prescription will be used on 77 percent of the habitat that will be treated. The prescription will maintain/promote 40 percent shading and develop uneven-aged structure with a mosaic of openings and tree groups of varying sizes.

Construction of up to 15 miles of new roads in the project area includes 0.2 mile of road (2 acres) in nest/roost recovery habitat, and 7.5 miles of road (60 acres) in pine-oak recovery habitat. Temporary road construction on 0.1 mile of road (1 acre) in protected habitat and 5 miles of road (40 acres) in pine-oak recovery habitat will occur. The temporary roads will be obliterated after use.

Treatments in Mexican spotted owl habitat

A diversity of patch sizes will be created in Mexican spotted owl habitat, with a minimum patch size of 2.5 acres (BA). Pre-settlement patches are dense forest patches dominated by old large diameter trees. A total of 281 acres of pre-settlement patches that are greater than two acres in size were identified within and adjacent to the Bill Williams PAC. The patches will be maintained and managed to provide nest and roost habitat for the Mexican spotted owl. Vertical diversity of smaller trees will occur within canopy openings and under residual trees. Patches dominated by pre-settlement trees will be thinned from below and create canopy openings either by removing a single mature tree or by opening to approximately 0.10 acre in size. A diversity of age/size classes will be maintained within those patches. The specific number of patches and canopy openings and their sizes has not been determined.

Areas outside of the patches will represent more open space than in the patches. Gaps will be formed in areas that lack pre-settlement and 24 inch dbh trees and contain surpluses of trees less than 18 inches dbh. More young (less than 5 inches dbh), intermediate (5 to 9 inches dbh), and suppressed trees will be retained in areas of lower fire hazard. Silvicultural prescriptions will meet the minimum canopy cover recommended (40 percent in pine-oak and 60 percent in mixed conifer). Silvicultural prescriptions will be designed to promote a diversity of tree sizes with a goal of having trees greater than 16 inches dbh contributing more than 50 percent of the stand basal area. All of the mixed conifer outside of the PAC will be managed for nest/roost replacement recovery habitat for the Mexican spotted owl.

Initial treatments will be thinning followed by prescribed broadcast burning. Trees up to 24 inches dbh will be removed with the majority being trees less than 12 inches DBH on 10,691 acres of Mexican spotted owl recovery habitat and critical habitat. Trees up to 18 inches dbh will be removed with the majority being trees less than 12 inches dbh on 2,671 acres of Mexican spotted owl protected and nest/roost replacement recovery habitat. After thinning, slash will be machine and rough piled and burned, or lopped and scattered and burned depending on concentrations. Maintenance burning will occur at intervals of 3 to 15 years for up to 40 years.

Conventional Thinning (hand thinning or mechanical equipment)

Ground-based conventional thinning will occur on 11,110 acres and remove 310,800 tons of timber. Conventional treatment methods will occur in 177 acres of the Bill Williams PAC, and 204 acres of mixed conifer and 155 acres of pine-oak in nest/roost replacement recovery habitat. Trees up to 18 inches dbh will be removed with the majority being trees less than 12 inches dbh on 530 acres. In pine-oak recovery habitat, trees up to 24 inches dbh will be removed with the majority being trees less than 12 inches dbh on 4,181 acres.

Step Slope Mechanical Thinning

Step slope ground-based thinning using steep slope harvester/forwarders to remove material will occur on 2,400 acres and remove 43,200 tons of timber. The method will be conducted in 393 acres of the PAC, 703 acres of mixed conifer, and 347 acres of pine-oak in nest/roost replacement recovery habitat. In protected and nest/roost replacement recovery habitat, trees up to 18 inches dbh will be removed with the majority being trees less than 12 inches dbh on 1,443 acres. In pine-oak recovery habitat, trees up to 24 inches dbh will be removed with the majority being trees less than 12 inches dbh on 80 acres. The only snags that will be removed will be those that pose an immediate safety risk for operators or snags that cannot be avoided in the forwarder route.

Helicopters to Remove Materials

Helicopters will be used to remove 19,080 tons of timber from 1,060 acres. Using helicopters will result in the removal of snags in 333 acres of the PAC, 265 acres of mixed conifer nest/roost replacement recovery habitat, 32 acres of pine-oak nest/roost replacement recovery habitat, and 88 acres of pine-oak recovery habitat. In 630 acres of protected and nest/roost replacement recovery habitat, trees up to 18 inches dbh will be removed with the majority being trees less than 12 inches dbh. In 88 acres of pine-oak MSO recovery habitat, trees up to 24 inches dbh

will be removed with the majority being trees less than 12 inches dbh. Patch cuts may be used to avoid effects to snags in some areas. Areas with many snags may be deferred from treatment when operator safety is not at risk. Flights in the Mexican spotted owl protected activity center (PAC) and within 0.25 mile of the PAC will occur outside of the Mexican spotted owl breeding season (March 1 through August 31).

Thinning Without Mechanical Equipment

Hand thinning will occur in the PAC and within 0.25 mile of the PAC outside of the Mexican spotted owl breeding season (March 1 through August 31). The areas selected for treatment are sparsely vegetated with very few of the key habitat components of Mexican spotted owl habitat. Thinning without the use of mechanized equipment (i.e., hand thinning with chain-saws) will occur in 12 acres of the PAC and 35 acres of mixed conifer nest/roost replacement recovery habitat. In 47 acres of protected and nest/roost replacement recovery habitat, trees up to 18 inches dbh will be removed, with the majority being trees less than 12 inches dbh.

Bill Williams PAC Core Area

No thinning will occur in the core area. Prescribed fire will occur in the core area if the prescription can meet low intensity fire behavior and low severity fire effects using cool season burns.

Fuel Breaks

Approximately 2,500 acres of fuel breaks will result in the removal of snags and large trees (BA). Fuel breaks will be placed in approximately 359 acres in the PAC and 1,222 acres in Mexican spotted owl recovery habitat. Fuel break treatments will reduce surface, ladder, and canopy fuels up to 300 feet along both sides of control lines. Treatments will be conducted with hand-felling techniques. Trees greater than 18 inches dbh in the PAC and nest/roost replacement recovery habitat and trees greater than 24 inches dbh in other Mexican spotted owl recovery habitat will not be targeted and will be conserved wherever possible. A few large snags may be removed.

Summary of effects from thinning including strategic fuel breaks

The goal of mechanical thinning and prescribed burning in Mexican spotted owl protected and 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 of trees with little understory that occurs in the project area. Treatments in owl habitat will focus on the removal of small to mid-sized trees (<9 to 18 inches dbh), although some larger trees will also be removed, depending on the treatment method. The prescriptions incorporate the desired conditions of Mexican spotted owl habitat, consistent with the Recovery Plan. Over time, the treatments are expected to promote the growth, resiliency, and retention of larger mixed conifer, 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.

Table 6 illustrates the modeled before and after conditions of Mexican spotted owl key habitat components in the various habitat categories (Addendum). We recognize that to meet the purpose and need for the project, there will be significant variation in the key habitat components in stands of Mexican spotted owl habitat that will be treated. While the proposed action is 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 the project. The project activities will affect the structure and function of Mexican spotted owl habitat over the short term, and therefore affect the breeding, feeding, and sheltering of Mexican spotted owls in the project area.

Table 6. Existing and modeled post-treatment Mexican spotted owl key habitat components. The top figure in each cell is an average, the middle figure is the standard deviation, and the bottom figure is the range. Numbers for 2033 are the modeled averages.

<i>Year</i>	<i>Basal area (BA)</i>	<i>% of BA by trees 12-18" dbh</i>	<i>% of BA by trees 18" + dbh</i>	<i>Trees per acre 18" + dbh</i>	<i>Snags 18" + dbh</i>	<i>Snags 12" + dbh</i>	<i>Logs 12" +</i>	<i>% Shade</i>
Protected Habitat excluding PAC Core Area (915 acres)								
Existing	163	32	26	15	3.6	17.8	26	72
	44	15	15	11	2.6	11.5	45	7.6
	70-247	8-58	0-53	0-39	0-10.9	0.08-45.24	0-106	51-83
After First Year	131	33	33	16	3.4	15.8	12	67
	45	19	19	10	2.4	10	19	11
	29-203	7-90	0-67	0-39	0-10	0.46-39.61	0-70	28-82
2033	118	34	41	18	2.3	4.9	22	64
Mixed Conifer Nest/Roost Recovery Habitat (1,207 acres)								
Existing	149	26	20	10	2.6	11.9	14	70
	43	19	11	6	1.5	5.3	6	9
	66-199	5-57	0-43	0-51	0.15-4.42	1.85-17.19	0-19	50-88
After First Year	123	27	25	10	2.4	10.9	6	65
	47	21	17	12	1.3	4.7	3	10
	55-199	6-58	0-62	0-51	0.12-4.16	1.55-15.53	0-9	45-78
2033	77	29	45	13	2.6	6.1	17	53
Pine-Oak Nest/Roost Recovery Habitat (549 acres)								
Existing	Pine:							
	144	28	15	9	2	8.4	6	69
	85	12	17	14	1.05	4.1	23	13
	86-218	18-56	0-54	0-51	0-2.68	0.28-11.34	0-69	56-88
	Oak:							
	14							
	12							
	0-32							
After First Year	Pine:							
	112	20	30	9	1.9	8.1	3	63
	40	15	21	12	1.03	3.7	10.3	8
	81-155	15-54	0-72	0-43	0-10	0.28-10.33	0-30	55-78

	Oak: 14 12 0-32							
2033	Pine: 100 Oak: 18	31	29	13	1.1	5.4	9	60

Pine-Oak Recovery Habitat (4,349 acres)

Existing	Pine: 163 44 70-247 Oak: 14 13 0-39	36 15 5-62	17 13 0-54	8 6 0-26	0.5 0.76 0-4.05	2.9 2.03 0.03-10.89	13 18 0-72	65 9 24-86
After First Year	Pine: 131 45 29-203 Oak: 14 13 0-39	37 17 3-54	26 17 0-72	7 5.7 0-43	0.5 0.73 0-3.94	2.8 1.96 0-10.33	6 7.9 0-31.16	54 9.34 25-88
2033	Pine: 73 Oak: 12	34	45	12	0.7	3.5	7	52

Although the entire project area will not be treated at one time, the removal of large amounts of material in a short period of time will result in modification of habitat characteristics including: patch size, horizontal and vertical diversity within patches, tree species diversity, composition of herbaceous and shrub species, opening size, and reduction of canopy cover from 100 percent in much of the project area to 40 percent in pine-oak and 60 percent in mixed conifer habitat (BA). Thinning will modify Mexican spotted owl habitat structure by reducing snags, downed logs, woody debris, multi-storied canopies, and dense canopy cover. Thinning may also modify the structure of prey habitat, which will affect the abundance and composition of prey species. Empirical models of factors that influence availability of five common Mexican spotted owl prey species indicate that microhabitat manipulation can influence abundance of the Mexican vole, followed by the long-tailed vole, Mexican woodrat, deer mouse and lastly the brush mouse (Ward 2001). Ward (2001) found that the total available biomass of mice and voles provided the strongest correlation with reproductive output. Model results indicated that abundance of the two vole species could be influenced by manipulating grass-forb height, whereas abundance of Mexican woodrats, the preferred prey, might be influenced by promoting shrub diversity and increasing large log cover.

We expect both beneficial and short-term adverse effects to occur to habitat from implementation of the proposed action as structure and composition of the forest is modified within the PAC, nest/roost habitat, and restricted/recovery habitat. However, we do not know how treatments that increase openings, modify patch size and location, and create other changes will influence owl use (foraging and dispersal as well as nesting and roosting) over time.

Road Construction, Transportation, and Maintenance

Maintaining, using, and constructing a transportation system to move people, equipment, and forest products will result in effects to Mexican spotted 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 displacement of prey.

Road construction will result in additional areas that will be affected by compaction and exposure of bare mineral soil. Construction of new roads will occur on 0.2 mile (1.6 acres) of Mexican spotted owl nest/roost replacement recovery habitat and 7.5 miles (60 acres) of pine-oak recovery habitat. Temporary road construction will occur on 0.1 mile (0.8 acre) of protected habitat and 5 miles (40 acres) in pine-oak recovery habitat. Road construction will remove key habitat components such as large trees, snags, and down logs in 61.6 acres in recovery habitat. No temporary roads will be constructed in the PAC core area.

Landings, road construction, road obliteration, and other harvest activities could adversely affect Mexican spotted owl habitat. Compaction, rutting, exposure of bare mineral soil, and loss of vegetation can occur. The Kaibab National Forest estimated the amount of ground disturbance by harvesting type in Arizona ponderosa pine forest on slopes less than 40 percent (BA). Typical equipment includes rubber-tired feller bunchers and rubber-tired skidders with tracked dozers used for piling of slash. The amount of disturbance (compaction, rutting, and/or exposure of bare mineral soil) in a typical harvest unit was estimated to be approximately eight percent associated with feller-buncher and skidding operations, three percent associated with machine piling of slash, three percent associated with landings, and three percent associated with temporary roads. Using helicopters to remove material would mostly avoid ground disturbance from heavy machinery on steep slopes, and thus would generally prevent compaction, rutting, and/or exposure to bare mineral soil. However, helicopter operations will require the use of landings where trees are processed and bundled for transport.

Of the 4,717 acres of Mexican spotted owl habitat to be treated with ground-based conventional methods, approximately 177 acres are protected habitat and 4,540 acres are recovery habitat. Approximately 660 acres (14 percent) will be affected by compaction, rutting, and/or exposure of bare mineral soil. Of the 1,523 acres Mexican spotted owl habitat to be treated with steep slope mechanized equipment, approximately 393 acres are protected and 1,130 acres are recovery habitat. Approximately 109 acres (14 percent) will be affected by compaction, rutting, and/or exposure of bare mineral soil.

Noise associated with hauling could disturb nesting owls. Most hauling activity will occur during day time hours, but trucks may operate at times when owls are active. Main haul routes within 0.25 mile of the PAC include Forest Service (FS) roads FS 45 (Bixler Saddle Road), FS

111 (Bill Williams Mountain Road), and a temporary road by the ski area on the eastern edge of the PAC. FS 45 is adjacent to the PAC and is within 0.25 mile of the core area, and there is potential for vehicle-related disturbance to nesting owls. That road will be used as a haul route for up to 3 consecutive seasons. If product material from the Bixler Basin area cannot be removed in three consecutive seasons, then seasonal restrictions will limit hauling to outside of the Mexican spotted owl breeding season (Williams Ranger District undated). Timber hauling may occur beyond 0.25 mile of the core area and PAC during the breeding season.

The proposed action will treat 470 acres that equate to an approximate maximum of 431 truckloads of logs that will be transported adjacent to the core area. Approximately 87 truckloads will be transported on FS 111, and 198 truckloads will be transported on the temporary road by the ski area. The transportation will occur consistently (more than twice per hour) for an extended period of time (more than one hour) and could influence reproductive success if owls are nesting in those locations.

Based on a normal operating season of April 15 through November 30 (150-210 days) and assuming mechanical treatment will occur on eight acres per day, implementation of the proposed action may require 5 to 10 years. However, most of the implementation will not occur in or near the PAC.

We also assessed the potential for collisions with owls due to the road traffic and hauling activity. The risk of collisions extends beyond where owls nest and roost, and also includes all areas they could be foraging, seasonally migrating, or dispersing through. 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. 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. The BA includes a conservation measure that states that speeds will be restricted to 15 miles per hour or less along haul routes within 0.25 mile of the PAC. This measure, combined with the comparatively low number of ground haul trips associated with the project and near the PAC, we conclude that owl-vehicle collisions are unlikely to occur.

Prescribed Fire

Prescribed fire will be conducted on approximately 15,146 acres of the project area. Prescribed fire is included in all Mexican spotted owl prescriptions except MSO 6 and 10 (Table 4) and will occur mainly in combination with other treatment methods (Table 2).

Fireline preparation will remove ladder fuels and reduce small understory trees (BA). The majority of trees to be removed will be 1 to 6 inches dbh. Fireline preparation may remove up to 75 percent of those pole-size trees. Post-fireline preparation tree density may range from 35 to 100 pole-size trees per acre. Trees greater than 18 inches dbh will not be removed unless they compromise firefighter safety. Very few large trees will need to be removed and current numbers per acre are not expected to change significantly. Snags will be protected unless the snag poses a risk to firefighter safety. Little change in ground layer plant species richness and cover in Mexican spotted owl habitat is expected from fireline preparation. Slight decreases in plant cover and slight increases in species richness may occur.

During broadcast burning activities, torching may occur, which is expected to create small openings of less than an acre in size. Broadcast burning will decrease coarse woody debris in protected and recovery habitat, and residual amounts will range from 8 to 19 tons per acre in mixed conifer and pine-oak habitat. Burning will modify vegetation. Reducing woody debris due to broadcast burning may decrease prey abundance on a short term basis (Jenness 2000).

Smoke from burning may temporarily disturb Mexican spotted owls. Prescribed fire will be managed to minimize the accumulation of smoke in the PAC during the breeding season. Smoke effects will be reduced through consideration of coordination, timing, type of burning, wind direction, topography, time of year, and distance to the PAC. Prescribed fire will not occur in the PAC core area March 1 through August 31, and burning will also be restricted during the Mexican spotted owl breeding season in areas that may create smoke impacts to the PAC and core area.

Effects from prescribed fire in recovery and PAC habitats are difficult to quantify due to the uncertainty inherent in prescribed fire. 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 those 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 National Forests. 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.
- Smaller snag (<9 inches dbh) densities increased 30 to 60 percent.

Coconino National Forest 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 21 percent loss of snags (based on a pre-treatment count), a 71 percent 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.

In summary, prescribed fire 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 recovery habitat and within PACs. 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.

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 the PAC in the project area. However, burning in the PAC and in a 0.25 mile buffer around the PAC will occur outside the Mexican spotted owl breeding season, which should reduce the effects of smoke on nesting birds and fledglings.

Disturbance

There are a number of studies that have attempted 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. (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 that perhaps the cost of an adult spotted owl fleeing during the nestling period may be higher than during the post-fledgling period.

Noise disturbance may be caused by activities including helicopters to remove material, thinning and burning, road construction, road maintenance, hauling of logs, and road rehabilitation in and adjacent to Mexican spotted owl habitat. No mechanical treatments will occur within the core area, and almost all treatment methods (thinning and burning) will occur outside of the Mexican spotted owl breeding season in the PAC and within a 0.25 mile buffer around the PAC. The exception is that project material produced outside of the PAC will be transported on FS 45 (Bixler Saddle Road) within 0.25 mile of, and adjacent to, the PAC core area (see the Road Construction, Transportation, and Maintenance section above) for up to three consecutive seasons (Addendum). All other project activities within the PAC and the buffer area will occur outside of the breeding season. Even if most actions do not occur within the PAC during the breeding season, project-related noise adjacent to and within 0.25 mile of the PAC could affect owls during the breeding season. Such activity could result in disturbance to breeding owls, interfering with nesting and foraging activities pre- and post-fledging.

Summary

The Bill Williams Restoration Project includes measures to protect the Mexican spotted owl and its habitat by deferring management activities in core areas and the PAC during the breeding season, planning for low severity fire effects in the PAC, and attempting to avoid breeding season disturbance to Mexican spotted owls from most project activities. However, the project has the potential to negatively affect the Mexican spotted owl and its habitat. There will likely be short-term disturbance to breeding owls and some loss of key habitat components (large trees, snags, and logs), although we also expect benefits to the owl through habitat enhancement over the long-term and reduced fire risk.

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 the Bill Williams Restoration Project. The PCEs for steep-walled rocky canyonlands are not analyzed in this BO because that habitat does not occur within the action area.

The BA stated that there were 6,342 acres of critical habitat in the project area. The Addendum corrected this total to 6,100 acres: 3,568 acres are pine-oak other recovery habitat, 549 acres are pine-oak nest/roost replacement recovery habitat, 1,207 acres are mixed conifer nest/roost

replacement recovery habitat, 766 acres are mixed conifer in the PAC, and 10 acres are pine-oak habitat in the PAC. All of the 6,100 acres of Mexican spotted owl critical habitat within the treatment area are proposed for treatment. Within that total acreage, 2,378 acres will be thinned using conventional methods, 2,376 acres will be thinned using steep slope mechanical treatment, 969 acres will have material removed by helicopter, and 397 acres will be thinned without mechanical equipment (hand thinning). The initial proposed treatments consist of thinning followed by prescribed broadcast burning. Trees up to 24 inches dbh will be thinned with the majority being trees less than 12 inches dbh on 3,429 acres in critical habitat and recovery habitat that overlaps with UGM-13. Trees up to 18 inches dbh will be thinned with the majority being trees less than 12 inches dbh on 2,671 acres in Mexican spotted owl protected and nest/roost replacement recovery habitat that overlaps with UGM-13.

Thinning will modify critical habitat structure including snags, downed logs, woody debris, multi-storied canopies, and dense canopy cover. The removal of large amounts of material in a short period of time will modify overall habitat condition through patch size alteration, changes in horizontal and vertical diversity within patches, changes in tree species diversity, changes to the composition of herbaceous and shrub species, changes to opening sizes, and reduction of dense canopy cover. Conservation measures require protection of large oaks, large conifers, large snags, and large woody debris at recommended levels in the Kaibab Forest Plan and Mexican spotted owl Recovery Plan (BA). Conservation measures also require a canopy cover that maintains 40 percent or more ground shading in Mexican spotted owl critical habitat in areas where that PCE is available.

Construction of 15 miles of new roads may increase sedimentation and watershed degradation, with permanent loss of PCEs on 7.7 miles of road within Mexican spotted owl critical habitat. Construction of 5 miles of temporary road in critical habitat will result in similar effects, and restoration of PCEs in these areas will require many years. Obliteration of 23 miles of existing poorly-placed roads should result in some improvement of critical habitat condition by reducing erosion and sedimentation. A total of 14.55 percent of critical habitat in the project area could be affected by compaction, rutting, and/or exposure to bare mineral soil (Addendum).

Prescribed fire will reduce the amount of small-to-medium fuels. The prescribed fire prescription only allows for low intensity fire that may create a mosaic of burned and unburned areas. Wetter north-facing slopes will have flame lengths averaging no more than one foot. Conservation measures require protection of large Gambel oaks, large conifers, large snags, and large woody debris at recommended levels.

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.

The proposed action will create openings; retain some large, uneven-aged patches dominated by trees greater than 18 inches dbh; and retain pre-settlement trees (30 percent to 45 percent of which are large trees with dbh of 12 inches or more). If present, more than 30 percent of mixed conifer and pine-oak trees greater than 12 inches dbh will be retained, and most trees equal to or

greater than 18" dbh will be retained (Table 6). If not present, the prescription will be designed to meet the desired condition. Removal of some trees greater than 24 inches dbh during thinning operations and as a result of road construction may reduce this PCE, but this removal is expected to be small. Prescribed fire is likely to reduce the amount of oaks, snags, and large logs, and will burn out patches with large trees. However, 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 will not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by owls. Therefore, the function and conservation role of this PCE will not be compromised by the proposed action.

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

Thinning and road construction will reduce the shade canopy, but shade will be maintained above 40 percent across the project area in critical habitat. We also do not expect that prescribed fire, as proposed, will reduce the shade canopy below 40 percent in areas where that level currently exists. Further, we expect that some reduction in existing canopy cover (which is currently up to 100 percent in many parts of the project area) may 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.

Snags will be reduced over approximately 3,470 acres of critical habitat as a result of removal of material by helicopter and construction of fuel breaks and roads. Snags could be both created and lost following proposed prescribed burning (Horton and Mannan 1988, Randall-Parker and Miller 2002) as both large and small trees are killed through prescribed burning. This may improve this PCE to the benefit of Mexican spotted owls, and particularly their prey species, as most snags created through 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, which tend to be limited in ponderosa pine and mixed conifer forests in northern Arizona (Ganey and Vojta 2004). Although we anticipate there will be a measurable loss of snags due to implementation of the proposed action, efforts to protect this rare resource will be made to minimize the loss, and the function and conservation role of the PCE will 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.

Thinning and prescribed fire will modify the structure of Mexican spotted owl prey habitat, which will affect the abundance and composition of prey species. Some coarse woody debris will also be removed for road construction in critical habitat. Prescribed fire will decrease fallen trees and coarse woody debris, and even low intensity prescribed fire will consume large logs and could burn out patches with large trees in critical habitat. Research and monitoring indicate that prescribed fire 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. Reducing woody debris will decrease prey abundance for approximately one year in these units (Jenness 2000). 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. Based on current conditions, there is an excess supply of coarse woody debris across the project area due to the exclusion of frequent, low-severity fire. Therefore, some removal of woody debris would result in an overall benefit to the function and conservation role of this PCE over the long-term.

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

Although thinning will not remove Gambel oak, there will be some loss of these trees during logging operations, prescribed fire, and road construction and maintenance. However, we expect that across the project area, this PCE will be positively affected by the actions taken under the proposed action. Plant species richness should increase following thinning and/or fire treatments that result in small, localized canopy gaps.

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

Thinning, road construction, and prescribed fire will cause localized reductions in herbaceous plant cover. Short-term decreases in plant cover will result from thinning operations, road construction, and prescribed fire, with long-term loss along permanent road corridors. Although there will be some short and long-term reduction in herbaceous plant cover, we do not expect that post-treatment, cover will be reduced below a level that is adequate to maintain fruits and seeds and allow plant regeneration.

We expect long-term increases in residual plant cover because both fire treatments and thinning will provide conditions suitable for increased herbaceous plant growth by reducing canopy cover and removing a thick layer of dead plant debris within burned areas. Prescribed fire will create a mosaic effect of burned and unburned areas and will open up small patches of forest within critical habitat; we expect this will increase herbaceous plant species diversity and density (Jameson 1967, Moore et al. 1999, Springer et al. 2001) and, in turn, assist in the production and maintenance of Mexican spotted owl prey. The combination of low-intensity prescribed fire and thinning would most likely result in only short-term effects to prey habitat. In frequent-fire landscapes, herbaceous understory response and plant regeneration tends to be positive following tree removal and prescribed fire (Springer et al. 2001). The function and conservation role of the PCE across the project area will 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 Bill Williams Mountain Restoration 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 project includes objectives and species protection measures in accordance with the Recovery Plan. These actions were identified by the Recovery Team as being necessary to recover the Mexican spotted owl, and the project will implement these actions in designated critical habitat.

Designated critical habitat includes all protected (PACs) and replacement/recovery habitat (unoccupied spotted owl habitat) within CHUs. These actions include the following:

- The Kaibab National Forest 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 Kaibab National Forest has identified and is managing mixed conifer and pine-oak stands 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 Kaibab National Forest'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 proposed Bill Williams Mountain Restoration 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.

The main non-Federal activities that may affect the Mexican spotted owl are loss of habitat through development of private inholdings and related disturbance at those properties, and disturbance from recreational activities such as camping, hiking, biking, and skiing. 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.

Climate change, in combination with drought cycles, is likely to exacerbate existing threats to the Mexican spotted owl. 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.

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

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 proposed Bill Williams Mountain Restoration 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 Bill Williams Mountain Restoration Project will strive to implement the Recovery Plan (USDI FWS 2012) and manage for Mexican spotted owl recovery on the Kaibab National Forest.
2. Desired conditions and guidelines in the Bill Williams Mountain Restoration Project recognize the need to reduce the potential for landscape level, stand-replacing fire in forests that the Mexican spotted owl occupies. These efforts to improve forest condition and sustainability should reduce the risk of high severity fire across large areas 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, UGM-13 CHU affected by the 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

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).

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 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.

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 proposed Bill Williams Mountain Restoration Project. Our anticipation of incidental take is based on the project activities related to thinning operations, logging trucks, and prescribed burning that will result in habitat modification and disturbance of resident owls.

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 the Bill Williams PAC 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 the PAC 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 the project are 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 the PAC are harassed over the course of more than three breeding seasons.

This incidental take tiers to (is included within) the amount of take anticipated under the 2013 BO for the Kaibab National Forest Land and Resource Management Plan. Under the 2013 BO for the Kaibab National Forest Land and Resource Management Plan, we anticipated incidental in the form of harassment of owls associated with no more than one PAC per year due to a single or short-term disturbance, and harm and/or harassment of owls associated with one PAC due to long-term or chronic disturbance, or habitat degradation or loss over the life of the 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 one PAC with anticipated take from mechanical thinning and burning actions to be implemented under the

project 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 Bill Williams Mountain Restoration Project.
2. Minimize adverse effects to Mexican spotted owl habitat affected by the Bill Williams Mountain Restoration Project.
3. Monitor the impacts of mechanical thinning, prescribed burning, and associated actions to the Mexican spotted owl affected by the Bill Williams Mountain Restoration 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 Consistent with term and condition 1.1 in the 2013 BO for the Kaibab National Forest Land and Resource Management Plan, the Kaibab National Forest 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, then this restriction may not apply.
- 1.2 Forest Service management activities within the PAC and recovery habitat shall be coordinated and implemented to reduce potential disturbance to Mexican spotted owls.
- 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 Kaibab National Forest. 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 the PAC and 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 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.
- 3.2 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 1 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 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 MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the FWS. The BGEPA prohibits anyone, without a FWS permit, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you think migratory birds and/or eagles will be affected by this project, we recommend seeking our Technical Assistance to identify available conservation measures that you may be able to incorporate into your project.

For more information regarding the MBTA and BGEPA, please visit the following websites. More information on the MBTA and available permits can be retrieved from <http://www.fws.gov/migratorybirds> and <http://www.fws.gov/migratorybirds/mbpermits.html>. For information on protections for bald eagles, please refer to the FWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) published in the Federal Register on June 5, 2007 (<http://www.fws.gov/southwest/es/arizona/BaldEagle.htm>), as well at the Conservation Assessment and Strategy for the Bald Eagle in Arizona (SWBEMC.org).

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. 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 Kaibab National Forest that protect 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 Bill Austin (928-556-2012) or Shaula Hedwall (928-556-2118). Please refer to the consultation number, 22410-2011-F-0233, in future correspondence concerning this project.

Sincerely,



 Steven L. Spangle
Field Supervisor

cc (electronic):

Shaula Hedwall, Fish and Wildlife Service, Flagstaff, AZ
District Ranger, Williams Ranger District, Kaibab National Forest, Williams, AZ
Forest Biologist, Kaibab National Forest, Williams, AZ
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Flagstaff, AZ
Director, Aha Makav Cultural Society, Fort Mojave Indian Tribe, Mohave Valley, AZ
Tribal Secretary, Havasupai Tribe, Supai, AZ
Director, Hopi Cultural Preservation Office, Kykotsmovi, AZ
Program Manager, Tribal Historic Preservation Office, Hualapai Tribe, Peach Springs, AZ

Director, Apache Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ
Director, Yavapai Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ
Director, Cultural Research Program, Yavapai-Prescott Indian Tribe, Prescott, AZ
Director, Zuni Heritage and Historic Preservation Office, Zuni, NM
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