2-21-98-F-246

BIOLOGICAL OPINION SUMMARY
Kaibab National Forest Prescribed Natural Fire Program

Date of opinion: April 30, 1999

Action agency: U.S. Forest Service

Project: Kaibab National Forest Prescribed Natural Fire Plan

Location: Kaibab National Forest

Listed species affected: The threatened Mexican spotted owl (*Strix occidentalis lucida*)

Biological opinion: Non-jeopardy

Incidental take statement:

Level of take anticipated: A) One MSO or one pair and/or associated eggs/juveniles in the form of direct mortality; B) Harm and harassment of MSO located in up to two protected activity centers (PACs) per year; C) Harm and harassment of MSO and habitat modification of 700 acres of restricted and protected MSO habitat per year caused by PNF for which adequate surveys have not been conducted, and; D) Harm and harassment of MSO and habitat modification of up to one PAC and 700 acres of restricted and protected MSO habitat caused by wildfire as an indirect result of PNF during the life of the Plan. Incidental take as described in items B, C, and D will only be tallied and reported in the MSO baseline if and when it occurs. Exceeding this level would require reinitiation of formal consultation.

Reasonable and prudent measures: The biological opinion presents four measures for assisting in the reduction of incidental take: 1) The Forest Service will implement the proposed actions in a manner that minimizes adverse effects to MSO and occupied or potentially occupied MSO nest/roost habitat; 2) Personnel education/information programs and well-defined operational procedures shall be implemented; 3) If fire suppression is initiated, suppression activities shall be carried out in a manner to reduce potential adverse effects to the MSO and its habitat, unless such actions would threaten life or property, and; 4) The Forest shall document all actions, report incidental take, and monitor the effects of the proposed action on habitat. These findings shall be reported to the Service. Implementation of these measures through the terms and conditions are mandatory.

Terms and conditions: Twenty-three mandatory terms and conditions are included to implement the reasonable and prudent measures. The terms and conditions require that the Forest Service minimizes adverse effects of PNF actions on MSO protected and restricted habitat in various ways, provides upper size limits for acres of MSO habitat affected by any

type of fire within the project area, requires a resource advisor to be present during all suppression activities, requires a yearly report from the Forest Service and a yearly meeting with the Service, and requires monitoring.

Conservation recommendations: Three conservation recommendations are provided. These include searching for additional means of funding to conduct MSO surveys, a recommendation to pursue the completion of a forest-wide consultation on wildfire suppression activities, and monitoring the direct effects of fire on PAC nest buffers and individual MSO. Implementation of these conservation recommendations is discretionary.

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In Reply Refer To:
AESO/SE
2-21-98-F-246

April 30, 1999

Ms. Conny J. Frisch
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Ms. Frisch:

The U.S. Fish and Wildlife Service (Service) has reviewed the project proposal for the Kaibab National Forest Prescribed Natural Fire Program. Your May 22, 1998, request for formal consultation was received on May 26, 1998. This document represents the Service's biological opinion on the effects of the proposed action on the Mexican spotted owl (*Strix occidentalis lucida*) (MSO) in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 *et seq.*).

According to the February 2, 1998, biological assessment and evaluation (BAE), the Forest Service has determined that the preferred alternative "may effect, not likely to adversely affect" the MSO. The Service was unable to concur with the Forest Service's determination of effect for the MSO. Because critical habitat for the MSO was revoked (63 FR 14378), no conferencing or consultation is required for critical habitat for this species.

This biological opinion is based on information provided in the February 2, 1998, BAE, the December 1997 environmental assessment (EA), the July 13, 1998, Kaibab Fire Management Plan, and other sources of information. Literature cited in this biological opinion does not represent a complete bibliography of literature available on the MSO or the effects of fire on the species, or other subjects that may have been considered in this opinion. A complete administrative record of this consultation is on file in the Arizona Ecological Services Field Office.

CONSULTATION HISTORY

Informal consultation on the Kaibab National Forest Prescribed Natural Fire program began on February 3, 1998, when the Forest Service provided the BAE and the EA to the Service for review. Informal consultation since that time consisted of several conversations between staffs of

adversely affect the bald eagle and the peregrine falcon.

On February 3, 1999, the Service provided a draft biological opinion for this project to the Forest Service for review. On March 8, 1999, the Forest Service provided comments on the draft biological opinion to the Service.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

In the original proposed project, the Kaibab National Forest (Forest) proposed to authorize the implementation of a Prescribed Natural Fire Plan (Plan) on the North Kaibab (655,074 acres), Tusayan (331,789 acres), and Williams (613,718 acres) Ranger Districts (Kaibab National Forest 1998). Prescribed Natural Fire (PNF) is defined as fire burning under conditions specified in an approved plan but ignited by lightning. During informal consultation and with the request for formal consultation, most of that portion of the North Kaibab Ranger District that contained restricted Mexican spotted owl habitat was withdrawn (182,986 acres) from the project area. The acreage now proposed for the North Kaibab Ranger District totals 472,088 acres.

The low-intensity burning associated with PNF is a tool not currently available on the Kaibab National Forest. A PNF Plan must be developed before this management practice can occur. Kaibab National Forest Plan direction provides for the development of a PNF Plan to allow for the management of naturally occurring ignitions. The Forest Service indicated implementation of this activity is expected to take place within one to two years.

The Forest Service indicated the Plan would allow managers to determine whether ignitions by lightning would be managed to improve resources or if fires should be suppressed. There would be a daily decision-making process that would assess whether wildland fire would continue to be managed or if control through suppression was necessary. The abilities of fire and resource management personnel to project the outcome of fire-related activities through monitoring in an adaptive framework will enable land management agencies to expand the application of prescribed natural fire.

The great increase in the number of small trees during the last century and heavy accumulation of woody vegetation in the forest contribute to an increasing risk of severely damaging wild fires caused by humans or lightning during unfavorable climatic conditions (Kaibab National Forest 1998). The objective of the Plan is to allow the use of prescribed natural fire as a management practice under specific guidelines and favorable climatic conditions.

The use of prescribed natural fire will assist in changing the current situation of infrequent, high-intensity fires, to frequent, low-intensity fires. This will occur by allowing fire to reduce the accumulation of woody debris, duff, and other vegetation. In addition, the re-establishment of

natural fire processes will decrease the risk of ground fires moving from the forest floor to tree canopies by reducing the high density of small sized trees (those less than 9 inches in diameter measured at 4.5 feet above the ground). This fuel ladder condition is especially evident in the ponderosa pine and mixed conifer habitat types where the high number of trees contribute to conditions that result in high-intensity fires.

Ponderosa pine sites inventoried on the North Kaibab Ranger District show substantial growth of white fir and other tree species which normally are susceptible to fire and were once controlled by the occurrence of frequent, low-intensity fires (Kaibab National Forest 1998). The Forest Service indicated that continued fire suppression would eventually lead to the conversion of a substantial portion of the area from pure ponderosa pine to mixed conifer, increasing the amount of heavy fuels and the risk of catastrophic wildfire.

Within the grassland ecosystems, encroachment of both ponderosa pine as well as pinyon pine and junipers, has reduced the amount of grass and forb plants and reduced the overall forage production in these zones. In addition, there is a need to decrease the number of pinyon pine and Utah juniper trees within the woodland ecosystems to increase the density of grass plants and hiding cover these plants provide (Kaibab National Forest 1998).

Specific resource objectives include the following (Kaibab National Forest 1998):

1. Reduce to an acceptable level, the risks and consequences associated with wildfire within the wildland/urban interface as well as heavy fuel accumulations on Forest Service lands adjacent to it.

2. Reduce the intensity and severity of fire behavior.

3. Increase understory forage production and density of perennial grasses, forbs, and browse plants.

4. Maintain grassland ecosystems by controlling encroachment of woodland and conifer tree species.

5. Reduce the potential for infrequent, high-intensity fire which would negatively impact threatened, endangered, and sensitive species habitat.

6. In the mixed conifer habitat type on the North Kaibab Ranger District, reduce the current 30 to 40 tons per acre of down woody material to about 10 tons per acre. This would likely occur over the ten-year implementation period on only about 1000 acres, predominantly on the North Kaibab.

7. Develop more open stands, reduced fuels, and decreased fuel ladders which will allow fires to actively function as an ecological process across the landscape.

With the proposed action (Alternative 1), the Kaibab National Forest would implement a PNF program on the Tusayan, Williams, and a portion of the North Kaibab Ranger Districts. All Federal lands would be available which includes not only wilderness, but also wildland/urban interface, and roadless areas. Approximately 1,417,595 acres would be authorized for PNF activity. The desired condition, by vegetation type, is as follows (Kaibab National Forest 1997).

Grassland communities (201,200 acres or 14 percent) are comprised of several terrestrial ecosystems including fourwing saltbush/needlegrass, western wheatgrass/pinyon pine/juniper species, Arizona fescue/mountain muhly, and *Carex*/bluegrass. The desired range resource values will range from fair to good condition over 75 percent of the area where these units are mapped. Fire will be employed to maintain the control of a variety of invading woodland species. Grasslands maintained in the desired condition hold a great variety of perennial grasses and an abundance of herbaceous production. Dominant species would include western wheatgrass, Arizona fescue, and junegrass with a strong subdominant representation of blue grama. Other species present include spike muhly, squirrel-tail, and side-oats grama as well as forbs such as asters, globemallow, spurge, and buckwheat. Fire behavior characteristics have flame lengths of less than 8 feet and fireline intensity of less than 500 BTU/ft/s. The composition of perennial grasses varies in location with a wide variety of cool and warm season grass. Shrubs are also a key element in these communities. Some tree species such as ponderosa pine, pinyon or juniper will be present but should not be a major component of the flora. These diverse plant communities provide forage for wildlife and domestic livestock (Kaibab National Forest 1997).

Shrubland communities (110,800 acres or 7 percent) include blackbrush/galletta, big sagebrush/blue grama, and mixed browse species including bitterbrush/cliffrose/mountain mahogany. The desired resource conditions include a vigorous resprouting community which is the result of periodic fire which moves through these browse belts. Fire reduces or maintains the encroachment from junipers which is estimated at a current frequency of less than 10 percent. The shrubland or chaparral habitat type contains a variety of age structures with a mixture of brush, grasses, forbs, and shrubs. Decadent plants are replaced with new vigorous growth after periodic fire occurrence. Flame lengths are less than 10 feet with fireline intensity less than 700 BTU/ft/s. Sagebrush communities will be dominated by uneven-aged sagebrush with a mixture of shrubs, forbs, and grasses in the understory. Flame lengths are less than 20 feet and fireline intensity less than 700 BTU/ft/s.

Pinyon/juniper woodlands (588,610 acres or 41 percent) are maintained by fire with age class and structural diversity well represented throughout this habitat type. Homogeneous patches are uncommon. Canopy is open with numerous grasses, shrubs, and forbs. Open and dense areas are mixed across the landscape. Forage to cover ratios will move from the current 10/90 percent to 40/60 percent over the planning period. This represents a shift of roughly 200,000 acres where over 50 trees per acre are found. The desired level is less than 10 trees per acre. Flame lengths are less than 40 feet and fireline intensity is less than 700 BTU/ft/s.

Ponderosa pine comprises 474,325 acres or 33 percent of the project area. Clumps of yellow pine are distributed across the landscape with an understory of grasses, forbs, and shrubs. Interspaces between clumps are comprised of younger aged and variable dense stands of pine. Fire maintains diverse age and structural conditions. Establishment and recruitment of younger trees occurs on seedbeds prepared by frequent fire. Large, mature trees are protected from competition by smaller trees by the occurrence of frequent, low-intensity fires. Invasion of ponderosa pine stands by white fir is curtailed through the use of prescribed burning. Crown fires are non-existent or occur only on scales of less than 15 acres. Flame lengths are less than 4 feet and fireline intensity is less than 100 BTU/ft/s.

Mixed conifer (92,085 acres or 6 percent) communities contain variable stand densities and canopy closures conducive to stand replacement fires on a small spatial scale. Species composition includes white fir, Douglas fir, true firs, limber pine, Engelmann spruce, and blue spruce. On drier, lower elevation sites, stands are open and frequent fires result in flame lengths that are less than 8 feet. Wetter, high elevation sites contain a more closed canopy with groups of even and uneven age stands. These stands experience flame lengths of less than 6 feet under historical weather conditions. Drought years produce flame lengths greater than 10 feet over areas of less than 50 acres with fireline intensity of less than 1000 BTU/ft/s.

The Forest Service indicated, and confirmed in a July 14, 1998, meeting, that the following conservation, protective, and mitigating measures are components of the proposed action (Kaibab National Forest 1998). Included in these measures are conservation actions that address other listed and non-listed species that are not subject to this consultation.

1. Known Mexican spotted owl Protected Activity Centers (PACs) and the associated 100-acre buffer zones will be incorporated into the Plan so that fire personnel can protect those areas where feasible.

2. Due to stand conditions and fuel loadings in PACs and other protected habitat for the Mexican spotted owl, fires will be managed with cooler prescriptions, thereby setting a "lighter trigger" on possible suppression action.

3. Through formal section 7 consultation with the Service, additional Reasonable and Prudent Measures and Conservation Recommendations will be adopted in the Plan.

4. If a PNF is located in habitat of a threatened or endangered (listed) species, the effects to the species will be assessed by the Forest and provided to the Service to allow for the tracking of the affected species' environmental baseline (i.e., incidental take).

5. If a PNF escapes and is declared a wildfire, emergency section 7 consultation will be initiated to provide the Service an assessment of the effects of the suppression actions on the listed species or its habitat.

6. Minimum Impact Suppression Tactics (M.I.S.T.) will be applied in Mexican spotted owl habitat in the event a PNF becomes a wildfire; firefighter and public safety is given primary consideration.

7. An annual report from the Forest and an annual meeting with the Service will occur if any PNF is managed within any habitat of a listed species.

8. A Resource Advisor familiar with listed species locations and concerns will be available if a PNF escapes and is declared a wildfire.

9. When a natural ignition occurs in habitat of a listed species, a wildlife biologist will provide input for the Maximum Allowable Perimeter that the PNF would be limited to.

10. As a PNF is reviewed every 24 hours after ignition, a wildlife biologist for the Forest will review the fire progress, foreseeable weather conditions, and expected fire behavior as it pertains to listed species, and provide recommendations for the daily decision process.

11. Monitoring would be accomplished by qualitative walk-throughs during and after a PNF. Photographs and a summary narrative describing fire effects to habitat of listed species attributes (components) and the fire behavior and prescription should be included.

12. Livestock grazing will be deferred from a PNF area for one growing season.

13. No more than 10% of the canopy of each Mexican spotted owl PAC will be affected by torching.

14. Size of gaps or openings created by PNF will not exceed two acres in protected MSO habitat. In restricted MSO habitat, the intent is to limit openings to up to two acres, recognizing that this may occasionally be exceeded.

15. No more than two Mexican spotted owl PACs per year should be impacted in the Kendrick or Sycamore Wilderness Areas which would include PACs from the Coconino National Forest.

16. The Forest will notify the Service within five working days of any declared PNF in habitat of a listed species.

17. Wildfire rehabilitation in habitat of listed species shall promote the protection and restoration of the area.

18. Continue informal monitoring of all Mexican spotted owl PACs on the Forest, as funding and work force permits. This will provide an accurate assessment of effects of wildland fire on the owls if a fire burns within a PAC.

19. If a Mexican spotted owl is encountered during a wildfire, the Resource Advisor shall be advised immediately. The Resource Advisor shall assess potential harm to the owl and advise the Incident Commander/Incident Management Team of methods to prevent harm. The Resource Advisor shall maintain a record of any Mexican spotted owls encountered during suppression activities. The information shall include the location, date, and time of observation and the general condition of the owl.

20. Condors are frequently drawn to active wildfire locations. If a California condor is observed within a PNF area, immediate notification of the wildlife biologist is required. Aircraft flights may need to be more closely controlled if sightings persist.

21. Prescribed natural fires in the North Canyon watershed on the North Kaibab need to adhere to the cooler prescription, as required in Mexican spotted owl PACs, to protect Apache trout habitat.

22. Retain an average of two or more logs per acre in restricted and protected MSO habitat.

23. With cooler prescriptions, retain 2 or more logs per acre (12 inches in diameter and 10 feet long) across northern goshawk nest areas and post-fledging family areas, and 1 or more logs over the entire foraging area.

24. Avoid burning in any Kaibab pincushion cactus habitat.

25. Assure that PNFs are cool, backing fires through Arizona bugbane, Tusayan flame-flower, Arizona leather flower, and other sensitive plant species habitat as identified by the Resource Advisor and/or wildlife biologist.

26. In the event of an escaped PNF, line construction will avoid any sensitive plant species habitat to the greatest extent possible.

27. Fire retardant use is restricted in the North Canyon drainage within or above the perennial stream containing Apache trout unless firefighter safety is threatened or unless extreme fire behavior is present.

28. Where nest sites for sensitive bird species are known, pretreatment around the nest tree will be done to prevent loss of the structure, where possible, after an ignition occurs. This can include hand lining the tree clump to include stumps. This may also require removing logs that may be lying next to the nest tree.

At the July 14, 1998, meeting, the Forest Service provided the Service with a copy of a July 13, 1998, draft Kaibab Fire Management Plan. The Plan included many of the measures listed above. The Service was advised that this Plan will be incorporated into the Forest Service

manual as Chapter 41 and will serve as the implementation document for the fire use program on the Kaibab National Forest.

During the course of the consultation, the Service requested a prescription (i.e., the environmental conditions under which the Forest Service planned to allow PNF in owl habitat) be included as part of the proposed project. On December 17, 1998, the Forest Service confirmed that the following prescriptions would be included as part of the proposed project description. In PACs, other protected owl habitat, and restricted mixed conifer habitat, the prescription will be as follows. Only PNF fires of low intensity are to occur in those habitat areas. Flame length targets will be to not exceed 2-3 feet with the recognition of occasional torching and concentrated fuel flare-ups. Maximum ambient temperature will be 85 degrees Fahrenheit. Minimum ambient temperature will be 10 degrees Fahrenheit. Relative humidities must be between 20 and 100 percent. Fuel moistures in the 1000-hour fuels must be 16 percent or greater. The Forest Service also confirmed that the prescription for restricted pine-oak MSO habitat would be as follows. Only PNF fires of low to moderate intensity are to occur in that habitat. Flame length targets will be not to exceed 4-5 feet with the recognition of occasional torching and concentrated fuel flare-ups. Maximum ambient temperatures will be 90 degrees Fahrenheit. Minimum ambient temperature will be 10 degrees Fahrenheit. Relative humidities must be between 15 and 100 percent. Fuel moistures in the 1000-hour fuels must be 12 percent or greater. If any one of the environmental conditions of these prescriptions are exceeded in their respective MSO habitat, then PNF will not be allowed at that time in those areas. Because these prescriptions are not likely to retain key habitat components of MSO habitat, the Forest Service will provide post-PNF event results regarding those key habitat components to the Service as soon as possible. The Service will then evaluate those monitoring results to determine to what extent the key habitat components are being retained after PNF events. Both agencies recognize that if the prescriptions are not sufficiently retaining those components of MSO habitat, then the values of the various parameters of the prescriptions will need to be modified to ensure the components will be retained.

The Forest Service stated that management priority should be based on reducing the primary existing threat which is catastrophic wildfire. Other specific guidelines listed within the Recovery Plan deal with the protection or enhancement of key habitat components, i.e., large oaks, tress > 24" dbh, logs, and snags. Target conditions outlined in Table III.B.1 of the Recovery Plan address nest and roost characteristics, which include tree density by size class. The limiting component for reaching target conditions for the Kaibab is the lack of large trees caused by the high density of small trees currently growing on site. According to the Forest Service, too many restrictions protecting the individual components makes it uneconomical to utilize fire as a tool preventing the number one management priority of reducing catastrophic wildfire. On December 17, 1998, the Forest Service also confirmed that the following protective measures for components of restricted pine-oak habitat are incorporated into the proposed project. Where individual PNF situations and workforce allow it, material 6 inches or greater in size will be removed away from the base of: ponderosa pine trees 16" dbh or larger. oak trees 10" dbh or larger, and alligator juniper trees 30" dbh or larger. In addition, all snags 18" dbh or larger

will be lined. Also, downed logs will not be purposely ignited, and no material will be piled upon them.

On December 17, 1998, the Forest Service also confirmed that the project description is modified to include additional monitoring to be conducted in restricted and protected MSO habitat. An appropriate number of transect lines will be established within each PNF area after the event. The lines will be established as soon as mortality or damage of trees is expected to be evident, and no later than six months after the event. The first one hundred oaks and one hundred large conifer trees will be identified along each line. Those trees will be classified as to whether they are living, dead, or likely to die. If more than 10% of oaks or 10% of large conifer trees are dead or dying, then that information will be provided to the Service immediately to determine if reconsultation on this project is required.

STATUS OF THE SPECIES

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Final MSO Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, much remains unknown about the species' distribution and ecology. This is especially true in Mexico where much of the MSO's range has not been surveyed. The MSO currently occupies a broad geographic area but does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to forested isolated mountain systems, canyons, and in some cases, steep, rocky canyon lands. The primary administrator of lands supporting MSO in the United States is the U.S. Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forest in Arizona and New Mexico). Forest Service Regions 2 and 4 (including 2 National Forests in Colorado and 3 in Utah) support fewer owls. According to the Recovery Plan, 91% of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

Surveys have revealed that the species has an affinity for older, well-structured forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico. The range of the MSO has been divided into six Recovery Units (RUs), as discussed in the MSO Recovery Plan (USDI 1995). The Recovery Plan reports an estimate of owl sites. An owl "site" is defined as a visual sighting of at least one adult owl or a minimum of two auditory detections in the same vicinity in the same year. This information was reported for 1990-1993. The greatest known concentration of known owl sites in the United States occurs in the Upper Gila Mountains RU (55.9%), followed by the Basin and Range-East RU (16.0%), Basin and Range-West RU (13.6%), Colorado Plateau RU (8.2%), Southern Rocky Mountain-New Mexico RU (4.5%), and Southern Rocky Mountain-Colorado RU (1.8%). Owl surveys conducted from 1990 through 1993 indicate that the species persists in most locations reported prior to 1989.

Diet studies conducted on the MSO have indicated that prey species of the MSO include woodrats (*Neotoma* spp.), white-footed mice (*Peromyscus* spp.), voles (*Microtus* and

Clethrionomys spp.), rabbits and hares (*Sylvilagus* and *Lepus* spp.), pocket gophers (*Thomomys* spp.), other mammals including a variety of bats, birds, insects, and reptiles. Ward and Block (1995) report that rangewide, 90% of an "average" MSO diet would contain 30% woodrats; 28% peromyscid mice; 13% arthropods; 9% microtine voles; 5% birds; and 4% medium-sized rodents, mostly diurnal sciurids. These rangewide patterns, however, are not consistent among MSO Recovery Units as data indicates significant differences in MSO diets among geographic location (Ward and Block 1995). Ganey (1992) conducted a MSO prey study between 1984-1990 in mixed conifer habitat of the San Francisco Peaks. He found the following percentages of prey biomass in the diet of MSO: 49.1% woodrats; 15% voles; 12.5% peromyscid mice; 9.1% pocket gophers; 6.7% rabbits; 4.4% other medium mammals; 3.1% birds; and 0.1% arthropods.

The Mexican woodrat (*Neotoma mexicana*) is perhaps the most common woodrat found within the range of the MSO, and it occurs within all Recovery Units (Ward and Block 1995). The altitudinal range of the Mexican woodrat begins in the lower pine zone and extends upward through mixed conifer forests where Findley *et al.*(1975) reported they reach their greatest abundance. The woodrat feeds on nearly any kind of shrub or forb and especially on whatever kinds of flowering plants are available. These rats may build very large, elaborate nest sites consisting of piled sticks and debris, or they may take advantage of crevices or other cavities for shelter (Hoffmeister 1986). Four species of voles are common prey of the MSO. The Mexican vole is common within the Upper Gila Mountain RU. This species is generally associated with dry, grassy locations usually in areas adjacent to ponderosa pine but extending from grassy areas in pinyon-juniper to spruce-fir zones (Hoffmeister 1986). In the Inner Basin of the San Francisco Peaks, the Mexican vole was present in the grassy areas amid spruce, fir, limber pine, and aspen (Hoffmeister 1986). The long-tailed vole occurs within the Upper Gila Mountains RU and is most common in meadows and grassy clearings in mixed conifer and spruce-fir forests (Hoffmeister 1986). Eight peromyscid mice occur within the range of the MSO. Only two species, the deer mouse and the brush mouse are consumed regularly by MSO in all RUs. The deer mouse is widespread, inhabiting all vegetation types except high-elevation tundra. Deer mice live in a variety of places: under or in logs, under debris, in crevices in rocks and rock walls (Hoffmeister 1986). High reproductive success of MSO in the Sacramento Mountains, New Mexico, has been recorded during irruptions of deer mice (Ward and Block 1995). More restricted in distribution, the brush mouse inhabits areas with extensive rock and shrub cover in pinyon-juniper, riparian, oak, and pine/oak woodlands (Hoffmeister 1986).

A reliable estimate of the absolute numbers of MSO throughout its entire range is not available (USDI 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USDI (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico.

At the end of the 1995 field season, the Forest Service reported a total of 866 management territories (MTs) established in locations where at least a single MSO had been identified (U.S. Forest Service, *in litt.* November 9, 1995). The information provided at that time also included a summary of territories and acres of suitable habitat in each RU. Subsequently, a summary of all territory and monitoring data for the 1995 field season on Forest Service lands was provided to

the Service on January 22, 1996. There were minor discrepancies in the number of MTs reported in the November and January data. For the purposes of this analysis we are using the more recent information. Table 1 displays the number of MTs and percentage of the total number of each Forest (U.S. Forest Service, *in litt.*, January 22, 1996).

Table 1. Number of management territories (MTs) as reported by the Forest Service (U.S. Forest Service, *in litt.*, January 22, 1996), percent of MTs as a proportion of the MTs in Forest Service Region 3, and the percent of suitable habitat surveyed in each Forest by National Forest (Fletcher and Hollis 1994).

National Forest	Number of MTs	Percent of MTs	Percent Suitable Habitat Surveyed
Apache-Sitgreaves	122	14.0	99
Carson	3	0.3	62
Cibola	43	5.0	41
Coconino	155	17.8	87
Coronado	108	12.4	49
Gila	197	22.7	50
Kaibab	6	0.7	96
Lincoln	126	14.5	90
Prescott	10	1.2	42
Santa Fe	33	3.8	44
Tonto	66	7.6	55
TOTAL	869	100	

The Forest Service has converted some MTs into PACs following the recommendations of the Draft MSO Recovery Plan released in March 1995. The completion of these conversions has typically been driven by project-level consultations with the Service and varies by National Forest.

The Kaibab National Forest Prescribed Natural Fire Program project area is located at the northern edge of the Upper Gila Mountains RU and in the Colorado Plateau RU as defined by the MSO Recovery Plan (USDI 1995). The Upper Gila Mountains RU is a relatively narrow band bounded on the north by the Colorado Plateau RU and to the south by the Basin and Range West RU. The southern boundary of this RU includes the drainages below the Mogollon Rim in

central and eastern Arizona. The eastern boundary extends to the Black, Mimbres, San Mateo, and Magdalena Mountain ranges of New Mexico. The northern and western boundaries extend to the San Francisco Peaks and Bill Williams Mountain north and east of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep forested drainages. This RU can be considered a "transition zone," because it is an interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces (Wilson 1969). Habitat within this RU is administered by the Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests. The north half of the Fort Apache and northeast corner of the San Carlos Indian Reservations are located in the center of this RU and contain an important habitat link between owl subpopulations at the western and eastern ends of the RU and the subpopulations directly south within the Basin and Range West RU.

This RU consists of deep forested drainages on the Mogollon Plateau. Vegetation generally consists of pinyon/juniper woodland, ponderosa pine/mixed conifer forest, some spruce/fir forest, and deciduous riparian forest in mid and lower elevation canyon habitat. Climate is characterized by cold winters and over half the precipitation falls during the growing season. Much of the mature stand component on the gentle slopes surrounding the canyons has been partially or completely harvested. Most of the forest habitat on steeper ground that may serve as MSO nesting habitat is in suitable condition. MSO are widely distributed and use a variety of habitats within this RU. Owls most commonly nest and roost in mixed-conifer forests dominated by Douglas fir and/or white fir and canyons with varying degrees of forest cover (Ganey and Balda 1989; USDI 1995). Owls also nest and roost in ponderosa pine-Gambel oak forest, where they are typically found in stands containing well-developed understories of Gambel oak (USDI 1995).

This RU contains the largest known concentration of MSO with approximately 55% of known MSO territories (USDI 1995). This RU is located near the center of the MSO's range within the United States and is contiguous to four of the other five RUs within the United States. Because of its central location and its large and relatively continuous spotted owl population, the MSO Recovery Team believes that the population in this RU could be uniquely important to the overall stability and persistence of the MSO population in the United States. Specifically, this population could serve as the source population, providing immigrants to smaller, more isolated populations in other RUs. Although the Recovery Team has no data on dispersal patterns or movements between RUs, the Recovery Team believes that this population should be maintained at current levels and with at least the current level of connectivity within the RU (USDI 1995). Significant discontinuities that develop in the MSO's distribution within this RU, and the loss of habitat to support the local sub-populations, may compromise the recovery of the species.

The Colorado Plateau RU includes most of southern and south-central Utah, plus portions of northern Arizona, northwestern New Mexico, and southwestern Colorado. Grasslands and shrub-steppes dominate the Colorado Plateau at lower elevations, but woodlands and forest dominate the higher elevations. Forest types in the woodland zone include ponderosa pine, mixed conifer, and spruce-fir. Conifers may extend to lower elevations in canyons. Deciduous

woody species dominate riparian communities, and are most common along major streams (USDI 1995).

MSO habitat appears to be naturally fragmented in this RU, with most owls found in disjunct canyon systems or on isolated mountain ranges. In southern Utah, breeding owls primarily inhabit deep, steep-walled canyons. These canyons are typically surrounded by terrain that does not appear to support breeding MSO. Owls apparently prefer canyon terrain in southwestern Colorado, particularly in and around Mesa Verde National Park. In northern Arizona and New Mexico, MSO have been reported in both canyon and montane situations. Recent records of MSO exist for the Grand Canyon and Kaibab Plateau in Arizona, as well as for the Chuska Mountains, Black Mesa, Fort Defiance Plateau, and the Rainbow/Skeleton Plateau on the Navajo Reservation. In addition, records exist for the Zuni Mountains and Mount Taylor in New Mexico. Federal lands account for 44% of this RU. Tribal lands collectively total 30%, with the largest single entity being the Navajo Reservation (USDI 1995). Threats in the southeastern portion of this RU according to the MSO Recovery Plan (USDI 1995) include timber harvest, overgrazing, catastrophic fire, oil, gas, and mining development, and recreation.

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 which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat to provide a platform to assess the effects of the action now under consultation.

In the project area, Mexican spotted owl habitat consists of eight designated PACs (Table 2), scattered protected habitat, and a few hundred thousand acres of restricted habitat (Kaibab National Forest 1998). Of the eight designated PACs located on the Forest, two are shared along a common boundary with the Coconino National Forest. All PACS on the Forest are of the mixed conifer forest type. Five of the PACs are on mountain slopes. Three PACs are in Sycamore Canyon on steep slopes.

Big Springs PAC

This PAC was established in 1994 when a pair was discovered. The pair fledged two young, one of which was captured, banded, and radiotelemetered. This bird was found dead of unknown causes later that year. In 1995, pair occupancy was confirmed again with several responses from the pair in the 1994 nest grove, but reproductive success was unknown. In 1996, the area was visited on May 21, and the male responded from the historic nest grove. Pair occupancy was confirmed on May 28, when the pair was found roosting within 30 feet of each other in the historic nest grove. The pair may have been nesting, but lack of funds precluded any further

Table 2. Protected activity center (PACs) acreages and nest buffer acreages within the Kaibab National Forest Prescribed Natural Fire Program project area.

Territory & Number	Total PAC Acres	KNF PAC Acres	Total Nest Buffer	KNF Nest Buffer
Big Springs #070225	721	721	121	121
Bill Williams #070120	668	668	115	115
Newman Spring #070210	647	647	119	119
Pumpkin Center #070201	636	636	117	117
Sitgreaves #070205	708	708	104	104
Tule #070115	807	807	107	107
LO Pocket #040226	762	166	Not designated	Not designated; probably all would be on Coconino NF
Stock Tank #040230	684	41	Not designated	Not designated; possibly would be partially on Kaibab NF

visits to the site. In 1997, the PAC was occupied; an audio detection of a female was obtained near the historic nest grove. In 1998, the PAC was occupied and audio detection of the pair was made near the historic nest grove. The Forest Service indicated that no management activities or wildfires have occurred in the PAC.

Bill Williams PAC

Mexican spotted owl occupancy was first confirmed in this area in 1978. Audio detections of adults were obtained in 1979 and 1983. Pair occupancy and reproduction were confirmed in

1984 when an adult and a juvenile were observed. No response was obtained in 1990. An adult female was observed in 1991. No response was obtained in 1992. Occupancy was last confirmed in the area in 1993. Information supplied by the Forest Service indicates that several problems were encountered in surveying in 1994, and that no surveys were conducted in 1995. Apparently, no responses were elicited in 1996, 1997, and 1998. The Forest Service did not provide any information regarding past management activities or wildfires in this PAC. However, there was an indication that, due to location, this PAC has not been subjected to management activity.

Newman Spring PAC

Mexican spotted owl occupancy was first confirmed in this area in 1985. In 1988, at least one owl was heard. Pair occupancy and reproduction were confirmed in 1990 when young were fledged. In 1991, a nest, two adults, and two young were found. In 1992, two adults and two juveniles were detected. Two adults were found nesting in 1993, with no young observed that year. One subadult male was found in 1994. Pair occupancy was confirmed in 1995. In 1996, pair occupancy was confirmed on March 19. The pair was found roosting together several hundred yards downslope of the roost grove of 1994 and 1995. Pair occupancy was confirmed in 1997. In 1998, a female was observed on the nest with a male nearby. The Forest Service indicated that there have been no management activities or wildfires in or near this PAC.

Pumpkin Center PAC

This PAC was established in 1994 when a pair of Mexican spotted owls was found. Reproduction by this pair has not yet been confirmed. Occupancy was confirmed in 1995 when a male was observed. In 1996, pair occupancy and nesting were confirmed on May 15. The pair was found in the stand which was occupied in both 1994 and 1995. In 1997, pair occupancy was confirmed when a male was observed and a female was heard. No response was obtained in 1998. The Forest Service indicated that there have been no management activities or wildfires in or near this PAC.

Sitgreaves PAC

Pair occupancy was first confirmed in the area in 1985. No response was obtained in 1987, and a single response was obtained in 1988. A pair was located in 1990. Reproduction was confirmed in 1991. Pair occupancy was again confirmed in 1992. In 1993, a nest, a pair of adults, and two fledglings were detected. In 1994, a pair responded and at least one owl was observed. In 1995, only a single male was found. Occupancy was confirmed in 1996 with a response from a male. No response was obtained in 1997. In 1998, at least one owl was observed. The Forest Service indicated that there have been no management activities or wildfires in or near this PAC other than lightning strikes which were suppressed near the PAC.

Tule PAC

This PAC was first established in 1990 in response to the discovery of a single adult male spotted owl. In 1993 a single bird was also discovered. In 1994, pair occupancy and reproduction were confirmed and a possible nest tree was located. In 1996, a single adult male spotted owl response was detected on the first visit to the PAC on May 22. A daytime excursion to the 1994 nest grove resulted in no owl response. In 1998, there was no response at the nest grove. However, a pair was detected downstream from that area. The Forest Service indicated no management activities have occurred in or near the PAC. A two-acre wildfire occurred in 1996 approximately 0.25 miles down drainage from the PAC boundary.

LO Pocket PAC

Occupancy of this area was first established in 1991 with a pair response but with nesting status undetermined. The same results were obtained in 1992. In 1993, a response was obtained from a male. The PAC was not monitored in 1994. In 1995, a response was obtained from a male. The PAC was not monitored in 1996, 1997, and 1998. No management activities are known to have occurred in this PAC. However, approximately 40 acres of the PAC was burned in the Geronimo Fire of 1990. Some mixed conifer may have burned in the drainage. An estimate for the entire 118 acre fire was that 20% of it was "stand replacement" and 80% was underburn.

Stock Tank PAC

This PAC was established in 1994 with location of a pair of Mexican spotted owls. The PAC has not been monitored since that time. No management activities are known to have occurred in this PAC. However, eight cut units of the Crowley Timber Sale totaling 15 acres were harvested within the old management territory near the PAC.

There are five PACs (Bunker Hill, Geronimo Spring, Hidden Cabin, Red Hill, Volunteer) immediately east of Sycamore Canyon, and one PAC on Kendrick Mountain (Jeep) adjacent to the Forest boundary, that are completely on the Coconino National Forest that could remotely be affected by the Plan. Those six PACs are within five miles of the Forest boundary. Five of the PACs on the Coconino are associated with the Sycamore Canyon complex and all are of the mixed conifer type with the exception of Bunker Hill which has a pine-oak association as the dominant forest type. The Jeep PAC is primarily mixed conifer. Those PACs are not considered further in this consultation because the Forest Service has indicated that, as part of the project proposal, all PNF on the Kaibab National Forest will be suppressed before such starts are allowed to cross the boundary into the Coconino National Forest.

During the course of the consultation, inspection of the established PACs revealed that the boundaries of a few should be adjusted. Four PACs where boundary adjustment is appropriate are Bill Williams, Newman Springs, Sitgreaves, and Tule. Maps and locations provided for the Bill Williams PAC suggested that several owl location records were outside of the established

PAC boundary. As a result, the Forest Service added additional acreage to the PAC, adjusted the boundary to include locations just outside of the boundary, and ensured the Service that other locations just outside of the boundary actually were within the boundary of the PAC. The Forest Service committed to providing a new map of the Bill Williams PAC that will clearly illustrate how all known owl locations have been included in the PAC. Original delineation of the Newman Springs PAC had not included a 1994 owl location. The Forest Service agreed to adjust the boundary of the PAC to include that location. Original delineation of the Sitgreaves PAC had not included a 1995 owl location. The Forest Service agreed to adjust the boundary of the PAC to include that location. Original delineation of the Tule PAC had not included two 1994 owl locations to the west of the established PAC boundary. In addition, a 1998 location is outside of the established PAC boundary to the east. The Forest Service agreed to attempt to determine, in 1999, if there are additional owl(s) to the west and east of the Tule PAC. If they do discover additional owls, then the appropriate number of additional PACs will be established. If additional owls are not detected, then they will adjust the boundary of Tule PAC to include those three owl locations that are currently outside of the PAC boundary. On December 18, 1998, the Forest Service confirmed that the above adjustments in the subject PACs would be accomplished, prior to allowing PNF within the areas' zone of influence, as part of this proposed project.

According to the Forest Service, there is a limited amount (approximately 250 acres) of unoccupied potential nesting habitat available in mixed conifer steep slopes. In each of the five general areas that are currently occupied on the Forest, there may be opportunity for one additional nesting pair in the future. For the purposes of possible incidental take being issued by the Service, there are eight known pairs and potential for five "new" pairs in the future on the Forest (Kaibab National Forest 1998).

Additional protected habitat on steep slopes greater than 40% with mixed conifer is limited to approximately 2000 acres on the South Kaibab scattered in small stringers in Sycamore Canyon, Tule Canyon, Bill Williams Mountain, Sitgreaves Mountain, and Kendrick Mountain. There are also islands of protected mixed conifer habitat on smaller cinder cones such as Davenport, Squaw, RS Hill, Government, 49er, and Wounded Ranger. The North Kaibab has no protected habitat outside of the Reserved Lands. The Tusayan Ranger District has no Mexican spotted owl habitat and all of the pine-oak type is classified as Unrestricted (Kaibab National Forest 1998).

The South Kaibab has few, if any, acres of mixed conifer restricted habitat. There are, however, 58,319 acres of pine-oak restricted Mexican spotted owl habitat. None of the stands of pine-oak meet the reference conditions for nesting and roosting described in the recovery plan as target/threshold (Kaibab National Forest 1998). In the absence of existing target/threshold habitat, the South Kaibab has selected 10% of the pine-oak that is closest to meeting the conditions. This process included criteria such as stand condition, proximity to PACs, and connectivity for dispersal corridors. The Mexican Spotted Owl Recovery Plan states that as few as 5% of nests are located in pine-oak habitat. The Forest Service indicated that surveys have widely covered the South Kaibab which included stratifying protocol surveys to those areas that

appear to have the best available habitat for nesting and roosting which included pine-oak. The only positive results were associated with Bill Williams Mountain and Sycamore Canyon.

The North Kaibab restricted habitat is comprised of 61,010 acres of mixed conifer, predominantly located above 8000 feet elevation (Kaibab National Forest 1998). Only 3,245 acres will be available for PNF under this proposal. For target/threshold habitat, 3,823 acres meet the recovery plan description. Only 1,384 acres will be available for PNF under this project.

The proposed project does not include any plans to survey the entire 64,392 acres of restricted and protected MSO habitat within the project area during the 10-year life of the prescribed natural fire plan. Thus, at some time during the life of the Plan, some or all of that protected and restricted habitat could remain unsurveyed or have accomplished surveys that are more than one year old. However, the Forest Service has indicated that, on average, no more than 700 acres of MSO habitat per year will experience PNF under this plan.

A total of 208 projects have been formally consulted on in Arizona and New Mexico since August 1993. Those projects included 66 where incidental take of MSO was anticipated. Those projects have resulted in the anticipated incidental take of more than 137 MSO. The Forest Service has formally consulted on 199 of those projects. In addition, the Bureau of Indian Affairs has consulted on one timber sale on the Navajo Reservation which resulted in an anticipated take of five MSO, and a highway reconstruction which resulted in the anticipated incidental take of two MSO. The Federal Highway Administration has consulted on one highway project that resulted in an undetermined amount of incidental take. The take associated with that action will be determined following further consultation. The biological opinion for the Kachina Peaks Wilderness Prescribed Natural Fire Plan (#2-21-94-F-220) determined thresholds for incidental take and direct take as follows: 1) one spotted owl or one pair of spotted owl adults and/or associated eggs/juveniles; 2) harm and harassment of spotted owls located in up to two PACs per year; 3) disturbance to spotted owls and habitat modification of a total of seven PACs during the life of the Kachina Burn Plan related to management ignited fire occurring in PACs for which the nest site information is three or more years old; 4) harm and harassment of spotted owls and habitat caused by PNF for which adequate surveys have not been conducted, and 5) harm and harassment of spotted owls and habitat modification of up to one PAC and 500 acres of potential nest/roost habitat caused by wildfire as an indirect result of PNF during the life of the Kachina Burn Plan. The biological opinion for the Sedona Ecosystem Management Forest Plan Amendment (#2-21-98-F-209) anticipated that 1) two spotted owls and/or associated eggs/juveniles could be taken every other year associated with one PAC, and 2) one spotted owl and/or associated eggs/juveniles associated with five PACs, due to harassment.

EFFECTS OF THE ACTION

The MSO Recovery Plan (USDI 1995) recognizes catastrophic fire as the greatest threat to MSO habitat. Prescribed and natural fire are extremely important management tools needed to

enhance, and often to restore many of the ecosystem functions and processes. Reduction in habitat and various habitat-based threats have contributed to the listing of the MSO. The long-term benefits to the MSO of many land management actions may contribute, in the short-term, to certain adverse effects to the MSO. Prescribed and natural fire projects often fall into this category. Species such as the MSO, whose habitats have been reduced, degraded, or altered, may currently respond to fire differently than they did historically when fire occurred in a more natural setting. Therefore, it is important to address such concerns by minimizing, to the greatest extent practical, those short-term adverse affects, and move forward with proactive land management as fire is applied in efforts to restore ecosystem functions and community dynamics.

The MSO Recovery Plan (USDI 1995) encourages fire management programs which take an active role in fuels management and understand the ecological role of fire. The Recovery Plan also recognizes that catastrophic wildfire is one of the primary threats to MSO in the Upper Gila Mountains and Colorado Plateau RUs. Therefore, fire plays the dual role of being both potentially beneficial and catastrophic to the owl and its habitat. The Service stresses the need to apply adaptive management when using fire. Prescriptions that maintain key structural features of owl and small prey habitats should be developed and tested. These features include large trees, snags, logs, and overstory. Treatments to produce or maintain such habitat components must be assessed by monitoring to evaluate if treatment objectives were met in both the short and long term. Wholesale use of fire without understanding or monitoring its effects on habitat may render these areas unusable by owls, and may also miss opportunities to improve our knowledge of fire effects on these habitats (Moir *et al.* 1995).

The effects of the proposed action are divided into the following sections: Effects to MSO Habitat, Effects to Prey Species, Long-term Benefits, and Effectiveness of Proposed Mitigation.

MSO Habitat

The Recovery Plan (USDI 1995) recognizes that prescribed natural fire may be beneficial to owl habitat in several ways: 1) it can aid in reducing fuel loads and the risk of catastrophic wildfire which may result in the loss of habitat over large areas; 2) it can create a diverse landscape with considerable horizontal heterogeneity which seems to be relatively characteristic of many areas occupied by spotted owls and also provides for a diverse prey base; 3) it can create conditions that maintain shade-intolerant species such as ponderosa pine or Gambel oak in the landscape.

Prescribed fire should be used carefully in owl habitat (USDI 1995). Fire is one of the most rapidly acting of natural disturbances. A crown fire can quickly consume vast tracts of forested habitat. After a large crown fire, habitat components for MSO nesting, roosting, and foraging are reduced or eliminated. Small-scale natural fires and prescribed burns, however, can reduce fuel loadings and create small openings and thinned stands that increase horizontal diversity and reduce the spread of catastrophic fire. Small-scale fires and lightning strikes also create snags, canopy gaps, and large downed logs, plus they perpetuate understory shrubs, grasses, and forbs which are important habitat components to the owl and its prey (Moir *et al.* 1995).

Fires have played an important role in the composition and structure of conifer forests. Generally, historic natural fires in ponderosa pine were light, its intensity depending of fuel loadings and weather conditions. This created a situation whereby some areas did not burn, some areas burned intensely with crown fires, and most areas burned lightly leaving large fire resistant trees, killing shrub topgrowth, and removing dead fuels (Wright and Bailey 1982). In mixed conifer forests, historic fires often were composed of intense, crown-replacement in small patches. Prescribed fire may be expected to alter mixed conifer habitats of the MSO in the short-term to a greater extent now than historically because the fuel accumulations that are characteristic of many MSO nest and roost sites generally place them at higher fire risk. This is particularly true in the project area, as fire has been excluded for many years, and fuel loadings are very high and continuous. In addition, livestock grazing has occurred for over 100 years in the project area, thereby reducing fine fuels (grasses and forbs) necessary for re-current, low-intensity fires, potentially assisting in the establishment of high numbers of tree saplings and encouraging the establishment of shade-tolerant and fire-sensitive species (Belsky and Blumenthal 1997).

Injury to ponderosa pine from ground fires is generally confined to scorch of bark and lower branches because the thick bark of this tree insulates the cambium (Patton and Gordon 1995). Bradley *et al.* (1992) indicates that ponderosa pine trees that are heavily infected by the dwarf mistletoe (*Arceuthobium campylopodum*) are more susceptible to fire-related mortality and crown scorch than uninfected or moderately infected trees. On moist sites, ponderosa pine often forms two-storied stands that may be quite susceptible to crown fire. The tendency for regeneration of ponderosa pine to form dense understories, or "dog-hair" thickets, on such sites creates fuel ladders that can carry surface fires to the crowns of overstory trees (Bradley *et al.* 1992). The thinning effect of fire is therefore much more pronounced in dense stands than it is in more open and mature stands. Heavy accumulations of litter at the base of pole and sawtimber-sized ponderosa pine increases the severity and duration of fire. Mature Douglas fir has relatively high resistance to fire damage. Saplings and small pole-sized trees of this species, however, are vulnerable to surface fires because of their thin bark (Bradely *et al.* 1992). Douglas fir occurs in open stands, but it also grows in dense stands with continuous understory fuels. Dense sapling and thickets of pole-sized trees can form an almost continuous layer of flammable foliage 10-26 feet above the ground that will support wind-driven crown fires. Crowning is often aided by the presence of lichens. Crowning and "torching" of individual Douglas fir is also aided by the presence of large, dense witches'-brooms caused by the dwarf mistletoe. As with ponderosa pine, heavy fuel accumulations at the base of Douglas fir increases the probability of fire injury. Heavy litter accumulations may allow injury to tree roots, causing delayed mortality and often resulting in sterilization of soils (Bradley *et al.* 1992).

Prescribed natural fire is likely to create small openings in the canopy caused by single or groups of trees crowning. The Service believes the risk of trees crowning is more probable in MSO nesting/roosting habitat. The location of quality owl habitat often corresponds to characteristics that put these sites at higher risk of crowning such as dense, multi-layered canopies, the presence

of mistletoe "brooms" and high fuel loadings resulting from high densities of down logs. The loss of some of the lower branches in the canopy may have some effect on MSO foraging. MSO utilize the "perch and pounce" method of hunting, using the lower branches of trees for perching. The loss of some perching sites when burning within prescription is not expected to significantly affect the ability of MSO to forage successfully.

The random nature of lightning does not allow for predicting where, when, or how many PNFs may occur in the project area. It is expected that the vast majority of lightning that may result in a fire will likely occur during the summer months, particularly during the monsoons of July and August each year. If a lightning-started fire falls within prescription parameters, it will be managed to meet resource objectives. If it does not, it will be suppressed as rapidly as possible. PNF will be permitted to burn within PACs during all times of the year, including the MSO breeding season of March 1 through August 31. In addition, PNF will be permitted to burn within the 100-acre nest buffers of PACs. Although the Recovery Plan (USDI 1995) encourages the use of PNF, both of these actions do not follow the specific recommendations of the Recovery Plan and therefore may result in adverse effects to individual MSO and habitat. The Recovery Plan takes a conservative approach to burning in PACs and recommends that the 100-acre nest buffer of PACs not be burned and that PACs not be burned during the breeding season. PNF within the PAC(s) during the breeding season and within the nest buffer may result in the direct or indirect death of adult and young MSO due to loss of nest/roost trees caused by individual of groups of trees crowning. In addition, the effects of smoke on adult and young owls is largely unknown and may directly affect the health of owls or the ability of owls to forage successfully, and therefore may affect the ability of adults to survive and/or successfully fledge young. Given that the effects of prescribed fire to MSO are largely unknown (USDI 1995), burning within the 100-acre activity centers, regardless of the time of year, will not permit the activity center to act as a buffer to offset any short-term negative effects of burning to the owls and their habitat.

Given that the locations and number of the lightning strikes cannot be predicted, and that the Forest Service has not put an upper limit on the size of any PNF, it is possible that multiple or all known PACs as well as potentially occupied habitat may be affected by PNF during one or more years of the 10-year period of the Kaibab National Forest Prescribed Natural Fire Plan. In addition, it is possible that PACs and potentially occupied habitat may be burned multiple times during the next 10-year period. The potential effects of burning an individual PAC more than once may include an increased loss of down woody material and snags, and the creation of multiple gaps in the canopy which could affect the overall canopy closure of a nest/roost habitat, thereby effecting the microclimate of the site, and a potential increase in the number of snags created through crowning. The effect of burning multiple PACs across the landscape and potentially occupied nest/roost habitat are unknown, but may include the short-term loss or reduction of owl reproduction of a percentage of the PACs in the project area and the resulting movement of owls to unburned areas either within or outside the project area.

Direct effects of PNF on MSO may include possible death by burning or carbon monoxide poisoning. This may be particularly true with young owls. Patton *et al.* (1991) found lower survival rates among radio-tagged female northern spotted owls following a forest fire. This was attributed to radio tags, but the birds in this study were exposed to dense smoke and high levels of carbon monoxide by an inversion that trapped smoke near the ground for 25 days following a fire which burned for 50 days. Flames and smoke from fire may cause MSO to flush from nests and/or roosts, and may impair hunting opportunities through interfering with audio and visual methods of detecting prey. Given that PNF may occur within PAC activity centers, there exists some possibility that nest and/or roosts trees may be killed through crowning or extreme heat. All of these may result in direct mortality, failed reproductive efforts and/or starvation of young and adult MSO.

Disturbance to the MSO may also be caused by human activities in, adjacent, and above PACs and potentially occupied habitat during PNF. Disturbance may be caused by fire resource personnel digging fire lines with shovels and other hand tools, walking and igniting with drip torches if "burning out" is needed to control a PNF, and monitoring fire conditions from the ground or air. Chainsaws, power equipment, or mechanized equipment may be used during PNF. Human disturbance in an occupied PAC during the breeding season may result in failed reproductive efforts, abandonment of the nest, and/or starvation of young.

Regardless of detailed planning and the use of the best fire science, there exists the possibility that a PNF may burn out of prescription and become a wildfire. The most likely reason for a PNF to go out of prescription would be a change in weather conditions such as wind speed or direction which would result in a subsequent change in fire behavior. The most devastating wildfire would be one that travels into the tree crowns and results in stand replacement over a large area. The results to the MSO of a PNF becoming a wildfire may include the direct loss of MSO, as well as loss of nest/roost habitat located in PACs as well as potentially occupied nest/roost habitat. If a wildfire occurs in such habitat during the breeding season, the fire may result in the loss of owl nests as well as young owls who may not be able to fly to safety. Wildfires that burn hot will result in the loss of owl prey habitat such as down logs and unburned snags. In addition to the direct loss of owl nest/roost habitat caused by a wildfire, effects to owls may also be caused by the actions taken to suppress the fire. These actions include back burning to contain the PNF and prevent its further growth, the use of chainsaws and the cutting of trees, the use of retardant planes and the dropping of slurry, the use of helicopters and the dropping of water, and the presence of humans in PACs and activity centers. The result of a stand replacement wildfire in large areas of nest/roost habitat in the project area includes the loss of the use of that habitat by MSO the year of the action and well into the future.

Prey Habitat

The effects of fire include both negative and beneficial effects on MSO habitat. Beneficial aspects would include increased response of herbaceous vegetation after a fire. Negative effects would include the loss of MSO prey habitat components such as herbaceous cover, down logs

and snags. The effects of fire on the prey base of the MSO are complex and are dependent on the variations in fire characteristics and in prey habitat. Fire intensity, size, and behavior are influenced by numerous factors such as vegetation type, moisture, fuel loads, weather, season, and topography. Fire can effectively alter vegetation structure and composition thereby affecting small mammal habitat. The initial effects of fire are likely to be detrimental to rodent populations as cover and plant forage species would be reduced.

Population responses by small mammals to fire-induced changes in their habitat vary. For example, deer mouse populations might increase immediately following fire and then decrease through time (Ward and Block 1995). Campbell *et al.* (1977) noted that populations of peromyscid mice decreased immediately following fire in an Arizona ponderosa pine forest that removed one-fourth (moderately burned) to two-thirds (severely burned) of the basal area; populations then returned to pre-fire numbers two years following the burn. Further, no differences were found in rodent populations between moderately and severely burned areas. They concluded that the effects of the fire were short-term, and the short-term positive numerical responses of mice were attributed to an increase in forage, particularly grasses and forbs after the fire (Ward and Block 1995). Irvine (1991) documented post-fire declines in deer mice populations at study sites on the Coconino National Forest. Irvine attributed these declines to reduced food supplies. Lowe *et at.* (1978) noted an increase in deer mice populations the first year after a fire in ponderosa pine near Flagstaff, Arizona. Small mammal diversity and densities are typically depressed for one to three years after a fire (Wright and Bailey 1982). Biswell *et al.* (1973) suggested that rodent populations would be less affected during fall fires; because, at that time of year, rodents have accumulated seed caches that will mitigate loss of food sources. Predation on surviving rodents that are part of the diet of the MSO may increase immediately after the fire. In one study in northern California, radio-collared northern spotted owls spent considerable time in burned-over areas. This activity was assumed to be due to easy capture of prey (Patton and Gordon 1995).

It is suspected that the effects of intense stand-replacing wildfires that dramatically alter forest structure and move the system to earlier seral stages would have longer-term effects on some rodent populations. Likely, early successional species, such as deer mice, and those that require open habitat with a well-developed herbaceous understory, such as microtine voles and pocket gophers, would benefit. In contrast, species that require a wooded or forested overstory would exhibit population declines. The net effect of such fires on the MSO is unclear: a fire that removes the tree canopy would likely render a portion of the area unusable for foraging by MSO; but if the spatial extent of crown loss is limited, a mosaic is created that could provide a diversity of prey for the owl and actually be beneficial (Ward and Block 1995). Because owl prey species evolved in ecosystems where fire was a natural process, we assume that historically, these species survived, and some even benefitted from the occurrence of fire. Fire has been excluded from most southwestern ecosystems during the 20th century, resulting in systems where fire behavior may deviate substantially from natural conditions. Effects of fire on small mammals under present environmental conditions are unclear (Ward and Block 1995).

Ward and Block (1995) examined correlates between the MSO's diet and reproduction. Their results suggested that the owl's reproductive success was not influenced by a single prey species, but by many species in composition. None of the specific prey groups significantly influenced owl reproductive success, but rather, they concluded it was more likely that the owl's reproductive success was influenced by total prey biomass consumed in a given year, rather than by a single prey species. More young were produced when moderate to high amounts of the three most common prey groups (woodrats, peromyscid mice, and voles) were consumed.

Prescribed natural fire conducted within the proposed prescription is likely to have immediate short-term adverse effects to MSO prey habitat. Although fire may enhance vegetative density and abundance in the long-term, short-term effects of burning, particularly in the spring and early summer when herbaceous vegetation is most critical for reproducing rodents, may limit available forage immediately after the fire event. Most prescribed natural fires will occur during the July and August monsoons, when the rodents would be most affected by habitat loss. Nesting MSO would also be most affected during this time as they would require a consistent supply of prey to successfully fledge young.

Long-term Benefits of PNF

Reintroducing fire into the ecosystems of northern Arizona can have many benefits and may improve long-term "ecosystem management" objectives. Among these are the reduction of woody fuels which would decrease the possibility of intense, stand-replacing fires and resulting erosion, soil sterilization, and increased plant mortality. Ultimately, if fire continues to be excluded from the system, a major wildfire will occur with potentially devastating effects to the MSO and its habitat. In the pre-settlement era, low-intensity fires that removed small trees and ground fuels, but rarely killed mature trees, probably occurred at frequent intervals. Implementing the proposed action would reduce fuels and hopefully begin to restore a natural fire regime in which frequent, low-intensity fire would act to maintain a mosaic of fuel loads across the area.

Effectiveness of Proposed Mitigation

The Service believes the mitigation measures proposed by the Forest Service for PNF actions represent the nature of the unpredictability of PNF and the use of PNF. The Service understands that implementation of specific recommendations of the Recovery Plan that assist in reducing potential adverse effects to the MSO and its habitat would be very costly or difficult to implement. However, without certain mitigation measures in place, the Service believes there may be short-term adverse effects to MSO and MSO habitat. Specifically, the Service believes that PNF that occurs within PACs during the breeding season, and within the 100-acre activity center at any time, may adversely affect the MSO and its habitat. The lack of an upper size limit of individual and cumulative PNF actions may also result in an unacceptable level of adverse effect to the MSO and its habitat in the project area. In addition, the effects of fire on the owl and to a certain extent on its prey habitat, are unpredictable. Combined with the uncertainty of

fire behavior and weather itself, adverse effects may occur in the form of fires burning out of prescription or in the form of wildfires. The Service believes that the Plan needs be viewed as a working document, and should be subject to constant evaluation and modification if and when needed, based on the results of each year's burning and monitoring. Applying new information to land management decisions as it is developed is an important aspect of adaptive management.

Much of the discussion above addresses appropriate use of low intensity PNF in MSO habitat and the pros and cons thereof. Because a low intensity prescription is lacking, required components of such a prescription are addressed in the Incidental Take section.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in the foreseeable future. Future Federal actions are subject to the consultation requirements established under sections 7, and, therefore, are not considered cumulative in the proposed action. In past Biological Opinions, it has been stated that, "Because of the predominant occurrences of the MSO on Federal lands, and because of the role of the respective Federal agencies in administering the habitat of the MSO, actions to be implemented in the future by non-Federal entities on non-Federal lands are considered of minor impact." However, there has been a recent increase of harvest activities on non-Federal lands within the range of the MSO. In addition, future actions within or adjacent to the project area that are reasonably expected to occur include urban development, road building, mineral development, logging, fuelwood gathering, trail construction, and other associated actions. These activities reduce the quality and quantity of MSO nesting, roosting, and foraging habitat, cause disturbance to breeding MSO and would contribute as cumulative effects to the proposed action.

SUMMARY OF EFFECTS AND CONCLUSION

After reviewing the current status of the MSO, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the Kaibab National Forest Prescribed Natural Fire Program, as proposed, is not likely to jeopardize the continued existence of the MSO.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined as 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 any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. 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 a prohibited taking 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 implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing responsibility to regulate the activity covered by this incidental take statement. If the Forest Service (1) 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, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

For the purposes of consideration of incidental take of MSO from the proposed action under consultation, incidental take can be anticipated as either the direct mortality of individual birds, or the alteration of habitat that affects the behavior (i.e. breeding or foraging) of birds to such a degree that the birds are considered lost as viable members of the population and thus "taken." They may fail to breed, fail to successfully rear young, raise less fit young, or desert the area because of disturbance or because habitat no longer meets the owl's needs.

In past Biological Opinions, the management territory was used to quantify incidental take thresholds for the MSO (see Biological Opinions provided by the Service to the Forest Service from August 23, 1993 through 1995). The current section 7 consultation policy provides for incidental take if an activity compromises the integrity of a PAC. Actions outside PACs will generally not be considered incidental take.

Using available information as presented within this document, the Service has identified conditions of probable take for the MSO associated with PACs and inadequately surveyed habitat. Based on the best available information concerning the MSO, habitat needs of this species, the project description, and information furnished by the Forest Service, take is anticipated for the MSO as a result of the following:

a) Prescribed natural fire which is permitted to burn in MSO PACs during the breeding season (March 1 - August 31).

b) Prescribed natural fire which is permitted to burn in the 100-acre nest buffer at any time of the year.

c) Prescribed natural fire which is permitted to burn in unsurveyed, potentially occupied MSO habitat for a period of 10 years.

d) The unknown upper size limits of both individual and cumulative PNF actions in PACs and unsurveyed, potentially occupied habitat for a period of 10 years.

e) The variability of fire effects and the unpredictable nature of weather, which may result in: 1) the fire burning out of prescription and detrimentally affecting habitat, and perhaps requiring suppression, and; 2) the fire burning out of prescription, becoming a wildfire, and then requiring suppression.

AMOUNT OR EXTENT OF TAKE

This biological opinion anticipates the following forms and amounts of take in regard to the proposed action:

DIRECT MORTALITY

A) One MSO or one pair and/or associated eggs/juveniles in the form of direct mortality resulting from owls killed or injured by fire, smoke, or heat for PNF actions that are within prescription.

HARM AND HARASSMENT

The following incidental take is an upper limit anticipated for the life of the proposed action (10 years). Any such take will be reported to the Service on an annual basis (see Reasonable and Prudent Measures). Only that incidental take as described below which occurs will be tallied and reported in the MSO baseline. Take will be tallied when any PAC is affected (see below) and when each increment of 700 acres of unsurveyed habitat is affected by PNF. Therefore, although the Forest Service is permitted the incidental take below, such take will not be counted unless it occurs.

B) Harm and harassment of MSO located in up to two PACs per year related to one or any combination of the following:

a) PNF occurring in the PAC(s) during the breeding season;
AND/OR
b) PNF occurring in PAC(s) nest buffer(s);
AND/OR
c) PNF occurring in PAC(s) in the nest buffer(s) during the breeding season.

A PAC is considered affected by PNF for the purposes of this take statement if one or more acres of the PAC are burned by a PNF to any degree. If PNFs are located in PAC(s) outside of the nest buffer, and are between 1 and 10 acres in size, the Forest Service will discuss with the Service the option of allowing PNF in one additional PAC in the given year.

C) Harm and harassment of MSO through habitat modification of 700 acres of restricted or protected MSO habitat for which adequate MSO surveys have not been conducted (habitat which has not been surveyed to protocol, or for which protocol surveys have been conducted but for which more than one breeding season has elapsed) per year caused by PNF.

The Service anticipates incidental take of MSO located in unsurveyed/inadequately surveyed restricted or protected habitat will be difficult to detect because finding a dead or impaired individual is unlikely due to the large acreage of potentially affected habitat in the project area and the remoteness of much this habitat.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the MSO.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take.

1) The Forest will implement the proposed actions in a manner that minimizes adverse effects to MSO and occupied and potentially occupied MSO nest/roost habitat.

2) Personnel education/information programs and well-defined operational procedures shall be implemented.

3) If fire suppression is initiated, suppression activities shall be carried out in a manner to reduce potential adverse effects to the MSO and its habitat, unless such actions would threaten life or property. This represents the indirect effects of PNF that burn out of prescription. The declaration of wildfire suppression actions are considered emergency actions which require separate consultation.

4) The Forest shall document all actions, report incidental take, and monitor the effects of the proposed action on habitat. These findings shall be reported to the Service.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary. Although several of these measures were included in the project description in a particular form, the Service believes that inclusion of those measures as terms and conditions facilitates clarity and tracking.

1.1 The Forest Service shall allow no grazing in areas where PNF or wildfire has occurred in PACs for a minimum period of one full year after the fire; if no seed head production has occurred by the end of one full year, allow no grazing until seed head production has occurred.

1.2 The Forest Service shall suppress all PNF actions if it is anticipated that the fire may burn out of prescription in the following 24 hours. The Forest Service may choose to suppress PNF actions prior to this.

1.3 For PNF, the Forest Service shall ensure that no more than 10% of the canopy of each PAC will be affected by gaps created by single or groups of trees crowning. Groups of trees that "torch" shall not exceed 2 acres in size.

1.4 The Forest Service shall ensure that no more than two PACs per year within the project area are affected by PNF. A PAC is considered affected by PNF if one or more acres of the PAC are burned by a PNF to any degree. If PNFs in one year are located in PAC(s) outside of the nest buffer, and are between 1 and 10 acres in size, the Forest Service will discuss with the Service the option of allowing PNF to occur in one additional (or the same) PAC in the given year.

1.5 The Forest Service shall ensure that no more than 700 acres of unsurveyed, potential MSO nest/roost habitat is affected by PNF each year.

1.6 Combined MIF, PNF, and wildfire (this includes both wildfire caused by MIF or PNF actions and wildfire resulting from any other cause) shall not affect more than 35,000 acres, or 50 percent of the approximately 70,000 total acres of PACs and restricted and protected MSO habitat, during the life of the Plan. As this figure is approached, re-negotiation with the Service can occur regarding the further use of PNF.

1.7 Delineate, with the cooperation of the Coconino National Forest, the 100-acre buffer zones for the LO Pocket and Stock Tank PACs prior to project implementation within the zone of influence for these areas.

1.8 PNF will be allowed in MSO habitat only under those respective prescriptions as described in the December 17, 1998, modification of the project description.

1.9 Protective measures to protect certain key habitat components of restricted pine-oak habitat will be administered as described in the December 17, 1998, modification of the project description.

1.10 As detailed in the environmental baseline section of this document, the Forest Service agreed to appropriately adjust the boundaries of, and provide maps for, several (Bill Williams, Newman Springs, Sitgreaves, and Tule PACs) existing Mexican spotted owl

Protected Activity Centers on the Kaibab National Forest. The work agreed to on December 18, 1998, must be completed prior to allowing PNF within the zone of influence of those PACs.

2.1 All field personnel who implement any portion of the proposed action shall be informed of regulations and protective measures as described herein for the MSO. All field personnel shall be informed that intentional killing, disturbance, or harassment of threatened species is a violation of the Act and could result in prosecution. A wildlife biologist will present an hour-long program regarding the management of fire in threatened and endangered species habitat to all personnel involved in the fire use program.

2.2 The Forest Service shall review actions after each year of activity prior to further PNF within the project area. Such review will take into account the cumulative effects of all fire activities in the project area.

2.3 The Forest Service shall ensure that all pertinent information from the reasonable and prudent measures of this biological opinion are included in the final burn plans for all PNF actions.

2.4 The Forest Service shall notify the Service within 5 working days of any declared PNF actions in restricted or protected MSO habitat within the project area.

3.1 A Resource Advisor will be available for all suppression activities associated with PNF, or wildfires resulting from PNF, in MSO habitat. Resource Advisors shall be provided adequate information from qualified biologists with knowledge of the MSO and its habitat. The Resource Advisor shall possess maps of all PACs and all potential nest/roost habitat in the project area and vicinity. The Resource Advisor shall coordinate MSO concerns and serve as an advisor to the Incident Commander/Incident Management Team. They shall also serve as field contact representatives responsible for coordination with the Service. They shall monitor fire suppression activities to ensure protective measures endorsed by the Incident Commander/Incident Management Team are implemented.

3.2 All fire suppression actions in PACs will occur, to the maximum extent possible, using "light on the land" methods. This will include not removing trees over 9 inches dbh unless it is deemed necessary to prevent the fire from affecting additional PAC acres.

3.3 If a MSO is encountered during the fire, the Resource Advisor shall be advised immediately. The Resource Advisor shall assess potential harm to the owl and advise the Incident Commander/Incident Management Team of methods to prevent harm. The Resource Advisor shall maintain a record of any MSO encountered during suppression activities. The information shall include for each owl the location, date, and time of observation and the general condition of the owl.

3.4 Restricted and protected MSO habitat disturbed during fire suppression activities associated with PNF events, such as fire lines, crew camps, and staging areas shall be rehabilitated, including the obliteration of fire lines to prevent their use by vehicles or hikers. The effectiveness of such closures shall be monitored on a yearly basis.

3.5 Fire camps, staging areas, and any other areas of disturbance created for fire suppression actions shall be located outside of MSO PACs.

3.6 Patches of unburned vegetation within burned areas shall not be burned out as a fire suppression measure, except as needed to secure the fire perimeter or provide for fire fighter safety.

4.1 By February 1 of each year, prior to further PNF that year, the Forest Service shall submit a report to the Arizona Ecological Service Office detailing the previous year's actions. The Report shall document the areas and acreage burned, the type of fire (MIF, PNF, wildfire), the name(s) of any PAC(s) affected, the amount of unoccupied MSO habitat affected, the extent of any suppression actions, the effectiveness of these terms and conditions, information about MSO monitored or encountered, any rehabilitation completed, quantification of any incidental take as defined in this biological opinion, and any recommendations for actions in the upcoming year(s) . A map shall be provided to the Service of fire that occurs each year. The Forest Service shall keep and maintain a map depicting cumulative fire information for the project area. By March 1 of each year, prior to any PNF implementation that year, the Forest Service will meet with the Ecological Services Office to review the report and discuss the following year's actions relative to the previous year's actions and cumulative actions.

4.2 The Forest Service will ensure that sufficient monitoring of the effects of fire on key habitat components of MSO habitat will be conducted after each PNF event. The intent of this required monitoring is to completely and adequately determine the effects of the PNF event on the key habitat components. The Forest Service, as a minimum, will accomplish qualitative walk-throughs during and after the events. A summary narrative and photographs fully and completely explaining the effects of the event on the key habitat components of MSO habitat will be produced. Each report will include a description of the prescription under which the PNF event occurred.

4.3 As detailed in the project description section of this document, the project description was modified to identify and include additional monitoring of PNF events in MSO habitat. For the sake of clarity and completeness, this term and condition requires that the monitoring will be conducted as described in the December 17, 1998, modification of the project description.

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, this level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. Sections 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. Sections 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

DISPOSITION OF DEAD, INJURED, OR SICK MSO

Upon locating a dead, injured, or sick MSO, initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 602/835-8289) 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. If possible, the remains of intact owl(s) shall be provided to this office. If the remains of owl(s) are not intact or are not collected, the information noted above shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should treated owls survive, the Service should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA 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. Take an active role in continuing surveying the approximately 65,000 acres of potentially occupied MSO habitat in the project area that may be affected by PNF. Given current Forest Service funding constraints, other means of funding should be explored to assist in this effort.

2. Pursue the completion of a forest-wide consultation on wildfire suppression activities.

3. Monitor selected PACs within the project area where PNF has affected the 100-acre nest buffers to determine the direct effects of such actions on individual MSO and reproductive success.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the draft biological evaluation and draft environmental assessment. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (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 that was 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.

Thank you for your consideration of threatened and endangered species. For further information please contact Bill Austin or Bruce Palmer. Please refer to the consultation number 2-21-98-F-246, in future correspondence concerning this project.

Sincerely,

David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (PARD-ES; GARD-AZ/NM)

Director, Arizona Game and Fish Department, Phoenix, AZ

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