

BIOLOGICAL OPINION SUMMARY
Kachina Peaks Wilderness Prescribed Natural Fire Plan

Date of opinion: September 10, 1997

Action agency: U.S. Forest Service, Coconino National Forest, Peaks Ranger District

Project: Kachina Peaks Wilderness Prescribed Natural Fire Plan. The Kachina Burn Plan proposed to re-introduce both management ignited fire (MIF) and prescribed natural fire (PNF) in the Kachina Peaks Wilderness Area and the adjacent Inner Basin. The Kachina Burn Plan outlines actions for a 10-year period of time. MIF will occur at a maximum amount of 1,600 acres per year, with a maximum acreage of 9,000 acres in the next 10 years. MIF will not be conducted in the 100-acre nest buffers of MSO protected activity centers (PACs) and will not be conducted in the PACs during the breeding season. MIF will only be used in habitat surveyed adequately for MSO, and snags and logs within MSO protected and restricted habitat will maintained as described in the project description. The intent of the PNF program is to return fire to the ecosystem. Lightning strikes in the project area are most likely to occur during the monsoon months of July and August. Prescriptions for both MIF and PNF permit only low intensity fires. PNF may occur in MSO PAC nest buffers and within PACs during the breeding season. PNF may also occur in unsurveyed or inadequately surveyed MSO habitat. All human-ignited fires would be suppressed. Wildfires require separate consultation.

Location: Coconino County, Arizona.

Listed species affected: Mexican spotted owl (*Strix occidentalis lucida*) (MSO), a listed threatened species.

Biological opinion: Nonjeopardy

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 2 protected activity centers (PACs) per year; C) Disturbance to MSO and habitat modification of a total of 7 PACs during the life of the Kachina Burn Plan related to MIF occurring in PACs for which the nest site information is 3 or more years old; D) Harm and harassment of MSO and habitat modification of 500 acres of potential nest/roost habitat per year caused by PNF for which adequate surveys have not been conducted, and; E) Harm and harassment of MSO and habitat modification of up to 1 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. Incidental take as described in items B, C, D, and E 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 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 harm 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 the measure through the terms and conditions are mandatory.

Terms and conditions: Twenty-six 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 MIF and PNF actions on MSO protected and restricted habitat in various ways, provides upper size limits for acres of MSO habitat effected by any type of fire within the project area, requires a resource advisor be present during all suppression activities, requires a yearly report from the Forest Service and a yearly meeting with the Service, and requires the use of the Regional monitoring protocol.

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

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AESO/SE
2-21-94-F-220

September 10, 1997

Mr. Bruce Greco
Acting District Ranger
Peaks Ranger District
5075 North Highway 89
Flagstaff, Arizona 86004

Dear Mr. Greco:

The U.S. Fish and Wildlife Service (Service) has reviewed the project proposal for the Kachina Peaks Wilderness Prescribed Natural Fire Plan located on the Peaks Ranger District. Your July 30, 1996, request for formal consultation was received on August 5, 1996. 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 March 17, 1995, biological assessment and evaluation (BA&E), the Forest Service has determined that the preferred alternative "may effect, not likely to adversely affect" the MSO. The Service is unable to concur with the Forest Service's determination of effect for the MSO. Since critical habitat for the MSO has been enjoined by New Mexico District Court (Coalition of Arizona-New Mexico Counties for Stable Economic Growth versus USFWS, No. 95-1285-M Civil, filed March 4, 1997), no conferencing or consultation is required for critical habitat for this species.

This biological opinion is based on information provided in the March 17, 1995, BA&E, the June 19, 1996, BA&E Addendum and draft burn plan, the Environmental Assessment, and the Kachina Peaks Wilderness Fire History Report included with the March 21, 1995, request for informal concurrence from the Peaks Ranger District, and conversations with Tammy Randall-Parker (wildlife biologist), Bob Smith (assistant fire management officer), and Allen Farnsworth (fire management), at the Peaks Ranger District, 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.

It is the Service's biological opinion that the Kachina Peaks Wilderness Prescribed Natural Fire Plan is not likely to jeopardize the continued existence of the MSO.

CONSULTATION HISTORY

Informal consultation on the Kachina Peaks Wilderness Prescribed Natural Fire Plan began in February 1994 when the Forest Service requested a species list. The Service responded to this request on March 4, 1994. The Forest Service provided a BA&E and requested concurrence with a "may effect, not likely to adversely affect" determination for the MSO on March 21, 1995. Informal consultation from that point consisted of numerous conversations between Michele James of the Service and Peaks Ranger District employees. These conversations dealt primarily with the implementation and interpretation of the MSO Recovery Plan (USDI 1995) and the issue of adverse effect. The Service requested additional information on April 4, 1996, during informal discussions. Michele James discussed the additional information needs with the Forest Service in a meeting on June 6, 1996, with Tammy Randall-Parker and Bob Smith of the Peaks Ranger District. The Forest Service provided a BA&E Addendum to the Service for the Kachina Fire Plan on June 19, 1996, which provided the additional requested information.

During informal consultation, the Service indicated that we would not be able to concur with a determination of "may effect, not likely to adversely affect" the MSO, given the prescribed natural fire portion of the proposed action included permitting fire in MSO protected activity centers (PACs) during the breeding season. On July 25, 1996, a meeting was held to discuss the consultation process for the proposed action. This meeting was attended by Greg Goodwin, Cecilia Dargan, Sandy Nagiller, Tammy Randall-Parker, and Bob Smith of the Coconino National Forest, and Michele James and Bruce Palmer of the Service. These discussions primarily involved the process for consulting on natural fire, and led to the conclusion that while lightning strikes are an "act of God," the decision whether to manage the fire or not is a management decision that requires consultation. The Forest Service requested formal consultation for the MSO on July 30, 1996, with no change in the determination of effect from that given in the March 17, 1995, BA&E which was "may effect, not likely to adversely affect." The Service provided a review copy of the draft biological opinion to the Forest Service on July 23, 1997. A meeting was held on July 24, 1997, to discuss the draft biological opinion, specifically the draft reasonable and prudent measures and terms and conditions. Attending this meeting were Michele James and Bruce Palmer of the Service, Tammy Randall-Parker, Bob Smith, Sandy Nagiller, and Cecilia Dargan, of the Forest Service. Minor clarifications of the terms and conditions were discussed. In addition, clarification of the take statement to assist in the reporting process were discussed. The Forest Service indicated that they wished to discuss the revised draft terms and conditions and take statement with the Acting District Ranger before finalization of the opinion. A revised draft biological opinion was provided to the Forest Service on July 28, 1997. The Forest Service informed the Service on September 4, 1997, of a clarification to burning prescriptions for MIF and PNF actions. These minor revisions narrowed the scope of the prescriptions to apply to MSO protected and restricted habitat only.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The Kachina Peaks Wilderness Prescribed Natural Fire Plan proposes to re-introduce both management ignited fire (MIF) and prescribed natural fire (PNF) in the Kachina Peaks Wilderness Area (Wilderness Area) and adjacent area. The Kachina Fire Plan proposes actions within the 18,200-acre Wilderness Area as well as within the 838-acre Inner Basin, located to the east of, and adjacent to the wilderness area. The Kachina Fire Plan outlines proposed actions for a 10-year period of time (pers. comm. Bob Smith, Peaks Ranger District). The Wilderness Area is located on the upper elevations of the San Francisco Peaks, approximately 3.5 miles north of Flagstaff, Arizona. The wilderness and Inner Basin are located primarily in the north half of T22N, R07E, and the south half of T23N, R07E (see Map 1, General Location).

Fire suppression has taken place in the project area since the 1930's, and most fires have been controlled to 10 acres or less. This has led to an increase of fuel loads in some areas to levels above what may have naturally occurred. High fuel loads are of particular concern in the ponderosa pine type within the project area. Currently there is no Fire Management Action Plan or PNF program for the Kachina Peaks Wilderness. The present policy as described in the Coconino Forest Plan (1987) is to suppress fires so they do not exceed 10 acres in size. The Forest Plan also states that a PNF program will be undertaken for wilderness areas. Prior to initiating a PNF program, a Fire Management Action Plan must be developed. This plan must describe how and where natural fire will be allowed to burn, location and prescription guidelines, and the decision process to determine whether to suppress or monitor lightning caused fires, and how MIF will be implemented. The Fire Management Action Plan for the Kachina Peaks Wilderness Area and Inner Basin is the subject of this consultation.

MIF

MIF is defined as fire burning under conditions specified in an approved plan and ignited by Forest Service personnel. In ponderosa pine areas, the goal of the Burn Plan would be to use MIF to lower the amount of fuels, thus allowing lightning-ignited fires to burn more safely in these areas at a later time. However, lightning-ignited fires may burn in these areas prior to MIF being introduced. The burn plan indicates that the burning prescription for MIF is as follows for actions in MSO protected and restricted habitat as defined by the MSO Recovery Plan (USDI 1995):

- Low intensity fire with 2-3 foot flame lengths;
- Maximum temperature of 85 degrees fahrenheit;
- Minimum of 10 degrees fahrenheit;
- Relative humidities must be between 20 and 100 percent;
- Fuel moistures in the 1000-hour fuels must be >25 percent.

Outside of MSO protected and restricted habitat, the fuel moistures in the 1000-hour fuels must be >15 percent. The Forest Service may choose to apply the prescriptions for MSO habitat in other habitat types. Each individual MIF will have its own burn plan completed.

The project area has been divided into six Zones. MIF is proposed for portions of Zones #2 and #3 only. These Zones are composed of ponderosa pine on south and northwest aspects and north and northeast aspects, respectively. Some mixed conifer is present as well within these Zones. MIF is proposed on 9,000 acres within Zones #2 and #3. MIF would be utilized in these areas where unnaturally high fuel accumulations are identified. The objective of MIF would be to bring fuel loads down to lower, more natural levels. In addition, MIF would be utilized around structures in the Inner Basin and Snowbowl Ski Area. MIF in these areas would consist of a 10 chain (660 feet) buffer around the permit areas. MIF in other areas would be conducted in 200-acre blocks; 100-acre burn blocks will be used in MSO PACs. Spacing between MIF burn blocks would be 200 acres or more. When fire line construction is necessary, light hand techniques would be used. Minimal scratch lines would be utilized and a reliance on trails and natural fire barriers would be emphasized.

Within the southern slopes of Zone #2 of the project area, the objective would be to burn three 200-acre blocks annually. Within the western slopes of Zone #2 in the project area, two 200-acre blocks would be burned annually. Within Zone #3, two 200-acre blocks annually, and two 100-acre blocks within separate MSO protected activity centers (PACs) would be burned each year. In total, MIF could be implemented on a scale of approximately 1,600 acres per year within Zones #2 and #3. If the maximum acreage is burned each year, it would take 5-6 years to accomplish the entire 9,000 acres proposed for MIF. The Forest Service indicates that it is unlikely that the maximum acreage would be burned each year due to the occurrence of PNF as well as due to monetary limitations and optimum prescribed weather conditions (pers. comm. Bob Smith, Peaks Ranger District). The actual rate of implementation would depend on fuel moisture conditions, funding, and PNF activities of both the recent past and for the year of the action.

Monitoring would be conducted for a portion of the MIF occurring in PACs or reserved lands. A vegetative monitoring plan is a part of the proposed action. This would consist of either the District's plan to monitor the vegetation on two 40-acre blocks within the 9,000 acre MIF area, or to conduct the Regional monitoring protocol if it is completed prior to the need for monitoring. The District's monitoring plan would sample 100 percent of the logs, snags, mature ponderosa pine and Douglas fir, and the regrowth of vegetation both before and after MIF. Canopy closure data would also be incorporated into the sampling design. The monitoring results would be utilized in future MIF to determine if prescriptions would need readjustment. A copy of the monitoring plan is included in the project file for this consultation.

Conservation and protective measures for MIF located in MSO protected and restricted habitat include the following:

- A. The 100-acre MSO nest buffers within all PACs would be deferred from treatment. This would be accomplished through utilizing topographic and other natural barriers to provide a fuel break, or through line construction. All fire line construction in PACs would be coordinated through a wildlife biologist on the Peaks Ranger District.
- B. MIF in PACs would occur September 1 through February 1 only, outside the MSO breeding season.
- C. All PACs within the project area would be reviewed by biologists and fuels management specialists to determine if and where MIF will be utilized. Burns would be designed and implemented to meet objectives of the MSO Recovery Plan (USDI 1995). The objectives of the Recovery Plan would be included in the burn plans. A cumulative map and records of all activities taking place in PACs would be maintained to assist in planning each MIF and for decisions for PNF. These records would include all habitat modification occurring within PACs located at least partially within the project boundaries.
- D. Within PACs, MIF would be introduced in blocks of approximately 100 acres to ensure the protection of vole habitat, one of the dominant MSO prey species.
- E. Snags 18 inches dbh and greater would be hand-lined prior to implementation to prevent their loss; 80-90 percent of the downed logs 12 inches and greater diameter at midpoint would be maintained through monitoring the fuel moisture content of 1000-hour fuels and hand-lining logs.
- F. MIF would only be utilized in areas which have had a minimum of two years of survey for MSO. Surveys for MSO according to protocol would be conducted in all areas currently not surveyed which have the potential for owl use. The upper limit for potential owl use in the Kachina Peaks Wilderness is defined at 10,000 feet in elevation.

PNF

PNF is defined as fire ignited by lightning and burning under conditions specified in an approved plan. All human ignited fires such as campfires and arson would be suppressed. The intent of the PNF program is to return fire to the ecosystem. Lightning strikes in the project area most often occur during the summer monsoon months of July and August, however, not all strikes result in fires. Fires occur only about 4 or 5 times within the project area each year. Less than one time per year will a lightning-caused fire grow into a larger crown fire. When a lightning-caused fire is detected, a fire specialist would visit the site and report fire behavior, wind direction, location and rate of spread. At that point, the Peaks Ranger District Fire Management Officer would determine if the fire is within prescription parameters and the direction the fire would likely travel. If the fire is southeast of the Snowbowl Ski Area, or if the fire behavior is outside of the prescription parameters, then the decision would be to suppress the fire. If the fire appears to be within prescription parameters, the decision would be to declare the

fire a PNF, and a burn plan would be developed within 72 hours. It is estimated that most burn plans would be completed within 1-3 hours of the decision to manage a fire as a PNF (pers comm. Bob Smith, Peaks Ranger District).

PNF would be allowed to burn within prescription parameters in all Zones. Zone #1 is the San Francisco Peaks Research Natural Area and Zone #5 is the Inner Basin. Within these Zones, PNF will be allowed with a size objective of 100 acres. Zones #4 and #6 are mixed conifer on the north and south aspects on the project area. PNF would be allowed within prescription parameters with a size objective of 500 acres in these Zones. Within Zones #2 and #3 fire would be allowed to burn. No upper size limit for PNF is proposed at this time for any Zones. Lightning-caused fires would be suppressed if necessary based on judgements about suppression forces available, expected fire behavior, whether or not structures are threatened, or if smoke levels are deemed unacceptable. The Environmental Assessment states that based on the past number of lightning caused fires in the Wilderness Area, it is estimated that PNF may be allowed to burn 1-5 times per year in the project area. It is possible that more than one PNF may be burning in the project area at the same time. During PNF, the possibility of stand replacement fires would exist in all Zones. The Forest Service may decide a need exists to "burn out" during PNF actions to assist in containing the fire. "Burning out" is considered a suppression action, and would involve personnel using drip torches to start fire at one end or around the perimeter of a PNF. This would assist in preventing the PNF from burning beyond the project area boundaries, for instance, or would assist in preventing the fire from burning additional acres outside the "burned out" perimeter.

According to the Forest Service, PNF would be allowed to burn within the mixed conifer Zones if the fire intensity is such that the fire is "low intensity" and does not burn at "high intensity". A "low intensity" fire in mixed conifer is not stand replacing; it consists of flame lengths of 2-3 feet, with only isolated "torching" of individual trees which may create small gaps in the canopy. A "high intensity" fire is one that becomes a crown fire and severely impacts large areas. A fire of this type in mixed conifer would be considered out of prescription and would be suppressed. The Burn Plan prescription for PNF is identical to the prescription parameters for MIF previously mentioned.

Conservation and protective measures for PNF include the following:

- A. All PNF would be reviewed each day to ensure that the fire would remain within prescription for the ensuing 24-hour period, given reasonably foreseeable weather conditions and expected fire behavior. A PNF would be declared a wildfire when the fire exceeds, or is expected to exceed, one or more prescription parameters and/or holding capability. A wildlife biologist and a fuels specialist would monitor PNF for affects to MSO habitat.
- B. Suppression of PNF would be considered if the fire enters or threatens nest buffers within PACs. A fuels specialist and a biologist would review the PNF on the ground and

determine impacts of suppression on the species and its habitat. The decision would be made on a case-by-case basis whether PNF or suppression action would be taken based upon which would cause the least disturbance to the owl and its habitat.

- C. Decisions on the size of PNF would be flexible to account for MIF action conducted within the same year to account for re-current fire activity in proximity in the same year.

PNF would be allowed to burn within prescription regardless of present or future survey efforts for MSO. PNF may occur within known PACs, within the nest buffers of PACs, and within potentially occupied habitat that has not yet been surveyed. PNF may occur within PACs at any time of the year, including during the breeding season (March 1 - August 31). Unsurveyed potential habitat will not necessarily be surveyed prior to PNF. There are no mitigation measures to protect snags or down logs other than that which can be accomplished within the parameters of the burning prescription.

Monitoring of PNF would include a ground review of on-going burns by a wildlife biologist and a fuels specialist. Qualitative walk-through monitoring would be conducted which would include taking photographs of active burns and completing a summary of visual inspections of the habitat attributes as described in the MSO Recovery Plan (USDI 1995), pages 106-107. This summary will include gathering information on burning data which address the burn prescription, as well as observations of wildlife habitat such as snags and logs consumed and gaps created.

STATUS OF THE SPECIES

Species Description - Mexican Spotted Owl

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.

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 Kachina Peaks Wilderness Fire Plan project area is located at the northern edge of the Upper Gila Mountains RU as defined by the MSO Recovery Plan (USDI 1995). This 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.

ENVIRONMENTAL BASELINE

Project Location and General Vegetation Communities

Proposed MIF and PNF actions would be located within the 18,200-acre Kachina Peaks Wilderness Area as well as within the 838-acre Inner Basin, located to the east of, and adjacent to the Wilderness Area. The Kachina Peaks Wilderness Area is part of a large, heavily vegetated, composite volcano rising 7,400 feet in elevation to 12,633 feet, and includes Humphrey's Peak, the highest point in Arizona. C. Hart Merriam conducted extensive research in the area in the 1880's and established the well-known life zone concept. In the project area, these zones consist of the Arctic-Alpine (12,000 feet and greater), Hudsonian (11,000 to 12,000 feet), Canadian

(9,000-11,000 feet), and Transition (7,000 to 9,000 feet). Some plant species of the Upper Sonoran (4,000-7,000 feet) can be found within the Wilderness Area at the lower elevations with a southern aspect.

Silvicultural examinations conducted by the Coconino National Forest indicate forest types (stands) in the Wilderness Area (pre-wilderness inventory boundaries) (Farnsworth 1989). This is not a complete accounting of habitat acres within the project area, but was the only habitat type information presented.

2,839 acres of ponderosa pine (14%)
 4,841 acres of mixed conifer (24%)
 3,517 acres of aspen (18%)
 5,266 acres of spruce-fir (27%)
 927 acres of bristlecone pine (5%)
 2,440 acres of non-forested type (12%)

Pure stands of ponderosa pine (*Pinus ponderosa*), aspen (*Populus tremuloides*), Engelmann spruce (*Picea engelmannii*) and bristlecone pine (*Pinus aristata*) are present. However, usually these species are located in a composite stand. Other species found in the wilderness include Douglas fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), and corkbark fir (*Abies lasiocarpa*). A few isolated pockets of Rocky Mountain maple (*Acer glabrum*) have been identified in mesic sites, as has Scouler willow (*Salix scouleriana*). Gambel oak (*Quercus gambelii*) is present on the southern slopes of the Wilderness Area.

The climate of the project area can be extremely variable. Winters are characterized by clear, cold nights and bright, sunny days. Winter snows can be exceptionally deep, and avalanches are not uncommon at the elevations above 10,000 feet. Winters can also bring little snow even to the higher elevations. Spring is characterized by windy and sunny days with an occasional storm front passing through. Late May and early June are normally the driest time of the year and the time of the highest fire danger (Farnsworth 1989). If wind and low humidities in the spring follow a dry winter, the fire danger can become extremely high. Fall is characterized by dry, warm, sunny days and cool nights. Snow can occur as early as October in the higher elevations. Snow often lingers on the north slopes of Humphrey's Peak well into the summer. The prevailing wind is from the south-southwest for most of the year (Farnsworth 1989). The average precipitation for Flagstaff, Arizona, between 1897 and 1987, was 20.4 inches (Farnsworth 1989). There is no permanent weather station on the San Francisco Peaks, therefore precipitation information is not available specifically for the project area. It can be assumed that the project area receives more precipitation than Flagstaff itself as an effect of orographic lifting, where the air is forced up the windward side of slopes causing these slopes to receive the heaviest precipitation.

In early to mid July, the summer monsoons begin. Moisture from Mexico moves into Arizona at this time and often results in violent afternoon thunderstorms over the project area. According to

Farnsworth (1989), the first few storms of the monsoon season often only result in dry lightning. After the first surge of moisture, it is not uncommon for dry weather to set in again for several days or even longer. This normally results in high temperatures, low humidity, and sometimes, high winds. When all of these conditions develop, fires have the potential to spread over large areas. When the thunderstorms return, they are accompanied by frequent lightning, high winds, locally heavy rain, and at times, hail. This pattern continues through mid to late August.

The San Francisco Peaks have one of the highest occurrences of lightning in the United States (Farnsworth 1989). Colton and Baxter (1932) noted that the thunderstorms are so frequent that Flagstaff ties with Santa Fe, New Mexico, for second place among the cities of the United States for the number of days on which thunder is heard. Lieberg *et al.* (1904) noted that lightning struck trees are common on the slopes east of the San Francisco Peaks, and that sections existed where 50 percent of the mature yellow pine was either wholly or in part killed by lightning strikes. The average number of lightning fires reported for northern Arizona is the highest in the U.S. at over 60 fires per million acres (Schroeder and Buck 1970).

Cattle and sheep grazing has occurred in the Wilderness Area and Inner Basin since European settlement. The grazing allotment permit for the project area has been held by the Navajo Nation since 1986. The Navajo graze both cattle and sheep. This permit was renewed in 1991 for a period of 10 years. The Navajo have not grazed the two pastures within the project area (Deadman's and Frisco Mountains) in 1996 and 1997, and are not expected to graze these pastures in 1998 (pers. comm. Buck Wickham, Range Technician, Peaks and Mormon Lake Ranger Districts). The Inner Basin and the tundra areas of the project area are closed to grazing due to the municipal watershed and the fragile nature of the tundra. The Navajo were originally permitted 3,600 head of yearlings. This number has been reduced to 1,600 head of yearling (pers. comm. Buck Wickham).

Fire history of the San Francisco Peaks area is varied. Cooper (1960) indicated that fire was used heavily by Native Americans in the late 1800's for hunting on the Kaibab Plateau and in the White Mountains of Arizona. It seems reasonable to conclude that the same holds true for the San Francisco Peaks area. An early pioneer of the area, John Lend, first arrived in Flagstaff in 1881 and witnessed the Native Americans setting fire to the Peaks to drive the game down (Cline 1976). Cooper (1960) indicates that the arrival of Native Americans may have intensified the extent of fire in the forest, but lightning fires were prevalent long before.

Early Arizona European settlers observed that the Flagstaff area was composed of vast forests of gigantic pine, interspersed with open glades, meadows and wide savannas, and covered with thick grass. In 1901, Leiberg (1904) noted nine old burns on the Peaks, with the most extensive of these occurring on the southern, western, and northern slopes of the Peaks, covering 18,000 acres. Leiberg estimated that these fires took place 100 to 110 years previously. It is believed that the largest of these fires was located in the Inner Basin. The Inner Basin fire left pockets of unburned or lightly burned old growth Engelmann spruce and other species.

Research conducted at the Chimney Springs study area in the ponderosa pine type, located two miles south of the Kachina Peaks Wilderness boundary, indicate that the composite fire interval for the 336 year period of 1540 through 1876 averaged 4.9 years, while the average individual tree fire intervals ranged from 4.4 to 17 years for the same period. After 1876, the fire frequency dropped radically. Deiterich (1980) theorized that grazing practices reduced the amount of grass in the area, therefore eliminating the primary fire-carrying medium in the area. Since the Coconino National Forest was created in 1908 and into the 1930's, fuelbreaks were built, trails were constructed, and fire lookout points were developed. In the 1930's the Civilian Conservation Corp was established to fight forest fires. By the mid-1970's, the Coconino National Forest had one of the largest fire suppression organizations in the country (Farnsworth 1989). During this time, a policy of total fire suppression, logging, and grazing contributed to the build up of unnatural levels of fuel loads.

Farnsworth (1989) analyzed record of both lightning-caused and man-caused fires for the Kachina Peaks Wilderness Area and Inner Basin for the years 1958 through 1988. Suppression action was taken on all fires. During this period, there were 90 lightning-caused fires. Four of these fires reached size class B (1/4 - 9 acres), with the remainder being in size class A (<1/4 acre). The majority of these fires were clustered near the Wilderness boundary on the south and east sides. The northwest quarter of the Wilderness had only three lightning fires during this time. This portion of the Wilderness contains very high fuel loads, therefore it is hypothesized that the lack of lightning fires in this area may be partially a result of thunder cell development patterns of the Peaks. During the period between 1958 and 1988, there were 73 man-caused fires within the Wilderness area and Inner Basin. Twenty-one of these were class B, two were class C (10-99 acres) and one was class D (100-299 acres). No data was presented for the number of fires occurring between 1989 and 1996. The Service is aware of the Bear Jaw Wildfire of 1995 which was located in the Wilderness Area on the north side of the Peaks, and reached a size of 780 acres. In addition, the Hochderffer Wildfire occurred in 1996 and burned 16,580 acres to the north and adjacent to the Wilderness Area. It is generally felt that the number of man-caused fires in the Wilderness Area and Inner Basin will continue to increase because the population of the state is expected to continue to grow, which in combination with the easy access and draw to the highest peak in Arizona, will cause increased use of the project area. With increased human use and the current fuel loads, major catastrophic fires are highly probable (Farnsworth 1989).

Farnsworth (1989) indicates that fires burning under natural conditions in the Wilderness Area and Inner Basin could be expected to run rapidly during the day and very slowly at night, as the temperatures decrease, the winds drop, and the relative humidity rises. This cycle would continue until the fire was stopped by natural barrier, a wetter fuel type, and/or a break in the weather. The final result of a fire is dependent upon a complex set of interrelated factors. Generally, as the elevation of the project area increases, the probability of factors leading to and sustaining a fire, decrease. Generally, fall fires would not burn as intensely as spring or early summer fires. Since conditions influencing fire intensity and behavior do not stay constant for long, fire would create a diverse mosaic pattern in the area. Under natural conditions, it is expected that the fire frequency in the ponderosa pine type would average between 2 - 14 years,

in the mixed conifer type, 15 - 30 years, in the spruce-fir type, 50 - 300 years, and an undetermined, but extremely long period of time in the bristlecone pine type (Farnsworth 1989).

Status of the Mexican Spotted Owl and its Habitat in the Project Area

Surveys for the MSO have been conducted on 7,100 acres of the project area since 1988. Survey efforts to date have located six MSO territories within or partially within the project area, and one immediately adjacent to the project boundary. All management territory (MTs) have been drawn into PACs as specified in the MSO Recovery Plan (USDI 1995), except for a new owl located in 1996. A PAC will be drawn for this new bird based on information gained during surveys in 1997 (pers. comm. Tammy Randall-Parker, Peaks Ranger District). Table 2 displays the acreages of the delineated PACs and nest buffers for each territory, and the respective acreages which fall within the project area boundaries. The PAC for the bird located in 1996 will be entirely within the project area.

East Bear Jaw Canyon PAC

The East Bear Jaw Canyon pair was first located in May 1995. Occupancy of the pair was determined but nesting status was unknown prior to the Bear Jaw Wildfire which occurred in July and August 1995. The Bear Jaw Wildfire burned 493 acres of the PAC with 250 acres of the PAC remaining unburned. The 250 acres of unburned habitat in the PAC is located outside the project area. High intensity fire conditions burned 205 acres of the PAC which resulted in a crown fire and stand replacement. The original 100-acre nest buffer was partially burned during the Bear Jaw Wildfire, but not by a high intensity fire. A dead MSO was located by a wildlife biologist during the initial attack of the Bear Jaw Wildfire, but the death was not due to the wildfire. The currently designated nest buffer is mixed conifer and contains no burned habitat. The East Bear Jaw PAC was found to be occupied by a pair of MSO in 1996, but nesting status was unknown.

Table 2. Protected activity centers (PACs) acreages and nest buffer acreages within and immediately adjacent to the Kachina Fire Plan project area boundaries (KFP).

Territory & Number	Total PAC	KFP PAC	Total Nest Buffer	KFP Nest Buffer
East Bear Jaw Canyon #040233	737	664	109	109
Jack Smith #040209	600	85	100	0
Pipeline #040201	633	143	100	32
Weatherford #040208	650	275	100	100
Orion Sprg. #040207	735	363	113	27
Snowbowl #040205	655	331	100	100
Veit Sprg. # none (not drawn yet)	~600	~600	~100	~100
Little Sprg. #040227	600	0	112	0

The PAC lies within Zone's #3 and #4 of the Kachina Wildemess Fire Plan and therefore would receive both MIF and PNF treatments as described in the proposed action. Additional monitoring of the PAC to locate the nest/roost site(s) is scheduled prior to conducting MIF within the PAC. The results of such monitoring may also lead to modification of the nest buffer and/or PAC boundaries depending on the results. The Forest Service indicates that this PAC was significantly impacted by wildfire in 1995, and with suppression efforts, received some disturbance. The Forest Service indicates that additional disturbance or fire in this PAC will be avoided until re-growth of vegetation is observed. MIF would be used only after a review of the area by a biologist and fuel specialist determines a need for additional fuel reduction.

Jack Smith PAC

The Jack Smith MSO pair were located in June 1987. This pair of MSO are elusive; when located in 1987 no vocalizations were made, and since that time, the pair has never been heard, only visually observed. The last sighting of the owls in this PAC was in 1991 when a single MSO was flushed from a roost by Forest Service personnel hiking in the area. Informal monitoring has occurred in 1992, 1993, and 1995, with no responses or locations detected. No monitoring of this PAC took place in 1996.

The Jack Smith PAC includes approximately 125 acres of MIF which was conducted in October 1994. No burning took place in the nest buffer of this PAC. Approximately 85 acres of this PAC occur within the project boundaries, with the remaining portion of the PAC located outside the Wilderness area. The 85 acres within the PAC and project area occurs within Zone #3, thus both MIF and PNF would occur under the proposed action. Additional monitoring of the PAC is scheduled to occur to locate nest/roost site(s) prior to MIF being conducted in the PAC.

Pipeline PAC

The Pipeline MSO pair was located in 1984. The site has consistently had a pair present each year it has been monitored, and is known to have fledged one young during four different years. The PAC contains no past prescribed fire or harvest activities. Most of the PAC and all of the nest buffer is located outside of the project area, with only 143 acres of the PAC located in the project area. The Forest Service indicates that fuel loading is very high throughout this PAC. The 143 acres within the project area are located in Zone #3, therefore both MIF and PNF could occur under the proposed action.

Weatherford PAC

The Weatherford pair were located in 1985. The site has consistently had a pair present however few young have been produced. The PAC contains several past activities including thinning and pile burning on 54 acres. The 275 acres of the PAC which are located in the project area are within Zones #2 and #4, therefore both MIF and PNF may occur in the area under the proposed action.

Orion PAC

The Orion pair was located in 1987. A pair is consistently present and young have been produced during four years. Only a male was located in the PAC in 1996. This PAC contains 40 acres of MIF which was conducted in January 1996. The habitat in the PAC is dominated by mixed conifer, pine, and aspen forest types, and 363 acres of the PAC is within Zone #2 of the Kachina Fire Plan, therefore, both MIF and PNF may occur within the PAC. The Forest Service indicates that this site is receiving high recreational use due to the Fredlien Prairie Road which bisects the PAC. In addition, the fuel loading is extremely high in the nest buffer and portion of

the PAC outside the project area and is at high risk for catastrophic wildfire, and is therefore a high priority both MIF and PNF.

Snowbowl PAC

The Snowbowl pair were located in 1985. A pair has been located in recent years, but the birds are elusive in that follow-up survey efforts have located few roosts and only one nest site to date. The nest buffer and 331 acres of the PAC are located within the project area. Habitat within the PAC is dominated by mixed conifer habitat but some pure stands of pine are present. The Forest Service indicates that there may be treatment within this PAC outside the project area under the Wing 10K Analysis Project. The purpose of treatment in this portion of the PAC would be to reduce fuel loads and treat dwarf mistletoe. The portion of the PAC within the Kachina Project area is located in Zone #2, therefore both PNF and MIF may be used. This site, like the Orion PAC, is at high risk for catastrophic fire due to its proximity to heavily used recreation sites and trails and use of the Snowbowl Road which bisects the PAC.

Veit Spring PAC

Information gained in 1996 indicate that an additional male MSO is located within or adjacent to the Snowbowl PAC. Pending information gained in 1997, a PAC will be drawn to encompass this bird(s). Such information may require the re-drawing of the Snowbowl PAC as well. It is not yet known if the entire PAC or only a portion will be located within the project area. The same is true for the 100-acre nest buffer. This PAC would likely be at high fire risk as well due its location near high use recreation areas. PNF and MIF may be used within this PAC.

Little Spring PAC

The Little Spring PAC is located outside of but adjacent to the northwest boundary of the project area. The pair were first recorded in 1930 when an adult female was collected by Mr. Sefton, a writer for the journal *The Condor*. The specimen is in a collection at the San Diego Society of Natural History. Surveys for MSO in this area began in 1984 and continued for almost 10 years with negative results, until the summer of 1993 when a pair was located. The PAC is entirely outside the project area, but the boundary of the PAC lies on the wilderness boundary. No MIF or PNF is planned for the PAC, but there is the possibility of fire entering the PAC from a PNF within the project area.

MSO Habitat

The Forest Service estimates that the project area contains approximately 10,300 acres of potential owl habitat outside of PACs, while the six current PACs encompass approximately 2,461 acres of the project area. Therefore, approximately 12,761 acres, or 67% of the 19,038 acre project area is composed of both occupied and potential owl nest/roost habitat. The minimum nearest-neighbor distance between two active nests in the San Francisco Peaks is

reported to be 2.7 kilometers (1.7 miles) (Ganey and Balda 1989). Based on this distance, and taking into account the current activity center locations of known PACs, the location of large meadows and large stands of aspen, and using an upper elevation limit of 10,000 feet and assuming that all remaining habitat within the project area provides potential nest/roost habitat, the Service estimates that there is habitat for approximately 6 more owl territories within or partially within the project area.

The Forest Service has formally consulted on 188 timber sales and other projects in Arizona and New Mexico since August 1993. These projects have resulted in the anticipated incidental take of 73 owls. 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.

EFFECTS OF THE ACTION

The Service is committed to large-scale, ecosystem based management and fully supports the proposed Kachina Fire Plan. 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 affects 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 RU. 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 proposed actions 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 characteristics 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).

MIF and PNF are 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. Crowning would be expected to affect the canopy in localized areas, usually composed of groups of 4-5 trees, but is not expected to effect areas over 2 acres in size (pers. comm. Bob Smith, Peaks Ranger District). Such crowning should not effect the overall ability of the area to function as habitat for the MSO. Some loss of the lower canopy may be expected as flame lengths of the prescription are 2-3 feet in height. This is likely to be particularly true in mixed conifer habitats which are usually denser and contain more of the "ladder fuels" created by smaller conifer trees. 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 effect the ability of MSO to forage successfully.

MIF

The Forest Service indicates that the locations where MIF will be introduced within PACs has not yet been determined. Burning is proposed in two, 100-acre blocks within separate PACs each year. Burning is proposed in increments of 100-acres to ensure the protection of vole habitat. As all burning in PACs will take place outside the MSO breeding season and outside the 100-acre activity center, MIF is not expected to result in direct effects to owls such as those related to flame and smoke exposure. A fire risk assessment completed by the Peaks Ranger District (April 8, 1997) indicates that the District has identified three of the six current PACs in the project area as being at the highest risk of catastrophic wildfire on the District. These PACs are Snowbowl, Weatherford, and Orion, and are located along the southern boundary of the project area. The Service commends this overall planning effort and encourages the use of MIF in these PACs given that nest sites are located prior to burning.

The MSO Recovery Plan (USDI 1995) states that the nest site must be known before burning occurs in the PAC, as this information is needed to determine the location of the 100-acre activity center and protect it from fire. Information in the Service's files indicates that there is limited or no information on nest locations of the Jack Smith (040209), East Bear Jaw (040233), and Veit Spring (number not yet assigned) PACs, while the other four designated PACs have varied levels of recent information on nest locations with some of it dating back to 1991. The Service believes that the most accurate, up-to-date information needs to be used to determine 100-acre activity centers before MIF occurs in PACs. The Forest Service does not present information regarding the schedule for repeated MIF within PACs. The Service is concerned about the interval of burning within PACs. Repeated burning of the same 100-acre blocks by MIF in PACs is likely to result in further reductions of important habitat components such as down woody material, snags, and canopy cover.

The Forest Service has committed to protecting 80-90 percent of the downed logs 12 inches dbh and greater, and to hand-lining snags 18 inches dbh and greater for all MIF actions within MSO protected and restricted habitat as defined by the MSO Recovery Plan (USDI 1995). These protective measures will assist in maintaining these important components of MSO prey habitat. The Service believes these measures will assist in ensuring that these habitat components of importance to the MSO are retained in the PACs.

MIF will be applied at a level of up to 1,600 acres per year (1,000 acres per year in Zone #2; 600 acres per year in Zone #3) with a total goal of 9,000 acres within the next 10 years. These zones encompass the lower and mid elevations of the project area where the majority of the occupied and potentially occupied MSO habitat is located. The Forest Service indicates that MIF will only be utilized in areas which have a minimum of two years of MSO survey and that surveys will be conducted in all areas not currently surveyed prior to MIF. No information was provided on the dates of the surveys conducted to date except that they began in 1988 and were continued through 1997. The Service's policy is that potential nest/roost habitat is considered inadequately surveyed if more than one breeding season has elapsed since the last year of survey to protocol. The Service therefore considers inadequately surveyed habitat to be occupied by MSO. Follow-up surveys consisting of an additional year of survey (4 visits) must occur prior to actions that may effect the owl or its habitat. Therefore, it is likely that much of the previously surveyed habitat in the project area is now considered inadequately surveyed and would need an additional year of survey prior to MIF to determine occupancy/non-occupancy.

If MIF burns out of prescription it will be declared a wildfire. Wildfire effects may include stand replacement of known owl PACs and/or stand replacement of unsurveyed potential nest/roost habitat both within and outside of the project area. Direct effects to MSO may include death of adults and/or juveniles, flushing of MSO off nests/roosts, smoke inhalation, and human disturbance related to fire suppression actions such as backfiring and the use of slurry tankers, helicopters, and chainsaws.

PNF

The random nature of lightening 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 lightening 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 lightening-started fire falls within prescription parameters, it will be allowed to burn. If it does not, it will be extinguished 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 or groups of trees crowning. In addition, the effects of smoke on adult and young owls is largely unknown and may directly effect the health of owls or the ability of owls to forage successfully, and therefore may effect 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.

The Forest Service estimates that PNF may occur 4-5 times per year in the project area. Given that the locations and number of the lightening 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 effected by PNF during one or more years of the 10-year period of the Kachina Burn Plan. In addition, it is possible that PACs and potentially occupied habitat may be burned multiple times during the next 10-year period. Forest Service information indicates that the southern slopes of the San Francisco Peaks have historically received the highest amount of lightening fires (pers. comm. Alan Farnsworth, Peaks Ranger District). The southern slopes of the project area contain four known PACs and habitat for approximately two more territories. It is likely that this area may be the most likely to be effected by multiple PNFs. 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 effect 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. Paton *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. No chainsaws, power equipment, or mechanized equipment would be used during PNF if the actions remain within prescription, but such equipment may be used to control a wildfire. The Forest Service indicates that they will determine if fire suppression action is needed within a PAC activity center based on site-specific information and professional opinion about which action have the least adverse affects to the owls and its habitat. 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 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.

The Recovery Team believes that the owl population within the Upper Gila Mountains RU could be uniquely important to the overall stability and persistence of the MSO population in the United States. This is due to the location of this RU near the center of the MSO's range and because of its large and relatively continuous owl population. Specifically, this population could

serve as the source population, providing immigrants to smaller, more isolated populations in other RUs. The Recovery Team believes that the population in this RU should be maintained at current levels and with at least the current level of connectivity within the RU. In addition to providing known MSO nesting habitat, the project area contains potential nesting habitat which can become occupied by dispersing juveniles. Located in the northwestern corner of the RU, the project area is likely to provide both available nesting habitat as well as act as "stepping stone" habitat for dispersing juveniles moving to or from the adjacent Colorado Plateau RU. Significant discontinuities that develop in the MSO's distribution within this RU, and the loss of habitat to support local sub-populations, may jeopardize the recovery of the species (USDI 1995). The loss of a large quantity of owl habitat in the project area due to wildfire(s) would not assist in the achievement of recovery in this RU.

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.

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).

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 that they studied 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 al.* (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 of 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).

The effects of livestock and wildlife grazing on MSO prey species and their habitat is also a complex issue. Impacts can vary according to grazing species, degree of use, including numbers of grazers, grazing intensity, grazing frequency, and timing of grazing, habitat type and structure, and plant and prey species composition (Ward and Block 1995). It is well documented that repetitive, excessive grazing of plant communities by livestock can significantly alter plant

species density, composition, vigor, regeneration, above or below phytomass, soil properties, nutrient flow, water quality, and ultimately lead to desertification when uncontrolled (Belsky and Blumenthal 1997; Ward and Block 1995). These effects have both direct and indirect adverse impacts on animal species that are dependent on plants for food and cover. However, moderate to light grazing can benefit some plant and animal species under certain conditions and in certain environments, maintain communities in certain seral stages, and may increase primary productivity (Ward and Block 1995). No studies document the direct and indirect effects of livestock and wildlife grazing on the MSO or its prey (USDI 1995). However, Ward and Block (1995) indicate that there exists some knowledge regarding the effects of livestock grazing on small mammals frequently consumed by spotted owls and regarding mesic or montane plant communities inhabited by the owl's prey. Based on studies conducted in other areas of the U.S., Ward and Block (1995) indicates that we would expect moderate to heavy grazing to decrease populations of voles and improve conditions for deer mice in meadow habitat. Increases in deer mouse abundance in meadows would not offset decreases in vole numbers because voles provide greater biomass per individual and per unit of area. Such decreases could negatively influence spotted owls occupying the Upper Gila Mountains RU where voles are common prey or used as an alternative food sources when other prey species are diminished (Ward and Block 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 benefited 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.

Both MIF and PNF conducted within the proposed prescription are 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. MIF within PACs, which encompass 75% of the foraging range of MSO on average, will be deferred during the MSO breeding season which overlaps with the rodent reproductive period. This mitigation measure will lessen the impacts on prey species within PACs, therefore, will lessen the impacts to the MSO. PNF however, will most likely 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 MIF and PNF

Reintroducing fire into the montane systems 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. These frequent, low-intensity fires would reduce the possibility of intense fires such as occurred during the Bear Jaw and Hochderffer Wildfires.

Effectiveness of Proposed Mitigation

The Service believes that introducing both MIF and PNF, given the proposed prescriptions, into the Kachina Wilderness should have limited adverse effects to owls and owl habitat. The Service believes that the mitigation measures proposed by the Forest Service for MIF will assist in the reduction of negative effects to the MSO and its habitat. MIF mitigation such as the deferring of the 100-acre nest buffer from burning, burning outside the breeding season, and the survey of habitat before introducing MIF are consistent with the recommendations of the MSO Recovery Plan. The Service's primary concerns regarding MIF in the project area relate to the use of repeated fire in PACs and the use of fire in unsurveyed or inadequately surveyed nest/roost habitat outside of PACs. Specifically, the Service believes MIF may cause adverse effects to MSO and habitat if the nest/roost site of a PAC is not identified using recent information, and if surveys of potential nest/roost habitat are not updated prior to MIF actions, and if burn blocks in PACs are burned more than once.

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 in a large wilderness area. 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 impossible to implement in the Wilderness area and Inner Basin. 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 Kachina Fire 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. Despite the potential short-term negative effects to the MSO and its habitat, the Service believes the long-term effects of PNF in the Wilderness Area and Inner Basin will be beneficial to the owl, and we fully support the Forest's efforts to pro-actively reintroduce natural fire into the project area.

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, land clearing, 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 Kachina Peaks Wilderness Fire Plan, 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 broadly defined 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, except in cases when areas that may support owls have not been adequately surveyed.

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 considered likely for the MSO as a result of the following:

- 1) MIF

- a) Introducing fire into PACs where the current nest/roost site is unknown, or for which such information is 3 or more years old.
- b) Introducing fire into potential nest/roost habitat for which more than one breeding season has elapsed since the last survey for MSO.

2) PNF

- a) Fire which is permitted to burn in MSO PACs during the breeding season (March 1 - August 31).
- b) Fire which is permitted to burn in the 100-acre nest buffer at any time of the year.
- c) Fire which is permitted to burn in unsurveyed, potentially occupied MSO habitat for a period of 10 years.
- c) 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.
- d) The unpredictable nature of fire behavior and the weather, which may result in: 1) the fire burning out of prescription and detrimentally effecting 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 actions of MIF and PNF:

DIRECT MORTALITY

- A) One MSO or 1 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.

The following incidental take is an upper limit permitted for the life of the proposed action (10 years). Any such take will be reported to the Service on a yearly basis (see Reasonable and Prudent Measures). Only that incidental take as described below which occurs will be tallied and reported in the MSO baseline. 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 2 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) Disturbance to MSO and habitat modification of a total of 7 PACs during the life of the Kachina Burn Plan related to MIF occurring in PACs for which nest site information is 3 or more years old; nest buffers of 200-acres will be applied where recent information is lacking.
- D) Harm and harassment of MSO and habitat modification of 500 acres of potential nest/roost habitat (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 for which adequate MSO surveys have not been conducted.
- E) Harm and harassment of MSO and habitat modification of up to 1 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 (i.e. an escaped PNF that is declared a wildfire or is otherwise burning out of the PNF prescription).

The Service anticipates incidental take of MSO located in unsurveyed/inadequately surveyed potential nest/roost 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 this habitat.

This biological opinion does not authorize any form of take not incidental to the MIF and PNF actions as described herein. If the incidental take authorized by this opinion is met, the Forest shall immediately notify the Service in writing. If the incidental take authorized by this opinion is exceeded, the Forest must immediately reinitiate consultation with the Service to avoid a violation of section 9 of the Act. In the interim, the Forest must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an adverse impact to the species. The Forest should provide the Service with an explanation of the cause of the taking.

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 harm life or property. This represents the indirect effects of PNF or MIF 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. Terms and conditions 1.1, 1.2, 1.3, 1.4, 1.5, 1.8, 1.10, 4.1, and 4.2 are adapted from the Kachina Burn Plan's project description and conservation and protective measures included in the project description. These Terms and Conditions are specific only to the conditions of the Kachina Burn Plan project.

- 1.1 The Forest Service shall defer the 100-acre nest buffer of all PACs when conducting MIF actions. This will be accomplished using topographic and other barriers, or through line construction. All line construction in PACs will occur outside the MSO breeding season, will not remove any trees larger than 9 inches dbh unless they pose a threat to the safety of fire fighters, and will only occur with a wildlife biologist from the Peaks Ranger District on-site.
- 1.2 The Forest Service shall introduce MIF in PACs in blocks of 100-acres or less only, and will conduct such actions between September 1 and February 28, outside the MSO breeding season. The Forest Service shall ensure that MIF will not occur in the same burn block more than once during the life of the Kachina Burn Plan. If all or a portion of a

PAC is influenced by PNF, that area will not be burned by MIF for the life of the Kachina Burn Plan.

- 1.3 For all MIF actions located in MSO protected and restricted habitat as defined by the MSO Recovery Plan (USDI 1995), the Forest Service shall hand-line all snags 18 inches dbh and greater, and will ensure the protection of 80-90 percent of logs 12 inches dbh and greater at midpoint through hand-lining these logs and/or burning only when of fuel moistures are adequate to ensure their protection.
- 1.4 The Forest Service shall only introduce MIF into potential MSO nest/roost habitat for which at least 2 years of survey to Forest Service Region 3 policy has been conducted, *and* for which one year of follow-up survey (4 visits) has been conducted if more than one breeding season has elapsed since the last survey to protocol and the action.
- 1.5 The Forest Service shall only introduce MIF into PACs if the nest/roost site is known the year of the action, or for which nest/roost site information is less than 3 years old. If nest/roost information for a PAC is 3 years old or more, a 200-acre nest buffer shall be deferred from treatment until such a time as the nest/roost can be located again.
- 1.6 The Forest Service shall not introduce MIF into the East Bear Jaw Canyon PAC (040233) for the life of the Kachina Burn Plan; the Forest Service shall prevent PNF from occurring in the nest buffer of this PAC to the maximum extent possible.
- 1.7 The Forest Service shall not introduce MIF into the 40 acres of the Orion PAC that was burned in 1996.
- 1.8 The Forest Service shall designate the Veit Spring PAC prior to calendar year 1998 and prior to allowing PNF within this area's zone of influence.
- 1.9 The Forest Service shall allow no grazing in areas where MIF, 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.
- 1.10 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.
- 1.11 The Forest Service shall ensure that prescriptions for MIF in PACs are such that no more than 10% of the canopy of each burn block will be effected by gaps created by single or groups of trees crowning. For PNF, the Forest Service shall ensure that no more than 10% of the canopy of each PAC will be effected by gaps created by single or groups of trees

crowning. Groups of trees that "crown out" shall not exceed 2 acres in size in either MIF or PNF actions.

- 1.12 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.
- 1.13 The Forest Service shall ensure that no more than 500 acres of unsurveyed, potential MSO nest/roost habitat is affected by PNF each year.
- 1.14 Combined MIF, PNF, and wildfire (this includes both wildfire caused by MIF or PNF actions and wildfire resulting from any other cause) shall not effect more than 6,380 acres, or 50 percent of the total 12,761 acres of occupied (PACs) and potentially occupied nest/roost MSO habitat, during the life of the Kachina Burn Plan. As this figure is approached, re-negotiation with the Service can occur.
- 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.
- 2.2 The Forest Service shall review actions after each year of activity prior to further MIF or 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 MIF and PNF actions.
- 2.4 The Forest Service shall notify the Service within 5 working days of any declared PNF actions within the project area.
- 3.1 A Resource Advisor shall be on the fire during all suppression activities. Resource Advisors shall be 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 effecting 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 Areas disturbed during fire suppression activities, 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 MIF or 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 effected, 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 MIF or 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 shall use the Regional monitoring protocol agreed upon by the Forest Service and Service for all pre and post fire monitoring for MIF actions, and PNF actions if applicable, that occur once this is available. Monitoring as detailed in the project description will be used for MIF actions conducted prior to the monitoring protocol finalization.

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.

Notice: While the incidental take statement provided in this consultation satisfies the requirements of the Endangered Species Act, as amended, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act.

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. The Forest Service should ensure that MIF does not occur within the 100-acre nest buffers of PACs. The Forest Service should consider enlarging the 100-acre nest buffer boundary to assist in meeting this objective.

2. The Forest Service should take an active role in surveying the 10,300 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.
3. The Forest Service should pursue the completion of a forest-wide consultation on wildfire suppression activities.
4. The Forest Service should 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.
5. The Forest Service should re-evaluate and re-delineate the Bear Jaw PAC (040233) to include *less* catastrophically burned habitat.

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 Michele James or Bruce Palmer. Please refer to the consultation number 2-21-94-F-220, in future correspondence concerning this project.

Sincerely,

/s/ Sam F. Spiller
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (GMA)(ES)
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM
Forest Supervisor, Coconino National Forest, Flagstaff, AZ

Director, Arizona Game and Fish Department, Phoenix, AZ

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