United States Department of the Interior

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April 21, 2008

Cons. #2-22-05-F-143

Ms. Jacque Buchanan, Acting Forest Supervisor
Lincoln National Forest
1101 New York Avenue
Alamogordo, New Mexico 88310-6992

Dear Ms. Buchanan:

Thank you for your biological assessment (BA) dated December 21, 2007, regarding the request to initiate formal section 7 consultation under the Endangered Species Act of 1973, as amended (Act). This consultation concerns the proposed Perk-Grindstone Fuel Reduction Project (Perk-Grindstone Project), on the Smokey Bear Ranger District, Lincoln National Forest (Forest), New Mexico. The U.S. Fish and Wildlife Service (Service) received your request, including the BA for this project, on December 26, 2007. The BA evaluates the potential impacts of the proposed Perk-Grindstone Project on the Mexican spotted owl (*Strix occidentalis lucida*) (MSO) and its designated critical habitat. You have determined that the proposed action "may affect, is likely to adversely affect" the MSO and its critical habitat and requested formal consultation.

The current biological opinion (BO) does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task Force v. USDI Fish and Wildlife Service (CIV No. 03-35279) to complete the following analysis with respect to critical habitat. This consultation analyzes the effects of the action and its relationship to the function and conservation role of MSO critical habitat to determine whether the current proposal destroys or adversely modifies MSO critical habitat. This document represents our BO for the MSO and its designated critical habitat in accordance with section 7 of the Act.

Consultation History

The Perk-Grindstone Project was originally included in the 2001 Regional Programmatic Wildland Urban Interface (WUI) consultation. The Lincoln National Forest WUI projects were later excluded from this programmatic consultation process. A BA was prepared for the Perk/Grindstone WUI Project and submitted to the Service for informal consultation in

August 2005. We provided comments on draft BAs for the Perk-Grindstone project on June 22, 2006 and March 8, 2007. We also met with the Forest on September 28 and December 6, 2006 and March 8 and April 24, 2007. Site visits to the project area were conducted on July 6, 2005 and May 2, 2007. We received a final BA and the Draft Environmental Impact Statement (DEIS) for the current proposed action on December 26, 2007. We submitted comments on the DEIS on February 8, 2008. The Forest Service notified us on February 20, 2008 that there would be no substantive changes to the proposed action as a result of public comments on the DEIS.

This BO is based on information provided in the BA; the December 18, 2007 DEIS for the project; email and telephone conversations between our staffs; data in our files, data presented in the Recovery Plan for the Mexican Spotted Owl (USDI Fish and Wildlife Service 1995) (Recovery Plan); literature review; the final programmatic biological and conference opinion for the continued implementation of the land and resource management plans for the eleven National Forests and National Grasslands of the Southwestern Region of the Forest Service (Service 2005); and other sources of information including the final rules to list the MSO as threatened (USDI Fish and Wildlife Service 1993; 58 FR 14248) and final rule to designate critical habitat (USDI Fish and Wildlife Service 2004; 69 FR 53182). References cited in this BO are not a complete list of all literature available on the MSO, the proposed action, or on other subjects considered in this BO. A complete administrative record of this consultation is on file at this office. We received all the information necessary to begin formal consultation on December 26, 2007.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The purpose of the proposed Perk-Grindstone Project is to moderate potential wildfire intensity on National Forest system lands surrounding the Village of Ruidoso. The project area is immediately adjacent to the community, which is listed as being at high risk from wildfire as defined by the National Fire Plan of 2000 (Forest Service 2007), and the number one community in New Mexico for being at risk of high severity wildfire. A stand replacing wildfire in the untreated areas on National Forest system lands surrounding Ruidoso could risk the lives of firefighters and others, and destroy private property, public facilities, and natural resource values targeted for conservation in the Forest Plan (Forest Service 2007).

The BA contains a completed description of the proposed action and is herein incorporated by reference. According to the BA, the proposed action would treat 4,855 acres (92 percent) of the 5,207-acre project area, on National Forest system lands, which would begin after the Record of Decision is signed. The proposed treatments may take up to 10 years, with future maintenance burns 5 to 20 years after project completion. The type of treatment proposed for each forest stand would be dependent on multiple factors including: dominate forest type, tree density, tree size distribution, insect/disease infestation, slope, and accessibility.

The proposed action involves two types of treatments:

1. Thin-from-below, to reduce the density in the smaller trees and create a complex mosaic of tree densities and size classes; and

2. Prescribed burning, to reduce activity-generated slash after thinning is completed, or to reduce existing surface fuels on sites where tree-thinning before burning is not needed.

Table 1 summarizes the treatment acreages in the proposed action, by treatment type and harvest method. The proposed action is described in further detail below.

Table 1. Proposed action treatments in acres by treatment type and harvest method.

Treatment type and method	Mastication no log removal	Skyline log removal	Cable log removal	Ground-based log removal	Manual no log removal	Burn only	Total acres and percent of treated acres	
Thin 18" dbh	604	662	7	930	255	0	2,458	51%
Thin ≤9" dbh	529	37	0	13	266	0	845	17%
Sanitation thin ≤18" dbh	60	86	5	79	272	0	502	10%
Community defense thin ≤18" dbh	156	54	0	149	4	0	363	7%
Community defense thin ≤9" dbh	146	16	0	0	0	0	162	3%
Burn only	0	0	0	0	0	525	525	11%
Total acres and percent of treated acres	875 18%	855 18%	12 <1%	1,133 23%	1,455 30%	525 11%	4,855	

Stand Density Index Treatments

Stand density index (SDI) is a metric that has been commonly used to measure relative stand density of forest stands (Reineke 1933). SDI is based on the number of trees per acre (i.e., density) and their mean diameter. This metric expresses the actual density in a stand as a percent of the theoretical maximum density possible for trees of that diameter and species. SDI can be represented as a percentage of maximum SDI. High stand densities may impede movements of spotted owls, whereas low stand densities may be too open for spotted owl nesting or roosting (Gutierrez et al. 1992). SDI describes the level of tree-to-tree competition that exists within a stand. SDI is correlated more closely than basal area to canopy cover and overall stand health, as measured in terms of level of insect and disease activity and tree mortality (Forest Service 2007). The desired condition for stand density over 75 percent of the forested landscape is 10 to 25 percent maximum SDI (Forest Service 2007a).

1. Thinning

A. Thinning up to 18 inches diameter-at-breast height (dbh)

This treatment involves felling trees in all size classes up to a maximum of 18 inches dbh, emphasizing retention of the largest and most dominant trees. Within this treatment type, some stands allocated as old growth would be thinned to a maximum dbh of 12 or 14 inches depending on forest type and site quality. This treatment is designed to reduce stand density to an average of approximately 25 percent of maximum SDI, although the thinning would be done in a variable-density, patchy, uneven-size pattern.

Mostly smaller, ladder fuels in the understory canopy would be thinned out, leaving patches of younger trees spatially separated from larger trees. Fewer trees in the 9-12 inch dbh class would be felled. Even fewer in the 12-18 inch dbh class and no trees over 18 inches dbh would be removed. Felling trees larger than nine inches dbh would be minimized in protected MSO habitat where possible while still meeting fuel reduction objectives. However, trees greater than nine inches dbh will be cut in protected habitat. Thinning would follow ecosystem restoration principles that promote a landscape mosaic (Forest Service 2007).

B. Thinning up to nine inches dbh

This treatment is the same as the previous treatment except that no trees larger than nine inches dbh would be felled. It would occur mostly in stands that have a low proportion of trees larger than nine inches dbh and in portions of MSO Protected Activity Centers (PAC) and allocated old growth areas.

C. Sanitation of dead and dying trees

This treatment is similar to the previous treatments except it would emphasize felling dead and dying trees. Dying trees are those that, based on mistletoe and/or bark beetle infestation ratings, would be predicted to lose needles within 1-2 years and be completely dead within approximately three years (five at most). Dead and dying trees may be felled up to 18 inches dbh. Trees expected to continue to be living for at least five years or longer may only be thinned up to a nine inches dbh. In selecting trees to thin in sanitation units, the MSO habitat needs described in the Forest Plan and Recovery Plan (USDI Fish and Wildlife Service 1995) would take precedence over removal of dead/dying trees to meet other management objectives. Trees with a mistletoe rating of three would also be removed.

D. Community Defense Zone – Thin up to 18 inches dbh

This treatment is nearly the same as the others except the understory trees would be more heavily thinned, to a slightly lower SDI of 10-20 percent of the maximum SDI by forest type. This would result in a wider spacing between trees or groups of trees, retaining primarily the largest trees and groups of the largest trees. This treatment applies to selected areas along the project area boundary adjacent to the Ruidoso community (north and east sides of project area), to aid in reducing crown fire hazard to a low to moderate crown fire hazard potential that can be used as fire suppression defense zones.

E. Community Defense Zone – Thin up to 9 inches dbh

This treatment is the same as the previous treatment except with a nine-inch diameter limit. It would occur mostly in stands that have a low proportion of trees larger than nine inches dbh.

II. Burning

A. Burn only

This treatment would be applied on 525 acres as a low to moderate intensity surface burn. The burn only treatment is only applied where there is a low density of trees larger than six inches dbh and there is a low risk of crown fire behavior. This treatment would primarily restore shrublands and meadows that have been encroached by conifer trees.

III. Slash treatments and maintenance burns

A. Broadcast burns

Broadcast burns would also be applied to primarily reduce the thinning generated slash in all the thinning treatment units except within approximately 100 feet of the Ruidoso community boundary where slash would be burned in piles. The broadcast burns would consume the fine fuels, generally less than four to five inches dbh, leaving the larger down logs and standing trees intact. Flames would generally reach only 3 to 4 feet high, and while some small trees would burn, most of the residual trees would survive. These burns would typically occur within about one year following the thinning, once the slash is sufficiently dried. Thinned areas would be divided into logical burn units based on the location of fuel breaks and natural barriers.

B. Future maintenance burns

Future maintenance burns would periodically be conducted in different sections of the project area approximately every 5 to 20 years after project completion, to mimic historic surface fire frequencies and maintain desired conditions. Maintenance burns would be low to moderate intensity surface fires that would burn some smaller trees but would primarily reduce the proportion of seedlings and woody material less than four inches dbh.

IV. Roads and Landings

A. Landings

Landings used for temporarily storing logs and loading logs onto trucks would average 0.25 acre to one acre each for the ground-based and skyline/cable landings. A total of up to 40 landings are proposed. Landings would be rehabilitated after use to restore soil productivity, native vegetation, hydrologic function, and scenic values.

B. Connected road management actions

Road management involves 20 miles of road construction or reconstruction. However, 3.9

miles of this would entail entirely new road segments to be constructed outside existing roadways. After project use, 11 miles would be closed and 9 miles would be decommissioned, resulting in 0 miles of open road density in the project area. Table 2 shows the miles of proposed road construction, reconstruction, closure, and decommissioning.

Table 2. Proposed road management activities

Pre- and post-treatment road management activities	**Miles**
Road reconstruction on existing closed system road Decommission after project use and convert to a trail	2.3
Road reconstruction on existing closed system road Close after project use	5.1
Road construction on existing system trail Close road after project use (may be used as a trail)	4.9
Road construction on existing unauthorized road Decommission after project use	2.8
Road construction on existing unauthorized road Close after project use	0.8
New road construction Decommission after project use	3.6
New road construction Use for project then close after project use	0.3
Total pre-treatment road construction/reconstruction and post-treatment closure/decommissioning	20

Proposed road construction and reconstruction involve activities such as (1) widening the roadway to a 12 to 14-foot width along with some turnaround areas, (2) realigning roads to take them out of drainage bottoms so they no longer channel sediment flows, (3) grading to smooth out the surface and reduce rutting, (4) adding erosion control and water drainage features as needed to meet standards for watershed protection, (5) adding rocks to stabilize some drainage crossings, and (6) taking other actions to meet road and watershed standards. No paving or gravel surfacing is likely to be needed to meet minimum haul road requirements.

Road closure means installing gates or other barriers at road entrances to eliminate vehicle use by the public on these roads. Closed roads may be used for hiking and similar activities. Closed roads are those needed for future use to maintain the desired conditions over time. Road decommissioning involves activities designed to stabilize and restore the roads to vegetative productivity similar to the surrounding landscape. Decommissioning activities would involve using slash, rocks, or other natural materials at road entry points to discourage people from driving on the road, restoring vegetative ground cover, and reducing erosion. In addition to post-treatment road closure and decommissioning, and rehabilitation of disturbed soil areas, all disturbed areas would be surveyed for invasive plant (weed) invasion. Invasive plant monitoring and control treatments in this area are scheduled to begin in 2008,

and would continue throughout the life of the project and as needed after the project. Any invasive plants found would be treated to prevent spread, in accordance with the existing Forest-wide EIS and Record of Decision for treating invasive plants.

V. Conservation Measures and Monitoring

The following are identified in the DEIS and BA as actions that will be fully implemented as part of the proposed action. These conservation measures represent actions proposed by the Forest that are evaluated below as part of our jeopardy and adverse modification analyses. They are intended to minimize impacts associated with the MSO and designated critical habitat. Therefore, these actions are non-discretionary, and must be undertaken by the Forest because they are part of the proposed action. If they are not fully implemented, the Service should be contacted to determine if reinitiation of formal consultation is required (50 CFR 402.16). Monitoring is also proposed to ensure that conservation measures are appropriately applied, and to determine the effects of treatments and conservation measures. The specific MSO conservation measures and monitoring measures for implementing the proposed action are:

- No project activities will occur in the 100-acre MSO core nest areas;
- Prescribed burns will be designed to minimize the risk of fire entering MSO core nest areas;
- No proposed treatment activities including prescribed burning will occur within MSO PACs between March 1 and August 31, unless monitoring determines the PAC is not occupied by a breeding pair, in accordance with regional survey protocol;
- In addition, no treatment activities including prescribed burning will occur in occupied goshawk post-fledgling family areas (PFAs) between March 1 and September 30. This measure slightly expands the breeding season restriction into a portion of protected and restricted MSO habitat outside the PACs, within goshawk PFAs;
- Retain all live trees 18 inches dbh or larger, and apply smaller diameter limits where identified for old growth or specific wildlife habitat areas. Exceptions are allowed for necessary roads, landings, or skyline-cable corridors. Where possible, avoid locating roads, landings, and skyline corridors where trees larger than 18 inches dbh would need to be removed;
- Retain all snags 18 inches dbh or larger in all forests and woodlands in the area unless removal is necessary for safety;
- Retain two trees with obvious wildlife cavities, live culls, or lightning scars per five acres, consistent with integrated resource management concepts;
- Retain at least one tree 12 inches dbh or larger per three acres in piñon-juniper woodlands. In areas with alligator juniper, retain two alligator junipers per acre;
- Retain at least one down log per acre (minimum 12 inches dbh, eight feet long). Retain woody debris averaging 10–15 tons per acre (in mixed conifer) and 5–7 tons per acre (in ponderosa pine);
- Retain clumps of broad-leafed woody vegetation and hardwood tress larger than 10 inches dbh at the root collar;
- In restricted MSO habitat:

a. Design thinning prescriptions to enhance development of at least 10 percent of restricted habitat at 170 square feet of basal area per acre and an additional 10 percent at 150 square feet of basal area per acre (stand averages).
b. Manage toward the goal of 20 trees per acre larger than 18 inches in diameter; and diameter distributions of 10 percent of SDI in 12 to 18 inches dbh trees, 10 percent in 18 to 24 inches dbh trees and 10 percent in 24 inches dbh and greater trees.
c. Retain substantive amounts of key habitat components: snags 18 inches dbh and greater, down logs 12 inches dbh, and hardwoods.
d. Mimic disturbance patterns by using irregular tree spacing and various patch sizes.
e. Manage for canopy gaps to occur that produce horizontal variation in stand structure.
f. Maintain all native hardwood trees including early seral species.

- Road or trail building in MSO PACs would be minimized. However, up to 0.5 miles of new road construction and 2.5 miles of road reconstruction would occur within PACs for pressing management reasons, consistent with Forest Plan direction.
- If there is a choice between removing large infested trees or snags and meeting habitat requirements for threatened, endangered or sensitive species, the species habitat requirements will take precedence over insect and disease considerations.
- Survey MSO habitat before activities commence if survey information is over five years old.
- In mixed-conifer and ponderosa pine, maximum opening size is up to four acres with a maximum width of up to 200 feet. Retain groups of 3–5 reserve trees per acre in openings greater than one acre. Limit created openings within the first 200 feet of system trails, roads, dispersed recreation sites, and private homes to less than one acre and design shapes of openings to achieve the characteristics of natural openings.
- Retain as much of the overstory canopy cover and groups or clumps of the largest trees available in the mid- to old-age patches to the extent possible while meeting fuel reduction objectives. This would be applied to both MSO PACs and goshawk PFAs.
- Design treatment prescriptions to maintain or move toward the desired distribution of Vegetation Structural Stages (VSS) for ponderosa pine and mixed-conifer stands: 10 percent grass/forb/shrub (VSS 1), 10 percent seedling/sapling (VSS 2), 20 percent young forest (VSS 3), 20 percent mid-aged forest (VSS 4), 20 percent mature forest (VSS 5), and 20 percent old forest (VSS 6). For this project area, this means moving toward larger diameter classes (VSS4-6), especially in the mixed conifer and ponderosa pine stands.
- Manage toward a non-uniform spacing of trees and clumping of trees. Retain existing overstory tree canopy cover to the extent possible while meeting fuel objectives.
- Emphasize retention of the more fire-adapted tree species that would have historically dominated these fire-adapted ecosystems, which are primarily ponderosa pine and Douglas-fir species within the ponderosa pine and mixed conifer stands.
- Mimic natural disturbance patterns incorporating irregular tree spacing, clumps of trees of various ages and size classes, and various patch sizes and openings in the canopy. More dense patches of trees will be retained in MSO and goshawk nesting habitat while stands will be more open along the community boundary.

- Move large concentrations or piles of slash as far away from living trees as possible to reduce the amount of scorching and fire-caused mortality. Design thinning prescriptions in allocated old growth areas with the objective of maintaining or promoting development of old growth characteristics as described in the Forest Plan.
- Follow all old growth management requirements in the Forest Plan and Healthy Forest Restoration Act. To promote old growth characteristics consistent with the Forest Plan, limit thinning in those stands to the following:
    a. In 43 percent of the allocated piñon-juniper, leave it unthinned or thin trees below 9 inches dbh, leaving all the larger overstory trees. In 39 percent of allocated piñon-juniper old growth, thin to a more open old growth condition that allows for some reproduction of grasses, forbs, and shrubs.
    b. In low site-quality ponderosa pine stands allocated to old growth, retain trees 14 inches dbh or greater.
    c. In high site-quality ponderosa pine and all mixed-conifer old growth allocations, retain trees 18 inches dbh or greater.
- Within the allocated old growth stands, apply treatments to suppress or prevent insect and disease outbreaks and reduce the dwarf mistletoe infection level.
- Dispose of all activity slash within one year, unless fire-weather conditions make it infeasible to do so.
- No ground-disturbing activities will occur within 20 feet of intermittent stream channels in the project area, or within a 40-foot radius of active springs or seeps (there are no perennial streams or wetlands within the project area).
- Beginning in 2008, formal monitoring (six visits) within the three MSO PACs will occur during the reproduction period for the MSO over the life of this project. This monitoring would determine presence/absence and MSO reproduction success within the three PACs in the project area. Monitoring will include recording MSO individuals, pairs, reproduction success, apparent survival, habitat recruitment and age structure; and populations will be tracked per quadrant and habitat stratum.
- In treatment areas within protected and restricted habitat, monitor changes in fuel levels, snag basal areas, live tree basal areas volume of down logs larger than 12 inches dbh, and basal area of hardwood trees larger than 10 inches dbh. Record and evaluate the gross area changes in vegetation composition, structure, and density.
- Send an annual report to the Service with updated MSO PAC history and MSO monitoring results and information.

DESCRIPTION OF THE ACTION AREA

For this consultation we are defining the action area to include the Basin and Range East Recovery Unit (RU). The action area was determined based on consideration of all direct and indirect effects of the proposed action on the MSO. MSOs within the RU will likely incur indirect impacts related to habitat disturbances from the prescribed treatments. Further reasons are explained and discussed in the 'Effects of the proposed action' section of this consultation.

STATUS OF THE SPECIES (range-wide)

Mexican spotted owl

Listing/threats to survival

The MSO was listed as a threatened species in 1993 (USDI Fish and Wildlife Service 1993). The primary threats to the species were cited as even-aged timber harvest and stand-replacing wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The Fish and Wildlife Service appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan in 1995 (USDI Fish and Wildlife Service 1995). Another factor that contributed to declines included the lack of adequate existing regulatory mechanisms. The Recovery Plan (USDI Fish and Wildlife Service 1995) also notes that forest management has created habitats favored by great horned owls, increasing the likelihood of predation. Other threats include the potential for increasing malicious and accidental anthropogenic harm (e.g., shooting and vehicle collisions), and for the barred owl to expand its range, resulting in competition or hybridization with the owl.

Global climate change may also be a threat to the MSO (e.g., see GAO 2007). The global average temperature has risen by approximately 0.6 degrees Celsius during the 20th Century (Intergovernmental Panel on Climate Change 2001). Warming temperatures have been documented in recent decades in the southwestern United States. In New Mexico, mean annual temperature has increased by 0.6 degree per decade beginning in 1970, and warming is greatest in spring (Lenart 2005). High elevation environments influenced by snow, such as the Sacramento Mountains, and the uppermost limits of vegetation and other complex life forms, are among the most sensitive to climate changes occurring on a global scale (Thompson 2000). Studies have shown that since 1950, the snowmelt season in some watersheds of the western United States has advanced by about 10 days (Dettinger and Cayan 1995, Dettinger and Diaz 2000, Stewart et al. 2004). Such changes in the timing and amount of snowmelt are thought to be signals of climate-related change in high elevations (Smith et al. 2000, Reiners et al. 2003). The impact of climate change is the intensification of natural drought cycles and the ensuing stress placed upon high elevation montane habitats (Intergovernmental Panel on Climate Change 2001, Cook et al. 2004, Breshears et al. 2005, Mueller et al. 2005).

Life history

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 Fish and Wildlife Service 1993) and in the Recovery Plan (USDI Fish and Wildlife Service 1995). The information provided in those documents is included herein by reference. Although the MSOs entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-

aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern U.S. and Mexico.

The U.S. range of the MSO has been divided into six RUs, as discussed in the Recovery Plan (USDI Fish and Wildlife Service 1995). The primary administrator of lands supporting the MSO in the U.S. is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). Forest Service Regions 2 and 4 (including two National Forests in Colorado and three in Utah) support fewer owls. According to the Recovery Plan (USDI Fish and Wildlife Service 1995), 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

Habitat impacts

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing is prevalent throughout Region 3 National Forest lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all forests, especially in meadow and riparian areas. There is anecdotal information and research that indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior. Fuels reduction treatments, though critical to reducing the risk of severe wildfire, can have short-term adverse effects to MSO through habitat modification and disturbance. As the population grows, especially in Arizona, small communities within and adjacent to National Forest System lands are being developed. This trend may have detrimental effects to MSO by further fragmenting habitat and increasing disturbance during the breeding season. West Nile Virus also has the potential to adversely impact the MSO. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that owls may be highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of owls and the lack of intensive monitoring of banded birds, we will most likely not know when owls contract the disease or the extent of its impact to MSO range-wide.

Currently, high severity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, severe, stand-replacing wildfire is one of the greatest threats to MSO within the action area. As throughout the West, fire severity and size have been increasing within this geographic area. Bond et al. (2002) described short-term effects of wildfires on MSOs throughout the species' range. The authors reported that relatively large wildfires that burned nest and roost areas appeared to have little short-term (1-year) effect on survival, site fidelity, mate fidelity, and reproductive success of MSOs, as rates were similar to estimates independent of fire. However, Elliot (1995), MacCracken et al. (1996), and Gaines et al. (1997) reported in some cases, large stand-replacing wildfires appeared to have a negative effect on MSOs. Jenness (2000) reported low- to moderate-severity fires did not adversely affect MSOs. Bond et al. (2002)

hypothesized that MSOs may withstand the immediate, short-term effects of fire occurring at primarily low- to moderate-severities within their territory. The Forest Service reported similar results following the 2002 Lakes Fire in the Jemez Mountains of north-central New Mexico (USDA Forest Service 2003). Danney Salas (USDA Forest Service, pers. comm., 2003) reported that of the 10 PACs that are monitored within the footprint of the Scott Able Fire, MSOs were detected in 9 of them. He also reported that the same number of MSO pairs before and after the Bridge Fire were detected and reproduced within the burn area. He also indicated that there were two MSO nest areas found in areas where fire retardant (slurry) was used during suppression activities. Given historical fire regimes within its range, the MSO may be adapted to survive wildfires of various size and severities. Therefore, prescribed burning and other forest management activities could be an effective tool to reduce fire risk and restore forests to natural conditions with short-term impacts to MSOs. For example, prescribed fire may prove useful in the creation or maintenance of habitat for MSOs or their prey (Gutierrez et al. 2003). Bond et al. (2002) cautioned that programmatic prescribed burning in MSO territories could not be justified solely on their observations. Manipulative experiments are needed to evaluate effects of fire (or other forest management activities) on MSOs (Bond et al. 2002).

Population dynamics

A reliable estimate of the numbers of owls throughout its entire range is not currently available (USFWS 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USFWS (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. However, Ganey *et al.* (2000) estimates approximately 2,950 ± 1,067 (SE) MSOs in the Upper Gila Mountains RU alone. The FS Region 3 most recently reported a total of approximately 1,025 PACs established on NFS lands in Arizona and New Mexico (B. Barrera, pers. comm. June 18, 2007). The FS Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than NFS lands have resulted in additional sites being located in all RUs.

Researchers studied MSO population dynamics on one study site in Arizona (n = 63 territories) and one study site in New Mexico (n = 47 territories) from 1991 through 2002. The Final Report, titled "Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations," (*in press*) found that reproduction varied greatly over time, while survival varied little. The estimates of the population rate of change (Λ=Lamda) indicated that the Arizona population was stable (mean Λ from 1993 to 2000 = 0.995; 95 percent Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6 percent (mean Λ from 1993 to 2000 = 0.937; 95 percent Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20 percent) fluctuations in numbers from year to year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the MSO is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

Prey species and habitat

MSO foraging habitat includes a wide variety of forest conditions, canyon bottoms, cliff faces, tops of canyon rims, and riparian areas (Gutierrez and Rinkevich 1991, Willey 1993). Ganey and Balda (1994) reported that MSOs foraged more frequently in unlogged forests containing uneven-aged stands of Douglas-fir and white fir, with a strong component of ponderosa pine, than in managed forests.

The primary MSO prey species are woodrats (*Neotoma* spp.), peromyscid mice (*Peromyscus* spp.), and microtine voles (*Microtus* spp.) (USDI Fish and Wildlife Service 1995, Young et al. 1997, Delaney et al. 1999, Seamans and Gutierrez 1999). Mexican woodrats (*N. mexicana*) are typically found in areas with considerable shrub or understory tree cover and high log volumes, or rocky outcrops associated with pinon-juniper woodlands (Sureda and Morrison 1998 Ward 2001). Sureda and Morrison (1998) and Ward (2001) found deer mice (*P. maniculatus*) to be more abundant and widespread in the 60 to 100 year old stands of mixed-conifer forests. Mexican voles (*M. mexicanus*) are associated with mountain meadows and high herbaceous cover, primarily grasses whereas, long-tailed voles (*M. longicaudus*) are found in dry forest habitats with dense herbaceous cover, primarily forbs, many shrubs, and limited tree cover (Ward 2001). High levels of MSO reproductive success and production may be due to prey abundance (Delaney et al. 1999). Ward and Block (1995) documented an increase in MSO production when moderate to high levels of woodrats, peromyscid mice, and voles, were consumed. A diverse prey base is dependant on availability and quality of diverse habitats. MSO prey species need adequate levels of residual plant cover, understory cover, and high log volume. Therefore, a wide variety of forest and vegetative conditions are important to the MSO and its prey.

Critical habitat

The final MSO critical habitat rule (USDI Fish and Wildlife Service 2004) designated approximately 8.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah, mostly on Federal lands (USDI Fish and Wildlife Service 2004). Within this larger area, critical habitat is limited to areas that meet the definition of protected and restricted habitat, as described in the Recovery Plan (USDI Fish and Wildlife Service 1995). Protected habitat includes all known owl sites and all areas within mixed conifer or pine-oak habitat with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas outside of protected habitat.

The primary constituent elements (PCE) for MSO critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USDI Fish and Wildlife Service 1995). Since owl habitat can include both canyon and forested areas, PCEs were identified in both areas. The PCEs which occur for the MSO within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the MSOs habitat needs for nesting, roosting, foraging, and dispersing are in areas defined by the following features for forest structure and prey species habitat:

PCEs related to forest structure include:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with diameter-at-breast height (dbh) of 12 inches or more;
- A shade canopy created by the tree branches covering 40 percent or more of the ground; and
- Large, dead trees (snags) with a dbh of at least 12 inches.

PCEs related to the maintenance of adequate prey species include:

- High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and
- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

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

Consultations

Since the owl was listed, we have completed or have in draft form a total of 189 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 385 PACs. The form of this incidental take is almost entirely harm or harassment, rather than direct mortality. These consultations have primarily dealt with actions proposed by FS Region 3. However, in addition to actions proposed by FS Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO. The jeopardy opinion issued for existing Forest Plans on November 25, 1997 was rendered moot as a non-jeopardy/no adverse modification BO was issued the same day.

In 1996, we issued a biological opinion on FS Region 3 adoption of the Recovery Plan (USDI Fish and Wildlife Service 1995) recommendations through an amendment to their Land and Resource Management Plans (LRMPs). In this non-jeopardy biological opinion, we

anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs. In addition, on January 17, 2003, we completed a reinitiation of the 1996 Forest Plan Amendments biological opinion, which anticipated the additional incidental take of five MSO PACs in Region 3 due to the rate of implementation of the grazing standards and guidelines, for a total of 156 PACs. Consultation on individual actions under these biological opinions resulted in the harm and harassment of approximately 243 PACs on Region 3 NFS lands. FS Region 3 reinitiated consultation on the LRMPs on April 8, 2004. On June 10, 2005, the FWS issued a revised biological opinion on the amended LRMPs. We anticipated that while the Region 3 Forests continue to operate under the existing LRMPs, take is reasonably certain to occur to an additional 10 percent of the known PACs on NFS lands. We expect that continued operation under the plans will result in harm to 49 PACs and harassment to another 49 PACs. To date, consultation on individual actions under the amended Forest Plans, as accounted for under the June 10, 2005, biological opinion has resulted in the incidental take of owls associated with 19 PACs. Incidental take associated with Forest Service fire suppression actions, which was not included in the LRMP proposed action, has resulted in the incidental take of owls associated with 12 PACs.

We reviewed the June 10, 2005 BO and conclude that this current consultation does not fall under the LRMP BO. We reached this conclusion based on two of the major assumptions in the LRMP BO:

1) The standards and guidelines in the Forest Plan LRMPs will be followed when selecting, planning, and executing site-specific management actions. In addition, should a site-specific action not follow the standards and guidelines, the action must be modified or the LRMP must be amended before the action can be allowed; and

2) Site-specific projects will conform to the standards and guidelines of the LRMPs.

The DEIS indicates that the current proposed action is to amend the Lincoln LRMP such that it "...would exempt this project from adhering to specific Forest Plan direction associated with managing Mexican spotted owl habitat, northern goshawk habitat, steep slopes, and sensitive visual quality areas (Forest Service 2007)." Moreover, the BA indicates that implementing the proposed action would require several project-level forest plan amendments, including one that is specific to management direction for the MSO. The project-level amendment would not change the Forest Plan, but would allow specific exceptions for this project. Because managing MSO habitat will be exempted from the Lincoln LRMP, this project will not follow or conform to standards and guidelines of the Forest Plan. As such, this project is inconsistent with both of the major assumptions of the LRMP BO identified above. Therefore, anticipated incidental take from the current proposed action will be in addition to the current incidental take in the environmental baseline for the MSO.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the effects of the action on federally listed species, we are required to take into consideration the environmental baseline. Regulations

implementing the Act (50 FR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

STATUS OF THE SPECIES (within the Action Area)

Mexican spotted owl

The Forest is within the Basin and Range - East RU. This RU is an important source population for other areas (USDI Fish and Wildlife Service 1995). MSOs here occur in isolated mountain ranges scattered across the region, the largest portion occurring in the Sacramento Mountains. In this RU, MSOs have been reported on Forest Service lands in the Sandia, Manzano, Sacramento, and Guadalupe Mountains, and in Guadalupe National Park, Carlsbad Caverns National Park, and the Mescalero Apache Reservation. MSOs are most common in mixed-conifer forest, but have been found in ponderosa pine forest and pinon/juniper woodland (Skaggs and Raitt 1988, USDI Fish and Wildlife Service 1995).

MSOs in this RU occur in isolated mountain ranges, the largest portion occurring in the Sacramento Ranger District. There are 196 PACs within the Basin and Range East RU, with 145 PACs on the Lincoln National Forest. The Sacramento Ranger District has 114 PACs; the Guadalupe Ranger District has 10 PACs; and the Smokey Bear Ranger District has 21 PACs. Additional PACs are located on the Mescalero Apache Reservation (37 PACs), the Guadalupe Mountains National Park (11 PACs), and the Cibola National Forest (3 PACs).

Major threats, in order of potential effects, include: 1) catastrophic, stand-replacement fires, 2) some forms of timber harvest, 3) fuelwood harvest, 4) grazing, 5) agriculture or development for human habitation, and 6) forest insects and disease (USDI Fish and Wildlife Service 1995). Minor threats include: 1) certain military operations, 2) other habitat alterations (e.g. power line and road construction, noxious weed control), 3) mining, and 4) recreation. Minor threats are activities not currently extensive in time or space but are potential threats to the MSO.

The dominant land uses within the RU include timber management and livestock grazing. Recreational activities such as off-road driving, skiing, hiking, camping, and hunting are locally common within the RU (USDI Fish and Wildlife Service 1995).

Fires such as the Burgett, Bridge, Scott Able, and Walker have modified thousands of acres of habitat and impacted multiple MSO territories. The Scott Able fire burned 16,034 acres (4,488.7 ha), of which 14,551 acres (5,889 ha) are administered by the Lincoln National Forest and 1,483 acres (600 ha) were on private land. Approximately 12,291 acres (4,974 ha) that burned were considered suitable MSO habitat. The Scott Able fire affected all or

portions of 6 PACs and 2 PACs are adjacent to the burned area. The Burgett fire affected all or portions of 3 PACs and the Walker Fire affected 2 PACs.

Past and present Federal, State, private, and other human activities that have undergone informal consultation and conferencing and may affect the MSO and its habitat are as follows: The Hay and Scott Able timber sales, Bridge salvage sale, Walker fire salvage sale, WUI Projects, livestock grazing, recreational activities, recreation and scenic vista developments, road construction, maintenance activities, land exchanges, right-of-way issuances, off-road motorcycle events, power line construction, wildlife research projects, urban development, and catastrophic wildfires, their suppression and rehabilitation activities.

The likelihood of owls occurring within the action area is very high. Informal and formal monitoring has confirmed owl presence and three PACs have been designated. Surveys have been conducted annually on the majority of the 3,242 acres and adjacent pine habitat within the project area from 2001 through 2007. Surveys were also conducted outside of MSO habitat because of the complex mosaic of vegetative types in the area. The following three PACs occur within the project boundary:

Brady PAC (08-01-19): In 2001 a pair of MSO was noted within the Brady PAC. In 2002, a single male MSO was observed in the area. No MSO observations were made during informal monitoring visits to the area four times annually from 2003 to 2006. The nest core area is based upon the pair and single owl roost locations per Ward and Salas (2000).

The 692-acre Brady PAC has 100 acres (14 percent) of ponderosa pine/piñon-juniper. The remaining 86 percent (or 591 acres) of the Brady PAC is mixed conifer and is considered to be suitable nesting and roosting habitat. The no treatment/nest core area (101 acres) was separated into two areas because contiguous suitable nesting/roosting habitat does not exist naturally in this PAC. There are 0.04 miles of existing road in this PAC.

Flume PAC (08-01-20): In 2005 a MSO nest was discovered and the Flume PAC was designated. Two young were produced by this pair. In 2006 a pair of MSO was documented within the area; however, reproductive success was unknown. The 623-acre Flume PAC (as revised with this BA; see Attachment 1, page 37) has 311 acres of ponderosa pine/piñon-juniper/oak woodlands and 312 acres of mixed conifer. Within the PAC there are approximately 252 acres of suitable nesting and roosting habitat and 371 acres of foraging habitat in ponderosa pine/piñon-juniper/oak woodlands. Fifty-nine acres of mixed conifer is foraging habitat. The PAC contains a 138-acre no treatment/nest core area. There are no existing roads in this PAC.

Perk PAC (08-01-21): In 2006 a pair of MSOs was located in a day roost. Prior to 2006, MSO sightings had been noted in the vicinity, but were adjacent to Forest Service lands. MSOs have been known to use Perk Canyon to forage, but were believed to return to the upper portions of this canyon to nest. It is not known if these sightings are related. The 607-acre Perk PAC (as revised with this BA; see Attachment 1, page 37) has 324 acres ponderosa pine/piñon-juniper/oak woodlands. The remaining 283 acres consists of mixed conifer habitat. There are approximately 214 acres of suitable nesting and roosting habitat and 393

acres of foraging habitat in ponderosa pine/piñon-juniper/oak woodlands within the PAC. The remaining 68 acres is mixed conifer foraging habitat. The PAC contains a 105 acre no treatment nest core area. There are no existing roads in this PAC.

Spotted owls are known to exhibit high site fidelity, with individual adults occupying the same home ranges for long periods of time, and likely for life. One study found that, of 25 nests of northern spotted owls that were checked in two or more years, 17 nests (or 68%) were used more than once (Forsman et al. 1984). Biologists on the Coconino and Lincoln National Forests have observed that MSOs often return to home ranges and nests following disturbances such as wildfire. Bond et al. (2002) determined that, at least in the short-term, MSOs are known to return to or remain within their territories following wildfires.

There are approximately 3,204 acres of MSO habitat within the project area. Of this habitat, 2,395 acres (75 percent) is protected MSO habitat and 809 acres (25 percent) is restricted habitat per the Recovery Plan (USDI Fish and Wildlife Service 1995). Of the 2,395 acres of protected habitat, 1,923 acres (80 percent of the protected habitat) are within the Brady, Flume, and Perk PACs (#08-01-19, #08-01-20, and #08-01-21). The remaining 472 acres (about 20 percent of the protected habitat) are on steep slopes (greater than 40 percent). Within the three PACs there are 418 acres (22 percent) designated as nest core areas.

Of the 824 acres of restricted habitat, none currently meets the threshold condition of 20 trees greater than18 inches dbh. This project has identified 168 target acres (20 percent of the 809 acres of restricted habitat) on four large productive sites that will be managed toward threshold conditions.

Critical Habitat

There are 253,726 acres of designated critical habitat in the Basin and Range East RU. The Lincoln National Forest is within the Basin and Range East RU and has four designated critical habitat units. There are 54,185 acres of critical habitat on the Smokey Bear Ranger District. The project area is located in the MSO Critical Habitat Unit Basin and Range-East-1a in the Sacramento Mountains, adjacent to the Village of Ruidoso, New Mexico. Approximately 1 percent (1,959 acres) of the total critical habitat within the Basin and Range-East Recovery Area of MSO critical habitat occurs within the project area. Of the 1,959 acres of critical habitat, 1,326 acres (66 percent) are within protected MSO habitat. On the 1,326 acres of protected habitat, 1,288 acres (97 percent of the protected habitat) are in three PACs and 38 acres (3 percent of the protected habitat) are slopes greater than 40 percent. About 190 acres (less than 1 percent of the critical habitat) are within restricted habitat, and the remaining 483 acres (24 percent of the critical habitat) are within ponderosa pine, piñon/juniper, and oak woodland habitat.

EFFECTS OF THE ACTION

The conservation measures identified above and in the DEIS and BA will be fully implemented by the Forest Service as part of their proposed action. These measures represent actions that were evaluated as part of our jeopardy analysis. These conservation

measures will help minimize some of the adverse impacts to the MSO and its habitat. Without these conservation measures, the negative effects to the species and its habitat likely would be greater.

Most of the forests in the southwest were extensively logged at the end of the nineteenth century and into the early twentieth century (Kaufmann et al. 1998), and are now in second growth condition. Some of the logged areas have returned to conditions that are suitable for MSOs. A notable example is the Lincoln National Forest. In order to be suitable MSO habitat, mixed conifer stands need to possess mature trees, multiple canopy structure, and other characteristics (e.g., large downed logs, prey cover). Protected steep slope habitat has not been harvested to any degree in the southwest in the past. Steep slopes provide MSO habitat because of the generally cooler microclimates often that support multi-layered canopies in the mixed conifer forest. Steep slopes often provide pockets of mixed conifer habitat within wider areas dominated by inferior MSO habitat (e.g., ponderosa pine or pinon-juniper vegetation types).

Fire behavior modeling is reasonably accurate for surface fires, and data are generally available on how prescribed fires and mechanical thinning may affect forest structure and fuels at small spatial scales (Forest Service 2004b). Modeling is less accurate for crown fires. Nevertheless, managers can reduce the risk of future crown fires by planning for fuel and forest structures that achieve a specific fire hazard or predicted fire behavior outcome (Forest Service 2004b). Well-established principles related to fuel treatment acknowledge that increasing canopy base height and decreasing crown density will open the understory, resulting in an increase of surface winds and drier surface fuels (Forest Service 2004b). Opening the canopy can exacerbate some fire risks through the growth of fine fuels, combined with the drying effects of sun and wind (Agee 2000).

Fuel treatments alter the behavior of fire up to a limit of weather conditions. Still, extreme weather conditions (low fuel moisture contents, low humidity, and high winds) can create fire behavior that may negate most fuel treatments (e.g., see Finney et al. 2003). Fuel treatments may change fire intensities or spread rates, but will not prevent combustion (Finney and Cohen 2003). No fuel treatments can guarantee elimination of crown fire (e.g., see Forest Service 2004a). The proposed Perk-Grindstone project may make tree-to-tree crown fire and the potential of torching less likely; however, the treatments will also create drier, windier conditions within some forest stands. Standing dead trees with needles attached may be flammable for 2 to 3 years until their needles drop. Without needles, crown fire hazard related to dead trees is essentially non-existent (e.g., see Turner et al. 1999). Notwithstanding the competing issues of reduced potential for crown fire and increased potential for drying of fine fuels, lowering the risk of high severity crown fire may still be possible from the proposed action. However, as described below, the proposed action will result in significant disruption to the three MSO PACs within the project area.

Mechanical Thinning

It is our understanding that the proposed action of thinning from below will primarily remove overtopped and intermediate trees and trees that are shorter and receive a limited amount of

light from above and none from the sides. Thinning from below is the removal of intermediate and codominant trees to favor the large, high quality trees in the upper crown classes. The proposed action would involve removal of a portion of living trees greater than 9 inches dbh within 621 (199 acres within PACs and 422 outside of PACs) acres of MSO protected habitat, 586 acres of critical habitat, and 728 acres of restricted habitat.

Nearly all forest stands in the Brady, Flume, and Perk PACs have a stand density index over 55 percent of the maximum. At 55 percent maximum stand density index, the forest stand would be at full site occupancy, tree-to-tree competition has resulted in reduced growth for individual trees, yet site productivity is still increasing and beginning to plateau (e.g., see Long 1985). The proposed action will lower the stand density index below 25 percent of the maximum, which would reflect an open grown stand of trees with little to no competition for moisture, nutrients, or sunlight (e.g,. see Long 1985). The DEIS indicates that desired forest structure would generally have wider spacing between the crowns of trees or groups of trees, with substantially fewer seedlings, saplings, and pole sized trees (Forest Service 2007). The DEIS further indicates that: 1) the geographic extent of continuous dense closed canopy forest would be reduced and would have an average canopy cover below 40 percent; 2) canopy cover would remain below an average less than 40 percent for 20 to 30 years; and 3) although the open understory would limit the amount of ladder fuels, it will also substantially reduce or eliminate the amount of multi-storied (vertical) forest structure and create canopy gaps up to a maximum of 200 feet wide. The Forest Service determined that these effects would result in short- and long-term adverse effects to the MSO and its habitat. We agree with these conclusions.

MSOs frequently occur in forests that contain dense, uneven-aged stands with a closed canopy (e.g., greater than 70 percent canopy cover) (Ganey et al. 2003, Ganey et al. 1997). Roosting and nesting habitat exhibit certain identifiable features, including large trees with trunk diameters greater than 12 inches, high tree basal area, uneven-aged tree stands, multi-storied canopy, moderate to high canopy closure, and decadence in the form of downed logs and snags (Ganey and Balda 1989, Grubb et al. 1997, Tarango et al. 1997, Peery et al. 1999, Ganey et al. 2000, Geo-Marine 2004). The Recovery Plan focuses on retaining structural features typical of closed-canopy forests (USDI Fish and Wildlife Service 1995). These types of areas provide vertical structure and high plant species richness that are important to MSOs (Seamans and Gutierrez 1995, Ganey et al. 2003). Ganey (2004) found that MSOs select cool nest areas, which supports the importance of high canopy cover as an important correlate of MSO habitat. In general terms, MSOs will be adversely affected by the proposed action by the removal or alteration of key habitat components such as snags, large downed logs and other woody debris, and large trees, and by reducing dense, closed canopy cover, the variety of tree in diameter classes, and the simplification or elimination of multistoried (vertical) canopy structure within forest stands.

The Forest Service has indicated that the treatments will take place within a variety of MSO protected, restricted, and designated critical habitat (e.g., see Table 18 in the BA). The proposed action will reduce forest stands to an below an average SDI maximum of 25 percent, with some stands averaging just 10 percent SDI maximum. Where patches of large overstory trees currently exist (generally over 12 inches in diameter), some may be retained.

Still, the geographic extent of continuous forest canopies having at least 40 percent cover would be significantly reduced within MSO habitat. In fact, the Forest Service found that a large portion of the forest stands within MSO protected habitat would not attain an average canopy cover of at least 40 percent for 20 to 30 years post-project (Forest Service 2007a). Based on this information, we conclude that average canopy cover with MSO protected habitat will be reduced below 40 percent on average for decades.

In some areas, MSOs use canopy cover greater than 40 percent; however, the majority of studies reporting canopy cover of protected habitat (i.e., nesting/roosting habitat) greater than 70 percent (e.g., see Ganey and Balda 1994, Seamans and Gutierrez 1995, Grubb et al. 1997; Tarango et al. 1997; Ganey et al. 2000; Geo-Marine 2003, Zwank et al. 1994). Moreover, MSOs in the Sacramento Mountains are not currently using forest stands with basal area less than 60 percent (Ganey 2005). Many of the proposed treatments within MSO habitat are in conflict with the recommendations provided in the Recovery Plan and recent peer-reviewed information on the management of MSO habitat (USDI Fish and Wildlife Service 1995; Ganey et al. 2003; May et al. 2004). The effects of mechanical treatments will reduce key components (e.g., high canopy cover, snags, high basal area, and large trees up to 18" dbh) of MSO protected and restricted habitat and adversely affect MSOs and protected habitat (Flume, Brady, and Perk PACs). For this reason, the proposed project will have a significant adverse effect on the 1,109 acres of protected MSO habitat within the project boundary.

The Recovery Plan notes that active management is needed within the Basin and Range East RU to alleviate the threat of high severity wildfire, but should avoid altering MSO nesting/roosting habitat (USDI Fish and Wildlife Service 1995). In fact, timber harvest is a major threat within this recovery unit (USDI Fish and Wildlife Service 1995). We consider aspects of this project that are in conflict with the specific guidance of MSO protected habitat in the Recovery Plan (USDI Fish and Wildlife Service 1995) to fall within this threat category.

MSO PACs do not encompass all of the home ranges used by resident owls. In fact, PACs were established using the size of owl activity centers, not the size of home ranges. Nevertheless, owls forage more than or as expected in unlogged forests, and less than or as expected in selectively logged forests (Ganey and Balda 1994). Both high-use roosting and high-use foraging sites had more big logs, higher canopy closure, and greater densities and basal areas of both trees and snags than random sites (Ganey and Balda 1994). Owls clearly use a wider variety of forest conditions for foraging than they use for roosting; however, they have been found to generally avoid habitat within managed (i.e., logged) forests (Ganey and Balda 1994). By reducing the key habitat elements within the project area, MSO foraging and roosting habitat will be adversely affected. Specifically, the removal of trees 18 inches dbh and less will significantly affect the Brady, Flume, and Perk PACs, as well as restricted (foraging) habitat outside of PACs. Moreover, the proposed reduction to less than 40 percent canopy cover will result in very open forest stands across the landscape, which may increase the abundance of great horned owls, a predator of MSOs (Ganey et al. 1997, Ganey 2005). As a result, we would anticipate that MSOs will likely avoid foraging and roosting within open forest stands.

Prey habitat

The owls have been described as "perch and pounce" predators. They typically locate prey from an elevated perch by sight or sound, then pounce on the prey and capture it with their talons. Spotted owls have also been observed capturing flying prey such as birds and insects (Verner et al. 1992). They hunt primarily at night (Forsman et al. 1984, Ganey 1988), although infrequent diurnal foraging has been documented (Forsman et al. 1984). Opening the understory and the canopy could make prey species more readily available in the short-term. These prey species would be depleted by owls and other avian and terrestrial predators. The 100-acre core areas that are proposed to be excluded from mechanical thinning and burning consist of dense mixed conifer stands serving as core nesting areas for MSOs, but will not offset detrimental impacts to prey habitat associated with the project.

The removal of the forest understory would reduce or alter habitat used by MSO prey. Owls consume a variety of prey throughout their range but commonly eat small- and medium-sized rodents such as woodrats (*Neotoma* spp.), peromyscid mice (*Peromyscus* spp.), and microtine voles (*Microtus* spp.) (USDI Fish and Wildlife Service 1995, Delaney et al. 1999, Seamans and Gutierrez 1999). Mexican woodrats (*N. mexicana*) are typically found in areas with considerable shrub or understory tree cover and high log volumes, or rocky outcrops associated with piñon-juniper woodlands (Sureda and Morrison 1998, Ward 2001). Sureda and Morrison (1998) and Ward (2001) found deer mice (*P. maniculatus*) to be more abundant and widespread in the 60 to 100 year old stands of mixed-conifer forests. Mexican voles (*M. mexicanus*) are associated with mountain meadows and high herbaceous cover, primarily grasses whereas, long-tailed voles (*M. longicaudus*) are found in dry forest habitats with dense herbaceous cover, primarily forbs, many shrubs, and limited tree cover (Ward 2001). Regional differences in the owl's diet likely reflect geographic variation in population densities and habitats of both prey and the owl. The removal and alteration of owl prey species habitat from the proposed action will affect the number and availability of prey and will negatively affect the owl.

No mechanical treatments are proposed within the 100-acre core areas of the 3 PACs. In the process of implementing mechanical treatments within these PACs, noise disturbances to MSO from mechanical tools used in the treatment process and vehicles used to access the treatment areas (outside of the MSO breeding season, March 1 to August 31), are likely to occur but are expected to be limited due to the timing restrictions. However, noise disturbances within the PACs will likely affect feeding and roosting MSO outside of the breeding season.

In summary, we find that the proposed project would adversely affect MSO roosting, nesting, and foraging habitat, by removing large trees with trunk diameters greater than 12 inches, reducing large tree basal area, altering uneven-sized tree structure, reducing multi-storied canopy layers, and significantly reducing canopy closure and decadence in the form of downed logs and snags. The treatments above will treat mixed-conifer habitat far beyond the recommendations in the Recovery Plan (USDI Fish and Wildlife Service 1995). As described above, these actions will result in adverse effects to the MSO and its prey habitat.

Insect and Mistletoe Treatments

When healthy trees undergo severe and sudden moisture stress, the phloem and inner bark of coniferous trees become host material for the Western pine beetle (*Dendroctonus brevicomis*) (DeMars and Roettgering 2005). Healthy trees produce abundant amounts of resin that "pitch out" attacking Western pine beetles. However, when trees are stressed because of insufficient moisture, they are unable to produce enough resin to fend off these attacks. Effective suppression methods require the location and treatment of all (or nearly all) infested trees over extensive areas in a short period of time (DeMars and Roettgering 2005). Timely spotting and treatment are inherently difficult and expensive tasks. Trees with a high risk of damage by beetles usually have low vigor and support dead tops or branches and sparse foliage. They may also be heavily infected by mistletoe or have been struck by lightning (DeMars and Roettgering 2005). The proposed action will remove dead and dying trees from insects and mistletoe. Trees with a mistletoe rating of 3 and above will likely be removed. The Forest Service did not quantify the number of trees, but it will likely involve a substantial number over a large geographic area. It is unclear whether entering a forest stand to remove trees that are heavily infected by mistletoe is an effective way to manage dwarf mistletoe or improve forest stands (e.g., see Conklin 2000). Still, many of these types of trees are characteristic of MSO habitat.

Usually, Western pine beetles breed in and kill scattered, overmature, slow-growing, decadent, or diseased trees and trees weakened by stand stagnation, lightning, fire, or mechanical injury (DeMars and Roettgering 1982). This tree mortality may be considered part of the normal ecological process of succession through which a forest matures and replaces itself. Interestingly, forest thinning projects are often redundant or irrelevant because forest insects, including bark beetles and defoliators, are natural thinning agents (Black 2005). In order for thinning to be effective to control insect outbreaks, it must significantly reduce water stress within a forest stand, which is unlikely during droughts when insect outbreaks usually happen (Black 2005).

Current tree mortality from various species of bark beetles and dwarf mistletoe infestations exceeds 10 percent of current basal area on about half of the mixed conifer and ponderosa pine forest stands (Forest Service 2007a). There has been an increasing trend in dwarf mistletoe and bark beetle activity in the project area, as stand density has increased and available water has decreased from drought. Severe dwarf mistletoe infection can also kill the host tree. In addition, the mistletoe forms into "brooms" on the tree branches which are highly flammable (Forest Service 2007a). However, mistletoe brooms also can provide nest sites for MSOs and habitat for prey species (USDI Fish and Wildlife Service 1995, Hedwall and Mathiasen 2006, Hedwall et al. 2006).

The Forest has proposed sanitation thinning of dead and dying trees up to 18 inches dbh within protected habitat. This treatment would emphasize felling of dead and dying (i.e., trees that are predicted to be completely dead within 5 years). The Forest Service indicated in the BA that MSO habitat needs described in the Forest Plan and Recovery Plan (USDI Fish and Wildlife Service 1995) would take precedence over the removal of dead and dying trees. Nevertheless, we are unclear how this would be implemented within MSO protected habitat

because the Forest is proposing removal of dead and dying trees in these areas and finds that canopy cover will be reduced for up to 5 years from sanitation treatments that remove dying trees. Therefore, it is our presumption that a significant number of dead and dying trees will be removed within MSO protected habitat. The Forest will remove dead or dying trees over 9 inches, but less than 18 inches dbh within PACs and 40 percent steep slope areas. We find that the resulting effects will be adverse for MSOs and their prey.

Prescribed Burning (Broadcast and Maintenance Burns)

Fires have played an important role in the composition and structure of conifer forests. Generally, historic natural fires in ponderosa pine were light in 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 top growth, 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 fires and pile burning with creep may be expected to alter mixed conifer habitats of the MSO in the short-term to a greater extent now than historically because the fuel accumulations that are characteristic of many MSO nest and roost sites generally place them at higher fire risk. This is particularly true in the project area, as fire has been excluded for many years, and fuel loadings are very high and generally continuous within some of the MSO habitat. In addition, historic grazing in the action area reduced 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 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 saw-timber-sized ponderosa pine can increase 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 (Bradley 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 and "torching" of individual Douglas fir is also aided by the presence of large, dense dwarf-mistletoe induced witches' brooms which can create fuel ladders. Heavy fuel accumulation at the base of trees 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).

The Recovery Plan (USDI Fish and Wildlife Service 1995) recognizes high severity fire as the greatest threat to MSO habitat. Prescribed burns can be an extremely important management tool to enhance and often begin to restore many of the ecosystem functions and processes. The long-term benefits to the MSO of some management actions may contribute to short term adverse effects to the MSO. Prescribed 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. As noted, the Recovery Plan (USDI Fish and Wildlife Service 1995) encourages conservative fire management programs that take an active role in fuels management, while minimizing effects to the MSO.

Broadcast burning would be utilized to remove small surface fuels. Broadcast burning the thinning generated slash would be expected to spread a low to moderate intensity surface fire over 75 percent or more of the burn unit. The potential for effects to MSO depend largely upon the specific type of fire activity and its location, within or in proximity to MSO habitat, or the timing, duration, and breadth of the action. We anticipate that broadcast and pile burns will consume some fine fuels, downed logs, some snags, shrubs, and other understory vegetation, and prescriptions will likely provide protective measures to reduce some adverse impacts. Some of the anticipated effects are generally: 1) mortality of tree seedlings and up to 50 percent reproduction of 1 to 9 inch dbh trees; 2) ground fuel accumulations and downed woody debris will be lessened; and 3) an increase in snags and downed woody material. Fire activity from these burns may range from creeping surface fires of less than one foot in pine litter and duff to an active surface fire which with 3 to 4-feet flame lengths. These low to moderate intensity fires would typically only consume the fine fuels 4 inches and less in diameter, while leaving mostly larger logs (12 inches and greater). Within each burn unit, 50 to 75 percent may burn, based upon variation in terrain and fuel moisture. Mastication units covered with various depths of shredded wood (less than 4 inches at the deepest), would be expected to burn in a similar manner as scattered slash units which would mimic historic surface fires (Hatchett et al., 2006).

The Forest Service proposed that prescribed burning would avoid the MSO breeding season and the 100-acre core areas within PACs. Additionally, large piles of slash would be moved far away from living trees to reduce the amount of scorching. Smoke may affect short-term foraging capabilities of MSOs by limiting site distance of prey, and the inhalation of smoke by MSO may negatively affect individuals during the duration of the burn. Short-term disturbance from smoke effects will likely affect feeding and roosting MSO outside of the breeding season.

Recent research indicates a third of snags and almost half of all logs will be lost following prescribed burning (Randal-Parker and Miller 2002). For example, the Coconino National Forest's monitoring data from already implemented projects indicates that losses of these key habitat components may be higher (USDI Fish and Wildlife Service 2006). Microhabitat monitoring from burns implemented on the Happy Jack Urban Interface Project on the

Mogollon Rim Ranger District showed an 8% loss of trees greater than 18 inches dbh, a 21% loss of pre-treatment counted snags, a 71% loss of logs, and a 47% loss of Gambel oak trees greater than five inches dbh in areas burned as of late 2004 (USDI Fish and Wildlife Service 2006). In addition, prescribed burns in Arizona conducted along Highway 87 and Forest Highway 3 appears to have had higher loss of canopy cover and basal area. The data from the published paper and the Happy Jack Urban Interface Project were collected from burns in ponderosa pine habitat. We would expect that initial entry burns (189 acres within PACs, 35 acres outside of PACs) in mixed conifer habitat, has the potential to result in even higher losses of these key habitat components. As such, controlled burning is expected to reduce the risk of wildfire by reducing accumulations of fuels, but it also can modify and/or destroy the key habitat components that comprise MSO habitat.

The implementation of broadcast burns should create a mosaic within some MSO habitat. High intensity burns should not occur within MSO habitat or will be small scale (e.g., less than a few acres). However, it cannot be ruled-out that instances may occur where loss of the dead and down components reaches a level in a given area that may adversely affect the MSO. We expect that such an effect would be very short-term as replacement material (tree mortality from bark beetle and burns, etc.) will be readily available to again bolster this habitat component to acceptable levels in these circumstances. Although short-term adverse affects to MSO habitat may occur, we believe these will be temporary and not likely to cover a significant portion of the action area. We expect that broadcast burning will provide conditions suitable for increased herbaceous plant growth by removing dead plant debris within treated areas. The mosaic created by burned and unburned areas is expected to increase herbaceous plant species diversity and, in turn, assist in the production and maintenance of the MSO prey base.

Maintenance burns have the potential to alter key habitat components for years in the future (approximately every 5 to 20 years) in different sections of the project area. These burns will likely target dead and live fuels near the forest floor, including dead and down material, live brush and, in some cases, "dog-hair" thickets of conifer. Generally, these activities will not affect canopy closure, but will reduce the amount of surface and ladder fuels. Therefore, we believe that the successful implementation of these burns may assist in reducing the existing threat of high severity wildfire, but may also continue to adversely affect the MSO. Alternatively, if low intensity broadcast burns can retain the characteristics recommended by the Recovery Plan (USDI Fish and Wildlife Service 1995), then anticipated adverse effects to MSO habitat are likely to be few.

It may be possible that low-intensity fires benefit MSOs although we are unaware of any definitive scientific evidence to support this conclusion. Jenness et al. (2004) suspected that low-intensity ground fires probably have little impact on MSO presence or reproduction, but they acknowledge there is no long-term data on the effects of fire on MSOs. Moreover, they recommended proactive fuels treatments only within areas not currently occupied by MSOs, whereas within occupied areas treatments should judiciously applied after weighing the benefits and risks (Jenness et al. 2004). Bond et al. (2002) examined the short-term effects of wildfires on all three subspecies of spotted owls. They determined that spotted owls exhibited high estimates of post-fire survival, site fidelity, and average number of fledglings

per pair, one year after both low and high severity fires. Unfortunately, their study describes only very short-term results, and was not designed to address the long-term effects of wildfires on spotted owls. Bond et al. (2002) stated that while they do not yet advocate wholesale prescribed burning in MSO territories, they do believe that their observations justify large-scale experiments to corroborate their observations and to establish cause-and-effect relationships. The proposed action includes a general monitoring component of fuels and MSOs, that may contribute in a general sense to the body of knowledge on the effects of fire and thinning on MSOs. However, the monitoring will not be conducted with any sort of careful experimental design that could advance our understanding of the relationship between fuels treatments and MSO survival and reproduction as called for by Noon and Franklin (2002), Lee and Irwin (2005), or Bond et al. (2002).

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.

High levels of owl reproductive success and production may be due to prey abundance (Delaney et al. 1999). The Recovery Plan (USDI Fish and Wildlife Service 1995) documented an increase in owl production when moderate to high levels of woodrats, peromyscid mice, and voles, were consumed. A diverse prey base is dependant on availability and quality of diverse habitats. Owl prey species need adequate levels of residual plant cover, understory cover, and high log volume. Therefore, a wide variety of forest and vegetative conditions are important to the owl and its prey. The removal and burning of slash will lower reproductive success for the owl.

Prescribed fire activity will be monitored by the Forest Service and extinguished if weather conditions fall outside of prescription parameters. The Forest Service requires, and will prepare written, site-specific prescribed burn plans that are approved by a line officer and contain standards for smoke management and other resource constraints (USDA Forest Service 2002). The purpose of these plans is to ensure that resource management objectives are clearly defined and that the site, environment, or human health is not harmed. The plan must complete a risk assessment to quantify the chance of fire escaping and develop a contingency plan for action taken to prevent escape and if it does, quickly contain the escape. The Forest Service's requirement for a prescribed burn plan will also minimize the chance of fire escaping because a contingency plan for action will be developed to prevent or quickly contain an escaped broadcast, jackpot pile, or pile burn. Therefore, escaped fires are not expected to occur.

MSO Critical Habitat

The Recovery Plan (USDI Fish and Wildlife Service 1995) encourages land management agencies to conduct fuels reduction projects within MSO habitat and provides guidelines for

these actions that will aid in reducing fuels, but still maintain habitat and minimize effects to MSO. These guidelines were designed to protect MSO habitat over the long-term by reducing the likelihood of severe crown fire; however, short-term effects from fuels reduction treatments can adversely affect the PCEs of MSO critical habitat directly or indirectly by affecting their habitat and/or prey.

There are 1,959 acres in critical habitat unit within the project area. Of the 1,959 acres of critical habitat, 1,326 acres (66 percent) are within protected MSO habitat. On the 1,326 acres of protected habitat, 1,288 acres (97 percent of the protected habitat) are in three PACs and 38 acres (3 percent of the protected habitat) are slopes greater than 40 percent. About 190 acres (less than 1 percent of the critical habitat) are within restricted habitat, and the remaining 483 acres (24 percent of the critical habitat) are within ponderosa pine, pińon/juniper, and oak woodland habitat.

On the Lincoln National Forest, protected or restricted habitat is generally composed of mixed conifer (USDI Fish and Wildlife Service 1995). The designation includes PCEs related to canyon habitat, but this habitat type does not occur within the action area. Therefore, we did not analyze the effects of this project on PCEs within canyon habitat. Additionally, the habitat-based guidelines and definitions of protected and restricted habitat of the Recovery Plan were utilized for our critical habitat designation and the analysis. Consequently, much of our analysis and conclusions detailed above are relevant to the current adverse modification analysis.

Some of the PCEs of MSO critical habitat will be adversely affected by the proposed action. For example, broadcast burning and mechanical thinning activities may affect the designated critical habitat by affecting snags, downed logs, woody debris, multi-storied canopies, and dense canopy cover. In addition, the proposed activities may change the structure of MSO prey species' habitat, affecting the abundance and composition of prey species. Although these activities may reduce the risk of high severity wildfire, they will also adversely affect MSO PCEs of critical habitat.

The conservation measures identified above and in the DEIS and BA will be fully implemented by the Forest Service as part of their proposed action. These measures represent actions that were evaluated as part of our adverse modification analysis. These conservation measures will help minimize or avoid adverse impacts to the function and conservation role of MSO critical habitat. Without these conservation measures, the negative effects to the function and conservation role of MSO critical habitat likely would be greater. The PCEs are listed below with the evaluation of effects as they pertain to the proposed actions.

Range of Tree Sizes

The full range of tree age classes that historically existed has been replaced by high densities of seedling trees and mid-story trees. Broadcast burns and mechanical thinning may decrease the number of small trees, but the range of size classes will generally remain unaffected. We do expect that adverse effects will occur from the simplification of forest (vertical) structure

over the project area. Additionally, areas that are currently less than target/threshold conditions indentified in the Recovery Plan (USDI Fish and Wildlife Service 1995) for restricted habitat will also be affected by treatment. Still, we do not expect the function and conservation role of this PCE will be compromised.

Canopy Closure

Loss of canopy closure (cover) will result from the proposed treatments. Although this action is proposed to reduce the risk of high severity wildfire, a long-term reduction of SDI below 25 percent maximum and the removal of trees up to 18 inches dbh within 3 PACs and other MSO habitat will adversely affect this PCE. Some of the treatments were designed to retain larger trees and promote development of some MSO restricted habitat, but it is unlikely that canopy cover of at least 40 percent will remain after treatments. As described in the DEIS, the proposed action will result in: 1) the geographic extent of continuous dense closed canopy forest would be reduced and would have an average canopy cover to below 40 percent; 2) canopy cover would remain below an average less than 40 percent for 20 to 30 years; and 3) although the open understory would limit the amount of ladder fuels, it will also substantially reduce or eliminate the amount of multi-storied (vertical) forest structure and create canopy gaps up to a maximum of 200 feet wide. For these reasons, we conclude that the long-term adverse effects to canopy closure will occur within much of the MSO habitat.

Implementation of the proposed action is expected to have a significant lasting effect on this PCE. Nevertheless, we do not expect the function and conservation role of this PCE will be compromised or appreciably reduced over the Basin and Range East RU. This is because the project area will only affect approximately 3.5 percent of the total critical habitat within the Basin and Range-East RU, which is not extensive in relation to the critical habitat unit or overall designation. The long-term effect of the PCE will not significantly and detrimentally alter the species' habitat over an area large enough that the likelihood of the owls' persistence and recovery, either range-wide or within a RU, is significantly reduced.

Large Snags

The implementation of the proposed project is expected to result in the loss of some snags and the creation of others. For example, we anticipate some loss of large diameter snags and trees. Measures to promote low to moderate intensity burns will limit the rate of burning and fire intensity. Standards and guidelines from the Forest Plan indicate that all snags greater than 18 inches dbh will be retained; however, removal of dead and dying trees up to 18 inches dbh will result in adverse effects to this PCE.

High Volumes of Fallen Trees and Woody Debris

The absence of frequent, low-intensity fire has altered and degraded many of the forest stands within the action area. Due to decades of fire suppression, high accumulations of fuels have created the opportunity for high severity, stand-replacing fires. The high volumes of fallen trees and other wood debris and duff can increase fire severity. We also anticipate that forest thinning activities will adversely affect this PCE. For these reasons, management of this

habitat component is problematic at best. We expect that a reduction in volumes of fallen trees and other woody debris will result from the proposed action. Although conservation measures have been designed to protect large down logs and other important features of MSO habitat, we anticipate this PCE will incur short-term adverse effects. Nevertheless, the function and conservation role of this PCE will be not be compromised.

Plant Species Richness, including hardwoods

Treatments do not call for the complete removal of any one species. Therefore, the combination of all treatments will not affect the "wide range of tree and plant species, including hardwoods" within the treatment units. Moreover, a standard and guideline from the Forest Plan indicates that key forest species such as oak will be retained. Thus, any effects to this PCE are expected to be insignificant and discountable. We conclude that the function and conservation role of this PCE will not be compromised

Residual Plant Cover for Prey Species

Short-term decrease in plant cover will result from prescribed fire activities and mechanical thinning. The prescribed burns will likely consume portions of the lower-level plant cover species, and reduce the number of fruits and seeds for plant regeneration. The combination of prescribed burns and the level of target canopy cover and SDI are expected to result in adverse effects to the "levels of residual plant cover to maintain fruits and seeds" within the treatment areas. However, the beneficial effects of fire will likely increase the response of herbaceous vegetation after treatments due to suitable conditions for increased herbaceous plant growth from the removal of a thick layer of dead plant debris within treated areas. Thus, we conclude that the function and conservation role of this PCE will not be compromised.

In summary, many of the PCEs of MSO critical habitat will be adversely affected by the proposed action. Canopy cover, large snags, and residual cover for prey species will likely be the PCEs affected most by the proposed action. We find that the effects to the function and conservation role of critical habitat relative to the RU and the entire designation are not significant because the impacts will occur in a relatively small area relative to the RU and the overall critical habitat designation. Therefore, we conclude that the PCEs of MSO critical habitat will serve the intended conservation role for species with implementation of the proposed action.

Interrelated and Interdependent Actions

We also must consider the effects of interdependent and interrelated actions of this proposed project to the MSO. Interrelated actions are actions that are part of a larger action, and are dependent on the larger action for their justification. Interdependent actions are actions that have no independent utility apart from the action under consideration.

Road Construction and Use

The construction and reopening of access roads are considered interrelated and interdependent with the implementation of the proposed project. The use of these roads during project implementation by field crews and vehicles, and any maintenance of the roads, or road repairs are also considered interrelated and interdependent with the implementation of the current proposed project.

The BA identified that the construction of 0.5 miles (Brady PAC) of new road and 2.5 miles (Flume PAC) of road reconstruction within MSO PACs would reduce the amount of forested areas with protected habitat. The most significant effects are expected to result from increased disturbances from vehicular traffic or recreation in and around these PACs (e.g., from reopening forest roads). When these roads are constructed or reopened, the area that may be subjected to high levels of disturbance that could extend beyond the PACs into adjacent lands. Still, adjacent unoccupied areas (e.g., restricted habitat), are not expected to be altered or indirectly disturbed to the extent that MSOs will be adversely affected.

Although, the proposed action is to close and decommission the road within the Flume PAC, the 0.5 miles of road within the Brady PAC will convert to permanent trail. The BA noted that recreational use of the trail may cause some disturbance to MSOs from human presence, especially during the breeding season. We agree with this conclusion. Therefore, we conclude that road construction and subsequent recreational activities may adversely affect the MSO due to disturbance.

Indirect effects

Indirect effects are those that are caused by, or result from, the proposed action, and are later in time, but are reasonably certain to occur. Although these roads would be closed and re-seeded after the treatments have been completed, they would be open and available to the public for use during the project. In addition, opening additional miles of roads would allow for increased human presence in PACs.

The DEIS acknowledges that there is an increased opportunity for weed establishment through soil disturbance or temporary aboveground reduction of surface layer vegetation. The main activities that would be expected to facilitate weed establishment under the proposed action are the road reconstruction/construction work and creation of skid trails and landings for log removal. Other proposed activities which are expected to cause some degree of soil disturbance are thinning and burning activities. Weed occurrence may unavoidably increase in some areas initially as a result of the proposed activities. This unavoidable increase would be minimized by virtue of design features and mitigation incorporated into the proposed action. For example, weeds would be minimized by checking all disturbed areas for invasive plant (weed) invasion. Invasive plant monitoring and control treatments in this area are scheduled to begin in 2008, and would continue throughout the life of the project and as needed after the project. Any invasive plants found would be treated to prevent spread, in accordance with the existing Forest-wide EIS and Record of Decision for treating invasive

plants. For these reasons, the indirect effect of weeds is considered insignificant and discountable.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions on endangered or threatened species or critical habitat that are reasonably certain to occur in the foreseeable future in the action area considered in this biological and conference opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Cumulative effects analysis as stated here applies to section 7 of the Act and should not be confused with the broader use of this term in the National Environmental Policy Act or other environmental laws. The Service's most recent assessment of the MSO and its habitat on non-Federal lands is found in the final rule designating critical habitat (USDI Fish and Wildlife Service 2004).

In past BOs, it has been stated that, "Because of the predominant occurrence of the MSOs 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, future actions on non-Federal lands adjacent to the Forest Service lands that are reasonably expected to occur include urban development, road construction, land clearing, logging, fuelwood gathering, and other associated actions.

The proposed project area is located in the proximity of the Village of Ruidoso, New Mexico. The area is interspersed by National Forest and non-Federal lands including Highways and existing infrastructure (e.g., powerlines), developed private campgrounds, and the Village of Ruidoso and surrounding residential areas, where activities occur either seasonally or year-round. These activities reduce the quality and quantity of MSO nesting, roosting and foraging habitat, and cause disturbance to breeding MSOs and contribute as cumulative effects to the proposed action.

Finally, increased warming could result in the intensification of outbreaks of forest "pest" insect species or wildfire (Logan et al. 2003; GAO 2007). Climatic disturbance may alter the distribution and phenology of plants within MSO habitat, which could negatively alter the landscape for both MSOs and their prey (Van Riper III et al. 2008). Habitat specialists such as the spotted owl may be at high risk to climate change (GAO 2007). For example, precipitation can influence MSO survival and reproduction (Seamans et al. 2002). As directed in Secretarial Order 3226, we have considered and analyzed potential climate change impacts on the MSO (USDI 2001). It is possible that the effects of climate change may result in future State, tribal, local, or private actions through increased forest thinning to treat future insect or disease outbreaks. Although we recognize and are concerned about the impact of changes in climate and the potential resulting forest management activities on the MSO and its habitat, we are unclear how to address a threat of this magnitude and complexity.

CONCLUSION

We recently developed policy to adapt a long-term view of the benefits of fuels treatment projects (USDI Fish and Wildlife Service 2002b). Some projects may have short-term adverse impacts on the MSO, but at the same time present opportunities for significant long-term benefits to the MSO. We do not believe this is the case for the current project. In future projects, the Service stresses the need to view MSO PACs as an essential piece of information related to managing the fire component on National Forest System lands. Prescriptions should be tailored to minimize human risk from catastrophic wildfire, while maintaining key structural features of MSO habitat. The Recovery Plan (USDI Fish and Wildlife Service 1995) indicates that reducing the risk of catastrophic fire must be done without compromising MSO nesting and roosting habitat. The objective of MSO protected habitat guidelines is to prohibit timber harvest, while allowing treatment of small diameter fuels and prescribed burning. This guidance is currently detailed in the Recovery Plan (USDI Fish and Wildlife Service 1995) and would maintain adequate levels of MSO habitat in addition to reducing high severity fire risks.

We recognize that there is an inherent risk with respect to the probability of stand replacing wildfire within MSO habitat in the project area. As noted, the Recovery Plan (USDI Fish and Wildlife Service 1995) provides specific guidelines that encourage a proactive approach to reduce fuel risks and simultaneously enhance MSO prey habitat. The intent of the MSO guidelines in the Recovery Plan (USDI Fish and Wildlife Service 1995) is not to preserve MSO PACs in perpetuity, but rather to protect them until it can be demonstrated that replacement habitat can be created through active management. The Recovery Plan (USDI Fish and Wildlife Service 1995) also indicates that habitat heterogeneity from fires can create patches that would benefit the MSO and its prey. Insect and mistletoe mortality are similar disturbance mechanisms, in that they also create mosaics within MSO habitat. The Forest Service found that, based upon current conditions, the largest threat to the MSO in the project area is the potential for high-severity crown fire. We disagree with this conclusion. We believe this type of a proposed project is the largest threat to the MSO within the Recovery Unit. We strongly encourage the Forest Service to adhere to their Land and Resource Management Plans and the respective 1996 amendments for future projects within the wildland urban interface.

Although severe wildfire risk will be reduced over the project area, the proposed actions will result in significant disruption of three MSO PACs to the extent that they will likely not remain viable for the long-term. Additionally, the reduction of crown fire over the project area is minimal when compared to the larger landscape. While the project may help protect the Village of Ruidoso, it will do little to reduce the threat of landscape level high-severity wildfire over a large geographic area for the MSO.

The Service believes that the long-term effects of the proposed treatments will adversely affect the integrity and viability of the Flume, Brady, and Perk PACs and other MSO habitat in the project area. In addition, impacts to these PACs will cause suppressed reproductive success, cause avoidance/abandonment or lead to future unoccupancy of these areas, and likely inhibit reoccupancy of the PACs. MSOs in the Sacramento Mountains frequently

reoccupy or fill vacant PACs (Kyle et al. 2007), indicating that formal MSO monitoring within the three PACs will likely be unable to determine whether individual MSO take occurs.

After reviewing the current status of the MSO, the environmental baseline for the action area, the effects of the proposed action as described and analyzed above, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the MSO and is not likely to destroy or adversely modify designated critical habitat. Although the proposed action will result in significant habitat modification and degradation of three PACs, the implementation of the proposed action is not expected to impede the ability of the survival or recovery of the MSO within the Basin Range East RU or range-wide. We also find that many of the proposed actions have the potential to cause adverse effects to designated critical habitat. Nevertheless, it is anticipated that these impacts will not affect the role of critical habitat unit Basin and Range-East-1a relative to the conservation of the MSO and to the overall critical habitat designation. We do not expect the effects of the proposed action to appreciably alter the function and intended conservation role of MSO critical habitat range-wide.

INCIDENTAL TAKE

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct. Harass is further defined by us as intentional or negligent actions that creates 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, and sheltering. Harm is further defined by us 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. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or extent of take

The Service anticipates that the proposed action will result in incidental take of MSOs in the form of harm and harassment. The anticipated take statement in this opinion does not assess the short-term take associated with the proposed action, as this would result in a simple double-counting of the effects of take to these PACs without considering the cumulative nature of those effects.

We anticipate that this proposed action will effectively render the area unsuitable for nesting MSO through noise disturbance to foraging, roosting, and nesting owls. The proposed

treatments will result in significant effects to MSO nesting and foraging through SDI reductions (below recommended levels of canopy cover and basal area) and through prey habitat reductions. These modifications are not expected to return to pre-project levels for decades. We recognize that birds will continue to reside for the near-term in these areas, and that there may be elevated prey levels in areas in response to some of the proposed habitat alterations; however, we believe the long-term survival and habitat capability of this area is, and will continue to be, adversely affected by this action. Incidental take of MSO will occur from significant habitat modifications that result in impaired behavioral patterns, including feeding and sheltering from the combination of treatments within the identified PACs. Based on the best available information concerning the MSO, the habitat needs of this species, the proposed project description, and information furnished by the Forest Service, take is considered likely as a result of the following actions:

- Harm of three PACs including three pairs of MSOs (and associated eggs/young) from forest thinning operations. We anticipate this take through direct disturbance of habitat within the Brady, Flume, and Perk PACs, resulting from forest thinning operations in and around these PACs. The take associated with this proposed action will be long-term (i.e., lasting several decades), such that these PACs will no longer contribute to MSO recovery. Disturbance from those impacts will result in disrupted MSO reproduction and the ability of these PACs to provide for essential elements of survival and recovery for resident MSOs.

The Recovery Plan (USDI Fish and Wildlife Service 1995) recommends maintaining the integrity of 600 acre PACs around occupied or historically occupied MSO sites. Therefore, incidental take can be supported if a habitat-altering action compromises the integrity of a PAC (i.e., an action is proposed in a PAC that would not fall under the specific recommendations of the Recovery Plan (USDI Fish and Wildlife Service 1995)). As detailed in the effects analysis, many of the treatments will not conform to the Recovery Plan's recommendations (USDI Fish and Wildlife Service 1995).

Noise disturbance studies have shown that owls have sensitive hearing, respond to noise, and can be disturbed by noise. We anticipate that the noise generated by logging trucks, tree cutting and hauling, and road repair, construction, and maintenance activities, which will occur within close proximity to PAC boundaries, in habitat likely used by the owls, or known owl sites, will disturb owls remaining within the proposed action area, as detailed above.

To the extent that this statement concludes that take of MSO, a migratory bird, will result from this agency action, the Service will not refer the incidental take of any such migratory bird for prosecution under the MBTA of 1918, as amended (16 U.S.C. §§ 703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Effect of the take

For the Brady, Flume, and Perk PACs, we anticipate long-term effects, which could essentially eliminate reproduction for several decades. Given that the anticipated reproductive

potential of a given MSO pair is approximately eight to 10 years, adverse effects for several decades to three PACs in this area is substantial.

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. We present this conclusion for the following reason:

- The three PACs within the proposed action area represent about one percent of the 196 PACs identified in the Basin and Range East RU and less than .01 percent of the 1,025 PACs located within the Forest Service lands of Arizona and New Mexico. This is a relatively small percentage of the total number of PACs.

Reasonable and Prudent Measures

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

1) Conduct all proposed activities in a manner that will minimize disturbance to the MSO and minimize modification and loss of MSO habitat.

2) Well-defined operational procedures shall be implemented and reported.

Terms and Conditions for the MSO

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service and their employees, contractors, or subcontractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1.1 All field personnel who implement any portion of the proposed action shall be informed and adhere to the protective conservation measures and terms and conditions as described in this BO, the DEIS, and the BA.

1.2 Limit the number and habitat loss associated with the construction of road turnouts. This should be done by:

a. Ensuring that any road turnouts that fall within protected habitat adhere to the recommendations in the Recovery Plan (USDI Fish and Wildlife Service 1995) with respect to tree removal, or place them outside of restricted and protected habitat.

b. Using radios to coordinate truck traffic;

c. Limiting construction of new turnouts unless line of sight is obstructed, or topography (i.e., hills) creates hazardous situations for trucks passing on the road.

1.3 Minimize unnecessary disturbance to protected MSO habitat within the proposed action area by:

a. Directing skid trails through treeless areas to prevent additional disturbance, especially in areas with little to no dead or dying trees;

b. Using existing forest openings, rather than removing additional trees, for log deck construction and use.

1.4 Patrol and enforce travel management regulations throughout action area, particularly reopened or newly constructed roads within the project area;

1.5 Protective measures to protect certain MSO key habitat features will be adhered to, as described in the proposed action and conservation measures; and

1.6 Staging areas for vehicles shall be placed outside of PACs.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 2:

2.1 The Forest Service shall document all actions, report incidental take, and monitor the effects of the proposed action on the MSO and its habitat. Those findings shall be reported to us by December 31 of each year. The report shall document the areas and acreage treated, the implementation and effectiveness of the terms and conditions of this BO, information about MSO monitored or encountered (including MSO surveys that were conducted), quantification of any incidental take as defined in this BO, and any recommendations for actions in the upcoming year(s). Maps shall also be provided which will include each treatment (e.g., prescribed fire or thinning activities) that occurred. By March 1 of each year, the Forest Service will meet with the New Mexico Ecological Services Field Office (NMESFO) to review the report and discuss the following year's actions relative to the previous year's actions and cumulative actions. This action will ensure the environmental baseline for the MSO is reviewed annually to rectify anticipated effects with those that occurred.

2.2 Within the same report under item 2.1, detail any other deviations from the proposed action.

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

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for these species. In order for us to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species and their habitats, we request notification of the implementation of the conservation recommendations. We recommend the following conservation recommendations be implemented:

1) When piling and burning slash, the Forest Service should: a) stack compact piles relatively high in relation to width or diameter; b) arrange piles far enough apart to prevent inter-ignition; c) consider igniting alternating piles or placing piles far enough away from surrounding MSO key habitat components to avoid damage from burning or scorching;

2) Each year during training or refresher courses (e.g., chain saw certification or refresher class), the Forest Service should provide field crews an overview of the requirements of this project including the identified conservation measures and other minimization activities identified in the applicable NEPA document. This would minimize or avoid actions that would adversely affect the MSO or other natural resources, while ensuring consistent implementation of the project;

3) Following the Recovery Plan (USDI Fish and Wildlife Service 1995), the Forest and Service should conduct a collaborative approach for an ecosystem assessment to document that a surplus of threshold habitat exists at the Forest and District Level (i.e., a larger landscape level). An ecosystem assessment should begin in Fiscal Year 2008. Manage this habitat toward target conditions following Table III.B.1. If a deficit of threshold habitat is found, additional forest stands should be identified that:

    a. have the site potential to reach target conditions; and

    b. whose current conditions most closely approach target conditions.

4) In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting MSO, the Service requests notification of the implementation of any conservation recommendations.

DISPOSITION OF DEAD OR INJURED LISTED ANIMALS

Upon finding a dead, injured, or sick individual of an endangered or threatened species (e.g., MSO), initial notification must be made to the nearest Service Law Enforcement Office. In

New Mexico, contact (505/346-7828) or the NMESFO (505/346-2525). Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Caution must be exercised when handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animals shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, we should be contacted regarding the final disposition of the animal.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposal to implement the Perk-Grindstone Fuel Reduction Project, on the Smokey Bear Ranger District, Lincoln National Forest, New Mexico. As required by 50 FR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may impact 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 future communications regarding this project please refer to consultation #2-22-05-F-143. If you have any questions or would like to discuss any part of this biological opinion, please contact Eric Hein or Lynn Gemlo of my staff.

Sincerely,

Wally Murphy
Acting State Administrator

Enclosure

cc:
Field Supervisor, USDI Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona
Assistant Field Supervisor, USDI Fish and Wildlife Service, Arizona Ecological Services Suboffice, Tucson, Arizona

Assistant Field Supervisor, USDI Fish and Wildlife Service, Arizona Ecological Services Suboffice, Flagstaff, Arizona

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