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AESO/SE  
2-21-03-F-0353

October 24, 2003

Memorandum

To: Fire Management Coordinator, Fish and Wildlife Service, Albuquerque, NM  
(Attn: Jeffery C. Whitney, FM)

From: Field Supervisor

Subject: Biological Opinion on the Proposed Braeside/Dry Lake Wildland Urban Interface  
Fuels Reduction Project in partnership with the Arizona State Land Department

This memorandum constitutes our biological opinion based on our review of the Braeside/Dry Lake Wildland Urban Interface Fuels Reduction Project, Coconino County, Arizona. The project is a partnership project between the Arizona State Land Department (ASLD) and the Fish and Wildlife Service, regarding implementation and planning of fuels reduction treatments within the Braeside/Dry Lake area. Through collaboration with the ASLD, we hope to find innovative solutions for protecting listed species habitat and the community of Flagstaff, Arizona, from severe wildfire that originates on or moves through the project area.

This biological opinion analyzes the project's effects on the threatened Mexican spotted owl (*Strix occidentalis lucida*) (MSO) and threatened bald eagle (*Haliaeetus leucocephalus*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*, Act). We received your October 22, 2003, request for formal consultation on October 23, 2003. In this request, you determined that activities associated with fuels reduction activities within the Dry Lake protected activity center (PAC) (#040231) and in adjacent MSO habitat would likely adversely affect the MSO. In your letter you also requested our concurrence that the proposed action may affect, but is not likely to adversely affect, the bald eagle. We concur with your determination. The basis for our concurrence is found in Appendix A.

This biological opinion is based on information provided in the October 22, 2003, Biological Assessment and Evaluation (BAE), field visits, conversations with and electronic mail transmissions from the ASLD, and other sources of information. Literature cited in this

biological opinion is not a complete bibliography of all literature available on the MSO, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

### **Consultation History**

Details of the consultation history are summarized in Table 1.

**Table 1.** Summary of Consultation History

<i>Date</i>	<i>Event</i>
1996- June 2003	The ASLD, Forest Service, Bureau of Land Management, and Fish and Wildlife Service discussed consultation alternatives for proposed fuels reduction projects in the Dry Lake area. The administrative record includes meeting notes, correspondence, and conversations documenting this process.
June 25, 2003	We sent a letter to the ASLD facilitating joint participation, communication, coordination, and collaboration regarding implementation of the Braeside/Dry Lake Wildland Urban Interface Project.
June - September, 2003	The ASLD and Fish and Wildlife staff met on multiple occasions to develop stand prescriptions, mark stands, and coordinate with other agencies and the Centennial Forest.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

The proposed project is located on Arizona State Trust lands immediately southwest of Flagstaff, Arizona (Township 21 North, Range 6 East, Sections 21, 22, 25, 27, and 28) and is a partnership project between the ASLD and the Fish and Wildlife Service. The project area is strategically located southwest of Flagstaff, and is adjacent to the Westwood Estates, Aspen Meadows, and Flagstaff Ranch subdivisions; U.S. Naval and Braeside Observatories; and the Coconino National Forest. In addition, there are other subdivisions, businesses, and infrastructure (power lines, wells) located within a five-mile radius of the area. The Fire Hazard Rating for the area, as developed by the Coconino National Forest, is HIGH to EXTREME risk condition. Therefore, the primary objective of the proposed action is to reduce the risk of a severe crown fire moving

through the Dry Lake MSO PAC and into the City of Flagstaff. Secondary objectives include managing for a high-density wildlife corridor, MSO habitat, American pronghorn (*Antilocapra americana*) habitat, and research objectives. Though the project partners expect the thinning to be completed within the next two years, the project time frame covered under this consultation is ten years.

The project area is approximately 1,800 acres and falls within the Braeside and Sinclair/Dry Lake Management Units (as defined by the ASLD). Each stand, within each management unit, will be treated under a multi-aged silvicultural prescription with the intent to increase the degree of spatial clumpiness within the stand. We are defining “spatial clumpiness” as the degree to which the residual stand is characterized by discrete groups of trees with interlocking crowns separated by forest openings. Thinning and prescribed burning will be used to accomplish these goals. All actions within the PAC will be coordinated with the Fish and Wildlife Service and the Arizona Game and Fish Department. Due to limited access in the winter, thinning will occur during the MSO breeding season (1 March through 31 August). No yellow pine or trees greater than or equal to 16 inches diameter at breast height (DBH) will be harvested. Appendix B lists the actual prescriptions, by stand, for the project area. Treatments will be designed to retain existing aspen (*Populus tremuloides*) and Gambel oak (*Quercus gambelii*) and to minimize the risk of introducing or spreading noxious weeds. Currently, no changes to the ASLD grazing management plan are expected as a part of this project.

Thinning slash will be piled and burned during the winter months, generally 1-3 years after thinning operations. No existing large down logs will be piled. In addition, all “cull” trees will be topped and left as an additional large downed woody material component. Slash piles will not be placed near large yellow pines or snags in order to avoid damage during burning.

All prescribed burning will be conducted according to the Recovery Plan for the Mexican Spotted Owl (USDI 1995). No broadcast or pile burning will occur during the MSO breeding season (1 March through 31 August) and no burning will occur within the two identified MSO activity areas. Large downed woody material and snags will be protected by raking individual snags and logs, deferring areas within stands, and using appropriate lighting techniques.

All attempts will be made to use existing roads. Identified roads that present resource concerns and all temporary roads will either be closed or obliterated based on the management objectives for each specific area. Roads needed for future management activities and fire suppression will be maintained, but roads needed only for fire suppression will be closed to restrict general public access. For these reasons, some road relocation, reconstruction, and temporary road construction may be necessary.

## **STATUS OF THE SPECIES**

The MSO was listed as a threatened species in 1993 (USDI 1993). The primary threats to the species were cited as even-aged timber harvest and catastrophic wildfire, although grazing,

recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The Service appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, 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, well-structured forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The primary administrator of lands supporting the MSO in the United States 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 2 National Forests in Colorado and 3 in Utah) support fewer owls. According to the Recovery Plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

The Upper Gila Mountains RU is a relatively narrow band bounded on the north by the Colorado Plateau RU and to the south by the Basin and Range-West RU. The southern boundary of this RU includes the drainages below the Mogollon Rim in central and eastern Arizona. The eastern boundary extends to the Black, Mimbres, San Mateo, and Magdalena mountain ranges of New Mexico. The northern and western boundaries extend to the San Francisco Peaks and Bill Williams Mountain north and west of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep forested drainages. This RU can be considered a "transition zone" because it is an interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces (Wilson 1969). Most habitat within this RU is administered by the Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests. The north half of the Fort Apache and northeastern corner of the San Carlos Indian reservations are located in the center of this RU and also support MSOs.

The Upper Gila Mountains RU consists of pinyon/juniper woodland, ponderosa pine/mixed conifer forest, some spruce/fir forest, and deciduous riparian forest in mid- and lower-elevation canyon habitat. Climate is characterized by cold winters and over half the precipitation falls during the growing season. Much of the mature stand component on the gentle slopes surrounding the canyons had been partially or completely harvested prior to the species' listing as threatened in 1993; however, MSO nesting habitat remains in steeper areas. MSO are widely distributed and use a variety of habitats within this RU. Owls most commonly nest and roost in mixed-conifer forests dominated by Douglas fir and/or white fir, and canyons with varying

degrees of forest cover (Ganey and Balda 1989, USDI 1995). Owls also nest and roost in ponderosa pine-Gambel oak forest, where they are typically found in stands containing well-developed understories of Gambel oak (USDI 1995).

Currently, high intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Mexican spotted owl habitat in the southwestern United States has been shaped over thousands of years by fire. Since MSO occupy a variety of habitats, the influence and role of fire has most likely varied throughout the owl's range. In 1994, at least 40,000 acres of nesting and roosting habitat were impacted to some degree by catastrophic fire in the Southwestern Region (Sheppard and Farnsworth 1995, unpublished Forest Service Report). Between 1991 and 1996, the Forest Service estimated that approximately 50,000 acres of owl habitat underwent stand replacing wildfires (G. Sheppard, Forest Service, Kaibab National Forest, Arizona, pers. comm.). However, since 1996, fire has become catastrophic on a landscape scale and has resulted in hundreds of thousands of acres of habitat lost to stand-replacing fires. This is thought to be a result of unnatural fuel loadings, past grazing and timber practices, and a century of fire suppression efforts. The 2002 Rodeo-Chediski fire, at 462,384 acres, burned through approximately 55 PACs on the Tonto and Apache-Sitgreaves National Forests and the White Mountain Apache Reservation (all within the Upper Gila RU). Of the 11,986 acres of PAC habitat that burned on National Forest lands, approximately 55% burned at moderate to high severity. Based on the fire severity maps for the fire perimeter, tribal and private lands likely burned in a similar fashion. We define moderate severity burn as high scorch (trees burned may still have some needles) and high severity burn as completely scorching all trees (trees completely dead).

Table 2 shows several high-intensity fires that have had a large influence on MSO habitat in this RU in the last decade. Obviously the information in Table 2 is not a comprehensive analysis of fires in the Upper Gila Mountains RU or the effects to MSO. However, the information does illustrate the influence that stand-replacing fire has on current and future MSO habitat in this RU. This list of fires alone estimates that approximately 11% of the PAC habitat within the RU suffered high to moderate intensity, stand-replacing fire in the last seven years.

**Table 2.** Names of a few influential fires within the Upper Gila Mountains Recovery Unit, approximate acres burned, number of PACs affected, and PAC acres burned.

<b>Fire Name</b>	<b>Year</b>	<b>Total Acres Burned</b>	<b># PACs Burned</b>	<b># PAC Acres Burned</b>
Rhett Prescribed Natural Fire	1995	20,938	7	3,698
Pot	1996	5,834	4	1,225
Hochderffer	1996	16,580	1	190

BS Canyon	1998	7,000	13	4,046
Pumpkin	2000	13,158	4	1,486
Rodeo-Chediski	2002	462,384	55	~33,000
TOTAL		525,894	84	~43,645

A reliable estimate of the numbers of owls throughout its entire range is not currently available (USDI 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USDI (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico. However, Ganey *et al.* (2000) estimates approximately  $2,950 \pm 1,067$  (SE) MSOs in the Upper Gila Mountains RU alone. The Forest Service Region 3 most recently reported a total of approximately 980 protected activity centers (PACs) established on National Forest lands in Arizona and New Mexico (USDA Forest Service, Southwestern Region, December 19, 2002). Based on this number of MSO sites, total numbers in the United States may range from 980 individuals, assuming each known site was occupied by a single MSO, to 1,960 individuals, assuming each known site was occupied by a pair of MSOs. The Forest Service Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than National Forest System lands have likely resulted in additional sites being located in all Recovery Units. Currently, we estimate that there are likely 12 PACs in Colorado (not all currently designated) and 105 PACs in Utah.

Since the owl was listed, we have completed or have in draft form a total of 121 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 325 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, 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 one of these projects (release of site-specific owl location information) has resulted in a biological opinion that the proposed action would likely jeopardize the continued existence of the MSO.

In 1996, the FWS issued a biological opinion on Forest Service Region 3's adoption of the Recovery Plan recommendations through an amendment of their Forest Plans. 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, with approximately 91 of those PACs located in the Upper Gila Mountains RU. In addition, 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. To date, consultation on individual actions under the amended Forest Plans have resulted in 240 PACs adversely affected, with 129 of those in the Upper Gila Mountains RU.

## **ENVIRONMENTAL BASELINE**

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat to provide a platform from which to assess the effects of the action now under consultation.

### **A. Status of the species within the action area**

Our records (based on information from the Forest Service) indicate that a pair of MSOs were observed on or near the Naval Observatory Flagstaff Station (NOFS) boundary by ASLD staff on June 28, 1994 (Township 21 North, Range 6 East, Section 27/22, NE/SE ¼). Nesting status was not determined and the pair has not been located since that time. However, MSO surveys conducted in 1994 were not well documented and the only written record of the observation was recorded by the Forest Service. Besides the pair detection, there were five single MSO detections in 1994 and single detections of MSO in 1995 and 2001. The Dry Lake PAC includes Forest Service, Arizona State Trust, and NOFS lands and was drawn cooperatively to include the best habitat and all known locations of MSO in the area. This resulted in a PAC consisting of two distinct segments. Under the direction of the Fish and Wildlife Service and the Recovery Team, a “land bridge” was added to the PAC boundary in order to provide habitat connectivity between the two portions of the PAC. The Dry Lake PAC encompasses approximately 1,106 acres total, but is an oddly-shaped, long, narrow strip that is not conducive to providing interior forest species habitat.

Owl surveys have rarely been complete because in most years only discrete portions (based on ownership) of the Dry Lake PAC have been surveyed. The ASLD, NOFS contractors, and the Coconino National Forest have all conducted surveys within and adjacent to the PAC. Mexican spotted owls were last detected in July 2001, in the eastern portion of the PAC (Township 21 North, Range 6 East, Section 35, NE¼). The NOFS was surveyed in 1994, 1997, 1999, 2001, and 2003. In 2003, surveys covered the ASLD and NOFS sections of the PAC, but the Woody Mountain area was not surveyed. Though portions of the NOFS were also surveyed by the ASLD in 1996 and 1998, not all protected and restricted habitat within the project area was surveyed and surveys were not conducted to protocol. A telemetry study conducted in the fall of 1995 found that a radio-telemetered dispersing juvenile MSO flew between this area and Arizona Army National Guard Camp Navajo installation. Therefore, this habitat may also serve as an

east-west corridor for dispersing owls between the Coconino and Kaibab National Forests and a north-south corridor for owls moving between the Mogollon Rim and the San Francisco Peaks.

Since the early 1900's, this analysis area has been managed for timber production and livestock grazing. Past harvest operations included sawtimber (1956) and pulpwood (1965) sales. Currently, the NOFS is conducting thinning within and adjacent to the Dry Lake PAC (Consultation #02-21-97-F-0110, 02-21-97-F-0110-R1). Approximately 120 acres of the 262.5 acres of MSO habitat to be thinned on the NOFS have been treated. This includes acreage within and outside of the Dry Lake PAC (approximately 124 acres of the NOFS are located within the Dry Lake PAC). Within the PAC is an area the Navy calls the Operations Area. This is an area of intensive use by Naval Observatory personnel. Vehicles and observatory staff operate in this area both day and night. In addition, the telescope dome is commonly opened and rotated at night. The biological opinions analyzing the effects of proposed NOFS operations and forest management activities on the MSO anticipated the take of two MSO (one pair) and/or associated eggs/juveniles following the full implementation of the thinning prescription. The incidental take anticipated is expected to be in the form of harm or harassment due to long-term habitat alteration. The ASLD has conducted recent thinning projects adjacent to the Dry Lake PAC (Consultations #02-21-01-I-0334, 02-21-96-I-0081) and permits grazing throughout the action area. Most of the area has been grazed by sheep with the exception of the westernmost portion, which has been grazed by cattle. The Forest Service will be treating portions of the Dry Lake PAC and the surrounding area as part of the Woody Ridge Wildland Urban Interface Project, which may include trail construction in the Dry Lake portion of the PAC.

## **B. Factors affecting species' environment within the action area**

Land ownership within and adjacent to the Dry Lake PAC includes the Forest Service, ASLD, NOFS, and private property. Actions included in this analysis that may affect the MSO include astronomical and forestry research, recreation, fuels reduction treatments, and development. Proposed and on-going activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. To achieve long-term research and educational goals and to provide a sustainable source of revenue, Northern Arizona University plans to construct a Centennial Forest Field Campus in the east ½ of the east ½ of Section 34, T21N, R6E. The field campus will be within and adjacent to the Dry Lake PAC and will include a forestry research station, small business development program, education camp and retreat center, and overnight guest lodging. The area is already a favorite recreation destination due to its proximity to Flagstaff, the Arboretum at Flagstaff, and the observatories. Established and new housing developments and a golf course to the north and east of the PAC have reduced habitat connectivity and increased the number of people accessing the PAC. Social trails currently exist around the Dry Lake Crater from the new Flagstaff Ranch development, and there is a trail from the Arboretum into the crater. The northernmost end of the PAC is approximately 0.5 miles from the Interstate 40 and Burlington Northern-Santa Fe Railroad corridor.



## EFFECTS OF THE ACTION

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

The Recovery Plan encourages land management agencies to conduct fuels reduction projects within MSO PACs and provides guidelines for these actions that will aid in reducing fuels, but still maintain habitat and minimize effects to MSO. These actions are supposed to protect owl habitat over the long-term by reducing the likelihood of severe crown fire; however, short-term effects from fuels reduction treatments can adversely affect owls directly or indirectly by affecting their prey. Approximately 550 acres of the Dry Lake PAC will be mechanically thinned. Within the next ten years, we expect to use prescribed fire in up to 75% of the PAC. Due to the area's proximity to the urban interface, the proposed action is unable to follow all of the Recovery Plan guidelines in order to effectively reduce the fire risk hazard in this area. The Braeside/Dry Lake area contains protected (PAC), restricted pine-oak, and pure ponderosa pine habitat. Treatments proposed will result in considerably more open stands (reducing canopy cover from approximately 65-75% to 35-40% ), which will reduce the likelihood of use by nesting or roosting MSO. The proposed action is to remove trees greater than nine inches DBH within the PAC, operate during the breeding season, and conduct thinning and prescribed burning in a PAC that does not have a defined activity center, as we do not have the data necessary to delineate one (Ward and Salas 2000). However, based on MSO detections and the best available habitat, the Forest Service has drafted a "potential" nest buffer area around the Dry Lake Caldera. In addition to the "nest buffer" used by the Forest Service, the ASLD has agreed to treat stand 15 and the drainage that includes portions of stands 5 and 9 as a "potential" nest buffer area. Within this area no trees greater than nine inches DBH will be removed, and the area will not be burned.

### Breeding Season Disturbance

Activities associated with thinning treatments can directly affect the MSO through auditory or visual disturbance. This disturbance can disrupt activities such as breeding, feeding, and roosting. The response of wildlife to noise disturbance is complex, being neither uniform nor consistent. Delaney *et al.* (1997) reviewed literature on the response of owls and other birds to noise and concluded the following: 1) raptors are more susceptible to disturbance-caused nest abandonment early in the nesting season; 2) birds generally flush in response to disturbance when distances to the source are less than approximately 200 feet and when sound levels are in excess of 95 dBA; and 3) the tendency to flush from a nest declines with experience or habituation to the noise, although the startle response cannot be completely eliminated by habituation.

Owls have more sensitive hearing than other birds (Bowles 1995). If noise arouses an animal, it has the potential to affect its metabolic rate by making it more active. Increased activity can, in turn, deplete energy reserves (Bowles 1995). Noisy human activity can cause raptors to expand their home ranges, but often birds return to normal use patterns when the humans are not present (Bowles 1995). Such expansions in home ranges could affect the fitness of the birds, and thus their ability to successfully reproduce and raise young. Species that are sensitive to the presence of people may be displaced permanently, which may be more detrimental to wildlife than recreation-induced habitat changes (Hammit and Cole 1987, Gutzwiller 1995, Knight and Cole 1995). If animals are displaced from areas that are essential for reproduction and survival, then that population will decline. Likewise, if animals are disturbed while performing behaviors such as foraging or breeding, that population will also likely decline (Knight and Cole 1995).

Birds may respond to disturbance during the breeding season by abandoning their nests or young; by altering their behavior such that they are less attentive to the young, which increases the risk of young being preyed upon; by disrupting feeding patterns; or by exposing young to adverse environmental stress (Knight and Cole 1995). There is also evidence that disturbance can result in lost foraging time that, in turn, may cause some raptors to leave an area or to not breed at all (Knight and Cole 1995).

### Prescribed Burning

The effects of fire include both negative and beneficial effects on MSO habitat. Beneficial aspects include increased response of herbaceous vegetation after a fire. Negative effects 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 spotted owl are complex and are dependent on the variations in fire characteristics and in prey habitat. Fire intensity, size, and behavior are influenced by numerous factors such as vegetation type, moisture, fuel loads, weather, season, and topography. Fire can effectively alter vegetation structure and composition thereby affecting small mammal habitat. The initial effects of fire are likely to be detrimental to rodent populations as cover and plant forage species would be reduced. Currently, since the ASLD is not going to defer livestock grazing with the project area, the long-term effects may result in the reduced recovery of the understory plant community.

Population responses by small mammals to fire-induced changes in their habitat vary. For example, deer mouse populations might increase immediately following fire and then decrease through time (Ward and Block 1995). Campbell et al. (1977) noted that populations of peromyscid mice decreased immediately following fire in an Arizona ponderosa pine forest that removed one-fourth (moderately burned) to two-thirds (severely burned) of the basal area; populations then returned to pre-fire numbers two years following the burn. Further, no differences were found in rodent populations between moderately and severely burned areas. They concluded that the effects of the fire that they studied were short-term, and the short-term positive numerical responses of mice were attributed to an increase in forage, particularly grasses and forbs after the fire (Ward and Block 1995). Small mammal diversity and densities are

typically depressed for one to three years after a fire (Wright and Bailey 1982). Biswell et al. (1973) suggested that rodent populations would be less affected during fall fires, because at that time of year rodents have accumulated seed caches that will mitigate loss of food sources. Predation of surviving rodents that are part of the diet of the spotted owl may increase immediately after the fire. In one study in northern California, radio-collared northern spotted owls spent considerable time in burned-over areas. This activity was assumed to be due to easy capture of prey (Patton and Gordon 1995).

The net effect of prescribed fires on MSO foraging is unclear: a fire that removes the tree canopy would likely render a portion of the area unusable for foraging by owls, but if the spatial extent of crown loss is limited, a mosaic is created that could provide a diversity of prey for the owl and actually be beneficial (Ward and Block 1995). Although owl prey species evolved in ecosystems where fire is a natural process, fire has been excluded from most southwestern ecosystems during the 20th century resulting in systems where fire behavior may deviate substantially from natural conditions. Effects of fire on small mammals under present environmental conditions are unclear (Ward and Block 1995).

Prescribed burning or thinning activities may indirectly affect the spotted owl by changing the owl's habitat structure (snags, downed logs, woody debris, multi-storied canopies, dense canopy cover, etc), potentially resulting in relocation of owls. In addition, the proposed activities may change the structure of spotted owl prey species' habitat, affecting the abundance and composition of prey species. Although treatments, especially prescribed burning, may have adverse effects to prey species and their habitat in the short term, the proposed treatments may increase the diversity of vegetative conditions that in turn provide for a diverse prey base.

In summary, we believe that MSO associated with the Dry Lake PAC will likely be adversely affected in the near term, and perhaps long term, through impacts to protected habitat from disturbance during the breeding season, and through a temporary degradation of habitat due to reduction in canopy cover, the removal of trees greater than nine inches DBH within protected habitat, and loss of snags and coarse woody debris during prescribed fire. In addition, though two core areas have been designated based on some of the MSO detections and habitat, we do not have the nest and/or roost sites needed to establish a 100-acre nest buffer/activity center per the recommendations of the Recovery Plan (Ward and Salas 2000).

## **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area to be considered in this biological opinion. Future Federal actions are subject to the consultation requirements established under section 7, and therefore are not considered cumulative in the proposed action. Future actions within the action area that are reasonably certain to occur include urban growth and development, recreation, road construction, fuels-reduction treatments, research, livestock grazing, and other associated actions. These actions have the potential to reduce the quality of MSO nesting, roosting, and foraging

habitat, cause disturbance to breeding MSO, and would contribute as cumulative effects to the proposed action.

### **Conclusion**

After reviewing the current status of the MSO, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that the proposed fuels reduction project within and adjacent to the Dry Lake PAC will not likely jeopardize the continued existence of the MSO. This conclusion is based on the following:

1. The proposed action is restricted to one PAC within the Upper Gila Mountains RU.
2. The proposed action is intended to protect the area from damage resulting from a severe crown fire, preserving its use by dispersing and foraging MSO.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined under section 3 of the Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined under 50 CFR 17.3 as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined under 50 CFR 402.02 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) of the Act, taking that is incidental to, and not intended as part of, the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement.

### **Amount or Extent of Take Anticipated**

We anticipate that the take of MSOs will be difficult to detect because finding a dead or impaired specimen is unlikely. However, the level of incidental take can be anticipated by the loss of essential elements in the habitat and chronic disturbance that would affect the reproductive success and survival of the MSO within the project area. We anticipate harm and harassment to MSO resulting from:

1. Harm through chronic disturbance from cumulative effects of past and on-going actions in the PAC coupled with the proposed action. This will result in

disturbance lasting greater than eight breeding seasons, which may result in disrupted MSO reproduction and the ability of this PAC to provide for essential elements of survival for resident MSO.

2. Harm through the reduction of MSO nesting and roosting habitat due to temporary habitat loss, which results in the removal of MSO habitat components to the extent that at least near-term survival of MSO in the PAC is not likely.
3. Harassment through the reduction of the habitat suitability for prey species, thus limiting the availability of prey for owls. Habitat suitability will be decreased through the loss of coarse woody debris and herbaceous vegetation following prescribed fires. These actions could impair the ability of MSO to successfully raise young.

As stated above, the Fish and Wildlife Service anticipated take for the Dry Lake PAC following the alteration of approximately 124 acres of protected habitat and 139 acres of protected steep-slope and restricted pine-oak habitat at the Naval Observatory (Consultation #02-21-97-F-0110, and #02-21-97-F-0110-R1). The proposed action analyzed herein will result in sustained harm and harassment to MSO associated with the Dry Lake PAC. The anticipated take described in this opinion does not result in the double-counting of effects to the same PAC because different acres will be treated under this action. In our opinion, this will result in adjusting the take already anticipated for this PAC, from short-term disturbance and habitat alteration, to sustained disturbance and at least near-term habitat degradation. We anticipate that the proposed action will effectively render the area unsuitable for nesting MSO through disturbance and habitat loss for several years. We are hopeful that treatments included in this proposed action will aid in maintaining habitat through protection from severe crown fire that will aid the survival of dispersing and/or foraging MSO. In addition, there may be actions taken by land owners and others to preserve habitat in this area (e.g., Arizona Preserve Initiative) that reduce the on-going chronic disturbance and habitat fragmentation, and allow for the survival and reproduction of MSO associated with the Dry Lake PAC.

### **Effect of the Take**

In this biological opinion we determine that this level of anticipated take is not likely to result in jeopardy to the species considered herein.

### **Reasonable and Prudent Measures With Terms and Conditions**

The following reasonable and prudent measure is necessary and appropriate to minimize take of MSO. In order to be exempt from the prohibitions of section 9 of the Act, the Fish and Wildlife Service and the ASLD must comply with the following terms and conditions, which implement the reasonable and prudent measures described below and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. The Fish and Wildlife Service and the ASLD shall minimize the adverse effects of the proposed fuels reduction project and all associated activities.

The following terms and conditions implement the reasonable and prudent measure:

- 1.1 All work conducted in association with the fuels reduction project during the MSO breeding season (1 March through 31 August) shall occur only between the hours of 0700 and 1700 in areas adjacent to or within 0.25 mile of the Dry Lake PAC.
- 1.2 To ensure consistency with this opinion, all activities (harvest, burning, research, etc.) within the project area will be coordinated through the ASLD and Fish and Wildlife Service.

The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. Sections 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. Sections 668-668d).

#### **DISPOSITION OF DEAD, INJURED, OR SICK MSO**

Upon locating a dead, injured, or sick spotted owl, initial notification must be made to the Service's Law Enforcement Office, 2450 West Broadway Suite #113, Mesa, Arizona 85202 (telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and should include the date, time, and location of the animal, a photograph, if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling specimens to preserve the biological material in the best possible state. If possible, the remains of intact owl(s) shall be provided to this office. If the remains of the owl(s) are not intact or are not collected, the information noted above shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should the treated owl(s) survive, the Fish and Wildlife Service should be contacted regarding the final disposition of the animal.

#### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that the ASLD, the NOFS, the AGFD, and Coconino County work with us to acquire lands within the Dry Lake area to permanently preserve and promote MSO habitat in and adjacent to the Dry Lake PAC. There is a provision within the Sikes Act and the Defense Authorization conference report (HR 772) for the military to work with private conservation groups or state organizations to spend money off-base for protection of threatened and endangered species. Coconino County is currently attempting to purchase land from the ASLD within the Dry Lake area to preserve as open space. This may be a good opportunity for all land management agencies involved to partner with the County to achieve multiple conservation goals.
2. We recommend that the ASLD, the NOFS, the AGFD, the Forest Service, and Coconino County work with us to strive to minimize the impacts of future actions in the area on wildlife. It would be beneficial for the ASLD and Forest Service to defer grazing in areas following prescribed burning and perhaps modify grazing permits to permanently defer certain areas from grazing.
3. We recommend that the ASLD, Northern Arizona University Centennial Forest, Forest Service, Flagstaff Arboretum, and NOFS work with us to remove and minimize disturbance impacts to MSO resulting from educational activities, planned facilities, social trails, unauthorized camping, and garbage dumping in and around the Dry Lake PAC. There are many opportunities to reduce the amount of activity and disturbance (both current and planned) within the PAC. It would be beneficial to reevaluate planned building site locations and ongoing and planned activities that adversely affect MSO and their habitat.

In order to keep us informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

### **REINITIATION - CLOSING STATEMENT**

This concludes formal consultation on the action outlined in this biological opinion. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your consideration of the threatened Mexican spotted owl. For further information, please contact Shaula Hedwall at (928) 226-0614 (x103), or Brenda Smith at (x101) of our Flagstaff Suboffice. Please refer to the consultation number 02-21-03-F-0353 in future correspondence concerning this project.

/s/ Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)  
Field Supervisor, Fish and Wildlife Service, New Mexico Field Office, Albuquerque, NM  
Assistant Field Supervisor, Ecological Services Suboffice, Flagstaff, AZ  
Assistant Field Supervisor, Ecological Services Suboffice, Tucson, AZ  
Section 7 Coordinator, Fish and Wildlife Service (Attn: Sarah Rinkevich)  
Commissioner, Arizona State Land Department, Phoenix, AZ  
Director, Fire Management Division, Arizona State Land Department, Phoenix, AZ  
Arizona State Land Department, Flagstaff, Arizona (Attn: Keith Pajkos)

Forest Supervisor, Coconino National Forest, Flagstaff, AZ (Attn: Cecelia Overby)  
District Ranger, Mormon Lake Ranger District, Flagstaff, AZ  
District Ranger, Peaks Ranger District, Flagstaff, AZ  
Wildlife Staff, Peaks Ranger District, Flagstaff, AZ  
Site Manager, Naval Observatory Flagstaff Station, Flagstaff, AZ (Attn: Michael Divittorio)  
Southwest Division, Naval Facilities Engineering Command, San Diego, CA (Attn: Robert Palmer)

Centennial Forest, Northern Arizona University, Flagstaff, AZ (Attn: Michael Wagner)  
Coconino County, Parks and Recreation, Flagstaff, AZ (Attn: Cynthia Lovely)  
The Arboretum at Flagstaff, Flagstaff, AZ (Attn: Nancy Morin)  
Wildlife Staff, Mormon Lake Ranger District, Flagstaff, AZ  
John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ



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## APPENDIX A - CONCURRENCE

### Bald Eagle

The bald eagle south of the 40th parallel was listed as endangered under the Endangered Species Preservation Act of 1966, on March 11, 1967 (USFWS 1967), and was reclassified to threatened status on July 12, 1995 (USFWS 1995). No critical habitat has been designated for this species. The bald eagle was proposed for delisting on July 6, 1999 (USFWS 1999). The bald eagle is a large bird of prey that historically ranged and nested throughout North America except extreme northern Alaska and Canada, and central and southern Mexico.

Bald eagles are primarily winter visitors to northern Arizona occupying all habitat types and elevations. Wintering eagles arrive in the fall, usually late October or early November, and leave in early to mid-April. They feed on fish, waterfowl, terrestrial vertebrates, and carrion. Eagles are often seen perched in trees or snags near roadways where they feed on road-killed animals. At night, small groups or individual eagles roost in clumps of large trees in protected locations such as drainages or hillsides. Key habitat components include nighttime roosts and prey availability. Roost trees are usually live or dead large ponderosa pine trees with open canopies on slopes that provide protection from inclement weather. Bald eagles do not breed within the action area and no bald eagle roosts have been identified within the action area.

Both ASLD and Forest Service staff have reported seeing wintering bald eagles within the project area. Forest Service and Fish and Wildlife staff have examined potential habitat for signs (e.g., feathers) of night roost sites, but as of yet, none have been located. Due to the amount of activity, developments, and proximity to the railroad and Interstate 17, the area is quite loud. This may preclude bald eagles from roosting within or adjacent to the project area. In addition, the area is located between Rogers Lake and Dry Lake, both of which are frequently dry in the winter. However, when these lakes contain water, foraging eagles are attracted to the area. In addition, the proximity of the site to Interstate 40 and other roads may provide a source of road-killed animals for foraging eagles.

We concur with your determination that the proposed action may affect, but will not likely adversely affect, the bald eagle. We base this determination on the following:

1. Large diameter ponderosa pine trees and snags suitable for perching and roosting will be maintained (no trees greater than or equal to 16 inches DBH will be removed).
2. Bald eagle detections within the project are incidental and no known roosts are within or adjacent to the project area. Therefore, though the project activities will be conducted when wintering eagles may be present, we do not expect the project to adversely affect eagles.

## APPENDIX B - STAND PRESCRIPTIONS

The primary goal of this project is to reduce the fire risk hazard and to protect the City of Flagstaff wildland urban interface. All silvicultural prescriptions will reflect this fuels reduction goal first, but ASLD and the Fish and Wildlife Service recognize that there are many unique environmental conditions that exist throughout the project area. Therefore, proposed prescriptions will also aim at protecting habitat connectivity; maintaining large trees, snags, and coarse woody debris; and, working with the NOFS and the Forest Service to “feather” thinning prescriptions across property lines.

The following prescriptions are grouped by management area and were agreed to by ASLD, Fish and Wildlife Service, and Centennial Forest/Northern Arizona University staff. For most stands, we provide an estimate of the current basal area (measured in square feet per acre) and desired basal area. We note that basal area has no direct biological significance to current stand structure. Basal area measures the cross-sectional area of physiologically dead wood. However, the area of a tree is fairly well correlated with the cross-sectional area of the crown. This means that if one removed 50% of the basal area of a fully closed stand, one would also be making approximately 50% of the crown-level growing space vacant. Because it is weighted by tree diameter, board-foot volume is a good way to assess the results of thinning programs, but is not a good parameter for expressing them. Therefore, we will try to describe the desired stand structure in addition to providing basal area information.

### **Braeside Management Area**

This management area (MA) will primarily be managed for fire risk reduction and increased tree vigor. These stands are generally located west of the Dry Lake PAC, but also include approximately 550 PAC acres.

#### Ponderosa pine stands

- |         |   |
|---------|---|
| Stand 1 | This stand will be thinned from below to reduce the existing basal area from approximately 100 square feet per acre, to 50 to 60 square feet per acre. Stand structure goals include opening up aspen stands (shared with stand 3), enhance existing openings, and protect yellow pines.  |
| Stand 3 | This stand abuts the Braeside Observatory and private homes. The east side of this stand will be thinned from below to reduce the existing basal area from approximately 130 square feet per acre, to 40 to 60 square feet per acre. The western and southern portions of the stand will be thinned using an uneven-aged group selection (identify existing groups and maintain multiple canopy layers within the group, while enhancing openings). |

Northern Arizona University students, working with Dr. John Bailey, plan to establish three study plots that contain aspen and eliminate all pine within these plots, to benefit aspen survival and growth. Small diameter tree boles will be left to impede elk movement and slash will be piled north of the study plots. Six plots will be established that contain no aspen. Within these plots, the goal is to reduce basal area to approximately 60 square feet per acre, on even spacing. Slash will be piled north of the plots, and will include clean-up of past thinning debris.

- Stand 4 This stand is located immediately south of the Braeside Observatory and north of the Naval Observatory. This stand will be thinned to reduce the existing basal area from approximately 140 square feet per acre, to 40 to 60 square feet per acre. Existing clumps, especially Gambel oak clumps, will be maintained by selecting clumps for deferral, and existing openings will be enhanced.
- Stand 5 This stand will be thinned using uneven-aged individual tree and group selection. This stand will be thinned to reduce the existing basal area from approximately 130 square feet per acre, to 50 to 80 square feet per acre. A north-south wildlife corridor will be maintained within the stand. This area will remain relatively dense to provide hiding and thermal cover for wildlife. Several small openings (0.25 to 1 acre) will be created throughout the stand to reduce crown connectivity by expanding existing openings.
- Stand 8 The entire stand will be thinned using a combination of uneven-aged group and individual tree selection. Basal areas will be lowest on the west half and northern portions of the stand and increase to the east. The stand will be thinned to reduce the existing stand basal area from approximately 160 square feet per acre, to 40 to 80 square feet per acre. The western side of this stand abuts an existing meadow and pronghorn corridor. The goal is to open up the area adjacent to this meadow to allow for increased pronghorn habitat. In the eastern half of the stand the focus will be maintaining existing clumps of trees, while creating 0.25 to 3 acre openings through the expansion of existing openings to reduce crown connectivity.
- Stand 9 This stand will be thinned utilizing uneven-aged group and tree selection. The stand will be thinned to reduce the existing stand basal area from approximately 150 square feet per acre, to 50 to 80 square feet per acre. A north-south wildlife corridor will be maintained within the stand. Several small (0.25 to 3 acre) openings will be created throughout the stand to reduce crown connectivity. Gambel oak will be favored over ponderosa pine, where it exists.

#### Ponderosa pine-Gambel oak stands

The following stands qualify as restricted pine-oak habitat, as defined by the Recovery Plan. Thinning prescriptions will follow the specific guidelines in the Recovery Plan and will enhance MSO habitat, while reducing the fire risk hazard. The goals are to achieve a clumpy stand structure, promote Gambel oak, enhance openings, and reduce dense, “dog hair” thickets. In these stands maintenance of snags and large ponderosa pine will be emphasized.

- Stand 2      This stand will be managed towards target-threshold conditions as specified in the Recovery Plan. This stand has a large Gambel oak component, which will be enhanced through removal of competing pines. A similar approach will be utilized around the remnant yellow pine. The remainder of the stand will be thinned utilizing uneven-aged group selection. The stand will be thinned to reduce the existing stand basal area from approximately 130 square feet per acre, to 80 to 100 square feet per acre. All existing openings will be enlarged and several small openings will be created.
- Stand 6      The southern and southeastern portions of the stand will be managed towards target-threshold conditions as specified in the Recovery Plan. The middle and western portions of the stand will be thinned to a 60 to 80 basal area using a mixture of uneven-aged silvicultural techniques. The north half of the stand will be thinned from below in the pine clumps. Gambel oak clumps will be enhanced through the removal of competing pines.
- Stand 10     This pine-oak stand will be managed as foraging habitat. Uneven-aged individual tree selection will be used here. The stand will be thinned to reduce the existing stand basal area from approximately 160 square feet per acre, to 60 to 100 square feet per acre, with the thickest areas left adjacent to the PAC.
- Stand 15     This stand includes the “potential” nest buffer that the ASLD has agreed to thin per the recommendations in the Recovery Plan. This area has slopes greater than 40%, but the objective will be to thin from below up to 9 inches DBH and try to break-up the canopy by enhancing existing openings and removing ladder fuels.

### **Dry Lake Caldera Management Area**

This management area is within the Dry Lake PAC. These stands are immediately south and west of the Westwood Estates and Flagstaff Ranch subdivisions and are primarily pure pine with frequent rock out croppings. Small portions of these stands do qualify as restricted pine-oak habitat. This portion of the PAC is believed to be used by the MSO primarily for foraging activities. This slope of the caldera is generally a hot and dry site with poor productivity potential.

Stand conditions are very poor with extensive dog-hair thickets throughout. Few remnant yellow pine are present. These stands will be thinned from below, mainly by hand. Silviculture will be

focused on providing defensible space adjacent to the houses, and a general reduction in the potential for a fire ignition to become a crown fire adjacent to the houses.

- Stand 6        This stand is best classified as a massive, “dog hair” thicket. Aggressive thinning of the understory and mid-stories is planned. Residual basal areas will be between 50 to 100 square feet per acre, with the goal to keep existing clumps and enhance existing openings. No yellow pine will be harvested. We will clear up to 60 feet around remnant Gambel oak and yellow pine.
- Stand 7        This stand abuts the Flagstaff Ranches subdivision. In order to provide a more open area near homes, aggressive thinning is proposed in order to reduce basal area to 50 to 60 square feet per acre.
- Stand 9        This stand will be thinned from below, up to 9 inches DBH. Since this area includes better MSO habitat, we aim to leave a residual basal area of greater than 100 square feet per acre. Thinning will be heavy around Gambel oak and yellow pine.
- Stand 10       Same as stand 6

### **Braeside/Dry Lake Caldera Area “Land Bridge” Management Area**

This portion of the project area is the “land bridge” between the two primary portions of the Dry Lake PAC. This area is dominated by large patches or groves of yellow pine intermixed with extensive dog hair thickets and pole stands. These two components are often separate and distinguishable from each other as there is seldom dense understory conditions under the yellow pine. However, these patches are within flame impingement distance of each other.

This area is immediately south and west of the subdivisions, and poses a significant threat of carrying a severe crown fire into Flagstaff. For the same reason, this portion of the PAC is at high risk of destruction by fire. Another significant threat within this area is the current bark beetle outbreak.

Within the Dry Lake Caldera Management Area, Stands 1, 2, 4, and 5, prescriptions include:

Use a series of deferrals at a rate of 15%-20% of the area in order to provide for connectivity between the two main portions of the Dry Lake PAC and provide for conditions conducive for movement and foraging by MSO.

Protection of the yellow pine component and restoring large openings will be a high priority. This will be accomplished by thinning aggressively up to 100 feet from these patches.

Aggressive thinning of the dog hair thickets throughout the project (outside of deferrals) .



Aggressive thinning of blackjack stands and patches to an average basal area of less than 80 BA. Approximately 30% of the blackjack stands will be thinned to a basal area of 40 to 60 square feet per acre. The rest will have a target basal area of 60 to 80 square feet per acre.

Within the Braeside MA, Stands 12 and 13, prescriptions include:

Aggressive thinning of stand 12 from below. This stand is immediately south and downhill from the NOFS. Target basal area will be between 40 to 60 square feet per acre. There are several openings throughout the stand that we plan to increase in size, thus creating more contrast between groups and openings.

Stand 13 will be lightly thinned from below to approximately 60 to 100 square feet of basal area per acre. A high density wildlife corridor will be incorporated in this stand.

**Braeside/Dry Lake Caldera Area Management Area, Pure Pine (Area South of the “Land Bridge”)**

Within the Dry Lake Caldera Management Area, Stands 5, 11, 12, and 14, objectives include:

These stands will be managed in a similar method as the stands inside the “land bridge”. In addition, existing meadows and grassy opening will be expanded and encroaching pine near Sinclair Wash removed.

Within the Braeside Management Area, Stands 11 and 14, objectives include:

Stands on the western portion will be thinned using a 1.1-1.2 Q uneven-aged silvicultural system to reduce the existing stand basal area from approximately 130 to 150 square feet per acre, to 60 to 70 square feet per acre. Understory thinning will be emphasized; however, in order to meet the density objectives, all size classes (up to 16 inches DBH) will be thinned. Existing meadows and grassy openings will be expanded. Encroaching pine near Sinclair Wash will be removed.

Within stands 11 and 14, three plots will be established to demonstrate three different types of restoration/fuels reduction harvest.