

**BIOLOGICAL OPINION SUMMARY**  
Pinaleno Ecosystem Management Demonstration Project

**Date of opinion:** October 5, 2000

**Action agency:** U.S. Forest Service, Coronado National Forest, Safford Ranger District

**Project:** Pinaleno Ecosystem Management Demonstration Project

**Location:** Graham County, Arizona

**Listed species affected:** Endangered Mt. Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) (MGRS) without critical habitat and the threatened Mexican spotted owl (*Strix occidentalis lucida*) (MSO) with proposed critical habitat, and threatened Apache trout (*Oncorhynchus apache*).

**Biological opinion:** Nonjeopardy for MGRS and nonadverse modification for MGRS critical habitat (page 12).

**Reasonable and prudent alternatives (RPAs):** None.

**Incidental take statement:**

**Anticipated take:** *Exceeding this level may require reinitiation of formal consultation.* Three MGRS may be taken as a result of the proposed action. Incidental take is expected to be in the form of harm and harassment, as follows:

1. Harm will occur if an active or inactive midden is burned or damaged.
2. Harassment (short-term and temporary noise and smoke) will occur to any MGRS that is in any area where crews are working.

**Reasonable and prudent measures:** *Implementation of these measures through the terms and conditions is mandatory.*

1. Minimize harm to MGRS and their middens.
2. Submit to the Service annual reports of results, effects, and incidental take (page 13).

**Terms and conditions:** *Terms and conditions implement reasonable and prudent measures and are mandatory requirements.*

1. Broadcast burning in any treatment block will not be conducted from April 1 through June 31, annually.
2. Reporting of monitoring results and complete records of all incidental take that occurred during the life of the project will be included in the Forest Service's Endangered Species Act (Act) report submitted annually to the Service.

**Conservation recommendations:** *Implementation of conservation recommendations is discretionary.*

1. The Forest Service should continue to actively promote MGRS population and habitat stability, per the 1993 MGRS Recovery Plan.
2. The Forest Service should continue to enhance and promote a healthy cycle of ecological succession in the Pinalenos, including the use of prescribed fire, silvicultural, and reforestation methods.
3. The Forest Service should determine cone crop set (cone fertility), timing, and production of the various conifers that the MGRS relies on for survival.
4. The Forest Service should determine status of MGRS continued existence or extirpation from West Peak, and should actively promote recovery of the MGRS in that area (page 14).

AESO/SE  
2-21-98-F-282

October 5, 2000

Mr. John McGee, Forest Supervisor  
Coronado National Forest  
300 West Congress, 6<sup>th</sup> Floor  
Tucson, Arizona 85701

Dear Mr. McGee:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed Pinaleno Ecosystem Management demonstration project (PEM) located in the Graham Mountains, Graham County, Arizona, and its effects on the endangered Mount (Mt.) Graham red squirrel (MGRS) (*Tamiasciurus hudsonicus grahamensis*) with critical habitat, pursuant to the Endangered Species Act of 1973, as amended (Act). Your request for formal consultation also included a request for concurrence that the PEM is not likely to adversely affect the threatened Mexican spotted owl (MSO) (*Strix occidentalis lucida*) with proposed critical habitat and the Apache trout (*Oncorhynchus apache*).

This biological opinion is based on information provided in the May 5, 2000, biological assessment and evaluation (BAE); additional information dated August 1, 2000, and received by the Service on August 2, 2000; telephone conversations between Forest Service and Service personnel; field investigations; and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, fuels reduction by thinning and prescribed burning and its effects, or other subjects considered in this opinion. A complete administrative record of this consultation is on file at our Phoenix office.

### **Consultation History**

The Forest Service letter dated May 5, 2000, the initial BAE, and the request for formal consultation was received by the Service on May 9, 2000. The Service letter of July 7, 2000, asked the Forest Service for clarification and additional information to complete the initiation package. The Service received that information on August 2, 2000, with the Forest Service letter dated August 1, 2000. The Service notified the Forest Service their initiation package was complete and they could expect a final biological opinion no later than December 16, 2000.

## BIOLOGICAL OPINION

### Description of the proposed action

The project area lies between the 9,000 to 9,800-foot elevations in the area roughly between Webb Peak and Old Columbine of the Pinalenos. The area is further refined by designated treatment blocks (lettered A through N) to help delineate the different treatments that will be used to reduce heavy fuel loads in the various sites (Maps 1 and 2, BAE). The PEM is estimated to take six years to complete, beginning fall of 2001. The Forest Service plans to implement treatments on about 250 to 300 acres per year, during the next six years, depending on funding levels.

MGRS and their middens occur throughout blocks A through N (Map 3, BAE). The Forest Service proposes to create shaded fuelbreaks along portions of Highway 366 (Swift Trail) with silvicultural methods of thinning from below, cutting, piling, and burning those piles. They will use these same methods to reduce fuels in other portions on about 1,111 acres (total) of the Pinaleno Mountains, as defined in the biological assessment and evaluation (BAE). Proposed project maps, acres per block for treatment, and other specific project data are detailed in the BAE and included here by reference.

Swift Trail travels along the edges of most of the treatment blocks or through them (Maps 1 and 2, BAE). A shaded fuelbreak is defined as an open forest (large trees that generally do not have touching canopies) with little to no ground fuel. The intent is to retain canopy cover, large snags and large logs, while reducing ladder fuels and the ground fuels that contribute to catastrophic fire conditions. These fuelbreaks help slow the advance of fire below the road from spreading upwards into the denser, thicker forest types, and aid firefighters in safely holding fire at the road when circumstances permit.

Blocks A through N will be treated roughly in order of their lettering, or from west to east (Maps 1 and 2, BAE). Project work will begin with MSO premonitoring. If needed, the Forest Service will reprioritize the blocks, first treating those blocks where premonitoring showed they a) contain the highest fuel loads, b) are in MSO restricted habitat, and c) are treatment blocks I and J (which contain dead trees remaining from the 1996 Clark Peak wildfire).

Next, piling and burning will occur in areas that also contain MGRS middens. This will be addressed as each block comes up for treatment. The Forest Service will use maps (updated bi-annually), Global Positioning System (GPS) data, and concentrated ground efforts to search all areas to be treated in any year, regardless of how much time has passed between treatments. For example, if an area is piled and burned one year, and then broadcast burned two years after that, it will be searched prior to work beginning in both years.

Finally, broadcast burning treatments will occur (in four treatment blocks only). All piling and burning within a block will be completed before any broadcast burning is implemented within that block. Timing of pile and broadcast burning will depend largely upon appropriate weather

conditions for these actions. Due to variable weather, it is possible broadcast burning may be suspended in some years, but the Forest Service does not expect to delay burning treatments for more than two years.

Project implementation is scheduled to begin in fall of 2001, although broadcast burning will likely be delayed until the next year (2002) because it will be conducted during the wetter months of the year, and there is no certainty that the National Environmental Protection Act (NEPA) and formal consultation processes will be completed before next spring.

The Forest Service proposes to use five types of fuel reduction treatments. These treatments are; 1) cut nine inches and smaller diameter breast height (dbh) trees that create fire ladders to older, larger trees, 2) pile and burn the cut trees, 3) broadcast burn (after cut, pile and burn) to reduce ground fuels, 4) thin small (nine inches dbh and less) trees to areas of about 20 feet by 20 feet spacing, and 5) cut, pile, and burn the majority of snags and logs in areas of the 1996 Clark Peak fire where all trees were killed. Table 1 in the BAE details the number of acres per block, per treatment.

Some blocks will receive more than one type of treatment. Each block was evaluated for listed species, their habitat requirements, and safe implementation of proposed treatments. The goal is to help limit or prevent the occurrence and spread of a large-scale, stand-altering wildfire by reducing fuels where fire danger is the highest and where human-caused fires most often start (near roads). About 75 to 85 percent of small (nine inches dbh or less) trees will be cut, piled and burned. This will allow retention of some regeneration and is not anticipated to alter or open the closed canopy where it occurs in the project area.

The desired outcome would allow fuel loads to range from five tons to 25 tons per acre. Ladder fuels would only carry fire into small (nine inches dbh and less) trees and/or clustered groups of these trees with leaning snags, and be limited to scattered, brushy areas throughout the project area. Larger trees would create a closed, interlocking upper canopy, with the project area having a few small, grassy openings. Larger logs and snags would occur scattered throughout the project area, generally clumped together, and would average between two to six each of logs and snags, per acre. Shaded fuelbreaks along Swift Trail would not appreciably reduce canopy cover, yet would reduce the fuel load and contribute to making it more difficult for a wildfire to easily cross the road, endangering numerous natural resources and structures in the higher elevations of the Pinaleno Mountains.

Effects will be measured by the changes shown between pre- and post monitoring and the monitoring and inspection of MGRS middens in each treatment area. Distribution of the anticipated effects of the proposed project in MGRS habitat during thinning, cutting, piling and burning will occur in a scattered, spread-out pattern, and will be highly selective and precise. Crews will thin individual trees that meet the thinning prescription (nine inches dbh or less) and will not fall trees onto middens. Piles will be carefully placed to avoid as many effects to

middens or midden sites as possible. Coordination and confirmation between the fire boss and the district biologist will occur during all activities on the project.

Broadcast burning will not take place in a designated block until after all piles have been burned in that block. While it appears less precise, the fire from broadcast burning will be forced to stay on the ground (not in the canopy) and will only burn hot enough to consume one hour (three inches dbh or less) ground fuels and duff due to the pre-broadcast burning work done to eliminate ground and ladder fuels. The extent of annual treatment actions will depend on funding, so the total number of treated acres per year is estimated at about 250 to 300 acres.

### **Status of the species**

#### Mt. Graham red squirrel (MGRS)

Background information is taken from the MGRS Recovery Plan (USFWS 1993a) unless otherwise noted. The MGRS was listed as an endangered species pursuant to the Endangered Species Act of 1973, as amended (Act), on June 3, 1987 (52 FR 20997). Critical habitat for this subspecies was designated on January 5, 1990 (55 FR 425). Critical habitat is located in three areas in the Pinaleno Mountains. They are referred to as the Hawk Peak-Mount Graham, Heliograph, and Webb Peak areas. The areas are irregularly shaped and cover about 2,000 acres. When designated, the three areas contained major concentrations of MGRS middens (cone debris piles where these squirrels store unopened cones), and other habitat components necessary for the MGRS to survive. Initially, the main constituent element was thought to be dense stands of mature spruce-fir forest, but current information suggests that mature mixed conifer stands may be equally as important. The major constituent elements are mature forest with a diversity of tree species, including either Douglas-fir (*Pseudotsuga menziesii*) or Engelmann spruce (*Picea engelmannii*), or both (G. Froehlich, Safford Ranger District, USFS, pers.comm., 2000).

The MGRS is a small, grayish-brown arboreal rodent with a rusty to yellowish tinge along the back. The tail is fluffy and the ears are slightly tufted in winter. In summer, a black lateral line separates the upper parts from the white under parts. The subspecies is one of two that occur in Arizona. First described in 1894 by J.A. Allen, the type specimen of the species is from the Pinaleno Mountains, Graham County, Arizona. It was designated as a subspecies based on pelage characteristics and its isolation from other populations for at least 10,000 years. It is also slightly smaller in several standard measurements than the other subspecies, the Mogollon red squirrel (*T. h. mogollonensis*) that occurs in Arizona. Although Hoffmeister (1986) thought the subspecies was not strongly differentiated from the Mogollon red squirrel, the subspecies designation was retained by both Hall (1981) and Hoffmeister (1986). Research with both protein electrophoresis (Sullivan and Yates 1995) and mitochondrial DNA (Riddle et al. 1972) has provided data which, in conjunction with morphological and ecological considerations, has demonstrated that the MGRS is a distinct population that deserves subspecific status.

Population ecology of the squirrel is largely unknown. So are survival rates. High mortality probably occurs between weaning age and age of first reproduction, followed by a plateau in adult mortality, ending in an increased mortality in older age classes. Survival rates likely vary markedly over years, and are presumably related to the supply of closed cones available for storage. Population estimates have been derived for the years 1986 through 2000 (B. VanPelt, AGFD, pers. comm., 2000) and the annual estimates obtained ranged from a low of 146 to a high of 562 squirrels. The spring 2000 survey estimated a population of 516 squirrels.

The MGRS inhabits only the Pinaleno Mountains of Graham County, Arizona, and its entire range is within the Safford Ranger District of the Coronado National Forest. This subspecies of red squirrel occurs in mature to old-growth mixed conifer and spruce-fir associations above approximately 7,800 feet in elevation. It also inhabits drainage bottoms where the mixed conifer association reaches lower elevations. Historically, the squirrel was common above 2,590 meters (8,500 feet) but is currently found (infrequently) below the 9,000-foot elevation. The MGRS has historically been restricted to a relatively small area, and both its range and numbers have declined during the past century. Early accounts of species sightings used descriptions such as “common” and “abundant”. By the 1950s, the population was described as “not abundant anywhere in the Mountains”. By the mid-1960s, it was rare enough to be considered extirpated (Minckley, 1968). The MGRS once occupied the westernmost peaks of the range (West Peak and Blue Jay Peak), but no additional records of squirrels from the western portion of the range have been verified since the 1970s (G. Froehlich, pers. comm., 2000).

Although not well documented, the MGRS population decline may be attributable to the expansion of logging operations in the Pinalenos and/or the introduction of tassel-eared squirrels (*Sciurus aberti*). By 1973, most accessible and marketable timber had been cut, altering the age structure and density of much of the squirrel's habitat. Logging operations and road building to accommodate harvests resulted in wind throw that damaged additional habitat for the MGRS. Additional losses of old-growth coniferous forest resulted from both natural and man-caused fires, ice storms, insect outbreaks, recreational development, road construction, and establishment of other structure. These direct habitat losses not only reduced the amount of habitat, but also resulted in forest fragmentation that may have reduced the quality of habitat for the MGRS. This fragmentation may have isolated some pockets of the squirrel population and prevented successful dispersal and/or movements between areas, thus reducing genetic flow within the population. Mannan and Smith (1991) predicted that developments that open the forest canopy, remove large trees, or reduce amounts of dead and down wood would reduce the number of potential MGRS middens in the Pinaleno Mountains.

Red squirrels are highly territorial and maintain middens (cone debris piles used for winter food caching) within these territories. Occasionally, conditions arise where more than one squirrel occupies a midden or a squirrel uses more than one midden. Typically, the same midden will be used and reused by succeeding generations of squirrels; thus, midden use can become consistent and persistent over time.

MGRS habitat suitability depends on the ability of the forest to produce reliable and adequate conifer cone crops and the microclimatic conditions suitable for winter storage of (closed) cones in middens. For the western red squirrel, these conditions are met by mature to old-growth stands with closed canopies. Red squirrel habitat quality is improved by large down logs, and live trees and snags with interlocking branch networks. These habitat characteristics provide red squirrels with adequate food resources, perching, storage and nesting sites, runways that allow safer cone retrieval in the winter, and escape routes for the avoidance of predators.

MGRS appear to be particularly selective about midden placement. High levels of canopy closure around a midden from the top and from the side appears to be a crucial element of habitat selection for midden sites among western subspecies of red squirrels. MGRS midden locations in the spruce-fir and transition associations are found in treed patches containing unusually dense foliage volumes and canopy cover. MGRS place their middens in stands with high canopy cover, foliage volume, and large amounts of dead and downed wood. The same characteristics are preferred by the MGRS in all vegetation associations.

Habitat analysis for the Pinalenos, reported by the Forest Service in 1988 (USFWS, 1993) determined that 11,733 acres of the 22,435 acres that occurs above 8,000 feet in elevation is suitable MGRS habitat. An initial estimate of 444 total midden areas was derived. Another 1986 evaluation of habitat capability, using a computer Habitat Capability Model, produced an estimate that the existing habitat could support up to 502 squirrels (USFWS, 1993). Based on information as of 1991, the Forest Service estimated current and future habitat capability for the Pinalenos using a Habitat Capability Model. The estimate suggested that under optimal conditions, the existing habitat could support approximately 650 squirrels. These may be conservative numbers; recent satellite imagery has estimated 16,680 acres of "spectrally suitable" habitat (Hatten 2000). Such habitat possesses the correct forest types, but may not be currently suitable due to seral stage of the vegetation. About 61 percent of the spectrally suitable habitat has been surveyed for MGRS middens. Due to steep slopes and human safety concerns, much of the area outside the current survey boundaries may never be searched by ground crews, but habitat that is safely accessible will be ground-searched within the next few years.

The majority of currently suitable MGRS habitat (90 percent) that is accessible has been surveyed for midden locations at least once (G. Froehlich pers. comm. 2000). As of March 2000, the accumulated total number of MGRS middens observed (since 1986) was 1,117. Of this, 42 are not yet validated (as middens during the proper season), and 299 have disappeared, leaving 774 currently known middens (Tim Snow, AGFD, pers. comm., 2000). These 774 middens include those that are classified as active, inactive, and abandoned.

## **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 in the action area to provide a platform to assess the effects of the action now under consultation.

The Service has determined the action area to encompass the MGRS range and critical habitat located in the Pinaleno Mountains.

All parts of the designated project area consist of mixed conifer forest. Portions of blocks F, G, H, and M meet Forest Service Regional Office (Regional) standards for old growth conditions and possess closed canopy, many large trees, snags, and downed logs across the landscape. These conditions are also likely the reason that MGRS consistently and continually inhabit these areas. Blocks I and J met Regional standards for old growth forest until the 1996 Clark Peak fire. That fire burned intensely in these two blocks, leaving blackened snags in its wake.

The remaining blocks (A, B, C, D, E, K, L, and N) have experienced varying amounts of past logging or fire activities and do not currently meet Regional standards for old growth. Many of the blocks contain suitable habitat for MGRS, with the habitat occurring in scattered patches rather than large or contiguous amounts of acreage. All blocks contain moderate to high fuel loads (this includes all snags, logs, duff, and ladder fuels).

Data on MGRS habitat show about 11,700 acres of coniferous forest are occupied by MGRS (USFWS 1999). All the treatment blocks (except for a very small portion of block M) occur within Management Zone 2, per the MGRS Recovery Plan. Management Zone 2 is classified in the MGRS Recovery Plan as occupied, but at lower densities than Management Zone 1. Further details are contained in the Recovery Plan (USFWS 1993a). Only treatment block H (scheduled for thin, cut, pile and burn) contains designated MGRS critical habitat (24 acres).

About 2,000 acres of pure spruce-fir forest occur on the Pinaleno Mountains. This stand is the southernmost extension of the ecosystem type common to the Rocky Mountains. The forest has been isolated on top of the mountain for at least 10,000 years. Several species, including the red squirrel, have evolved with the ecosystem. Current forest appearance and conditions (tree species, age variety, and distribution) may be due to the large (epidemic) populations of insects that occur every 200 to 300 years. In 1997 and 1998, about 437 acres of spruce-fir trees were defoliated because of the irruption of the Geometrid moth caterpillar (also called loopers). That population of caterpillar appears to have crashed (subsided to low levels), but spruce beetles (*Dendroctonus rufipennis*) and Western Balsam bark beetles (*Dryocoetes confuses*) have moved in. Beginning in 1998, these two bark beetle populations have been responsible for killing mature trees in the upper elevations of the mountain. At least 730 acres of mature spruce and fir trees have experienced almost total mortality from these insects, with an estimated 16,000 trees dying between 1999 and 2000. Another estimated 700 acres now have bark beetles present (J. Anhold, USFS Pest Management, pers. comm., 2000). It was recently discovered that lower elevation stands within the mixed conifer forest are also being affected. Because bark beetles prefer large diameter (greater than 16 inches dbh), mature trees, and the large spread of this

multi-species epidemic, it is essential that the status of the species and its habitat be re-analyzed in the near future.

To further complicate the insect situation on Mount Graham is the presence of an exotic species of spruce aphid (*Elatobium abietinum*). The spruce aphid is active during winter months, when it defoliates Engelmann spruce. Heavily defoliated trees are most likely to die that same year. It is too early to predict mortality rates, but the Pinalenos have been particularly hard hit (Ann Lynch, Rocky Mountain Research Station, USFS, pers. comm., 2000).

The University of Arizona (UA) Red Squirrel Monitoring Program (RSMP), which monitors construction impacts from the Mount Graham International Observatory (MGIO), has been tracking the insect infestations since they first appeared. Initial reports of damage and possible identification of the looper and aphid were made by this group (G. Froehlich, pers. comm., 2000). In December 1997, 90 acres of the RSMP study area experienced insect outbreaks (RSMP 2000). Thirty-five middens were within the outbreak area, of which 16 were occupied (46 percent). By December 1999, 300 acres and 114 middens within the RSMP area were affected by the outbreak. Midden occupancy was reduced to 24 percent (27 of 114 middens) (RSMP 2000). In the spruce-fir non-construction zone (SFN) surrounding High Peak, occupied midden numbers have decreased from 37 in December 1997 to 18 in December 1999 (RSMP 2000). In the northern portion of the same area, which had suffered almost total mortality, occupancy decreased from 23 occupied middens in December 1997 to 4 occupied middens in December 1999 (RSMP 2000). Even in a best-case scenario, the trees and habitat are predicted to be unable to recover to suitable status for at least 100 years. Within the Hawk Peak-Mt. Graham critical habitat unit, this insect epidemic is considered a catastrophic loss of habitat for the species.

### **EFFECTS OF THE ACTION**

Some combination of the five types of treatments will occur close to MGRS middens because middens are scattered in the various treatment blocks. Treatment crews have been trained to identify MGRS and middens, and careful use of thin, cut, pile and burn actions is not anticipated to result in direct effects to any MGRS or midden.

The proposed project actions that occurs in MGRS critical habitat will not adversely affect the important elements that the MGRS depends on for survival: areas where existing logs, snags, and clumps of corkbark fir (four to eight trees measuring up to 16 inches dbh) occur in juxtaposition with larger trees that produce cones. The proposed project will cut, pile and burn small (nine inches dbh or less) trees and logs, and ladder and ground fuels, providing a long-term beneficial effect of helping protect the loss of canopy and larger trees and midden sites by reducing the risk of a stand-altering wildfire. The canopy will remain intact.

Noise disturbance will occur (voices, chainsaws, chopping) during daylight hours. Depending on weather, topography, and workload, crews are anticipated to move through a treatment block

while thinning at a speed of about one person per acre, per day. Thinning will proceed across the landscape at a more rapid rate as more people are added to thinning crews. Piling rate of speed is estimated at two to five acres per day, per crew, and burning is estimated to proceed at a rate of about 10 acres per week. This gives a rough idea of duration of noise in any one area.

Thin, cut, and pile actions are expected to occur during the summer months when access up the mountain becomes clear (due to weather conditions). As the weather allows, piles will be burned (likely late summer, early fall). Broadcast burning (in treatment blocks A, D, F, and N only) will occur in the fall and early winter months, depending on weather. These four blocks (425 acres) support 3 MGRS middens. These middens will be protected from burning operations by crews circling the middens (and any others located prior to implementation) with handline (vegetation scraped away in a path of about 18 inches wide, by hand tools, down to mineral soil).

Forest Service biologists will search areas to be piled and burned before any piling takes place. They will look for areas where existing logs, snags, and clumps of corkbark fir (four to eight trees measuring up to 16 inches dbh) occur in juxtaposition with larger trees. These areas will be marked and avoided during piling and burning operations. These characteristics are important because such combinations were 15 times more common at MGRS midden sites than at random sites (Smith 1972). These sites are much more likely than other sites to become midden areas and will be completely avoided during the project.

The crews will ensure logs at least 16 inches midpoint diameter and 30 feet long will not be bucked up or included in burn piles. In stands where there are few large logs, no logs greater than 12 inches midpoint diameter will be cut up. Burn piles will not be placed close to large trees or logs; this reduces the risk of these trees and logs catching fire.

Piling and burning debris could create new openings in the canopy. To avoid this possibility, piles will not be placed closer than 50 feet to any existing MGRS midden, and will be placed farther away if possible. To help avoid creating new openings, crews will use existing dry openings and old skid trails when building piles. If there are no existing openings, piles will be placed at least 50 feet from a midden's center and as far as possible from any large trees, snags and logs. If an area is found where it is difficult to meet these criteria, the fire boss and/or crews will consult with the district biologist before piling fuel.

This project, as described, is also expected to remove a small part of the larvae stages and some adults of one or all four of the insect epidemic, but is not expected to contribute in a significant way to curbing the infestation.

Only treatment blocks A, D, F, and N will be broadcast burned (after the initial piling and burning actions). Three MGRS middens are known to exist in these 425 acres. The treatment blocks will be intensively searched immediately before burning, and handline (about 18 inches wide, scraped to mineral soil) will be built (at least fifty feet from the midden center) around all located middens. Depending on the placement of middens within the blocks and consultation

with the district biologist and fire boss concerning safety, fire may be lit from the handline to burn into the rest of the stand. This method of broadcast burning is expected to further reduce small ground fuels without endangering MGRS or their middens.

### **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Future actions will include Arizona Department of Transportation (ADOT) road maintenance and improvements. ADOT maintains an easement (granted by the United States Department of Transportation, Federal Highways Administration), that consists of 100 feet on either side of the centerline on Highway 366 (Swift Trail). Maintenance projects such as maintenance road grading, drainage ditch and culvert clearing, and hazard tree removal are included in their Highway Easement Deed, recorded March 20, 1998. Future project environmental documentation is the responsibility of the State of Arizona, in conjunction with the Federal Highways Administration.

### **CONCLUSION**

The Forest Service will protect and avoid inadvertently burning middens or MGRS by having experienced and trained personnel intensively search treatment areas prior to any activity and handlining middens found (three are currently known to occur in the broadcast burning areas). The canopy cover (of MGRS critical habitat) will remain intact due to the careful thinning, piling and burning, and the low intensity fire prescription used and firing methods employed, and the overall fire danger will be safely reduced by the reduction in ladder fuels. Because of this, and after reviewing the current status of the MGRS, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action, as described, is not likely to jeopardize the continued existence of the MGRS, and is not likely to destroy or adversely modify designated critical habitat.

### **INCIDENTAL TAKE STATEMENT**

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 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 the Service 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 by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which

include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service or the applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

#### **AMOUNT OR EXTENT OF TAKE**

The Service anticipates the following take as a result of the proposed action. Incidental take is expected to be in the form of harm and harassment, as follows:

1. 3 MGRS may be harassed by noise and smoke where crews are working.
2. 1 of the 3 MGRS may be harmed by the inadvertent burning or damaging of a midden.

#### **EFFECT OF THE TAKE**

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of MGRS critical habitat.

#### **REASONABLE AND PRUDENT MEASURES**

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize take of MGRS.

1. Minimize harm to MGRS and their middens.
2. Submit annual reports of results, effects, and incidental take to the Service.

## **TERMS AND CONDITIONS**

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. To implement Reasonable and Prudent Measure Number 1, the Forest Service shall implement the following term and condition:

Broadcast burning in any treatment block will not be conducted from April 1 through June 31, annually.

2. To implement Reasonable and Prudent Measure Number 2, the Forest Service shall implement the following term and condition:

Reporting of monitoring results and complete records of all incidental take that occurs during the life of the project will be included in the Forest Service's Endangered Species Act (Act) report submitted annually to the Service.

The Service believes no more than 3 MGRS will be harassed and no MGRS will be harmed as a result of inadvertent damage or burning of a midden. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and 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 Service 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.

1. The Forest Service should continue to actively promote MGRS population and habitat stability, per the 1993 MGRS Recovery Plan.

2. The Forest Service should continue to enhance and promote a healthy cycle of ecological succession in the Pinalenos, including the use of prescribed fire, silvicultural, and reforestation methods.

3. The Forest Service should determine cone crop set (cone fertility), timing, and production of the various conifers that the MGRS relies on for survival and enhance the same.

4. The Forest Service should determine status of MGRS continued existence or extirpation from West Peak, and should actively promote recovery of the MGRS in that area.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

### **REINITIATION NOTICE**

This concludes formal consultation on the action(s) outlined in the (request/reinitiation request). 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 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.

The Service appreciates the Forest Service's efforts on behalf of listed species and the public lands they inhabit. Please contact Thetis Gamberg (520/670-4619) or Sherry Barrett (520-670-4617) of my Tucson staff with any questions or concerns. Please refer to the consultation number, 2-21-98-F-282 in future correspondence concerning this project.

Sincerely,

David L. Harlow  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Steve Chambers)  
Debra Bills, Fish and Wildlife Service, Phoenix, AZ  
Michele James, Fish and Wildlife Service, Flagstaff, AZ  
State Director, Bureau of Land Management, Phoenix, AZ

John Kennedy, Habitat Branch, Arizona Fish and Wildlife Department, Phoenix, AZ

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## CONCURRENCES

### Mexican spotted owl (MSO)

Background information is taken from the MSO Recovery Plan (USFWS 1995a) unless otherwise noted. The MSO was listed as threatened March 16, 1993 (USFWS 1993b). Critical habitat was designated for the species June 6, 1995, but was withdrawn (USFWS 1995b, USFWS 1998a). The MSO Recovery plan was published December 1995 (USFWS 1995a). Critical habitat was again proposed July 2000 (USFWS 2000).

The MSO was originally described from a specimen collected at Mount Tancitaro, Michoacan, Mexico, and named *Syrnium occidentale lucidum*. The spotted owl was later assigned to the genus *Strix*. Unlike most owls, spotted owls have dark eyes. The MSO is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. The spots of the MSO are larger and more numerous than in the other two subspecies giving it a lighter appearance. Several thin white bands mark an otherwise brown tail.

Species range, distribution, and biology are detailed in the 1995 MSO Recovery Plan and included here by reference. The plan provides for three levels of habitat management; protected areas, restricted areas, and other forest and woodland types.

“Protected habitat” includes all known owl sites, and all areas in mixed conifer or pine-oak forests with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years, and all reserved lands. Protected Activity Centers (PACs) are designated around known MSO sites. A PAC encompasses a minimum of 600 acres which includes the best nesting and roosting habitat in the area. The recommended size for a PAC includes about 75 percent of an owl’s foraging area. If a nest or roost site is known, a 100-acre minimum area (“core”) is further designated and protected from management actions that would alter, modify, or damage it. “Restricted habitat” includes mixed conifer forest, pine-oak forest, and riparian areas; the Recovery Plan provides less specific management guidelines for these areas. The Plan does not provide MSO-specific guidelines for “other habitat”.

About 30,000 acres (minimum) in the Pinaleno Mountains rate out as restricted and protected (including foraging) habitat for MSO. Thirty-one MSO PACs are known and mapped on the Safford Ranger District, covering about 20,720 acres. The proposed project (1,111 acres) represents about four percent of the total available MSO habitat in the mountains. About three percent of identified MSO PAC lands are located within project boundaries.

The proposed action will involve thinning from below, cutting small (nine inches dbh or less) trees, logs, and snags, and piling and burning these piles. MGRS and MSO monitoring will be conducted during the life of the project according to established protocols. Fuel reduction actions along Swift Trail will occur within four MSO PAC boundaries. Actions will occur in

proposed MSO critical habitat, and at least 0.25 miles away from the boundary of any MSO buffer zone (nest and or roost site).

Large logs measuring 16 inches or greater (at the large end) will be retained in all blocks where they occur. Because the MSO Recovery Plan defines “large” logs as measuring 12 inches midpoint diameter or greater, loss of logs in the 12 inches to 16 inches size class is not in compliance with the MSO Recovery Plan.

Stand data indicate that reducing logs that measure only up to 12 inches will still leave a heavy load of dry ground fuels that will aid in producing hot, intensely burning, stand-altering wildfires with strong negative ecological effects; there is a tremendous amount of fuel in the 12 to 16 inches size class in the Pinaleno Mountains.

On the 300 acres (of the 1,111-acre project area), fuel loads are 60 tons per acre or greater. This averages out to about 11 large logs occur that measure 16 inches or greater (at the large end) in these areas. The Forest Service Regional Office old-growth standard is established at four to six logs per acre.

By retaining between six to 10 logs measuring 16 inches or greater, per acre, the loss of any number of logs in the 12 inches to 16 inches size class will not change the effect determination for the MSO. If fewer than six logs meeting this size requirement are in a treatment area, the Forest Service will reduce the minimum diameter to 12 inches or greater, per acre. This meets the intent of preserving Key Habitat Components (KHCs) for the MSO and lowering fuel loads to help prevent crown and stand-altering wildfires.

The entire project area was surveyed between 1990 and spring of 2000. Thorough surveys were completed in 1997, 1998 and 1999, with Forest Service and Arizona Game and Fish Department trained personnel.

Two MSO PACs (Webb Peak 0504006 and Chesley Flat 0504004) occur in the project area. MSO PACs will experience some treatments. About 470 acres of the 612-acre Webb Peak PAC will be thinned from below, cut, piled, and burned, but no part of the PAC will be broadcast burned. About 100 acres of the 681-acre Chesley Flat PAC (excluding the buffer zone and nest) will experience a combination of all five treatment actions. Buffer zones (a minimum 100-acre area around nest and/or roost sites in PACs) are designated for all MSO PACs and exclude these nest and/or roost sites from all project actions. Table 2, below, shows treatment blocks (by MSO protected and restricted habitat) and proposed treatment actions.

The proposed action will result in several habitat-altering effects. The threat of future fires in the area will be reduced, and those fires that do occur should be of lessened intensity and duration than those that occur in untreated areas. Small diameter trees and woody debris will be reduced. In any areas actually burned through broadcast fire, there may be a temporary (two growing seasons) and localized reduction in MSO prey species. Thinning, cutting, piling, and burning

**Table 2.** Proposed treatments in MSO habitat designations. January 2000.

	PROTECTED HABITAT	RESTRICTED HABITAT
PILE AND BURN ONLY	E, G, H, K, L, and DEAD ONLY IN I, J	B, C, M
PILE & BURN PLUS PRESCRIBED FIRE	F and EASTERN HALF OF A, D	N and WESTERN HALF OF A, D

operations will not remove large snags and logs. See Table 5., below, for predicted results to KHC’s through treatment actions.

Minimization actions expected to reduce KHC loss will combine a low intensity burning prescription, careful application techniques, timing (winter months only), piling and burning fuels away from the KHCs, raking the duff layer at least one foot away from the root collar of about 50 to 75 percent of large trees and a minimum of four large snags per acre, and keeping prescribed fire out of the MSO 100-acre buffers.

**Table 4.** Prescription for Pinaleno Ecosystem Management Demonstration project in mixed conifer stands. Pinaleno Mountains, Safford Ranger District, Graham County, Arizona. January, 2000.

Parameter	Minimum	Maximum
temp day-degrees fahrenheit	50	70
temp night - degrees fahrenheit	30	50
relative humidity - percent	10	50
1 hr fuel moisture - %	7	14
10 hr fuel moisture- %	9	16
100 hr fuel moisture - %	11	18
1000 hr fuel moisture - %	13	25
live fuel moisture - %	NA	200
midflame wind speed - mph	0	10

**Table 5.** Predicted reduction in fuel levels in mixed conifer stands for the Pinaleno Ecosystem Demonstration project, Pinaleno Mountains, Safford Ranger District, Graham County, Arizona. January, 2000.

fuel class	diameter class (inches)	percent reduction predicted	current average
1 hour	0-1/4	60-80	to be determined
10 hour	1/4-1	40-60	"
100 hour	1-3	30-50	"
1000 hour	3-8	15-30	"

Only treatment blocks B, C, the western half of D and I, M, and N, will be piled and burned during the MSO breeding season because they are in restricted, not protected, habitat. The other stands are within PACs and chainsaws and burning operations (noise, drift smoke) could affect any unknown MSO in the area, even though the project actions occur outside the 100-acre buffer around known nest sites. Direct effects of pre-treatment thinning, piling and burning to all blocks include potential short-term reduction of MSO prey species in foraging areas during operations. The treatments are anticipated to allow for a more open understory and reduced ladder fuels. After pre-treatment, stands are expected to show an increase in visibility and small openings. After one growing season, an increase in MSO prey species is anticipated to occur. The combined treatments will safely reduce the extremely high fuel loads and the risk of catastrophic fire, and aid in increasing vegetation and MSO prey species diversity after two growing seasons and in the long-term.

About 400 chains (five miles) of handline will be built along the edges of treatment blocks A, D, F, and N. The line will then be fired in a backing fire into the stands. The lines around the three middens in stands D and F will also be fired out from the middens if safety considerations allow. Handline is consistent with the MSO recovery plan; trees nine inches dbh or greater will not be cut (should they occur along the line); all handline will be rehabilitated with water bars after the burn has been completed to mitigate for potential soil loss.

Short-term reduction in small fuels may temporarily (two growing seasons) decrease rodent populations, but as grasses grow into small openings and the small fuels are quickly replaced, MSO prey species populations are expected to return to original numbers, if not increase over the long-term. Another effect is the reduction in risk of catastrophic fire to the burned and treated areas and the MSO PACs uphill from them.

Nest/roost areas are located downed canyon (lower elevations) from the burning areas and are not expected to be affected by smoke, as canyon breezes flow upward during daytime. Smoke and noise will be short-term and sporadic during the cutting stages, but could harass any MSO in the area. Smoke and noise during burning conducted in 1998 (outside the MSO breeding season) did not appear to have affected the 1999 MSO breeding pair located in the Turkey Flat PAC. Following a burn in the winter months (about 0.25 miles from the then unknown nest site), the pair produced two young in 1999 (Kuklinski 1999). The Webb Peak PAC MSO pair has continued to produce young for several years after a moderately hot burn during late April to mid-May, 1996 (Clark Peak Fire).

Pretreatment monitoring will meet the requirements of the MSO Microhabitat Monitoring (USFS 1998). Fuel transects will be placed randomly along with vegetation plots as they are set out for microhabitat monitoring. Pretreatment monitoring of log density will use log and snag transects. After monitoring shows the fuel densities, the combination of pretreatment and burning is expected to meet the objectives described in Table 5.

The Forest Service will conduct the treatments per the MSO recovery plan with the exception of retaining 12 inches and greater downed logs and snags. The exceptionally heavy fuel load

provides such a heavy fuel load in the 12 inches to 16 inches size class, that treatments as proposed and actions followed as described will ensure plenty (greater than Regional requirements) of large downed logs and snags in MSO habitat, yet still accomplish a reduction in heavy fuels. Proposed critical habitat for MSO includes specific constituent elements, as described in the MSO recovery plan. For these reasons, the Service concurs that the proposed project, as described, is not likely to adversely affect the MSO or proposed critical habitat.

### **Apache trout**

Background information is taken from the Arizona (Apache) trout Recovery Plan (USFWS 1983) unless otherwise noted. The Apache trout (*Oncorhynchus apache*) was listed as endangered in 1969, brought under the protection of the Endangered Species Act (Act) of 1973, as amended, and down-listed to threatened status on July 19, 1975 (USFWS 1975). The Apache trout recovery plan was finalized and revised September 22, 1983 (USFWS 1983). The plan focuses on 1) surveying and addressing the genetic status (purity) of existing Apache trout populations, and protecting those populations, 2) renovating selected streams in historic habitat and repatriating Apache trout following elimination of non-native trout species, 3) surveying populations and habitat conditions and developing and implementing habitat recovery measures, and 4) developing a hatchery broodstock and enhancing sport fisheries for the species.

Distinguishing characteristics of Apache trout include a deep and compressed body, a large dorsal fin, and obvious spots on the body that are often uniformly spaced. These spots are roundish in general outline and medium-sized, appearing slightly smaller than most interior subspecies of cutthroat trout but more like the typical cutthroat trout rather than spots on the Gila trout (Miller 1972).

Dominant ground colors are yellowish or yellow-olive, with live specimens showing tints of purple and pink; however, no red or pink lateral band was present in Miller's specimens (Miller 1972). In 1987, specimens taken during renovation of Hurricane Creek and Lake on the Fort Apache Indian Reservation (FAIR) included fish with a red or pink lateral band. These fish were genetically tested and found indistinguishable from pure Apache trout [from a personal communication from G. J. Carmichael to the original authors of the Draft Apache Trout Recovery Implementation Plan, unpublished]. Current information from the Service (Arizona Fishery Resources Office in Pinetop, Arizona), confirms 25 total streams in historic Apache trout range inhabited by genetically pure Apache trout (Leslie Ruiz, pers. comm. 2000).

Dorsal, pelvic and anal fins show conspicuous cream or yellowish tips. A yellow cutthroat mark is usually present (Miller 1972). Vertebrae number 58 to 61; pyloric caeca number 21 to 41, scales number 133-172 (range of means 146 to 158) in the lateral line series, and scales above the lateral line number 32 to 40 (range of means 34 to 36) (Behnke and Zam 1976).

Apache trout are threatened by non-native introduced fish species (competitors, predators, and hybridizers) and habitat alterations associated primarily with timber harvest operations, livestock grazing, water quality and flow alterations, and mining (sand and gravel operations) which

contribute to its status as a threatened species. These threats reduce the ability of Apache trout to survive and greatly limit the present range of the species.

Four creeks in the Pinaleno Mountains (Ash, Big Canyon, Grant, and Marijilda) contain Apache trout populations. While treatments are not planned to occur directly within Apache trout habitat (Ash and Big Canyon Creeks), there may be indirect effects to this listed species on the two watersheds that support these creeks. About 100 acres in block N lies within the lower portion of the 2,759-acre Big Canyon Creek watershed, and about 114 acres of block M lies within the 5,094-acre Ash Creek watershed. The other watersheds and creeks will not be affected by the proposed project. The creeks will be checked by the district biologist for possible effects from watershed reactions to treatments.

Neither these threats or others such as erosion, fire, or vegetation elimination at stream sides, exist or are anticipated to occur from project actions. Watersheds that support the streams with known locations of Apache trout in the Pinaleno Mountains will experience selected occurrences of thinning, piling and burning, and some light-intensity broadcast burning, but these actions are not anticipated to contribute to erosion, nor will fire be allowed to burn near (200 feet or closer) any stream side. Therefore, the Service concurs with the Forest Service effect determination that the proposed project, as described, is not likely to adversely affect the Apache trout.