

THE NAVAJO NATION
MANAGEMENT PLAN
FOR THE
MEXICAN SPOTTED OWL
(*STRIX OCCIDENTALIS LUCIDA*)



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ACRONYMS and ABBREVIATIONS:

ac = acre

CFR = Code of Federal Regulations

cm = centimeter

dbh = diameter at breast height – unit of measurement for tree diameter

ESA = federal Endangered Species Act

FMP = Ten-Year Forest Management Plan for Navajo Nation Commercial Forest

FR = Federal Register

ft = feet

ha = hectare

km = kilometer

m = meter

MBTA = federal Migratory Bird Treaty Act

mi = mile

MSO = owl = Mexican Spotted Owl (*Strix occidentalis lucida*)

NESL = Navajo Endangered Species List

NNC = Navajo Nation Code

NNDFWL = Navajo Nation Department of Fish and Wildlife

NNHP = Navajo Natural Heritage Program of Department of Fish and Wildlife

NPS = National Park Service

PAC = Protected Activity Center

Plan = Navajo Nation Mexican Spotted Owl Management Plan

RPMO = Recovery Plan for the Mexican Spotted Owl (USDI Fish & Wildlife Service 1995)

USFWS = United States Fish and Wildlife Service

A. INTRODUCTION:

1. PURPOSE AND NEED

The Mexican Spotted Owl (*Strix occidentalis lucida*) is recognized by both the Navajo Nation and the United States as a species in need of protection and special management. This document serves as the Management Plan (Plan) for the Mexican Spotted Owl (hereafter, MSO or owl) on all lands administered by the Navajo Nation. The Plan is designed to effectively manage all MSOs on the Navajo Nation using accepted conservation techniques, especially those recommended in the “Recovery Plan for the Mexican Spotted Owl” (hereafter, RPMSO) (USDI Fish and Wildlife Service 1995). The MSO occurs within three fairly distinct habitat types on the Navajo Nation. This Plan recognizes the uniqueness of these habitats, and serves as an effective tool for conserving the MSO throughout the Navajo Nation. We consider current and future activities and potential threats within each habitat type, followed by conservation recommendations that will be employed within each type. This Plan will take effect upon approval by the Navajo Nation Council’s Resources Committee, and all aspects of the plan will be in-effect during the duration of the Plan. The life of this Plan will be based on the Tribal and federal statuses of the MSO. The Plan’s effectiveness and the current status of the owl on the Navajo Nation will be reviewed, by the Navajo Nation Department of Fish and Wildlife (NNDFWL), every five years from the Plan’s effective date, or more often as needed. Revisions to the Plan will be made accordingly.

2. AUTHORIZATION

This plan shall become effective upon approval of the Resources Committee, a standing committee of the Navajo Nation’s Council, whose purpose is to ensure the optimum use of Navajo resources and protect the rights of the Navajo Nation and people to such resources, both now and in the future. The Resources Committee is empowered to oversee the enforcement and administration of applicable Navajo and federal laws and regulations, and approve plans for the management of all resources (2 NNC § 695 [b]).

3. CURRENT TRIBAL AND FEDERAL STATUSES

The MSO is a “Group-3” Tribally-listed endangered species on the Navajo Endangered Species List (NESL). A Group-3 endangered species is “a species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future on the Navajo Nation.” Given its status on the NESL, Navajo Nation Code (17 NNC § 507) makes it “unlawful for any person to take, possess, transport, export, process, sell or offer for sale or ship” the MSO. Under

this Code, “take,” means “the hunting, capturing, killing in any manner or the attempt to hunt, capture or kill in any manner...” Habitat protection, per se, is not afforded under the NNC.

Federal laws protecting the MSO include the Endangered Species Act of 1973 (ESA), and the Migratory Bird Treaty Act (MBTA). Federally threatened species are those that are “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range”. Prohibited activities for federally listed species are outlined in section 9 of the ESA; briefly, the ESA prohibits take, possession, selling, transport, import and export of such species. “Take” is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct”. Within the definition of “take”, “harass” includes disruption to normal behavior patterns, while “harm” includes significant habitat alteration or degradation (50 CFR 17.3). The MBTA protects the owl with a more restrictive “take” definition (does not include “harass” or “harm”), but also provides protection to the owl’s nests and eggs (U. S. Code, T.16 Conservation § 703).

a. Previous Navajo Nation Actions

Pursuant to the NNC, (Chapter 17 § 507[a]) the NNDFWL proposed listing the MSO as an endangered species in 1990. This proposal was based on “investigations concerning wildlife, and other available scientific and commercial data, and after consultation with wildlife agencies in surrounding states, appropriate federal agencies, and other interested persons and organizations.” The following factors are considered when proposing a species as endangered: the present or threatened destruction, modification or curtailment of its habitat; over-utilization for scientific, commercial or sporting purposes; the effects of disease or predation; and other natural or man-made factors affecting its prospects of survival or recruitment on the Navajo Nation (17 NNC § 500[H]). On 14 February 1991, the Resources Committee, through resolution RCF-014-91, approved listing the MSO as an endangered species, classified in Group 3.

b. Previous Federal Actions

The following is a brief history of the federal actions, with Federal Register (FR) references, for the process of listing the owl under the ESA. The MSO was proposed by the U. S. Fish and Wildlife Service (USFWS) for federal listing as a threatened species under the ESA on 4 November 1991 (56 FR 56344). The final rule declaring the owl as a threatened species without critical habitat was then published on 16 March 1993 (58 FR 14248). At that time, critical habitat was not proposed because sufficient detail to accurately delineate the necessary habitat was lacking. Designation of

critical habitat for the owl was published as a proposed rule on 7 December 1994 (59 FR 63162), and published as a final rule, after the public comment period, on 6 June 1995 (60 FR 29914). A New Mexico federal district court later set aside this final rule and forbid the USFWS from enforcing MSO critical habitat (Coalition of Arizona-New Mexico Counties for Stable Economic Growth v. U.S. Fish and Wildlife Service, No. 95-1285-M Civil). As a result, critical habitat designation for the owl was removed from the Code of Federal Regulations on 25 March 1998 (63 FR 14378). Most currently, on 13 March 2000, the U. S. District Court for the District of New Mexico, (Southwest Center for Biological Diversity and Silver v. Babbitt and Clark, CIV 99-519 LFG/LCS-ACE), ordered the USFWS to propose critical habitat within four months of the court order and to complete, and publish a final designation of critical habitat for the MSO by 15 January 2001. Thus, critical habitat for the MSO was again proposed for designation on 21 July 2000 (65 FR 45336).

4. GEOGRAPHY OF THE NAVAJO NATION

The Navajo Nation is the largest Indian Nation in the continental United States, and occupies 30,883 km² (24,347 mi²) within northeastern Arizona, northwestern New Mexico and southeastern Utah (Figure 1). The borders are roughly defined as the: San Juan River on the north; Marble Canyon section of the Colorado River on the west, Little Colorado and Puerco Rivers (35-degrees 10-minutes north latitude) on the south; and an irregular eastern border extending to the eastern portion of Chaco Mesa. The eastern-most portions of Navajo Nation lands occur in the form of individual “checker-board” allotments intermingled with private, federal, and state lands. The Navajo Nation also has governmental jurisdiction over three distinct satellite communities in New Mexico, which themselves have unique recognition by the United States. These are the Ramah-Navajo Reservation, Alamo Community, and Canoncito.

The Navajo Nation is situated within the south-central part of the Colorado Plateau, and has an elevation range between 853 m (2,800 ft) at the mouth of the Little Colorado River, to 3,175 m (10,416 ft) at the summit of Navajo Mountain. Within this elevation range, there are three recognized ecological zones of (1) cold temperate mountain forest and woodland, (2) intermediate steppe grassland, and (3) arid desert lands. These zones are composed of mosaics of the following biotic communities (Brown 1982): petran subalpine and petran montane conifer forest types; Great Basin desertscrub and conifer woodlands; and plains and Great Basin Grasslands and subalpine grasslands. Annual precipitation ranges from an average of 15 cm per year in the desertlands to over 61 cm per year in the mountainous areas. Geologically, the Navajo Nation is composed

mostly of flat-lying or slightly tilted sedimentary sandstone layers that are incised by canyons and surmounted by buttes and mesas. Additionally, older-aged igneous- and metamorphic-rock intrusions are scattered throughout the landscape. All of these landscape features have created a diverse range of environmental and landform conditions, expressed in a great diversity of biological habitats.

The Navajo Nation is within the Colorado Plateau Recovery Unit (Figure 2) as identified in the RPMSO. This recovery unit also includes south-central and southern Utah, northern Arizona, northwestern New Mexico, and southwestern Colorado. Tribal lands compose 30 % of the area within this unit, of which, Navajo Nation composes approximately 89 %. The MSO reaches its north-western range limit of central Utah within this unit. Throughout the Colorado Plateau, owl habitat is highly fragmented with most owls occurring in disjunct canyon systems or within isolated mountain ranges.

5. LAND STATUS OF THE NAVAJO NATION

Lands of the Navajo Nation are primarily composed of Federal Trust Lands. “Federal Trust” is a special status in which the lands technically are federal in ownership, but held in “trust” for the benefit of the Navajo People. Despite the federal connection, trust lands are not public lands and are not subject to public land laws, such as the National Forest Management Act. The Bureau of Indian Affairs is the lead federal agency in administering tribal lands but all federal agencies share trust responsibility. Federal courts have recognized Native American governments as domestic dependent nations. The Navajo Nation government is a three-part government, composed of legislative and executive branches elected by Navajo Tribal members, and an appointed judicial branch. The Navajo Nation Council enacts laws, approved by the Tribal President, which are codified in the Navajo Nation Code. The Navajo government exercises legislative, administrative and judicial control over activities within the boundaries of the Navajo Nation. The federal government has acknowledged its responsibility to operate within a government-to-government relationship with tribes when undertaking activities affecting tribal rights and trust resources (59 FR 22951).

6. LIFE HISTORY OF THE MEXICAN SPOTTED OWL

a. Known and Potential Distribution on Navajo Nation

The MSO is one of three subspecies of Spotted Owls in the western U.S. The Mexican subspecies occupies the largest area of the three, but occurs in disjunct localities throughout its range. The

known range extends north from Aguascalientes, Mexico through Arizona, New Mexico, and western Texas, to central Utah, southwestern Colorado, and the Front Range of central Colorado. On the Navajo Nation (Figure 1), the MSO is known from the Chuska Mountains, Defiance Plateau, and Canyon de Chelly, north to the Carrizo Mountains; and its range extends from Black Mesa northwest through the extensive canyon systems to just north of Navajo Mountain. No comprehensive surveys of the nesting / roosting habitats have been attempted on the Navajo Nation; thus, our current knowledge of owl occurrences is limited. The MSO has been found in both canyon and forested areas; and, within this document we consider “Black Mesa” to be a third habitat type because of its unique habitat components. Potential habitat also occurs in the sandstone uplift extending between Gallup and Crownpoint, NM, and the deeply-incised canyon areas of the Little Colorado, Colorado, and San Juan Rivers.

The Navajo Natural Heritage Program (NNHP) of the Navajo Nation Department of Fish and Wildlife (NNDFWL) (both later described in section A.8.a.) currently has XX owl records. The RPMSO differentiates between a record and an “owl site”, which is defined as a “visual sighting of at least one adult spotted owl or as a minimum of two auditory detections in the same vicinity in the same year.” “Owl sites” are used for protection and management (see section A.8.d.). Based on this “owl site” definition, and the currently accepted procedure for evaluating historic owl locations (USDI Fish and Wildlife Service, June 5, 2000, in lit.), we determined that XX of these records constitute “owl sites”, and have designated them as such. These XX owl sites consist of both recent and historic (prior to 1990) owl locations. The other XX records consist of a single auditory response outside the breeding season, and was post-1990 with unsuccessful protocol follow-up surveys. XX of the XX owl sites occur within, or in adjacent edge habitats to, the Navajo Nation Commercial Forest; XX owl sites are within forested canyons of the Chuska-Carrizo Mountain Chain, but outside of the commercial forest; XX sites are from Canyon de Chelly; XX are on the northeastern part of Black Mesa; and XX owl sites are within the canyons extending from just north of Black Mesa to Navajo Mountain area.

b. Life History

Several aspects of the life history of the owl, including home-range size, seasonal movements, and breeding phenology, have implications for proper management. Home range, defined as the area used by an animal during its normal activities, of the MSO has been studied elsewhere using radio-telemetry. In general, home ranges include roosting and nesting areas, as well as, foraging areas. Home ranges have been found to vary considerably among different habitats and geographic areas.

On the Colorado Plateau, range sizes for 11 owls in three study areas varied from 924 to 1,487 ha (2,282 to 3,672 ac). In other parts of the owl's range, home-range sizes have been determined to be as small as 261 ha (645 ac), and as large as 1,551 ha (3,831 ac) (USDI Fish and Wildlife Service 1995). Breeding densities of owls have been found to vary between regions in Arizona. In northern Arizona, MSO pairs have been found to occur at intervals of 3 to 4 km, whereas they were spaced 1.6 to 3.2 km in southern Arizona (Ganey and Balda 1989). Undoubtedly, breeding densities of the MSO in most areas on the Navajo Nation vary more than these figures due to the fragmented nature of their preferred habitat, especially in our extensive canyonlands.

Owls use their home range differently during the breeding season as compared to the non-nesting season, and a large degree of variation in seasonal use of ranges has been found between owls. No long-term MSO-nesting surveys have been performed on Navajo Nation to obtain exact nesting dates; however, the general nesting season may be summarized from Gutierrez et al. (1995) as:

late FEB - late MAR	:	pair formation, courtship, nest-site selection
mid MAR - late MAY	:	egg-laying and incubation (30 days)
late APR - late JUN	:	nestling period (34-36 days)
late MAY - late JUN	:	fledging of young
late JUN - late AUG	:	post-fledging period (60-90 days)
early SEP - late OCT	:	independence of young, dispersal from natal area

Some owls maintain the same home range throughout the nesting and non-nesting seasons, some remain in the same general area but exhibit shifts in their habitat usage, while others may migrate up to 20 to 50 km during the winter. Generally, owls migrate to more open habitats at lower elevations for winter (USDI Fish and Wildlife Service 1995). No owls have been radio-tracked on the Navajo Nation to accurately determine home-range size and seasonal use of habitats.

c. Typical Habitat Types

The MSO uses at least two major habitat types throughout the Southwest (forests and canyons); but we consider a third unique habitat, which occurs only on Black Mesa, to exist on the Navajo Nation. This unique habitat consists of rocky drainages with mixed-conifer in pinyon-juniper woodlands, and will be described in section B.3. of this Plan. All habitats of the MSO have one characteristic in common, that being the presence of a cool microclimate. It has been theorized that owls are relatively intolerant of high temperatures, and therefore nest and roost in the coolest conditions available (USDI Fish and Wildlife Service 1995). This generally means closed-canopy forests that are typically on north-facing slopes, or deeply-incised, shady canyons.

i. Mixed-conifer Forests

The most common forest type used for nesting and roosting by the MSO is the mixed-conifer forest that is dominated by Douglas-fir (*Pseudotsuga menziesii*) and/or white fir (*Abies concolor*), and with codominant species of southern white pine (*Pinus strobiformis*), limber pine (*P. flexilis*), and ponderosa pine (*P. ponderosa*) (Fletcher and Hollis 1994). The understory of this forest type is typically composed of coniferous species as well as deciduous species, such as Gambel oak (*Quercus gambelii*), maple (*Acer* spp.), boxelder (*Acer negundo*), and New Mexico locust (*Robinia neomexicana*). High-quality nesting / roosting areas normally have at least 40 % of the tree basal area composed of conifer, and usually have less than 40 % basal area of hardwoods. These stands also have moderately closed, to fully closed, canopy closure (> 60 %), and possess multiple canopy layers with at least one layer composed of the dominant conifer species. Overall, the stands are typically uneven-aged, tending to mid-aged, mature, and older-growth forest stages. The trees composing the top canopy are usually 31 to 46 cm (12 to 18 inches) dbh (diameter at breast height) in mid-aged forests, and > 46 cm dbh in mature and older-growth forests (Fletcher and Hollis 1994). Within this forest type, Douglas-fir trees are those most commonly selected for roosting and nesting; and nesting usually occurs in large trees. This forest type is typically found on north-facing, steep-sloped forests within the mountains above 2286 m (7,500 ft) in elevation.

The USFWS has identified those physical and biological features that: (1) are essential to conservation of the MSO, and (2) that may require special management considerations or protection (the USFWS calls these features “primary constituent elements”). The features within forest habitats that support owl nesting, roosting, and foraging include:

- (1) high basal area of large diameter trees;
- (2) moderate to high canopy closure;
- (3) wide range of tree sizes suggestive of uneven-age stands;
- (4) multi-layered canopy with large overstory trees of various species;
- (5) high snag basal area;
- (6) high volumes of fallen trees and other woody debris;
- (7) high plant species richness, including hardwoods; and
- (8) adequate levels of residual plant cover to maintain fruits, seeds, and regeneration to provide for the needs of MSO prey species (65 FR 45336).

The preceding habitat description of mixed-conifer forests presents descriptions of high-quality nesting / roosting habitats; owls do however, use a range of lesser-quality mixed-conifer forest types for nesting and roosting. In general, the NNDFWL uses the presence of certain tree species, specifically Douglas-fir, Engelmann spruce (*Picea engelmannii*), or blue spruce (*P. pungens*), to define habitats that are “potential forest habitat” for the MSO. This definition of “potential habitat”

for forests includes those habitats that the RPMSO defines as “Protected” and “Restricted” habitats. The RPMSO uses the following definition for mixed-conifer forests:

“The definition of mixed-conifer forest shall generally be confined to the following series (Layser and Schubert 1979) and associated habitat types: white fir, Douglas-fir, limber pine, or blue spruce. Within this framework, the following exceptions to the general guideline apply: (1) any stand within the *Pinus aristata* (Bristlecone Pine), *Picea engelmannii*, or *Abies lasiocarpa* (subalpine fir) Series not having a plurality (Eyre 1980) of basal area of any of these three species or *Pinus ponderosa*, singly or in combination, should also be defined as mixed-conifer; (2) stands that can be described as “pure” for coniferous species other than Douglas-fir, white fir, and southwestern white pine, limber pine, or blue spruce should be excluded from the broad category of mixed-conifer for the purposes of RPMSO implementation regardless of the series or habitat type (pure means that one species comprises 80% or more of the dominant and codominant trees); and (3) stands of mixed species with $\geq 50\%$ of the basal area consisting of quaking aspen should be defined as quaking aspen (*Populus tremuloides*) for the purposes of RPMSO implementation regardless of the series or habitat type.”

ii. Canyons

Canyons are also used by the MSO for nesting and roosting. This habitat is found, and is usable by the owl, at all elevations on the Navajo Nation. Canyons that owls may use for nesting and roosting have steep, often vertical, rock walls, and a highly variable amount of forest structure. These canyons may have no tree structure at all (the owls will nest and roost in small caves, holes, cracks, ledges, and boulders), while others have a high degree of forest structure, especially on north-facing walls (usually clumps of Douglas-fir forest on the Navajo Nation). The canyon bottoms of those with vegetation structure often contain riparian stringers composed of conifers and/or hardwoods. In Utah, canyons with no forest structure have narrow widths, several vegetation layers, high snag basal area, large amounts of ground litter, and a high relative humidity (Fletcher and Hollis 1994). The elements identified by the USFWS as necessary for MSO conservation in canyon habitats (primary constituent elements) include:

- (1) cooler and often more humid conditions than the surrounding area;
- (2) clumps or stringers of trees and/or canyon wall containing crevices, ledges, or caves;
- (3) high percent of ground litter and wood debris; and
- (4) riparian or woody vegetation (although not at all sites) (65 FR 45336).

The NNDFWL defines “potential habitat” for canyons that may be used for nesting / roosting as: canyons with a cooler microclimate than the surrounding area, and with clumps or stringers of trees, and/or canyon walls containing crevices, ledges, or caves.

iii. Other Forest and Woodland Types Not Addressed in This Plan
Along the Mogollon Rim forests of Arizona and New Mexico, the MSO roosts and nests within ponderosa pine–Gambel oak forests (in addition to mixed-conifer forests and rocky canyons). The pine-oak habitat type occurs on Navajo Nation’s Commercial Forest, but is not considered protected or restricted in this portion of the Colorado Plateau Recovery Unit. The RPMSO recognizes that only the Zuni Mountains and Mount Taylor regions of the Colorado Plateau have pine-oak stands that are potential MSO habitat. Numerous clearance-protocol surveys within the Navajo Nation Commercial Forest have found no MSOs roosting or nesting within pine-oak habitats. Thus, the pine-oak habitat is not further addressed in this Plan.

7. CULTURAL SIGNIFICANCE OF MSO TO THE NAVAJO

Traditional Navajo culture specifically mentions owls in its oral history (the term “owl” is used within this section to indicate all owl species). The cultural use of owls is considered highly confidential and protected. Therefore, the information presented here is very limited. Owls play an important role in Navajo ceremonialism; however, due to the influx of Western thought, Christianity, Pan Indianism, etc., they are misunderstood and are usually associated with evil and witchcraft. The eagle and owl were created together and were charged to be messengers. The owl was specifically made a caller informing others of danger or neglect. Within the Navajo culture, special offerings are made in, or toward, owl’s nests; and, the language has esoteric names for each of the different species of owls. The MSO and other large owls are used in certain ceremonies of the Navajo people. Owl and eagle feathers are used to make offerings, and as a ritual broom to banish evil during ceremonies. Split owl tail feathers are used to decorate various types of headgear and specific ritual arrows, and owl claws are often part of medicine bundles and are used as piercing tools in ritual ceremonies. Lastly, the use of wild-animal fat as a lotion may include owl fat. In summary, various owls species, including the MSO, have important roles in Navajo culture as messengers and for ceremonial use.

8. CURRENT MSO MANAGEMENT ON THE NAVAJO NATION

The current management scheme for the conservation of the MSO on the Navajo Nation is based upon the recognized authority of the NNDFWL to conserve the Navajo Nation’s wildlife and habitats, and is composed of several components. These components are: (1) protection pursuant

to the owl's Tribal and federal statuses through: (a) the Tribal project-approval process; (b) mandatory "pre-action surveys" using the accepted Mexican Spotted Owl Inventory Protocol (currently, U. S. Forest Service 1996)(Appendix B); (c) establishment of "Protected Activity Centers" (PACs), for protection purposes, around all recent and historic owl sites per the RPMSO; and (d) federal agency consultations with the USFWS; and (2) having the zoologist of the NNHP serve as a member of the MSO Colorado Plateau Working Team.

a. Navajo Nation Department of Fish and Wildlife

The NNDFWL was established under the Executive Branch within the Division of Natural Resources in 1977 by 23 NNC § 201[a]. On February 8, 1994, the NNDFWL's Plan of Operation was passed under resolution (GSCF-3-94), declaring the purpose of the NNDFWL as "to conserve, protect, enhance and restore the Navajo Nation's fish, wildlife, plants, and their habitat, through aggressive management programs for the spiritual, cultural, and material benefit of present and future generations of the Navajo Nation." Pursuant to IV (2) of the Plan of Operation, the NNDFWL is authorized to "develop and recommend policies, rules and regulations, and management plans relating to fish, wildlife, and native plant management and enforcement."

The Navajo Natural Heritage Program (NNHP) is a section of the NNDFWL, and is contracted from the Bureau of Indian Affairs through PL93-638 to maintain a database of rare and threatened species on the Navajo Nation. Specifically, the Plan of Operation authorizes the NNHP's responsibilities as "gathering and organizing technical data on the existence, status and distribution of rare plants, animals or habitat for the purpose of biological land conservation planning and assessing impacts to the natural environment."

b. Tribal Project Approval Process

The Navajo Nation's Resources Committee (a standing committee of the Navajo Nation Council) oversees and regulates the Tribal project-approval process for actions involving the disposition of resources, surface disturbance or alteration of the natural state of resources. The Resources Committee has the power to give final approval for any land exchanges, non-mineral leases, right-of-ways, permits, and other licenses and usufructuary interests in Navajo land in accordance with applicable federal and Navajo Nation laws (2 NNC § 695). The Resources Committee recommends all actions involving the approval of mineral agreements, land acquisitions, and energy development agreements to the Navajo Nation Council. Decisions are made by the Council and its standing committees through resolution. Proposed Council and committee resolutions

involving natural resources are reviewed by the director of the Division of Natural Resources, and appropriate departments within the Division, for necessary clearances (2 NNC § 164). The NNDFWL reviews resolutions, on behalf of the Division, to ensure compliance with Tribal and federal wildlife laws, including the Navajo Endangered Species Code and the federal ESA.

c. Pre-action Surveys

Formal clearance surveys for the MSO began for commercial timber harvest projects in 1991, two years prior to the species being federally listed. These surveys were the first on Navajo Nation to systematically follow the accepted protocol; however, prior to 1991 there were a number of MSOs known through incidental discoveries and non-protocol MSO surveys. After federal listing, all federal agencies proposing activities, and all projects with a federal connection, needed to comply with section 7 of the ESA. Section 7 requires federal agencies to insure that their actions are not likely to jeopardize the continued existence of federally listed species. Thus since 1993, all projects that were federally planned, funded, or authorized in, or within 0.4 km (¼ mi) of, potential MSO habitat (as defined in section A.6.c.) needed to address the owl in project planning. Thus these federally based projects often required the project sponsor to perform MSO protocol-clearance (pre-action) surveys to determine presence or absence of owls; and if necessary, undergo appropriate section 7 consultation per the ESA (see section A.8.e.). In addition, all non-federal projects requiring tribal approval in, or near, potential habitat (as defined in section A.6.c.) needed to address the MSO to prevent “take” of individuals, and perform protocol clearance surveys if necessary. Habitat suitability for nesting / roosting habitat, and therefore the need for pre-action surveys, is determined by field biologists using the definitions of protected and restricted habitats within the RPMSO and section A.6.c. of this Plan.

d. Protected Activity Centers

As recommended in the RPMSO, the NNDFWL has established PACs around all owl sites on Navajo Nation. Once delineated, PACs serve as a means of protecting the MSOs and their essential habitat. To date, very few project-based habitat alterations have been performed within PACs on Navajo Nation, and none have occurred without permit or federal consultation. As recommended, PACs are at least 243 ha (600 ac) in size, and enclose the best owl habitat for each owl site. An attempt was made to center the PAC around a known nest or roost site, and if these were unknown, the best nesting / roosting habitat (based on the best judgment of a biologist familiar with the area). (Prior to PAC establishment in the mid-1990s, Management Territories of

809 ha (2000 ac) were established for all owl sites as per Forest Service Region 3 protocol; these were then redrawn and became PACs after finalization of the RPMSO.)

e. Consultations with U. S. Fish and Wildlife Service

Federal agencies are also involved in the protection and conservation of owls on the Navajo Nation. A federal agency must consult with the USFWS if that agency's action may affect a threatened or endangered species, or that species' designated critical habitat. Section 7 of the ESA states that each federal agency shall ensure any action that they authorize, fund or carry out "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species...determined to be critical..." In addition, federal agencies are to use their authorities to carry out programs to recover listed species. Section 9 of the ESA prohibits the take of threatened and endangered species (see section A.3. of this Plan). The Secretary of the Interior, through the USFWS, provides assistance to the federal action agency via consultation to meet the requirements of sections 7 and 9. It is important to note that, section 7 of the ESA does not apply to Native American actions, per se. However, if a tribal action is funded or authorized by a federal agency then that federal agency's decision is subject to section 7 consultation.

Consultation is a multifaceted process, but basically means any form of communication between the action agency and the USFWS for the purpose of identifying and resolving section 7 and 9 issues. The action agency determines the need for consultation based on the ESA and federal regulations. The two basic forms of consultation are informal and formal consultations. Informal consultation is used to determine if formal consultation is necessary. There are no specific requirements or time frames. Requesting a species list from the Service is part of informal consultation. Informal consultation can conclude with a determination of "may affect but not likely to adversely affect" that is concurred upon, in writing, by the USFWS.

Formal consultation is required if the action agency determines their action may adversely affect a listed species or its critical habitat. There are specific requirements for documentation and time frames in formal consultation (see 50 CFR Part 402 for more information). Formal consultation concludes with the USFWS's biological opinion. The opinion may include reasonable and prudent measures (and their implementing terms and conditions) to reduce incidental take for animal species. ("Incidental take" is take that results from, but is not the intended result of, an action.) Reasonable and prudent measures are mandatory but can only involve minor changes to a proposed

action. If the USFWS determines that the action may jeopardize the continued existence of a species or destroy or adversely modify critical habitat then they issue reasonable and prudent alternatives to the action. Reasonable and prudent alternatives are intended to avoid the likelihood of jeopardy or adverse modification. Reasonable and prudent alternatives must be consistent within the intended purpose of the action and the scope of the federal agency's legal authority and jurisdiction, and be economically and technically feasible.

f. Colorado Plateau MSO Recovery Unit Working Team

Prior to 1999, a wildlife biologist with NNDFWL, serving in the capacity of forest biologist, attended all semiyearly meetings associated with overseeing the implementation of the RPMSO, and served as liaison between the Colorado Plateau MSO Working Group and the Navajo Nation. Since 1999, the zoologist of NNHP has served as Navajo Nation's liaison to this group, now called the Colorado Plateau MSO Recovery Unit Working Team, and currently serves as co-chair to the Team. This relationship is important in that it allows ideas, information, and concerns from the Navajo Nation to be expressed among other professionals of state and federal agencies, so that this information can be incorporated into recovery of the MSO. Also, this relationship provides the most direct route for current information on the owl to be transmitted back to the Navajo Nation.

9. POTENTIAL THREATS TO MSO ON THE NAVAJO NATION

There are ten known or potential, current or future, threats to long-term management of the MSO on the Navajo Nation. These threats vary widely in the type and degree of impacts on owls and their habitats. Our goal was to list all reasonably possible threats. The potential threats, in alphabetical order, include:

- a. Abandoned Mine Reclamation -- The reclamation of abandoned mine features on the Navajo Nation is being directed by the Abandoned Mine Lands Reclamation Program, of the Navajo Nation's Division of Natural Resources. There are two to four project areas being reclaimed each year, most of which were once used for uranium extraction (D.Martinez, pers.comm.). Many of these sites are located within remote forested and canyon areas within the Chuska-Carrizo Mountain Chain, Black Mesa, and other canyonlands, and therefore, reclamation has potential to influence owls and their habitats. Abandoned mine reclamation may have direct negative influences to nesting, roosting, or foraging owls with short-term human disturbance (human activity and noise disturbance) during the reclamation process. Another potential direct impact may result from micro-habitat alteration (closure of small caves), although no

owls have yet been found using old mine portals. On the other hand, the owl population may experience a long-term benefit from closure of mines and caves with elevated levels of radioactivity. Indirect impacts may result from temporarily, or more permanently, re-opening roads that may have been naturally closed over time (some sites require re-opening of roads to haul equipment to the portals), which may attract vehicle usage for various reasons by other persons (e.g. fuelwood harvest, hunting, recreation).

- b. Commercial Timber Harvest -- The preparation and administration of commercial timber harvest on the Navajo Nation is under the direction of the Navajo Forestry Department. The shelterwood-harvest method was used in the Navajo Nation Commercial Forest into the early 1990s, at which time commercial harvest ceased, pending development of a new forest management plan. Adverse habitat alteration due to past silvicultural practices in the Southwest, especially even-aged management, is cited as the primary factor leading to the federal listing of the MSO. This was typically a shelterwood harvest regime that removed a disproportionate number of large trees, and produced even-aged forests rather than the uneven-aged, multi-layered stands usually used by the MSO (USDI Fish and Wildlife Service 1995). Commercial timber harvest may have several direct and indirect influences on MSOs and their habitat. Potential direct threats to the owl include noise and visual disturbance of roosting, nesting, and foraging owls from human and heavy-machinery activity, and take of young or nests due to loss of nest trees. The most obvious direct possible threat to the habitat is the short- and long-term alteration or fragmentation of nesting / roosting habitat, especially if the forest is managed under a even-aged system, including the mixed-conifer stands. Indirect influences to owls and their habitat resulting from commercial timber harvest may include increases in number, or alterations, to forest roads and homesites, and alterations to grazing patterns, the fire regime, owl prey populations, and recreation.
- c. Fire and Fire Management – Catastrophic fire, along with timber harvest, was identified as a leading threat to the MSO, due to fire's capacity to quickly cause destruction and modification of habitat (58 FR 14248). Fire can have beneficial or deleterious effects on MSOs and their habitats, depending upon the fire's location, duration, intensity, as well as other factors. Large crown fires are catastrophic to MSO habitat in that they quickly eliminate or reduce the necessary components for nesting, roosting, and foraging. In general, the risk of catastrophic fires is widespread in the Southwestern forests. On the other hand, fires may be beneficial to MSO habitat if the fires are small and of low intensity, and act to

preserve the necessary habitat features for the MSO over the long term. Beneficial fires reduce fuel loading, and create small openings and thinned stands with a smaller chance of carrying crown fires; they also create snags, canopy gaps, large logs, and perpetuate understory shrubs, grasses, and forbs (USDI Fish and Wildlife Service 1995). Fires may have the following direct negative influences on MSOs and the habitat: disturbance from human activities related to fire control; direct mortality of adults, or more likely, young owls; alteration of important habitat components such as multi-layered overstory, understory growth, and down woody material; and alterations to prey populations and their microhabitats.

- d. Fuelwood Harvest – Currently, 1.95 million ha (4.8 million ac) of woodlands are used for fuelwood cutting. Fuelwood harvest is performed through a permit system under the direction of the Navajo Forestry Department. Harvest of trees for fuelwood may have several impacts to the MSO and its habitats. Potential direct impacts to owls include: the possible cutting and removal of nest trees; disturbance from human activity, machinery, and vehicular activities; and from noise. Long- and short-term alterations to roosting, nesting, and foraging habitats may result from removal of the dead and down timber, which is ideal habitat for prey species. Removal of dead and down timber may also act reduce the potential of catastrophic wildfires.
- e. Grazing -- There have been no long-term studies on the effects of livestock and wildlife grazing on MSO habitat, thus we can only speculate about potential influences of grazing. On the Navajo Nation, no information has been collected on the degree of impact of grazing on owl sites. The potential influences of grazing upon MSO populations or their habitats include: altered prey availability, altered susceptibility to fire, degeneration of riparian plant communities, and impaired ability of plant communities to develop into MSO habitat. Potential direct effects of grazing include removal of vegetation by consumption or trampling, while indirect effects may include loss of seed source for regeneration or damaged soil. Moderate to heavy grazing may reduce plant density, cover, biomass, vigor, and regeneration ability. These factors may result in altered relative composition and structure of grass, forb, shrub, and tree components, and potentially altered prey diversity and abundance. Within conifer forests, grazing may reduce grasses and forbs to an extent that allows for over-production of seedling conifers. This over-stocking can alter forest structure and

composition that degrades the quality of MSO habitat, and increases the fire risk for the stand (USDI Fish and Wildlife Service 1995).

- f. Homesite Development -- Homesite construction for an ever-increasing human population may influence long-term conservation of owls on the Navajo Nation with several direct and indirect threats. The Navajo Nation forest is unique from National Forest lands in that there are many scattered homesites within the commercial forest boundaries. Homes in the lower elevations are occupied year-round, while those at higher elevations are used primarily as sheep camps during spring through autumn. Homesites within deep, remote canyon habitats are less common and placed in relation to road access. Potential impacts from homesite construction (including utility extensions) within, or near, potential nesting, roosting, and foraging habitats include noise and visual disturbance from human activity (e.g. vehicles and light machinery), and alterations to habitats from fuelwood harvest, associated grazing, and increased access through road establishment. More importantly, these disturbances, in addition to indirect and cumulative effects (utilities development and additional future homesites), become long-term disturbances after occupation of the homesite.
- g. Large-scale Coal Mining -- The Peabody Coal Mine has been performing surface-coal mining on Black Mesa since 1971, with approximately 243 ha (600 ac) being mined annually. The total area of leased land to Peabody Coal is 25,900 ha (64,000 ac), of which about 65 % is pinyon-juniper woodland, and 35 % is sagebrush (*Artemisia* spp.) and saltbush (*Atriplex* spp.) shrublands. No potential nesting / roosting habitat is directly affected by operation of this mine, but there is potential for long-term disturbance to owl foraging habitat within the lease. Also, operation of the mine may represent a potential disturbance to nesting or roosting owls on lands adjacent to the mine lease. This disturbance may result from the presence of, or noise disturbance from, heavy machinery, people, or vehicular traffic.
- h. Recreation -- Recreation may have direct and indirect negative influences to the MSO. In most areas on the Navajo Nation, recreation is not frequent enough, or even existent, to be of concern for MSO management. Big-game hunting is likely the most intensive, short-term recreational activity that may influence MSOs. Most big-game hunting occurs during the autumn months, which is the owl's non-breeding season. The other potential source of recreational disturbances to owls is from hiking and camping, especially within the two National Parks on the Navajo Nation that have resident MSOs (Canyon de Chelly and

Navajo National Monuments). Direct impacts to nesting, roosting, or foraging sites may result from human disturbances causing behavioral changes in the owls. Indirect impacts may include habitat alterations due to trampling of vegetation or soil damage, as well as, development or expansion of recreational facilities into or near MSO habitat (USDI Fish and Wildlife Service 1995).

- i. Road Building and Reconstruction -- New construction and reconstruction of roadways near owl habitat may have direct threats to nesting, roosting, or foraging owls due to human activity, noise disturbances of vehicles and heavy machinery, and blasting, if necessary. Also, road construction may have direct alterations to potential habitat by removal of live and dead trees, downed logs, and other vegetation. Riparian habitats may be altered if culverts or re-routing of waterways are necessary. After construction, long-term vehicular disturbances may influence the MSO, as well as increase the likelihood of accidental deaths of owls by car-strikes. Indirect impacts include opening areas, or increasing traffic flow to areas, that results in increased human activity (e.g. fuelwood harvest, homesite construction, and recreation).

- j. Other Human Developments and Activities -- There may be other human developments and activities that are potential causes of direct or indirect disturbances to nesting, roosting, or foraging MSOs, or cause direct or indirect alterations to habitat. Some of these threats include industrial development (e.g. radio tower construction, etc.) and human activities (such as MSO protocol surveys or research, and other scientific research).

B. MANAGEMENT AREAS ON THE NAVAJO NATION

1. COMMERCIAL AND NON-COMMERCIAL FORESTS

a. General Description and Distribution of Commercial Forest

The Navajo Nation Commercial Forest is found within the foothills and mountains of the Defiance Plateau and Chuska Mountains, which straddle the Arizona and New Mexico state border. The area encompasses nearly 242,817 ha (600,000 ac), of which approximately 173,209 ha (428,000 ac) are available as commercial timberland. The Chuska Mountains consist of a long narrow mesa formed from Chuska Sandstone atop the east Defiance monocline. This area extends northwesterly from Fort Defiance, AZ for approximately 88 km (55 mi) to Red Rock, AZ. The flattened summit area that runs the length of the mountain range is 3 to 6 km wide, and around 2,743 m (9,000 ft) in elevation. This area is marked by rolling forested hills, subalpine grasslands, and many small lakes and ponds. The western and northern escarpments of the Chuska Mountains consist of a combination of steep-sloped forests and vertical-walled cliffs, while the eastern edge is a more gradual-sloped forested area with numerous large timbered “benches”. The Defiance Plateau is a broad, flat-topped ridge that extends about 64 km (40 mi) long by 16 km (10 mi) wide. The plateau is highest in average elevation at the rim of Canyon de Chelly (around 2,438 m or 8,000 ft) and drops to around 2,134 m (7,000 ft) at its southern terminus near Houck, AZ.

b. General Description and Distribution of Non-Commercial Forest

There is an additional large area (approximately 40 km long and 8 to 16 km wide) of non-commercial forest within the Chuska-Carrizo Mountain chain that is addressed separately. This area is generally defined as the remainder of the mountain chain, north of the commercial forest to the north end of the Carrizo Mountains, including Mexican Cry and Cove Mesas. This area is more rugged with adjacent canyons, and more inaccessible, than the commercial forest. The habitat description for the commercial forest also applies to these lands, except that mixed-conifer forests are much more prevalent throughout the area. Most importantly, these areas will be treated differently within this Plan since the proposed Forest Management and Fire Management Plans do not include them within their scope of management.

c. Habitat Description of Commercial and Non-Commercial Forests

Three major habitats types of the commercial forest may be identified by the dominant canopy-tree species, those being mixed-conifer, ponderosa pine, and pinyon-juniper forests. Mixed-conifer forests compose approximately 19,837 ha (49,016 ac) or 8 % of the commercial forest lands.

These forests stands typically have Douglas-fir or Engelmann and blue spruce as the dominant canopy species, and various mixtures of other trees including aspen and ponderosa pine. This habitat is usually at the highest elevations, and is found on steep, north-facing slopes. The majority of the forest is composed of stands dominated by ponderosa pine (179,731 ha, 444,110 ac, or 74 % of the forest). These stands are typically composed nearly entirely of ponderosa pine, while some may also have aspen extending into the canopy. Understory within this forest type varies considerably with combinations of ponderosa pine, aspen, Gambel oak, and pinyon-juniper. The pinyon-juniper forest habitat occurs at the lowest elevations of the commercial forest. These stands are normally composed only of pinyon pine (*Pinus edulis*) and Rocky Mountain (*Juniperus scopulorum*), one-seed (*J. monosperma*), and Utah junipers (*J. osteosperma*), although some may also have a ponderosa pine component, particularly in drainages. Pinyon-juniper forests compose approximately 4 % of the commercial forest, or 8,839 ha (21,841 ac). The remaining 12 % of the commercial forest is composed of grasslands, and lakes and ponds, and other non-forest habitats. The non-commercial forest is similar in composition to the commercial forest but has more mixed-conifer.

d. Commercial Forest Management Plan and Fire Management Plan

i. Commercial Forest Management Plan and the RPMSO

A proposed Ten-Year Forest Management Plan (FMP) for the Navajo Nation Commercial Forest and its Environmental Impact Statement are currently under review by the various Navajo Governmental entities; date for acceptance of the plan is unknown. When accepted, this plan will regulate all activities within the authority of the Navajo Forestry Department or BIA Navajo Regional Office Branch of Forestry, including, timber harvest, timber stand improvement, forest protection, permitting for Navajo personal use of forests, and access development as required for these activities. The FMP currently has five alternatives ranging from “no change” of past practices to no-planned-commercial harvesting; two others involve designating special management areas (comprising about 30,300 ha (75,000 ac)) within a matrix of even, or even- and uneven-aged management; and the fifth is un-even aged management throughout the forest without special management areas. Within special management areas, commercial timber harvest will be secondary to wildlife habitat management and water quality protection and enhancement.

Under the four alternatives with commercial timber harvest, the FMP will generally adopt the RPMSO (recommendations in “Part III: Recovery”). The recommendations that will not be followed as per the RPMSO are: (1) “Grazing Recommendations” found within “Other Forest and Woodland Types” section, (2) the guidelines found within “Riparian Communities” of “Restricted

Areas” will be followed for all forestry practices, but not in relation to unregulated grazing, (3) the Pine-Oak Forest type is not considered a “Restricted Area” within the Navajo Nation Commercial Forest, and (4) while we have very little recreation on the Navajo Nation Forest within spotted owl habitat, the small amount that may occur is unregulated. These recommendations are summarized within the FMP in Appendix G, and are also contained within Appendix E, which is the Timber-Wildlife Coordination Handbook.

The MSO is also addressed within the proposed FMP under a possible MSO population monitoring program within the forest. Appendix D of the Forest Plan contains two plant (*Allium gooddingii*, Goodding’s Onion, and *Erigeron rhizomatus*, Rhizome fleabane) and two animal species (MSO and *Accipiter gentilis*, Northern Goshawk) that may be monitored over the plan’s life. The MSO was proposed for population monitoring because past, current, and future timber-harvest practices in the Southwest were identified as a primary factor leading to the federal listing of the MSO (USDI Fish and Wildlife Service 1995). In addition, the current population size and distribution of the MSO within the Forest is unknown, and worthy of an intensive study in relation to commercial timber harvest.

ii. Fire Management Plan and the RPMSO

A Fire Management Plan for the Navajo Nation Commercial Forest is currently under development by the Bureau of Indian Affairs, Branch of Forestry, who will administer the plan. This plan is designed to produce controlled burns within selected areas of the commercial forest to reduce fuel loads, with the goal of reducing the catastrophic-fire potential. The expected completion and acceptance dates of this plan are unknown. Currently the NNDFWL has not reviewed drafts of this fire management plan. However, the NNDFWL will recommend that the plan consider burning within a selected number of PACs within the commercial forest, and if incorporated, the guidelines within the RPMSO (see Appendix A, or RPMSO for more details) will be followed.

e. Activities occurring within Commercial and Non-commercial Forests

The Navajo Nation Commercial Forest is busy with many human activities occurring throughout most areas. Two paved highways, and many improved and unimproved dirt roads, including old logging roads, cross the commercial forest. Many of these smaller roads also serve homesites. At least 1,200 homesites occur within the forest boundaries; however, there has been a moratorium on homesite development since 1992. This moratorium on homesite development is to last until completion of the FMP. Most homesites are not within or near MSO potential habitat, but rather in

forest openings or ponderosa pine forests. Higher-elevation sites are occupied mostly from spring through autumn. Many of these seasonal homesites are used in conjunction with cattle and/or sheep grazing, as many units of domestic livestock are brought to the forest to graze each spring. In general, grazing may occur anywhere within the forest. Although there are currently no accurate estimates of the number of livestock units in the Navajo Nation forest each summer, the forest rangeland is generally believed to be “clearly overgrazed.” Long-term grazing has also reduced conditions of the forest’s riparian conditions to “fair to poor for most areas.” (Navajo Forestry Dept. 2000). At the time of this writing, there has been no commercial timber harvest for 8 years, although at least 4,200 fuelwood-cutting permits have been issued in the past several years. The Fire Management plan for the commercial forest is in its fledgling stages with small areas having been burned for fuel-load reduction in 1999 and 2000. There are three abandoned mine land project areas within the commercial forest; all are in varying stages of reclamation with completion scheduled within the next three years (D.Martinez, pers.comm.). Lastly, recreation, mostly in the form of big-game hunting and fishing occurs throughout, and adjacent to, the commercial forest.

Most of the above activities also occur, but to a lesser extent within the non-commercial forested areas. The most obvious difference is that there is no commercial timber harvest and no fire management throughout this area; however, fuelwood harvest does occur. Roads and homesites are much less common and extensive because of the rugged nature of the landscape.

f. Present and Future Potential Threats to MSO within Commercial and Non-commercial Forests

- | | |
|------------------------------|--|
| 1. Commercial Timber Harvest | 6. Road Building and Reconstruction |
| 2. Fuelwood Harvest | 7. Abandoned Mine Reclamation |
| 3. Fire and Fire Management | 8. Recreation |
| 4. Grazing | 9. Other Human Developments and Activities |
| 5. Homesite Development | |

2. CANYON AREAS

a. General Description and Distribution of Canyon Areas

Navajo Nation’s canyonlands compose some the most scenic areas on the Colorado Plateau. These areas are highly variable in size and canyon depth, but all were formed by wind and water erosion of the exposed sandstone layers. The Navajo Nation consists of several gigantic folds in the underlying rock layers, called monoclines, with several large basins lying between them. Erosion has worn-through these old rock layers in the higher-elevation monoclines, and produced deep,

steep-walled canyons (Baars 1995). Canyons on the Navajo Nation usually have near vertical walls of approximately 30 to 122 m (100 to 400 ft) in height, and have several layers of sandstone exposed. We consider the following areas to have significant canyon habitat for this Plan: Canyon de Chelly National Monument; the maze of canyons stretching north and west from Kayenta, AZ, to the north end of Navajo Mountain; the deeply-incised sections of the San Juan, Colorado, and Little Colorado Rivers; the exposed-sandstone cliff areas of the Chuska–Carrizo Mountain Chain (especially around Cove and Mexican Cry Mesas); and the sandstone uplift area between Gallup and Crownpoint, NM.

b. Habitat Description of Canyons With MSOs

The canyons on Navajo Nation that have roosting and nesting MSOs are similar to those described in the “Typical Habitat Types” in section A.6.c. of this Plan. These canyons usually have steep, nearly- vertical rock walls and a cool microclimate in the shaded, north-facing areas. Forest structure is highly variable within these canyons, and ranges from a nearly-continuous, mixed-conifer forest dominating the north-facing canyon wall to small patches (3-10 trees) of isolated, Douglas-fir trees. To date, all of our canyons used by owls have some forest structure present, and most often, at least a small number of large Douglas-fir trees are present. These sites have large canyon widths ranging from about 200 to 536 m (660 to 1,760 ft), most have pinyon-juniper dominating the mesa tops and south-facing canyon areas, and pine-fir stringers with some riparian vegetation and Gambel oak composing the canyon bottom. At least one site has no mixed-conifer at the MSO-roost site. Despite the presence of vegetation at all sites, owls have been found nesting and roosting in small caves, cracks, and ledges in the sandstone walls at several sites. Thus, we recognize that the Navajo Nation’s large number of treeless canyons also represent potential habitat for the MSO. These canyons are typically much smaller in width than those with significant forest structure, and may not have riparian vegetation.

c. Activities occurring within Canyons

Due to their remote and rugged nature, most canyon areas on the Navajo Nation have much less human activity and development than surrounding areas. Many canyons have no homesites or roads near potential MSO habitat (generally, the more remote areas); however, homes and roads often occur within foraging habitats in other parts of the canyon, and on the mesa tops. Even the remote sections may have livestock grazing, and possibly fuelwood removal, to some degree, and these activities also likely occur within the MSO foraging areas. Light recreation, especially big-game hunting and hiking has potential to occur to some degree throughout the roosting and

foraging habitats. At least two abandoned mine project areas occur within canyon habitats; both are in early stages of the reclamation process, with scheduled completion within three years (D.Martinez, pers.comm.). The canyonlands encompassed by Canyon de Chelly and Navajo National Monuments have slightly different levels of activities than non-monument canyons since they were established partially to accommodate recreation. There are seasonally-occupied homesites (and all activities associated with homesite occupation) and regulated recreation within Canyon de Chelly; whereas, there are no homesites within Navajo National Monument, and recreation is likely the most-commonly occurring activity.

d. Present and Future Potential Threats to MSO in Canyons

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|-------------------------|--|
| 1. Grazing | 5. Fire and Fire Management |
| 2. Recreation | 6. Abandoned Mine Reclamation |
| 3. Homesite Development | 7. Road Building and Reconstruction |
| 4. Fuelwood Harvest | 8. Other Human Developments and Activities |

e. Special Management /Authority of Canyon Lands within National Parks

There are two National Park Service (NPS) units within the boundaries of the Navajo Nation that have resident owls; they are Canyon de Chelly and Navajo National Monuments. The special land management status for these units warrant special mention within this document. The land management status for these two Monuments is best described as “land owned by the Navajo Nation, but placed under the NPS for administrative care of the structures of cultural significance and control of recreational use of the area” (Sullivan 1947). Thus, lands administered by NPS are subject to the same laws as those elsewhere on the Navajo Nation, and are then subject to this Plan.

Canyon de Chelly was proclaimed a NPS unit in 1931, in which the NPS was charged with the administration of the area for “the care, maintenance, preservation, and restoration of the prehistoric ruins, or other features of scientific or historical interest.” However, with this designation, the Navajo Nation’s “right, title, and interest” in the area was not “impaired” (Act of February 14, 1931, 46 Stat. 1161; and Proclamation (No. 1945) of April 1, 1931, codified as amended at 16 U.S.C. 445-445b.). In 1933, a boundary revision was proclaimed so that the NPS was to administer the area defined as “all lands in Del Muerto, De Chelly, and Monument Canyons, and the canyons tributary thereto, and the lands within one-half mile of the rims of the said canyons” (Proclamation (No. 2036) of March 3, 1933, codified as amended at 16 U.S.C. 445-445b). There are currently no other current management plans for the MSO in effect for lands within this monument.

Navajo National Monument was designated (Proclamation (No. 873) of March 20, 1909) as a NPS unit in 1909, with a boundary revision in 1912 (Proclamation (No. 1186) of March 14, 1912). The boundary defined with the revision designated two 65-ha (160-ac) tracts that contained Keet Seel and Betatakin Ruins, and a 16-ha (40-ac) tract that contained Inscription House Ruins on Navajo Creek. In 1961, an additional 98 ha (240 ac) were added to this NPS unit, mostly for expansion of facilities, under cooperative agreement between the Navajo Nation, Bureau of Indian Affairs, and NPS (J. Charles, pers.comm.). The NPS is currently developing a General Management Plan to incorporate all aspects of land administration by the NPS at Navajo National Monument, including the MSO and other natural resources. The prospective completion date of this plan is September 2001. The NPS expects that the NNDFWL will, among others, review this plan and the NPS will incorporate their suggestions as necessary (J. Charles, pers.comm.).

3. BLACK MESA

a. General Description and Distribution of Black Mesa

Black Mesa is located within parts of Apache, Navajo, and Coconino Counties, approximately in the center of the Arizona portion of the Navajo Nation. The mesa covers approximately 850,000 ha (2.1 million ac), and extends from Kayenta south to the Arizona Highway 264, and from near the Coconino County line east to the Chinle Valley. A network of five parallel drainages with numerous side drainages run southwest and ultimately empty into the Little Colorado River. Thus the lowest elevations (1,676 m or 5,500 ft) are found in the southwestern portion of Black Mesa, while the highest areas are along the northeastern rim (2,438 m or 8,000 ft). Most of the mesa consists of low mesas, rolling hills, and shallow valleys; however, the northern portion has unique geological qualities that are represented as deep canyons and major cliff escarpments (150- to 610-m high). The dominant habitat types on the mesa are reflected in the elevational differences. The low to mid-elevations of the southwestern and central portions are typified by shrublands within the drainages, and pinyon-juniper woodlands on the rolling hills. The northern portion also contains these habitats, as well as, mixed-conifer woodlands and aspen groves. Also important to note is that the Peabody Coal Company began surface coal mining on its 25,900-ha lease (64,000 ac) in 1971, and still mines today. The lease area is composed of about 65 % pinyon-juniper woodland and 35 % shrublands (LaRue 1994).

b. Habitat Description of Black Mesa With MSOs

We consider the nesting / roosting habitat on Black Mesa to be unique to habitats found elsewhere throughout the owl's range on the Navajo Nation; this habitat is best described as moderately-sloped drainages containing Douglas-fir, within pinyon-juniper woodlands. The woodlands on Black Mesa are greatly influenced by rainfall patterns in that the drier pinyon-juniper woodlands dominate the broad mesa tops, but localized factors also produce pockets of more moist mixed-conifer stands. These localized factors include the presence of (1) deep, sheltered and shaded canyons, (2) north-facing slopes, (3) concentration of precipitation runoff through joint traces and cracks, and (4) small, shallow drainages above 2,255 m (7,400 ft) elevation that concentrate runoff. Thus, these mixed-conifer stands are found in the upper canyons and at sheltered cliff bases along the mesa rim from 2,070 to 2,470 m (6,800-8,100 ft) elevation. Understory vegetation within the mixed-conifer woodlands typically includes Gambel oak, snowberry (*Symphoricarpos* sp.), cliff fendlerbush (*Fendlera rupicola*), mountain mahogany(*Cercocarpus intricatus*), and wax currant (*Ribes cereum*) (LaRue 1994). Generally, the owls are found within the cool, moist mixed-conifer stands (selecting for the cool microclimate) found among the vast pinyon-juniper woodlands.

c. Activities occurring on Black Mesa

The current human activities on Black Mesa are similar to those within the Navajo Nation Commercial Forest, with several major exceptions. Most of the homesites are scattered throughout the area, and are permanently inhabited, rather than being seasonally occupied. This allows for livestock grazing to occur within the various habitats throughout the year. Many of the homesites are located within the five major drainages, possibly near roosting and nesting, as well as foraging, habitats. There is no commercial timber harvest on the mesa, although yearly fuelwood harvest occurs, especially within the vast expanses of pinyon-juniper forests. The largest difference is the operation of the Peabody Coal Mine on Black Mesa. Like the commercial forest, roads bisect the mesa to serve residents, and big-game hunting occurs on the mesa. There are two abandoned mine project areas in eastern Black Mesa; one project is scheduled to be completed in 2001, and the other in 2002 (D.Martinez, pers.comm.).

d. Present and Future Potential Threats to MSO on Black Mesa

- | | |
|-------------------------------|--|
| 1. Grazing | 6. Fire and Fire Management |
| 2. Homesite Development | 7. Road Building and Reconstruction |
| 3. Large-scale Coal Mining | 8. Recreation |
| 4. Fuelwood Harvest | 9. Other Human Developments and Activities |
| 5. Abandoned Mine Reclamation | |

C. FUTURE MSO MANAGEMENT ON THE NAVAJO NATION

1. MANAGEMENT PRACTICES COMMON TO THE NAVAJO NATION COMMERCIAL FOREST, NON-COMMERCIAL FOREST, CANYONS, BLACK MESA, AND NATIONAL PARK LANDS

The following practices will be used to protect and manage the MSO and its habitats on the Navajo Nation:

- (a) Require pre-action surveys using the most-currently accepted protocol (Appendix B) prior to any federally- or Tribally-approved projects in, or within 0.4 km (¼ mi) of, potential nesting or roosting MSO habitat (as defined in section A.6.c. and the RPMSO).
- (b) If owls are found during surveys, avoidance will include: no habitat alteration within 40-ha (100-ac) Core Area around nest (certain silvicultural treatments may occur during 1 September to 28 February within remainder of the PAC, as per RPMSO); and, no activity allowed within 0.4 km of the known nest or roost site during 1 March to 31 August, or within 0.4 km of PAC boundaries, if nest and roost sites are unknown.
- (c) Establish and maintain PACs of at least 243 ha (600 ac) for all historic, recent, and future owl sites (as defined in section A.6.a., ¶2). The recommendations that will be followed for PACs are those found in the RMPSO (see section A.4. of Appendix A, or RPMSO for more detail). As stated previously, if fire management is proposed within PACs, these recommendations will be followed.
- (d) Make recommendations to avoid, or minimize, impacts associated with other non-Tribally- or-federally-approved human actions that may alter MSO habitat or behavior.
- (e) An employee of the NNDFWL serves as a member of the MSO Colorado Plateau Working Team; currently the NNHP zoologist serves as co-chair for this working team, and will continue to act in this capacity. Functions and benefits of this working team relationship were discussed previously.

2. MANAGEMENT PRACTICES UNIQUE TO THE COMMERCIAL FOREST

As described in section B.1.d., the FMP generally adopts, regardless of the alternative selected, the RPMSO. Until the FMP is accepted and implemented, and for other activities that occur within the commercial forest boundaries, the items listed above will be in-effect. After acceptance of the plan, the “General Recommendations” found in the RPMSO will be implemented, except for those mentioned in section B.1.d. The fire management plan, if controlled burns will be planned within PACs, will also follow the recommendation of the RPMSO. Briefly, the recommendations represent three levels of habitat management (Protected Areas, Restricted Areas, and Other Forest and Woodland Types). “Protected Areas” include all

known and future owl sites, all mixed-conifer areas with slopes > 40 % where timber harvest has not occurred in the past 20 years, and all legally and administratively reserved lands. “Restricted Areas” include mixed-conifer and pine-oak forests, and riparian areas (as defined by RPMSO); the objective for these areas is to manage the landscape to maintain existing, and develop future replacement, owl habitats. “Other Forest and Woodland Types” include ponderosa pine, spruce-fir, pinyon-juniper, and aspen forest types (as defined by RPMSO); these habitats are primarily used by owls for foraging, wintering, migration, and dispersal. Refer to the RPMSO for details; or Appendix A of this Plan for an brief outline of those recommendations.

3. MANAGEMENT PRACTICES UNIQUE TO NON-COMMERCIAL FOREST

There are no management practices unique to Non-Commercial Forest Areas.

4. MANAGEMENT PRACTICES UNIQUE TO CANYONS

There are no management practices unique to Canyon Areas.

5. MANAGEMENT PRACTICES UNIQUE TO BLACK MESA

The activities of Peabody Coal Company are unique to the MSO habitats on Black Mesa. Mining activities will be monitored for potential effects to owls and their habitats through yearly review, by NNDFWL personnel, of biological reports produced by Peabody Coal Company.

6. MANAGEMENT PRACTICES UNIQUE TO NATIONAL PARK SERVICE UNITS

Due to the unique land ownership situation within the NPS units on Navajo Nation, the NNDFWL will assist land managers of the NPS units, as requested, with developing or maintaining land-use policies that incorporate sound MSO management. This Plan will also apply if owls are found in the future within NPS units, other than Canyon de Chelly and Navajo Nation Monuments, within Navajo Nation’s borders.

7. TRIBAL PROJECT APPROVAL AND CONSULTATIONS

The Tribal-approval process and consultations for future projects on the Navajo Nation will continue as described in section A.8.b and A.8.e., respectively, of this Plan.

8. POSSIBLE ADDITIONAL FUTURE MSO MANAGEMENT TECHNIQUES

a. MSO Habitat Predictor Model

Prior to 1999, several university researchers and governmental-agency personnel worked together

to develop a MSO habitat predictor model for Arizona and Utah, including lands of the Navajo Nation. Several habitat factors known to be common to MSO habitat were entered into a Geographic Information System; these were then combined to create a model that would successfully predict the location and extent of MSO habitat. It was hoped that this model would predict canyon and forest habitats equally well. During the 1999 field season, NNHP helped with the validation phase of this project by performing MSO surveys at 15 sites, mostly within the Chuska-Carrizo Mountain Chain and Defiance Plateau. The results of this work, along with those from other areas on the Colorado Plateau, were evaluated to estimate the model's effectiveness at predicting MSO habitat. The model was then modified, and is currently being re-tested. This statistical analyses for the first field test are unavailable to report here; however, researchers involved in the project have reported that the model was fairly effective in predicting MSO habitat (MSO Colorado Plateau Working Team, pers.comm.).

A computer-generated model such as this must be used with some caution, however. One must remember that it is only a habitat predictor based on many factors identified as important to compose owl habitat. Thus, not all areas predicted by the model will contain owls, and some owls may occur outside the predicted areas. With this in mind, a predicted-habitat map from such a model could be used by NNDFWL to more accurately assist project planners to determine if owl habitats may occur near project sites. The model may also aid in providing avoidance recommendations to planners. This will aid Navajo Governmental Departments (e.g. Navajo Forestry, Navajo Housing Authority, Abandoned Mine Land Reclamation) and other planners (e.g. the 110 Chapters of the Navajo Nation) to avoid disturbances to owls in future land-use planning.

b. Habitat Monitoring

The RPMSO requires population monitoring of MSOs within the core recovery units of Upper Gila, and Basin and Range – East and –West; but only long-term habitat monitoring is required within the Colorado Plateau Recovery Unit. Habitat monitoring should be designed to: (1) track changes in the quantity of macrohabitat, and (2) verify that microhabitat changes within treated stands meet the intent of the RPMSO. Macrohabitat monitoring will be accomplished using remote-sensing techniques (e.g. LANDSAT Thematic Mapper imagery) by entities other than the Navajo Nation. Microhabitat monitoring tracks changes of key components in owl habitat within areas with silvicultural treatments, or other habitat-altering actions; this monitoring may be necessary at some point on the Navajo Nation.

Microhabitat monitoring involves measuring habitat variables (such as number of large trees, snags, logs, and hardwoods) before and after silvicultural or prescribed fire treatments designed to maintain, improve, or create owl habitat; this insures that treatments are meeting their stated objectives. Over the last several years, there have been two microhabitat-monitoring plans proposed for forest habitats, both are currently being field tested by US Forest Service personnel. The results of these field tests, and refinements to the plans will be monitored by NNDFWL personnel so that implementation of microhabitat monitoring will be possible in the future. The proposed FMP includes plans to initiate an approved microhabitat monitoring plan (as summarized in Appendix G of FMP) prior to commercial timber harvest. A separate monitoring plan will be necessary due to the unique environmental conditions that compose owl habitat in canyons. Thus, the MSO Colorado Plateau Working Team is working to develop and test a microhabitat monitoring plan for canyon habitats. The canyons of the Navajo Nation may be used as testing areas for this monitoring plan, and the final plan may be adopted to monitor potential habitat-altering projects in canyons with MSO habitat.

c. Population Monitoring

Ideally, the NNDFWL would like to know where most, or all, of the MSOs occur, along with their reproductive-success on the Navajo Nation. This information would not be obtainable without a great deal of effort (i.e. time and money) expended for a number of years. The only current plan to monitor the MSO population on the Navajo Nation involves those owls within the commercial forest, as proposed in the FMP (see section B.1.d.). A monitoring study of the reproductive potential of the owl would provide the NNDFWL with information on the owl's current population and long-term outlook, diversity and intensities of the various threats, mortality factors, and dispersal potential.

9. FUNDING

Under this MSO Management Plan, The NNDFWL will require little, if any, additional funding to fulfill its goals. The NNHP of the NNDFWL is contracted by the Bureau of Indian Affairs to collect and manage information on rare, and federally and tribally listed plant and animal species on the Navajo Nation, including review of projects and their environmental documents. Thus it is within their scope of work to insure that this Plan is properly implemented and regulated (except for those items listed under section C.8., which would require additional funding). The Navajo Forestry Department is the lead entity responsible for acquiring funding to implement the FMP, including those sections incorporating wildlife, and MSO, management.

D. LITERATURE CITED

- Baars, D.L. 1995. Navajo Country, a geology and natural history of the Four Corners region. University of New Mexico Press, Albuquerque. 255 pp.
- Brown, D. E. (ed.) 1982. Biotic communities of the American Southwest – United States and Mexico. University of Arizona. 342 pp.
- Eyre, F. H. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Bethesda, MD. 148pp.
- Fletcher, K. W. and H. E. Hollis. 1994. Habitats used, abundance, and distribution of the Mexican spotted owl on national forest system lands in the southwestern region. USDA Forest Service, Southwestern Regional Office.
- Ganey, J. L. and R. P. Balda. 1989. Distribution and habitat use of Mexican spotted owls in Arizona. *Condor*, 91: 355-361.
- Gutierrez, R. J., A. B. Franklin, and W. S. Lahaye. 1995. Spotted Owl (*Strix occidentalis*). *In* The Birds of North America, No. 179 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.
- LaRue, C. T. 1994. Birds of northern Black Mesa, Navajo County, Arizona. *Great Basin Naturalist*, 54: 1-63.
- Layser, E. F. and G. H. Schubert. 1979. Preliminary classification for the coniferous forest and woodland series of Arizona and New Mexico. USDA Forest Service Research Paper, RM-208. Rocky Mountain Forest and Range Experimental Station. Fort Collins, CO.
- Navajo Forestry Department. 2000. Final programmatic environmental impact statement for the Navajo Nation 10-year forest management plan alternatives. Unpublished Document.
- Sullivan, T.A. 1947. Proclamations and orders relating to the National Park Service up to January 1, 1945. Washington: GPO. Appendices 4 (Navajo N.M.) and 6 (Canyon de Chelly N.M.).
- USDI Fish and Wildlife Service. 1995. Recovery plan for the Mexican spotted owl: Vol. I. Albuquerque, New Mexico. 172 pp.
- U. S. Forest Service. 1996. Mexican Spotted Owl Inventory Protocol. USDA Forest Service.

Figure 1. Approximate Boundaries of Occupied and Potential Mexican Spotted Owl Habitat on the Navajo Nation

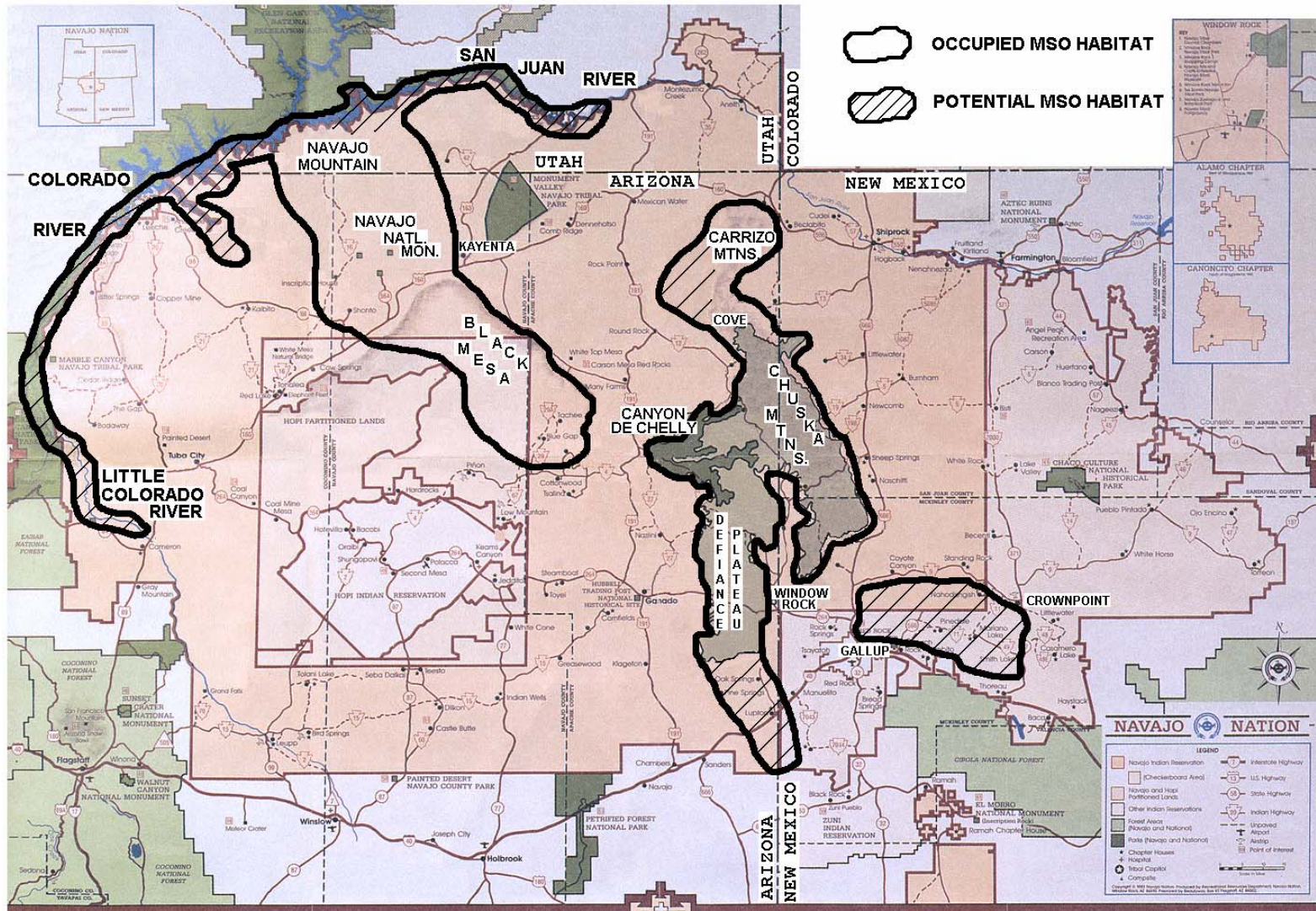
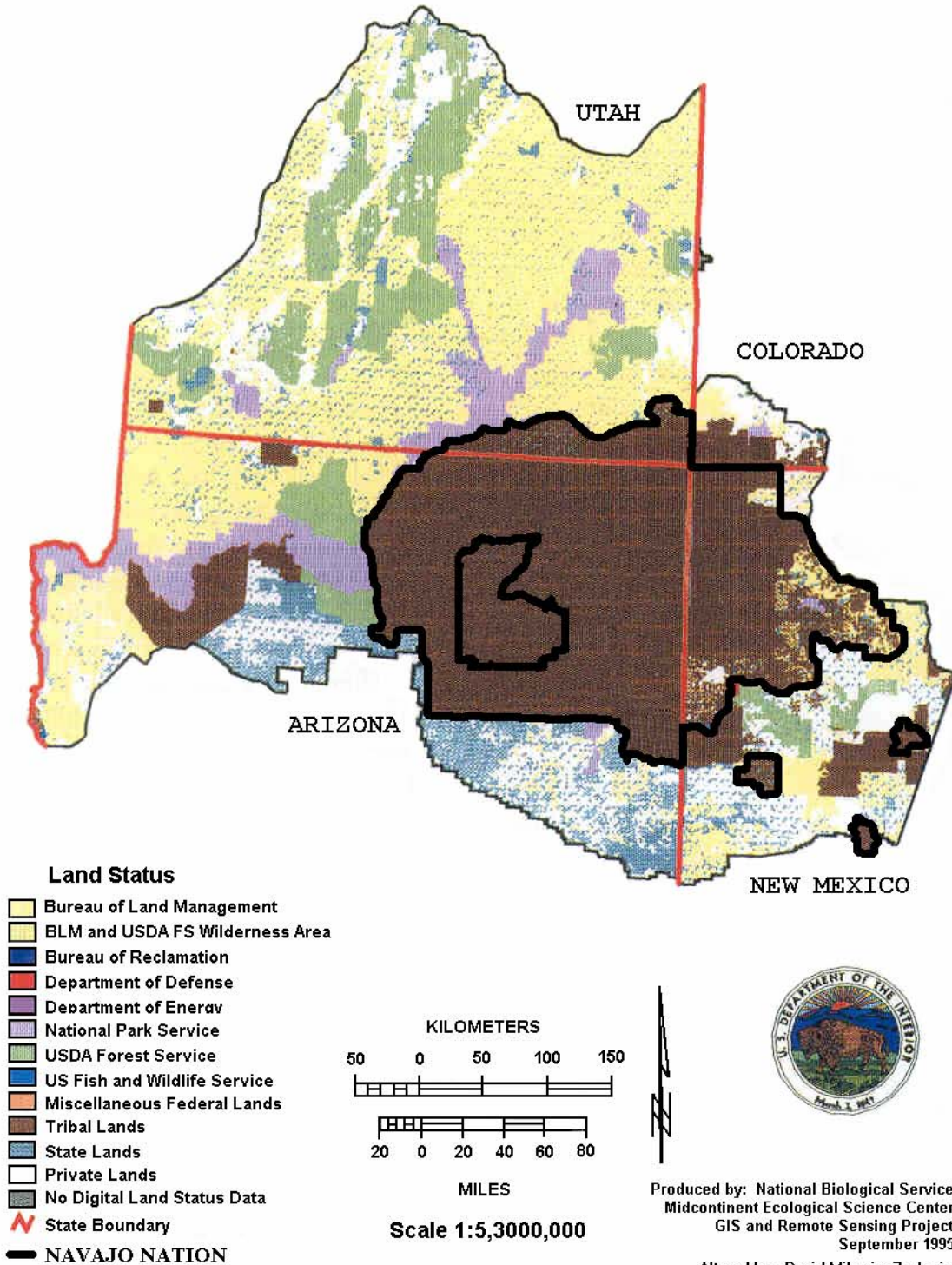


Figure 2. Land Management Status for the Mexican Spotted Owl – Colorado Plateau Recovery Unit, with Navajo Nation Border.



APPENDIX A. Outline of General Recommendations of Recovery Plan for the Mexican Spotted Owl

Three levels of habitat management: Protected Areas, Restricted Areas, and Other Forest and Woodland Types

*One guideline applying to all areas is inventory for MSO prior to implementing any management action that will alter habitat structure.

A. PROTECTED AREAS:

1. protect all MSO sites known from 1989 through the life of RPMSO (Protected Activity Centers)
2. all areas in mixed-conifer and pine-oak types with slope >40% where timber harvest has not occurred in past 20 yrs
3. all legally and administratively reserved lands

Guidelines for Protected Areas

4. Protected Activity Centers (PACs)

- a. establish PACs of 600 acres at all MSO activity centers (nest/roost sites), including historic and new sites
- b. no harvest of trees > 22.4 cm (9in.) dbh is allowed in PAC
- c. fuelwood harvest within PACs should be managed to minimize effects on the owl, their prey, and habitats
- d. road or trail building in PACs should generally be avoided but may be allowed on case-specific basis
- e. implement a program consisting of appropriate treatments to abate fire risk
 1. select up to 10% of PACs within each Recovery Unit that exhibit high fire risk conditions
 2. within each selected PAC, designate 40 ha centered around the nest site to be deferred from treatments
 3. within remaining 203 ha (500ac), combinations of thinning trees <22.4 cm dbh, treatment of fuels, and prescribed fire can be used to reduce fire hazard and improve habitat conditions for owl prey
 4. treatments can occur only during non-breeding season (1 Sept.-28 Feb) to minimize effects on owls
 5. following treatments to 10% of PACs, effects on owls, prey species, and their habitats should be assessed
- f. within the remaining PACs, light burning of ground fuels may be allowed within the 500 ac surrounding the 100-ac centers, done only during non-breeding season
- g. within PACs treated to reduce fire risk, either by fire or mechanical removal, pre- and post-treatment assessments of habitat conditions and owl occupancy must be done
- h. if a stand-replacing fire occurs within a PAC, timber salvage plans must be evaluated on a case-specific basis the PAC and 400m buffer needs to be surveyed for owls, this info. is used to determine salvage procedures

5. Steep Slopes (outside of PACs)

- a. within mixed-conifer and pine-oak types, allow no harvest of trees >22.4 cm on any slopes >40% where timber harvest has not occurred in the past 20 years
- b. these guidelines also apply to bottoms of steep canyons
- c. thinning of trees <22.4cm dbh, treatment of fuels, and fire are allowed with no seasonal restrictions
- d. prescribed natural fire is also permitted as is the creation of fire breaks
- e. pre- and post-treatment monitoring of habitat conditions should be done for any treatment on slopes

6. Reserved Lands

Encourage the use of prescribed natural fire where appropriate in Wilderness, Research Natural Areas, and other reserved lands.

B. RESTRICTED AREAS

These guidelines are provided to maintain and develop potential nesting and roosting habitat now and in the future; the guidelines are stratified by broad vegetative cover types: mixed-conifer forest, pine-oak forest, and riparian areas. They apply to planning areas (where management activities are considered), with the underlying objective to maintain and create replacement owl habitat where appropriate, while providing a diversity of stand conditions and stand sizes across the landscape.

1. Mixed-Conifer and Pine-Oak Forest - Overriding Guidelines

- a. manage mixed-conifer and pine-oak forest types to provide continuous replacement nest habitat over space and time; depending on stands' capability to attain desired stand conditions
- b. incorporate natural variation, such as irregular tree spacing and various stand patch sizes, into management prescriptions and attempt to mimic natural disturbance patterns
- c. maintain all species of native vegetation in the landscape, including early seral species; both uneven-aged and

- even-aged systems may be used as appropriate
- d. allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure

2. Mixed Conifer and Pine-Oak Forest - Specific Guidelines -intended to minimize threats to MSO, retain and enhance habitat elements, and provide management flexibility
 - a. emphasis should be placed on uneven-aged management systems
 - b. extend rotation ages for even-aged stands to >200 yrs., silvicultural prescriptions should explicitly state when vegetation manipulation will cease until rotation age is reached
 - c. within pine-oak types, emphasis should be placed on management that retains existing large oaks and promotes the growth of additional large oaks
 - d. retain all trees >61 cm (24in.) dbh
 - e. retain hardwoods, large down logs, large trees, and snags
 - f. management priorities should be placed on reducing identified risks to MSO habitat (primarily catastrophic fire), by use of thinning and/or prescribed and prescribed natural fire to reduce hazardous fuel accumulations
 - g. no stand that meets threshold conditions can be treated as to lower that stand below those conditions until ecosystem assessments can document that a surplus of these stands exist at larger landscape levels
3. Riparian Communities - Guidelines - goals are to maintain healthy riparian ecosystems where they exist and initiate restoration measures to return degraded areas to healthy conditions
 - a. maintain riparian broad-leaved forests in a healthy condition where they occur, especially canyon-bottoms
 - b. restore lowland riparian areas
 - c. emphasize a mix of size and age classes of trees

C. OTHER FOREST AND WOODLAND TYPES

There are no specific guidelines for several forest and woodland communities where they occur outside of PACs, including ponderosa pine, spruce-fir, pinyon-juniper, and aspen, since these habitat types are not typically used for nesting and roosting. These habitats are used primarily for foraging, wintering, migration, and dispersal.

1. Grazing Recommendations -goals of managing grazing in MSO habitat are to maintain or enhance prey availability, maintain potential for beneficial ground fires while exhibiting potential for destructive stand-replacing fire, promote natural and healthy riparian plant communities, and preserve the processes that develop MSO habitat
2. Grazing Guidelines - should be applied to all protected and restricted areas
 - a. monitor grazing use by livestock and wildlife in *key grazing areas* (riparian areas, meadows, and oak)
 - b. implement and enforce grazing utilization standards that would attain good to excellent range conditions within the key grazing areas
 - c. implement management strategies that will restore good conditions to degraded riparian communities as soon as possible, strategies may include reductions in grazing levels and increased number of exclosures to protect riparian plant cover and regeneration, and to prevent damage to stream banks and channels
3. Recreation Recommendations - Guidelines - should be applied to all protected and restricted areas
 - a. no construction, either of new facilities or for expanding existing facilities, should take place within PACs during the breeding season (1 March-31 Aug.)
 - b. managers should, on case-specific basis, assess the presence and intensity of allowable recreational activities within PACs; spatial and temporal restrictions should be considered for new activities
 - c. seasonal closures of specifically designated recreational activities should be considered where appropriate

D. MONITORING PROCEDURES

1. Habitat Monitoring - is implemented to track changes in the quantity of macrohabitat, and to verify that microhabitat changes within treated stands meet the intent of the RPMSO
 - a. Macrohabitat – range-wide monitoring whose purpose is to track gross changes in habitat as the result of disturbance, from both natural and anthropogenic causes, using remote sensing technology
 - b. Microhabitat - entails measuring habitat variables before and after silvicultural or prescribed fire treatments designed to maintain, improve, or create owl habitat, to verify that treatments are meeting their stated objectives; sampling units are to be treated stands by establishing a number of vegetation sampling points
2. Population Monitoring - monitoring yearly progress of territorial MSOs to examine breeding success, recruitment, etc., is performed for Recovery Goals by Upper Gila, Basin & Range-W, and Basin & Range-E Recovery Units.

Mexican Spotted Owl Inventory Protocol

Introduction.

The Regional inventory protocol requires two years of survey where no owls are found prior to an activity proceeding. When an owl is located, a Protected Activity Center (PAC) of 600 acres is established at this site. Any of the area outside the PAC boundary requires a second years survey.

Objective: to standardize procedures used in inventory for Mexican spotted owls in order to find owls or have reasonable assurance that owls are absent.

Use the following methodology when conducting spotted owl inventories. All persons conducting inventory work under these protocols will meet training standard requirements.

1. Survey Design.

- a. Design daytime and nighttime calling routes to insure complete coverage of the survey area. Calling points must be situated such that they cover up to 0.5 miles outside of the survey area in order to locate owls adjacent to the planning area.
- b. Ensure calling routes and points along routes are no more than 0.75 miles (preferably 0.5) apart, straight line distance. Occasionally, the distance between calling points may be increased to 1.00 mile (preferably 0.75), but less than 5 percent of a survey area should have more than 0.75 miles between calling points. Include reasons for exceeding 0.75 miles between calling points in the documentation of your biological evaluation.
- c. Locate the calling routes and points in a survey area so that all areas with any potential for owl use would be called, that calls given by the person conducting the field outing would be heard by a spotted owl, and that the caller would hear an owl's response.
- d. Use nighttime field outings for all continuous or point calling routes in an inventory area unless safety dictates a daytime field outing is necessary.
- e. Consider the size of the survey area when designing the calling routes. Minimum size of the survey area is 640 acres.
- f. Ensure you have sufficient callers to attain a complete survey within the 7 day time limit, based on the number of field outings and types of methods to be used for this area.
- g. Fixed calling points are not necessary, but consistency in obtaining complete coverage is.
- h. Include considerations for survey cost and efficiency while still obtaining complete coverage when designing routes.

2. Survey Method.

a. Select the best survey method for the situation and/or terrain when designing for complete coverage. It will likely take combinations of methods; including calling point, leap frog, and/or continuous calling routes; to obtain complete coverage of an area.

3. Complete Survey.

a. A complete survey may be a combination of daytime and nighttime calling outings for a given survey area.

b. It is a set of one or more field outing in an inventory area that obtains complete coverage.

c. Complete all field outings of a survey area within 7 consecutive days to attain a complete survey.

d. Wait at least 5 full days before beginning the next complete survey but start it within 21 days after completion of previous survey. For example, one complete survey is finished on May 5. The next complete survey cannot begin before May 11, and must begin before May 26.

e. In remote areas you may conduct two complete surveys during one trip into the area. If this option is used, allow a minimum of two days between complete surveys. Conduct all field outings required for a complete survey prior to repeating any route for the second survey. Wait a minimum of 15 and maximum of 30 days before starting the next two surveys.

f. Conduct at least four complete surveys of the survey area during the field season. *You may conduct additional surveys in an area if you have reason to believe owl area there, but you have not found them.* Note this on the inventory form.

g. Ensure the four complete surveys are spread out over the breeding season by:

1. Conducting no more than one complete survey prior to April 16.

2. Conducting the first complete survey prior to July 1.

3. Finishing at least three complete surveys prior to August 1.

h. Consider vocal or visual locations of owls outside of the field season as anecdotal information.

i. Apply the following in situations where the first complete survey occurs during the period of July 1 to August 31: PACs are established for owls found prior to September 1; negative surveys do no contribute towards the 2 year survey requirement.

j. The preferred calling time is at night. The two to three hour time period following sunset and preceding sunrise provide the best times to locate owls in or near day roosts or nests.

k. Conduct a field outing only when conditions will likely allow for completion of an effective outing. Do not conduct field outing during existing or predicted windy (>15mph) or stormy weather, nor when there are access problems due to road conditions or snow.

l. You may discontinue field outings in a given area when it is evident the entire area being searched is occupied by on or more PACs having a single or pair present. Use professional judgment and such factors as terrain, size of the area being inventoried, and so forth, when making this determination.

m. Conduct at least two complete surveys prior to making a determination to discontinue field outings because the entire area is occupied by owls. Use the remainder of the time you would have used doing the last two complete surveys to conduct daytime follow-up visits to find a day roost or the nest tree.

NOTE: Between March 1 and May 1, use people already on board, bring on temporaries in an intermittent status for the days (nights) field outings are to be conducted, or include these dates in your contracts to allow contractors to begin early. Do not bring on temporaries in a full time status unless you already have other work for them to do during the time they are not able to call and you are able to adjust their work schedule accordingly, from night to day and back again.

4. Calling.

a. Spend at least 15 minutes at each calling point. More time may be spent if deemed necessary; especially outside the Basin & Range West, Basin & Range East, and Upper Gila Mountain Recovery Units.

b. Alternate calling and listening, giving a call or series of calls about every minute and listening between calls

c. Use recorded calls of the Mexican spotted owl, vocal limitations of these calls, or combinations of both when doing surveys. Use enough volume to ensure that owls can hear you up to 0.5 miles away.

d. Use the four note hoot call as the primary call.

e. Use other calls individually or in combinations to provide a good mix of calls.

f. Continue calling but proceed with caution if predators, such as a great-horned owl, are detected in areas where the presence of spotted owls is undetermined.

g. Discontinue calling at any point a predator is detected in an area where spotted owls are known. Wait at least 30 minutes and call again to determine if the predator is still in the area. If the predator continues to respond after waiting 30 minutes or more, move 0.5 or more miles along the calling route and continue calling. If the predator follows you to discontinue calling this route and go to another route if time permits.

h. Use intermediate calling points when weather or other factors increase the probability of not getting complete coverage.

i. Spend 2 to 3 minutes at each intermediate calling point. Alternate calling and listening as in 4b.

5. Once an Owl is Heard.

a. Take a bearing from your calling location to the location where the owl responded from. Record both the location where the owl responded from and your calling location on the map and forms. Attempt to get two or more bearings on an owl by using a calling location a short distance from the calling location where the first response was heard.

b. Provide the best location you can of where you think the owl was located without chasing after the owl.

- c. Locate this on this on the map.
- d. Record the type of call you gave and the type of call the response was.
- e. Identify the sex of the owl(s) responding to your call when possible.
- f. Go to next calling point and continue the field outing.
- g. If it becomes evident an owl is following you, stop calling and move on to the next calling point, or a distance of about 0.75 miles.
- h. Report the location and bearing of all other species of raptors heard, the same as you would for a spotted owl.

6. Daytime Follow-up Visits.

- a. Conduct daytime follow-up visits (a 4 certified person-hour search in a 0.25-0.5 mile radius from detection) in all areas where Mexican spotted owl presence was detected during field outing. The objective is to confirm single or pair occupancy and to locate nest or roost sites.
- b. Complete a daytime follow-up visit as soon as possible but within a maximum of 48 hours after Mexican spotted owls are detected.
- c. Conduct daytime follow-up visits in the early morning or late afternoon/early evening whenever possible. The first 2-3 hours following sunrise and the last 2-3 hours prior to sunset are the best times to have an owl respond to a call.
- d. Use mousing to locate a pair of owls, nest, or roost area once a single has been confirmed.
- e. Discontinue calling if a predator such as a great-horned owl, red-tailed hawk, or goshawk responds to your calls or is seen in the area.
- f. Continue your visual search effort.
- g. Begin calling again when you believe the predator has left the area.
- h. Proceed with caution.
- i. If you are not able to continue calling for any reason and feel the search effort was not satisfactory because of the presence of predators or weather, conduct another daytime follow-up visit as soon as possible.

7. Record Keeping.

- a. Record all survey activities on prescribed inventory or daytime follow-up forms. Complete all blocks of each form using the keys provided.
- b. Attach a copy of the field map to each form. Label the map with the inventory area name, topographic quad it is found on, and date.
- c. Complete a final map that summarizes all of the field maps. This map should include the inventory area boundary, all detections, and locations of owls found during follow-up visits.

8. At the End of the Field Season.

- a. Establish Protected Activity Centers where owls are found. Record the PAC number on each form containing a vocal or visual identification of a Mexican spotted owl used to determine that PAC.
- b. Determine all portions of the survey area where no portion of a PAC was established.
- c. Conduct a second year of inventory following the same procedures in any portion of the survey area where no PAC was established during the initial spotted owl inventory of this survey area.
- d. Send legible copies of all maps and other FWS reporting requirements to the Regional Office at the end of the field season, including a copy of the summary map.

9. Inventory Definitions. Use this list of standard terms and definitions when referring to spotted owl inventory activities to reduce potential misunderstanding and provide greater consistency throughout the Region.

Absence. Assumed when no response is recorded after second year of inventory protocol is completed in a defined area. Absence in a given year does not necessarily mean that owls may never occupy the area.

Adult. A Mexican spotted owl > 2 years old. Usually does not have the whitish terminal band on the tip of its tail used to distinguish juveniles. Terminal band not pointed if present. The tail appears rounded.

Anecdotal information. Owl location information obtained outside the field season. It is not to be used to establish occupancy or reproductive status for a given year.

Breeding Season. That time period from March 1 through August 31 which includes the courtship, nesting, nestling, and fledgling-dependency periods.

Calling points. Locations distributed throughout an area to attain complete coverage of the survey area being inventoried for spotted owls. A minimum of 15 minutes is spent at each point. Calling points are not as rigorously applied as fixed points used in Formal Monitoring and generally need to be in the same vicinity for each complete survey.

Calling Route. An established route in a survey area where vocal imitations or recorded calls of spotted owls are used to elicit a response from all spotted owls that will respond. Calling routes may include calling points and intermediate points but they often use continuous calling or leap-frog methods.

Calling Outing. A nighttime or daytime outing to obtain complete calling coverage of the inventory area.

Complete Coverage. The intent of obtaining complete coverage is to elicit a response from all owls in the survey area that will respond to a spotted owl call and have the person conducting the field outing hear and locate their response. All areas with any potential for owl use must be surveyed before implementing any management action that will alter habitat structure.

Complete Survey. One of 4 replicate sets of one or more field outings in a survey area that attains complete coverage of the survey area within the 7 day time period. The objective is to detect spotted owls.

Continuous Calling. Call at regular or irregular intervals while walking along an established route. Listen for a response for a short period of time.

Daytime Follow-up Visit (Inventory). A daytime follow-up visit is a four certified person-hour, or longer, walk-through search within a minimum of a 0.25 and generally not more than 0.5 mile radius around the location where at least presence has been established.

Field Outing. Each trip to the field associated with conducting protocol activities. For inventory it includes nighttime and daytime calling outings and daytime follow-up visits.

Field Season. March 1 through August 31.

Fledgling. An owl of the year that is out of the nest but unable to completely care for itself. It is considered fledged when it is fully feathered and capable of flying, generally by September. Gives only juvenile begging call.

Foraging Habitat. Habitat that may be used by the owl for foraging. Owls clearly use a wider variety of forest conditions for foraging than for roosting. It usually cannot attain the characteristics of nest/roost habitat.

Historical sites. Owl location information obtained prior to 1989.

Intermediate Points. Calling locations between identified calling points or routes to attain complete coverage. Used to improve coverage when conditions require it. Not required to be established prior to the field outing used.

Juvenile. An owl less than 2 years old. Usually identified by tail-feathers that have a pointed whitish terminal band. The point and terminal band tend to wear off as the owl ages making it difficult to distinguish a juvenile owl, during its second year, from an adult.

Leap Frog Calling. The leapfrog method is very useful when drivable roads allow coverage of all or a portion of the survey area. It requires two people, but nighttime inventories are best accomplished by two people from a safety standpoint. One caller begins calling while the other person drives the vehicle ahead to a predetermined point, usually about a half mile, leaving the vehicle for the first person, and they continue on down the road like this. It often involves continuous calling.

Mixed Conifer. Mixed conifer forests are generally confined to the following series and habitat types: white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), or blue spruce (*Picea pungens*). Additionally, any stand within the bristlecone pine (*Pinus aristata*), Engelman spruce (*Picea engelmannii*), or corkbark fir (*Abies lasiocarpe*) with less than 50% BA of any bristlecone pine, Engelman spruce, corkbark fir, or ponderosa pine (*Pinus ponderosa*) singly or in combination is considered mixed conifer. Pure stand (>80%) of coniferous species other than Douglas-fir, white fir, southwestern white pine, limber pine, or blue spruce are not considered mixed conifer. Stands of mixed species with >50% of the BA consisting of quaking aspen should be defined as quaking aspen.

Mousing. Feeding mice to owls. The most efficient way to locate nests, females, and young. The assumption is that an adult male will take a mouse to a female on the nest, a female for her to feed the young, or to the young itself; thus locating the nest, mate, and/or young.

Nest. A spotted owl nest is a platform on which eggs are laid. Nest substrates include broken topped trees, old raptor nests, witches brooms, rock outcrops, caves or cliff ledges. A Mexican spotted owl must be observed using the structure. Use includes; copulation, female in nest, young in nest, etc.

Nest/Roost Habitat. Mexican spotted owls nest and roost primarily in closed-canopy forests or rocky canyons. In the northern portion of the range (so. Utah and Colorado), most nests are in caves or on cliff ledges in steep walled canyons. Elsewhere, the majority of nests appear to be in trees. Forests used for nesting and roosting often contain mature or old-growth stands with complex structure. These forests are typically uneven-aged, multistoried, and have high canopy closure. Nest trees are typically large in size, whereas owls roost in both large and small trees. Tree species used for nesting vary somewhat among areas and habitat types, but available evidence suggests that Douglas-fir is the most common species of nest tree. A wider variety of trees are used for roosting, but again Douglas-fir is the most commonly used species. Cover types providing nest/roost habitat include mixed conifer and a subset of the pine/oak. The following structural characteristics provide the best description of what we know about suitable forested habitat.

Nestling. An owl of the year that is still in the nest.

Observer/surveyor/caller. Used interchangeably in this document. These terms refer to the person doing spotted owl inventories.

Occupancy Classification. A classification used in inventory and monitoring that includes the following classes: 1) absence, 2) presence, 3) single inferred, 4) single confirmed, 5) pair inferred, and 6) pair confirmed.

Other Forest Types. Other forest cover types of interest for management of the Mexican spotted owl include:

1. Chihuahua pine. The Chihuahua pine (*Pinus leiophylla*) series is Madrean in affinity and, within the U.S., is restricted to central and southern Arizona and southwestern New Mexico.

2. Quaking aspen. Quaking aspen is a major seral species in corkbark fir, blue spruce, and white fir series. It is a minor seral species in the Engelman spruce, Douglas fir, and ponderosa pine series. As such quaking aspen should be a common component of these landscapes under natural disturbance regimes.

3. Riparian forests. Southwestern riparian forests are dominated by various species of broadleaved deciduous trees and shrubs. Trees common in adjacent uplands, such as conifers, oaks, and quaking aspen, may occur in association with riparian trees but, generally do not dominate the site.

Pair Confirmed. A pair(s) of owls is confirmed if any of the following are observed:

(a) One spotted owl is observed roosting within 200 yards of its mate;

(b) A male is observed and female is still on the nest;

(c) Young spotted owls are observed;

(d) A vocalization by one owl and the visual observation of another, of the opposite sex, within 200 yards of each other during a 10 minute time period during either the daytime or nighttime.

(e) Male and female owls are vocalizing back and forth within 200 yards of each other during a 10 minute time period during the daytime.

Pair Inferred. A pair of owls is inferred when one of the following are observed:

(a) Vocalizations of young are heard but not seen and adults are not seen or heard.

(b) Male and female owls are vocalizing with each other within a 10 minute time period within 200 yards of each other during a nighttime field outing, but a daytime follow-up visit confirms only one bird and vocalizations of the mate are not heard.

(c) Male and female owls are vocalizing back and forth to each other within a 10 minute time period and within 200 yards of each other during nighttime field outings, but daytime follow-up visits do not find any owls present.

Pine/oak Type. Any stand within the *Pinus leiophylla* series. Any stand within the *Pinus ponderosa* series that meets the following criteria simultaneously:

Habitat types that reflect *Quercus gambelii* or a *Q.gambelii* phase of the habitat type.

The stand is located in either the Upper Gila Mountain or Basin and Range West Recovery Unit (RU) or the Zuni Mountains or Mount Taylor Regions of the Colorado Plateau RU. Ten percent or more of the stand basal area or ten square feet of basal area consists of Gambel oak >5 in. diameter at root collar.

Any stand in the Basin and Range West RU that has greater than 50% of the basal area in yellow pines (ponderosa, Arizona, Apache, or Chihuahua). Ten percent or more of the

stand basal area or ten square feet of basal consists of any oaks >5 in. diameter at root collar.

Point Calling. A survey method where the surveyor calls for a specified period of time at each calling point and then moves to the next point.

Ponderosa Pine Type. Any forested stand of the ponderosa pine (*Pinus ponderosa*) series not included in the pine-oak forest type or any stand that qualifies as pure (>80%) ponderosa pine, regardless of the series or habitat type.

Predator. Potential Mexican spotted owl predators include great-horned owl, goshawk, red-tailed hawk, golden eagles, and procyonid mammals. Great-horned owls and golden eagles have been observed preying on spotted owls. Some of these predators occupy the same general habitats as the spotted owl, but there is little direct evidence regarding the extent to which spotted owls are preyed upon at this time. In most cases of recorded fatality the identity of the predator is unknown. Bald eagle, peregrine falcons, and other avian predators may prey on owls on rare occasions, but should generally not be considered potential predators.

Presence. Occupancy classification determined by confirmation of at least a single Mexican spotted owl.

Remote Area. Any survey area which requires more than 4 hours of travel time by vehicle and/or foot during good road, trail and weather conditions. (good for the road or trail in question) to reach from the District Office.

Roost. Tree, cliff ledge, rock, or log used by a Mexican spotted owl for extended rest periods. A roost site consists of the tree used to perch in and all other trees whose crowns overlap or interlock with the perch tree. Identified by observations of the owl and presence of pellets, white-wash, and other evidence indicating a spotted owl's roost. Classed as: a) day-roosts - characterized by sites used during the day that provide a cool moist microclimate or b) night-roost - used for resting during night foraging.

Single Confirmed. A visual location of a single spotted owl during a daytime field outing or daytime follow-up visit

Single Inferred. Auditory responses heard during two or more separate nighttime field outings with no visual observation of a spotted owl.

Subadult. Fully feathered but less than 2 years old. The points of the terminal tail band tend to wear off as the owl ages, making it difficult to distinguish a second year subadult from an adult.

Survey or Inventory Area. The area in which spotted owl inventory is conducted.

Survey Methods. Methods used in spotted owls inventories which include 1) continuous calling, 2) leap frog, 3) calling point, and 4) fixed point for Formal monitoring.

Training standards. Standards established for all persons doing spotted owl inventory work to ensure they recognize spotted owls, their predators, understand the protocol, data forms, use of UTM's, and map and compass.

Travel Time. The time it takes to travel from the District office to the starting point of the closest route in a survey area.

Young. Owls of the year that are out of the nest but not fully feathered. May be capable of gliding or flying. Gives only juvenile begging call.