

Environmental Assessment for Designation of Critical Habitat for the Mexican Spotted Owl

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1.0 PURPOSE OF AND NEED FOR ACTION

The USDI Fish and Wildlife Service (Service) has prepared this Environmental Assessment (EA) to analyze potential effects to natural resources, social conditions, and economic conditions that may result from designation of critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*), a species listed as threatened under the Endangered Species Act of 1973 (ESA), as amended. This EA will be used by the Service to decide whether or not critical habitat will be designated as proposed, if the proposed action requires refinement, or if further analyses are needed through preparation of an environmental impact statement. If the proposed action is selected as described or with minimal changes and no further environmental analyses are needed, a Finding of No Significant Impact will be prepared.

This EA has been prepared pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) as implemented by the Council on Environmental Quality regulations (40 CFR 1500, *et seq.*) and Department of the Interior NEPA procedures.

1.1 Introduction

The final rule to list the Mexican spotted owl as threatened under the ESA was published on 16 March 1993 (58 FR 14248). The primary reason for listing was modification of habitat caused by timber harvest programs that produce and maintain even-aged forest stand conditions, which are unsuitable for Mexican spotted owl (58 FR 14248: 14266). At the time of listing, it was estimated that about 23½ percent of habitat suitable for Mexican spotted owl in New Mexico

and Arizona national forests had been lost (58 FR 14248: 14267). Forest plans in place at the time of listing indicated that 44 percent of remaining suitable habitat in Arizona and New Mexico national forests would be lost during the planning period (58 FR 14248: 14267).

Most of the Mexican spotted owls known at the time of listing were found on national forests (91 percent), and most of those occurred in national forests in New Mexico and Arizona (58 FR 14248: 45252). The remainder of known Mexican spotted owls occurred on Indian lands (four percent), national parks (four percent), and lands managed by the Bureau of Land Management (one percent). In 1990, it was estimated that 69 percent of suitable habitat for Mexican spotted owls was on national forests, 13 percent was on Indian lands, 10 percent was on Bureau of Land Management lands, five percent was on national parks, and three percent was on State of New Mexico lands. Less than one percent of suitable habitat for Mexican spotted owls (*ca.* 5,000 acres) was on privately-owned lands (58 FR 14248: 14252).

In the rule to list the Mexican spotted owl as threatened, the Service concluded that designation of critical habitat for Mexican spotted owl would "*provide benefits to the species greater than those provided by listing alone*" and that "*the designation of critical habitat will facilitate management and recovery planning by the Forest Service and other agencies in a way that could not be accomplished through listing*" alone (58 FR 14248: 14270). Pursuant to agency regulations (50 CFR 424.12[a][2]), the Service indicated that a rule to designate critical habitat would be

published later because sufficient information to delineate critical habitat was not yet available.

A final rule designating critical habitat for Mexican spotted owl was published on 6 June 1995 (60 FR 29914). Critical habitat designated in the 1995 rule was set aside by a New Mexico federal court ruling in 1997 (*Coalition of Arizona-New Mexico Counties for Stable Economic Growth v. U.S. Fish and Wildlife Service*, No. 95-1285-M Civil, 1 April 1997), which affirmed an earlier ruling that analysis of the effects of critical habitat designation pursuant to NEPA was required (*Catron County Board of Commissioners v. United States Fish and Wildlife Service*, 75 F.3d 1429, 1439 [10th Cir. 1996]). These court rulings prompted the Service to withdraw critical habitat designation for Mexican spotted owl (63 FR 14378).

In March 2000, a New Mexico federal court ruling ordered the Service to publish a final designation of critical habitat for Mexican spotted owl by 15 January 2001 (*Southwest Center for Biological Diversity and Silver v. Babbitt and Clark*, CIV 99-519 LFG/LCS-ACE, 13 March 2000). Critical habitat was again proposed and a final rule designating critical habitat for Mexican spotted owl was published on 1 February 2001 (66 FR 8530). In 2003, a federal court in Arizona ruled (*Center for Biological Diversity v. Norton*, Civ. No. 01-409 TUC DCB, 13 January 2003) that the 2001 critical habitat designation violated the requirements of the ESA and the Administrative Procedures Act (5 U.S.C. 551 *et seq.*). Although critical habitat as designated in the 2001 rule was allowed to stand in the interim, the Service was ordered to re-propose critical habitat by 13 April 2004 and publish a final rule on critical habitat by 20 August 2004. On 18 November 2003, the Service published a notice in the *Federal Register* reopening the public comment period on the July

2000 proposed rule to designate critical habitat for Mexican spotted owl (68 FR 65020). This EA analyzes alternatives for designation of critical habitat for Mexican spotted owl.

1.2 Purpose of the Action

Preservation of the habitat required by an endangered or threatened species is a crucial component of conservation. A primary purpose of the ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species may be conserved" (section 2[b]). The critical habitat provisions of the ESA are intended to provide protection of habitat that is essential to the conservation of listed species.

The purpose of this action is to re-designate critical habitat for Mexican spotted owl, a species listed as threatened under the ESA. Critical habitat designation identifies geographic areas that are essential for conservation of Mexican spotted owl. It also describes the physical and biological features that constitute critical habitat (*i.e.* primary constituent elements).

1.3 Need for the Action

Habitat protection and management is essential for conservation of Mexican spotted owl. Threats to habitat of Mexican spotted owl were a primary reason for listing the species as threatened (58 FR 14248: 14266). The stated goal of the land management recommendations in the recovery plan is "to protect [habitat] conditions and structures used by spotted owls where they exist and set other [forest] stands on a trajectory to grow into replacement nest habitat or to provide conditions for foraging and dispersal" (Service, 1995a: 82). The critical habitat provisions of the

ESA were intended to address habitat requirements of listed species.

1.4 Background

1.4.1 Critical Habitat

1.4.1.1 Provisions of the ESA Section 4(a)(3) of the ESA states that critical habitat shall be designated to the maximum extent prudent and determinable and that such designation may be revised periodically, as appropriate. Section 4(b)(2) of the ESA requires that critical habitat designation be based on the best scientific information available and that economic and other impacts must be considered. Areas may be excluded from critical habitat designation if it is determined that the benefits of excluding them outweigh the benefits of their inclusion, unless failure to include the areas in critical habitat would result in extinction of the species.

Critical habitat is defined in section 3(5)(A) of the ESA as:

"(I) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical and biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection;

and

(ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by

the Secretary that such areas are essential for the conservation of the species."

Section 3(5)(C) also states that critical habitat "shall not include the entire geographical area which can be occupied by the threatened or endangered species" except when the Secretary of the Interior determines that the areas are essential for the conservation of the species.

Section 7(a)(2) of the ESA requires federal agencies to consult with the Service to "insure that any action authorized, funded, or carried out by such agency ... 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 which is determined ... to be critical." Each agency is required to use the best scientific and commercial data available. This consultation process is typically referred to as *section 7 consultation*. Section 7 of the ESA does not apply to state, local, or private land unless there is a federal nexus (*i.e.* federal funding, authorization, permitting).

Designation of critical habitat can help focus conservation activities by identifying areas that are essential to the conservation of the species, regardless of whether they are currently occupied by the listed species. Designation of critical habitat also serves to alert the public and land management agencies to the importance of an area for conservation of a listed species. As described above, critical habitat receives protection from destruction or adverse modification through required consultation under section 7 of the ESA. Aside from the requirement to consult with the Service under section 7, the ESA does not impose any restrictions on lands designated as critical habitat.

1.4.1.2 The Section 7 Consultation Process

The section 7 consultation process (Figure 1) begins with a determination of effects on listed species and designated critical habitat by the federal action agency. If the federal action agency determines that there will be no effect on listed species or designated critical habitat, the proposed action is not altered or impacted by ESA considerations. If the federal action agency determines that listed species or designated critical habitat may be affected, then consultation with the Service is initiated.

Once it is determined that the proposed federal action may affect a listed species or critical habitat, the federal action agency and the Service typically enter into informal section 7 consultation. Informal consultation is an optional process for identifying affected species and critical habitat, determining potential effects, and exploring ways to modify the action to remove or reduce adverse effects to listed species or critical habitat (40 CFR §402.13). The informal section 7 consultation process concludes in one of two ways: 1) the Service concurs in writing that the proposed action is not likely to adversely affect listed species or critical habitat; or 2) adverse impacts are likely to occur and formal consultation is initiated.

Formal consultation is initiated when it is determined that the proposed federal action is likely to adversely affect a listed species or critical habitat (40 CFR §402.14). Formal consultation concludes with a biological opinion issued by the Service on whether the proposed federal action is likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of critical habitat or is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of critical

habitat (a *non-jeopardy opinion*; 40 CFR §402.14[h]). Independent analyses are made under both the jeopardy and the adverse modification standards.

A "non-jeopardy" opinion concludes consultation and the proposed action may proceed under the ESA. The Service may prepare an *incidental take statement* with *reasonable and prudent measures* to minimize take, and associated, *mandatory terms and conditions* that describe the methods for accomplishing the reasonable and prudent measures. Discretionary *conservation recommendations* may also be included in a biological opinion based on effects to species. Conservation recommendations, whether they relate to the jeopardy or adverse modification standard, are discretionary actions recommended by the Service. These recommendations may address minimizing adverse effects on listed species or critical habitat, identify studies or monitoring, or suggest how action agencies can assist species under their own authorities and section 7(a)(1) of the ESA. There are no ESA section 9 prohibitions for critical habitat. Therefore, a biological opinion that concludes no destruction or adverse modification of critical habitat may contain conservation recommendations but would not include an incidental take statement, reasonable and prudent measures, or terms and conditions.

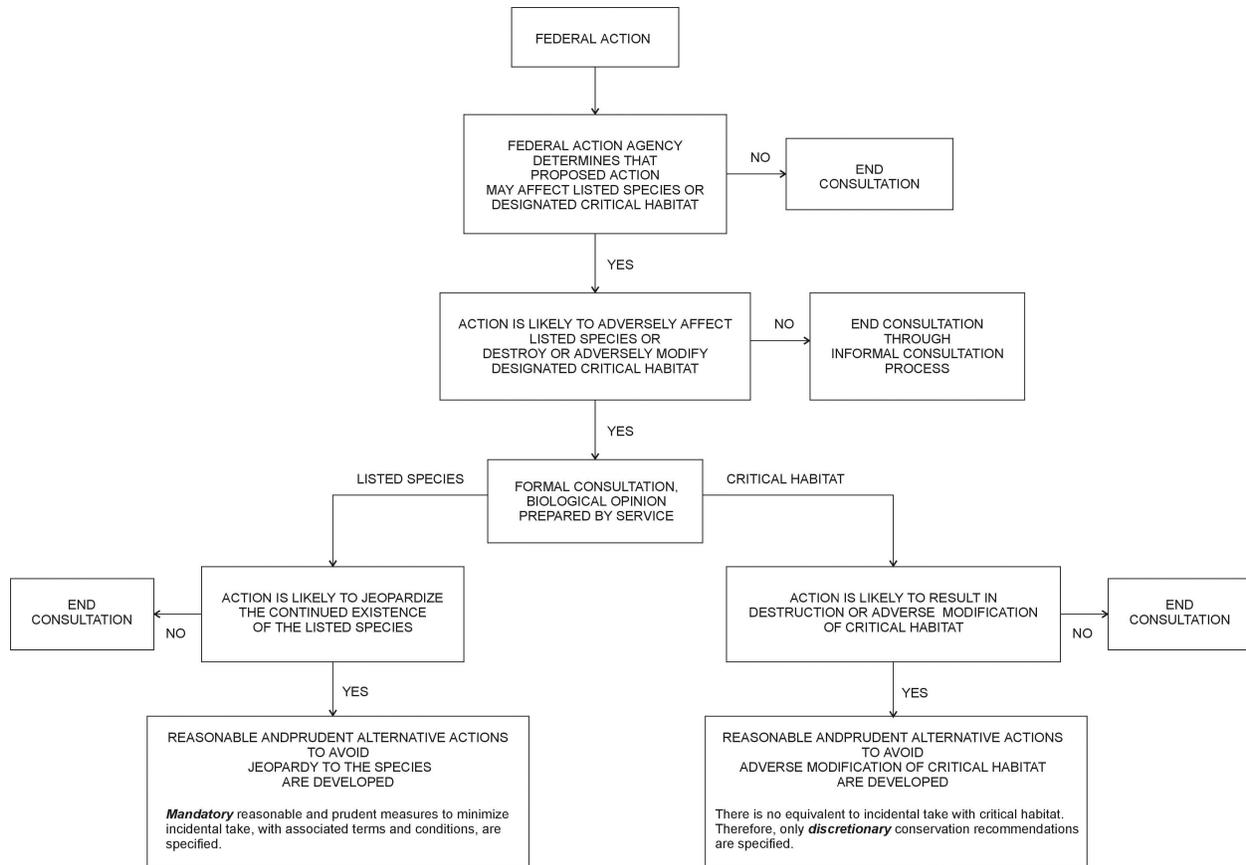


Figure 1. Simplified diagram of the ESA section 7 consultation process showing the parallel track for listed species and designated critical habitat. The informal section 7 consultation process leading to a determination of no adverse effect to listed species or designated critical habitat is not portrayed in detail.

In a biological opinion that results in a jeopardy or adverse modification conclusion, the Service develops mandatory *reasonable and prudent alternatives* to the proposed action. Reasonable and prudent alternatives are actions that the federal agency can take to avoid jeopardizing the continued existence of the species or adversely modifying critical habitat. The Service may develop reasonable and prudent alternatives that vary from slight project modifications to extensive redesign or relocation of the project, depending on the situations involved. Reasonable and prudent alternatives must be consistent with the intended purpose of the proposed action and they also must be consistent with the scope of the federal agency's legal authority. Furthermore, the reasonable and prudent alternatives must be economically and technically feasible. A biological opinion that results in a jeopardy finding, based on effects to the species, may also include an incidental take statement, reasonable and prudent measures, terms and conditions, and conservation recommendations. A biological opinion that results in an adverse modification finding may include reasonable and prudent alternatives and conservation recommendations, but no incidental take statement or associated reasonable and prudent measures and terms and conditions.

1.4.1.3 Proposed Primary Constituent Elements In accordance with section 3(5)(A)(I) of the ESA and regulations at 50 CFR 424.12, the Service is required to consider those physical and biological features, called *primary constituent elements*, that are essential to conservation of the species and that may require special management considerations or protection. Proposed primary constituent elements essential to the conservation of Mexican spotted owl include those physical and biological features that support nesting, roosting, and foraging. These elements were

determined from studies of Mexican spotted owl behavior and habitat use throughout the range of the species. Although plant community types and structural attributes used by Mexican spotted owl vary across its range, they consist primarily of warm-temperate and cold-temperate forests, and, to a lesser extent, woodlands and riparian deciduous forests.

Mixed-conifer forest appears to be the most frequently used community throughout most portions of the range of Mexican spotted owl (Skaggs and Raitt, 1988; Ganey and Balda, 1989; Ganey and Balda, 1994; Service, 1995a; May and Gutiérrez, 2002; Ganey *et al.*, 2003). The structural characteristics of Mexican spotted owl habitat used for nesting, roosting, and foraging vary. Structural characteristics of habitat also vary among plant community types. However, some general structural attributes are common throughout the range of Mexican spotted owl.

The proposed primary constituent elements which occur for Mexican spotted owl within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the species' habitat needs for nesting, roosting, foraging, and dispersing are in areas defined by the following.

Proposed primary constituent elements related to forest structure:

- a range of tree species, including mixed-conifer, pine-oak, and riparian forest types, composed of different ages of trees, 30 percent to 45 percent of which are large trees with a trunk diameter of 12 inches or more when measured at 4.5 feet from the ground;
- a shade canopy created by the tree branches covering 40 percent or more of the ground; and

- large dead trees (snags) with a trunk diameter of at least 12 inches when measured 4.5 feet from the ground.

Proposed primary constituent elements related to maintenance of adequate prey species:

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

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

Steep-walled rocky canyon lands are typically within the Colorado Plateau Recovery Unit, but also occur in other Recovery Units. Canyon habitat is used by Mexican spotted owls for nesting, roosting, and foraging and includes landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to 1.2 miles in width (from rim to rim), with canyon reaches often 1.2 miles or greater, and cool north-facing aspects. Rock walls must include caves, ledges, and fracture zones that provide protected nest and roost sites. Breeding sites are located below

canyon rims. However, it is known that Mexican spotted owls use areas outside of the canyons (*i.e.* rims and mesa tops). Mexican spotted owls nest and roost primarily on cliff faces using protected caves and ledges, and forage in canyon bottoms, on cliff faces and benches, and along canyon rims and adjacent lands. Although it is difficult to rely on vegetation alone to identify canyon habitat, these areas frequently contain small clumps or stringers of mixed-conifer, ponderosa pine, pine-oak, piñon-juniper, or riparian vegetation.

Proposed primary constituent elements related to canyon habitat:

- presence of water (often providing cooler and often more humid conditions than the surrounding areas);
- clumps or stringers of mixed-conifer, pine-oak, piñon-juniper, or riparian vegetation;
- canyon walls containing crevices, ledges, or caves; and
- high percent of ground litter and woody debris.

The proposed primary constituent elements identified above provide a qualitative description of those physical and biological features necessary to ensure the conservation of Mexican spotted owl. The range of quantitative estimates (*e.g.* basal area, canopy closure) is not provided by the primary constituent elements because these vary greatly over the range of the species.

1.4.2 Mexican Spotted Owl

1.4.2.1 Description Mexican spotted owl is one of three subspecies of spotted owl occurring in the United States. It is distinguished from the other two subspecies (northern spotted owl, *S. o. caurina* and California spotted owl, *S. o. occidentalis*) by geographic distribution, plumage, and genetics (Barrowclough and Gutiérrez, 1990; Barrowclough *et al.*, 1999). Mexican spotted owl is mottled in appearance with irregular white and brown spots on its abdomen, back, and head (Figure 2). Several thin white bands mark its brown tail. Unlike most other owls, all spotted owls have dark eyes. Spots on the body of Mexican spotted owl are larger and more numerous than in the other two subspecies, giving it a lighter appearance (Service, 1995a).

1.4.2.2 Distribution Mexican spotted owl has the largest geographic range of the three subspecies. Its range extends north from Aguascalientes, Mexico, through the mountains of Arizona, New Mexico, and western Texas, to the canyons of Utah and Colorado, and the Front Range of central Colorado. Much remains unknown about the distribution of the subspecies in Mexico, where much of its range has not been surveyed.

Mexican spotted owl occupies a fragmented distribution throughout its United States range, corresponding to the availability of forested mountains and canyons, and in some cases, rocky canyon lands (Gutiérrez *et al.*, 1995; Service, 1995a; Tarango *et al.*, 1997; Young *et al.*, 1997; Sureda and Morrison, 1998; Peery *et al.*, 1999; Sorrentino and Ward, 2003). Although there are no estimates of the species' historical population size, its historical range and present distribution are thought to be similar (58 FR 14248: 14248).

1.4.2.3 Abundance A reliable estimate of the number of Mexican spotted owls found range-wide is not currently available. Using information gathered by Region 3 of the Forest Service, Fletcher (1990) calculated that 2,074 Mexican spotted owls existed in Arizona and New Mexico in 1990. Based on more up-to-date information, this estimate was revised to 2,160 Mexican spotted owls in the U.S. (Service, 1991). However, these numbers are not considered reliable estimates of current population size for a variety of statistical reasons, and a pilot study (Ganey *et al.*, 2000) conducted in 1999 estimated the number of Mexican spotted owls for the Upper Gila Mountains Recovery Unit, exclusive of tribal lands, as 2,950 (95 percent confidence interval = 717 to 5,183). The Upper Gila Mountains Recovery Unit contains over half of the known Mexican spotted owl sites in the U.S.

1.4.2.4 Habitat Mexican spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Nesting habitat is typically in areas with complex forest structure or rocky canyons, and contains uneven-aged, multi-storied mature or old-growth stands that have high canopy closure (Ganey and Balda, 1989a; Service, 1991). In the northern portion of the range (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 Douglas-fir (*Pseudotsuga menziesii*) trees (Fletcher and Hollis, 1994; Seamans and Gutiérrez, 1995). A wide variety of tree species is used for roosting; however, Douglas-fir is the most commonly used species in mixed-conifer forests (Ganey, 1988; Fletcher and Hollis, 1994; Young *et al.*, 1998). Mexican spotted owls generally use a wider variety of forest conditions for foraging than they use for nesting and roosting.



Figure 2. Mexican spotted owl in Scheelite Canyon, Fort Huachuca, Cochise County, Arizona, 10 May 1992 (photo courtesy of Steve Metz, copyright 2000).

Some Mexican spotted owls are year-round residents within an area, some remain in the same general area but show shifts in habitat use patterns, and some migrate considerable distances (12 to 31 miles) during the winter, generally migrating to more open habitat at lower elevations (Ganey and Balda, 1989b; Willey, 1993; Ganey *et al.*, 1998). The home-range size of Mexican spotted owls appears to vary considerably among habitats and geographic areas (Service, 1995a), ranging in size from 647 to 3,688 acres for individuals birds, and 945 to 3,846 acres for pairs (Ganey and Balda, 1989b; Ganey *et al.*, 1999; Ganey *et al.*, 2000). Little is known about habitat use by juveniles dispersing soon after fledgling. Ganey and others (1998) found dispersing juveniles in a variety of habitats ranging from high-elevation forests to piñon-juniper woodlands and riparian areas surrounded by desert grasslands.

1.4.2.5 Life History Reproductive patterns of Mexican spotted owl vary across its range. In Arizona, courtship usually begins in March with pairs roosting together during the day and calling to each other at dusk (Ganey, 1988). Eggs are typically laid in late March or early April. Incubation begins shortly after the first egg is laid and is performed entirely by the female (Ganey, 1988). The incubation period is about 30 days (Ganey, 1988). During incubation and the first half of the brooding period, the female leaves the nest only to defecate, regurgitate pellets, or receive prey from the male, who does most of the hunting (Forsman *et al.*, 1984; Ganey, 1988). Eggs usually hatch in early May, with nestlings fledgling four to five weeks later and then dispersing in mid-September to early October (Ganey, 1988).

Mexican spotted owls breed sporadically and may not nest every year (Ganey, 1988). Reproductive

output of Mexican spotted owl is variable (White *et al.*, 1995), but averages about one young per pair per year. Based on short-term population and radio tracking studies and longer-term monitoring studies, the probability of an adult Mexican spotted owl surviving from one year to the next is 80 percent to 90 percent. Average annual juvenile survival is considerably lower (six percent to 29 percent). However, these estimates may be artificially low due to the high likelihood of permanent dispersal from the study area and the lag of several years before marked juveniles reappear as territory holders and are detected as survivors through recapture efforts (White *et al.*, 1995). Little research has been conducted on the causes of mortality, but predation by great horned owl (*Bubo virginianus*), northern goshawk (*Accipiter gentilis*), red-tailed hawk (*Buteo jamaicensis*), and golden eagle (*Aquila chrysaetos*), starvation, and collisions (*e.g.* with cars, power lines), may all be contributing factors.

1.4.2.6 Food Habits Mexican spotted owls consume a variety of prey throughout their range, but commonly eat small and medium-sized rodents such as wood rat (*Neotoma* spp.), peromyscid mice (*Peromyscus* spp.), and microtine voles (*Microtus* spp.). Mexican spotted owls also may consume bats, birds, reptiles, and arthropods (Ward and Block, 1995; Ward, 2001). Each prey species uses a unique habitat, so that the differences in the species' diet across its range likely reflect geographic variation in population densities and habitats of both the prey and Mexican spotted owl (Ward and Block, 1995). Deer mouse (*P. maniculatus*) is widespread in distribution in comparison to brush mouse (*P. boyleyi*), which is restricted to drier, rockier substrates, with sparse tree cover. Mexican wood rat (*N. mexicana*) is typically found in areas with considerable shrub or understory tree cover and high log volumes or rocky outcrops. Mexican

vole (*M. mexicanus*) is associated with high herbaceous cover, primarily grasses, whereas long-tailed vole (*M. longicaudus*) is found in dense herbaceous cover, primarily forbs, with many shrubs and limited tree cover.

1.5 Permits Required for Implementation

No permits are required for critical habitat designation. Designation of critical habitat occurs through a rule-making process under the Administrative Procedures Act and the ESA.

1.6 Related Laws, Authorizations, and Plans

Related provisions of the ESA require federal agencies to consult with the Service when there are potential effects to endangered or threatened species, independent of critical habitat. The *Mexican Spotted Owl Recovery Plan* was finalized in 1995 and describes actions and criteria for recovering the species (Service, 1995a). Land management plans that address conservation of the Mexican spotted owl have been developed by federal agencies and tribes. Several tribes have prepared and implemented plans for conservation of Mexican spotted owl including: the *Mexican Spotted Owl Management Plan for the Mescalero Apache Indian Reservation*, May 1998; the San Carlos Apache Tribe's *Mexican Spotted Owl Conservation Plan*, 2003, and the *Mexican Spotted Owl Conservation Plan for the Malay Gap Forest Management Unit*, 1997; the *Navajo Nation Management Plan for Mexican Spotted Owl*, 2000; and the *Conservation Plan for the Spotted Owl on the Jicarilla Apache Reservation, New Mexico*, 1994. Region 3 of the Forest Service amended its forest plans in 1996 to

incorporate standards and guidelines for conservation of habitat of Mexican spotted owl following recovery plan recommendations. Policies have been enacted by the Bureau of Land Management to protect Mexican spotted owl (Service, 1995a: 6).

Several other federal laws address various aspects of conservation of fish and wildlife and their habitat, which apply to Mexican spotted owl. These include the Lacey Act of 1900, the Migratory Bird Treaty Act of 1918, the Conservation Programs on Military Reservations Act (Sikes Act) of 1960, and the National Forest Management Act of 1976. State wildlife laws in Arizona, New Mexico, Utah, and Colorado provide limited protections for Mexican spotted owl (Service, 1995a: 7-8).

1.7 Issues

The following issues associated with designation of critical habitat were identified in comments received during the re-opened public comment period of 18 November through 17 December 2003 on the July 2000 critical habitat proposed rule (68 FR 65020).

- Indian tribes are the appropriate entity to manage natural resources on tribal lands to their benefit; designating critical habitat on tribal lands would infringe on that capability and would also be in contradiction to Secretarial Order 3206 (American Indian Tribal Rights, Federal - Tribal Trust Responsibilities, and the Endangered Species Act, 5 June 1997).
- Designation of critical habitat on tribal lands would adversely affect the relationship between tribes and the Service.
- Designation of critical habitat on tribal lands would negatively affect existing forest resource management programs, including commercial and recreational uses.
- Management plans are already in place for conservation of Mexican spotted owl on national forests in Arizona and New Mexico; therefore, designation of critical habitat on those lands would have no added conservation benefit to the Mexican spotted owl and is not necessary.
- Geographic boundaries of critical habitat proposed in the July 2000 rule (65 FR 45336), include areas that do not have proposed primary constituent elements defined for critical habitat.
- Economic impacts associated with designation of critical habitat, including those impacts that are attributable coextensively to other causes, must be identified.
- Designation of critical habitat would inhibit forest restoration programs and projects and result in increased risk of catastrophic wildfire and decreased water yield from forest watersheds.
- Designation of critical habitat may have disproportionately high and adverse human health or environmental effects on minority and low-income populations.
- Designation of critical habitat may affect traditional uses of the land such as firewood gathering, cutting timber for traditional lodging, gathering berries, use of sacred sites, and other spiritual uses of the land.
- Critical habitat designation may limit or severely affect access to public lands, oil and gas development activities, livestock grazing, recreation, and logging practices on federal lands.

2.0 ALTERNATIVES, INCLUDING THE NO ACTION ALTERNATIVE

2.1 Development of Alternatives

Identification of areas essential for the conservation of Mexican spotted owl is the cornerstone of critical habitat designation. The *Recovery Plan for the Mexican Spotted Owl* (Service, 1995a), served as the basis for developing critical habitat designation alternatives. The recovery plan includes geographically-explicit considerations (*i.e.* recovery units and habitat management areas) and habitat characteristics (*i.e.* protected and restricted areas). This recovery plan information, together with information received during the public comment period, was used in developing the alternatives for critical habitat designation.

Six recovery units were identified for Mexican spotted owl in the U.S. because of the disjunct distribution of populations and variation in habitat conditions and biological characteristics of the species (Service, 1995a: 11, 36-49). These recovery units are: Colorado Plateau; Southern Rocky Mountains - Colorado; Southern Rocky Mountains - New Mexico; Upper Gila Mountains; Basin and Range - West; and Basin and Range - East. Stable or increasing populations of Mexican spotted owl in each of the six recovery units is a criteria for delisting (Service, 1995a: 80). Thus, habitat protection and management in each of the six U.S. recovery units is required for recovery of Mexican spotted owl.

The recovery plan also specifies three levels of habitat management areas: protected areas;

restricted areas; and other forest and woodland types (Service, 1995a: 84). Protected areas are "all occupied nest or roost areas, all areas with slope >40% where timber harvest has not occurred in the past 20 years, and all legally administered reserved lands" such as Wilderness Areas or Research Natural Areas (Service, 1995a: 122). Occupied nest or roost areas are called *protected activity centers*. Protected activity centers (PACs) consist of at least 600 acres of the best nesting and roosting habitat and are centered around Mexican spotted owl locations. The recommended size for a PAC includes, on average, 75 percent of the foraging area of a Mexican spotted owl. Protected areas are considered vital to recovery in that they provide refuge habitat "until it can be demonstrated that owl habitat can be created through management" (Service, 1995a: 122). The recovery plan provides specific recommendations for inventory and delineation of PACs, prescribed burning, timber harvest, and other uses in protected areas. Restricted areas are mixed-conifer and pine-oak forest habitats that are not within the definition of protected areas. The recovery plan provides guidelines for silvicultural prescriptions that improve habitat suitability for Mexican spotted owl, as well as guidelines for other land uses. No specific guidelines are provided for other forest and woodland types that are not typically used by Mexican spotted owl for nesting or roosting (*e.g.* ponderosa pine, spruce-fir, piñon-juniper, and aspen stands outside of PACs).

2.2 No Action Alternative

The No Action alternative is defined as no designation of critical habitat for the Mexican spotted owl. Analysis of the No Action alternative is required by NEPA, and it serves as a baseline for analyzing effects of action alternatives. However, it is not clear that the Service could, under the law, adopt the No Action alternative. The ESA specifies that the Service must designate critical habitat to the maximum extent prudent and determinable. Also, re-designation of critical habitat was specified in a federal court order (*Center for Biological Diversity v. Norton*, Civ. No. 01-409 TUC DCB, 13 January 2003).

2.3 Alternative I

Alternative I consists of selected areas within 72 mapped critical habitat units (Figure 3), as described in the 21 July 2000 proposed rule (65 FR 45336). Only federal and tribal lands within these 72 critical habitat units that meet the definition of protected or restricted areas would be designated as critical habitat. Further, only those protected and restricted areas on federal or tribal lands that have proposed primary constituent elements would be included in the designation.

2.3.1 Federal Lands

This alternative includes habitat on federal and tribal lands used by known populations of Mexican spotted owl, with the exception of some low-density areas. Protected or restricted area habitat with one or more of the proposed primary constituent elements is included in this alternative, pursuant to section 3(5)(A) of the ESA. Inclusion

of protected and restricted area habitat is appropriate because these areas are used by Mexican spotted owl and are considered essential for conservation of the species.

Some areas on federal land known to have widely scattered Mexican spotted owl sites, low population densities, or marginal habitat quality, which are not considered to be essential to survival or recovery of Mexican spotted owl were not included in this alternative. These areas include Dinosaur National Park in northwest Colorado, Mesa Verde National Park, other Forest Service and Bureau of Land Management land in southwest Colorado, and the Guadalupe Mountains and Davis Mountains in southwest Texas. Isolated mountains on the Arizona Strip, such as Mount Trumbull, were also not included due to their small size, isolation, and lack of information about Mexican spotted owls in the area.

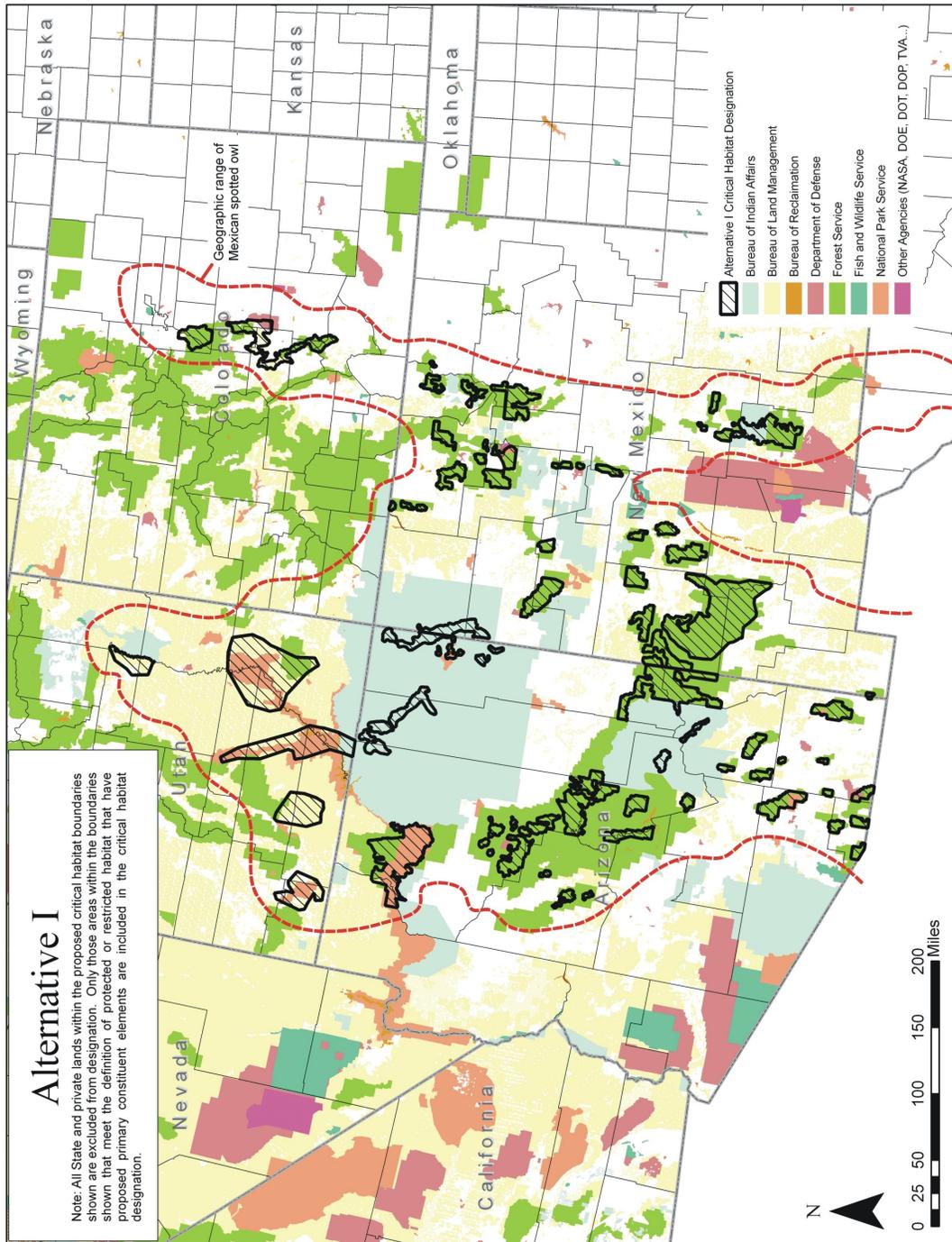


Figure 3. Critical habitat areas proposed in Alternative I.

2.3.2 Private and State Lands

State and private lands are not included in this alternative. No private or state lands within the mapped boundaries of the 72 critical habitat units would be designated as critical habitat.

The overwhelming majority of Mexican spotted owl records are from federal and tribal lands, indicating that some or all of those lands are essential to the recovery of Mexican spotted owl. Some of the state (195,288 acres) and private (637,216 acres) parcels within the critical habitat unit boundaries likely contain mid- and higher-elevation forests that are capable of providing nesting and roosting habitat. However, given that the range of Mexican spotted owl is primarily on federal and tribal lands, state and private lands were not considered to be essential to recovery and are not included as designated critical habitat in this alternative.

2.3.3 Tribal Lands

Lands of the Mescalero Apache Tribe, San Carlos Apache Tribe, and Navajo Nation that could contribute to conservation of Mexican spotted owl would be designated as critical habitat with Alternative I (Figure 3). Lands that meet the definition of critical habitat (*i.e.* from the *Proposed Regulation Promulgation* section of the July 2000 proposed rule) would be designated as critical habitat. This includes areas within the mapped boundary that meet the definition of protected or restricted area habitat, as described in the recovery plan.

The Southern Ute Reservation, Ute Mountain Ute Reservation, and Jicarilla Apache Reservation were excluded because either there are no known Mexican spotted owls, the number of known

Mexican spotted owl sites are very few, or population densities are very low (Ward *et al.*, 1995; 60 FR 29914: 29929; 65 FR 45336: 45345). These areas are not considered to be important in recovery of Mexican spotted owl and, therefore, are not included in the critical habitat designation in Alternative I.

Other tribal lands including the Picuris, Taos, and Santa Clara pueblos in New Mexico and the Havasupai Indian Reservation in Arizona are adjacent to critical habitat units and may have potential Mexican spotted owl habitat. However, available information on habitat quality and current or past Mexican spotted owl occupancy in these areas do not indicate that they are essential to conservation of Mexican spotted owl (65 FR 45336: 45345). Therefore, these tribal lands are not included in critical habitat designation under Alternative I.

2.3.4 Acreage Summary

Alternative I comprises 13,487,544 acres of federal and tribal lands in New Mexico, Arizona, Utah, and Colorado. Almost three-quarters of the critical habitat unit acreage in Alternative I is on Forest Service (60 percent) and Bureau of Land Management (14 percent) lands (Table 1). About 11 percent of the total critical habitat unit acreage is on National Park Service lands, and another 10 percent is on tribal lands. The remaining five percent is on Bureau of Reclamation (two percent), other federal lands (three percent), and Department of Defense lands (less than one percent). Only protected and restricted area habitat within the 13,487,544 acres of federal and tribal lands in Alternative I would be designated as critical habitat, as described above.

Table 1. Critical habitat unit acreage totals by land ownership in Alternative I.

	Arizona (acres)	New Mexico (acres)	Colorado (acres)	Utah (acres)	Total (acres)
Forest Service	3,287,339	4,171,869	375,837	274,616	8,109,661
Bureau of Land Management	12,115	14,528	148,894	1,646,388	1,821,925
National Park Service	795,850	31,179	0	643,328	1,470,357
Department of Defense	24,038	4,157	44,394	0	72,589
Bureau of Reclamation	0	0	0	270,853	270,853
Other Federal Land	0	0	0	385,995	385,995
Tribal	846,344	408,548	0	101,272	1,356,164
Total Acres	4,965,686	4,630,281	569,125	3,322,452	13,487,544
No. of Critical Habitat Units	37*	31*	2	5	72

* Three critical habitat units have portions in New Mexico and Arizona.

The 72 critical habitat units in Alternative I are located in the following counties:

- **New Mexico** - portions of Bernalillo, Catron, Cibola, Colfax, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, San Juan, San Miguel, Sandoval, Santa Fe, Sierra, Socorro, Taos, Torraine, and Valencia counties;
- **Arizona** - portions of Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, and Yavapai counties;
- **Colorado** - portions of Custer, Douglas, El Paso, Fremont, Huerfano, Jefferson, Pueblo, and Teller counties; and
- **Utah** - portions of Carbon, Emery, Garfield, Grand, Iron, Kane, San Juan, Washington, and Wayne counties.

Precise legal descriptions of each critical habitat unit are on file at the New Mexico Ecological Services Field Office, Albuquerque, New Mexico.

2.4 Alternative II

Alternative II excludes all tribal lands from critical habitat designation and refines critical habitat unit boundaries on federal lands based on improved, more precise mapping of protected and restricted habitat, exclusion of some Department of Defense lands pursuant to the 2004 National Defense Authorization Act, and exclusion of some lands on the Carson National Forest that do not contain PACs (Figure 4). The result would be a total of 52 critical habitat units encompassing 8,647,750 acres.

2.4.1 Federal Lands

Under Alternative II, only federal lands within 52 critical habitat units that meet the definition of protected or restricted areas would be designated as critical habitat. Further, only those protected and restricted areas on federal lands that have proposed primary constituent elements would be included in the designation.

Federal lands that would be designated as critical habitat with Alternative II were refined based on new information received during the comment period on the draft EA. These refinements included updated, more precise mapping of areas that contained protected or restricted habitat for Mexican spotted owl.

Based upon the most recent PAC information, the critical habitat designation under Alternative II was refined to exclude all of the proposed critical habitat units that are not essential to the conservation of the species. This included a large portion of the Carson National Forest where surveys for Mexican spotted owl have been conducted on 400,000 acres since 1988 and have yet to find any Mexican spotted owls outside of

the Jicarilla Ranger District. Although hypotheses have been suggested as to why the majority of this National Forest is apparently unoccupied (*e.g.* high elevation, unsuitable climatic conditions), definitive reasons have not been identified. A great deal of effort has been expended by biologists to survey potential habitat in this area and have only documented Mexican spotted owls on the Jicarilla Ranger District. Other historic Mexican spotted owl records have been difficult to verify, and are currently considered by the Forest Service and others to be questionable. Consequently, the Carson National Forest outside of the two critical habitat units on the Jicarilla Ranger District is not considered to be essential to conservation of Mexican spotted owl because no PACs have been found in this area.

Department of Defense lands that have an Integrated Natural Resources Management Plan in place are excluded from critical habitat designation in Alternative I. These lands include Fort Carson in Colorado, Fort Huachuca in Arizona, and the U.S. Naval Observatory Flagstaff Station in Arizona. The 2004 National Defense Authorization Act (Public Law 108-136, November 2003), Section 318, Military Readiness and Conservation of Protected Species, amended section 4(a)(3) of the ESA to exempt from critical habitat designation installations with a final Integrated Natural Resources Management Plan. Fort Wingate Army Depot in New Mexico is also excluded from proposed critical habitat designation in Alternative I because it does not contain areas that are essential to the conservation of the species.

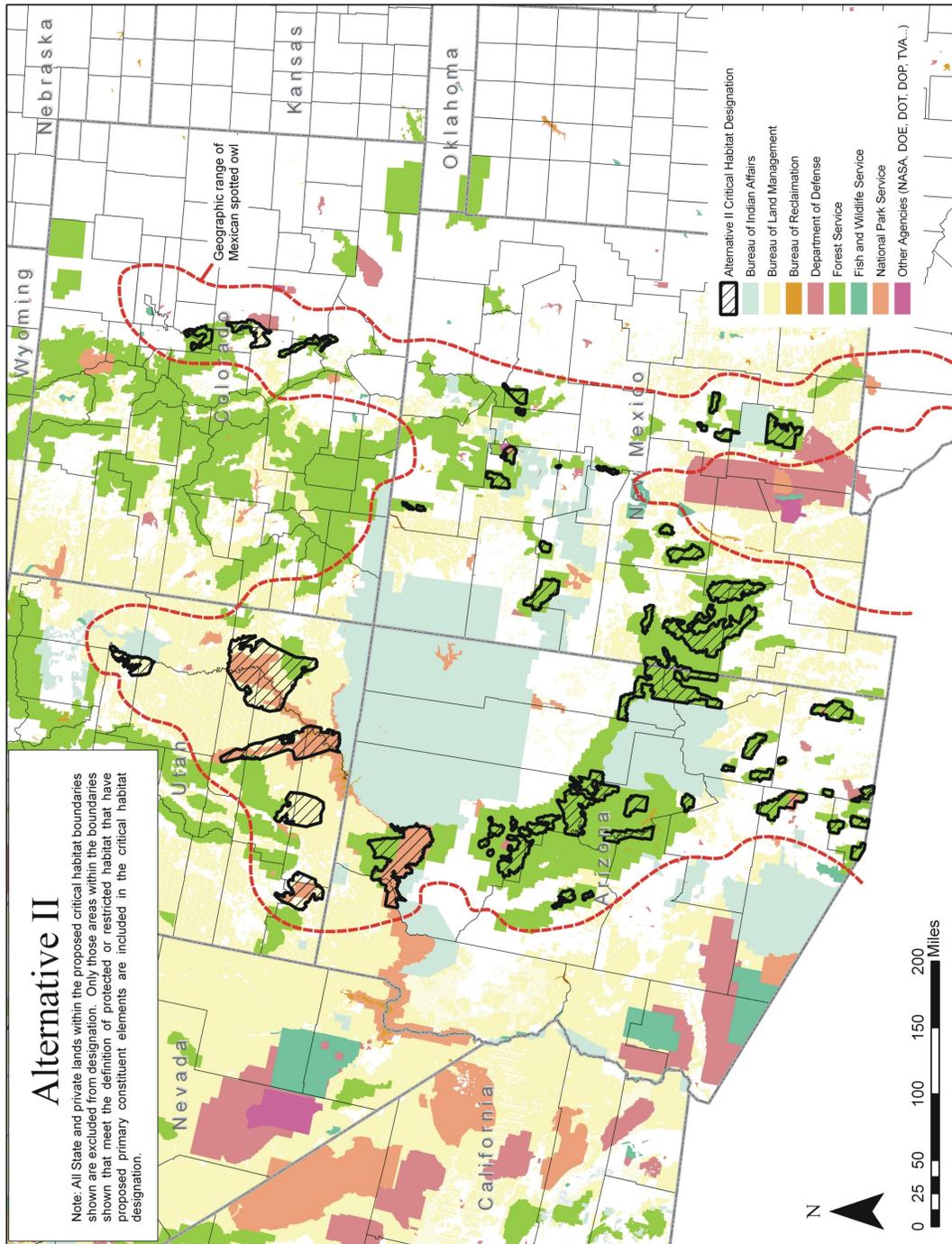


Figure 4. Critical habitat areas proposed in Alternative II.

2.4.2 State and Private Lands

State and private lands are not included in Alternative II for the same reasons described in Alternative I (section 2.3.2). No private or state lands within the mapped boundaries of the critical habitat units would be designated as critical habitat.

2.4.3 Tribal Lands

This alternative excludes all tribal lands. Areas on tribal lands that meet the definition of critical habitat, as described in Alternative I (1,356,164 acres) would be excluded from designation in Alternative II. Although critical habitat on tribal lands could be important in conservation of Mexican spotted owl (section 2.3.3), exclusion of these lands may be warranted under section 4(b)(2) of the ESA. Under this section of the ESA, the Secretary of the Interior may exclude any area if it is determined that "*the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat*" unless "*failure to designate such area as critical habitat will result in extinction of the species.*"

The potential for designation of critical habitat on tribal lands to adversely affect the relationship between tribes and the Service was identified as an issue. Good working relationships between the Service and Indian tribes have been beneficial in implementing natural resource programs, including conservation of Mexican spotted owl. If designation of critical habitat on tribal lands adversely affects these working relationships, then the benefit of excluding those lands may outweigh the benefits of including them, given that exclusion of tribal lands would not result in extinction of Mexican spotted owl. Also, the potential for designation of critical habitat to

infringe on the capability of tribes to manage natural resources on tribal lands to their benefit (*cf.* Secretarial Order 3206: American Indian Tribal Rights, Federal - Tribal Trust Responsibilities, and the Endangered Species Act, 5 June 1997) was also raised. Alternative II was formulated to address the issues of the working relationship between the Service and the tribes and the tribes' capability to manage their lands to their own benefit.

2.4.4 Acreage Summary

Alternative II comprises 8,647,750 acres of federal lands in New Mexico, Arizona, Utah, and Colorado. Forest Service land would compose 66 percent of the total critical habitat unit acreage in Alternative II (Table 2). National Park Service lands would make up another 29 percent and Bureau of Land Management Lands would make up five percent. Department of Defense lands and other federal lands would comprise less than one percent of the proposed critical habitat designation under Alternative II.

The 52 critical habitat units in Alternative II would be located in portions of the same counties listed for Alternative I, with the exception of San Juan County, New Mexico. No critical habitat would be designated in San Juan County, New Mexico.

Table 2. Critical habitat unit acreage totals by land ownership in Alternative II.

	Arizona (acres)	New Mexico (acres)	Colorado (acres)	Utah (acres)	Total (acres)
Forest Service	3,228,145	2,056,536	263,026	156,732	5,704,439
Bureau of Land Management	1,541	2,171	59,299	362,135	425,146
National Park Service	751,261	30,817	0	1,720,727	2,502,805
Department of Defense	2,041	0	0	0	2,041
Bureau of Reclamation	0	0	0	0	0
Other Federal Land	55	0	0	13,264	13,319
Tribal	0	0	0	0	0
Total Acres	3,983,043	2,089,524	322,325	2,252,858	8,647,750
No. of Critical Habitat Units	25*	20*	3	5	52

* One critical habitat unit has portions in New Mexico and Arizona.

2.5 Alternative III

Alternative III would exclude all Forest Service lands in Arizona and New Mexico and all tribal lands. Forest Service lands in Arizona and New Mexico are essential to the conservation of Mexican spotted owl. Special management plans for protection and conservation of habitat of Mexican spotted owl have been developed by the Forest Service in their 1996 plan amendments for forests in the Southwestern Region. Alternative III was formulated to address the issue that Forest Service, Region 3 management plans are sufficient for protection of habitat essential to the conservation of Mexican spotted owl and that designation of critical habitat on those lands would have no added conservation benefit to the species and is not necessary. Exclusion of tribal lands under Alternative III would be based on the same reasons provided in the description of Alternative II.

2.5.1 Federal Lands

Only federal lands that meet the definition of protected or restricted areas would be designated as critical habitat, excluding all Forest Service lands in Arizona and New Mexico. Further, only those protected and restricted areas on non-Forest Service federal lands that have proposed primary constituent elements would be included in the designation.

2.5.2 State and Private Lands

State and private lands are not included in Alternative III for the same reasons described in Alternative I (section 2.3.2). No private or state lands within the mapped boundaries of the critical habitat units would be designated as critical habitat.

2.5.3 Tribal Lands

Tribal lands would be excluded from critical habitat designation as described in section 2.4.3.

2.5.4 Acreage Summary

Alternative III comprises 4,672,172 acres of non-Forest Service federal lands in New Mexico and Arizona, and federal lands in Utah and Colorado. No Forest Service lands in Arizona or New Mexico are included in this alternative. Bureau of Land Management lands would compose 39 percent of the total critical habitat unit acreage in Alternative III, with National Park Service lands contributing another 31 percent (Table 4). The remainder would consist of Forest Service lands in Colorado and Utah (14 percent), Bureau of Reclamation (six percent), and other federal lands (eight percent).

The 18 critical habitat units in Alternative III would be located in portions of the same counties in Utah and Colorado listed for Alternative I. Critical habitat units in New Mexico would be located in portions of Rio Arriba, Los Alamos, and Sandoval counties. Critical habitat units in Arizona would be located in portions of Mohave, Coconino, Navajo, Apache, Pima, and Cochise counties.

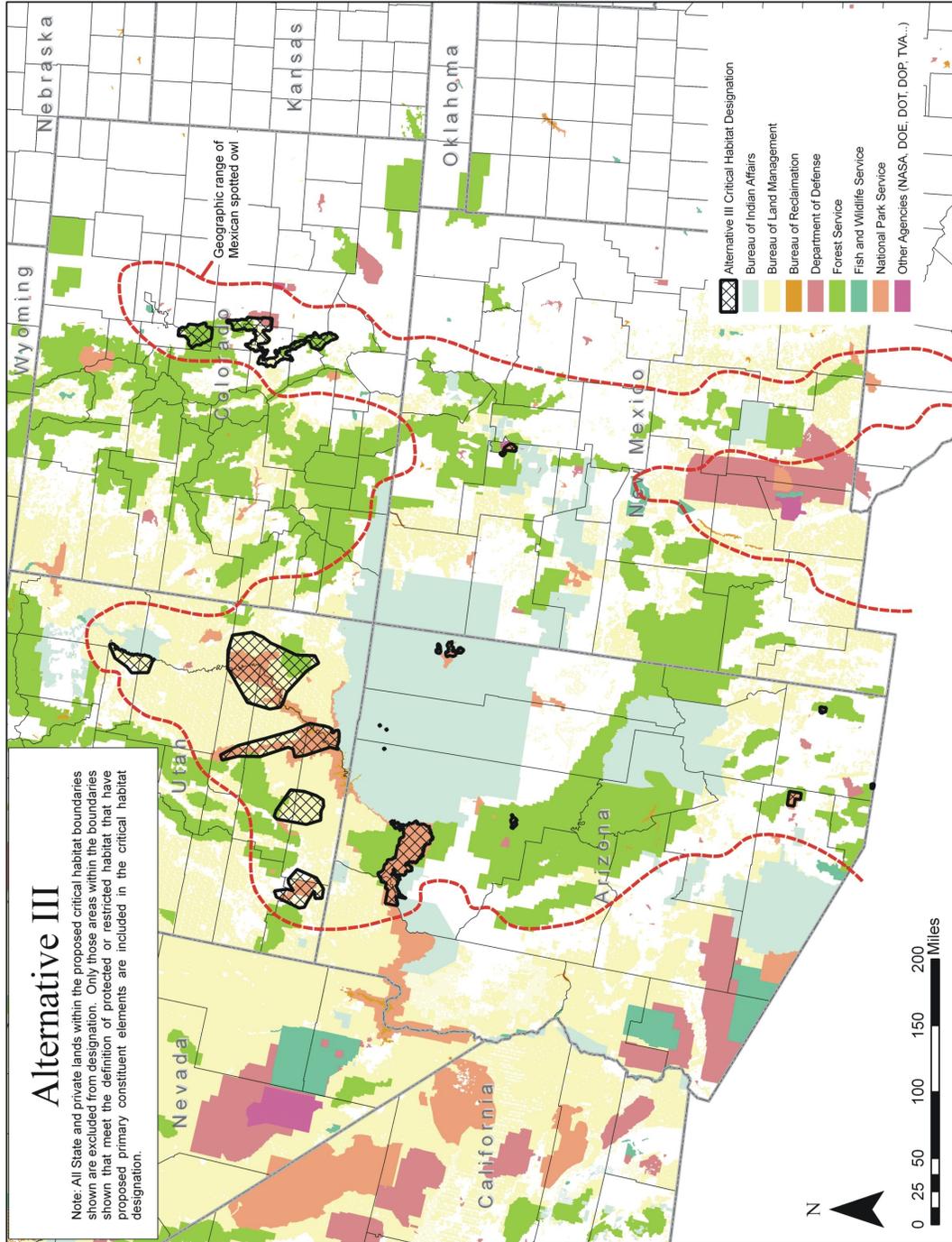


Figure 5. Critical habitat areas proposed in Alternative III.

Table 3. Critical habitat unit acreage totals by land ownership in Alternative III.

	Arizona (acres)	New Mexico (acres)	Colorado (acres)	Utah (acres)	Total (acres)
Forest Service	0	0	375,837	274,616	650,453
Bureau of Land Management	12,115	14,528	148,894	1,646,388	1,821,925
National Park Service	795,850	31,179	0	643,328	1,470,357
Department of Defense	24,038	4,157	44,394	0	72,589
Bureau of Reclamation	0	0	0	270,853	270,853
Other Federal Land	0	0	0	385,995	385,995
Tribal	0	0	0	0	0
Total Acres	832,003	49,864	569,125	3,221,180	4,672,172
No. of Critical Habitat Units	8	3	2	5	18

2.6 Option A - Exclusion of 158 WUI Project Lands

Option A was formulated to address concerns about risks to human health and safety from wildfire. This option would exclude from critical habitat designation 157 Wildland-Urban Interface (WUI) Fuel Treatment project areas and the Peñasco WUI Project area on Forest Service, Region 3 lands that contain protected or restricted habitat areas. These 158 areas were identified to be at high risk of imminent catastrophic wildfire and include residential communities, critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures in the project area (Forest Service, 2001; Service, 2001; Service, 2002). Option A may be combined with alternatives I or II.

One-hundred and fifty-seven of the high-priority WUI project areas that would be excluded from

critical habitat designation under this option are those that were identified in the February 21, 2001, programmatic Biological Assessment and Evaluation for WUI fuel treatment (Forest Service, 2001; <http://www.fs.fed.us/r3/wui/>). The Forest Service proposed treatments in these 157 WUI areas and the Peñasco WUI area to keep fires on the ground, where suppression efforts can be more effective. The 157 WUI project areas and the Peñasco WUI area encompass approximately 134,000 acres on Forest Service lands in Arizona and New Mexico. A programmatic Biological Opinion for 157 WUI projects was completed in 2002 (Service, 2002) and a separate biological opinion for the Peñasco WUI project was completed in 2001 (Service, 2001). The Service concluded that the proposed action would not be likely to jeopardize the continued existence of the Mexican spotted owl (Service, 2001; Service, 2002). The programmatic biological opinion for the 157 WUI projects and the Peñasco WUI Project biological opinion analyzed effects to Mexican spotted owl

habitat from the activities proposed to reduce the risk of catastrophic wildfire.

The benefits of excluding the 158 WUI project area lands from designation may outweigh the benefits of including those lands. The WUI project areas are in fire condition class 2 or 3, indicating moderate-to-high fire severity with severe consequences to the ecosystem and human life and property (Forest Service, 2001). Excluding these project areas from the designation of critical habitat will result in section 7 consultation not having to be reinitiated. This exclusion will allow the Forest Service to proceed without any delays associated with reinitiation of consultation. Loss of habitat from catastrophic wildfire is one of the main threats to Mexican spotted owl. Consequently, management actions taken to reduce risk and potential size of high-severity wildfires are recognized as a vital component of recovery of the species (Service, 1995).

2.7 Comparison of Alternatives

The following table summarizes the potential effects or characteristics of the alternative critical habitat designations on the environment. Potential effects on resources are summarized from the analyses presented in Chapter 3.

2.8 Preferred Alternative

Alternative II with Option A is the alternative preferred by the Service.

Table 4. Comparison of potential effects of alternative critical habitat designations, as compared to existing conditions, by resource category. Alternative II with Option A is the preferred alternative.

Resource Category	No Action Alternative	Alternative I	Alternative II	Alternative III
Total Acres	0	13,487,544	8,647,750	4,672,172
Number of Critical Habitat Units	0	72	52	18
Conservation of Mexican Spotted Owl	<ul style="list-style-type: none"> - No §7 consultation on potential effects to critical habitat - Consultation on effects to suitable habitat outside of PACs by federal action agencies is discretionary - No potential for tracking changes in habitat - No educational benefit from critical habitat designation 	<ul style="list-style-type: none"> - Minor change in §7 consultations compared to existing condition - Consultation on effects to suitable habitat outside of PACs mandatory within designated critical habitat - Highest benefit from tracking changes in habitat - Highest educational benefit from critical habitat designation 	<ul style="list-style-type: none"> - Minor change in §7 consultations compared to existing condition - Consultation on effects to suitable habitat outside of PACs mandatory within designated critical habitat - Moderate benefit from tracking changes in habitat - Moderate educational benefit from critical habitat designation 	<ul style="list-style-type: none"> - Minor change in §7 consultations compared to existing condition - Consultation on effects to suitable habitat outside of PACs mandatory within designated critical habitat - Lowest benefit from tracking changes in habitat - Lowest educational benefit from critical habitat designation
Fire and Ecosystem Management	No change	<ul style="list-style-type: none"> - Reinitiation of consultation on effects to critical habitat would be required for ongoing projects in designated areas - Fuel treatment projects to reduce high risk of imminent catastrophic wildfire in 158 areas would have substantial delays due to reinitiation of consultation - Potential for minor modifications to some projects to minimize effects to proposed primary constituent elements <p>WITH OPTION A:</p> <ul style="list-style-type: none"> - Fuel treatment projects to reduce high risk of imminent catastrophic wildfire in 158 areas would not be delayed by designation of critical habitat 	<ul style="list-style-type: none"> - Reinitiation of consultation on effects to critical habitat would be required for ongoing projects in designated areas - Fuel treatment projects to reduce high risk of imminent catastrophic wildfire in 158 areas could have substantial delays due to reinitiation of consultation - Potential for minor modifications to some projects to minimize effects to proposed primary constituent elements <p>WITH OPTION A:</p> <ul style="list-style-type: none"> - Fuel treatment projects to reduce high risk of imminent catastrophic wildfire in 158 areas would not be delayed by designation of critical habitat 	<ul style="list-style-type: none"> - Reinitiation of consultation on effects to critical habitat would be required for ongoing projects in designated areas - Potential for minor modifications to some projects to minimize effects to proposed primary constituent elements

Table 4, continued

Resource Category	No Action Alternative	Alternative I	Alternative II	Alternative III
Timber Harvest Livestock Grazing Recreation Oil and Gas Resources	No change	- Reinitiation of consultation on effects to critical habitat would be required for ongoing projects in designated areas - Potential for minor modifications to some projects to minimize effects to proposed primary constituent elements	- Reinitiation of consultation on effects to critical habitat would be required for ongoing projects in designated areas - Potential for minor modifications to some projects to minimize effects to proposed primary constituent elements	- Reinitiation of consultation on effects to critical habitat would be required for ongoing projects in designated areas - Potential for minor modifications to some projects to minimize effects to proposed primary constituent elements
Tribal Trust Resources	No change	- Critical habitat designation on tribal lands would adversely affect the working relationship between tribes and the Service	No change	No change
Social and Economic Conditions	No change	- Minor additional incremental costs related to addressing critical habitat in section 7 consultations	- Minor additional incremental costs related to addressing critical habitat in section 7 consultations	- Minor additional incremental costs related to addressing critical habitat in section 7 consultations

3.0 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This chapter describes aspects of the environment that may potentially be impacted by designating critical habitat for Mexican spotted owl. Potential effects of critical habitat designation under each alternative are then described for the various resource categories. Resource categories addressed in the analysis were selected based on issues identified during the public comment period (*cf.* section 1.7) and Mexican spotted owl conservation considerations (Service, 1995a).

3.1 Assessment of Impacts

3.1.1 Nature of Impacts from Critical Habitat Designation

Impacts on the environment from designation of critical habitat stem from the section 7 consultation requirements of the ESA (*cf.* section 1.4.1.2). Under section 7(a)(2) of the ESA, federal agencies are required to consult with the Service on actions that they fund, implement, or authorize, which may affect listed species or critical habitat (40 CFR §402). The purpose of section 7 consultation, with respect to critical habitat, is to ensure that the actions of federal agencies do not adversely modify critical habitat. Critical habitat is defined as habitat that is essential for the conservation of a listed species.

Critical habitat designation does not have any impact on the environment other than through the section 7 consultation process. Critical habitat designation alone does not establish blanket rules or restrictions on land use, nor does it automatically prohibit or modify any activity.

Each proposed federal action that may potentially affect designated critical habitat is analyzed individually during the section 7 consultation process. Individuals, organizations, states, local governments, and other non-federal entities are potentially affected by the designation of critical habitat only if their actions occur on federal lands, require a federal permit, license, or other authorization, or involve federal funding.

In the case of Mexican spotted owl, federal actions that are likely to destroy or adversely modify critical habitat would typically also result in jeopardy to the species when the action is proposed in a PAC. In practice then, the outcome of section 7 consultation in cases dealing with actions in PACs is similar whether or not critical habitat is designated. Adverse effects on primary constituent elements or segments of critical habitat generally do not result in an adverse modification determination unless that loss, when added to the environmental baseline, is likely to appreciably diminish the capability of the critical habitat designation to satisfy essential requirements of the species. In other words, activities that may destroy or adversely modify critical habitat include those that alter the primary constituent elements to an extent that the value of critical habitat for conservation of the species is appreciably reduced.

Actions that would be expected to both jeopardize the continued existence of Mexican spotted owl and destroy or adversely modify its critical habitat would include those that significantly and detrimentally alter its habitat over an area large enough that the likelihood of its persistence and recovery, either range-wide or within a recovery

unit, is significantly reduced. Thus, the likelihood of an adverse modification or jeopardy determination would depend on the baseline condition of the recovery unit and the critical habitat. Some recovery units (*e.g.* Southern Rocky Mountains-New Mexico, Southern Rocky Mountains-Colorado) support fewer owls and have less owl habitat than other recovery units and, therefore, may be less able to withstand habitat-altering activities than recovery units with large contiguous areas of habitat supporting higher densities of Mexican spotted owl.

Actions not likely to destroy or adversely modify critical habitat include activities that are implemented in compliance with the recovery plan (Service, 1995a), such as:

- thinning trees less than nine inches in diameter in PACs;
- fuels reduction to abate the risk of catastrophic wildfire;
- personal-use commodity collection such as fuel wood, *latillas*, *vigas*, and Christmas tree cutting;
- livestock grazing in upland habitats; and
- most recreational activities including hiking, camping, fishing, hunting, cross-country skiing, off-road vehicle use, and various activities associated with nature appreciation.

Critical habitat designation is not likely to impose any restrictions on these activities. In addition, some activities may be considered to be of benefit to Mexican spotted owl habitat and, therefore, would not be expected to adversely modify critical habitat. Examples of activities that could benefit critical habitat may include some protective measures such as fire management, prescribed burning, brush control, snag creation, and certain silvicultural activities such as thinning.

3.1.2 Impact Assessment Method

Many projects analyzed in the context of NEPA involve a specific action with well-defined parameters, such as a proposed fuel reduction project that would remove trees within a certain size range at a known location and conduct prescribed burning inside a defined boundary. In contrast, critical habitat designation is a complex action. The consequences of section 7 consultation on potential effects to Mexican spotted owl and critical habitat are highly variable, depending on the characteristics, context, location, duration, geographic extent, and timing of each proposed action subject to consultation. This complexity is heightened by the dynamic nature of the natural environment. Biological conditions that influence the magnitude of potential impacts may change over time and from place to place.

The complexity of the effects of critical habitat designation was addressed by using past section 7 consultations as a basis for the impact assessment. Past consultations with various federal agencies were sampled to obtain a broad cross-section of project types, locations, sizes, and other characteristics. The sampled section 7 consultations were examined to identify consultation characteristics, determination of effects, and modifications or impacts to proposed federal actions. Past federal actions that were the subject of section 7 consultations on effects to Mexican spotted owl and critical habitat have included:

- land management plans;
- land acquisition and disposal;
- road construction, maintenance, and repair;
- timber harvest;

- livestock grazing and management;
- fire and ecosystem management projects (e.g. prescribed natural fire and management ignited fire, thinning, brush control);
- power line construction and repair;
- campground and other recreational developments; and
- access easements.

The impact assessment for this EA anticipated that these same types of activities would be reviewed in section 7 consultations.

Almost all of the consultations in the administrative record were for projects in Arizona or New Mexico, and the majority of those were for Forest Service projects. There was only one consultation in the record from Colorado and only two from Utah. For this reason the analysis was based primarily on Forest Service consultations in Arizona and New Mexico.

A separate analysis of the economic impacts of designating critical habitat for Mexican spotted owl was conducted and the results were incorporated into this EA. The economic analysis considered impacts that were "*attributable co-extensively to other causes*" (*New Mexico Cattle Growers Ass'n v. U.S. Fish and Wildlife Service*, 248 F.3d 1277 [10th Cir. 2001]). This broadened the scope of the economic analysis to include effects resulting from all conservation actions conducted for Mexican spotted owl since the species was listed. In contrast, the analysis in this EA focuses on effects that are a consequence of critical habitat designation, which would not occur in the absence of that action.

3.2 Conservation of Mexican Spotted Owl

3.2.1 Existing Conditions

The requirement for federal agencies to consult on effects of proposed actions to Mexican spotted owl has been in place since the species was listed in 1993. Federal agencies are also required to consult on effects to critical habitat within currently designated areas. Critical habitat was proposed or designated at various times since the species was listed up to the present time.

Designated critical habitat currently includes federal, non-tribal lands that comprise protected or restricted habitat in portions of McKinley, Rio Arriba, Sandoval, Socorro, and Taos counties in New Mexico; Apache, Cochise, Coconino, Graham, Mohave, and Pima counties in Arizona; Carbon, Emery, Garfield, Grand, Iron, Kane, San Juan, Washington, and Wayne counties in Utah; and Custer, Douglas, El Paso, Fremont, Huerfano, Jefferson, Pueblo, and Teller counties in Colorado (66 FR 8530). Forest Service lands in Arizona and New Mexico, all tribal lands, and state and private lands are excluded from the current designation.

Section 7 consultation is triggered when a proposed action has the potential to affect Mexican spotted owl. The species receives protection from unauthorized "*take*", which is defined to include not only physical harm to individuals but also significant habitat modification or degradation that results in impairment of behavioral patterns such as breeding, feeding, or sheltering.

The Service adopted a policy on section 7 consultation on Mexican spotted owl and critical habitat in July 1996 (Service, 1996a). This policy specified actions that would result in a "may affect" determination during section 7 consultation. These included:

- 1) actions that alter riparian, mixed-conifer, or pine-oak habitats regardless of whether Mexican spotted owls are present or not, both inside and outside of critical habitat (emphasis added);
- 2) actions in PACs (*i.e.* known Mexican spotted owl nest sites);
- 3) actions for which no surveys or inadequate surveys for Mexican spotted owls have been conducted; and
- 4) actions in habitats within "other forest and woodland types" within one mile of a PAC, with some exceptions for site-specific conditions.

The Service's policy therefore requires consultation on the effects of federal actions on the species in any protected area, restricted area, or other forest and woodland type within one mile of a PAC, regardless of occupancy status by nesting Mexican spotted owls and regardless of critical habitat designation. This is because these areas may be used at any given time by Mexican spotted owls for foraging, movement, sheltering, or other vital life history requirements.

Actions that occur within designated critical habitat boundaries must also be examined for effects on primary constituent elements. The Service's policy states that "*actions in critical habitat that affect primary constituent elements (as described in the final rule designating critical*

habitat) may affect critical habitat and, therefore, must be consulted upon."

Federal agencies make the initial determination of whether or not their action will affect Mexican spotted owl or designated critical habitat. If the action agency determines that there will be no effect, they are not required to consult with the Service. Based on listing of the species alone, Federal agencies consult on effects to protected or restricted areas and other forest and woodland types within one mile of a PAC regardless of occupancy by nesting Mexican spotted owls. These consultations are directed at avoiding or minimizing impacts to important habitat variables such as habitat patch size, stand structure, tree size and density, large woody debris, and understory vegetation (Service, 1995a). These habitat variables are consistent with the proposed primary constituent elements of critical habitat (*cf.* section 1.4.1.3).

Forests in Region 3 (Arizona and New Mexico) consult under the jeopardy standard with the Service on projects that may affect suitable habitat regardless of occupancy by nesting Mexican spotted owls (Keith Meñasco, U.S. Forest Service, pers. comm., 20 January 2004). This is also the case on Forest Service lands in Colorado (Leslie Ellwood, Service, pers. comm., 22 January 2004). Suitable habitat, as used here, encompasses both protected and restricted areas, as defined by the recovery plan, and other forest and woodland types within one mile of a PAC (Service, 1995a). Review of past consultations indicate that the Forest Service has been consistent in adopting the Service's policy, as evidenced by the number of consultations involving actions in suitable habitat. For example, of the 24 Mexican spotted owl consultations on the Lincoln National Forest from 1996 to 2000, 19 (79 percent) dealt with impacts to suitable habitat outside of any PAC.

The National Park Service has also adopted the practice of consulting on projects potentially affecting suitable habitat outside of PACs (Cay Ogden, National Park Service, pers. comm., 20 January 2004), as has the Bureau of Land Management in Colorado (Leslie Ellwood, Service, pers. comm., 22 January 2004).

The Bureau of Indian Affairs and tribal governments typically modify projects to avoid effects to Mexican spotted owl and its habitat (Joseph Jojola, Bureau of Indian Affairs, pers. comm., 20 January 2004). However, of the seven consultations in the administrative record between the Bureau of Indian Affairs or tribal governments and the Service, three (43 percent) involved impacts to suitable habitat outside of PACs.

Most known Mexican spotted owl sites and suitable habitat for the species occurs on lands administered by the U.S. Forest Service (Service, 1995a: 21), mostly within the Southwestern Region (Service, 1995a: 23-24). Recent estimates indicate that there is at least 6,052,842 acres of habitat suitable for Mexican spotted owl on forests in the Southwestern Region (Table 5; U.S. Forest Service, 2004). About 11 percent of the suitable habitat consists of Mexican spotted owl PACs. There are at least 987 PACs on forest lands in the Southwestern Region (Figure 5).

To date, 125 formal consultations have been initiated involving Mexican spotted owl (Shaula Hedwall, Service, unpubl. data). In other words, there have been 125 projects that have resulted in an adverse effect to the species. Cumulative anticipated incidental "take" of Mexican spotted owls from these projects was 348 PACs (Table 6).

Table 5. Estimated amount of habitat suitable for Mexican spotted owls, Forest Service Region 3. PACs includes only those known and mapped. Source: U.S. Forest Service, 2004.

FOREST	PACs		Suitable Habitat Outside of PACs*	Total
	PACs	Acres	Acres	Acres
Apache-Sitgreaves	138	88,530	786,007	874,537
Carson	2	1,454	355,023	356,477
Cibola	53	34,788	618,325	653,113
Coconino	184	124,799	603,065	727,864
Coronado	107	75,388	163,219	238,607
Gila	225	142,673	1,506,869	1,649,542
Kaibab	6	3,691	160,244	163,935
Lincoln	137	84,868	181,730	266,598
Prescott	15	9,128	144,211	153,339
Santa Fe	48	31,572	395,215	426,787
Tonto	72	46,505	495,538	542,043
TOTAL	987	643,396	5,409,446	6,052,842

* Suitable habitat acreage outside PACs includes all mixed-conifer and mixed-conifer transition stands and all pine or pine-oak stands with one percent or greater canopy cover in Gambel oak (except for the Lincoln, Carson, and Santa Fe). Protected area habitat is likely overestimated, while restricted area habitat is underestimated (Forest Service, 2004).

Over three-quarters of the formal consultations were with the Forest Service (77 percent). The National Park Service and the military each comprised six percent of the formal consultations. Five percent of the formal consultations were with the Bureau of Indian Affairs, and the remaining formal consultations were with the Federal Highway Administration, Department of Energy, Environmental Protection Agency, or Service

(Table 6). Forest Service projects comprised 86 percent of the total anticipated incidental "take" of Mexican spotted owls, measured as the number of Protected Activity Centers, or PACs, which are known nest sites. No other single agency had more than 10 percent of the total anticipated incidental "take" (Table 6).

Table 6. Number of formal consultations and anticipated incidental "take" of Mexican spotted owl to date.

AGENCY	NO. OF FORMAL CONSULT.	ANTICIPATED "TAKE" (No. of PACs)
U.S. Forest Service	96 (77%)	294 (86%)
National Park Service	8 (6%)	5 (1%)
Military*	7 (6%)	20 (6%)
Bureau of Indian Affairs	6 (5%)	25 (7%)
Federal Highway Administration	4 (3%)	4 (1%)
Other	4 (3%)	0 (0%)
TOTAL	125	348

* Includes projects proposed by the U.S. Air Force, Army, or Navy.

The data in tables 5 and 6 indicate that incidental "take" was anticipated in 30 percent of the PACs known to occur on Forest Service lands (*i.e.* 294 PACs taken, 987 PACs known).

Designated critical habitat has been in effect during various periods since 1995. Only one of the formal consultations contained an opinion that the proposed action would destroy or adversely modify designated critical habitat. This opinion was issued in consultation on the U.S. Forest Service, Region 3 forest plans prior to their amendment to include recovery plan guidelines for Mexican spotted owl (Service, 1996b).

3.2.2 Effects on Mexican Spotted Owl

3.2.2.1 No Action Alternative No section 7 consultations pursuant to the critical habitat provisions of the ESA would be conducted. The educational aspect and value of critical habitat designation would also not be realized. Critical habitat designation focuses attention to and awareness of specific geographic areas that are essential to conservation of the species. When a federal agency proposes an action and can see that the action is located within the boundaries of a critical habitat unit, they can plan their projects in a proactive fashion consistent with section 7(a)(1) of the ESA.

Federal agencies would still be required to consult with the Service on actions that potentially affect Mexican spotted owl. Effects to Mexican spotted owl would continue to include potential impacts to protected or restricted habitat or other forest and woodland types within one mile of a PAC, regardless of occupancy by nesting Mexican spotted owls (Service, 1996a). Therefore, federal action agencies would continue to consult with the Service on actions that potentially may affect suitable habitat for Mexican spotted owl that is outside of any PAC.

3.2.2.2 Alternatives I, II, and III and Option A Critical habitat designation under alternatives I, II, and III would have the effect of requiring section 7 consultation when proposed actions may affect primary constituent elements within critical habitat unit boundaries (Service, 1996a). In practice, critical habitat designation is unlikely to trigger section 7 consultations that would not occur in its absence. This is because federal agencies are already consulting with the Service under the jeopardy standard on impacts to suitable

habitat outside of PACs. However, consultations occurring within designated critical habitat would potentially be more standardized with respect to analysis of impacts on primary constituent elements.

Critical habitat designation would also add a comprehensive recovery-unit and range-wide perspective to assessment of impacts to habitat. Currently, the Service tracks the total, range-wide take of Mexican spotted owls authorized through formal consultations. A similar tracking system for critical habitat would allow for analysis of changes in habitat over time to ensure that adequate areas remain for conservation of the species. The benefit of critical habitat acreage tracking would be highest with the most comprehensive designation (Alternative I). Alternative II would have an intermediate benefit to the species, in that all critical habitat units would be tracked with the exception of areas on tribal lands. Tracking of habitat changes and status under Alternative III would have little benefit to conservation of the species, as much of the habitat for the species would be omitted from critical habitat designation.

Critical habitat designation would also have an educational aspect that would benefit conservation of Mexican spotted owl. The educational value of critical habitat designation arises from the geographic description of areas that are essential for conservation of the species. The more comprehensive the delineation of critical habitat is, the more educational value it has. Therefore, Alternative I would have the highest educational benefit, followed by Alternative II and then by Alternative III.

Option A combined with either alternative I or II would have little added effect on conservation of Mexican spotted owl because of the relatively

small areas involved. There would be no additional effect from combination of Option A with Alternative III, because Alternative III excludes Forest Service lands in New Mexico and Arizona.

3.3 Timber Harvest

3.3.1 Existing Conditions

Timber harvest activities occur on National Forest lands and some tribal lands. Both the Mescalero Apache Tribe and the White Mountain Apache Tribe have active commercial timber management programs (Joseph Jojola, Bureau of Indian Affairs, pers. comm., 20 January 2004). The Navajo Nation also manages commercial forests for timber harvest.

Timber harvest on national forests in the Southwestern Region of the Forest Service (Arizona and New Mexico) began to decline beginning in 1989 (U.S. Forest Service, 1995: 30; U.S. Forest Service, 2004). This decline has been attributed to a substantial decline in the density of trees larger than 19 inches diameter at breast height (Service, 1995a: 68), changes in market conditions, concerns over conservation of old-growth forests, changes in timber management to protect northern goshawk (*Accipiter gentilis*) and Mexican spotted owl, and declining Forest Service budgets (Forest Service, 1995: 30).

The total volume of timber cut on the 11 national forests in the Southwestern Region declined from 426.8 million board feet in 1989 to 233.5 million board feet in 1992 (U.S. Forest Service, 2004). Total timber harvest volume from Forest Service lands in the Southwestern Region has been fairly stable over the last three years (Figure 6).

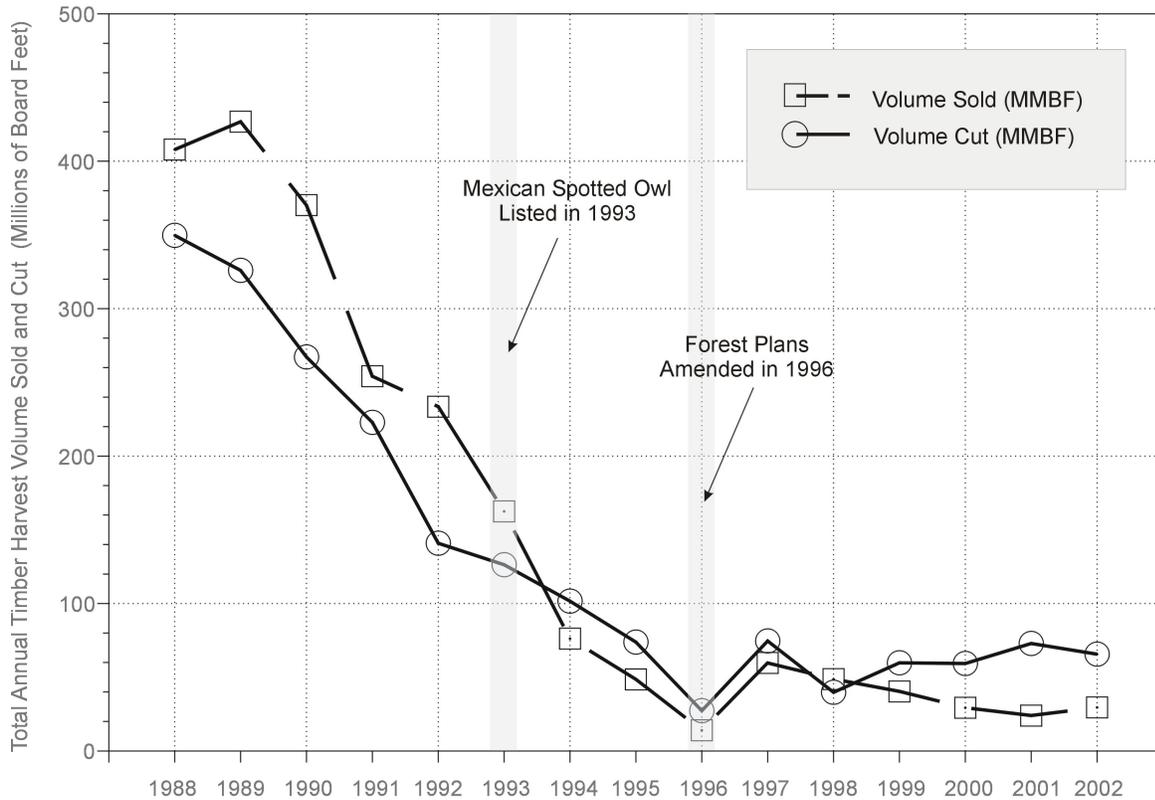


Figure 6. Total annual timber harvest from Forest Service, Region 3, 1998-2002. The square symbols and dashed line show volume of timber sold, in millions of board feet. The circles and solid line show the volume of timber cut, in millions of board feet. Source: U.S. Forest Service, 2004.

Listing of the Mexican spotted owl in 1993 and subsequent changes in land management prompted shifts in dominant types of silvicultural treatments on Forest Service lands. Forest plans in the Southwestern Region were amended in 1996 to include standards and guidelines for Mexican spotted owl, northern goshawk, grazing management, and old growth. Additionally, thinning treatments increased in response to accumulation of fuels and recognition of the increased potential for catastrophic wildfire. Silvicultural treatments have shifted from predominately shelterwood cutting into the mid-1990s to primarily selection harvesting and commercial thinning at present (U.S. Forest Service, 2004).

Section 7 consultations involving potential effects to Mexican spotted owl use consistency with the recovery plan as a standard for determining whether or not an action may adversely effect the species (Service, 1996a). With respect to timber harvest, the recovery plan includes the following recommendations (Service, 1995a).

PROTECTED AREAS - PACs

Protected Activity Centers (PACs) are areas 600 acres or more in size delineated around nest sites.

- No treatments within a 100-acre area delineated around the nest site.
- No harvest of trees greater than nine inches diameter at breast height (dbh).
- Treat no more than 10 percent of the PAC at any one time.
- Conduct treatments during the nonbreeding season (1 September - 28 February).
- Evaluate salvage logging within PACs subject to stand-replacing fire through section 7 consultation.

PROTECTED AREAS - Steep Slopes

These are areas in mixed-conifer or pine-oak forest with slopes greater than 40 percent, that have not been logged in the past 20 years.

- No harvest of trees greater than 9 inches dbh.
- No seasonal restrictions apply.

RESTRICTED AREAS

Mixed-conifer forest, pine-oak forest, and riparian habitats not on steep slopes and not within PACs.

- Maintain stands to meet threshold conditions, or to move them towards target conditions (Service, 1995a: 92).
- Emphasize uneven-age management.
- Extend rotation for even-age management to greater than 200 years.
- Retain all trees greater than 24 inches dbh.
- Retain large oaks.
- Retain hardwoods, large down logs, large trees, and snags.
- Maintain riparian broad-leaved forests in healthy condition.
- Emphasize a mix of age and size classes, including large mature trees and vertical diversity.

To date, there have been about 154 informal consultations and 18 formal consultations on timber sale projects involving effects to Mexican spotted owl. Projects that incorporated recovery plan guidelines related to timber harvest activities typically underwent informal consultation and were completed with concurrence by the Service on a "may affect, not likely to adversely affect" determination for Mexican spotted owl. These projects were usually implemented with no or only minor modifications to avoid adverse effects to Mexican spotted owl.

Fourteen of the eighteen formal consultations on timber sale projects were initiated prior to amendment of forest plans in the Southwestern

Region. The plan amendments incorporated recovery plan guidelines for managing habitat of the Mexican spotted owl. Three of the four timber harvest-related formal consultations from 1996 to 2003 were for salvage sales.

3.3.2 Effects on Timber Harvest

3.3.2.1 No Action Alternative Trends in timber harvest sales and cut volumes would not change with no designation of critical habitat for Mexican spotted owl. Section 7 consultation on the effects of federal timber projects on Mexican spotted owl under the jeopardy standard would still be required. As described in section 3.3.1, section 7 consultations would analyze potential effects of projects proposed in protected areas outside of PACs, restricted areas, and other forest and woodland types within one mile of a PAC.

3.3.2.2 Alternatives I, II, and III and Option A Designation of critical habitat would cause reinitiation of section 7 consultation for any ongoing timber harvest projects in designated areas. This effect would vary, with Alternative I most likely to cause the greatest number of consultation reinitiations and Alternative III causing the least. Option A, when combined with alternatives I or II, would eliminate the requirement for reinitiation of consultation on the 158 WUI projects.

It is unlikely that reinitiated consultations on critical habitat would add any new modifications or restrictions. This is because existing consultations on effects to the species have included analysis of impacts to suitable habitat outside of known nesting areas, or PACs.

New timber harvest projects within designated critical habitat areas would be analyzed for

potential effects to proposed primary constituent elements as well as effects to the species. Habitat is already considered in consultations on effects to the species. Therefore, critical habitat designation is unlikely to change the potential for project modifications or restrictions compared to the existing condition.

3.4 Fire and Ecosystem Management

3.4.1 Existing Conditions

Fire and ecosystem management activities subject to section 7 consultation involving Mexican spotted owl have occurred primarily on lands administered by the Forest Service, National Park Service, or Bureau of Land Management. Ecosystem management projects in forested areas are typically developed to restore more natural vegetation structure and ecological function. Ecosystem management projects are often integrally tied to fire management. This is particularly the case in ponderosa pine (*Pinus ponderosa*) forest ecosystems, where changes in vegetation structure, fuel loads, and fire regimes have dramatically increased the likelihood of high severity crown fires (e.g. Covington and Moore, 1994; Service, 1995a: 60-64; Swetnam and Baisan, 1996; Arno and Harrington, 1999).

Wildfires on National Forest lands have increased in size and intensity over the last 15 years (U.S. Forest Service, 2004; Figure 7). Annual acreage treated with prescribed burning has been variable from 1992 through 2002, depending on factors such as suitable weather conditions and funding levels. Hazard fuel reduction treatments were relatively stable from 1994 through 2001 (Figure 7), but may increase in the near future with

projects developed under the Healthy Forests Initiative. Mexican spotted owl was listed as endangered in 1993 and forest plans were amended in 1996 to include recovery plan management recommendations. Loss of habitat from catastrophic wildfire is one of the main threats to Mexican spotted owl (Service, 1995a: 2). Management measures taken to reduce the risk and potential size of high-severity wildfires is recognized as a vital component of conservation of Mexican spotted owl (Service, 1995a: 61).

As discussed in section 3.3.1, section 7 consultations involving potential effects to Mexican spotted owl use consistency with the recovery plan as a standard for determining whether or not an action may adversely effect the species (Service, 1996a). Timber harvest recommendations from the recovery plan are applicable to thinning projects conducted to reduce the potential for high-severity wildfire. The recovery plan also includes a set of recommendations for reducing the threat of high-severity fire in PACs, which include thinning and use of prescribed fire (Service, 1995a: 86-88). Thinning and prescribed fire is also recommended in restricted area habitats (Service, 1995a: 94).

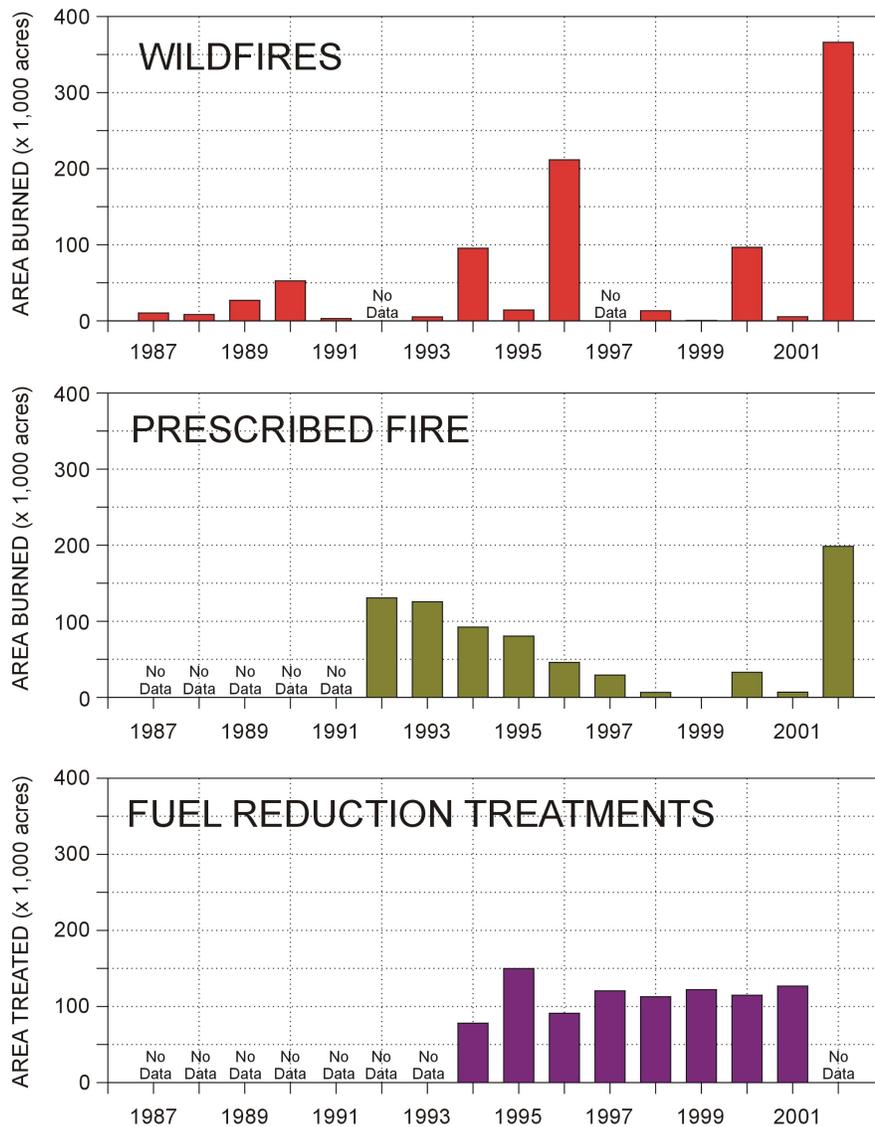
There have been 121 informal and 33 formal consultations on fire management projects involving effects to Mexican spotted owl. Twenty-five of the 33 formal consultations (76 percent) have been with the Forest Service and six have been with the National Park Service. Thirteen of the 33 formal consultations on fire management were conducted on wildfire suppression or burned area reclamation. Six of these formal consultations were on emergency suppression actions. The Service's foremost concern in emergency situations is the protection of human life; recommendations made by the

Service for protection of Mexican spotted owl are secondary to this concern.

Consultations on wildfires address the effects of fire-fighting activities, not of the wildfire itself. For example, formal consultation was conducted on suppression of the Madera Fire, which occurred on the Tonto National Forest in Gila County, Arizona, in July 1998. Formal consultation was initiated because suppression activities occurred within a PAC. Incidental take of a pair of Mexican spotted owls, in the form of harassment, was anticipated from operation of vehicles, water and retardant drops, aircraft overflights, construction of hand line, and associated noise and disturbance.

The remaining 20 formal consultations on fire management were for prescribed burning, tree thinning projects, fire management plans, or Wildland-Urban Interface (WUI) projects. Measures typically specified to minimize incidental "take" of Mexican spotted owl in fire and ecosystem management projects include: protecting 100-acre areas around known nest sites; minimizing fire intensity; retaining trees larger than nine inches dbh; retaining large, downed woody debris (greater than 12 inches diameter) and snags; conducting treatments during the nonbreeding season (1 September - 28 February) in occupied habitat, if possible; and monitoring and reporting of actual effects.

Figure 7. Wildfires, prescribed fires, and fuel reduction treatments in Forest Service, Region 3. Source: U.S. Forest Service, 2004.



3.4.2 Effects on Fire and Ecosystem Management

3.4.2.1 No Action Alternative Fire and ecosystem management would not change compared to the existing condition with the No Action Alternative. Potential effects of fire and ecosystem management projects on Mexican spotted owl would continue to be assessed through the section 7 consultation process, which considers impacts to both PACs and suitable habitat outside of PACs.

3.4.2.2 Alternatives I, II, and III Designation of critical habitat would cause reinitiation of section 7 consultation for ongoing fire and ecosystem management projects in designated areas. This effect would vary, with Alternative I most likely to cause the greatest number of consultation reinitiations and Alternative III causing the least.

Reinitiation of consultation could result in substantial delays in implementation of high-priority fuel reduction treatments for WUI projects. There are 158 high-priority WUI projects that have undergone consultation and ready for implementation (Forest Service, 2001; Service, 2001). Designation of critical habitat in these projects areas would require the Forest Service to reinitiate section 7 consultation with the Service. The Forest Service would have to update the programmatic Biological Assessment for the projects, which would entail intensive Geographic Information System analysis and updating the assessment with new information. The delay caused by reinitiation could be on the order of six months or more. Delaying high-priority projects for this length of time or longer could result in a substantial increase in risk to human health and safety associated with catastrophic wildfire.

Existing consultations have likely addressed all habitat issues that would arise during consultation on effects to designated critical habitat. For example, recent conferencing on the effects of a proposed wildland-urban interface project on proposed critical habitat did not identify any additional conservation recommendations (Service, 2004a). Recommendations for seasonal restrictions on work activity would not be made in consultation on effects to critical habitat. Seasonal restrictions on work activity are typically a component of section 7 consultation under the jeopardy standard when a project is proposed in a PAC. However, there is the possibility that consultation on designated critical habitat could identify additional discretionary conservation recommendations for minimizing impacts. This could result in minor project modifications but would be unlikely to cause delays in project implementation. Given the importance of fire and ecosystem management in recovery of Mexican spotted owl, it is very unlikely that project modifications would be substantial.

3.4.2.3 Option A Option A would exclude the 158 high-priority WUI project areas from critical habitat designation. Designation of critical habitat with Option A and alternatives I or II would not cause reinitiation of section 7 consultation on these projects. Therefore, there would be no delays in project implementation caused by critical habitat designation and no increase in risk to human health and safety associated with catastrophic wildfire.

3.5 Livestock Grazing

3.5.1 Existing Conditions

Livestock grazing in habitat of Mexican spotted owl occurs primarily on Forest Service and tribal lands. Currently, there are 1,417 active domestic livestock grazing allotments on national forests in the Southwestern Region (U.S. Forest Service, 2004). Fifty percent of permitted livestock grazing is for year-long use, while 43 percent is for summer use, and seven percent is for winter use (U.S. Forest Service, 2004).

There has been a general trend of decreasing livestock grazing levels on national forests in the Southwestern Region from 1985 through 2002 (Figure 8; U.S. Forest Service, 2004). Grazing levels fluctuate primarily in response to forage and market conditions. Climate has an overriding influence on forage conditions in the Southwest, and drought conditions since 1996 have been a major cause of declining grazing levels. Other factors that may influence grazing levels on a smaller scale include elective non-use by permittees, non-use for resource protection prompted by declining range conditions or forage production, and exclusion of livestock from sensitive habitats, especially riparian areas, for conservation of listed species, or to comply with forest plan standards and guidelines (U.S. Forest Service, 2004).

Amendment of forest plans in the Southwestern Region in 1996 incorporated standards and guidelines to minimize impacts on Mexican spotted owl. With respect to grazing, the plan amendments included the following guidelines to prevent jeopardy to Mexican spotted owl (U.S. Forest Service, 1995: 157):

"Implement forest plan forage utilization standards and guidelines to maintain owl prey availability, maintain potential for beneficial fire while inhibiting potential destructive fire, maintain and restore riparian ecosystems, and promote development of owl habitat. Strive to attain good to excellent range condition."

Fifty-three informal and 13 formal consultations have been conducted on livestock grazing actions involving effects to Mexican spotted owl. All of the formal consultations were with the Forest Service on grazing management plans. Section 7 consultations on effects of grazing actions to Mexican spotted owl consider impacts to both PACs and suitable habitat outside of PACs.

An example of modifications to grazing management resulting from consultation on Mexican spotted owl is provided by the *Mud-Tinny and Tinny Springs Grazing Allotments Biological Opinion* (Service, 1999). This formal consultation was completed in 1999 and involved livestock grazing on two allotments on the Mormon Lake Ranger District of the Coconino National Forest, Coconino County, Arizona. The two allotments contained all or portions of 37 PACs. Incidental take of Mexican spotted owls associated with three PACs was anticipated from harm caused by *"reduction of suitability of the habitat for prey species, thus limiting the availability of prey for owls"* due to poor range condition of meadows and spring areas. Measures required to minimize incidental take included modifying or constructing fencing to exclude cattle from specific springs and meadow areas, herding to prevent cattle from congregating at specific springs and associated meadows, monitoring to ensure that specified forage utilization levels were not exceeded, and moving cattle between pastures when threshold forage

Figure 8. Livestock grazing levels in Forest Service, Region 3, 1985-2002. Grazing level is expressed as 1,000s of Animal Unit Months (AUMs). An Animal Unit Month is defined as the amount of dry forage required by one animal unit for one month based on a forage allowance of 26 pounds per day.



utilization levels were met. No reductions in the number of Animal Unit Months (AUMs) on the allotment were required as part of the consultation on effects to Mexican spotted owl.

3.5.2 Effects on Livestock Grazing

3.5.2.1 No Action Alternative The effect of section 7 consultation on grazing actions would not change, compared to the existing condition, with the No Action Alternative. Section 7 consultations, as described above, would continue to assess effects to Mexican spotted owl due to impacts to suitable habitat that is outside of any PAC. Management measures implemented to improve habitat for Mexican spotted owl may result in long-term increases in forage production, particularly in ponderosa pine and piñon-juniper woodland habitats (Forest Service, 1995: 19). This would occur with restoration of forest stands to more natural vegetation structure and ecological function.

The economic analysis assumed that continuing conservation activities for Mexican spotted owl, irrespective of critical habitat designation, would result in a 10 percent to 50 percent reduction in AUMs in protected habitat areas (*i.e.* all occupied nest or roost areas, all areas with slope greater than 40 percent where timber harvest has not occurred in the past 20 years, and all legally administered reserved lands such as Wilderness Areas or Research Natural Areas). However, the analysis pointed out that the AUM reduction assumption was overstated because "*multiple factors affect reductions in AUMs other than MSO conservation and that reductions [in AUMs] are likely to result from a combination of factors in addition to MSO conservation, such as forage availability, competition with other ungulates, and competing management priorities*"

(Industrial Economics, Inc., 2004: ES-8 and Chapter 4). Furthermore, habitat of Mexican spotted owl (*i.e.* steep slopes in densely forested areas) is typically poorly suited for livestock grazing. However, the economic analysis assumed that AUMs were distributed evenly, regardless of habitat, which contributes to the overstatement of impacts to grazing from ongoing Mexican spotted owl conservation activities (Industrial Economics, Inc., 2004: ES-21).

3.5.2.2 Alternatives I, II, and III and Option A

Designation of critical habitat would cause reinitiation of section 7 consultation for ongoing grazing management actions in designated areas. This effect would vary, with Alternative I most likely to cause the greatest number of consultation reinitiations and Alternative III causing the least. The consequences of critical habitat designation would be negligible, in terms of potential modifications to or restrictions of grazing actions. This is because impacts to suitable habitat (both within and outside of PACs) are currently being assessed in section 7 consultations on effects to the species (*i.e.* under the jeopardy standard). Livestock grazing levels may change in the project area, irrespective of critical habitat designation, for reasons such as drought, market conditions, and other land management requirements.

The economic analysis concluded that future impacts to livestock grazing would be associated with ongoing conservation actions for Mexican spotted owl, irrespective of critical habitat designation. The only effect of critical habitat designation on livestock grazing would be "*some additional administrative costs related to addressing critical habitat in future consultation efforts.*" With designation of critical habitat, "*future impacts related to section 7 consultations and project modifications are expected to remain*

largely the same" as under existing conditions (Industrial Economics, Inc., 2004: ES-6).

Option A combined with either alternative I or II would have little added effect on livestock grazing because of the relatively small areas involved. There would be no additional effect from combination of Option A with Alternative III, because Alternative III excludes Forest Service lands in New Mexico and Arizona.

3.6 Tribal Trust Resources

3.6.1 Existing Conditions

The United States has a trust responsibility and treaty obligations to Indian tribes and members of those tribes. *Tribal trust resources* are natural resources that are retained by or reserved for Indian tribes through treaties, statutes, judicial decisions, and executive orders. The United States is entrusted with these resources for the benefit of Indian tribes. However, tribal lands are not federal public lands or part of the federal domain and are therefore not subject to federal land laws, such as the National Forest Management Act. Tribal lands are managed by Indian tribes consistent with their goals and objectives.

The analysis area for the critical habitat designation alternatives includes some lands of the Navajo Nation, Mescalero Apache Tribe, and San Carlos Apache Tribe. Lands of the Navajo Nation encompass 15,582,080 acres in portions of New Mexico, Arizona, and Utah. About 250,588 acres are wooded or forested (Mikesic, 2000). The Navajo Reservation was established in 1868. The Navajo Nation is the largest federally recognized tribe in the United States, with 255,543 enrolled members. Population of Navajo

Nation tribal lands was 180,000 in 2000, which included 168,000 enrolled members of the Navajo Nation (Navajo Nation, 2003).

Lands of the Mescalero Apache Tribe are located in the northern half of Otero County, New Mexico. The reservation was established in 1873, and now encompasses 460,661 acres. There are approximately 4,000 tribal members living on lands of the Mescalero Apache Tribe (Mescalero Apache Tribe, 2003).

Lands of the San Carlos Apache Tribe are located in Gila, Pinal, and Graham counties in Arizona and include 1,834,781 acres. The San Carlos Apache Reservation was established in 1871. About one-third of the lands are forested or wooded. Population on San Carlos Apache tribal lands was 9,385 in 2000 (Arizona Department of Commerce, 2003; Inter Tribal Council of Arizona, 2003).

Important uses of tribal lands include economic activities such as timber harvest, livestock grazing, fuel-wood collection, recreation, and commercial and residential development. Tribal lands are also of major cultural significance. Cultural uses of the land by tribal members may include gathering of particular plant materials, ceremonial uses of specific sites, and other traditional practices.

Implementation of the ESA on Indian lands is guided by Secretarial Order #3206 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act). This order directs the Department of Interior to carry out its responsibilities under the ESA *"in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty ...and that strives to ensure that Indian tribes do not bear a disproportionate burden for the*

conservation of listed species." The order also acknowledges that *"Because of the unique government-to-government relationship between Indian tribes and the United States, the Departments and affected Indian tribes need to establish and maintain effective working relationships and mutual partnerships to promote the conservation of sensitive species ... and the health of ecosystems upon which they depend."*

In this context, the Service worked with the Navajo Nation, Mescalero Apache Tribe, and San Carlos Apache Tribe to develop management plans for Mexican spotted owl. The Navajo Nation completed the *Navajo Nation Management Plan for Mexican Spotted Owl* in 2000, and the Mescalero Apache Tribe completed the *Mexican Spotted Owl Management Plan for the Mescalero Apache Indian Reservation* in 1998. The San Carlos Apache Tribe developed two plans: the *Mexican Spotted Owl Conservation Plan* in 2003 and the *Mexican Spotted Owl Conservation Plan for the Malay Gap Forest Management Unit* in 1997.

There has only been one informal consultation regarding potential effects of a specific cultural activity to Mexican spotted owl. Cultural activities by tribes have typically been practiced for such a long time that they are part of the baseline condition for Mexican spotted owl. There have been no instances where gathering of plant materials for cultural uses or ceremonial use of specific areas has been determined to affect Mexican spotted owl.

3.6.2 Effects on Tribal Trust Resources

3.6.2.1 No Action Alternative No designation of critical habitat for Mexican spotted owl would not change the manner or effect of section 7 consultations with tribes compared to existing conditions. Management of natural resources on tribal lands and implementation of management plans for Mexican spotted owl would continue. The ability of tribes to manage natural resources on their lands for the benefit of their people would not change from existing conditions. Cultural uses of plant materials or ceremonial uses of specific areas would continue to be unaffected by section 7 consultations involving Mexican spotted owl.

3.6.2.2 Alternative I Designation of critical habitat with Alternative I would include 1,356,164 acres of tribal lands, consisting of parts of the Navajo Nation, Mescalero Apache Tribe, and San Carlos Apache Tribe lands. Section 7 consultations are not likely to be substantially different from existing conditions, because potential effects to suitable habitat outside of PACs are part of existing consultations pursuant to Service policy (Service, 1996a). However, the Navajo Nation, San Carlos Apache Tribe, and the Southwest Region of the Bureau of Indian Affairs indicated during the comment period that designation of critical habitat would have an adverse effect on working relationships with the Service (Shirley, 2003; Kipp, 2003; Kitcheyan, 2003). The adverse effect would result from the potential for or perception of increased federal involvement and control of tribal land management and reducing the ability of tribes to manage their lands for their own benefit. It is unlikely that critical habitat designation would directly affect a Tribe's proposed action unless

the action would adversely modify critical habitat. Otherwise, consultations would include only discretionary conservation recommendations. Nevertheless, the potential to adversely affect the working relationship could compromise the government-to-government relationship that is essential to achieving the mutual goal of managing healthy ecosystems and maintaining the federal trust responsibility.

3.6.2.3 Alternatives II and III Designation of critical habitat under alternatives II and III would exclude tribal lands. Therefore, effects of these two alternatives on tribal trust resources would be the same as the No Action Alternative.

3.7 Economic Conditions

3.7.1 Existing Conditions

There are over 190,000 business establishments that employ over 2.9 million people in the 52-county analysis area. The service industry is the major employer in the analysis area, composing 47 percent of all jobs (Table 7). Retail trade is the second-leading industry in terms of employment, followed by manufacturing. These three employment sectors combined make up about 70 percent of all jobs in the analysis area. Timber and livestock grazing employment is a component of the "Agriculture and Forestry" sector in Table 7. The agriculture and forestry employment sector represents 0.09% of all jobs in the analysis area (Industrial Economics, Inc., 2004).

Table 7. Employment by industry in the analysis area. The analysis area includes only those counties in each state where critical habitat may be designated. Source: Industrial Economics, Inc., 2004.

Employment Sector	AZ Counties	CO Counties	NM Counties	UT Counties
Total Jobs	1,901,737	499,932	455,384	63,577
Services	873,425 (46%)	242,760 (48%)	228,513 (50%)	26,847 (42%)
Retail Trade	258,033 (13%)	80,600 (16%)	70,232 (15%)	12,031 (19%)
Manufacturing	192,545 (10%)	45,313 (9%)	29,903 (6%)	5,029 (8%)
Mining	11,397 (0.60%)	1,517 (0.30%)	7,293 (1.6%)	3,190 (5%)
Agriculture & Forestry	1,772 (0.09%)	167 (0.03%)	579 (0.13%)	120 (0.19%)

The service industry composed 41.2 percent of the total annual payroll in the analysis area in 2001. Manufacturing, retail trade, and construction accounted for another 32.8 percent of total annual payroll. Agriculture and forestry industries composed 0.02 percent of total annual payroll in the analysis area in 2001 (Industrial Economics, Inc., 2004).

Forestry-related earnings may play a slightly larger economic role at the county level. However, nowhere do earnings attributable to the forestry industry exceed one percent of the total county earnings. Although agriculture is a minor contributor to total economic activity in the analysis area, livestock production is the dominant agricultural activity, in terms of total receipts, in the analysis area.

3.7.2 Effects on Economic Conditions

3.7.2.1 No Action Alternative Economic efficiency and distributional impacts resulting from ongoing conservation actions for Mexican spotted owl would continue, as described in the economic analysis (Industrial Economics, Inc., 2004). Ongoing conservation actions for Mexican spotted owl are estimated to result in economic efficiency impacts ranging from \$1.0 to \$3.3 million per year. These impacts include the costs of section 7 consultations, costs associated with project modifications, and losses in grazing permit value.

3.7.2.2 Alternatives I, II, and III Designation of critical habitat under any of the action alternatives would have a small economic efficiency impact related to the addition of critical habitat considerations in section 7 consultations. The economic analysis of critical habitat designation for Mexican spotted owl concluded that:

"...many of the expected future [economic] impacts represent ongoing impacts resulting from past conservation efforts. For the most part, this analysis does not anticipate that MSO CHD [Mexican Spotted owl critical habitat designation] will result in additional economic impacts above and beyond the current regulatory burden. With the exception of some additional administrative costs related to addressing critical habitat in future consultation efforts, future impacts related to section 7 consultations and project modifications are expected to remain largely the same as historical costs associated with these activities. In addition, because future regional economic impacts related to the timber, livestock grazing and oil and gas

industries are associated with ongoing management actions, few additional impacts to these activities are anticipated in the future" (Industrial Economics, Inc., 2004: ES-6).

The economic analysis also recognized that some impacts attributed solely to overall conservation of Mexican spotted owl were likely exaggerated because they were the product of numerous factors, of which conservation of Mexican spotted owl was only one.

"In some instances, these [economic] impacts could be overstated where impacts related to MSO conservation cannot be separated from impacts related to other factors, such as declines in the timber market, poor range conditions, or alternative Agency management objectives" (Industrial Economics, Inc., 2004: ES-6).

3.8 Recreation Management

3.8.1 Existing Conditions

Recreational uses in habitat of Mexican spotted owl occur primarily on federal lands managed by the Forest Service, National Park Service, and Bureau of Land Management. Recreational uses include activities such as camping, hiking, off-highway vehicle use, rock climbing, bicycling, hunting and fishing, birdwatching, and airplane tours.

The analysis area includes portions of the following National Park Service units: Bandelier National Monument; Saguaro National Park; Chiricahua National Monument; Walnut Canyon National Monument; Grand Canyon National Park, Canyon de Chelly National Monument;

Glen Canyon National Recreation Area; Capitol Reef National Park; Canyonlands National Park; and Zion National Park.

The analysis area also includes Escalante National Monument, which is managed by the Bureau of Land Management and includes the following Wilderness Study Areas: Blues; Mud Spring Canyon; Death Ridge; Paria-Hackberry; and Wahweap. Other Wilderness Study Areas administered by the Bureau of Land Management in Utah include: Desolation Canyon; Jack Canyon; Turtle Canyon; Fiddler Butte; French Spring-Happy Canyon; Horseshoe Canyon; Indian Creek; Bridger Jack Mesa; Middle Point; Little Rockies; Dirty Devil; Fish Creek Canyon; Mount Pennel; Canaan Mountain; Parunweap; Deep Creek; Orderville Canyon; North Fork Virgin River; The Watchman; La Verkin Creek; and Spring Creek Canyon. Bureau of Land Management Wilderness Study Areas in Colorado that are within the analysis area include Beaver Creek.

National Forests within the analysis area are: Pike-San Isabel; Carson (including portions of the Latir Peak and Wheeler Peak wilderness areas); Santa Fe (including portions of the Pecos Wilderness and the Jemez National Recreation Area); Cibola (including Sandia Mountain, Manzano Mountain, Apache Kid, and Withington wilderness areas); Lincoln (including the White Mountain and Capitan Mountains wilderness areas); Gila (including the Aldo Leopold, Gila, and Blue Range wilderness areas); Apache-Sitgreaves (including the Bear Wallow and Escudilla wilderness areas); Coronado (including Chiricahua National Monument and the Miller Peak, Mount Wrightson, Pajarita, Pusch Ridge, Ricon Mountain, Mount Graham, Santa Teresa, and Galiuro wilderness areas); Tonto (including the Four Peaks, Mazatzal, Salome, and Sierra

Ancha wilderness areas); Coconino (including the West Clear Creek, Fossil Springs, Red Rock-Secret Mountain, and Kachina Peaks wilderness areas); Kaibab (including the Kanab Creek Wilderness); Prescott (including the Castle Creek and Woodchute wilderness areas); Dixie; and Manti-La Sal (including the Dark Canyon Wilderness).

There is a general trend of increased recreational use of public lands in the analysis area. Associated with this increased use is a heightened demand for developed recreation sites such as campgrounds and picnic areas. Recreation-related actions that may affect Mexican spotted owl include concentrated camping and hiking, off-highway vehicle use, tour plane or helicopter overflights, construction of new facilities or expansion of existing overnight or day-use facilities, and trail construction and maintenance.

The recovery plan includes recommendations for minimizing the impact of recreation management actions. These recommendations include: implementing construction projects located within PACs during the nonbreeding season; assess recreation use within PACs and implement restrictions on new activities, if needed; implement seasonal recreational activity closures, as determined on a case-by-case basis, where warranted (Service, 1995a: 98).

There have been numerous informal consultations on recreation management actions involving potential effects to Mexican spotted owl and its habitat. These consultations typically result in, at most, minor modifications of projects to avoid or minimize impacts to Mexican spotted owl and its habitat. For example, the Lucas Canyon Trail Relocation Project on the Lincoln National Forest in 1997 involved reconstructing four miles of hiking trail, part of which was located in a PAC.

Impacts to the PAC were avoided by conducting work in that area during the nonbreeding season (1 September to 28 February). The Baca Ecosystem Management Area Project on the Apache-Sitgreaves National Forest in 1999 involved reducing the amount of designated trails within PACs, signing them for non-motorized use only, and monitoring the area.

There have been 11 formal consultations on recreation-related actions involving effects to Mexican spotted owl. Ten of the formal consultations were with the Forest Service and one was with the National Park Service. These consultations were on actions ranging from airplane tour overflights to campground construction projects. An example of the latter is the Madera Canyon Developed Recreation Project on the Coronado National Forest. Formal consultation on this project was completed in 1999. The project involved construction of a developed site, including roads, camping sites, and day-use facilities, and various segment of hiking trails. Five PACs were located in the vicinity of the project area. No incidental take of Mexican spotted owl was anticipated because the project would result in less recreational use in PACs due to trail and facility design and siting. Also, construction activities were proposed to be implemented during the nonbreeding season.

3.8.2 Effects on Recreation Management

3.8.2.1 No Action Alternative The effect of section 7 consultation on recreation management actions would not change, compared to the existing condition, with the No Action Alternative. Section 7 consultations, as described above, would continue to assess effects to

Mexican spotted owl due to impacts on habitat of the species, whether or not it is occupied.

3.8.2.2 Alternatives I, II, and III Designation of critical habitat would cause reinitiation of section 7 consultation for ongoing recreation management actions in designated areas. However, the potential for modifications of project is low, as effects to habitat of Mexican spotted owl would already have been considered in consultation on effects to the species. For example, section 7 consultation was reinitiated for the Twilight Campground Development Project on the Coronado National Forest in July 1995 after critical habitat was designated for Mexican spotted owl (Service, 1995b). The biological opinion concluded that although the project would result in localized adverse effects, adverse modification or destruction of critical habitat would not occur. Therefore, there were no mandatory reasonable and prudent alternatives specified in the opinion and the project was not modified. The effect of reinitiating consultation would be greatest with Alternative I and least with Alternative III.

3.9 Oil and Gas Resources

3.9.1 Existing Conditions

Oil and gas leasing and development activities were identified as a potential threat to Mexican spotted owl in the southeastern portion of the Colorado Plateau Recovery Unit, and, to a lesser degree, in the Southern Rocky Mountains - Colorado Recovery Unit (Service, 1995a: 99). The southeastern portion of the Colorado Plateau Recovery Unit includes the San Juan Basin. The San Juan Basin is one of the largest natural gas fields in the United States. Gas production in the basin has been ongoing since the late 1920s, and

substantial remaining reserves indicate production will continue well into the future (Burlington Resources, 2004). Oil and gas activities include exploration (including seismic testing), installation and maintenance of wells, construction and maintenance of treatment and compressor facilities, and construction and maintenance of pipelines and associated facilities.

There have been 32 informal consultations on oil and gas related actions and no formal consultations. Typical requirements placed on oil and gas activities are to conduct surveys for Mexican spotted owl in suitable habitats to determine its presence and schedule activities that cause disturbances within PACs during the nonbreeding season.

3.9.2 Effects on Oil and Gas Resources

3.9.2.1 No Action Alternative The effect of section 7 consultation on oil and gas resource actions would not change, compared to the existing condition, with the No Action Alternative. Section 7 consultations would continue to assess effects to Mexican spotted owl due to impacts on habitat of the species, whether or not it is occupied.

3.9.2.2 Alternatives I, II, and III Designation of critical habitat would cause reinitiation of section 7 consultation for ongoing oil and gas resource actions in designated areas. However, the potential for modifications of project is low, as effects to habitat of Mexican spotted owl would already have been considered in consultation on effects to the species. The effect of reinitiating consultation would be greatest with Alternative I and least with Alternative III.

3.10 Environmental Justice and Social Conditions

3.10.1 Existing Conditions

Federal agencies are required to "*identify and address disproportionately high and adverse human health or environmental effects*" of their programs and actions on minority populations and low-income populations, as directed by Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).

The analysis area for this EA includes 51 counties in four states. In New Mexico, the following counties are in the analysis area: Bernalillo, Catron, Cibola, Colfax, Grant, Hidalgo, Lincoln, Los Alamos, McKinley, Mora, Otero, Rio Arriba, San Juan, San Miguel, Sandoval, Santa Fe, Sierra, Socorro, Taos, Torrance, and Valencia. Arizona counties in the analysis area are: Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, and Yavapai. Colorado counties in the analysis area are: Custer, Douglas, El Paso, Fremont, Huerfano, Jefferson, Pueblo, and Teller. And in Utah, the analysis area includes the following counties: Carbon, Emery, Garfield, Grand, Iron, Kane, San Juan, Washington, and Wayne.

Based on the 2000 census, Arizona had the largest statewide population and the greatest number of people in the analysis area, followed by Colorado. Utah had the third largest population, but the fewest number of people in the analysis area (Table 8).

Table 8. Population size of the four states and the analysis area. Source: U.S. Census Bureau, 2004.

STATE	TOTAL STATE POPULATION	POPULATION OF ANALYSIS AREA
Arizona	5,163,632	4,950,911
Colorado	4,301,261	1,439,288
New Mexico	1,818,046	1,365,676
Utah	2,233,169	191,603
TOTAL	13,516,108	7,947,478

Racial characteristics are similar in the states and the corresponding counties in the analysis area (Figure 9A). Potentially-affected counties in all of the states except New Mexico have a higher percentage of white persons and a lower percentage of racial minorities than the statewide totals. White persons comprise 67 percent of the total population in New Mexico. In the potentially-affected counties in New Mexico, white persons make up 65 percent of the population. American Indians make up a higher percentage of minorities in the potentially-affected counties in Utah (six percent), compared to the statewide population where American Indians are one percent of the population. This is attributable to the contribution of Navajo Nation lands in southeastern Utah to the potentially-affected counties in the state.

The percentage of Hispanic or Latino persons is one to four percent lower in the potentially-affected counties than in the overall state populations (Figure 9B). The differences are greatest in Colorado and Utah.

The percentage of the population that is below the poverty level is the same in the potentially-affected counties in Arizona and the state overall

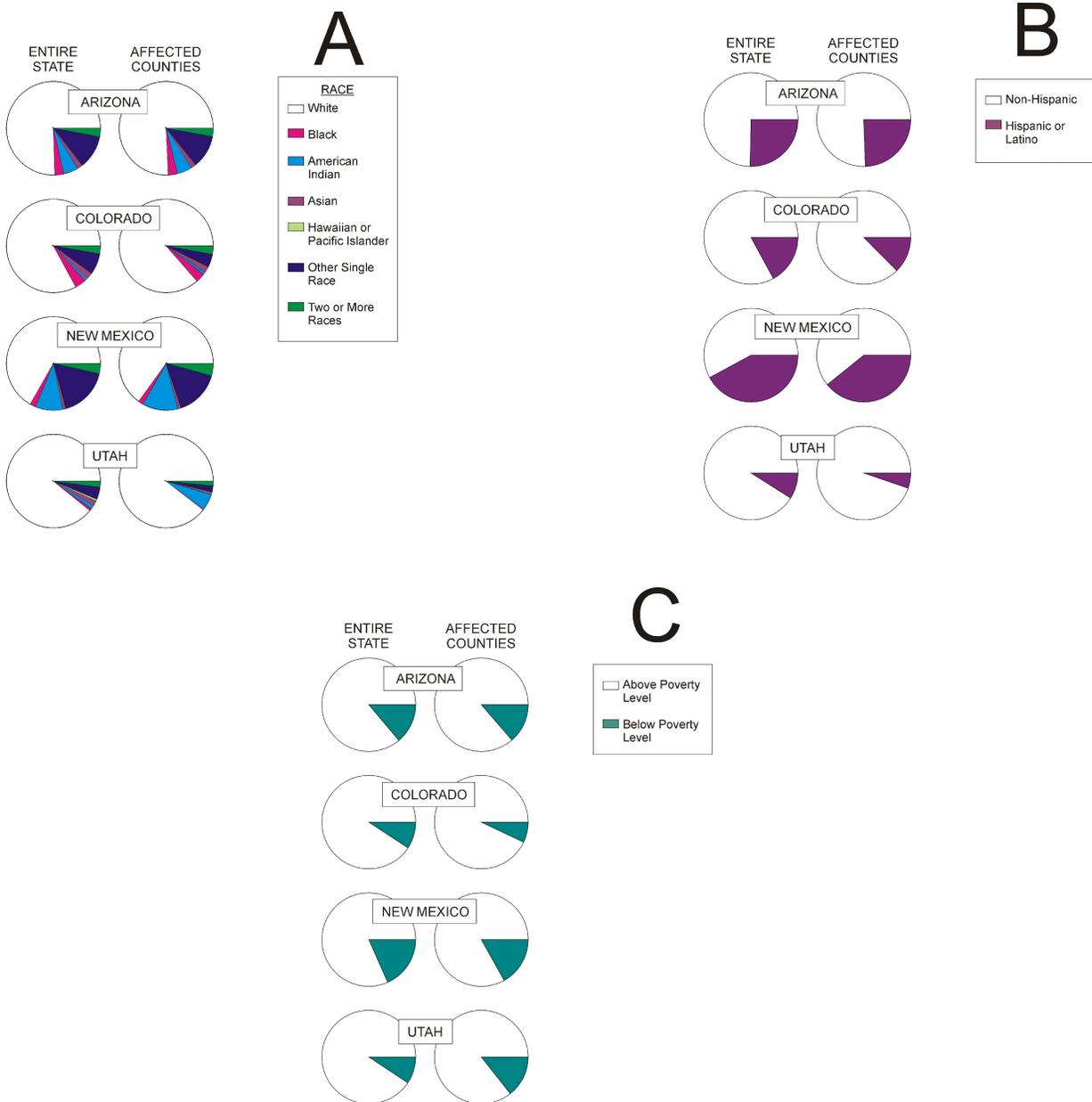
(Figure 9C). In Colorado and New Mexico, there are fewer persons below the poverty level in the potentially-affected counties compared to the state. However, in Utah the percentage of the population below the poverty level is five percent higher than in the state overall.

Social and cultural conditions in the project area are diverse. The project area encompasses human settlements ranging from small rural communities to major metropolitan areas and large areas of dispersed rural populations. Regulations for implementing NEPA require analysis of social effects when they are interrelated with effects on the physical or natural environment (40 CFR §1508.14). The viability of rural communities in the project area is traditionally closely tied to the land. Agriculture, livestock production, and harvest of forest products typically make up the economic base of these communities (*cf.* section 3.7).

3.10.2 Environmental Justice and Effects on Social Conditions

Overall, the percentages of racial minorities, Hispanic or Latino persons, and persons below the poverty level are lower in the analysis area than in the combined, four-state population. These data indicate that any impacts that may result from critical habitat designation under any alternative would not disproportionately affect minorities or low-income groups.

Figure 9. Race and poverty-level characteristics of the analysis area. “A” shows percentage of the total population by race in each of the four states (pie charts on the left) and in the affected counties (pie charts on the right). Percentage of the population that is Hispanic or Latino is shown in “B”. “C” shows the percentage of the population living below the poverty level. Source: U.S. Census Bureau, 2000.



Designation of critical habitat, as described previously, would have an effect only through the Section 7 consultation process. Because impacts to habitat of Mexican spotted owl are already considered in consultation on effects to the species, critical habitat designation would not likely cause any modifications to federal projects that would not occur under existing conditions.

Social conditions related to use of the land are therefore unlikely to change, compared to existing conditions, with designation of critical habitat under any of the action alternatives. Designation of critical habitat under any of the action alternatives would not have any effect on the following social concerns (*cf.* Service, 2004b): community disruption or disintegration, land use patterns, lifestyles, social interactions, family ties, kinship patterns, displacement or relocation of businesses, the ability to provide and deliver social services, public health, public safety, displacement of community facilities, public vehicular access, public pedestrian access, or community tax base.

Designation of critical habitat under any of the action alternatives may have a positive effect on perceived environmental quality for some people. For these people, delineation of geographic areas deemed essential for conservation of Mexican spotted owl provides assurance that forests will be managed for ecosystem integrity, maintenance of biological diversity, and sustainable use as well as conservation of the species. For other individuals, designation of critical habitat under any of the action alternatives may have a negative effect on perceived well-being. Some people may feel threatened by what they see as another government intrusion into their lives and potential restriction on their use of federal lands.

Concerns have been expressed that designation of critical habitat will reduce job opportunities and the economic viability of small rural communities. Because Section 7 consultations already incorporate consideration of habitat for Mexican spotted owl, whether the species is present or not, critical habitat designation is unlikely to result in any incremental impacts to federal actions that would directly or indirectly influence jobs in rural communities.

There are also indications of traditional industries adapting and new industries emerging that are consistent with forest ecosystem restoration and conservation of Mexican spotted owl. For example, the Catron County Citizens Group started a small-diameter wood mill in Reserve, New Mexico, with dual goals of creating jobs and promoting forest restoration efforts. The Arizona Sustainable Forests Partnership was created with the mission of establishing "*an environmentally and economically sustainable forestry industry in Arizona utilizing small-diameter Ponderosa Pine and other under-utilized wood species requiring thinning and restoration.*" Santa Clara Woodworks, located east of Silver City, Grant County, New Mexico, is focused on using small-diameter trees harvested from forest restoration project to produce wood products such as *vigas*, *latillas*, log home materials, and other specialty items. Another initiative, the Grant County Jobs and Biodiversity Coalition is "*a community-based organization that recognizes the potential to stimulate small business and job creation in the local community, through forest ecosystem restoration projects.*" The main goal of the coalition is to restore ecological processes in the local area while creating and supporting sustainable jobs and livelihoods.

3.11 Cumulative Effects

Cumulative effects are "*the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions*" (40 CFR §1508.7). Cumulative effects were analyzed by examining cause-and-effect relationships between critical habitat designation and resources of concern (Council on Environmental Quality, 1997). Critical habitat designation does not have any impact on the environment other than through the section 7 consultation process. Critical habitat designation alone does not establish blanket rules or restrictions on land use, nor does it automatically prohibit or modify any activity. Each proposed federal action that may potentially affect designated critical habitat is analyzed individually during the section 7 consultation process. Individuals, organizations, states, local governments, and other non-federal entities are potentially affected by the designation of critical habitat only if their actions occur on federal lands, require a federal permit, license, or other authorization, or involve federal funding.

The geographic extent for which cumulative effects are considered vary for each of the resources analyzed. The past, present, and reasonably foreseeable future actions in the proposed critical habitat analysis area that, combined with the proposed action, could contribute to cumulative effects include:

- effects of section 7 consultations on other species and other designated critical habitat; and
- existing land management policies and plans.

Effects of proposed critical habitat designation on most resource areas are generally similar under each of the action alternatives, and vary only in terms of potential area of effect. These effects consist primarily of the potential for minor changes to projects resulting from reinitiation of consultation and implementation of discretionary conservation recommendations. Critical habitat designation is unlikely to result in any additional project modifications that would not occur in the absence of designation. This is because impacts to habitat, whether occupied by Mexican spotted owl or not, are already analyzed in Section 7 consultations on effects to the species. Therefore, potential impacts from critical habitat designation would not be likely to result in any incremental impact when added to other past, present, or reasonably foreseeable future actions. Thus, there are unlikely to be any cumulative effects associated with any of the critical habitat designation alternatives.

3.12 Relationship Between Short-Term and Long-Term Productivity

Proposed designation of critical habitat is a programmatic policy that would have no effect on short-term or long-term productivity.

3.13 Irreversible and Irrecoverable Commitment of Resources

Irreversible commitments of resources are those effects that cannot be reversed. For example, the extinction of a species is an irreversible commitment. Irrecoverable commitments of resources are those that are lost for a period of

time, but may be reversed, such as building a shopping center on farmland. The land cannot be used for farming again until the pavement is removed and soils are restored to productivity. Designation of critical habitat for the Mexican spotted owl would result neither in irreversible or irretrievable commitments of resources.

4.0 COUNCIL ON ENVIRONMENTAL QUALITY ANALYSIS OF SIGNIFICANCE

Pursuant to the Council on Environmental Quality regulations for implementing NEPA, preparation of an environmental impact statement is required if an action is determined to significantly affect the quality of the human environment (40 CFR 1502.3). Significance is determined by analyzing the context and intensity of a proposed action (40 CFR 1508.27).

Context refers to the setting of the proposed action and includes consideration of the affected region, affected interests, and locality (40 CFR 1508.27[a]). The context of both short- and long-term effects of proposed designation of critical habitat includes the 51-county analysis area as well as local areas that encompass critical habitat units. The effects of proposed critical habitat designation at both of these scales, although long-term, would be small.

Intensity refers to the severity of an impact and is evaluated by considering ten factors (40 CFR 1508.27[b]). The intensity of potential impacts that may result from proposed designation of critical habitat for Mexican spotted owl is low.

- The potential impacts may be both beneficial and adverse, but minor.
- There would be no effects to public health or safety from proposed designation of critical habitat, and the proposed action would not affect unique characteristics of the geographic area.
- Potential impacts from critical habitat designation on the quality of the environment are unlikely to be highly controversial with respect to substantial dispute or disagreement about the size, nature, or effects of the proposed action and do not involve any uncertain, unique, or unknown risks.
- Proposed designation of critical habitat for Mexican spotted owl does not set a precedent for future actions with significant effects and would not result in significant cumulative impacts.
- Significant cultural, historical, or scientific resources are not likely be affected by proposed designation of critical habitat.
- Proposed critical habitat designation would have a beneficial effect to Mexican spotted owl and other threatened or endangered species (*e.g.* Mexican gray wolf, Gila trout).
- Proposed critical habitat designation would not violate any federal, state, or local laws or requirements imposed for the protection of the environment.

5.0 PREPARERS OF THE EA

This EA was prepared by Blue Earth Ecological Consultants, Inc., under contract to the U.S. Fish and Wildlife Service, Region 2. The economic impact analysis summarized in the EA was prepared by Industrial Economics, Inc.

6.0 REFERENCES

- Arizona Department of Commerce. 2003. *San Carlos Apache Reservation, Community Profile*. Arizona Department of Commerce, Phoenix, Arizona.
- Arno, S. F. and M. G. Harrington. 1999. *Eighty-eight Years of Change in a Managed Ponderosa Pine Forest*. U.S. Department of Agriculture, Forest Service, General Technical Report RMRS-GTR-23.
- Barrowclough, G. F. and R. J. Gutiérrez. 1990. Genetic variation and differentiation in the spotted owl (*Strix occidentalis*). *Auk* 107: 737-744.
- Barrowclough, G. F., R. J. Gutiérrez, and J. G. Roth. 1999. Phylogeography of spotted owl (*Strix occidentalis*) populations based on mitochondrial DNA sequences: gene flow, genetic structure, and a novel biogeographic pattern. *Evolution* 53: 919-931.
- Burlington Resources. 2004. *San Juan Division Web Site*, http://www.br-inc.com/assets/assets_sanJuanBasin.asp.
- Council on Environmental Quality. 1997. *Considering Cumulative Effects Under the National Environmental Policy Act*. Council on Environmental Quality, Executive Office of the President, Washington, D.C.
- Covington, W. W. and M. M. Moore. 1994. Southwestern ponderosa forest structure: changes since Euro-American settlement. *Journal of Forestry* 92(1): 39-47.
- Fletcher, K. W. 1990. Habitats used, abundance, and distribution of the Mexican spotted owl, *Strix occidentalis lucida*, on National Forest System lands. U.S. Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, New Mexico. 55 pp.
- Fletcher, K. W. and H. E. Hollis. 1994. Habitats used, abundance, and distribution of the Mexican spotted owl (*Strix occidentalis lucida*) on National Forest System lands in the Southwestern Region. U.S. Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, New Mexico. 86 pp.
- Forsman, E. D., E. C. Meslow, and H. M. Wright. 1984. Distribution and biology of the spotted owl in Oregon. *Wildlife Monographs* 87: 1-64.
- Ganey, J. L. 1988. Distribution and habitat ecology of Mexican spotted owls in Arizona. M.S. Thesis, Northern Arizona University, Flagstaff, Arizona. 229 pp.
- Ganey, J. L. and R. P. Balda. 1989a. Distribution and habitat use of Mexican spotted owls in Arizona. *Condor* 91: 355-361.

- Ganey, J. L. and R. P. Balda. 1989b. Home-range characteristics of spotted owls in northern Arizona. *Journal of Wildlife Management* 53: 1159-1165.
- Ganey, J. L. and R. P. Balda. 1994. Habitat selection by Mexican spotted owls in northern Arizona. *Auk* 111: 162-169.
- Ganey, J. L., W. M. Block, J. K. Dwyer, B. E. Strohmeier, and J. S. Jenness. 1998. Dispersal, movements, and survival rates of juvenile Mexican spotted owls in Northern Arizona. *Wilson Bulletin* (2): 206-217.
- Ganey, J. L., W. M. Block, J. S. Jenness, and R. A. Wilson. 1999. Mexican spotted owl home range and habitat use in pine-oak forest: implications for forest management. *Forest Science* 45: 127-135.
- Ganey, J. L., G. C. White, A. B. Franklin, J. P. Ward, Jr., and D. C. Bowden. 2000. A pilot study on monitoring populations of Mexican spotted owls in Arizona and New Mexico: second interim report. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Flagstaff, Arizona. 41 pp.
- Ganey, J. L., W. M. Block, and S. H. Ackers. 2003. Structural characteristics of forest stands within home ranges of Mexican spotted owls in Arizona and New Mexico. *Western Journal of Applied Forestry* 18(3): 189-198.
- Gutiérrez, R. J., A. B. Franklin, and W. S. LaHaye. 1995. Spotted owls (*Strix occidentalis*). In Poole, A. and F. Gill (eds.). *The Birds of North America*, No. 179. The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.
- Industrial Economics, Inc. 2004. *Final Economic Analysis of Critical Habitat Designation for the Mexican Spotted Owl, 19 July 2004*. Prepared for the U.S. Fish and Wildlife Service, Division of Economics, Arlington, Virginia.
- Inter Tribal Council of Arizona. 2003. *San Carlos Apache Tribe, Introductory Information*. http://www.itcaonline.com/tribes_sancar1.html
- Kipp, S. O. 2003. Letter from the Acting Regional Director of the Bureau of Indian Affairs, Southwest Region to Ms. Joy Nicholopolous, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, 19 December 2003. U.S. Department of the Interior, Bureau of Indian Affairs, Southwest Region, Albuquerque, New Mexico.
- Kitcheyan, K. W. 2003. Letter from the San Carlos Apache Tribe, Tribal Chairwoman to Ms. Joy Nicholopolous, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, 9 December 2003. The San Carlos Apache Tribe, San Carlos, Arizona.

- May, C. A. and R. J. Gutiérrez. 2002. Habitat associations of Mexican spotted owl nest and roost sites in central Arizona. *Wilson Bulletin* 114(4): 457-466.
- Mescalero Apache Tribe. 2003. *Mescalero Apache Reservation*. <http://www.mescaleronet.com/index.htm>
- Mikesic, D. 2000. *The Navajo Nation Management Plan for the Mexican Spotted Owl (*Strix occidentalis lucida*)*. Natural Heritage Program, Navajo Nation Department of Fish and Wildlife, Window Rock, Arizona.
- Navajo Nation. 2003. *Navajo Nation Profile*. Navajo Nation Washington Office, <http://www.nnwo.org/nprofile.htm>
- Peery, M., R. J. Gutiérrez, and M. Seamans. 1999. Habitat composition and configuration around Mexican spotted owl nest and roost sites in the Tularosa Mountains, New Mexico. *Journal of Wildlife Management* 63(1): 36-43.
- Seamans, M. E. and R. J. Gutiérrez. 1995. Breeding habitat of the Mexican spotted owl in the Tularosa Mountains, New Mexico. *Condor* 97: 944-952.
- Shirley, J., Jr. 2003. Letter from the President of the Navajo Nation to Field Supervisor, New Mexico Ecological Services Field Office, 10 December 2003, with preface letter by Jeffrey Cole, Acting Director, Navajo Nation Department of Fish and Wildlife. The Navajo Nation, Window Rock, Arizona.
- Skaggs, R. W. and R. J. Raitt. 1988. A spotted owl inventory of the Lincoln National Forest, Sacramento Division. Unpublished report for the New Mexico Department of Game and Fish, Santa Fe, New Mexico. 12 pp.
- Sorrentino, G. and J.P. Ward, Jr. 2003. Analysis of Mexican spotted owl food habits gathered from two caves in the Guadalupe Mountains, Lincoln National Forest, New Mexico. Rocky Mountain Research Station, Cloudcroft, New Mexico.
- Sureda, M. and M. L. Morrison. 1998. Habitat use by small mammals in southeastern Utah, with reference to Mexican spotted owl management. *Great Basin Naturalist* 58(1): 76-81.
- Swetnam, T. W. and C. H. Baisan. 1996. Historical fire regime patterns in the Southwestern United States since AD 1700. Pages 11-32 in: Allen, C. D. (tech. ed.). *Fire Effects in Southwestern Forests, Proceedings of the Second La Mesa Fire Symposium*. U.S. Department of Agriculture, Forest Service, General Technical Report RM-GTR-286.
- Tarango, L. A., R. Valdez, P. J. Zwank, and M. Cardenas. 1997. Mexican spotted owl habitat characteristics in southwestern Chihuahua, Mexico. *The Southwestern Naturalist* 42(2): 132-136.

- U.S. Census Bureau. 2004. *Census 2000 Redistricting Data (Public Law 94-171) Summary Files*. <http://quickfacts.census.gov/qfd/states>.
- USDI Fish and Wildlife Service. 1991. Mexican spotted owl (*Strix occidentalis lucida*) status review. *Endangered Species Report 20*, Albuquerque, New Mexico.
- USDI Fish and Wildlife Service. 1995a. *Recovery Plan for the Mexican Spotted Owl (Strix occidentalis lucida)*. U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico.
- USDI Fish and Wildlife Service. 1995b. *Biological Opinion, Twilight Campground Development Project, U.S. Forest Service, Coronado National Forest, Safford Ranger District*. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona.
- USDI Fish and Wildlife Service. 1996a. *Conducting Section 7 Consultation on Mexican Spotted Owls and Critical Habitat – Policy*. Memorandum from the Assistant Regional Director, Ecological Services, Region 2 to Supervisor, Ecological Services Field Offices, Phoenix, Arizona and Albuquerque.
- USDI Fish and Wildlife Service. 1996b. *Biological Opinion, Mexican Spotted Owl and Critical Habitat and Existing Forest Plans, U.S. Forest Service, Southwestern Region*. U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.
- USDI Fish and Wildlife Service. 1999. *Biological Opinion, Mud-Tinny and Tinny Springs Grazing Allotments, U.S. Forest Service, Coconino National Forest, Mormon Lake Ranger District*. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona.
- USDI Fish and Wildlife Service. 2001. *Biological Opinion, Peñasco WUI Project, U.S. Forest Service, Lincoln National Forest, Sacramento Ranger District*. U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico.
- USDI Fish and Wildlife Service. 2002. *Biological Opinion, Wildland/Urban Interface (WUI) Fuel Treatments in Arizona and New Mexico, U.S. Forest Service, Region 3*. U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.
- USDI Fish and Wildlife Service. 2004a. *Biological and Conference Opinion, Verde Analysis Area Wildland-Urban Interface Fuels Reduction Treatment, U.S. Forest Service, Tonto National Forest, Payson Ranger District*. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona.
- USDI Fish and Wildlife Service. 2004b. *National Environmental Policy Act Handbook - Environmental Impact Checklist for Some of the More Common Social Concerns*. U.S. Fish and Wildlife Service, <http://www.fws.gov/r9esnepa/checklists/cklstSocial.PDF>.

- U.S. Forest Service. 1995. *Final Environmental Impact Statement for Amendment of Forest Plans*. U.S. Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, New Mexico.
- U.S. Forest Service. 2001. *Biological Assessment and Evaluation, Wildland Urban Interface Fuel Treatment*. U.S. Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, New Mexico.
- U.S. Forest Service. 2004. *Draft Resource Program Report*. Unpublished report, U.S. Forest Service, Southwestern Region, Albuquerque, New Mexico.
- Ward, J. P., Jr. 2001. *Ecological Responses by Mexican Spotted Owls to Environmental Variation in the Sacramento Mountains, New Mexico*. Ph.D. Dissertation, Colorado State University, Fort Collins.
- Ward, J. P., Jr. and W. M. Block. 1995. Mexican spotted owl prey ecology. Chapter 5 (48 pp) *in*: USDI Fish and Wildlife Service. Recovery plan for the Mexican spotted owl (*Strix occidentalis lucida*), Volume II. U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico.
- Ward, J. P., Jr., A. B. Franklin, S. E. Rinkevich, and F. Clemente. 1995. Distribution and abundance of Mexican spotted owl. Chapter 1 (14 pp) *in*: USDI Fish and Wildlife Service. Recovery plan for the Mexican spotted owl (*Strix occidentalis lucida*), Volume II. U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico.
- White, G. C., A. B. Franklin, and J. P. Ward, Jr. 1995. Population biology. Chapter 2 (25 pp) *in*: USDI Fish and Wildlife Service. Recovery plan for the Mexican spotted owl (*Strix occidentalis lucida*), Volume II. U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico.
- Willey, D. W. 1993. Home-range characteristics and juvenile dispersal ecology of Mexican spotted owls in southern Utah. Unpublished report, Utah Division of Wildlife Resources, Salt Lake City, Utah.
- Young, K. E., P. J. Zwank, R. Valdez, J. L. Dye, and L. A. Tarango. 1997. Diet of Mexican spotted owls in Chihuahua and Aguascalientes, Mexico. *Journal of Raptor Research* 31(4): 376-380.
- Young, K. E., R. Valdez, P. J. Zwank, and W. R. Gould. 1998. Density and roost site characteristics of spotted owls in Sierra Madre Occidental, Chihuahua, Mexico. *Condor* 100: 732-736.

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