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In Reply Refer To:
AESO/SE
02-21-02-F-0206

June 01, 2006

Ms. Nora B. Rasure
Forest Supervisor
Coconino National Forest
1824 South Thompson Street
Flagstaff, Arizona 86001-2529

RE: East Clear Creek Watershed Health Project Biological Opinion

Dear Ms. Rasure:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated December 16, 2005, and received by us on December 21, 2005. This consultation concerns the possible effects of the East Clear Creek Watershed Health Improvement Project, Coconino County, Arizona, on the threatened Little Colorado spinedace (*Lepidomeda vittata*) and its critical habitat, and the threatened Mexican spotted owl (*Strix occidentalis lucida*) (MSO) and its critical habitat. In addition, the Forest Service has determined that the proposed action "may affect, but will not likely adversely affect" the threatened bald eagle (*Haliaeetus leucocephalus*) and threatened Chiricahua leopard frog (*Rana chiricahuensis*). We concur with your determinations. The basis for our concurrence is found in Appendix A.

This final biological opinion is based on information provided in the December 16, 2005, Biological Assessment and Evaluation (BAE), conversations and electronic correspondence with your staff, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the Little Colorado spinedace, MSO, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Details of the consultation history are summarized in Table 1.

Table 1. Summary of Consultation History

<i>Date</i>	<i>Event</i>
September 1999	The FWS, Forest Service, Arizona Game and Fish Department (AGFD), and permittee for the Buck Springs Range Allotment completed the East Clear Creek Watershed Strategy for the Little Colorado Spinedace and Other Riparian Species. This is the document upon which the East Clear Creek Watershed Health Project is based.
May 1, 2002	We received the first Environmental Assessment (EA) the Forest Service completed for the East Clear Creek Watershed Health Project.
August 2, 2002	We provided comments on the EA.
February 20, 2004	We received a letter from the Forest Service informing the public that the above EA was not implemented and that due to several issues, the Forest Service was re-initiating the scoping process for the East Clear Creek Watershed Health Project.
March 29, 2004	We provided comments on the proposed action/scoping letter.
June 6, 2005	We received the letter from the Forest Service indicating that the 30-day comment period for the EA for the East Clear Creek Watershed Health Project would begin on June 7, 2005.
July 11, 2005	We received the June 2005 EA for the East Clear Creek Watershed Health Improvement Project.
July 15, 2005	You requested formal consultation for potential adverse affects to the MSO and Little Colorado spinedace resulting from implementation of the East Clear Creek Watershed Health Improvement Project.
August 19, 2005	We acknowledged your request for formal consultation with a 30-day letter.
October 12, 2005	The Forest Service informed us they were going to create a new preferred alternative to the East Clear Creek Watershed Health Improvement Project, based on comments received on the June 2005 EA, and they would be sending a new BAE to us. We informed your staff that the Forest would need to reinitiate consultation on the project due to significant changes in the proposed action.
November 16, 2005	We met with Forest Service staff to discuss the new alternative and information for a revised BAE.
November 18, 2005	You withdrew your request for consultation pending the preparation of a revised BAE for the project.
December 12, 2005	We received the revised BAE for the project.

December 21, 2005	We received your request for formal consultation on the revised East Clear Creek Watershed Health Improvement Project
January 5, 2006	We received a copy of the specialist's report for the proposed action.
January 25, 2006	We acknowledged your request for formal consultation with a 30-day letter.

BIOLOGICAL OPINION

DESCRIPTION OF THE ACTION

The Coconino National Forest is proposing to conduct the East Clear Creek Watershed Improvement Project, which is designed to: restore vegetative health and diversity; reduce the potential for stand-replacing wildfire; restore soils, meadow systems, and riparian areas; and reduce road impacts to watershed condition and riparian habitat. The project area encompasses approximately 70,800 acres of Forest Service lands within the East Clear Creek Watershed. The project area is located southeast of State Highway 87, and south of East Clear Creek, on the Mogollon Rim Ranger District in Coconino County, Arizona. The eastern boundary is formed by Leonard Canyon, the southern boundary is the Mogollon Rim, and the western boundary runs along the old Blue Ridge and Long Valley Ranger District border. The project will be implemented over approximately the next 10 to 15 years, depending upon funding and the ability to implement burning prescriptions successfully.

The Coconino National Forest, FWS, AGFD, and the allotment permittee conducted an assessment of watershed conditions in the East Clear Creek Watershed in 1999, which resulted in the "*East Clear Creek Watershed Recovery Strategy for the Little Colorado spinedace and other Riparian Species.*" This document identified current and ongoing impacts to the watershed, the needs for reducing these impacts, and recommended potential projects and actions to reduce and/or eliminate those impacts. The East Clear Creek Watershed Health Improvement Project includes the proposed implementation of many of those recommendations.

Specific treatments included in the proposed action may be put in one of three categories: forest health and fuels treatments; soils, meadow systems, and riparian area treatments; and road management treatments. The full project treatment is described in the December 2005 BAE and the June 2005 EA. However, we will briefly summarize the proposed project activities below:

Forest Health and Fuel Treatments

- Burn approximately 14,500 acres over a 10-15 year period to encourage new understory growth, stimulate browse species, reintroduce fire into the landscape, and reduce fuel loadings. After the initial prescribed burning is completed, ponderosa pine and mixed conifer trees up to 12 inches diameter-at-breast height (dbh) would be thinned-from-below on approximately 8,935 acres within the burned acreages. Thinning would be

variable spaced, creating openings and leaving clumps. The thinning will feature protection and removal of small competing trees around individual and clumps of yellow pines and large oaks (10 inches diameter-at-root collar). All small conifers would be removed from aspen patches. Opening sizes would vary from 0.5 acre to four acres in size. Slash would be lopped and scattered to a 2-foot height. A second burn would occur in the entire 14,500 acres after thinning to maintain low fuel loads.

- Thin trees up to nine inches dbh on approximately 165 acres. Thinning would be variable spaced, creating openings and leaving clumps. The thinning would feature protection and removal of small competing trees around individual and clumps of yellow pines and large oaks [a large oak is defined as 10 inches diameter-at-root collar (drc) or greater]. Opening sizes will vary from 0.25 to 0.5 acre. Slash would be hand piled in openings.
- Thin trees between 5 to 18 inches dbh on approximately 1,052 acres to reduce long-term fire risk, improve understory biodiversity, and improve tree growth. These acres will be broadcast burned after tree removal, with machine piling at landings. Proposed treatments include thinning from below on 650 acres and uneven-aged prescriptions on 402 acres. Treatments will be variable spaced, creating openings and leaving clumps.
- Thin trees up to nine inches dbh on approximately 1,150 acres along Forest Road (FR) 95, FR 96, FR137, FR 321, FR 295, FR 751, FR300, and FR 139 to create fuel breaks approximately 100 feet on either side of these roads. The thinning within the fuel break will be a variable spacing thinning, with more openings/less basal area near the road, feathering back to denser forest conditions. Brushing to restore right-of-ways only (no thinning to 100 feet) will occur in the Lockwood Draw MSO Protected Activity Center (PAC) (#040701) along FR 96 and in the Rock Crossing PAC (#040712) along FR 751. The fuels treatments in these areas will be either lop and scatter or hand pile and burn.
- Conduct research thinning and burning in mixed conifer sites. The objectives of these thinning prescriptions would be to: define and enhance existing small openings up to an acre in size; promote a multi-storied stand structure; retain existing Douglas fir, Gambel oak, southwestern white pine, aspen, and bigtooth maple in all size classes; and retain all dead trees >12 inches dbh. Prior to marking, stem maps will be generated to illustrate the thinning prescription. The research blocks would consist of the following treatments:
 - 1) Control (no treatment) on approximately 175 to 210 acres.
 - 2) Broadcast burn only on approximately 175 to 210 acres.
 - 3) Thin to a variable tree density, leaving a residual basal area of 80 to 100 square feet per acre, lop and scatter, then broadcast burn on approximately 175 to 210 acres.
 - 4) Thin to a variable density, leaving a residual basal area of 60-80 square feet per acre, lop and scatter, then broadcast burn on approximately 175 to 210 acres.

Soils, Meadow Systems, and Riparian Area Treatments

- Use natural channel design or headcut drop structures to stabilize headcuts, lay back vertical stream banks, hydro-mulch disturbed areas, and improve the functioning condition in Barbershop Canyon, Houston Draw, Lockwood Draw, East Bear Canyon, Buck Springs, Dick Hart Draw, Kinder Draw, and Bill McClintock Draw meadows. Total length of treatment would be approximately ten miles. Culverts would be raised to create ponded wetlands, and energy dissipaters would be installed on the outlet side of Dick Hart Draw meadow to improve the functioning condition.
- Remove or rehabilitate four tank sites in the Dick Hart Draw meadow to improve vegetative ground cover and functioning condition.
- Construct elk enclosure fences in Bear Canyon, Buck Springs, Houston Draw, Dick Hart Draw, Bill McClintock Draw, Lockwood Draw, Kinder Draw, and Barbershop Canyon.
- Rehabilitate or remove any stream channel wood structures located in Buck Springs and Houston Draw that are not functioning properly.
- Thin trees up to 16 inches dbh on approximately 83 acres in upland areas above Merritt, McFarland, Limestone Tank and Upper Buck Springs to increase flow duration of springs.
- Remove encroaching conifers up to nine inches dbh in meadow systems on approximately 330 acres in Bear Canyon, Houston Draw, Barbershop Canyon, Buck Springs, Bill McClintock Draw, Kinder Draw, East Bear Canyon, General Springs, Holder Cabin, Merritt Draw, Middle Leonard Canyon, West Leonard Canyon, and McClintock Springs. Slash would be lopped and scattered to a two-foot height across meadows.

Road Management Treatments

Under this proposal, roads would be designated to provide recreation and administrative access and minimize impacts to riparian areas and threatened, endangered, and sensitive species habitat. Specifically the Forest Service would:

- 1) Designate 306 miles of open roads;
- 2) Close 47 miles of currently open roads;
- 3) Decommission and obliterate 29.8 miles of currently open roads; and
- 4) Decommission and obliterate 14.2 miles of currently closed roads.

The following is a list of specific activities in the project area aimed at reducing impacts of roads and vehicular access to riparian resources.

- Stabilize stream crossings and install or maintain proper drainage and energy dissipaters to minimize sediment production and mitigate flows to streams on 16 roads and 46 stream crossing sites.

- Decommission forest system roads to maintain a natural flow regime and minimize sedimentation and headcutting on previously obliterated roads. Decommissioning would include removing the old roadbed, shaping it to the natural contour, replanting the area, and blocking the front of the road to discourage use.
- Pave the following locations (approximately 100 feet on both sides of crossings) and install energy dissipaters on leadouts to minimize sediments from entering into streams: (1) FR 95 and 96 at East Clear Creek and Barbershop Canyons; (2) FR 95 at Bear Canyon; (3) FR 95 at Houston Draw; and (4) FR 96 at Yeager Canyon.
- Create an area closure to vehicular traffic on approximately 30 acres at Dane Springs. The closed road at Dane Springs would be converted to a trail and the area closure would be signed at the trailhead.
- Create a 15-acre vehicular closure at the Dines Tank/Leonard Canyon crossing. The road to Dines Tank and Leonard Canyon would be converted to a footpath and engineered to minimize sediment entry into Dines Tank and Leonard Canyon. An unpaved parking lot would be created for recreationists. A walk-through fence would be built to access the footpath to Dane Springs.
- Maintain FR 643A by adding 4 rolling dips. One hundred yards of pole fence would be constructed at the edge of the meadow at Holder Cabin to minimize access across the meadow by vehicles. Approximately 0.3 mile of semi-permeable fill road would be constructed with raised culverts at the north end of the meadow to create a ponded wetland and provide access to the recreational sites.
- Maintain areas around FR 321C to minimize impacts from vehicular traffic to the meadow system and minimize impacts from the road to the aquatic system. Maintenance would include constructing approximately 500 yards of pole fences and walk-throughs along pullouts and spur roads to limit vehicular access to meadows, and creating a dispersed recreation and camping site.

Conservation Actions

Little Colorado Spinedace

- Soil and water best management practices (BMPs) will be implemented to minimize erosion from project activities.
- Mixed conifer research areas will be fire lined within 0.5 mile of Leonard and East Leonard Canyon prior to conducting burning operations.
- All construction activities planned in spinedace habitat will be implemented in the fall to minimize impacts to spinedace.

- The Forest Service will work with the FWS and AGFD to conduct fish surveys in aquatic habitats prior to potentially harmful project activities. If spinedace are found and there is the potential for impacts to the fish, the AGFD and FWS will remove spinedace and hold them in a safe area or move them to a different portion of the creek. Moving fish is an activity that is permitted under a separate process from this consultation. AGFD and FWS are permitted to move fish, the Forest Service is not. Therefore, this action is not authorized by this biological opinion, but by AGFD.

Mexican spotted owl

- No project activities will occur within 0.5 mile of an MSO PAC if the current nest location is unknown or within 0.5 mile of a known nest.
- All burning prescriptions will be designed and implemented to maintain the following:
 - 95% of conifers greater than 18 inches dbh in all habitats
 - 90% of Gambel oaks greater than 10 inches drc in all habitats
 - 90% of snags and 75% of downed logs in protected and target/threshold habitat
 - 80% of snags and 60% of logs in restricted habitat
 - 75% of snags and 60% of logs in unrestricted habitat
- All snags 18 inches dbh and greater will be fire-lined prior to broadcast burning.
- Pre- and post-monitoring will be conducted in all protected and restricted habitat where treatments are planned. Monitoring will measure changes in fuel levels, snag basal area, live tree basal area, volume of downed logs greater than 12 inches dbh, and basal area of hardwood trees greater than 10 inches drc.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Little Colorado spinedace

The Little Colorado spinedace was listed as threatened with critical habitat designated on October 16, 1987 (USFWS, 1987). Threats were identified as habitat alteration and destruction, predation by and competition with non-native aquatic organisms, and recreational fishery management. Forty-four stream miles of critical habitat were designated: 18 miles of East Clear Creek immediately upstream and 13 miles downstream from C.C. Cragin Reservoir (formerly called Blue Ridge Reservoir) in Coconino County; eight miles of Chevelon Creek in Navajo County; and five miles of Nutrioso Creek in Apache County. Constituent elements of critical habitat consist of clean, permanent flowing water with pools and a fine gravel or silt-mud substrate.

The spinedace is a small (about 4 inch) minnow native to the Little Colorado River (LCR) drainage. This fish occurs in disjunct populations throughout much of the LCR drainage in

Apache, Coconino, and Navajo counties. Extensive collections summarized by Miller (1963) indicated that the spinedace had been extirpated from much of the historical range from 1939 to 1960. Although few collections were made of the species prior to 1939, the species is believed to have inhabited the northward flowing LCR tributaries of the Mogollon Rim, including the northern slopes of the White Mountains.

Food habits of spinedace include chironomid larvae, dipterians, filamentous green algae, and crustaceans (Runck and Blinn 1993, Blinn and Runck 1990). Spinedace are late-spring to early-summer spawners (Blinn 1993, Blinn and Runck 1990, Miller 1961, Minckley 1973, Minckley and Carufel 1967) although some females have been found to contain mature eggs as late as October (Minckley and Carufel 1967). A complete discussion of the taxonomic, distributional, and life history information of the spinedace has been compiled in the Little Colorado Spinedace Recovery Plan (USFWS 1998).

Mitochondrial DNA work on the spinedace was initiated in the 1990s and indicated the existence of three sub-groups identifiable by geographic area (Tibbets *et al.* 1994): the East Clear Creek drainage, Chevelon Creek, and the upper Little Colorado River including Nutrioso and Rudd creeks. The study concluded that the genetic patterns seen were likely the result of populations isolated and differentiated by both natural and human-caused events. The East Clear Creek and Chevelon Creek sub-groups are more individually distinctive, likely the result of a higher degree of isolation, and possess unique haplotypes. Individuals from the upper Little Colorado sub-group are more similar to each other. Possibly, until recent time, there was one population with considerable gene flow until various dams and diversions increased local isolation. The cause and exact time of the isolation of the three sub-groups are not known, but Tibbets *et al.* (1994) recommend that all of these populations be maintained to conserve genetic variation in this species.

As would be expected for a species adapted to fluctuating physical conditions, the spinedace is found in a variety of habitats (Blinn and Runck 1990, Miller 1963, Miller and Hubbs 1960, Nisselson and Blinn 1989). It is unclear whether occupancy of these habitats reflects the local preferences of the species or its ability to tolerate less-than-optimal conditions. Available information indicates that suitable habitat for the Little Colorado spinedace is characterized by clear, flowing pools with slow to moderate currents, moderate depths, and gravel substrates (Miller 1963, Minckley and Carufel 1967). Cover provided by undercut banks or large rocks is often a feature. Spinedace have also been found in pools and flowing water conditions over a variety of substrates, with or without aquatic vegetation, in turbid and clear water (Denova and Abarca 1992, Nisselson and Blinn 1991). Water temperatures in occupied habitats ranged from 58 to 78 degrees Fahrenheit (Miller 1963). Miller (1963) called the spinedace “trout like” in behavior and habitat requirements, and it is likely that prior to 1900 the spinedace used habitats now dominated by non-native salmonids.

As with most aquatic habitats in the southwest, the Little Colorado River basin contains a variety of aquatic habitat types and is prone to rather severe seasonal and yearly fluctuations in water

quality and quantity. Both mountain streams and lower-gradient streams and rivers have provided habitat for the spinedace. Residual pools and spring areas are important refuges during periods of normal low water or drought. From these refuges, spinedace are able to recolonize other stream reaches during wetter periods. This ability to quickly colonize an area has been

noted in the literature (Minckley and Carufel 1967) as well as in observations by others familiar with the species. Populations seem to appear and disappear over short time frames and this has made specific determinations on status and exact location of populations difficult. This tendency has been observed by both researchers and land managers (Miller 1963, Minckley 1965, Minckley 1973) and has led to concerns for the species' survival.

The spinedace is assumed to still occupy the streams it is known from historically (Chevelon, Silver, Nutrioso, East Clear Creek, and the LCR proper). However, populations are generally small and the true population size for any occupied stream is unknown due to the yearly fluctuations and difficulty in locating fish. Spinedace have a tendency to disappear from sampling sites from one year to the next and may not be found for several years. For example, the Silver Creek population was considered extirpated until fish were collected from the creek again in 1997. Although AGFD surveyed Silver Creek in 2003 and 2004, no fish have been located since 1997. This ephemeral nature makes management of the species difficult since responses of the population to changes within the watershed cannot be measured with certainty.

AGFD personnel surveyed several 328-foot transects in Nutrioso and Rudd creeks in spring 2005, with a single spinedace and a few speckled dace captured from Rudd Creek. A total of 7 spinedace were captured upstream of Nelson Reservoir. No spinedace were found below the reservoir, but many fathead minnow and green sunfish were captured. Surveys conducted in April 2005 in Nutrioso Creek located 128 spinedace, upstream of Nelson Reservoir. The largest concentration of spinedace was found on the EC Bar Ranch (private in-holding). The fish were associated with submerged woody debris from branches and exposed willow roots. No spinedace were located downstream of Nelson Reservoir (in Nutrioso Creek) or in Rudd Creek.

Spinedace are currently considered rare in East Clear Creek (Denova and Abarca 1992). Drought conditions have confounded cooperative recovery efforts for the Little Colorado spinedace in the East Clear Creek watershed. Recent inspections have found drying of the stream courses within the watershed. The status of the species within East Clear Creek is described in detail in the environmental baseline.

Native fishes associated with spinedace include speckled dace (*Rhinichthys osculus*), bluehead sucker (*Pantosteus discobolus*), Little Colorado sucker (*Catostomus* sp.), roundtail chub (*Gila robusta*), and Apache trout (*Oncorhynchus gilae apache*) (USFWS 1998). The list of non-native fishes is much larger and includes species with varying degrees of incompatibility with the spinedace's long-term survival. The presence of non-natives was one of the primary reasons the species was listed, and may contribute to the disjunct distribution patterns observed and the spinedace's retreat to what may be suboptimal habitats. Non-native fish may compete with, prey upon, harass, and alter habitat utilized by native fish. In the last 100 years, at least ten non-native

fish species have been introduced into spinedace habitats. These include rainbow trout (*Oncorhynchus mykiss*), fathead minnow (*Pimephales promelas*), and golden shiner (*Notemigonus crysoleucus*). Surveys in East Clear Creek have documented the presence of these three non-native species and brown trout (*Salmo trutta*) in the watershed (Denova and Abarca 1992). Data from research experiments and field observations indicate that at least the rainbow trout is a predator and potential competitor with the spinedace (Blinn *et al.* 1993).

Since the spinedace was listed, the Rudd Creek population was discovered. There is also one refugial population of East Clear Creek spinedace (located at the Flagstaff Arboretum), that may have between 200 and 300 individuals. There are no refugial populations for the other two genetic sub-groups, although we expect to have a captive population established at Winslow High School for the Chevelon Creek genetic sub-group by late 2006. All of the known populations have decreased since 1993 and drought conditions continue to put additional strain on all known populations.

Our information indicates 24 formal consultations have been completed or are underway for actions affecting Little Colorado spinedace rangewide (Appendix B, Table 1). Adverse effects to Little Colorado spinedace have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects of incidental take on Little Colorado spinedace. However, as is the case with many aquatic species, it is difficult, if not impossible, to quantify the actual incidental take of spinedace to date. The continued invasion of non-native aquatic species into spinedace habitat and the on-going reductions in surface water (due to both drought and groundwater pumping) are two of the greatest threats to the species and are contributing factors to the spinedace's overall decline.

Mexican spotted owl

The MSO was listed as a threatened species in 1993 (USDI 1993) and critical habitat was most recently designated in 2004 (USDI 2004). The primary threats to the species were cited as even-aged timber harvest and catastrophic wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The FWS appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The primary administrator of lands supporting the MSO in the United States is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). According to the Recovery Plan, 91% of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service.

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

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, severe, stand-replacing wildfire is probably the greatest threat to MSO within the Upper Gila Mountains. As throughout the West, fire severity and size have been increasing within this geographic area. Table 2 shows several stand-replacing fires that have had a large influence on MSO habitat in this RU in the last decade. Obviously the information in Table 2 is not a comprehensive analysis of fires in the Upper Gila Mountains RU or the effects to MSO. However, the information does illustrate the influence that stand-replacing fire has on current and future MSO habitat in this RU. This list of fires alone estimates that approximately 11% of the PAC habitat within the RU suffered high-to-moderate-intensity, stand-replacing fire in the last seven years.

Table 2. Some recent influential fires within the Upper Gila Mountains Recovery Unit, approximate acres burned, number of PACs affected, and PAC acres burned.

Fire Name	Year	Total Acres Burned	# PACs Burned	# PAC Acres Burned
Rhett Prescribed Natural Fire	1995	20,938	7	3,698
Pot	1996	5,834	4	1,225
Hochderffer	1996	16,580	1	190
BS Canyon	1998	7,000	13	4,046
Pumpkin	2000	13,158	4	1,486
Rodeo-Chediski	2002	462,384	55	~33,000
TOTAL		525,894	84	~43,645

A reliable estimate of the numbers of owls throughout its entire range is not currently available (USDI 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USDI (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico. However, Ganey *et al.* (2000) estimates approximately $2,950 \pm 1,067$ (SE) MSOs in the Upper Gila Mountains RU alone. The Forest Service Region 3 most recently reported a total of approximately 989 PACs established on National Forest lands in Arizona and New Mexico (USDI 2005). Based on this number of MSO sites, total numbers in the United States may range from 989 individuals, assuming each known site was occupied by a single MSO, to 1,978 individuals, assuming each known site was occupied by a pair of MSOs. The Forest Service Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than National Forest System lands have resulted in additional sites being located in all Recovery Units.

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

Since the owl was listed, we have completed or have in draft form a total of 166 formal consultations for the MSO. These formal consultations have identified incidences of anticipated

incidental take of MSO in 361 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO.

In 1996, we issued a biological opinion on Region 3 of the Forest Service adoption of the Recovery Plan recommendations through an amendment to their Land and Resource Management Plans (LRMPs). In this non-jeopardy biological opinion, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs, with approximately 91 of those PACs located in the Upper Gila Mountains RU. In addition, on January 17, 2003, we completed a reinitiation of the 1996 Forest Plan Amendments biological opinion, which anticipated the additional incidental take of five MSO PACs in Region 3 due to the rate of implementation of the grazing standards and guidelines, for a total of 156 PACs. Consultation on individual actions under these biological opinions resulted in the harm and harassment of approximately 243 PACs on Region 3 National Forest System Lands. Region 3 of the Forest Service reinitiated consultation on the LRMPs on April 8, 2004. On June 10, 2005, the FWS issued a revised biological opinion on the amended LRMPs. We anticipated that while the Region 3 Forests continue to operate under the existing LRMPs, take is reasonably certain to occur to an additional 10 percent of the known PACs on Forest Service lands. We expect that continued operation under the plans will result in harm to 49 PACs and harassment to another 49 PACs. To date, consultation on individual actions under the amended Forest Plans, as accounted for under the June 10, 2005, biological opinion has resulted in 15 PACs adversely affected (11 PACs harmed, 4 PACs harassed), with 9 of those PACs in the Basin and Range West RU and 6 in the Upper Gila Mountains RU.

Mexican spotted owl Critical Habitat

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

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

Primary constituent elements related to forest structure include:

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

Primary constituent elements related to the maintenance of adequate prey species include:

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

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

Primary constituent elements related to canyon habitat include one or more of the following:

- Presence of water (often providing cooler and often higher humidity than the surrounding areas);
- Clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, and/or riparian vegetation;
- Canyon wall containing crevices, ledges, or caves; and
- High percent of ground litter and woody debris.

There are 13 critical habitat units located in the Upper Gila Mountains RU that contain 3.1 million acres of designated critical habitat.

ENVIRONMENTAL BASELINE

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

Elevation ranges from 7,800 feet at the southern end of the project area on the Mogollon Rim, to 6,400 feet at the northern boundary of the project area on East Clear Creek. The land slopes generally downward from south to north, draining into East Clear Creek, which drains into the Little Colorado River. The project area is characterized by deep, steep-sided, narrow canyons, and broad, relatively flat ridgetops. Major drainages within the project boundary include portions of Leonard Canyon, Barbershop Canyon, Yeager Canyon, Bear Canyon, General Springs Canyon, Miller Canyon, Dane Springs Canyon, and Buck Springs Canyon.

The southern one-third of the project area is adjacent to the Mogollon Rim and is dominated by multi-storied, mixed conifer habitat. The northern portion of the project area receives less precipitation and is dominated by ponderosa pine habitats. The canyons are occupied by pockets of mixed-conifer, which extend into the northernmost section of the project area.

Little Colorado spinedace

A. Status of the species and critical habitat within the action area

The spinedace has been declining within the East Clear Creek watershed since its 1987 listing and faces the potential of extirpation. The Little Colorado Spinedace Recovery Plan (USFWS 1998) lists the East Clear Creek population as second in order of those populations in imminent danger of extinction, and states that the loss of any population of spinedace significantly increases the risk of extinction for the species (USFWS 1998). Therefore, any impacts to this species in this watershed are considered extremely serious and warrant careful monitoring. The East Clear Creek population of spinedace has been recorded primarily from the mainstem of the creek and in portions of Leonard Canyon. As stated previously, this population fluctuates widely and is usually found in small, isolated pockets of habitat. A key factor in the presence of the fish appears to be the quantity of water in the systems. Over the past several years, personnel from the Coconino National Forest, the Forest Service's Rocky Mountain Research Station, AGFD, FWS, and Northern Arizona University have conducted surveys for spinedace. These surveys have indicated that spinedace population levels in the East Clear Creek system have continued to decline.

Spinedace have been observed at six locations within the project area in recent years. Observations within critical habitat, adjacent to the allotment include: (1) the Jones Crossing population (1993, 1994, 1995); (2) near the mouth of Miller Canyon (1994); and (3) below C.C. Cragin Reservoir (1995 through 1997, and 2005). Three populations, which are not in critical habitat, have been observed in Leonard Canyon and its tributaries: (1) in Dines Tank (1969 through 1993, 1999, 2002); (2) in West Leonard Canyon (1994, 1999, 2000, 2001, 2002, 2003); and (3) in Leonard Canyon between the confluences of Buck Springs Canyon and West Leonard Canyon (1997). Of all the drainages surveyed in 1999 and 2000, West Leonard Canyon was the only drainage to contain spinedace. The pools containing spinedace in West Leonard Canyon were located within the same general vicinity as those found in 1994 (White 1995).

Drought conditions have confounded cooperative recovery efforts for the Little Colorado spinedace in the East Clear Creek watershed. Recent inspections have found drying of the

stream courses within the watershed. Of particular concern at this point are Dines Tank, West Leonard Canyon, and Yeager Canyon. The Forest Service, FWS, and AGFD salvaged spinedace from Dines Tank, West Leonard Canyon, and Yeager Canyon in 2002. A pool in Dane Canyon held water throughout the summer of 2002 and 57 of the spinedace salvaged from West Leonard Canyon were stocked into Dane Canyon in August 2002. With the exception of the last several years, Dines Tank has been noted as one of the few dependable waters to contain a source population of spinedace. The lack of spinedace in recent past fish collections from Dines Tank (2000, 2001) has been attributed to an abundance of non-native crayfish, fathead minnows, and trout. In 2002, the lack of a winter snow pack, followed by extremely dry spring conditions, reduced Dines Tank to a fraction of its normal volume. On May 7, 2002, AGFD and the Coconino National Forest salvaged 38 adult spinedace from Dines Tank. Though the live salvage of fish from Dines Tank was an emergency measure, it does indicate that fish most likely were present during 2000 and 2001. We made plans with AGFD in March of this year to salvage spinedace again from Dines Tank, due to northern Arizona's extremely dry winter. However, the precipitation the area received in late March/early April supplied additional water to Dines Tank and it appears to still be holding water at this time.

Since the summer of 2000, of all the drainages inventoried within the East Clear Creek watershed, spinedace were only known to exist in West Leonard and Leonard Canyons (Dines Tank). Unfortunately, surveys completed in 2002 found that West Leonard Canyon and its major tributaries were all virtually dry due to drought conditions. All but one pool in West Leonard Canyon that contained spinedace in 2001 were non-existent in 2002 and the pool in West Leonard Canyon that has consistently contained a significant number of spinedace almost completely dried. Given those conditions, Forest Service and AGFD Region II personnel salvaged approximately 128 spinedace from this pool on June 27, 2002, and stocked them at the Flagstaff Arboretum. Since 2002, the pool in West Leonard Canyon that contains the majority of the wild East Clear Creek spinedace has held water, but this pool and Dines Tank continue to be our only dependable sources of fish in the watershed.

In order to try and increase the numbers of spinedace in the watershed, the AGFD, FWS, and Forest Service are implementing the stocking strategy identified in the *East Clear Creek Watershed Recovery Strategy for the Little Colorado Spinedace and Other Aquatic Species*. During the spring of 2000, the AGFD stocked approximately 50 spinedace in Houston Draw and approximately 30 spinedace in General Springs Canyon. These spinedace were translocated from the spinedace refugium at the Flagstaff Arboretum pond. Due to a lack of water, these two sites do not appear to have been successful stocking sites. In addition, the Forest Service stocked 57 spinedace into Dane Canyon on August 15, 2002. These fish were not located again during subsequent surveys. On July 30, 2004, the AGFD stocked 49 adult and one young-of-the-year spinedace from the Flagstaff Arboretum pond into Bear Canyon Creek in the East Clear Creek drainage. In June 2005, AGFD translocated 122 adult spinedace from the Flagstaff Arboretum to Dane and Bear Canyons. AGFD stocked 63 fish into two pools in West Bear Canyon and 59 fish into a single pool in Dane Canyon. Prior to the stocking, surveys conducted the last five to ten years have not located spinedace in either Dane or Bear Canyons. AGFD has not conducted follow-up surveys in 2006 yet to determine the success of the 2005 stocking.

During the summer of 2000, Forest Service survey crews completed habitat inventory and fish sampling surveys in Yeager, Kehl, Dane, and Bear Canyons and in the upper portion of East Clear Creek within the Buck Springs Allotment and the project area under consultation. Five, 200-meter permanent sites were established in each location listed above. All of these drainages were found to contain potentially suitable spinedace habitat, but no spinedace were found. Despite extremely dry conditions, several larger pools in each of those five drainages retained sufficient depth to provide suitable sites for supplemental stocking of Little Colorado spinedace. Based on this work, 99 spinedace of East Clear Creek watershed origin were translocated into Yeager Canyon in November 2000. A May 2001 survey found that spinedace overwintered in Yeager Canyon and an October 2001 survey found young-of-the-year and adult spinedace in the canyon below the 96 Road Crossing. However, due to drought conditions in 2002, spinedace located in Yeager Canyon on April 8, 2002 were salvaged in order to avoid losing the fish completely. In August 2003, annual monitoring of these sites was conducted, and two additional sites were established in Miller and West Leonard Canyons. No spinedace were collected from any of the sites, except the West Leonard Canyon site, where AGFD collected approximately 95 spinedace. In 2004 and 2005 AGFD surveys in East Clear Creek did not locate any spinedace. However, during annual spring surveys in 2005, AGFD found one adult (gravid) female spinedace in East Clear Creek below the C.C. Cragin Dam. This was the first time in many years that a spinedace had been documented below the reservoir.

In summary, land managers salvaged fish from all known populations of Little Colorado spinedace within the East Clear Creek watershed in 2002 and placed these fish in a refugium in order to preserve this genetic sub-group of spinedace. However, we know that not all spinedace were removed from the salvaged pool in West Leonard Canyon based upon surveys conducted since that time.

Critical Habitat

Thirty-one miles of critical habitat for the spinedace has been designated in East Clear Creek within the Coconino National Forest. Constituent elements of critical habitat consist of clean, permanent flowing water, with pools and a fine gravel or silt-mud substrate. Critical habitat is designated from Potato Lake in the headwaters to C.C. Cragin Reservoir (8 miles) and below C.C. Cragin Dam to the confluence with Leonard Canyon (6 miles). Critical habitat is not designated for Leonard Canyon. In addition to critical habitat, Leonard Canyon and other major tributaries to East Clear Creek contain historical, suitable, and/or potential spinedace habitat. Approximately 35 miles of East Clear Creek are considered habitat for the spinedace, as are the several major tributaries that drain into East Clear Creek.

With no flow gages on Leonard Canyon, specific flow data are not available. However, East Clear Creek and its tributaries in the Leonard Canyon watershed are ephemeral. Most of the flows are the result of runoff from snowmelt in March and April, with localized contributions from summer monsoon rains. Peak flows can be quite high and the most recent high flows were 1993 and the winter of 2004/2005. Some pools are found in the streams when there is no flowing surface water. Although these pools are often isolated, they provide the only fish habitat available during dry periods. Scattered pools, such as Dines Tank, normally persist through the seasonal dry periods. However, under current drought conditions, these pools are not holding water.

Soils conditions are classified as satisfactory over approximately 96% of the area, 3% are considered impaired, and less than 1% are classified as unsatisfactory. The mountain meadows make up the unsatisfactory areas due to past heavy grazing and recreation pressures that have reduced ground cover, compacted soils, and contributed to the lowering of the water table. Meadow areas are located within almost all headwater drainages across the southern end of the project area and much concern exists over the current condition of these meadows. Compaction and unsatisfactory soil conditions in the headwater meadows lead to increased runoff, sedimentation, and reduced baseflows, which have the potential of negatively impacting spinedace habitat much farther downstream.

Approximately 36 miles of streams classified as functional, 13 miles of at-risk streams, and two miles of non-functional streams may be accessed by livestock. Riparian assessments (Proper Functioning Condition) conducted in 1995 and 1998 classified stream reaches in steep canyons, where ungulate access is very limited and physical characteristics make them more resistant to effects of upstream activities, as “functional” riparian corridors (66% of the stream reaches within the allotment). Another 24% of the stream reaches are considered “functional-at-risk” and are generally smaller, shallow drainage habitats that are more accessible by both livestock and elk. “Non-functional” riparian stream courses comprise approximately 10% of the streams within the allotment. These drainages tend to occur in the flatter, southern portions of drainages, especially within the mountain meadows. These areas have been heavily grazed by both livestock and elk and exhibit compacted soils and downcut banks. Exclosures in four meadows show that areas grazed only by elk are only slightly less utilized than areas grazed by both elk

and livestock. It is unclear whether this is a function of the large number of elk in the area, and/or the displacement of elk from areas livestock graze. However, meadow areas protected from all ungulate grazing exhibit a significantly greater production of grasses, forbs, and willows; and increased retention of subsurface water.

Some historical background on riparian conditions is contained in the Hydro Science (1993) report. The present conditions of streams in the area are not the condition that would have existed without the high levels of grazing that began in the late 1800s and continued through the 1950s. Even if some stream reaches are considered “functional” today, it does not mean that they are in good condition relative to the pre-grazing baseline. A wide, gravel-cobble wash is a very different system compared to a narrow, meandering stream channel bordered by riparian vegetation.

The streams within the project area are now ephemeral. While this may be the baseline condition, the amount of time when there are no flows may have increased as bank storage declined due to erosive gullying and downcutting, and runoff increased as vegetation was reduced. This has had a significant effect on the availability and quantity of fish habitat in the stream reaches under consideration in this consultation.

Studies in the East Clear Creek areas indicate that past intensive grazing by ungulates has resulted in considerable change to the historical condition of aquatic and riparian habitats and thus the habitat available for spinedace (Hydro Science 1993). In some areas, the channels are moving toward, or have achieved, stability although it is not the same as the pre-grazing stability. Recovery of the streams and associated floodplains and riparian areas to those historical conditions may be extremely difficult, if not impossible, to attain.

The Kehl and Leonard Canyon sub-watersheds were evaluated in 1993 (Hydro Science 1993) under a contract with the Forest Service. This contract report provides specific information on stream reaches most important to the spinedace in the East Clear Creek drainage. We have included only a discussion of Leonard Canyon, as Kehl Canyon is not within the East Clear Creek Watershed Health Improvement Project area. The Leonard Canyon watershed analysis area included the mainstem and tributaries of Leonard Canyon including Buck Springs Canyon. The portion of the watershed east of the canyon itself is on the Apache-Sitgreaves National Forest. The western portion of the watershed is on the Buck Springs Range Allotment.

Natural erosion risk in the Leonard Canyon watershed is generally slight, with severe risk occurring at the upper ends of the drainages. Watershed conditions are generally satisfactory although many areas are below potential. Stream reaches in these upper areas are largely in dysfunctional condition, or are at-risk. Stream stability is 94% fair and 6% good in the 17.2 miles of stream evaluated (Hydro Science 1993). Sediment load in these streams is low.

B. Factors affecting the species and its critical habitat within the action area

Spinedace habitats in the East Clear Creek drainage and within the project area have been altered by the construction of dams on the mainstem and tributaries such as C.C. Cragin Reservoir, Knoll Lake, and Bear Lake. Other land management activities that have altered the habitat include timber harvest, livestock grazing, road construction and maintenance, recreational development and usage, fire management, and inter-basin water diversions. These activities have affected watershed function, runoff patterns, peak flows, seasonal flows, riparian vegetation, wet meadow functions, bank erosion, siltation, and water quality. Wildlife and fisheries management largely associated with providing hunting or fishing opportunities has altered the faunal component of the habitat. Introduction of non-native trouts, baitfish, and crayfish at C.C. Cragin and Knoll Lake Reservoirs have increased competition for available resources and possibly predation on spinedace. In addition, there is concern that elk (*Cervus elaphus*) are much more abundant in the East Clear Creek drainage than they were historically, and that they may have a significant effect on the existing riparian and aquatic habitats. The Forest Service is working with the AGFD to determine the carrying capacity for elk and the appropriate adjustment of elk numbers within the East Clear Creek watershed.

There are three range allotments within the Coconino National Forest portion of the East Clear Creek watershed. These three allotments, the Buck Springs, Bar-T-Bar, and Hackberry/Pivot Rock Allotments, include and/or border spinedace critical habitat. The Buck Springs Allotment Management Plan (AMP) was revised and consulted on in 2003. Though the revised AMP significantly reduced impacts from livestock grazing, our biological opinion on the action still anticipated take from implementation of continued grazing on the allotment. Impacts from the Bar-T-Bar allotment are low because livestock have rare/infrequent access to East Clear Creek (pers. comm. Jerry Gonzales 2003), the allotment does not include headwater meadows, and soil and watershed conditions are predominantly satisfactory. Fence construction eliminated livestock access to critical and suitable habitat within the Hackberry/Pivot Rock Allotment.

Soil compaction results from roads, timber harvest operations, recreational development, and dispersed recreation. The impacts of dispersed recreation are most pronounced along East Clear Creek near Poverty Flat (within the Hackberry/Pivot Rock Allotment). Watershed assessments in selected sub-watersheds within East Clear Creek found limited impacts associated with timber harvest and roads (Hydro Science 1993). This may be true for the harvest units themselves, however, the density and location of roads within the watershed continues to be a concern.

Fire management has also probably had an effect on the hydrology of the watershed. Historically, fires burned through the pine forest and created a mosaic of stand sizes, ages, and densities. The success of suppression efforts over the past 100 years has resulted in densely stocked forests with high canopy closure. This increase in the number of trees within the watershed imposes a negative effect on the hydrologic cycle.

Because the streams are located in the head of the watershed, conditions within this allotment can only be attributed to upstream activities under the control of the Coconino National Forest. There is only a limited amount of non-Federal land in the area of the allotment and, with the exception of the operation of C.C. Cragin Dam, the Coconino National Forest has management authority over the majority of the lands involved. Outside entities have a limited, though potentially critical, effect on water availability within the East Clear Creek watershed.

Permanent flowing water is a primary constituent element of critical habitat for the Little Colorado spinedace. Therefore, water currently being withdrawn from the area, and potentially lost to the watershed, will affect habitat for the species. Currently, there are several projects either on-going or planned that divert water from this watershed. The improvement list for the Buck Springs Allotment includes 115 tanks, 29 borrow pits, 17 springs, and 10 backhoe springs. There are also two reservoirs located within the project area (C.C. Cragin and Knoll Lake Reservoirs). Currently, water from C.C. Cragin Reservoir is pumped into the East Verde River. Livestock tanks, reservoirs, and water rights all have the potential to reduce the quality of habitat for the spinedace. In addition, the C.C. Cragin Reservoir, Knoll Lake Reservoir, and ongoing water rights adjudication procedures all have the potential to affect spinedace habitat and critical habitat within the project area. These procedures may ultimately mean less water would be available for the spinedace within the East Clear Creek watershed, and habitat destruction from impoundment and de-watering of East Clear Creek will continue to impact the environmental baseline of this species.

Mexican spotted owl

A. Status of the species and critical habitat within the action area

The East Clear Creek Watershed Health Improvement Project analysis area is within the Upper Gila Mountain RU and MSO critical habitat unit Upper Gila Mountains 10 (UGM-10). There are approximately 562,988 acres within the UGM-10 critical habitat unit. The unit contains forested habitats and steep, forested canyon habitats. MSO nesting habitat is mostly restricted to steeper terrain and steep canyons within this critical habitat unit. There are approximately 47,057 acres of protected and restricted habitat within the analysis area. These acres are also designated critical habitat (USDI 2004). Of the 20,561 acres of protected habitat in the analysis area, 12,061 acres are currently designated as PACs. The remaining protected habitat (8,500 acres) is on slopes greater than 40%, outside of PACs. There are 26,496 acres of restricted habitat (9,582 acres mixed conifer habitat and 16,914 acres pine-oak habitat) within the analysis area. Approximately 7,092 acres of restricted habitat have been identified as target-threshold habitat, per the Recovery Plan (USDI 1995).

The entire East Clear Creek Watershed has been surveyed for owls many times, and 24 PACs lie wholly or partially within the project area. The majority of the PACs are centered along steep canyons and drainages, especially along East Clear Creek and its tributaries, and along Leonard Canyon. Table 3 lists the PACs, acres of PAC within the project area, percent of each PAC within the project areas, acres of treatment within each PAC, and ongoing actions occurring in each PAC.

Table 3. MSO PAC information for the East Clear Creek Watershed Strategy Health Improvement Project Analysis Area. The italicized rows indicate PACs that will be treated under this project.

PAC #	PAC Name	PAC Acres	Acres/% in Project Area	Acres to be Treated	Ongoing Actions in PAC
010401*	Knoll Lake	631	85/13	0	Knoll Lake dam and recreation
010402*	Ohaco	602	164/27	0	Knoll Lake dam and recreation
010421*	Limestone	616	145/24	0	
040701	Lockwood Draw	632	506/80	0	Popular fishing location
040702	<i>Quayle Springs</i>	634	634/100	10	
040703	<i>Hart Point</i>	649	551/85	7	<i>Reservoir, fishing</i>
040704	General Springs	628	628/100	0	Reservoir, fishing
040708	Weimer	623	145/23	0	
040710	North Miller	637	637/100	0	
040711	Mid Miller	596	596/100	0	
040712	Rock Crossing	607	607/100	0	Reservoir, heavy recreation, boat ramp
040718	Leon-Limestone	605	238/23	0	
040719	<i>Dane-Barber</i>	610	610/100	7	<i>Barbershop Trail</i>
040722	<i>Pinchot</i>	617	617/100	6	
040723	<i>Yeager</i>	608	608/100	23	
040724	McCarty	603	569/95	0	
040730	Rock Crossing West	600	600/100	0	Reservoir, no fishing concentration
040731	<i>Clear Creek</i>	622	622/100	19	<i>Jones Crossing, popular dispersed camping location</i>
040733	<i>Houston</i>	541	541/100	4	
040734	<i>Aqueduct</i>	776	776/100	165	<i>Fred Haught Trail, APS line, 100% grazed</i>
040735	Turkey	623	623/100	0	
040736	Kinder	624	280/45	0	Kinder Trail
040738	Bear	884	884/100	0	
040415	East Miller	665	397/60	0	

*These PACs are shared with the Apache-Sitgreaves National Forest.

In our April 30, 2003, biological opinion on the effects of the Buck Springs Range Allotment Management Plan, we anticipated that incidental take was reasonably certain to occur to one pair of MSOs and their young associated with the Aqueduct (#040734) PAC. The primary type of take expected to result from grazing on the Buck Springs Range Allotment was through harassment by the reduction of suitability of the habitat for prey species, thus limiting the availability of prey for owls. This would impair the ability of MSOs to successfully raise young. Livestock are able to access and potentially impact 100% of this PAC every other year for a ten year period.

B. Factors affecting the species and its critical habitat within the action area

In the early 1990s there were two large timber sales within the analysis area. The Buckhorn Timber Sale (1993) was 4,764 acres and the Lockwood Timber Sale (1995) was 1,664 acres. These were both commercial timber sales and most likely impacted some amount of MSO habitat within the analysis area. However, there is no information regarding how much MSO habitat may have been modified in these timber sales or how these sales may have modified how MSO currently use the area. Planned actions that will or are occurring within the analysis area include the Buck Springs and Bar-T-Bar Range Allotment livestock management improvements and the Victorine Wildland Urban Interface Project. The Victorine Wildland Urban Interface Project will conduct thinning and burning treatments on approximately 8,700 acres of ponderosa pine habitat adjacent to the East Clear Creek Watershed Health Improvement analysis area. Both of the range improvement projects associated with the Buck Springs and Bar-T-Bar allotments and the Victorine Wildland Urban Interface Project will predominately result in long-term positive effects to MSO and other species habitat within the area. These projects include actions to improve forest and watershed health, remove/obliterate roads, remove livestock from sensitive areas, and will improve long-term management within the East Clear Creek Watershed. In addition, to these activities, those listed under factors affecting the species and its critical habitat within the action area, also have impacted MSO habitat. This includes fire management, ungulate use of the area, reservoir construction and operation, and continued impacts to riparian corridors.

Additionally, the project analysis area is used for both motorized and non-motorized recreation. Most recreation within the area is fairly dispersed, but areas such as Jones Crossing and areas surrounding the C.C. Cragin Reservoir, Knoll Dam, and Bear Lake do receive higher visitation than most areas within the analysis area.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline.

The direct and indirect effects of the proposed action include impacts from: *forest health and fuel treatments* (thinning and burning) that will aid in restoring understory and overstory vegetative health and diversity and reduce the risk of stand-replacing wildfire; *soil, meadow system, and riparian area treatments* that will restore these areas for listed and sensitive species habitat; and *road management* (designation of open road system, road closure, and road obliteration) that will reduce road impacts to watersheds and riparian area habitat. We summarize the expected effects of each of these groups of actions and evaluate the impacts to the Little Colorado spinedace and its critical habitat, and the MSO and its critical habitat.

Little Colorado spinedace

The project should not result in any direct effects to Little Colorado spinedace since the treatments will not occur in currently known occupied habitats. In areas where spinedace may occur, surveys will be conducted prior to any action occurring that may directly harm fish. If fish are found, the AGFD and FWS will make the decision as to whether the fish will be moved.

However, some indirect effects are likely, as short-term increases (pulses) in ash and/or sediment are possible and may impact water quality as described below.

Forest Health and Fuels Treatments

Prescribed Burning

Prescribed burning is proposed on 14,500 acres within the project area. The northern project area contains a high amount of topographic relief, and except for the extreme southern portion of the project area, these areas drain rather rapidly into the bordering canyons via the steep, sloping, side canyons.

Native fish habitat, specifically spinedace, exists within the drainages associated with the proposed burn area. Recorded spinedace historic sites are identified within East Clear Creek, Barbershop Canyon, Miller Canyon, and Leonard Canyon (and their tributaries), which border the burn blocks. Essentially, due to the topographic nature of the project area, most burn blocks will occur adjacent to currently occupied or potential spinedace habitat. Given this and the steep terrain of the adjacent burn areas, indirect effects from prescribed burning to fish and their habitats are likely to occur, especially with the potential severe risk of erosion in the upper ends of the drainages (Hydro Science 1993). Wind and water can transport ash from the burn into stream courses and may alter the alkalinity and pH of water in the drainages. The degree of ash flow from adjacent burns is largely dependent upon the timing and severity of a precipitation event following burning. Duration and severity of impairments to water quality would depend upon the amount of ash that enters the stream courses and whether peak flows were sufficient to flush and dilute the ash downstream.

Burning, which removes the protective vegetative ground cover, may result in sheet and/or rill erosion (USDA 1995). The proposed burning would therefore be expected to produce an increase in erosion and deposition rates of sediments into drainages. Very intense burning (e.g., stand-replacing wildfire) can cause soils to become hydrophobic, resulting in a slower rate of revegetation and longer periods of runoff and post-burn erosion (Baker 1990, Cain *et al.* 1997). Given the steep slopes, even a light rain on a recently burned area may flush ash and sediments into the drainage system. An intense summer thunderstorm may have the potential to flush large amounts of sediment all the way into East Clear Creek. This sediment flush could adversely affect spinedace habitat with an increased release of nutrients, increased water turbidity, and increased silt deposition within the channel substrates. Specifically, there is the potential for short-term adverse effects to Dane, Yeager, General Springs, and Houston Draw from the transport and/or loading of silt and ash within these areas. Dane is currently occupied by spinedace and though Yeager, General Springs, and Houston Draw have been stocked with spinedace in the past, all dried in 2002 and it is unlikely that fish survived.

However, prescribed fires usually do not burn 100% of the ground cover. Typically, prescribed burns create a mosaic pattern of burned and unburned areas. Unburned areas are important in filtering ash and soil transported from the burned areas. The proposed action includes the use of filter strips (unburned areas adjacent to stream courses) that would be maintained between burn blocks and drainages. The unburned vegetative cover and plant litter material in the filter strips will greatly minimize the potential for ash and eroded soil to move into stream channels and will lessen the potential effects of prescribed burning on spinedace and other native fish habitat. In

addition, prescribed fire will reduce the risk of stand-replacing wildfire by reducing accumulations of ground and ladder fuels, which will reduce the potential for complete loss of riparian and stream habitat.

Thinning Treatments

Tree thinning is proposed on 12,135 acres within the project area. Many of these treatment areas are currently in dense stands where the existing tree canopy reduces the amount of moisture available as runoff (due to interception of precipitation by the canopy). Dense canopies can also reduce the amount of water storage in soils, which in turn can affect the supply available for groundwater discharge. If groundwater discharge is decreased, the result is a subsequent reduction in base flows.

The proposed thinning would treat smaller diameter trees, which would neither significantly improve nor adversely affect soil water storage and delivery conditions for the associated drainages. However, the proposed thinning will increase the amount of sunlight and precipitation that reaches the ground, which will increase herbaceous ground cover and improve water infiltration into the soil.

The increased water infiltration may result in an increased base flow (during snowmelt) in drainages within the project area.

The actual thinning of trees is not expected to affect associated stream channels and the respective fish habitat. Soils disturbed from within the activity areas would be filtered out by vegetation and litter prior to movement into the adjacent stream channels. Therefore, we do not expect the proposed thinning treatments to result in adverse impacts to spinedace habitat.

Soil, Meadow System, and Riparian Area Treatments

The soil and watershed improvement projects are planned specifically to improve watershed function and health for the spinedace and other native aquatic species. Many of these projects were specifically identified in the *East Clear Creek Recovery Strategy for the Little Colorado Spinedace and other Aquatic Species* and implementation of these actions, especially in the long-term, is expected to improve habitat for the spinedace in the East Clear Creek watershed.

Long-term sediment introductions into streams will be reduced through improved road crossings, installation of energy dissipators at road leadouts, removal of problem roads, improvement of headcuts in meadows, reduction in vehicular access to meadows, rehabilitation and revegetation of vertical banks in meadows, removal of tanks in meadows, and vehicular closures at Dines Tank/Leonard Canyon and Dane Springs. However, there is the potential for short-term pulses of project produced sediment through drainages during these actions.

Overall, sediment introductions into streams may increase slightly in the short-term, but overall sedimentation will be greatly reduced over time. BMPs would be incorporated to minimize the short-term sediment input. The proposed actions will also work to slow the movement of water through the system and improve water filtration in headwater meadows. In addition, these actions should reduce peak flows and increase the duration of base flows in riparian systems.

Monitoring of habitat conditions and fish populations will continue by the AGFD, FWS, and

Forest Service. The Forest Service established permanent monitoring sites for the collection of long-term data on spinedace habitat within the watershed and in 1995 AGFD established five 200-meter permanent fish survey stations in East Clear Creek, below the reservoir. Continued long-term monitoring of these sites, known occupied sites, and future supplemental stocking sites will allow us to measure the effects of this action on spinedace and other aquatic species. The monitoring of macroinvertebrate (aquatic insect) abundance and species diversity will also occur on selected sites within the watershed. Macroinvertebrates are a management indicator species (MIS) for the Coconino National Forest's riparian areas and their presence and/or absence is a barometer for detecting the health of aquatic systems.

Improvements in watershed conditions would result in improvement in stream and riparian function, which will improve habitat for Little Colorado spinedace. Actions taking place directly in stream systems and riparian habitats, such as road crossings, will be preceded by fish surveys, so that conservation measures can be implemented to protect spinedace and other native fish during project implementation.

Road Management

Roads can cause increased erosion, especially at stream crossings (Gucinski *et al.* 2001, Havlick 2002, Forman and Alexander 1998, Trombulack and Frissel 2000). The effects of this occur to riparian dependent species where increased sediments can lead to a decrease in water quality and the subsequent decrease in habitat for fish and other aquatic species (Gucinski *et al.* 2001, Havlick 2002, Forman and Alexander 1998, Trombulack and Frissel 2000).

There are 17 crossings over riparian reaches. The use of energy dissipaters is an accepted BMP for minimizing the impact of sediments from road crossings (Edwards and Evans 2004, Gućinski *et al.* 2001, USDA 2000). The use of energy dissipaters (primarily rock rip-rap) will reduce sediments from the roads, but will not totally remove the effects of roads. There still will be some sediment delivery and a slight change in stream flow regimes (Hydro Science 1993) within the watershed. The installation of the dissipaters is expected to create a short-term negative impact to stream channel substrates through sediment loading from project-generated soil disturbance. Long-term benefits are expected from an overall reduction in the amount of sediments these road crossings contribute to their respective stream courses. The Yeager Canyon 6th code watershed has the most miles of road impact that will be improved by the installation of dissipaters (0.8 miles). Yeager Canyon is a supplemental stocking site for the spinedace and is considered important habitat.

The obliteration of roadbeds on 31 miles of road will likely benefit spinedace and their habitat by decreasing recreational impacts to habitat and runoff.

Many of the roads are presently closed or obliterated, but some are still used for two-track cross-country access and those that still exist contribute to excessive runoff and increased sediment input into stream channels.

Critical Habitat

Thinning, prescribed burning, and road decommissioning and closures will occur adjacent to designated critical habitat above the C.C. Cragin Reservoir. Though these actions may result in the increased potential for ash or sediment inputs into East Clear Creek, we believe that the impact will be minimal due to the BMPs and conservation measures the Forest Service will implement. Most of the creek in this section is typically dry and spinedace have not been located in this area since 1995. However, ash and/or sediment inputs would be expected to occur during high-flow events. The filter strips that will be left along drainages should help to intercept ash and/or silt and minimize effects. In addition, thinning and burning should result in increased infiltration in the watershed and perhaps aid in increasing water in this section of critical habitat. Road decommissioning (obliteration) and closures should actively reduce long-term sediment input into Clear Creek and reduce recreation impacts in the area.

Mexican spotted owl

Forest Health and Fuels Treatments

Project activities are planned to reduce the risk of severe, stand-replacing wildfire to MSO PACs, protected steep-slope, and restricted habitat as recommended in the Recovery Plan (USDI 1995). However, even projects with projected long-term benefits may reduce habitat quality for wildlife in the short-term. The project will be implemented over the next 10 to 15 years, and then it will take some period of time for longer-term project benefits to be realized. In the short-term, direct and indirect effects to the MSO and its habitat may include disturbance, the loss of key habitat components, and reduced severe wildfire risk. Direct and indirect effects to critical habitat may include the loss or modification of the primary constituent elements and reduced severe wildfire risk. This section will describe the potential effects of the fuels reduction projects to MSO and how actions implemented under the East Clear Creek Watershed Health Improvement Project may result in short-term adverse effects to the species and its habitat; however, we also expect that the proposed action will reduce the potential for severe wildfire and provide increased protection to existing and future MSO habitat.

As stated above, the East Clear Creek Watershed Health Improvement Project analysis area encompasses 70,800 acres within the East Clear Creek watershed. Within this analysis area, there are approximately 47,057 acres of MSO habitat (PACs, protected steep-slope, restricted, critical habitat). Of the 47,057 acres of MSO habitat, approximately 7,000 acres will be treated. Table 5 summarizes the proposed actions that will occur in MSO protected, restricted, and critical habitat.

Table 5. Mexican spotted owl habitat within project treatment areas (acres). All acres to be treated are designated critical habitat.

MSO Habitat	Burning	Thinning
PACs	241	241
Protected Steep-slope	0	0
Restricted	4,692	4,713
Target Threshold Habitat	1,787	1,260
Total Acres	6,720	6,214

Protected Habitat (PACs)

There are 24 MSO PACs that occur within the analysis and project area. Thinning and burning are planned for 241 acres in eight PACs (see Table 3), with the majority of this occurring in the Aqueduct PAC (#040734) where approximately 165 acres will be thinned and burned. No trees greater than 9 inches dbh will be removed from the PAC, per the recommendations in the Recovery Plan (USDI 1995). A nest/roost buffer for the Aqueduct PAC has been established and no treatments will occur within the nest/roost buffer. Thinning up to nine inches dbh for roadside fuelbreaks on an additional 76 acres within seven PACs will help minimize the risk of fires starting along roads and spreading into nesting habitat. Although nest buffers have not been delineated for all seven PACs, a review of known nesting and roosting locations indicates that these areas would not be included in delineated nest/roost buffers. However, the Lockwood Draw and Rock Crossing PACs have nesting and roosting locations that are located relatively close to FR 96 and FR 751, respectively. Therefore, these PACs will not be treated except for brushing the roadway shoulders to restore the right-of-way. Brushing will entail removing brush and vegetation along the road shoulder, but will not include thinning trees.

Direct and indirect effects from the thinning actions within the PACs will be minimal. The PAC will be thinned per recommendations in the Recovery Plan, which will result in retention of all trees greater than nine inches. Though this prescription will maintain larger trees through the thinning process, it is possible that removing only these smaller trees may create a more even-aged stand within the PAC, reduce the number of canopy layers, and not significantly reduce mortality of remaining trees following prescribed burning.

Effects from prescribed burning in the PAC may be more significant. The Forest Service predicts that they will lose 10% of snags, 25% of logs, 5% of conifers greater than 18 inches dbh, 10% of oaks greater than 10 inches drc, 15% of oaks 5 to 10 inches drc, 5% of the basal area, and 5% canopy closure in the PAC acres treated (see BAE, page 24). The Forest Service did not provide specific information regarding how they will achieve their predicted loss estimates. These estimates are low, especially for snags and logs which tend to be vulnerable to loss during prescribed burning. Efforts will be made to avoid large trees, snags, and logs during all burning treatments, but research indicates a third of snags and almost half of all logs will be lost following prescribed burning (Randal-Parker and Miller 2002). The Coconino National Forest's monitoring data from already implemented projects indicates that losses of these key habitat components may be higher. Microhabitat monitoring from burns implemented on the Happy Jack Urban Interface Project on the Mogollon Rim Ranger District showed an 8% loss of trees greater than 18 inches dbh, a 21% loss of pre-treatment counted snags, a 71% loss of logs, and a 47% loss of Gambel oak trees greater than five inches dbh in areas burned as of late 2004. In addition, prescribed burns conducted over the last year along Highway 87 and Forest Highway 3 appears to have had higher loss of canopy cover and basal area than is predicted for this project. The data from the published paper and the Happy Jack Urban Interface Project were collected from burns in ponderosa pine habitat. We would expect that initial entry burns in mixed conifer habitat, with its higher fuel loads and increased fuel ladders, may result in even higher losses of these key habitat components. Controlled burning is expected to reduce the risk of wildfire by reducing accumulations of fuels, but it also can significantly modify and/or destroy the key habitat components that comprise MSO habitat.

Smoke created from broadcast burning may also affect MSO. Smoke tends to settle into low-lying areas during the nighttime and could potentially affect owls associated with the 24 PACs located in and adjacent to the project area during the breeding season when spring burns are conducted. The BAE states effects would be short-term (3 to 5 days) and of low intensity since all prescribed burning inside PACs and within 0.5 mile of PACs will be conducted outside the breeding season between September 1 and February 28.

Disturbance to nesting MSO will not occur as the thinning and burning in the eight PACs will all be implemented outside the breeding season. In addition, no treatments will occur within 0.5 mile of an MSO PAC if the current nest location is unknown or within 0.5 mile of a known nest during the breeding season (March 1 through August 31).

Restricted Habitat (Including Target/Threshold Habitat)

Approximately 4,713 acres of MSO restricted habitat, of which 1,260 acres is target/threshold habitat, will be treated under the proposed action. Mechanical thinning of trees up to 12 inches dbh will occur on 4,713 acres and prescribed burning will occur on 4,692 acres of MSO restricted habitat. On approximately 83 acres, trees up to 16 inches will be thinned to help restore spring areas and on 420 acres of mixed conifer forest, trees up to 24 inches will be thinned. The thinning is expected to promote an increase in herbaceous vegetation that will benefit MSO prey species in the long-term and provide the fine fuels needed to carry prescribed fire or low-intensity wildfires. Thinning of understory conifers (trees less than 16 inches dbh) will also reduce fuel ladders.

Target/threshold habitat is intended to be managed for future MSO nesting and roosting habitat, and is a subset of restricted habitat. This habitat is restricted habitat that has the most potential to develop into nesting and roosting habitat. Per the Recovery Plan (USDI 1995) and the Forest Plan, the Forest Service is required to designate 10% of the pine-oak restricted habitat and 25% of mixed conifer restricted habitat as target/threshold habitat. Within the East Clear Creek Watershed Improvement Health Project, approximately 17% of the pine-oak restricted habitat and 44% of the mixed conifer restricted habitat were identified as target/threshold habitat. Mixed conifer treatments may occur in 579 acres (447 acres for research and 132 acres of fuelbreaks) of potential target/threshold habitat with approximately 86% of potential target/threshold habitat remaining untreated. Treatments in target/threshold habitat are designed to enhance the large tree component and remove ladder fuels from the understory. In pine-oak habitat, stand-level conditions will remain at or above the threshold values given in Table III.B.I (USDI 1995), where they exist. In mixed conifer habitat, research objectives may end up reducing stand-level conditions below threshold values on 447 acres by reducing basal area to less than 150 square feet per acre. Approximately 39% of restricted mixed conifer will be maintained as potential target/threshold habitat.

Forest Service goals for burning within restricted habitat are to retain 80% of snags, 60% of logs, 95% of ponderosa pine trees greater than 18 inches dbh, 90% of oaks greater than 10 inches drc, 75% of oaks 5 to 10 inches drc, 95% of the basal area, and 95% of the pre-treatment canopy closure. Therefore, by prescription, we are expecting a potential loss of 20% of large snags and 40% of the large dead and down logs in MSO restricted habitat. In target/threshold habitat, the losses are expected to be similar to those predicted for PAC acres. However, for initial entry burns we expect that losses of snags, logs, and impacts to basal area and canopy cover may be

more significant, particularly in mixed-conifer habitat where fuel loads are greater (see discussion under Protected Habitat on pages 28-29).

Longer-term beneficial effects will be a reduction in excessive fuels that put MSO habitat at risk for severe wildfire and an increase in vegetative ground cover that provides prey habitat. Maintenance burning will occur on a 3- to 12-year interval and would result in maintaining snag densities below two snags per acre and log densities below two logs per acre in restricted habitat (see BAE page 26).

Critical Habitat

As stated above, approximately 4,713 acres of MSO protected and restricted habitat will be thinned and 4,692 acres of habitat will be burned under the proposed action. The restricted habitat is composed of forested mixed conifer and pine-oak habitat. Canyon habitat, as defined in the critical habitat rule (USDI 2004) will not be impacted by the proposed action. Therefore, we will not analyze the effect of this project on the primary constituent elements within canyon habitat.

The Recovery Plan (USDI 1995) encourages land management agencies to conduct fuels reduction projects within MSO habitat and provides guidelines for these actions that will aid in reducing fuels, but still maintain habitat and minimize effects to MSO. These guidelines were designed to protect MSO habitat over the long-term by reducing the likelihood of severe crown fire; however, short-term effects from fuels reduction treatments can adversely affect the primary constituent elements of MSO critical habitat directly or indirectly by altering their habitat and/or prey. Broadcast burning and mechanical thinning may affect designated critical habitat by reducing snags, downed logs, woody debris, multi-storied canopies, and dense canopy cover. In addition, the proposed activities may change the structure of MSO prey species' habitat, affecting the abundance and composition of prey species. Although these activities may have adverse effects to MSO prey species and habitat in the short-term, the proposed treatments may increase the diversity of vegetative conditions and reduce the risk of severe, stand-replacing wildfire.

The conservation measures identified in this document and the BAE will be fully implemented by the Forest Service as part of their proposed action. These conservation measures will help minimize or avoid adverse impacts to the function and conservation role of MSO critical habitat. Without these conservation measures, the negative effects to the function and conservation role of MSO critical habitat would likely be greater.

Primary constituent elements were identified by the FWS in the final rule designating critical habitat (USDI 2004). The importance of each of these components to MSO habitat is described in the final rule (USDI 2004) and the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. The expected effects on the primary constituent elements of MSO critical habitat as a result of the East Clear Creek Watershed Health Improvement Project are summarized below by forest structure and prey species habitat.

Table 6 lists the predicted losses of primary constituent elements due to prescribed fire and thinning in MSO habitat. We will reference this table in our discussion of effects to primary constituent elements below.

Table 6. Predicted losses of primary constituent elements due to prescribed fire and thinning in MSO habitat.

MSO Habitat	Snags	Logs	Conifers >18" dbh	Oaks >10" drc	Oaks 5 - 10" drc	Total BA	Canopy Closure
Protected	10%	25%	5%	10%	15%	5%	5%
Target/Threshold	10%	25%	5%	10%	15%	5%	5%
Restricted	20%	40%	5%	10%	25%	5%	10%
Other	25%	40%	5%	10%	25%	10%	15-20%

Forest Structure

Range of trees species, tree size: In forested critical habitat, a range of tree species, composed of different tree sizes reflecting different ages of trees, 30% to 45% of which are large trees with dbh of 12 inches or more, is desired. Diversity in tree-size distributions is typical of MSO habitat and provides the vertical structure that is thought to be important to owls (Seamans and Gutierrez 1995). The Forest Service predicts a loss of 5% of large, live conifers (pines and firs) greater than 18 inches dbh, a 10% loss of large Gambel oak trees greater than 10 inches drc, and a 15 to 25% loss of small drc oaks. These reductions will occur following prescribed burning and when large trees are removed during the spring restoration treatments (up to 16 inches dbh on 83 acres of restricted habitat) and mixed conifer thinning (up to 18 inches dbh on 128 acres and up to 24 inches dbh on 420 acres of restricted habitat). These actions will result in impacts to the size and species structure of MSO critical habitat, particularly during initial entry burns in mixed-conifer habitat where white and Douglas fir make-up a majority of the mid-story canopy layers. This impact to tree species diversity and loss of certain sized trees will result in a short-term adverse effect to this primary constituent element. Large, live trees are an important element of MSO habitat, and owl use is often correlated with a medium-to-large tree component (USDI 1995). Large trees and snags take many years to develop and are very difficult to replace, even over the long-term.

A shade canopy created by the tree branches covering 40% or more of the ground: The Forest Service expects that shade canopy will be reduced following thinning and burning treatments. However, they do not expect canopy closure to fall below 40%. Ganey et al. (2003) found that 32 out of 34 MSO roosting stands had canopy cover >40% and 75% of stands used for roosting had canopy cover >60%. Following implementation of the project, MSO restricted habitat, including some acres of target-threshold, will be at the lower end of habitat used by MSO for nesting or roosting. However, over time, we would expect canopy cover to increase in areas, particularly in those stands managed as target-threshold habitat. We do not expect reduction of canopy cover in protected habitat to be significantly different from what the Forest Service predicted. We would expect that some small reduction (5 to 10%) may actually aid in increasing the understory herbaceous and forb production, which will benefit MSO prey species.

Large, dead trees (snags) with a dbh of at least 12 inches: Large snags will most likely be reduced following proposed prescribed burning. Currently, large snags are rare across the action area and any loss of this habitat component may be significant in terms of maintaining MSO and prey habitat. The Forest Service will attempt to minimize this loss through the proposed conservation measures. However, it is likely that following burning treatments, upwards of 30%

of this currently rare habitat component may be lost within treated MSO habitat, resulting in adverse effects to this primary constituent element.

Maintenance of adequate prey species

High volumes of fallen trees and other woody debris: Fallen trees and woody debris will likely be reduced by the proposed burning treatments (broadcast, piling, and maintenance burning). Logs are expected to be reduced by approximately 25 to 40% within protected and restricted habitat. This loss of large logs will result in short-term adverse effects to this primary constituent element.

A wide range of tree and plant species, including hardwoods: We do not expect that this primary constituent element will be adversely affected by the proposed action. Plant species richness will likely increase following thinning and/or burning treatments that result in small, localized canopy gaps. Retention goals for oaks in MSO habitat are 90% for large oaks (>10 inches drc) and 75 to 85% for smaller oak trees. Proposed conservation measures and burning techniques should aid in maintaining oaks, but some level of short-term loss is expected.

Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration: Short-term decrease in plant cover will result from fire-related activities and possibly mechanical thinning. We expect long-term increases in residual plant cover because treatments will provide conditions suitable for increased herbaceous plant growth by removing a thick layer of dead plant debris within treated areas. The mosaic effect created by burned and unburned areas and by opening up small patches of forest within protected and restricted habitat is also expected to increase herbaceous plant species diversity and, in turn, assist in the production and maintenance of the MSO prey base. The function and conservation role of this primary constituent element will not be compromised by the proposed action.

Summary of effects to Critical Habitat

In summary, several MSO critical habitat primary constituent elements may be adversely affected by the proposed action. Snags, large coarse woody debris, and large trees will be lost during project implementation of forest health and fuels treatments. However, we find that the effects to the function and conservation role of critical habitat relative to the Recovery Unit and the entire designation are not significant because the impacts will be temporary and occur in a very small area relative to the Recovery Unit and the overall critical habitat designation. Therefore, we conclude that the primary constituent elements of MSO critical habitat will continue to serve the intended conservation role for the species with the implementation of the East Clear Creek Watershed Health Improvement Project.

Soil, Meadow System, and Riparian Area Treatments

In general, watershed restoration projects would have no adverse effects to MSO. There are five riparian area improvement projects that will be implemented on approximately 26 acres within four PACs (Lockwood Draw, Pinchot, Yeager, and Clear Creek).

These projects will not affect MSO nesting or roosting habitat and will be conducted outside the breeding season in order to eliminate the potential for disturbance to nesting birds. However, these projects and all other riparian enhancement projects may improve prey species habitat in meadows and riparian areas, which would benefit owls. In addition, the area closure at Dane Springs will reduce potential disturbance to nesting owls by recreationists.

Road Management

The removal of “problem” roads (roads causing habitat degradation and/or damage), the reduction of vehicular access to meadows, and planned road closures and obliterations resulting from the East Clear Creek Watershed Health Project will help to reduce recreational impacts within the watershed to MSO. The obliteration of 44 miles of roadbed may benefit MSO by decreasing human access, disturbance, and runoff. Many of these roads are presently closed or obliterated, but some are still used for two-track, cross-country access, and the existing roadbed contributes to excessive runoff during storm events. Open road miles would be decreased throughout the project area by 78 miles, with 18.1 miles of road closure and 6.3 miles of road obliteration planned to occur within MSO protected habitat. Existing roads provide access to MSO nest areas and increase the potential for recreation activities and fuelwood cutting to occur. Illegal fuelwood cutting of oak is prevalent throughout the Coconino National Forest and snags and downed logs are also preyed upon by fuelwood collectors. Road closures/obliteration will potentially prevent the harvest of many oaks and protect snags and downed wood that are primary constituent elements of critical habitat and key habitat components of MSO habitat.

CUMULATIVE EFFECTS

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

The East Clear Creek Watershed is predominately managed by the Coconino National Forest. Future non-federal actions within the project area that are reasonably certain to occur include the potential development and/or modification (e.g., road construction, land clearing, logging, fuelwood gathering) of private property in-holdings. These activities may reduce the quality and quantity of MSO nesting, roosting, and foraging habitat; result in disturbance to breeding MSOs; and contribute as cumulative effects to the proposed action. These actions may also result in increased sedimentation into spinedace habitat (from road construction) and the potential for further non-native aquatic species introductions.

CONCLUSION

After reviewing the current status of the Little Colorado spinedace and the MSO, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that implementation of the East Clear Creek Watershed Health Improvement Project will not likely jeopardize the continued existence of the Little Colorado spinedace and MSO, and is not likely to destroy or adversely modify designated critical habitat for either species.

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

We present this conclusion for the Little Colorado spinedace for the following reasons:

1. Though the project may result in short-term increases in sediment inputs to spinedace habitat within the East Clear Creek Watershed, the proposed actions are designed to improve spinedace habitat over the long-term and protect currently occupied habitats from further degradation due to ongoing watershed impacts.
2. Thinning and prescribed burning in the watershed will improve water infiltration and increase base flows to occupied, potential, and critical habitat in the East Clear Creek Watershed.
3. Implementing the proposed action will improve the Little Colorado River spinedace’s chance of recovery in the East Clear Creek Watershed.

We present this conclusion for the MSO for the following reasons:

1. Though treatments in critical habitat may result in the loss of some primary constituent elements and treatments in protected habitat may reduce key habitat components, the proposed action will increase the long-term viability of MSO habitat by reducing the threat of severe, stand-replacing wildfire.
2. The implementation of the proposed action is not expected to impede the survival or recovery of MSO within the Upper Gila Mountains Recovery Unit.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as the part of the agency action is not considered to be prohibited taking under the Act

provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

We do not anticipate that incidental take is reasonably certain to result from the proposed action for the reasons given below.

Little Colorado spinedace

Using available information as summarized within this document, we have identified conditions of possible adverse effects to spinedace associated with the implementation of the East Clear Creek Watershed Health Improvement Project. However, based upon the best available information concerning the spinedace, habitat needs of the species, and the project description, we do not believe that the short-term potential for increased pulses of ash and/or sediment into drainages within the East Clear Creek Watershed is reasonably certain to affect spinedace to the point where incidental take occurs. Currently, there are ongoing inputs of sediment into occupied and suitable habitat that are reducing the quality of the habitat for spinedace. Though there is the potential for adverse effects to result from a short-term pulse of sediment, this will most likely be undetectable compared to the constant sediment input will continue until the proposed soil, watershed, and road improvements are implemented. The implementation of the project will reduce the sediment inputs overall, not increase them. In addition, we believe that the filter strips of unburned land left adjacent to drainages will protect stream courses from ash input into spinedace habitat.

Mexican spotted owl

Using available information as summarized within this document, we have identified conditions of adverse effects to the MSO associated with implementation of the East Clear Creek Watershed Health Improvement Project, particularly within the Aqueduct PAC. However, based on the best available information concerning the MSO, habitat needs of the species, the project description, and information furnished by the Forest Service, we do not believe that the Forest Service's predicted estimates for loss of snags, downed logs, and other key habitat components within this PAC or in adjacent restricted habitat is reasonably certain to affect spotted owls to the point where incidental take occurs. However, we are very concerned that the project description provided by the Forest Service is not accurate and that more key habitat components will be lost within the PAC than reported in the analysis. Habitat monitoring data will be critical to making the case that prescribed burning effects were not greater than predicted. We expect the Forest Service to implement the proposed conservation measures and carefully monitor the burn impacts to the Aqueduct PAC to ensure that the proposed action occurs as described in the BAE. If initial monitoring indicates that effects to MSO habitat are greater than predicted, we recommend that the Forest Service reinitiate consultation.

DISPOSITION OF DEAD, INJURED, OR SICK MSO

Upon locating a dead, injured, or sick spotted owl, initial notification must be made to the Service's Law Enforcement Office, 2450 West Broadway Suite #113, Mesa, Arizona 85202 (telephone: 480/967-7900) within three working days of its finding. Written notification must be

made within five calendar days and should include the date, time, and location of the animal, a photograph, if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling specimens to preserve the biological material in the best possible state. If possible, the remains of intact owl(s) shall be provided to this office. If the remains of the owl(s) are not intact or are not collected, the information noted above shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should the treated owl(s) survive, the AESO should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

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

1. We recommend that the Forest Service continue to work with us and AGFD to implement actions that will improve the environmental baseline for the Little Colorado spinedace.
2. We recommend that the Forest Service work with us to continue to improve prescribed burning techniques and determine means by which more key habitat components/primary constituent elements of MSO habitat may be retained following fuels reduction treatments. We would appreciate the Forest Service including us in the implementation of the burn block that includes the Aqueduct PAC and allowing us to assist with monitoring.

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

REINITIATION - CLOSING STATEMENT

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

Thank you for your continued coordination. No further section 7 consultation is required for this project at this time. Should project plans change, or if information on the distribution or abundance of listed species or critical habitat becomes available, this determination may need to be reconsidered.

We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department. In all future correspondence on this project, please refer to consultation number 02-21-02-F-0206.

Should you require further assistance or if you have any questions, please contact Shaula Hedwall (x103) or Brenda Smith (x101) of our Flagstaff Suboffice at (928) 226-0614.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Flagstaff, AZ
District Ranger, Mogollon Rim Ranger District, Happy Jack, AZ
District Wildlife Staff, Mogollon Rim Ranger District, Happy Jack, AZ

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LITERATURE CITED

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APPENDIX A – CONCURRENCE

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for the bald eagle and Chiricahua leopard frog.

Bald eagle (*Haliaeetus leucocephalus*)

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

- There are no known winter roosts within the analysis area, though potential sites are located on canyon slopes within the analysis area. However, potential roost habitat on canyon slopes will not be treated.
- Some snags that serve as potential perch trees may be lost during broadcast burning operations. However, all snags 18 inches dbh and greater will be lined prior to prescribed burning in order to protect this resource.
- No burning activities will occur in the northern portion of the project area (burn blocks 2, 3, 5, 6, and 8) from October 15 to April 15 each year, due to the potential for wintering eagles to use this area for roosting and foraging.
- Proposed project activities will not affect foraging opportunities for bald eagles.

Chiricahua leopard frog (*Rana chiricahuensis*)

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the Chiricahua leopard frog. We base this concurrence on the following:

- Though the analysis area contains perennial and intermittent streams as well as stock tanks that may be potential habitat for this species, no frogs have been detected during ranid frog surveys.
- Best management practices will be followed to limit the input of ash and sediment into creeks and stock tanks following thinning and burning treatments. This will aid in maintaining the integrity of these aquatic habitats and should result in insignificant and discountable effects to these habitats.
- The proposed action will improve watershed condition, including potential leopard frog habitat. Projects that improve stream crossings, rehabilitate wood structures in riparian habitats, reduce vehicular access to meadows, and restore spring areas and channels will improve potential leopard frog habitat.

APPENDIX B**Table 1:** Formal consultations for actions affecting the Little Colorado spinedace.

Consultation #	Date	Name	Anticipated Incidental Take
02-21-88-F-0029	May 22, 1989	US Route 180/Arizona 666	Yes, death to approximately 8% of the population and loss of 500 linear feet of habitat
02-21-88-F-0029 R1	April 30, 1991	Reinitiaion of US Route 180/Arizona 666	Yes, death to approximately 8% of the population and loss of 275 linear feet of habitat
02-21-92-F-0403	August 2, 1995	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-92-F-0403	November 20, 1995	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-96-F-339	July 31, 1996	Greer River Reservoir Dam	None anticipated
02-21-01-F-0425	May 6, 1997	Buck Springs Range Allotment Management Plan	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-88-F-0167	March 30, 1998	Phoenix Resource Management Plan for the Bureau of Land Management	None anticipated
02-21-97-F-0343	March 31, 1998	Bank Stabilization on the Little Colorado River South of St. Johns, Arizona	Yes, take of 5 adults or juveniles Little Colorado spinedace anticipated
000089RO	February 2, 1999	Regional ongoing grazing activities on allotments (Buck Springs, Colter Creek, Limestone, South Escudilla)	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-96-F-0422 and 0423	April 16, 1999	Amendment No 1 Phoenix District Az Grazing EIS Upper Gila San Simon	None anticipated
02-21-99-F-0167	July 1, 1999	McCain and Sears Whip Bank Stabilization on the Little Colorado River	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided

02-21-92-F-0403	May 25, 2001	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-01-F-0218	August 21, 2001	Upper Little Colorado River Riparian Enhancement Demonstration Project	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-02-F-0220	October 4, 2002	Crayfish Study in Nutrioso Creek *	Yes, take of 10 Little Colorado spinedace anticipated
02-21-01-F-0101	April 19, 2002	Apache trout reintroduction	None anticipated
02-21-01-F-0425	April 30, 2003	Buck Springs Allotment Management Plan	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-03-F-0369	October 16, 2003	Replacement of Little Colorado River Bridge #1184 State Route 87	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-03-F-0210	September 3, 2004	BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management	None anticipated
02-22-03-F-0366	June 10, 2005	Region 3 Forest Service Continued Implementation of the Land and Resource Management Plans for the 11 Southwestern Forests and Grasslands	Yes, take anticipated; not possible to quantify. FWS concludes that IT of LCS will be exceeded if there is a loss of one population in the current number of spinedace populations on NFS lands without being off-set by newly established populations.
22410-2006-F-0222	May 8, 2006 (draft)	Wilkin's Family Little Colorado River Riparian Enhancement Project	Yes, take anticipated; not able to quantify. FWS concludes that IT of LCS will be exceeded if channel width at bankfull stage increases in more than 20% of the project area and/or if channel bed elevations in riffle sections do not remain at current elevations as determined by monitoring data.

02-21-05-F-0640	May 12, 2006	Eager South Wildland Urban Interface Project	Yes, take anticipated; not possible to quantify. FWS concludes that IT of LCS will be exceeded if there are declines or poor ratings in upland or stream state conditions measured by BMPs and/or the BMPs are inadequate in preventing sediment transport as determined by monitoring.
02-21-05-F-0385	May 18, 2006 (draft)	Nutriosio Wildland Urban Interface Project	Yes, take anticipated; not able to quantify. FWS concludes that IT of LCS will be exceeded if: there are declines in stream functioning conditions; effects to LCS are greater than those disclosed in the BAE; and/or, there is a decline in LCS constituent elements due to proposed action.
02-21-02-F-0206	In progress	East Clear Creek Watershed Health Project	None anticipated
02-21-05-I-0316	Formal consultation not initiated yet	C.C. Cragin Reservoir	Formal consultation not yet initiated.

* The project "Crayfish Study in Nutriosio Creek" never occurred.