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AESO/SE
02EAAZ00-2012-F-0282

April 11, 2013

Memorandum

To: Scott C. Cooke, Field Office Manager, Safford Field Office, Bureau of Land Management, Safford, Arizona

From: Field Supervisor

Subject: Biological Opinion on the Aravaipa Ecosystem Management Plan, EA #AZ-0410-2006-040

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 June 28, 2012, and received by us on July 2, 2012. At issue are impacts that may result from the proposed travel management plan, recreation, and the designation of campsites within Turkey Creek, as part of the Aravaipa Ecosystem Management Plan (AEMP), in Pinal and Graham counties, Arizona. The proposed action may adversely affect loach minnow (*Tiaroga cobitis*) and its critical habitat, spikedace (*Meda fulgida*) and its critical habitat, Gila topminnow (*Poeciliopsis occidentalis occidentalis*), desert pupfish (*Cyprinodon macularius*), and Mexican spotted owl (*Strix occidentalis lucida*).

In your memorandum, you requested our concurrence that the proposed action is not likely to adversely affect southwestern willow flycatcher (*Empidonax traillii extimus*) and lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*). In your e-mail of July 16, 2012, you requested our concurrence that the proposed action is not likely to adversely affect ocelot (*Leopardus (=Felis) pardalis*). We concur with those determinations and provide our rationale in Appendix A at the end of this Biological Opinion (BO).

This biological opinion is based on information provided in the June, 2012, biological assessment, telephone conversations, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, recreation and road management, their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

- April 6, 2005. We sent you the Biological Opinion on the Effects of Existing Land Management Practices on Reestablished Populations of Gila Topminnow and Desert Pupfish in the Aravaipa Creek Watershed (Reintroduction BO) (02-21-04-F-0022).
- December 12, 2006. We sent you the Reinitiated Biological and Conference Opinion on the effects of the Safford Resource Management Plan (RMP BO) (02-21-05-F-0086).
- August 6, 2007. We sent you the Biological Opinion on the Effects of the Proposed Restoration and Maintenance of Existing Roads Damaged by Severe Flooding in Aravaipa Canyon and Turkey Creek, Graham County, Arizona (Road BO) (22410-2007-F-0224).
- May 21, 2012. We sent you the Biological Opinion on the Gila District Livestock Grazing Program (22410-2006-F-0414).
- July 2, 2012. We received your memorandum, dated June 28, 2012, requesting formal consultation on the proposed action (AEMP).
- July 16, 2012. We received your e-mail requesting our concurrence that the proposed action is not likely to adversely affect ocelot (*Leopardus (=Felis) pardalis*).
- July 20, 2012. We sent you a memorandum stating we received all the necessary information and that formal consultation had been initiated.
- January 17, 2013. We sent you an e-mail suggesting a conservation measure that maintenance equipment fueling, parking, etc, be stipulated to occur outside the 100-year floodplain.
- January 29, 2013. We received an e-mail that you agree to include a conservation measure that stipulates equipment fueling, parking, etc., occur outside the 100-year floodplain.
- February 7, 2013. We sent you the draft BO for your review and comments
- April 3, 2013. We received an e-mail from Jeff Conn of your office that you do not have any comments on the draft BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Refer to the BA for more detailed information regarding the proposed action.

The AEMP was developed to establish guidance, objectives, policies, and management actions for the Aravaipa Ecosystem Planning Area (AEPA), including the three Areas of Critical Environmental Concern (ACECs) within its boundary, while integrating management directions for The Nature Conservancy (TNC) properties and management goals of the Arizona Game and Fish Department (AGFD), in compliance with the Bureau of Land Management's (BLM's) 1991 Safford District Resource Management Plan and Final Environmental Impact Statement (Safford District RMP/EIS, as amended) and applicable amendments. The AEPA encompasses approximately 77,400 acres of land located around Aravaipa Canyon, along the borders of Graham and Pinal counties, Arizona (Figure 1). The planning area includes approximately 69,600 acres of land managed by the BLM and approximately 7,800 acres of adjacent land owned by TNC. Aravaipa Creek is located within the planning area. The Aravaipa Canyon Wilderness (ACW), Desert Grasslands Research Natural Area (RNA) ACEC, Turkey Creek Riparian ACEC, and Table Mountain RNA ACEC are also within the planning boundaries.

Aravaipa Canyon is located about 50 miles west of Safford, Arizona, along the border of Graham and Pinal counties. The complete Aravaipa watershed area is about 557mi^2 (356,984 acres), with an elevation range of 2,160 ft. - 8,441 ft. In the upper watershed, surface flow is ephemeral to intermittent in a broad alluvial valley between the Pinaleño and Santa Teresa Mountains to the east and Galiuro Mountains to the west. The creek becomes perennial at Aravaipa Spring, at the head of Aravaipa canyon near Stowe Gulch, and cuts westward through the Galiuros. Aravaipa Creek's 22-mile-long perennial reach supports one of the last remaining assemblages of desert fishes in Arizona, with seven native species, including spikedace and loach minnow. Other wildlife species using the canyon include the threatened Mexican spotted owl and candidate western yellow-billed cuckoo. Riparian habitats support mixed forests of sycamore, cottonwood, willow, walnut, ash, and white oak. Mesquite bosques line higher terraces above the floodplain. Low-elevation upland areas are dominated by Sonoran desert scrub with creosote, palo verde, diverse shrubs, and saguaro. Mid-elevation slopes have semidesert grassland/scrub with native perennial grasses. Steeper slopes at middle and upper elevations support evergreen woodlands of oak and juniper and mixed chaparral. The area specifically addressed by this plan includes approximately 69,609 acres of BLM land around Aravaipa Canyon (Figure 1). It also addresses cooperative management issues for 7,802 acres of private land owned by The Nature Conservancy within or adjacent to the South Rim allotment.

The proposed actions of the AEMP addressed in this biological opinion are the proposed travel management plan, recreation, and the designation of campsites within Turkey Creek.

Travel Management

Of the 254 miles of roads within, or entering the planning area, the BLM is proposing to close 16 miles, limit access to administrative use only on 11 miles, leave open with mitigation measures 57 miles, and leave the remaining 170 miles as they are (see Appendix 6 and Map 5 of AEMP). Some of the Closed or Limited routes will be managed as trails for non-motorized use. The BLM did not specify how the roads would be closed, so for this analysis we assume that all closed roads will remain (not obliterated), but closed to vehicles by signs or obstacles.

The majority of roads within the planning area are designated as primitive (a linear route managed for use by four-wheel drive or high-clearance vehicles). Primitive roads may be passable by passenger car, but rough areas occur that may be marginally passable by such vehicles. Primitive roads generally do not receive maintenance unless they become impassable or are causing resource damage. These roads are used primarily for livestock operations, hunter access, and OHV driving.

The primary roads into the east and west ends of Aravaipa Canyon (5018 and 5001, respectively) qualify as "roads" and are managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use. Roads will generally accommodate two-way recreational and commercial rural traffic and may be passable by passenger car and large vehicle types (*e.g.,* motor homes, trailer combination vehicles, and haul trucks). These sections of roads are routinely maintained by Graham and Pinal counties for residential access.

Road 5018 currently crosses Aravaipa Creek at one ephemeral crossing and six wetted crossings within the planning area. The Turkey Creek road (# 5021) crosses Turkey Creek approximately 10 times. The majority of Turkey Creek road crossings are dry and only flow seasonally from precipitation events. The number of crossings can and does change during flood events.

Beyond approximately Bear Canyon, on the east end of Aravaipa Canyon, roads 5018 and 5021 (the Turkey Creek road) are maintained by the BLM. Maintenance is typically required once per year after the summer monsoon rains and flooding has ended. This maintenance is generally done between September and November and takes one to two days with a small bulldozer. Larger flood events within the canyon, generally once every five years, require more extensive work, which may take three to five days and involves having to move log/debris jams that have occurred and/or repairing areas where the road captured high flow volumes and incised. No road maintenance is done within the stream channel. Occasionally a bank, which has been cut by flooding, must be graded to allow for vehicles to pass.

Maintenance and/or repair of the primitive road network within the AEPA may occur annually, if necessary, or as required after major flooding events if access roads become damaged or impassable. Routine maintenance activities will be minimal and conducted as needed to maintain a road as primitive. Road repairs after flood events are infrequent and will employ the least destructive repairs necessary to make the road safe and passable. Routine maintenance and road repair will require the use of a D-4 dozer or similar type of

equipment. Typically work includes removing downed trees and limbs from the road or wetted road crossings. Ingress and egress of road crossings may have to be smoothed and in some areas a road will need to be bladed. Blade work will be minimized to include only that necessary to reopen, redefine, and stabilize the roads. Cutting and removal of smaller-sized debris will be by hand, hand-tools, and small mechanized tools (*e.g.*, chainsaws).

To reduce the potential of motor fluids from entering the aquatic and riparian habitats only equipment free of oil and fluid leaks will be allowed to work in the area. Equipment maintenance, fueling, and parking will take place outside the 100-year floodplain and as far from the active channel as is practicable to minimize the potential for contamination of the stream.

Recreation

A variety of outdoor enthusiasts use the AEPA for hiking, hunting, picnicking, birding, horseback riding, primitive camping, dirt-road vehicle driving, geo-caching, and playing in the stream. Many activities are seasonal (*e.g.*, playing in the stream) and do not occur year-round due to temperature. The primary season of use is fall through spring due to milder temperatures and the timing of hunting seasons. It is expected that the current level of recreational use will continue into the future.

Designation of Campsites in Turkey Creek

Camping within Turkey Creek and along Turkey Creek road is being reduced from fifteen documented campsites to thirteen designated campsites (see AEMP Map 6, p. 78). Other sites outside of the 15 known campsites are also being used for camping as there was no limit to the number or location of campsites. This current overuse by day and overnight recreationists has contributed to erosion and degradation of the aquatic and riparian habitats. By designating 13 campsites, the BLM will be able to prevent campsite proliferation, which should allow resource conditions to improve by reducing the number of recreationists within Turkey Creek. Camping will not be allowed in areas within Turkey Creek which are not designated. The BLM will annually monitor camping sites and activities in the area to determine impact on the environment, and take appropriate actions, if damage reaches an unacceptable level. If appropriate, campsite restrictions will be implemented, which may include temporary closures, to allow areas to recover or to protect sensitive resources. Campfires will be discouraged and will be prohibited at times of heightened fire risk. Only dead and down wood for campfires is permitted.

Wilderness Hiking and Backpacking

The Aravaipa Canyon Wilderness forms a major attraction for recreation within the planning area. A BLM permit is required for entry to the wilderness and entry levels will continue to be limited to 50 visitors per day within the canyon, 30 from the west end and 20 from the east end. However, fifty permits are not issued every day, particularly on weekdays and the hot summer months. Not all hikers travel the entire 11 miles, nor is all hiking concentrated in the streambed. Much of the canyon is traveled by routes on the floodplain and upper terrace. The majority of hikers enter Aravaipa Canyon from the west-end. Approximately, 4,710 visitors entered the wilderness for an average of 8,215 visitor-days per year, for the period 2000-2004. About 70% of the visitors were there for backpacking and about 30% for day

hiking. Visitation was highest during April and October, often approaching the permitted limit in April.

No good record exists of recent wilderness use outside the main canyon, but a 1989 survey found that 63% of wilderness visitors explored at least one side canyon and 12% climbed up to the canyon rims (Moore *et al*., 1989).

Car camping and picnicking

The east end of Aravaipa Canyon, specifically Turkey Creek, is frequented by vehicle-based groups for day use and designated camping. Outside the wilderness, the east end of Aravaipa Canyon receives frequent recreational use by vehicle-based groups, with Turkey Creek Canyon as the primary destination. Data collected from traffic counters for calendar year 2004 show that 2,354 vehicles entered Aravaipa downstream from Bear Canyon and 1,496 drove into Turkey Creek Canyon. These values use one-half the total vehicle counts on the assumption that nearly all vehicles returned the way they came. Vehicles that entered Turkey Creek from the south cannot be distinguished, but it is assumed that they made round-trip visits to Klondyke and back. Based on observations by BLM and TNC staff, most of those vehicles recorded in Turkey Creek Canyon brought people for day use or camping within that canyon.

If it is assumed that the 300 permit-holders for east end access to the wilderness during the same period came in single cars and all parked at the wilderness trailhead, then 468 additional vehicles stopped somewhere in Aravaipa Canyon. These include some mix of secondary vehicles accompanying primary permit-holders, BLM or TNC staff conducting management activities, visitors who are illegally entering the wilderness, and unauthorized day users on TNC land in Aravaipa Canyon.

Hunting

The AEPA provides a popular destination for hunting, especially for deer and javelina. The project area includes about 10% of Game Management Units 31 and 32, for which the AGFD issued 1,250 mule deer and 2,600 white-tailed deer tags in 2004. Javelina hunting permits for 2005 numbered 2,850. Because these permit numbers encompass the entire two hunt units, and in some cases other hunt units, it is assumed that approximately 10% or less of these tag holders actually hunt in the AEPA. These hunters typically camp at Fourmile, lower Turkey Creek, and lower Bear Canyon, and utilize vehicular access to the uplands. The area is also open to bear and mountain lion hunting. Unit specific information on hunter numbers is not available, but AGFD records indicate that 11 black bears and 28 mountain lions were taken in hunt units 31 and 32 in 2004. Of these, two bears and 14 mountain lions were removed due to depredations on livestock. Again, only a portion of these bears and lions were actually taken within the AEPA. Other predators taken by hunters in the area include coyotes, foxes, and bobcats, but only a small number of hunters pursue these species. The population of bighorn sheep provides limited hunting opportunities with only one or two permits offered to hunters each year. The small game season opener is popular for quail hunting in the AEPA. Gambel's quail are generally abundant throughout the area with seasonal population fluctuations based on precipitation levels. Mearn's quail also occupy the AEPA, but densities are low and hunting for them is not as popular.

Off-highway vehicle use

Aside from the roads entering both ends of Aravaipa Canyon, most roads in the AEPA are not maintained and are very rough. Local residents use them for livestock operations and other management purposes, but most public use is for hunting or recreational off-highway vehicle driving. There are no quantitative data on use levels of recreational OHV driving around Aravaipa. However, it is a growing form of recreation and areas within Aravaipa have received considerable use prior to roads being closed by recent private landowner actions.

The Safford District RMP designated Aravaipa Wilderness, Oak Grove Canyon, and Turkey Creek above Oak Grove Canyon corral as closed to off-highway vehicle use. For the remainder of the BLM lands, off-highway vehicle use was limited to roads and trails existing at the time of the plan and any new roads approved for construction during the life of the RMP.

Other Activities in the Aravaipa Ecosystem Management Plan

The BLM has determined that other activities identified within the AEPA: 1) have no effect to threatened or endangered species, 2) have already undergone section 7 consultation for their impacts to threatened or endangered species or, 3) will be consulted on when a site specific plan is developed and it is determined that threatened, endangered, or proposed species or designated or proposed critical habitat would be affected.

Conservation Measures

The BLM will implement the following conservation measures as part of the proposed action:

- Post signs at both the east end and west end of Aravaipa canyon and include messages and other public education materials to educate hikers to use trails away from the stream edge to protect the stream banks and reduce sedimentation of the stream.
- No recreational developments, including trails, would be maintained or constructed in the wilderness.
- Discourage stream edge trails by placing obstructions in trails.
- Limit camping along Turkey Creek road to designated campsites. Temporary closures maybe placed on individual campsites, to protect sensitive resources.
- Limit wood harvesting to dead and down trees only, and only for on-site use. No dead trees larger than 10 inches in diameter shall be cut, even if down.
- Restrict vehicular use to designated roads.
- Keep the number of vehicle riparian crossings to a minimum.
- Collect flow data in AEPA and apply for instream flow rights with the Arizona Department of Water Resources.

- Monitor and control, where feasible, invasive, nonnative species that pose a significant threat to the Aravaipa ecosystem.
- Implement erosion control and cienega restoration in the upper end of Turkey Creek and investigate other potential locations; if feasible, initiate erosion control projects.
- Retain, maintain and/or enhance all habitats essential to the recovery or survival of any Threatened or Endangered species, including habitat historically used by the species.
- Maintain courtesy zone signs at Turkey Creek notifying recreationists to reduce speed, noise, and dust when using this area.
- Equipment maintenance, fueling, and parking will take place outside the 100-year floodplain and as far from the active channel as is practicable to minimize the potential for contamination of the stream.
- Establish a scientific advisory committee to review fish monitoring data and threats to the aquatic community.
- The annual surveys of Aravaipa Creek, in cooperation with the Arizona Game and Fish Department, US Fish and Wildlife Service, and BLM, will continue to determine population status and trend for the fish species.

The action area consists of the project area and the extent of any effects emanating from the proposed action. The action area for this proposed action is the AEPA, areas adjacent to the AEPA, and Aravaipa Creek downstream of the AEPA boundary to the fish barrier.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Loach Minnow

The loach minnow (*Tiaroga cobitis)* was reclassified as an endangered species on February 23, 2012 (77 FR 10810), and was originally listed as a threatened species on October 28, 1986 ((51 FR 39468). Critical habitat has been designated (March 8, 1994 - 59 FR 10898) and redesignated (April 25, 2000 – 65 FR 24328; March 21, 2007 – 72 FR 13356) in response to legal concerns and policy changes (see summary discussion at 75 FR 66482, p. 66485). The current critical habitat designation was published simultaneously with the reclassification of loach minnow to endangered status on February 23, 2012 (77 FR 10810).

Background

The loach minnow is a small fish from the minnow family Cyprinidae. Loach minnow are olivaceous in color, and highly blotched with darker spots. Whitish spots are present at the front and back edges of the dorsal fin, and on the dorsal and ventral edges of the caudal fin. A black spot is usually present at the base of the caudal fin. Breeding males have bright red-orange coloration at the bases of the paired fins and on the adjacent body, on the base of the caudal lobe, and often on the abdomen. Breeding females are usually yellowish on the fins and lower body (Minckley 1973; USFWS 1991).

The limited taxonomic and genetic data available for the loach minnow indicate there are substantial differences in morphology and genetic makeup between remnant loach minnow populations. Tibbets (1993) concluded that results from mitochondrial DNA and allozyme surveys indicate variation for the loach minnow follows drainage patterns, suggesting little gene flow among rivers. The levels of divergence present in the data set indicated that populations within rivers are unique, and represent evolutionarily independent lineages. The main difference between the mtDNA and allozyme data was that mtDNA suggest that the San Francisco/Blue and Gila groups of loach minnow are separate, while the allozyme data places the Gila group within the San Francisco/Blue group. Tibbets (1993) concluded that the level of divergence in both allozyme and mtDNA data indicated that all three main populations (Aravaipa Creek, Blue/San Francisco Rivers, and Gila River) were historically isolated and represent evolutionarily distinct lineages.

The loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989; Propst and Bestgen 1991). Loach minnow use the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al*. 1988; Propst and Bestgen 1991; Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feed exclusively on aquatic insects (Schreiber 1978; Abarca 1987). Loach minnow live two to three years with reproduction occurring primarily in the second summer of life (Minckley 1973; Sublette *et al*. 1990). Spawning occurs March through May (Britt 1982; Propst *et al*. 1988); however, under certain

circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al*. 1988; Vives and Minckley 1990).

Distribution

Loach minnow are believed to occupy approximately 15 to 20 percent of their historical range, and are now restricted to portions of the Gila River and its tributaries, the West, Middle, and East Fork Gila River (Grant, Catron, and Hidalgo Counties, New Mexico) (Paroz and Propst 2007, p. 16; Propst 2007, pp. 7–8, 10–11, 13–14; Propst et al. 2009); the San Francisco and Tularosa rivers and their tributaries Negrito and Whitewater creeks (Catron County, New Mexico) (Propst *et al.* 1988, p. 15; Arizona State University (ASU) 2002; Paroz and Propst 2007, p. 16; Propst 2007, pp. 4–5); the Blue River and its tributaries Dry Blue, Campbell Blue, Pace, and Frieborn creeks (Greenlee County, Arizona and Catron County, New Mexico) (Miller 1998, pp. 4–5; ASU 2002; Carter 2005, pp. 1–5; Carter 2008a, pers. comm.; Clarkson *et al.* 2008, pp. 3–4; Robinson 2009a, p. 3); Aravaipa Creek and its tributaries Turkey and Deer creeks (Graham and Pinal Counties, Arizona) (Stefferud and Reinthal 2005, pp. 16–21); Eagle Creek (Graham and Greenlee Counties, Arizona), (Knowles 1994, pp. 1–2, 5; Bagley and Marsh 1997; pp. 1–2; Marsh *et al.* 2003; pp. 666–668; Carter *et al.* 2007, p. 3; Bahm and Robinson 2009, p. 1); and the North Fork East Fork Black River (Apache and Greenlee Counties, Arizona) (Leon 1989, pp. 1–2; Lopez 2000, pers. comm.; Gurtin 2004, pers. comm.; Carter 2007a, p. 2; Robinson *et al.* 2009, p. 4); and possibly the White River and its tributaries, the East and North Fork White River (Apache, Gila, and Navajo Counties, Arizona).

Loach minnow have recently been placed in additional streams as part of the recovery efforts for the species. In 2007, loach minnow were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a; Orabutt 2009, pers. comm.; Robinson *et al.* 2010a; Robinson *et al.* 2010b; Robinson 2011a, pers. comm.). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Augmentation efforts have been suspended at Hot Springs Canyon to allow managers to better evaluate if recruitment of loach minnow is occurring without further augmentation. Monitoring will continue at this site, and future augmentations may occur if needed.

In 2007, loach minnow were translocated into Fossil Creek, within the Verde River subbasin (Carter 2007b), with additional fish added in 2008 and 2011 (Carter 2007b; Carter 2008b; Robinson 2009b; Boyarski *et al.* 2010; Robinson 2011b). In 2008, loach minnow were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (Blasius 2008, pers. comm.; Robinson 2008b, pers. comm.). Augmentations at Bonita Creek have been temporarily suspended due to re-invasion of by nonnative species above the fish barrier. We anticipate that augmentations with additional fish will occur for the next several years at these sites, if adequate numbers of fish are available, and habitats remain suitable.

Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will ultimately be successful and result in establishment of new populations of loach minnow in these locations.

Critical Habitat

When critical habitat was designated in 2012, the Fish and Wildlife Service determined the primary constituent elements (PCEs) for loach minnow. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see 77 FR 10810, p. 10837), which are summarized in Table 1 below.

The loach minnow critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins. Critical habitat has been designated in each of these subbasins (See 77 FR 10810 for additional detail).

Our information indicates that, rangewide, more than 390 consultations have been completed or are underway for actions affecting spikedace and loach minnow, which often co-occur. The majority of these opinions concerned the effects of road and bridge construction and maintenance, grazing, water developments, fire, species control efforts, or recreation. There are a high number of consultations for urban development and utilities, however, these projects typically do not result in adverse effects to the species but are for technical assistance only. Small numbers of projects occur for timber, land acquisition, agriculture, sportfish stocking, flooding, Habitat Conservation Planning, native fish restoration efforts, alternative energy development, and mining.

Table 1. Primary Constituent Elements (PCEs) for Loach Minnow.

PCE	Description
Abundant Aquatic Insect Food Base	mayflies, true flies, black flies, caddis flies, stoneflies, and dragonflies.
Flows	Perennial flows or interrupted stream courses that are periodically dewatered but serve as connective corridors between occupied or seasonally occupied habitats
Depth	Generally less than 3.3 feet
Velocities	Slow to swift velocities between 0.0 and 31.5 inches per second
Stream Microhabitats	Pools, runs, riffles, and rapids
Substrate	Gravel, cobble, and rubble with low or moderate amounts of fine sediment and substrate embeddedness
Gradient	Less than 2.5 percent
Elevation	8,200 feet or less
Water Temperatures	46.4 to 77 degrees Fahrenheit
Pollutants	No or low levels present
Nonnative Aquatic Species	None, or present at levels sufficiently low as to allow persistence of loach minnow
Flow Regime	Natural and unregulated, or if modified or regulated, regimes that allow for adequate river functions, such as flows capable of transporting sediments.

Spikedace

The spikedace (*Meda fulgida*) was reclassified as an endangered species on February 23, 2012 (77 FR 10810), and was originally listed as a threatened species on July 1, 1986 (51 FR 23769) and reclassified as endangered on February 23, 2012 (77 FR 10810). Critical habitat has been designated (March 8, 1994 - 59 FR 10906) and redesignated (April 25, 2000 - 65 FR 24328; March 21, 2007 - 72 FR 13356) in response to legal concerns and policy changes (see summary discussion at 75 FR 66482, p. 66485). The current critical habitat designation was published simultaneously with the reclassification of spikedace to endangered status on February 23, 2012 (77 FR 10810).

Background

The spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst *et al*. 1986; Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow

borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst *et al*. 1986). Spikedace spawn from March through May with some yearly and geographic variation (Barber *et al*. 1970; Anderson 1978; Propst *et al*. 1986). Actual spawning has not been observed in the wild, but spawning behavior and captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace live about two years with reproduction occurring primarily in one-year old fish (Barber *et al*. 1970; Anderson 1978; Propst *et al*. 1986). It feeds primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983; Marsh *et al*. 1989). Additional details on habitat preferences are provided in the 2012 critical habitat designation (77 FR 10810).

Distribution

The spikedace was once common throughout much of the Gila River basin, including the mainstem Gila River upstream of Phoenix, and the Verde, Agua Fria, Salt, San Pedro, and San Francisco subbasins. Habitat destruction and competition and predation by nonnative aquatic species reduced its range and abundance (Miller 1961; Lachner *et al.* 1970; Ono *et al.* 1983; Moyle 1986; Moyle *et al.* 1986; Propst *et al.* 1986). Spikedace are now restricted to portions of the upper Gila River (Grant, Catron, and Hidalgo Counties, New Mexico); Aravaipa Creek (Graham and Pinal Counties, Arizona); Eagle Creek (Graham and Greenlee Counties, Arizona); and the Verde River (Yavapai County, Arizona) (Marsh *et al.* 1990; Brouder2002; pers. comm.; Stefferud and Reinthal 2005; Paroz *et al.* 2006; Propst 2007).

In 2007, spikedace were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a; Robinson 2008b, pers. comm.; Orabutt 2009, pers. comm.; Robinson 2009a; Robinson *et al.* 2010a; Robinson *et al.* 2010b; Robinson 2011a, pers. comm.). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Augmentation efforts have been suspended at Hot Springs Canyon to allow managers to better evaluate if recruitment of spikedace is occurring without further augmentation. Monitoring will continue at this site, and future augmentations may occur if needed.

Spikedace were translocated into Fossil Creek, a tributary to the Verde River in Gila County, Arizona, in 2007, and were subsequently augmented in 2008 and 2011 (Carter 2007; Carter 2008; Robinson 2009b; Boyarski *et al.* 2010; Robinson 2011b).

In 2008, spikedace were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (Blasius 2008, pers. comm.; Robinson *et al.* 2009), and were repatriated to the upper San Francisco River in Catron County, New Mexico (Propst2010, pers. comm.). Augmentations at Bonita Creek have been temporarily suspended due to re-invasion by nonnative species above the fish barrier. We anticipate that augmentations with additional fish will occur for the next several years at all sites, if adequate numbers of fish are available and habitats remain suitable. Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will

ultimately be successful and result in establishment of new populations of spikedace in these locations.

The spikedace is now common only in Aravaipa Creek in Arizona (Arizona State University (ASU) 2002; Reinthal 2008, pers. comm., Reinthal 2011) and one section of the Gila River south of Cliff, New Mexico (NMDGF 2008; Propst *et al.* 2009). The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey (Brouder 2002, pers. comm.; AGFD 2004). Spikedace from the Eagle Creek population have not been seen for over a decade (Marsh 1996), although they are still thought to exist in numbers too low for the sampling efforts to detect (Carter *et al.* 2007; see Minckley and Marsh 2009). The Middle Fork Gila River population is thought to be very small and has not been seen since 1991 (Jakle 1992), but sampling is localized and inadequate to detect a sparse population.

Planning among several State and Federal agencies is underway for restoration of native fish species, including spikedace, in the Blue River through construction of a barrier that will exclude nonnative fish from moving upstream from the lower San Francisco River, and allow for translocation of spikedace. Barrier construction was completed in mid-2012, and plans are underway to translocate spikedace to the Blue River.

Taxonomic and genetic work on spikedace indicates there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations occupy isolated fragments of the Gila basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek are morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992; Tibbets 1993).

Critical Habitat

When critical habitat was designated in 2012, the Fish and Wildlife Service determined the primary constituent elements (PCEs) for spikedace. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see 77 FR 10810, p. 10837), which are summarized in Table 2 below.

The spikedace critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins (See 77 FR 10810 for additional detail on occupancy by subbasin). Critical habitat has been designated in each of these subbasins (See 77 FR 10810 for additional detail).

Our information indicates that, rangewide, more than 390 consultations have been completed or are underway for actions affecting spikedace and loach minnow, which often co-occur.

The majority of these opinions concerned the effects of road and bridge construction and maintenance, grazing, water developments, fire, species control efforts, or recreation. There are a high number of consultations for urban development and utilities, however, these projects typically do not result in adverse effects to the species but are for technical assistance only. Small numbers of projects occur for timber, land acquisition, agriculture, sportfish stocking, flooding, Habitat Conservation Planning, native fish restoration efforts, alternative energy development, and mining.

Table 2. Primary Constituent Elements (PCEs) for Spikedace (77 FR 10810).

PCE	Description
Flows	Perennial, or interrupted stream courses that are periodically dewatered but serve as connective corridors between occupied or seasonally occupied habitats
Depth	Generally less than 3.3 feet (1 meter)
Velocities	Slow to swift, between 1.9 and 31.5 inches per second (5 and 80 centimeters/second)
Stream Microhabitats	Glides, runs, riffles, margins of pools and eddies
Substrate	Sand, gravel, and cobble, with low or moderate amounts of fine sediment and substrate embeddedness
Gradient	Less than approximately 1.0 percent
Elevation	Below 6,890 feet (2,100 meters)
Water Temperatures	Between 46.4 to 82.4 degrees Fahrenheit; 8.0 to 28.0 degrees Celsius
Pollutants	No or low levels present
Nonnative Aquatic Species	None, or present at levels sufficiently low as to allow persistence of spikedace
Flow Regime	Natural and unregulated, or if modified or regulated, regimes that allow for adequate river functions, such as flows capable of transporting sediments.

Gila topminnow

The Gila topminnow was listed as endangered in 1967 without critical habitat (32 FR 4001). Only Gila topminnow populations in the United States, and not in Mexico, are listed under the ESA. The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonnative fishes (Miller 1961, Minckley 1985); other listed fish suffer from the same impacts (Moyle and Williams 1990). Life history information for the Gila topminnow can be found in the 1984 recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and references cited in the plans.

Gila topminnows are highly vulnerable to adverse effects from nonnative aquatic species (Johnson and Hubbs 1989). Predation and competition from nonnative fishes have been a major factor in their decline and continue to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997, Minckley and Marsh 2009). The native fish fauna of the Gila basin and of the Colorado basin overall, was naturally depauperate and contained few fish that were predatory on or competitive with Gila topminnow (Carlson and Muth 1989). In the riverine backwater and side-channel habitats that formed the bulk of Gila topminnow natural habitat, predation and competition from other fishes was essentially absent. Thus Gila topminnow did not evolve mechanisms for protection against predation or competition, and is predator- and competitor-naive. Due to the introduction of many predatory and competitive nonnative fish, frogs, crayfish, and other species, Gila topminnow could no longer survive in many of their former habitats, or the small pieces of those habitats that had not been lost to human alteration. Both large (Bestgen and Propst 1989) and small (Meffe et al. 1983) nonnative fish cause problems for Gila topminnow, as can nonnative crayfish (Fernandez and Rosen 1996) and bullfrogs.

Gila topminnow was listed as *Poeciliopsis occidentalis*. The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, is collectively known as the Sonoran topminnow. Both subspecies are protected under the ESA.

Historically, the Gila topminnow was abundant in the Gila River drainage in Arizona and was one of the most common fishes of the Colorado River basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). Gila topminnows also were recorded from the Gila River basin in New Mexico. In the last 50 years, this was reduced to only 16 naturally occurring populations. Presently, only 9 of the 16 known natural Gila topminnow populations are considered extant (Weedman and Young 1997, Voeltz and Bettaso 2003, Service files). Only eight have no nonnative fish present and, therefore, can be considered secure from nonnative fish threats. There have been at least 200 wild sites stocked with Gila topminnow, however, topminnow persist at only 35 of these localities. Of these, two sites are outside topminnow historical range and one contains nonnative fish (Voeltz and Bettaso 2003). All of these sites except two are in New Mexico. Many of the reestablished sites are very small and may not contain viable populations. In addition, several of the 35 sites have been reestablished in the last few years, and their eventual disposition is unknown.

The Sonoran Topminnow Recovery Plan (USFWS 1984) established criteria for down- and de-listing. Criteria for down-listing were met for a short period. However, due to concerns regarding the status of several populations, down-listing was delayed. Subsequently, the number of reestablished populations dropped below that required for down-listing, where it has remained. The Yaqui topminnow is now included within the Yaqui Fishes Recovery Plan (USFWS 1995). A draft revised recovery plan for the Gila topminnow is available (Weedman 1999). The plan's short-term goal is to prevent extirpation of the species from its natural range in the US and reestablish it into suitable habitat within historical range.

Downlisting criteria require a minimum of 82 reestablished populations, some of which have persisted at least 10 years.

The status of the species is poor and declining. Gila topminnow has gone from being one of the most common fishes of the Gila basin to one that exists at about 35 localities (9 natural and 26 stocked). Many of these localities are small and highly threatened. The theory of island biogeography can be applied to these isolated habitat remnants, as they function similarly (Meffe 1983, Laurenson and Hocutt 1985). Species on islands are more prone to extinctions than continental areas that are similar in size (MacArthur and Wilson 1967). Meffe (1983) considered extinction of Gila topminnow populations almost as critical as recognized species extinctions. Moyle and Williams (1990) noted that fish in California that are in trouble tend to be endemic, restricted to a small area, part of fish communities with fewer than five species, and found in isolated springs or streams. The Gila topminnow has most of these characteristics.

Desert pupfish

The desert pupfish was listed as an endangered species with critical habitat in 1986 (51 FR 10842). Historical collections occurred in Baja California and Sonora, Mexico and in the United States in California and Arizona. Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Agua Fria rivers, although collections are lacking for the latter three. The desert pupfish was also found in the Lower Colorado River, Rio Sonoyta basin, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888, Garman 1895, Gilbert and Scofield 1898, Evermann 1916, Miller 1943, Minckley 1980, Black 1980, Turner 1983, Miller and Fuiman 1987). Additional life history information can be found in the recovery plan (USFWS 1993) and other references cited there.

One or more threats imperil most natural and transplanted populations. Since the 19th century, desert pupfish habitat has been steadily destroyed by stream bank erosion, the construction of water impoundments that dewatered downstream habitat, excessive groundwater pumping, the application of pesticides to nearby agricultural areas, and the introduction of nonindigenous fish species. Nonnative bullfrogs may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet throughout its range that includes fish (Cohen and Howard 1958, Clarkson and deVos 1986). There is also a concern that introduced salt cedar (*Tamarix* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990). The remaining populations continue to face these threats, and the Salton Sea area populations, in particular, are severely threatened.

Our records indicate that in Arizona, 44 formal conferences or consultations have been completed for actions affecting desert pupfish.

Critical Habitat

Critical habitat was designated for the desert pupfish at Quitobaquito Spring, Organ Pipe Cactus National Monument, Pima County, Arizona; and along portions of San Felipe Creek,

Carrizo Wash, and Fish Creek Wash, Imperial County, California. These areas provide the PCEs necessary to maintain pupfish, including adequate food and cover, and at Quitobaquito Spring, desert pupfish are at least partially isolated from predatory and competing exotic fishes.

Mexican Spotted Owl

The MSO was listed as a threatened species in 1993 (USDI 1993). The primary threats to the species were cited as even-aged timber harvest and stand-replacing wildland fire, 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). The FWS completed the Final Recovery Plan for the Mexican spotted owl, First Revision (Revised Recovery Plan) in late 2012 (USFWS 2012). Critical habitat was designated for the MSO in 2004 (USDI 2004).

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), in the Recovery Plan (USDI Fish and Wildlife Service 1995), and the Revised Recovery Plan (U.S. Fish and Wildlife Service 2012). The information provided in those documents is included herein by reference. The MSO occurs in forested mountains and canyonlands throughout the southwestern U.S. and Mexico (Gutiérrez et al. 1995). It ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several States of Mexico. Although the MSO's entire range covers a broad area of the southwestern U.S. and Mexico, it does not occur uniformly throughout its range. Instead, the MSO occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known MSO locations indicate 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 U.S. and Mexico.

The MSO occupies many habitat types scattered across a diverse landscape. In addition to this natural variability in habitat influencing MSO distribution, human activities also vary across the MSO's range. The combination of natural variability, human influences on MSOs, international boundaries, and logistics of implementation of the Recovery Plan necessitates subdivision of the MSO range into smaller management areas. The 1995 Recovery Plan subdivided the MSO's range into 11 "Recovery Units" (RUs): six in the U.S. and five in Mexico. In the Revised Recovery Plan, we renamed RUs as "Ecological Management Units" (EMUs) to be in accord with current FWS guidelines (USDC NMFS and USDI FWS 2010). We divide the MSO range within the U.S. into five EMUs: Colorado Plateau (CP), Southern Rocky Mountains (SRM), Upper Gila Mountains (UGM), Basin and Range-West (BRW), and Basin and Range-East (BRE).

There are two types of monitoring that can be conducted for the MSO. The first type of monitoring is a site-specific inventory of MSO habitat conducted using the MSO survey protocol. This method can provide information regarding the presence or absence of MSOs in a specific area (and is used to establish PACs, etc.), but does not provide population level

indicators of the species general population trend. We will refer to this type of monitoring as "MSO surveys." The second type of monitoring is population monitoring. Population monitoring is conducted a large enough scale (typically range-wide) to provide information regarding population trend (i.e., is the species increasing, decreasing, or stable). Methodologies to conduct this type of monitoring include demographic studies or range-wide occupancy monitoring as described in the Revised Recovery Plan (USFWS 2012).

MSO surveys since the 1995 Recovery Plan have increased our knowledge of MSO distribution, but not necessarily of MSO abundance. Population estimates, based upon MSO surveys, recorded 758 MSO sites from 1990 to 1993, and 1,222 MSO sites from 1990 to 2004 in the U.S. The Revised Recovery Plan for the MSO (USFWS 2012) states that there are approximately 1,324 MSO sites (as of the date of publication). An MSO site is an area used by a single or a pair of adult or subadult MSOs for nesting, roosting, or foraging. The increase in number of known MSO sites is mainly a product of new MSO surveys being completed within previously unsurveyed areas (e.g., several National Parks within southern Utah, Grand Canyon National Park in Arizona, Guadalupe National Park in West Texas, Guadalupe Mountains in southeastern New Mexico and West Texas, Dinosaur National Monument in Colorado, Cibola NF in New Mexico, and Gila NF in New Mexico). Thus, an increase in abundance in the species range-wide cannot be inferred from these data (USFWS 2012). However, we do assume that an increase in the number of areas considered to be occupied to be a positive indicator regarding MSO numbers.

Two primary reasons were cited for the original listing of the MSO in 1993: (1) historic alteration of its habitat as the result of timber-management practices; and, (2) the threat of these practices continuing. The danger of stand-replacing fire was also cited as a current and future threat at that time. Since publication of the original Recovery Plan (USDI Fish and Wildlife Service 1995), we have acquired new information on the biology, threats, and habitat needs of the MSO. Threats to its population in the U.S. (but likely not in Mexico) have transitioned from commercial-based timber harvest to stand-replacing wildland fire. Recent forest management has moved from a commodity focus and now emphasizes sustainable ecological function and a return toward pre-settlement fire regimes, both of which have potential to benefit the MSO. Southwestern forests have experienced larger and more severe wildland fires from 1995 to the present than prior to 1995. Climate variability combined with dense forest conditions may also synergistically result in increased negative effects to habitat from fire. The intensification of natural drought cycles and the ensuing stress placed upon overstocked forested habitats could result in even larger and more severe fires in MSO habitat. Several factors have been identified as particularly detrimental to the MSO, including predation, starvation, accidents, disease, and parasites.

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 Mexican spotted MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing is prevalent throughout Region 3 NF lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all forests, especially in meadow and riparian

areas. Fuels reduction treatments, though critical to reducing the risk of severe wildland fire, can have short-term adverse effects to MSOs through habitat modification and disturbance. As the human population grows in the southwestern U.S., small communities within and adjacent to National Forest System (NFS) lands are being developed. This trend may have detrimental effects to MSOs by further fragmenting habitat and increasing disturbance during the breeding season.

West Nile Virus also has the potential to adversely impact the MSO. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that MSOs may be highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of MSOs and the lack of intensive monitoring of banded birds, we will most likely not know when MSOs contract the disease or the extent of its impact to the MSO range-wide.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, high-severity, stand-replacing wildland fire is probably the greatest threat to the MSO within the action area. As throughout the West, fire severity and size have been increasing within this geographic area. Landscape level wildland fires, such as the Rodeo-Chediski Fire (2002) and the Wallow Fire (2011), have resulted in the loss of tens of thousands of acres of occupied and potential MSO habitat across significant portions of its range.

Global climate variability may also be a threat to the MSO and synergistically result in increased effects to habitat from fire, management actions across the MSO's range that result in adverse impacts, and other factors discussed above. Studies have shown that since 1950, the snowmelt season in some watersheds of the western U.S. has advanced by about 10 days (Dettinger and Cayan 1995, Dettinger and Diaz 2000, Stewart et al. 2004). Such changes in the timing and amount of snowmelt are thought to be signals of climate-related change in high elevations (Smith et al. 2000, Reiners et al. 2003). The impact of climate change is the intensification of natural drought cycles and the ensuing stress placed upon high-elevation montane habitats (IPCC 2007, Cook et al. 2004, Breshears et al. 2005, Mueller et al. 2005). The increased stress put on these habitats is likely to result in long-term changes to vegetation, invertebrate, and vertebrate populations within coniferous forests and canyon habitats that affect ecosystem function and processes.

Critical Habitat

The FWS designated CH for the MSO in 2004, on approximately 8.6 million acres (3.5 million hectares) of Federal lands in Arizona, Colorado, New Mexico, and Utah (U.S. Fish and Wildlife Service 2004). Within the designated boundaries, CH includes only those areas defined as protected habitats (defined as PACs and unoccupied slopes >40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted habitats (defined as unoccupied mixed conifer and pine-oak on slopes <40% or have been harvested for timber in the past 20 years and riparian forests) as defined in the 1995 Recovery Plan (USDI Fish and Wildlife Service 1995). The PCEs (PCEs) for MSO CH were determined from studies of their habitat requirements and information provided in the

1995 Recovery Plan (USDI Fish and Wildlife Service 1995). Since MSO habitat can include both canyon and forested areas, PCEs were identified in both areas. The PCEs identified 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:

- 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 percent of which are large trees with diameter at breast height ((dbh) 4.5 ft above ground)) of 12 inches or more;
- A shade canopy created by the tree branches covering 40 percent or more of the ground;
- Large, dead trees (snags) with a dbh of at least 12 inches;
- 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 PCEs 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 PCEs 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.

The PCEs identified for the MSO within canyon areas are:

- Presence of water (often providing cooler and often higher humidity than the surrounding areas);
- Clumps of 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.

Steep-walled rocky canyonlands are typically within the Colorado Plateau EMU, but also occur in other EMUs. Canyon habitat is used by owls for nesting, roosting, and foraging and includes landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to 1.2 miles (2 kilometers) in width (from rim to rim), with canyon reaches often 1.2 miles (2 kilometers) or greater in length, and cool north-facing aspects. Rock walls must include caves, ledges, and fracture zones that provide protected nest and roost sites. Breeding sites are located below canyon rims; however, it is known that owls use areas outside of the canyons (i.e., rims and mesa tops).

Overall, the distribution of the MSO and its designated CH has not changed significantly range-wide in the U.S. (which includes Utah, Colorado, Arizona, New Mexico, and extreme southwestern Texas) based upon the information collected as part of the completing the

Revised Recovery Plan (USFWS 2012). What we mean by this is that MSOs continue to occur in the same areas and CH is continuing to provide for the life history needs of the MSO throughout all of the EMUs located in the U.S. We do not have detailed information regarding the status of the MSO in Mexico, so we cannot make inferences regarding its overall status.

Since the owl was listed, we have completed, or have in draft form, a total of 241 formal section 7 consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO over the course of 19 years. The form of this incidental take is almost entirely harm or harassment, rather than direct fatality, and many of these actions have resulted in single or short-term disturbance to owls that has not resulted in long-term harassment, habitat degradation, or habitat loss. These consultations have primarily dealt with actions proposed by Forest Service Region 3. However, in addition to actions proposed by 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. The jeopardy opinion issued for existing Forest Plans on November 25, 1997 was rendered moot as a non-jeopardy/no adverse modification BO was issued the same day.

ENVIRONMENTAL BASELINE

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

Description of the Action Area

The action area consists of the project area and the extent of any effects emanating from the proposed action. The action area for this proposed action is the AEPA, areas adjacent to the boundary of the AEPA up to 0.5 miles, and the portion of the Aravaipa Creek downstream of the AEPA boundary approximately five miles to the fish barrier, though we do not anticipate that most effects of the proposed action will occur within 0.5 miles of the AEPA boundary or will reach the fish barrier.

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

Loach Minnow and Spikedace

Aravaipa Canyon supports the most protected loach minnow and spikedace populations in their range due to special use designations on BLM land (such as wilderness designation), substantial ownership and protective management by The Nature Conservancy, and ephemeral reaches and fish barriers located downstream that act to prevent invasion of non-native fish species. Loach minnow are found in Aravaipa Creek from the downstream non-native fish barriers upstream to above Turkey Creek, in Deer Creek upstream from its confluence with Aravaipa Creek to the Aravaipa Canyon Wilderness boundary, and occasionally in the lower most segment of Turkey Creek next to its confluence with Aravaipa Creek. Spikedace are found from the midpoint of the canyon at Horse Camp Wash upstream to above Turkey Creek. It is believed that spikedace occurred throughout the canyon at one time, but have been virtually absent from the lower reaches of Aravaipa Canyon since the 1970s, mainly due to low or no water flows. Spikedace numbers have increased in the upper reaches of Aravaipa Canyon as a result of aquatic habitat improvement. Intensive monitoring has demonstrated that loach minnow and spikedace persist in the Aravaipa Creek area, and the populations are likely stable. River and riparian habitat along Aravaipa Creek and Deer Creek areas provide high quality loach minnow and spikedace habitat. There is a risk from non-native fish invading the canyon, especially red shiner, and from livestock waters located in the uplands either adjacent to or in tributary canyons that drain into Aravaipa that may harbor non-native aquatic organisms. Aravaipa Creek maintains a self-sustaining population of loach minnow and spikedace that varies in number from year to year. The status of the Deer Creek loach minnow population, discovered in 1995, is unknown.

Critical Habitat

In the action area, loach minnow and spikedace critical habitat has been designated in Aravaipa Creek (11 miles), Turkey Creek extending from the confluence with Aravaipa Creek upstream to the confluence with Oak Grove Canyon (approximately 3 miles), and Deer Creek extending from the confluence with Aravaipa Creek upstream to the boundary of the Aravaipa Wilderness (approximately 2 miles). Aravaipa Creek, which is occupied by loach minnow and spikedace, has one or more of the PCEs that are sufficient to maintain the species. Also, Deer Creek, which is occupied by loach minnow, has one or more of the PCEs that are sufficient to maintain both species. Turkey Creek may maintain most PCEs for both species, but low or no water flows through part of most years may limit loach minnow and spikedace presence.

Recovery and Critical Habitat Management

The recovery plans did not specifically identify travel management (roads) or recreation as factors affecting these species. In general, changes in vegetation, water flow, and water availability are addressed, which could result from road use/maintenance and recreation. The only recovery objective related to the proposed action is to discourage detrimental land and

water use practices, and ensure perennial flows. The critical habitat listing (77 FR 10854) lists five actions that may destroy or adversely modify critical habitat:

1. Actions that would significantly diminish flows within the active stream channel.
2. Actions that significantly alter the water chemistry of the active channel.
3. Actions that would significantly increase sediment deposition within a stream channel.
4. Actions that could result in the introduction, spread, or augmentation of aquatic species in occupied stream segments, or in stream segments that are hydrologically connected to occupied stream segments, even if those segments are occasionally intermittent, or introduction of other species that compete with or prey on spikedace or loach minnow.
5. Actions that would significantly alter channel morphology.

Critical habitat managed to maintain or improve the PCEs for loach minnow or spikedace over time will maintain or improve these characteristics.

Gila Topminnow and Desert Pupfish

Parson's Grove was stocked in October 2005 with desert pupfish and Gila topminnow, along with additional sites on TNC property. Follow-up surveys conducted by the BLM and TNC have failed to collect desert pupfish; however, Gila topminnow appear to be doing well and are reproducing. Stocking in future years are continuing in other suitable sites in the general area, along with supplemental stockings in the already stocked sites to establish and maintain genetic integrity of these small populations. Formal consultation was completed for the establishment of these species on BLM and TNC land in the Aravaipa Creek Watershed reestablishment BO (#02-21-04-F-0022). We anticipate that desert pupfish and Gila topminnow will occur in Aravaipa Creek, Turkey Creek, or other tributaries of Aravaipa Creek during the life of this proposed action because high water flows during storms may move the fish downstream to Aravaipa and Turkey creeks, and provide access to other tributaries.

Critical Habitat

Critical habitat has not been designated for Gila topminnow. No desert pupfish designated critical habitat occurs within the action area.

Mexican Spotted Owl

MSO habitat in the area generally occurs in Aravaipa Canyon and its side canyons. The area provides nesting habitat along the cliffs, and foraging habitat along the riparian areas of the canyons. Surveys for Mexican spotted owls were conducted in 2008 in Turkey Creek when a pair of Mexican spotted owls was documented. Additional surveys in Turkey Creek, lower Oak Grove Canyon, and Aravaipa Creek near the confluence of Turkey Creek were completed in 2009. These surveys documented a nesting pair of Mexican spotted owls and their two young in a side canyon of Turkey Creek and another nesting pair and their two young in a side canyon of Aravaipa Creek. Both nests are located in rock alcoves. The

BLM has established two protected activity centers (PACs) within the planning area; one encompassing Turkey Creek Canyon and a portion of Oak Grove Canyon and the second along Aravaipa Canyon, approximately centered at the confluence of Turkey Creek (Figure 2).

Critical Habitat

No MSO designated critical habitat occurs within the action area.

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

All species

The action area has been and continues to be adversely affected by natural events, such as fire, flood, or drought, and from non-native species invasions, recreation activities, up-stream water withdrawal and improper livestock grazing, and/or other land-use practices on non-Federal lands. Past and current actions in the action area may result in some adverse effects to the species, but the action area will likely maintain favorable conditions for all species in Aravaipa Creek and its tributaries in the long-term.

EFFECTS OF THE ACTION

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

Loach minnow and spikedace

Travel Management, including Off-Highway Vehicle Use

Loach minnow and spikedace may be impacted directly and indirectly from roads, road maintenance, and road use. Motorized vehicle traffic and road maintenance through wetted creek crossings may result in fish mortality or injury. Adult fish, which are more mobile than younger fish, will likely escape being crushed by tires, but earlier life stages are either unable to move to avoid being crushed, such as eggs, or are less mobile, such as larval and juvenile fish. Fish may also be stranded on land from vehicle splash, especially larval and juvenile fish.

Aquatic and riparian habitat located at stream crossings would be altered every time a vehicle or machinery crosses the stream. Where crossings occur upstream of occupied fish habitat, disturbance from use of a road could introduce fine sediments into downstream reaches, creating both short and long term impacts to fish and critical habitat if sediment input

exceeds that which can be carried normally by the stream as bedload. Filling of interstitial spaces (*i.e.*, the gaps between rocks on the stream bottom) with fine sediment (particles < 6 mm in size) eliminates habitat for many insects that loach minnow and spikedace use for food. Fish eggs and early life stages can also be buried and smothered when interstitial spaces are embedded with fine sediment. Hiding cover for larval fish and some species of insects are also lost as interstitial spaces become embedded with fine sediment. The probability of habitat loss through this type of non-point-source sediment input occurring increases with presence of erosive soil types and impaired riparian buffers. Buffer strips between roads and streams tend to reduce sediments reaching aquatic ecosystems. However, the extent and quality of riparian buffers vary between the wetted creek crossings and cannot be relied upon to reduce or eliminate sediment from entering these systems. No data specific to road sediment contributions exists for roads throughout and outside of the AEMP; however, the majority, if not all, are eroding and causing erosion into the adjacent uplands, associated tributaries, and washes. In certain areas with a steep gradient the eroding road may be contributing sediment directly into tributaries, such as Turkey Creek, that drain into Aravaipa Creek. Motor fluids, through leaking or accident, may harm aquatic life and degrade water quality (though the proposed action will minimize the likelihood of this occurrence).

While we expect the mortality or injury of individuals from road use and maintenance to occur, we do not anticipate that they will occur often, and would not be sufficient to affect the presence of the species or their populations. While we expect habitat alterations to occur at the crossings and downstream of some of the roads, we do not expect these actions to alter habitat sufficiently in the area to affect species' presence or their populations. These actions have been occurring for over 30 years, during which these populations have persisted in this system, and are anticipated to persist into the future. Also, conservation measures to minimize impacts to stream edge, limit riparian crossings, and implementing equipment maintenance outside the flood plain will help minimize effects to individual fish and habitat characteristics.

Recreation

Currently, the primary management actions affecting loach minnow and spikedace in the AEPA are permitted and non-permitted recreation. The AEPA is used primarily for hiking, hunting, picnicking, birding, primitive and designated camping, and dirt-road vehicle driving. Other uses include horseback riding, geocaching, and playing in the stream.

Designation of Campsites in Turkey Creek
Car Camping, Picnicking, and Hunting

Dispersed and designated camping (along Turkey Creek road) along or adjacent to aquatic habitats within the AEPA has caused soil compaction and erosion, bank sloughing, and damage to, or loss of native riparian plant species. Campers along with other recreationists may use the creek for cleaning and bathing. If soap or other such products are used, water quality may be temporarily altered. This affect would be more noticeable in lentic habitat or disconnected habitat, but not measurable in lotic habitats. Allowing camping only in the

designated campsites are likely to reduce these effects. The likelihood of these actions affecting the survival of individual fish in Turkey Creek (and Aravaipa Creek downstream) is low because water running in Turkey Creek is ephemeral, limiting the opportunity for fish to occur.

Other recreational activities that generally occur away from Aravaipa and Turkey creeks may have effects to water quality and habitat condition. Most of these effects are associated with road use, which are explained in the Travel Management section. Most of the other actions will likely have little effect to fish or their habitat because they will generally occur away from fish habitat.

Wilderness Hiking and Backpacking

Throughout sections of the Aravaipa Canyon Wilderness are signs of well-worn trails from recreationists. Areas of greatest concern are located along the creek's banks. Although not maintained, many of these trails have been in existence for decades. Reduction and loss of the amount and quality of vegetation within and along the streambanks and the riparian zone from these hiking trails accelerates erosion as there is not enough vegetation present to bind the soils with the roots. Stream bank degradation by human traffic can be as detrimental to obtaining wetland proper functioning condition as livestock traffic or vehicle traffic.

In Aravaipa Creek, riffles are common locations for stream crossings because of firmer substrate and shallower water. Adult and subadult fish exhibit startle and escape behaviors when presented with large mammals treading through their habitat. Such behaviors are common with all kinds of potential threats the fish are faced with on a daily basis.

Loach minnow adult, egg and larvae life stages, may be adversely affected by hikers through disturbance and/or death of eggs or larvae through trampling or siltation (by dislodging fine sediments) during late winter (February) through mid-July or the onset of the monsoon rains, and then again in October through the end of November. During the remainder of the year such affects would be extremely unlikely as eggs would not be present and larvae would be more mobile or would have transformed to the juvenile size class. Spikedace, egg and young life stages, may be adversely affected by hikers through disturbance, injury, or death of eggs or young through trampling or siltation (by dislodging fine sediments) during the spawning season (March) through late June or the onset of the monsoon rains. During the remainder of the year such affects would be extremely unlikely as eggs would not be present and larvae would be more mobile or would have transformed to the juvenile size class.

No trails or other recreation developments would be maintained or constructed in designated wilderness and only dispersed hiking would be allowed. Prohibiting new trails and allowing the soil and vegetation at existing trails to recover may allow sections of riparian, aquatic, and terrestrial vegetation to recover. Obstructions will be placed in trails to encourage the recreating public to use trails away from the stream edge to minimize soil erosion by allowing stream-edge trails to recover from past and current human impacts. Signs will be posted at both ends of the canyon and will encourage and educate hikers to use trails away from the stream edge to protect the stream banks and reduce sedimentation of the stream.

Vegetation buffers along and nearby aquatic habitats may slow down the erosive force of rain and reduce the amount of sediment and or pollutants entering the aquatic systems.

While the actions of recreational use may affect individuals and habitat, we do not expect that these effects would result in changes in the viability of the populations or the presence of fish in the general area because:

- Habitat may be affected occasionally, such as hikers in a creek, or quite often, such as vehicle use of roads through Aravaipa Creek, but these effects will either be temporary or limited to specific areas. The vast majority of the creeks where the fish could occur will continue to provide the necessary characteristics to maintain the populations.
- Road use and maintenance may result in direct injury or mortality of larvae and eggs, but these effects will be limited to specific areas
- The populations have persisted in the AEPA even though these effects have occurred for over 30 years, and we expect the populations to persist into the future.

Loach minnow and spikedace critical habitat

Road presence, use, and maintenance of roads within the scope of the AEMP will affect loach minnow and spikedace critical habitat. At the watershed scale, dirt road networks can modify natural drainage networks and accelerate erosion processes. These changes can alter physical processes that govern stream dynamics including the following: changes in flow regimes, sediment transport and storage, bank and bed configuration, and substrate composition. These changes have been documented to have biological consequences that affect a wide array of ecosystem components fundamental to fish habitat (Furniss *et al*., 1991). The effects of road networks on aquatic habitat increase with proximity to fish habitat such as unimproved stream crossings. Hikers and backpackers in Aravaipa canyon go through loach minnow and spikedace critical habitat. This may result in effects to some PCEs such as substrates and microhabitats. Other recreational use may affect some PCEs (see previous section for effects to habitat), but generally they will occur away from critical habitat so there will be little effect.

Of the PCEs of loach minnow and spikedace critical habitat, those affected by the proposed action include: stream microhabitats and substrates that support all life stages and no or low levels of pollutants. The effects to these PCEs are similar to effects to habitat as detailed in the previous sections. Even though these effects to PCEs have been occurring in the area for over 30 years, habitat conditions have maintained sufficiently to maintain the general area for these species, and are expected to continue.

Recovery and Critical Habitat Management

The recovery potential of critical habitat will not be compromised by the proposed action. As stated in the previous section, the effects to the PCEs have been occurring over 30 years. Implementation of the proposed action is expected to result in the perpetuation of loach minnow and spikedace populations in the action area. Critical habitat will be managed to

maintain or improve the PCEs for loach minnow and spikedace over time, contributing to recovery.

The effects of implementing the AEMP to loach minnow, spikedace, and their critical habitat are similar to effects as described in the RMP BO, Reintroduction BO, and Road BO. Refer to those BOs for further analysis.

Gila Topminnow and Desert Pupfish

Effects of implementation of the proposed action on Gila topminnow and desert pupfish that may occur in Aravaipa Creek and its tributaries would be similar to those described for loach minnow and spikedace. Effects of implementation of the AEMP on these fish that occur in other areas of the AEPA would be similar to that described in the Reintroduction BO. In general, the isolated reintroduction sites away from the Oak Grove Canyon and Turkey Creek may be affected by light recreational use, but this is not anticipated to affect the success of the reintroductions. While these actions may affect the species and its habitat, it is unlikely that they will result in injury or mortality of individuals because the reintroduction sites are generally isolated areas where these actions are unlikely to occur, and the likelihood of individuals occurring in Aravaipa Creek and its tributaries is very small.

Mexican Spotted Owl

Due to the relatively narrow canyon of Aravaipa and Turkey creeks and the inability to predict where an owl may be roosting, road activities and recreation have the potential to cause flushing or an alteration in roosting owl behavior during the breeding season. Visual and noise disturbances may adversely affect the behavior of Mexican spotted owls during breeding, nesting, or foraging activities. Most of these actions will occur during the day when owls are roosting or nesting in the side canyons, and, generally, any nest or roost location is isolated sufficiently from roads and recreational use such that these actions are unlikely to result in disturbance. Road maintenance and repair would normally occur in the fall, which would not affect MSO during their breeding season. Camping will occur in the Turkey Creek area, but limiting camping to thirteen designated sites under the proposed action will decrease possible disturbance to foraging owls when compared to the existing condition. Disturbance to foraging owls from camping would be minimal because activities will generally only occur in the campsite itself.

Road use/maintenance and recreational use may impact MSO prey habitat by altering the riparian habitat. This impact is generally limited to the existing roads, and generally does not affect the habitat away from the roads. Camping can concentrate these effects, but they are limited to the campsite and the adjacent areas. Limiting camping to thirteen designated sites will reduce the effects of camping in the general area of Turkey Creek. Campsites may be closed temporarily or seasonally as needed for resource protection or benefit, which would further reduce these effects. The Turkey Creek road will be closed to motorized vehicles after the last campsite. This results in 0.87 miles of road within the Turkey Creek PAC being closed and rehabilitated and should result in an increase in vegetative cover and potentially some riparian trees (this section of road is a more open and xeric section of the canyon). Woodcutting is not permitted in Turkey Creek or Aravaipa Canyon. Downed wood (less

than 10” diameter and 42” in length) may be gathered for use on site. Firewood use results in areas immediately surrounding regular campsites being cleared of smaller dead wood.

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.

Human development, recreational site encroachment, and changes in land-use patterns on non-Federal lands around occupied and potentially-occupied reaches of Aravaipa Creek that further fragment, modify, or destroy upland or riparian vegetation negatively affect water quality and quantity. Increased development and continuation of agricultural and livestock grazing practices may result in the drainage, development, or diversions of wetland and aquatic habitats that reduce water quantity and quality, and destroy spawning and other important habitats. If additional bait-bucket or other introductions of non-native fishes occur in occupied reaches of Aravaipa or Turkey creeks, increased resource competition and direct mortality from predation would likely result.

Farming and ranching activities occur in the east and west portions of Aravaipa Creek and in the uplands, on private, federal, and state lands. Groundwater pumping, surface water diversions, agricultural return flows, flood control activities, and channelization projects could potentially alter flows through the project area, which would affect both aquatic and terrestrial species and their habitats. In addition, recreational activities including hiking, hunting, picnicking, birding, horseback riding, primitive camping, off-highway vehicle driving, geocaching, will continue and may increase. Increase in recreation may have additive impacts to the species and their habitats.

Recently, concerns regarding lead from mine tailings in the area have been discussed. Lead from two mine tailings have been deposited in the general area, either wind driven or through precipitation runoff. This has been occurring for many decades, but the flooding in summer 2006 raised concerns about direct movement of lead from a mine tailing along Aravaipa Creek. Current levels of lead in the system have not seemed to limit population persistence or levels, but sampling of the aquatic system is occurring to monitor the effects of lead levels.

CONCLUSION

After reviewing the current status of each species and its critical habitat, the environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the loach minnow, spikedace, Gila topminnow, or desert pupfish, is not likely to destroy or adversely modify designated critical habitat for loach minnow and spikedace. We base these conclusions on the following reasons:

1. Effects to individuals from implementation will be small and not occur often, and not be sufficient to affect the presence of the species or their populations. Most adults will likely avoid the disturbances. Some eggs and larvae may be affected, but these will be small, not occur often, and not measurable for reproduction.

2. Effects to habitat from implementation will generally be restricted to crossings and downstream of roads, but these effects are not expected to alter habitat sufficiently in the area to affect species' presence or their populations.

3. These actions have been occurring for over 30 years, during which spikedace and loach minnow populations have persisted in this system and are anticipated to persist in to the future. Implementation of the proposed action should improve the current conditions for these species.

4. Effects to loach minnow and spikedace designated critical habitat will occur, but these effects will not alter PCEs sufficiently so that the general area will not be maintained for these species. The recovery potential of the critical habitat in the action area will not be compromised.

5. No critical habitat for Gila topminnow has been designated, so none will be affected.

6. No critical habitat for desert pupfish occurs in the action area, so none will be affected.

After reviewing the current status of MSO, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Mexican spotted owl. We base these conclusions on the following reasons:

1. Disturbance to MSO during the breeding season will be minimal because the proposed action will generally occur away from nesting or roosting individuals, generally occur during the day when individuals are nesting or roosting, and activities at night will generally be restricted to designated campsites.
2. Effects to prey (riparian) habitat will be limited to existing roads and designated campsites, and generally not affect habitat away from these areas.
3. MSOs occur and nested under existing conditions, therefore, we anticipate that the proposed action will not affect the persistence of MSOs in the project area. In addition, implementation of the proposed action should improve conditions for MSOs.

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 statutory provisions of the Act to complete the following analysis with respect to critical habitat.

The conclusions of this biological opinion are based on full implementation of the proposed action 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 further 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 part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

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

Loach Minnow and Spikedace

AMOUNT OR EXTENT OF TAKE

We anticipate that the proposed action may result in the incidental take of the loach minnow and spikedace by injuring or killing eggs or larvae through hiking in Aravaipa Creek and use and maintenance of Road 5018. We anticipate incidental take of loach minnow and spikedace will be difficult and unlikely to detect or determine for the following reasons: destroyed eggs and larvae are difficult to find, occupied habitats are located within remote wilderness, cause of death may be difficult to determine, losses may be masked by seasonal fluctuations, and other actions (such as recreational hiking) are affecting the species. Based upon long-term, intensive surveys conducted every year, loach minnow and spikedace populations persist and appear to be stable within Aravaipa Canyon even with all the uses within the Canyon, including recreational hiking (see RMP BO) and road use/maintenance. We expect that implementing this proposed action will not affect the ability of loach minnow and spikedace populations to continue to persist and be stable. The amount of anticipated incidental take will be considered to have been exceeded if the continued yearly monitoring of Aravaipa Creek native fish population trends show decreases that cannot be explained by

other factors (e.g., floods, livestock grazing) and the proposed action has been implemented for a sufficient time to influence such trends. This exceed statement is similar to that in the RMP BO, except that this also applies to road use and maintenance.

EFFECT OF THE TAKE

In this biological opinion, the FWS determines that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat for the reasons stated in the Conclusions section.

REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS

There are no reasonable and prudent measures or terms and conditions beyond the proposed action, including the conservation measures in this BO that will further reduce effects to loach minnow and spikedace. The conservation measure to continue surveying Aravaipa Creek will provide the population information necessary to determine if take is exceeded. No additional reasonable and prudent measures in addition to the conservation measures in this BO are necessary to minimize incidental take.

Gila Topminnow and Desert Pupfish

AMOUNT OR EXTENT OF TAKE

The FWS does not anticipate the proposed action will incidentally take any Gila topminnow or desert pupfish for the following reasons:

- We do not anticipated that individuals will be affected in or near their release sites because of implementing the proposed action.
- No Gila topminnow or desert pupfish are known to currently occur in or adjacent to Aravaipa Creek or its tributaries.
- If Gila topminnow move into or adjacent to Aravaipa Creek in the future, there will be little to no effect to individuals because topminnow are a live-bearing species.
- If desert pupfish move into or adjacent to Aravaipa Creek in the future, areas where eggs or larvae occur will be very few so that the likelihood that the proposed action will affect any eggs or larvae will be very low.

Mexican Spotted Owl

The FWS does not anticipate the proposed action will incidentally take any MSO because most activities during the breeding season will occur during the day and occur far enough away from nesting and roosting sites so that individuals will not be disturbed.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded,

such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The BLM must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, Resident Agent in Charge, 4901 Paseo del Norte NE, Suite D, Albuquerque, New Mexico, 87113, telephone: (505) 248-7889, within three working days of its finding. Written notification must be made within five calendar days and 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 dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

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

1. We recommend that BLM coordinate with AGFD and FWS in efforts to work with private landowners upstream of known locations to eradicate any source populations of non-native aquatic species from their lands.

2. We recommend that BLM collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in occupied fish sites, if such rights have not been previously obtained.

3. We recommend that the BLM work with FWS on developing, if necessary, and implementing the recovery plan for each fish, and assist in establishing additional populations.

4. We recommend that the BLM coordinate with other land managers and landowners to develop cooperative projects to improve watershed conditions.

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

REINITIATION NOTICE

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

The FWS appreciates the BLM's efforts to identify and minimize effects to listed species from this project. For further information please contact Mark Crites (520) 670-6150 (x229) or Scott Richardson (x242). Please refer to the consultation number 02EAAZ00-2012-F-0282 in future correspondence concerning this project.

/ s / Jean Calhoun for
Steven L. Spangle

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TABLES AND FIGURES

Figure 1. Aravaipa Ecosystem Management Area

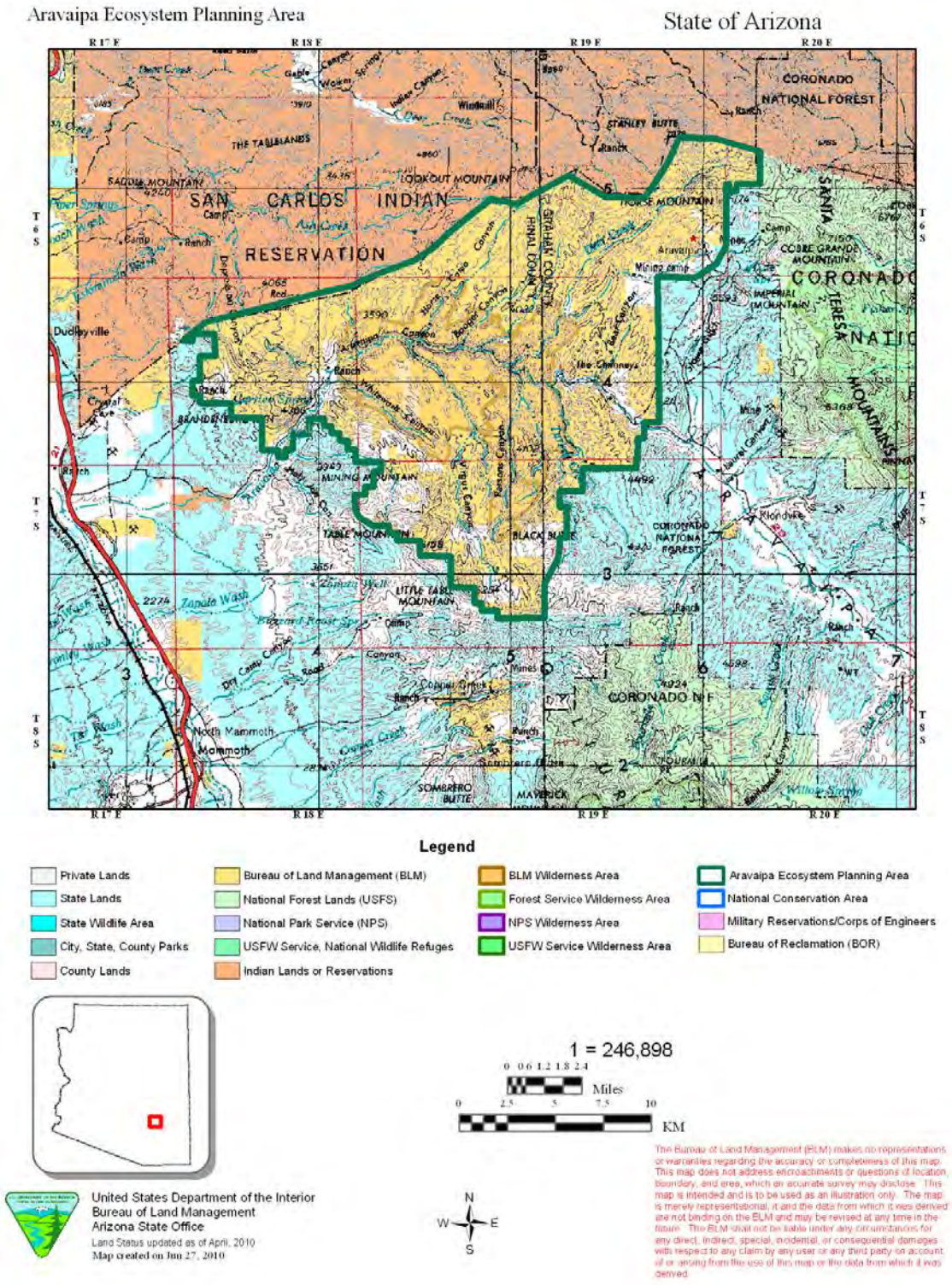
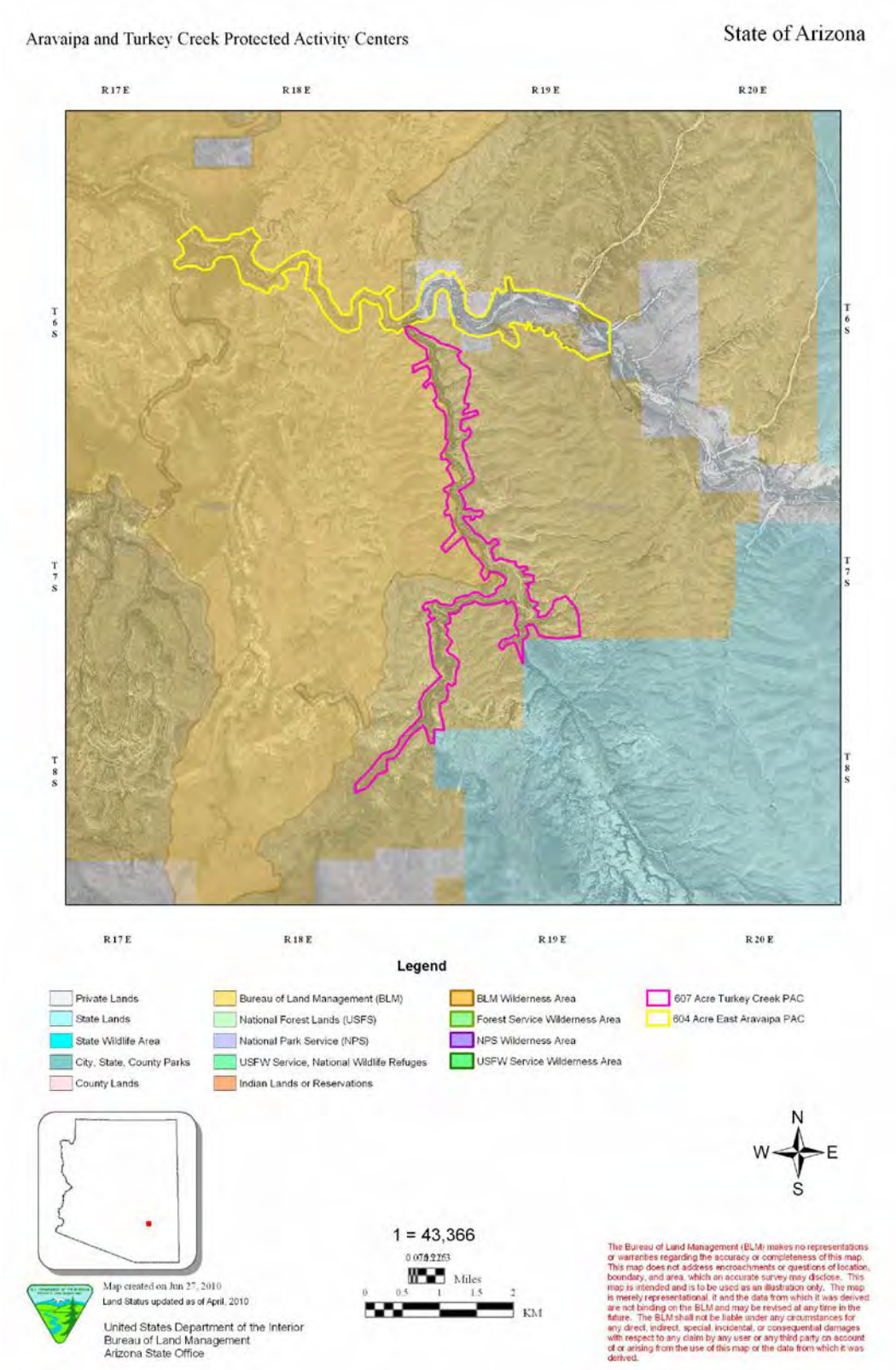


Figure 2. Aravaipa and Turkey Creek Protected Activity Centers



Appendix A: Concurrences

Southwestern Willow Flycatcher

The action area does not contain southwestern willow flycatcher (flycatcher) breeding habitat. The action area may provide migration habitat for the flycatcher during the late spring and summer months. We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the flycatcher based on the following reasons:

- Breeding flycatchers will not be affected because no breeding habitat occurs in the action area.
- Effects of the proposed action to migrating flycatchers would be insignificant and discountable because:
  - The proposed action could momentarily disturb an individual flycatcher moving through the area during migration, but they would quickly return to their normal activities.
  - This disturbance is unlikely to occur because few flycatchers are likely to move through the area during migration.
  - Road repair and maintenance activities would generally occur outside of the season that Southwestern willow flycatchers could be present within the canyon.
- Effects of the proposed action to migration habitat will be insignificant because:
  - Consistent disturbance to riparian vegetation (such as road crossings) would only affect small areas, and
  - Other disturbances (such as hiking) may temporarily affect riparian vegetation, but the areas would likely recover quickly.
- There is no flycatcher critical habitat within the action area.

Lesser Long-Nosed Bat

No lesser long-nosed bat roost locations are known within the project area at this time, but some potentially occur within the AEPA. There are many bat colony roosts within caves along the canyon walls inside and outside of the Aravaipa Wilderness and some of these may be used by lesser long-nosed bats. Paniculate agaves may grow along the edges of sections of road in suitable soils and have the potential to be killed during road maintenance activities and when vehicles pull onto road shoulders. Small agaves may occasionally be stepped on and damaged or killed by recreationists.

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat based on the following reasons:

- The effects of the proposed action are discountable because the majority of possible roosts are not accessible to recreationists due to being higher up on cliff walls. Human disturbance to bat roosts within the planning area is not known to be an issue at this time.
- Given the small proportion of the landscape that impacts to forage plants would occur on in any one year and the number of agave and saguaro which occur within the planning area, the possible destruction of a small number of agave is expected to be insignificant.

Ocelot

At this time, there are no documented occurrences of ocelots within the project area. Likely habitat occurs within the AEPA in the canyons and possibly some of the uplands with dense vegetation. Sightings of ocelot within southern Arizona, while increasing within the last few years, are still extremely uncommon. Recreation, permitted and non-permitted, road use, and road maintenance have the potential to disturb ocelots, but considering that they are uncommon and highly secretive, it is unlikely that individuals will be affected. We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the ocelot based on the following reasons:

- The effects of the proposed action will be insignificant or discountable because:
  - It is unlikely that individual ocelots will be affected by recreationists, vehicles, or road maintenance because it is unlikely ocelots will occur when these actions occur or, if an individual ocelot is present and exposed to disturbance of some kind, that individual will likely remain hidden or move a short distance until the disturbance has passed.
  - Vehicles travel slowly enough within the planning area, due to road conditions, that collisions with ocelots are not anticipated.
  - The continued protection of riparian areas (e.g., ACECs and exclusion of livestock from the majority of riparian areas) within the planning area will ensure that ocelot habitat is maintained.