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In Reply Refer To:
AESO/SE
02-21-05-F-0385

June 5, 2006

Ms. Elaine J. Zieroth
Forest Supervisor
Apache Sitgreaves National Forests
P.O. Box 640
Springerville, Arizona 85938-0640

RE: Nutrioso Wildland Urban Interface Fuels Reduction Project

Dear Ms. Zieroth:

Thank you for your request for formal consultation and conferencing 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 was dated June 21, 2005, and received by us on June 17, 2005. At issue are impacts that may result from implementing the proposed Nutrioso Wildland Urban Interface Fuels Reduction Project (Nutrioso WUI) located on the Alpine Ranger District, Apache-Sitgreaves National Forest (ASNF), Apache County, Arizona. In your request, you determined that the proposed action is "likely to adversely affect" the Mexican spotted owl (*Strix occidentalis lucida*) and its critical habitat, the Chiricahua leopard frog (*Rana chiricahuensis*), the Little Colorado spinedace (*Lepidomeda vittata*) and its critical habitat, and the loach minnow (*Tiaroga cobitis*). You also determined that the proposed action "may affect, but is not likely to adversely affect" the southwestern willow flycatcher (*Empidonax traillii extimus*) and the bald eagle (*Haliaeetus leucocephalus*), and requested our concurrence with your effect determinations. Our concurrence is provided in Appendix A.

The FWS informed the ASNF of the presence of proposed loach minnow critical habitat within the Nutrioso WUI action area. The ASNF acknowledged that the proposed action is "likely to adversely affect" proposed critical habitat for the loach minnow and requested a conference opinion. Our conference opinion is provided within this document.

This biological opinion and conference opinion is based on information provided in the June 7, 2005, biological assessment and evaluation (BAE), the June 2005 environmental assessment, the November 21 2005, BAE amendment, the April 1, 2006 new road clarification document, telephone and email conversations with Linda WhiteTrifaro, Bill Wall, and Jim Probst of your staff, and other sources of information. Literature cited in this biological opinion and conference

opinion is not a complete bibliography of all literature available on the species of concern, fuel reduction treatments and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at Phoenix, Arizona Ecological Services Field Office (AESO). The following Table of Contents is provided to assist in your review of this document.

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CONSULTATION HISTORY

- During November 2000, a Programmatic BAE for wildland-urban interface (WUI) fuel treatment areas was completed by the U.S. Forest Service, Southwest Region, and submitted for formal consultation to the FWS on February 28, 2001; the BAE was amended on April 6, 2001.
- April 17, 2001: A Programmatic Biological Opinion (BO) was issued. The Nutrioso WUI was one of many projects included in this consultation. The original boundary for the Nutrioso WUI covered 30,032 acres.
- An amendment to the original Nutrioso WUI project area was drafted after the Wildfire Protection Plan was developed in 2004 by Apache County and included an additional 11,726 acres beyond the 30,032 acres evaluated.
- March 14, 2005: We received an informal notification of Nutrioso WUI project through email.
- April 24, 2005: We received the draft BAE through email.
- March 14 through July 19: We received and responded to numerous emails and telephone conversations with the Forest.
- June 21, 2005: Formal consultation was initiated, with an initial completion date of November 3, 2005.
- September 22, 2005: Meeting with the Forest Service to discuss cumulative impacts from Eager South WUI.
- November 25, 2005. We received an amendment to the BAE from the Forest Service. The amendment to the BAE reset the consultation timeframe. The new completion date was changed to April 9, 2006.
- February 13, 2006. We discussed with Bill Wall the need for a conference opinion regarding the designation of proposed critical habitat for loach minnow.
- February 15, 2006. We received a call from Bill Wall requesting a conference opinion for proposed loach minnow critical habitat.
- March 21, 2006. Additional information was requested through email to the Forest Service regarding new road construction.
- April 1, 2006. We received an email from the Forest Service documenting the new road construction and closure process.
- April 10, 2006. We requested a 60-day extension of the consultation period.

- April 24, 2006. We received a letter from the Forest Service concurring with our 60-day extension request. The new completion date is June 8, 2006.
- May 18, 2006: Draft BO submitted to the Forest.
- May 24, 2006: We received comments on the draft biological opinion from the Forest.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Nutrioso WUI project area includes 41,758 acres of Forest Service (FS) lands. Figure 1 contains the Area Location Map. The project area is located within the following USGS 7.5' quad maps from north to south and west to east: Eagar, Rudd Knoll, Buffalo Crossing, and Nelson Reservoir, Nutrioso, Alpine.

PRESCRIBED TREATMENTS

The prescribed treatments are outlined in Appendix B of this biological opinion. It contains two exhibits:

- Exhibit 1 details prescribed treatments within 0.5 mile of private land.
- Exhibit 2 details prescribed treatments beyond 0.5 mile, both by vegetation type and slope.

Table 1 below outlines the general prescriptions with the acreage of impacts found in Appendix B. Treatments include:

- thinning trees to certain crown spacing;
- removing or not removing boles;
- treating existing and created slash using various methods (e.g., pile and burn, broadcast burning, chipping, removal, and re-occurring maintenance burns or fire use).
- Areas that cannot be treated mechanically, e.g., steep slopes (>25% in pinyon-juniper and >40% in other conifer types) will receive low-intensity prescribed burning.

Table 1. Outline of Prescribed Treatments (within and beyond 0.5 mile of private land) found in Appendix B with acres of treatments within Mexican spotted owl protected habitat.

General Prescriptions*	Acres Within ½ Mile	Acres Beyond ½ Mile	Total Acres	Mexican spotted owl protected habitat
Cut Boles/Remove Boles/Burn	6,843	13,229	20,072	261
Cut Boles/Leave Boles/Burn	3,520	2,786	6,306	3
Burn Only	2,838	4,752	7,590	1,838
Thin to 110 (BA) Favoring 16"+ or Burn Only		802	802	
Grassland Restoration	3,129	1,457	4,586	
Pine Restoration		1,396	1,396	
No Treatment - Greenwood watershed restoration area and shrublands.			1,006	
Total Acres	16,330	24,422	41,758	2,102

*see Appendix A, Exhibits 1 & 2, for treatment code and description

The prescribed treatments were developed to create a condition that limits the ability of fire to reach the crown (reduce ladder fuels) and should it reach the crown, to reduce the ability of fire to spread between crowns (increase crown spacing) on 40,752 of the 41,578 acres of FS lands in the project area. No treatments are proposed for 1,006 acres of FS lands that are within shrublands or a watershed restoration area (Greenwood). Some treatments would be implemented under the White Mountain Stewardship Contract (WMSC), under which approximately 5,000 to 25,000 acres each year would be offered to receive urban interface fuels reduction treatments across the ASNF over the 10-year contract.

Burn only treatments would be implemented by the ASNF. The majority of treatment prescriptions in Appendix B call for low-intensity prescribed burning. Appropriate conditions for low intensity fires are generally in the spring and fall, with winds typically 12 miles per hour (mph) or less. Fire severity under the prescribed conditions can result in pockets of mortality in all diameter classes, but burn plans specify measures that minimize intensity and severity such as backing fires, ignition late in the day after the burning period (the time of day when fires spread more rapidly), etc. Burn plans will be developed prior to implementation by the Fuels Specialists in conjunction with the Wildlife, Watershed, Soils, and Vegetation/Grazing Management specialists.

As indicated in the BAE amendment (November 21, 2005), the ASNF will monitor the viability of all stream management zones with Little Colorado spinedace occupied or critical habitat through the following project phases: planning of pre-ignition and mechanical thinning, implementation of fire and mechanical thinning operations, and post-ignition and mechanical thinning. The ASNF will monitor each phase listed above and recommend the necessary adjustments in order to protect the integrity of the stream management zones. There will be no

prescribed burning treatments within known Little Colorado spinedace occupied habitat during the spring months. This area begins just above the southern end of Nelson Reservoir upstream to the private land boundary, approximately 3.2 river miles. In addition, all of Rudd Creek (where suitable spinedace habitat occurs) is considered occupied habitat.

The thinning prescriptions of 3A1, 3A2, and 5A1 (Appendix B) have a target (minimum) crown spacing from 10ft. to 25ft. with an average of 15ft. to 20ft. Because crown spacing is determined off of existing stand structure, a variety of actual spacing occurs. In addition, the stand specific silviculture prescriptions will include utilizing groups or clumps of trees as a single “tree unit” from which the prescribed crown spacing is determined; except for removing ladder fuels, they will be left unthinned.

The BAE and amendment identified sensitive areas and included restrictions on timing and number of acres treated in order to minimize impacts to threatened and endangered species within the action area. These restrictions are described under the Best Management Practices (BMPs) section of the Proposed Action. The proposed project timeframe is expected to be 10 years.

In most cases trees >16” diameter at breast height (dbh) would not be cut. The four cases where a tree >16” dbh may be cut include:

- 1) Dwarf mistletoe rating of 4 or greater (scale is 1 to 6).
- 2) Any evidence of insect infestation (e.g. bark beetle).
- 3) Trees that act as ladder fuels (a large tree that has a live crown ratio of 80% or more, or one with branches within 10 ft. of the ground that provides continuous material from the forest floor into the crowns of dominant trees).
- 4) Imminent mortality (within 0.5 mile of private land) as evidenced by a) 80% or more of crown fading, b) a dead top tree with 20% or less live crown, or c) certain trees (white fir, corkbark fir, blue spruce, and Engelmann spruce) leaning more than 30 degrees.

No hardwoods or aspen are proposed for removal. Retention of needed snags, and down woody material will be addressed in specific prescribed burning plans developed by the Fuels Specialists in conjunction with the Wildlife Specialist. Crown spacing of conifers will be primarily achieved by thinning conifers <16” dbh (emphasis is retention of large trees). Snags of any size or species within 300 ft. of private land, and within 300 ft on both sides of identified fire control roads will be felled (see Appendix B). Elsewhere, snags <12” dbh may be felled as needed (such as in pockets of insect or disease-killed trees).

In addition to the proposed treatments, approximately 2.4 miles of new roads (unpaved) are proposed in 11 segments (proposed locations are found in the maps provided with the BAE). Once these new roads are no longer needed (timeframe was not provided in the BAE), all but a 0.07-mile section will be closed to full-sized, highway motor vehicles but will still be available to ATV or off-highway vehicle use. The 0.07-mile section will be gated and open only for administrative use. New roads will be constructed with an average width of 18 ft. All BMPs related to roads identified in the BAE will be followed.

Overview of Best Management Practices Related to Prescribed Treatments *Riparian BMPs*

Riparian Soil Protection

To protect and maintain soil and ambient temperatures, moisture retention, large woody debris, and floodplain function within the Streamside Management Zones (SMZs), conifer trees greater than 16" dbh shall be identified by the Fisheries Biologist and protected from thinning to provide large enough trees for future stream channel placement; these trees shall not be considered in determining prescribed crown spacing (Riparian BMP No. 4d). SMZs are defined as 150 ft either side of the drainage's high water mark on both perennial and intermittent drainages. Additionally, beyond 0.5 mile of private land, crown spacing for the SMZ shall be one-half of upland crown spacing and all deciduous and riparian vegetation will be protected (Riparian BMP No. 4c).

Stream Channel and Wetland Protection

Riparian BMP No. 1 states that stream channels and other wetlands to be protected will be shown on the project contract maps along with their associated SMZs, which shall be designated along intermittent and perennial stream channels. Crossing stream channels shall be limited to designated crossings and pre-approved by a Forest Officer. One short segment of new road construction is planned across lower Auger Creek and will likely require installation of a culvert(s).

SMZ Protection

Riparian BMPs No. 1 and 4b allow no mechanized activities within the SMZ unless approved by a Forest Officer. Riparian BMP No. 5 states that log landings (decking areas) shall not be allowed in meadows, riparian areas, stream channels, and SMZs unless approved by a Forest Officer. These areas will be clearly designated on the project area contract map. Additionally, riparian BMP No. 6 states that mechanical slash piling shall not occur in meadows, SMZs, or riparian areas unless approved by a Forest Officer. These areas will be clearly designated on the project area contract map.

Selective Retention of Trees within Riparian and SMZs

Riparian BMP No. 4c adjusts prescribed crown spacing to half that prescribed in the uplands. Riparian BMP No. 4d provides for the identification of conifers >16" dbh for retention in SMZs.

Restrictions Related to Mechanical Treatments

BMP No. 2 states no burning of slash in drainages or depressions shall be allowed, although created slash may be placed in minor drainages to aid in rebuilding of deeply incised gullies and head cuts. BMP No. 3 states that a minimally disturbed filter strip of vegetation (width of filter strip was not provided in BAE) and litter shall be maintained between skid trails/log

decks/roads and ephemeral drainage channels. Riparian BMP No. 6 states that mechanical slash piling shall not occur in meadows, SMZs and riparian areas.

Restrictions Related to Prescribed Burning

Riparian BMP No. 8 states that fire (burn) control lines shall not be constructed on slopes greater than 40% or within SMZs unless approved by a Forest Officer with identified specific mitigations being implemented as needed. It also states that prescribed burning treatments shall be accomplished within the riparian drainages when the lower duff layer in contact with the soil surface is moist enough to avoid hydrophobic soil conditions. The resulting cool burns allow for adequate ground cover retention to help reduce overland flow and soil erosion, and help retain long-term soil productivity. Cool burns also reduce negative impacts to soil structure that could ultimately reduce water infiltration rates. They also allow for nitrogen to be condensed into the soil instead of being volatilized into the air.

There will be no ignition in riparian areas. Riparian BMP No. 8b states ignition shall be above slope breaks of active floodplain and will be based on soil and fuel moistures within the active floodplain and riparian area. Fire will be allowed to burn down into the channel with a maximum of 15% burned area within the active floodplain and riparian areas. The burned area percentage is based on a geomorphic reach scale as identified in the FS Region 3 Stream Survey Protocol. Burned areas will be identified by estimating the blackened areas resulting from the treatment. All burning within the SMZ shall be managed for low-intensity and low-severity burns. Woody debris within the riparian area will not be intentionally burned to avoid localized moderate- to high- severity burns.

Prescribed Burning BMPs

Restrictions Related to Timing

Under General Watershed BMP No. 1, specialists will modify treatment activities to minimize soil disturbance in Nutrioso Creek/Auger and San Francisco Headwaters/Judd Lake 6th code watersheds. These watersheds have highly erosive soils and drain into Little Colorado spinedace habitat. Modifications will include staggering treatments over time and space, timing of treatments within the year, and deferment of some locations within treatment areas in order to either enhance resource objectives or limit negative resource impacts.

Unforeseen Events and Additional Analysis

Under General BMP No. 2, if unforeseen events occur in the future (e.g., large wildfires, prescribed burns producing higher than planned levels of severely burned conditions, etc.) that result in significant disturbances to a 6th code watershed, another Equivalent Disturbed Area (EDA) analysis will be performed to determine if the planned schedule of treatment activities in that watershed needs to be revised for watershed recovery before the next treatment action takes place.

Deferred Livestock Grazing

Riparian BMP No. 8c states that livestock grazing will be coordinated with prescribed burning, especially relative to drainages and their floodplains. Livestock use may be deferred if necessary.

Other BMPs

Seeding Related BMPs

Various BMPs call for seeding (log landings, skid trails, and road obliteration and closures) primarily with native species. However, appropriate native species in sufficient quantities can be difficult to obtain at times. The Specialist's Report for Understory Vegetation contains a mitigation strategy stating that any fills, or re-vegetation seeding, used during or after project implementation will be certified weed-free.

Logging and Prescribed Burning Restrictions Related to Mexican Spotted Owl

The WMSC contains a "Timing of Logging Restriction" for the Mexican spotted owl (MSO). No tree removal (or no mechanical treatments for the purpose of this consultation) will occur from March 1 through August 31. It also restricts road use for hauling during certain times of the year: clause H.7.6. states "hauling may be prohibited within 0.25 mile of Mexican Spotted Owl nesting sites" and "such restrictions for specific roads will be listed in the Project Information." For the Nutrioso WUI project, hauling restrictions will be further refined to restrict road use within 0.25 mile of the MSO Protected Activity Center (PAC) boundary when the nest location cannot be determined.

Prescribed burning activities within MSO PACs will occur outside of the breeding season. No aerial ignition will occur in MSO PACs. All prescribed burn planning will include other resource specialists such as wildlife, fisheries, watershed/soils/hydrology, etc.

Watershed Restrictions Related to Thinning and Harvest Treatments

Under General BMP No. 1, thinning and harvest treatments in 3A1, 3A2, 5A1 and 5A2 will be limited in order to prevent a concentration of effects. In the Nutrioso Creek/Auger 6th code watershed, treatment will be limited to 2,000 acres within any two-year period and to 3,000 acres within any four-year period. In the San Francisco Headwaters/Judd Lake 6th code watershed, treatments will be limited to 1,500 acres within any two-year period and to 2,500 acres within any four-year period. These acreage restrictions do not apply to prescribed burning entries into those treatment areas.

Additional protection measures were developed through coordination with the ASNF to minimize impacts to Little Colorado spinedace, in a manner consistent with the intended purpose of the proposed action. The ASNF provided an amendment to the BAE with an alternative consistent with their scope of the action. The BAE amendment states, the ASNF will not treat more than 2,000 acres with mechanical treatments within the Rudd Creek 6th code sub-watershed during any one year period (365 days). This 2,000-acre limit is designed to reduce the effects to Little Colorado spinedace and the watershed, in general.

DESCRIPTION OF THE ACTION AREA

For this consultation we are defining the action area as all 41,758 acres of the Nutrioso WUI including 1,124 acres of state land, and 9,772 acres of private land, and Nutrioso Creek extending north, down to its confluence with the Little Colorado River, and from the headwaters of Boneyard Creek to its confluence with the North Fork of the East Fork Black River (Figure 2. Action Area Map). All of these areas are included within the proposed project boundary and will likely incur impacts related to smoke, noise, and other disturbances related to the prescribed treatments mentioned above.

STATUS OF THE SPECIES

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 catastrophic wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The FWS appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The Nutrioso WUI is located in the Upper Gila Mountains RU. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep, forested drainages. MSO habitat associated with this RU consists of pinyon/juniper woodland, ponderosa pine/mixed-conifer forest, some spruce/fir forest, and deciduous riparian forest in mid- and lower-elevation canyon habitat. The Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests administer most habitat within this RU.

MSO are widely distributed and use a variety of habitats within this RU. MSO most commonly nest and roost in mixed-conifer forests dominated by Douglas fir and/or white fir, and canyons with varying degrees of forest cover (Ganey and Balda 1989, USDI 1995). MSO also nest and roost in ponderosa pine-Gambel oak forest, where they are typically found in stands containing well-developed understories of Gambel oak (USDI 1995).

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Fuels reduction treatments, though critical to reducing the risk of catastrophic wildfire, can have short-term adverse effects to MSO through habitat modification and disturbance. As the human population grows, especially in Arizona, small communities within and adjacent to National

Forest System lands are being developed. This trend may have detrimental effects to MSO by further fragmenting habitat and increasing disturbance during the breeding season.

Since the MSO was listed, we have completed or have in draft form a total of 166 formal consultations. These formal consultations have identified incidences of anticipated incidental take of MSO in 361 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO.

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

Mexican Spotted Owl Critical Habitat

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

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

Primary constituent elements related to forest structure include:

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

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

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

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

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

Chiricahua leopard frog

The Chiricahua leopard frog was listed as a threatened species without critical habitat in a Federal Register notice dated June 13, 2002 (USFWS 2002).

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 ft. in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of northern and central Chihuahua (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997, Sredl and Jennings 2005). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable. In Arizona, slightly more than half of all

known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of populations extant in Arizona from 1993-1996 were found in stock tanks (Sredl and Saylor 1998).

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*Rana tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-78) (Hale and May 1983). From 1983-1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During extensive surveys conducted from 1994-2001, the Chiricahua leopard frog was found at 87 sites in Arizona, including 21 northern localities and 66 southern localities. (Sredl *et al.* 1997, Rosen *et al.* 1996, USFWS files).

Based on Painter (2000) and the latest information for Arizona, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has also not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In many of these regions, Chiricahua leopard frogs were not found for a decade or more despite repeated surveys.

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey *et al.* 2001). Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Fernandez and Rosen 1998, 1996; Rosen *et al.* 1996; 1994; Snyder *et al.* 1996; Fernandez and Bagnara 1995; Sredl and Howland 1994; Clarkson and Rorabaugh 1989). For instance, in the Chiricahua region of southeastern Arizona, Rosen *et al.* (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and non-native predatory fish. Rosen *et al.* (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

Fire frequency and intensity in southwestern forests are much altered from historical conditions (Dahms and Geils 1997). Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870-1900, these frequent ground

fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer *et al.* 1997, Swetnam and Baisan 1996). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996).

The change in intensity and frequency of fires in the southwestern forests has increased the potential modification and destruction of leopard frog habitat. Following the 1994 Rattlesnake fire in the Chiricahua Mountains, Arizona, a debris flow filled in Rucker Lake, a historical Chiricahua leopard frog locality. Leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) apparently disappeared from Miller Canyon in the Huachuca Mountains, Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. Bowers and McLaughlin (1994) list six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires.

Additional information about the Chiricahua leopard frog can be found in Painter (2000), Sredl *et al.* (1997), Jennings (1995), Degenhardt *et al.* (1996), Rosen *et al.* (1996, 1994), Sredl and Howland (1994), Platz and Mecham (1984, 1979), and Sredl and Jennings (2005).

Recent (2004 to present) Section 7 Biological Opinions addressing the Chiricahua leopard frog are listed in the table below. Many of these Biological Opinions anticipated some level of incidental take of leopard frogs, although none anticipated local extirpations at any site.

Project Name	Consultation Number
Historic Mail Trail Project	02-21-21-98-0399-R4
Awtry and Marks Ditch Diversion Repair on the Blue River	02-21-03-F-0046 R2
Buzzard Roost and Soldier Camp Allotments	02-21-04-10 F-0273
Programmatic Biological and Conference Opinion for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region	02-22-03-F-366
Buenos Aires National Wildlife Refuge Fire Management Plan for the 2005-2008 Burn Seasons	02-21-05-F-0243
Term Permit to Graze Livestock for 10 Years on the Little Green Valley Complex	02-21-99-F-0300-R1
Biological and Conference Opinion for the BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management	02-21-03-F-0210
Apache Trout Enhancement Project – Second Reinitiation	02-21-01-F-0101 R2
Verde Analysis Area Wildland Urban Interface Fuels Treatment	02-21-03-F-0213

Ryan Fire Biological Opinion	02-21-02-F-0157
Livestock Grazing on the Kunde and Papago allotments	02-21-98-F-0399-R2

Little Colorado spinedace

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

The spinedace is a small (about 4 inch) minnow native to the Little Colorado River (LCR) drainage. This fish occurs in disjunct populations throughout much of the LCR drainage in Apache, Coconino, and Navajo counties. Extensive collections summarized by Miller (1963) indicated that the spinedace had been extirpated from much of the historical range during the period 1939 to 1960. Although few collections were made of the species prior to 1939, the species is believed to have inhabited the northward flowing LCR tributaries of the Mogollon Rim, including the northern slopes of the White Mountains.

A complete discussion of the taxonomic, distributional, and life history information of the spinedace can be found in the Little Colorado Spinedace Recovery Plan (USFWS 1998).

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

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

degrees Fahrenheit (Miller 1963). Miller (1963) called the spinedace “trout like” in behavior and habitat requirements, and it is likely that prior to 1900 the spinedace used habitats now dominated by non-native salmonids.

As with most aquatic habitats in the Southwest, the Little Colorado River basin contains a variety of aquatic habitat types and is prone to rather severe seasonal and yearly fluctuations in water quality and quantity. Both mountain streams and lower gradient streams and rivers have provided habitat for the spinedace. Residual pools and spring areas are important refuges during periods of normal low water or drought. From these refuges, spinedace are able to recolonize other stream reaches during wetter periods. This ability to quickly colonize an area has been noted in the literature (Minckley and Carufel 1967) as well as in observations by others familiar with the species. Populations seem to appear and disappear over short time frames and this has made specific determinations on status and exact location of populations difficult. This tendency has been observed by both researchers and land managers (Miller 1963, Minckley 1965, Minckley 1973) and has led to concerns for the species’ survival.

The spinedace is assumed to still occupy the streams it is known from historically (Chevelon, Silver, Nutrioso, East Clear Creek, and the LCR proper). However, populations are generally small and the true population size for any occupied stream is unknown due to the yearly fluctuations and difficulty in locating fish. Spinedace have a tendency to disappear from sampling sites from one year to the next and may not be found for several years. For example, the Silver Creek population was considered extirpated until fish were collected from the creek again in 1997. Although Arizona Game and Fish Department (AGFD) surveyed Silver Creek in 2003 and 2004, fish have not been located since 1997. This ephemeral nature makes management of the species difficult since responses of the population to changes within the watershed cannot be measured with certainty.

AGFD personnel surveyed several 328 ft. transects in Nutrioso and Rudd creeks spring 2005, with a single spinedace and a few speckled dace captured from Rudd Creek (immediately downstream of the Sipes property). A total of seven spinedace were captured upstream of Nelson Reservoir (surveys included the Crosswhite property). No spinedace were found below the reservoir, but many non-native fathead minnow (*Pimephales promelas*) and green sunfish (*Lepomis cyanellusi*) were captured.

Native fishes associated with spinedace include speckled dace (*Rhinichthys osculus*), bluehead sucker (*Pantosteus discobolus*), Little Colorado sucker (*Catostomus* sp.), roundtail chub (*Gila robusta*), and Apache trout (*Oncorhynchus gilae apache*) (USFWS 1998). The list of non-native fishes is much larger and includes species with varying degrees of incompatibility with the spinedace’s long-term survival. The presence of non-natives was one of the primary reasons the species was listed, and may contribute to the disjunct distribution patterns observed and the spinedace’s retreat to what may be suboptimal habitats. Non-native fish compete with, prey upon, harass, and alter habitat utilized by native fish. In the last 100 years, at least 10 non-native fish species have been introduced into spinedace habitats. These include rainbow trout (*Oncorhynchus mykiss*), fathead minnow, and golden shiner (*Notemigonus crysoleucus*). Data from research experiments and field observations indicate that at least the rainbow trout is a predator and competitor with the spinedace (Blinn *et al.* 1993).

Since the spinedace was federally listed, the Rudd Creek population was discovered. There is currently one refuge population of East Clear Creek spinedace (located at the Flagstaff Arboretum), totaling between 300 and 400 individuals. There are no refuge populations for the other two genetic sub-groups, although we expect to have a captive population established at Winslow High School for the Chevelon Creek genetic sub-group by 2006. All of the known populations have decreased since 1993 and drought conditions continue to exacerbate the effect of so few populations.

Our information indicates that, rangewide, 19 formal consultations have been completed or are underway for actions adversely affecting the spinedace (Appendix D). Adverse effects to spinedace have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects to species. However, the species is still declining.

The table in Appendix D of this biological opinion identifies the Forest Service Southwestern Region Land Resource Management Plan (LRMP) biological opinion. Within the LRMP biological opinion, the FWS examined the effects of the proposed action on the species in order to determine whether the project would result in a jeopardy determination. During the evaluation process, serious concerns for the spinedace (and three other species) were raised due to their tenuous current status and environmental baseline. For this reason, the FWS and Forest Service cooperatively developed a “series of biologically meaningful conservation measures for the species”. The conservation measures were subsequently included and analyzed as part of the proposed action. Thus, the LRMP biological opinion concluded that with the implementation of the proactive conservation activities the proposed action would not jeopardize the continued existence of the spinedace. A list of conservation measures included within the LRMP biological opinion can be found on our AESO webpage (http://www.fws.gov/arizonaes/Documents/Biol_Opin/FS%20LRMP%20BO%20FINAL%206-10-05.pdf).

Loach Minnow and its Proposed Critical Habitat

Loach minnow (*Tiaroga cobitis*) was listed as a threatened species on October 28, 1986 (USFWS 1986), and critical habitat was proposed December 20, 2005 (USFWS 2005). Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Historical range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al.* 1990). Habitat destruction plus competition and predation by non-native species have reduced the range of the species by about 85 percent (Miller 1961, Williams *et al.* 1985, Marsh *et al.* 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White rivers, and Aravaipa, Turkey, Deer, Eagle, Campbell Blue, Dry Blue, Pace, Frieborn, Negrito, Whitewater and Coyote creeks in Arizona and New Mexico (Barber and Minckley 1966, Silvey and Thompson 1978, Propst *et al.* 1985, Propst *et al.* 1988, Marsh *et al.* 1990, Bagley *et al.* 1995, USBLM 1995, Bagley *et al.* 1996).

The proposed critical habitat designation listed primary constituent elements (PCEs) that are essential for the conservation of loach minnow. The PCEs are summarized below:

1. Permanent , flowing, water with low levels of pollutants;
2. Sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Suitable levels of embeddedness are generally maintained by a natural, unregulated hydrograph that allows for periodic flooding or, if flows are modified or regulated, a hydrograph that allows for adequate river functions, such as flows capable of transporting sediments.
3. Streams that have low gradients, water temperatures (between 35-85° Fahrenheit), pool, riffle, run, and backwater components, and an abundant aquatic insect food base.
4. Habitat devoid of nonnative fish species detrimental to loach minnow or habitat in which detrimental nonnative fish species are at levels which allow persistence of loach minnow.
5. Areas within perennial, interrupted stream courses which are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

The status of loach minnow is declining rangewide. Loach minnow currently exist in approximately 419 miles of streams, which represents only 15 to 20 percent of their historical range. In occupied areas, loach minnow may be common to very rare. Loach minnow are common only in Aravaipa Creek, the Blue River, and limited portions of the San Francisco, upper Gila, and Tularosa rivers in New Mexico (USFWS 2000). Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending; however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994).

Our information indicates that, 32 formal consultations have been completed for actions affecting the loach minnow. Adverse effects to loach minnow have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects to species. Overall, the species is still declining.

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.

A. STATUS OF THE SPECIES AND CRITICAL HABITAT WITHIN THE ACTION AREA

Mexican spotted owl

Protected Habitat

Protected habitat (within the Nutrioso WUI boundary) as defined by the MSO Recovery Plan (RP) includes a total of 2,948 acres. Of those acres, 2,104 acres are associated with PACs and 844 acres are associated with slopes >40%. There are 5 PACs within the proposed treatment area of the Nutrioso WUI boundary (Table 2). Table 2 identifies the protected acres, core area acres, and recent survey results. Several PACs within Table 2 indicate no response from survey efforts, these PACs are still considered occupied. Molly's Nipple, Colby, and Auger PACs are all located entirely within the WUI boundary; and Escudilla and Benton Creek PACs are located within and outside of the boundary. Rudd Creek and Water Canyon PACs are located outside of the Nutrioso WUI boundary. Proposed treatments will not occur within the Rudd Creek and Water Canyon PACs; however, project related impacts are likely to occur within these areas. Information on the number of protected habitat acres and MSO survey results within the Rudd Creek and Water Canyon PACs were not provided in the BAE.

Table 2. MSO PACs with treatments within the Nutrioso WUI boundary.

PAC Year established	Acres within NWUI	100-acre Core	Recent Monitoring/Inventory and Results
Molly's Nipple, 1993	670 (384 ac within ½ mi)*	113 (all within ½ mi)*	2003, 2004 no response both years
Colby, 2005	642	115	2003, 2004 1 adult 2003; pair 2004
Auger, 1993	623	103	2003, 2004 no response both years
Escudilla, 1997	150	68 within NWUI (109 total)	2003, 2004 no response both years
Benton Creek, 1999	19**	outside NWUI	2003 no response
TOTAL ACRES	2104	399	

* within 0.5 mile indicates distance from private land

** the forest type on these 19 acres, and adjoining acres, is ponderosa pine

Restricted Habitat

Timber exam data has been collected on 76% of the Nutrioso WUI project area; much of the unexamined area is within pinyon-juniper and other non-forested vegetation types. Based on exam data, mixed-conifer, as defined by the MSO RP, occurs on 10,855 acres. Of this, 538 acres (or 5%) meets mixed-conifer threshold conditions. Based on exam data, pine-oak, as defined as by the MSO RP, occurs on 3,874 acres. Of this, 489 acres (or 13%) meets pine-oak threshold conditions. There are about 643 acres of riparian habitat found in upper Benton and Rudd Creeks; Colter, Auger, Nutrioso, Paddy, Hulsey Creeks; and upper Davis and Woods Creeks.

Critical Habitat

Under Section 4(b)(2) of the Act, critical habitat was excluded within the WUI project areas consulted on and contained in the 2001 Programmatic BO. That programmatic consultation included 30,072 acres within the Nutrioso WUI project area. Of the remaining 11,726 acres within the Nutrioso WUI project area there are 6,468 acres that fall within the area to be considered for critical habitat under the 2004 designation. Within the 6,468 acres there are 3,348 acres of protected or restricted habitat.

AQUATIC SPECIES

Chiricahua leopard frog

Occupied Chiricahua leopard frog (CLF) habitat is not known to occur within the Nutrioso WUI boundary or within suitable dispersal distance (within 1 mile over land, 3 miles along an ephemeral or intermittent drainage, or 5 miles along a perennial stream). CLF surveys have not been completed within the project area. The last known documentation of CLF within the Nutrioso WUI boundary was in 1996 (at Rudd Creek Pond and Trinity Reservoir). Rudd Creek Pond and Trinity Reservoir were surveyed in 1997 and in 1998: no CLF were observed. Other previously occupied habitat locations within the action area include; Nelson Reservoir (1971, 1973, 1976, 1979, and 1989), Nutrioso Creek at Correjo Crossing (1979), and a location 0.25 mile NE of Highway 180 after the Highway leaves the creek downstream of Rudd Creek (1979).

Suitable habitat such as creeks (see Appendix C), stock ponds, ciénegas, and springs are located throughout the Nutrioso WUI project area. These areas may also provide potential refuge sites. CLF surveys within these areas have not been completed and are not proposed during implementation of the Nutrioso WUI project. Although CLF surveys have not been completed, dispersal from previously occupied CLF locations to suitable refuge habitat within the Nutrioso WUI project area is possible; therefore, occupancy within the implementation timeframe of the Nutrioso WUI (10 years) is unknown.

Critical habitat has not been designated for the Chiricahua leopard frog.

Little Colorado Spinedace and its Critical Habitat

Occupied habitat within the action area starts above the confluence of Milk Creek and follows Nutrioso Creek down to Nelson Reservoir and then below the Nelson Reservoir dam to Correjo

Crossing (occupied spinedace habitat within the project area was provided in the BAE). Occupied/suitable habitat also includes approximately 5 miles of Rudd Creek. Nutrioso and Rudd creeks are considered populations within the upper Little Colorado River sub-group. AGFD (2005) surveys within Nutrioso and Rudd creeks captured a single spinedace in Rudd Creek and a total of seven spinedace upstream of Neslon Reservoir (in Nutrioso Creek). None were found below the reservoir. In 2006, AGFD re-sampled the survey locations established in 2005. A total of 128 spinedace were captured upstream of Nelson Reservoir (in Nutrioso Creek) and no spinedace were found in Rudd Creek. Excessive vegetation and the presence of non-native fish and crayfish were found in the pools below the reservoir, which could be a serious problem for spinedace. Increased vegetation will limit the amount of available habitat; non-native fish are listed in the Final Rule (USFWS 1987) as a significant threat and a contributing factor in the decline of spinedace.

Nutrioso Creek and its tributaries are located within all or portions of the sub-alpine, montane, and Great Basin riparian communities. The ASNF indicates the creek is not meeting satisfactory standards¹ for riparian condition, shade, siltation, and bank stability. For this reason, Nutrioso Creek may not be able to absorb short-term increased run-off from the treatments (mechanical and prescribed burning) in Appendix B.

Large seasonal variations in water discharge for Nutrioso Creek, above and below Nelson Reservoir, is known to occur primarily from snowmelt run-off and some spring rain events between mid-February to the beginning of May (ADEQ 2000). A turbidity study performed by the Arizona Department of Environmental Quality (ADEQ) in November 1999 and January 2000, indicates that the majority of the stream meets turbidity standards; however, a portion of the stream from the town of Nutrioso to Nelson Reservoir (about 7 miles) violates the Nephelometric Turbidity Units (NTU) standard (ADEQ 2000). This turbidity impairment is the result of excess sediment coming from the banks of the stream. The banks of the stream are incised due to channel degradation which created a loss in floodplain. The loss of floodplain in the channel increases the stream velocity during high flow events, thus increasing the erosion potential (ADEQ 2000). ADEQ is conducting effectiveness monitoring for Nutrioso Creek based on the monitoring plan in the July 2000, Nutrioso Creek Turbidity Total Maximum Daily Load (TMDL) report. ADEQ is currently drafting a report summarizing their findings (2/22/2006 email from Jason Sutter, ADEQ, Water Quality Division).

Information on current conditions within Paddy, Hulsey, Milk, and Davis creeks were not provided within the BAE. AGFD survey information from 1994 indicates Colter Creek is not meeting ASNF's standards regarding embeddedness and canopy cover. And the upper reaches of Colter Creek are satisfactory in riparian condition and bank stability. No survey information for Riggs Creek is available; however, ASNF's observations from aerial photos indicate poor riparian conditions and incised channels.

AGFD surveys in 1994 indicate that Rudd Creek is not meeting ASNF's standards regarding siltation, and bank stability. The upper reaches do not meet ASNF's standards regarding satisfactory riparian condition and canopy cover. Due to the creek's generally incised channels

¹ Satisfactory Riparian Condition (As described in the ASNF Forest Plan Glossary p. 227) – This means being in a condition where: 1) stream banks are stabilized, 2) head cutting is not evident, and 3) riparian vegetation is present and increasing in density and vitality.

and poor riparian condition, it is not likely to handle large scale or chronic disturbances within its drainage without adversely affecting spinedace and/or its habitat.

The critical habitat portion of Nutrioso Creek is located within the Nutrioso WUI action area, and constitutes 11.4% of the total designated critical habitat for the spinedace. There is permanent water within Nutrioso Creek (below Nelson Reservoir) down to the confluence with Rudd Creek and then intermittent pools down to Correjo Crossing (Kathy McMillan, ASNF, pers. comm., September 14, 2005). Therefore, while the entire stretch of critical habitat within Nutrioso Creek is potential habitat, only the habitat above Correjo Crossing is currently suitable for the Little Colorado spinedace (Kathy McMillan, ASNF, pers. comm., September 14, 2005).

Spinedace are not known to occur within the critical habitat portion of Nutrioso Creek (AGFD 2005 surveys). The absence of water is a limiting factor within this portion of the creek (below Nelson Reservoir) as well as the presence of non-native fish where water does occur, and excess vegetation in pools when water is available. The ASNF indicated in their BAE that the creek's incised channels and poor riparian condition will not adequately process large scale or chronic disturbances within its drainage. The presence of non-natives, current condition of Nutrioso Creek as described above, and the general absence of water clearly has a negative impact to the spinedace and critical habitat.

Loach Minnow and its Proposed Critical Habitat

Known occupied habitat within the action area occurs near the confluence of Boneyard Creek and the North Fork of the East Fork Black River approximately 5.2 river miles from the Nutrioso WUI boundary. However, only the lower portion of Boneyard Creek, 2.3 miles upstream from the confluence of the North Fork of the East Fork Black River, is considered suitable habitat. Proposed critical habitat within the action area includes the 2.3 miles of Boneyard Creek upstream from the confluence of the North Fork of the East Fork Black River.

Stream surveys within the headwaters of Boneyard Creek have not been performed by the ASNF; therefore, the following description is based on ASNF's observations. The upper headwater reaches of Boneyard Creek are sub-alpine riparian community types. These reaches are steep, narrow, and are generally absent of meadow bottoms. The reaches are also limited in riparian species, and are interspersed with pines and mixed-conifers, depending on aspect. In the uppermost reaches of Boneyard Creek, channel stability appears to be meeting ASNF's standards. Embeddedness appears high and riparian condition may also be below ASNF's standards related to satisfactory conditions.

B. FACTORS AFFECTING SPECIES ENVIRONMENT AND CRITICAL HABITAT WITHIN THE ACTION AREA

A number of the upcoming WUI projects on the ASNF were consulted on under the 2001 Programmatic BO. One WUI project with effects that may contribute to the environmental baseline within the action area is the Alpine WUI (4,745 acres), which is expected to occur contemporaneously with this project. The Alpine WUI borders the southeast portion of the Nutrioso WUI boundary, within the Centerfire Creek-San Francisco River 5th code watershed and may contribute to impacts within the Nutrioso WUI action area including smoke and noise disturbance to MSO and sediment and ash inflow from prescribed fires and mechanical

treatments to CLF. The Eagar South WUI, originally part of the 2001 Programmatic BO, is a 15-year project that includes 21,129 acres of Forest Service lands. This WUI is north and adjacent to the Nutrioso WUI boundary and is separated by Rudd Creek. Treatments include thinning and treatment of created and existing fuels on the ground using various methods (e.g., pile and burn, broadcast burning, chipping, removal, and re-occurring maintenance burns or fire use). Areas that cannot be treated mechanically (e.g., steep slopes) will receive low-intensity prescribed burning. These treatments will contribute to impacts within the Nutrioso WUI action area including smoke and noise disturbance to MSO and sediment and ash inflow from prescribed fire and mechanical treatments to suitable CLF and spinedace habitat in Rudd and Nutrioso creeks.

Additional activities affecting the MSO within the action area include noise disturbance from increasing levels of recreation use in the summer months [dispersed camping, hiking, fuelwood collection, hunting, and Off-Highway Vehicle (OHV) use]. Based on road data from ASNF, there are approximately 230 miles of roads within the Nutrioso WUI project area. There are 91.4 miles of road that are maintained for full-sized, highway vehicles; the remaining 138.6 miles are closed to full-sized highway vehicles and open and legal for All Terrain Vehicle (ATV) or OHV use.

Within the perennial sections of Boneyard Creek, adjacent grassland/meadows do not have adequate ground cover to be considered high quality buffers for minimizing suspended sediment inputs within the creek. These conditions may be due to the numerous roads, road crossings, past timber harvests, and Datil soils within the upper reaches.

The Arizona Department of Transportation (ADOT) plans to treat noxious plants (herbaceous and woody) and hazardous vegetation in the right-of-way along US Highway 180/191 utilizing herbicides. Treatments are scheduled along the highways (180/191) from the community of Nutrioso north to the Forest boundary, which encompasses 13.9 miles within the project area (7.7 miles within private land). However, herbicide application will be an ongoing treatment year to year. Other ongoing ADOT actions include the use of chemical de-icer on the highways during winter and early spring months.

Also included in the environmental baseline are the grazing actions previously consulted on in the Nutrioso WUI project area. Allotments within the Nutrioso WUI project area that were consulted on are listed below, showing approximate acres and percent of allotment within Nutrioso WUI.

Based on recent Allotment Management Plan (AMP) analyses, range and soil conditions overall across these allotments are generally unsatisfactory relative to ASNF's standards. However, AMP decisions have included a number of measures to limit impacts to listed species and their habitats. Some of these are found in Table 3 below.

Table 3. Allotments within the Nutrioso WUI project area and associated Conservation Measures for loach minnow and Little Colorado spinedace.

	Allotment Name	Acres	% w/in NWUI	Conservation Measures
Alpine Ranger District	Williams Valley	3,866	28%	Excluded 2 pastures and riparian corridors from livestock grazing for loach minnow .
	Nutrioso Summer w/Boneyard Winter	13,990	67%	Nutrioso Summer - Excluded 2 pastures containing Nutrioso Creek from livestock grazing for Little Colorado spinedace .
	Colter Creek	7,231	69%	Excluded Nutrioso Creek and Nutrioso wetland from livestock grazing and livestock crossing of Nutrioso Creek is restricted to FR 8058.
	South Escudilla	7,261	44%	Exclosures and limited livestock use benefiting Little Colorado spinedace .
Springerville Ranger District	Benton Creek	660	98%	No direct access to Rudd Creek to protect Little Colorado spinedace .
	Rudd Creek Winter	2,770	50%	No livestock grazing on the Rudd Creek Winter allotment between and including Benton and Rudd Creeks

The livestock grazing exclusions applied within the Nutrioso WUI will limit impacts to spinedace, loach minnow, and potentially CLF within the Alpine Ranger District and Rudd Creek (and associated tributaries).

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.

Mexican Spotted Owl and its Critical Habitat

The ASNF project silviculturist and fuels specialist utilized the Forest Vegetation Simulator (FVS) Model and its Fire-Fuels Extension (FFE) Model to simulate forest growth, mortality, responses to the various thinning, slash treatments, and prescribed burning treatments, and to assess changes in comparison to no action, using the same points in time. Their modeled results are not absolute numbers but represent a *relative estimate* of per-acre results. Tables 4 and 5 estimate the pre- and post-treatment changes for MSO PACs and restricted mixed-conifer and pine-oak threshold habitats.

Table 4. Simulated Effects of Treatments Compared to Pre-treatment Status in Protected Habitat (including slopes >40%)

PACS and Steep Slopes (data for mixed conifer & aspen/mixed conifer)	5C 1,720 acres		5B 1,070 acres		3B 1,578 acres		ASNF Comments
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	
Basal Area--total B (conifer BA) 1/	222 (149)	143 (106)	202 (152)	88 (72)	same as 5B	same as 5B	
% trees left in: 5-10" dbh 10-20" dbh 20+ " dbh	N/A	58% 76% 93%	N/A	48% 60% 67%	N/A	same as 5B	
Canopy closure 2/ and multi or single storied stand?	high multi	moderate multi	high multi	moderate multi	same as 5B	same as 5B	
Snags/acre ave.	4.5	23.9	4.7	31.8	same as 5B	same as 5B	over 2-10 years snags increase 3/ then become new down log recruits
Dwarf mistletoe rating	severe	severe	severe	severe	same as 5B	same as 5B	very few large trees removed by treatment
Bark beetle rating	high	moderate	high	moderate	same as 5B	same as 5B	due to reduction in conifer BA

1/ the difference between total and conifer BA is basal area in aspen and/or oaks

2/ canopy closure: low = 0-39%; moderate = 40-59%; high = 60+%

3/ New snags would occur over time, some as a consequence of prescribed burning, some from increases in dwarf mistletoe in large trees left (those with DMR 1-3) and some likely from some level of continuing bark beetle impact.

Table 5. Simulated Effects of Treatments Compared to Pre-treatment Status in Restricted Habitat

Mixed Conifer	3A1 769 acres		3A2 414 acres		5A1 5,672 acres		ASNF Comments
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment	
Basal Area--total BA (conifer BA) 1/	180 (138)	76 (44)	170 (139)	69 (48)	180 (138)	76 (44)	
% trees left in: 5-10" dbh 10-20" dbh 20+ " dbh	N/A	73% 88% 100%	N/A	84% 91% 100%	N/A	73% 88% 100%	
Canopy closure 2/ multi or single storied	high multi	low multi	high multi	low multi	high multi	low multi	
Snags/acre (ave.)	7.1	7.7	2.2	4.6	same as 3A1	same as 3A1	number is variable acre-to-acre, year-to-year
Dwarf mistletoe rating	severe	medium	severe	low	severe	medium	
Bark beetle rating	high	low	high	low	low	low	

Pine-oak	3A1 1,516		3A2 248 acres		5A1 1,302 acres		ASNF Comments
Basal Area--total BA (conifer BA) 1/	170 (142)	71 (48)	139 (113)	65 (47)	170 (142)	71 (48)	
% trees left in: 5-10" dbh 10-20" dbh 20+ " dbh	N/A	81% 94% 100%	N/A	80% 97% 100%	N/A	81% 94% 100%	some areas with gaps of missing 0-16" dbh
Canopy closure 2/ multi or single storied	high multi	low multi	high multi	low multi	high multi	low multi	
Snags/acre	5.1	2.8	2.8	1.4	same as 3A1	same as 3A1	number is variable acre-to- acre, year-to- year
Dwarf mistletoe rating	high	medium	medium	lower medium	high	medium	
Bark beetle rating	high	low	high	low	high	low	

1/ the difference between total and conifer BA is basal area in aspen and/or oaks

2/ canopy closure: low = 0-39%; moderate = 40-59%; high = 60+%

MSO Protected Habitat

Prescribed Fire and Pile Burns

Rudd Creek PAC borders the Nutrioso WUI boundary and Water Canyon PAC is approximately 0.25 mile from the northwest corner of the Nutrioso WUI boundary. Habitat altering activities are not proposed within Rudd Creek and Water Canyon PACs; therefore, direct effects to MSO and habitat associated with these PACs are not anticipated.

Based on modeled treatment results (Table 4), mixed-conifer in Benton Creek (19 acres total, no treatments within core acres), Escudilla, Colby, Auger, and Molly’s Nipple PACs (including core acres) are expected to be reduced from 149 to 106 BA with the majority of impacts to conifers in 5-10” dbh (42% reduction) and 10-20” dbh (24% reduction) categories. And mixed-conifer on slopes >40% are expected to be reduced from 152 to 72 BA with the majority of impacts to conifers in 5-10” dbh (52% reduction), 10-20” dbh (40% reduction) and 20” + dbh (33% reduction) categories. The treatments above will reduce mixed-conifer and pine-oak habitat far beyond the recommendations for protected habitat identified in the MSO RP. These BA reductions from prescribed fire and pile burn treatments will adversely affect MSO and protected habitat by significantly reducing key habitat components essential for MSO nesting habitat (snags) and prey habitat (large logs and hardwoods).

Prescribed burning in PACs will not occur during the MSO breeding season; therefore, MSO are more likely to disperse to surrounding undisturbed habitat when flushed. These effects are not likely to result in injury to MSO but will likely disrupt normal feeding and roosting behaviors.

Mechanical Treatments

Mechanical treatments 3A1 and 3A2 are proposed within 284 acres of Molly’s Nipple PAC. Additionally, approximately 1.75 miles of primary fire control road currently goes through this PAC and all snags would be cut within 300 ft. on both sides of this road (~ 127 acres). Mechanical thinning treatments will reduce conifers 3.0 ft. tall to 16”dbh, conifers >16”dbh (that meet the four removal requirements found in the Prescribed Treatment section of this document),

and snags within 300ft. of the primary fire control road. The treatments above (see Table 5) will reduce mixed-conifer and pine-oak habitat far beyond the recommended guidelines for protected habitat identified in MSO RP. These habitat reductions from mechanical treatments will adversely affect MSO and protected habitat (Molly's Nipple PAC only) by significantly reducing key habitat components essential for MSO nesting habitat (snags and large trees between 12" and 16" dbh).

Smoke Disturbance

The prevailing winds in the project area are southwest. Smoke from prescribed and pile burning within the Nutrioso WUI boundary will primarily move down drainage in the Nutrioso watershed to the north; however, wind shifts are possible during burning operations (Linda WhiteTrifaro, USFS, pers. comm., 2005). Although the prevailing winds are southwest, wind shifts during burning operations may impact MSO through smoke disturbance in Rudd Creek, Water Canyon, Benton Creek, Escudilla, Colby, Auger, and Molly's Nipple PACs. Smoke may affect short-term foraging capabilities by limiting site distance of prey, and the inhalation of smoke by MSO may negatively affect individuals during the duration of the burn. Short-term disturbance from smoke effects will likely affect feeding and roosting MSO outside of the breeding season.

Noise Disturbance

Molly's Nipple PAC is the only PAC within the Nutrioso WUI with mechanical treatments proposed within the PAC boundary (approximately 284 acres). No mechanical treatments are proposed within the 113-acre core of the PAC. In the process of implementing mechanical treatments within the PAC, noise disturbances to MSO from mechanical tools used in the treatment process and vehicles used to access the treatment areas (outside of the MSO breeding season, March 1 to August 31), are likely to occur but are expected to be limited due to the timing restrictions. Noise disturbances within the Molly's Nipple PAC will likely affect feeding and roosting MSO outside of the breeding season.

Rudd Creek, Benton Creek, Escudilla, Colby, and Auger PACs do not have mechanical treatments proposed within the PAC boundaries. However, mechanical treatments are adjacent to or surrounding the PAC boundaries. In the process of implementing mechanical treatments adjacent to or surrounding the PACs, noise disturbances to MSO are likely to occur from mechanical tools used in the treatment process and vehicles used to access the treatment areas.

Water Canyon PAC is approximately 0.25 mile west of the Nutrioso WUI boundary. And the PAC boundary is lower in elevation than the mechanical treatment area within the Nutrioso WUI boundary. For these reasons, noise from mechanical treatments will not affect MSO within Water Canyon PAC.

Table 6. Treatments and associated effects separated by PACs

MSO PAC	Prescribed Fire/ Number of Acres/ Pile Burns	Mechanical Treatments	Smoke Impacts	Noise Impacts
Rudd Creek	None	No	Yes	Yes
Water Canyon	None	No	Yes	No
Benton Creek	19 acres	No	Yes	Yes
Escudilla	150 acres	No	Yes	Yes
Colby	642 acres	No	Yes	Yes
Auger	623 acres	No	Yes	Yes
Molly's Nipple	670 acres	Yes	Yes	Yes

Restricted Habitat

About 77% of the mixed-conifer threshold stands and about 81% of pine-oak threshold stands will have treatments 3A1 and 5A1 (a minor amount, 19 acres, of pine-oak will receive treatment 6A). The ASNF combined and modeled these treatments for proposed action effects (Table 5). In mixed-conifer threshold stands, post-treatment BA will be reduced from 347 to 72. These treatments do not comply with the RP standards of 170 BA on 10% and 150 BA on 15% of acreage in mixed-conifer threshold stands. The standard for 20 trees per acres of 18" plus dbh will be met in stands where this level currently exists. Post-treatment BA in pine-oak threshold stands will be reduced from 216 to 129. These treatments will also be reduced below the RP standards of 150 BA in pine-oak threshold stands. The standard for 20 trees per acre (mixed-conifer) and 15 trees per acre (pine-oak) of 18" plus dbh will be met in stands where this level currently exists.

New road construction and closure (except for the 0.07 mile gated segment) of 2.44 miles is proposed in 11 segments throughout the Nutrioso WUI. The road construction will occur in portions of restricted habitat. One 0.07 mile segment is located approximately 0.1 mile west of the Colby PAC boundary and below the canyon rim. The small footprint (0.07 mile and 18 ft wide) and placement of the new road below the canyon rim will reduce the level of noise disturbance from road construction. For this reason, MSO in Colby PAC will not be adversely affected by the new road construction. The remaining new road construction sections will not affect MSO within the action area.

Critical Habitat

Approximately 3,348 acres of mixed-conifer and pine-oak critical habitat within the Nutrioso WUI will be treated. Note that this critical habitat is only a small fraction of the action area and does not contain any PACs or portions of PACs due to the Programmatic WUI BO exclusions. Prescribed burns, pile burns, mechanical thinning and road construction will adversely affect PCEs; however, the conservation role of the critical habitat is expected to be retained. The PCEs are listed below with the evaluation of effects as they pertain to the proposed actions.

Two new road segments will be construction within critical habitat. Construction of these two segments will not affect the PCEs related to MSO critical habitat.

Anticipated Effects to Primary Constituent Elements

PCEs related to Forest Structure

1. A range of tree species, including mixed-conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30% to 45% of which are large trees with dbh of 12" or more.

Portions of the critical habitat will receive treatments 5A1, 3A1, 3B, and 5B. Modeled results in Tables 4 and 5 above, show a percentage of mixed-conifer and pine-oak habitat remaining in 5-10" dbh, 10-20" dbh, and 20"+ dbh size classes. The percent, range of trees species, and size class for treatment 5A1, 3A1, 3B, and 5B will be reduced below the 30% to 45% recommendations for this PCE. All other treatments (6A, 5A2, and 5WL) are expected to retain the "range of tree species" and are not expected to reduce the "different tree sizes reflecting different ages of trees" below the recommended percentages.

2. A shade canopy created by the tree branches covering 40% or more of the ground.

Based on modeled results in Table 4 above, critical habitat receiving treatments 3B and 5B, is expected to retain a moderate canopy of 40 to 59% in mixed-conifer habitat. Treatment 5A1 was also modeled and is similar in prescription and habitat type to treatment 3A1. Based on the modeled results, treatment 5A1 and 3A1, respectively is expected to reduce the shaded canopy cover below 40% in mixed-conifer and pine-oak habitat. Additionally, based on treatment prescriptions found in Appendix B, treatment 5A2 is not expected to reduce the shaded canopy cover below 40%.

A limited area (< 802 acres) of critical habitat will receive the treatment prescription for unit 5WL, and is expected to maintain a minimum 110 BA while retaining the largest trees possible. Areas that are currently less than 110 BA will not be thinned. The treatment prescription for unit 6A is designed to promote and protect presettlement trees and stand conditions by removing younger trees within competitive distances. Although the percentage of canopy cover after treatments in units 5WL and 6A were not provided in the BAE, the focus of these treatments is to retain the larger trees and promote and protect presettlement trees; however, it is not known if the shaded canopy cover of 40% will remain.

3. Large, dead trees (snags) with a dbh of at least 12 inches.

Some of the critical habitat will receive treatments 3A1, 5A1, 5B, and 3B. Based on modeled results in Table 5 above, the number of snags per acre in treatments 3A1 and 5A1 will remain the same in mixed-conifer, and the number of snags per acre will be reduced in pine-oak habitat. In treatments 5B and 3B the number of snags per acre after treatments were not provided; however, over a two- to ten-year period, snags will increase significantly (4.7 snags/acre to 31.8 snags/acre).

In treatment 3A1, prescriptions call for the removal of all snags within 300 ft of private land boundaries and along key fire control roads. Beyond the 300 foot strip, only conifer snags <12 ft dbh may be cut. Treatments 6A and 5WL call for removal of all snags within the 300 ft of key fire control roads. Snags beyond the 300 foot strip will be retained.

Although snags within the treatment areas will be removed or reduced, snags with a dbh of at least 12 inches will remain.

PCEs related to the maintenance of adequate prey species

4. High volumes of fallen trees and other woody debris.

Treatments 5A1, 6A, 3A1, 5A2, 3B, 5B, and 5WL include periodic low-intensity prescribed burns. Additionally, treatments 3A1, 5A1, 5WL, and 6A call for the removal of all created and pre-existing slash through mechanical treatments (chipping, etc.) or piled and burned. The combination of prescribed burns and the removal of all created and pre-existing slash will adversely affect the “high volumes of fallen trees and other woody debris.”

5. A wide range of tree and plant species, including hardwoods.

Treatments 5A1, 6A, 3A1, 5A2, 3B, 5B, and 5WL do not call for the complete removal of any one species. However, mixed-conifer and pine-oak habitats will be thinned; oak and aspen will not be removed within the treatment areas. Therefore, the combination of all treatments will not affect the “wide range of tree and plant species, including hardwoods” within the cutting units. The conservation value of this PCE will remain intact.

6. Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

The combination of low-intensity prescribed burns (treatments 5A1, 6A1, 3A1, 5A2, 3B, 5B, and 5WL) will likely consume portions of the lower-level plant cover species, and reduce the number of fruits and seeds for plant regeneration. The target crown spacing of 15 to 25 ft (averaging 15 to 20 ft) in conifers (treatments 3A1 and 5A1) will open up the mid- to upper-level canopy within the treatment areas.

The combination of low-intensity prescribed burns and the level of target crown spacing is expected to result in short-term adverse effects to the “levels of residual plant cover to maintain fruits and seeds” within the treatment areas. However, the beneficial effects of fire will likely increase the response of herbaceous vegetation after treatments.

AQUATIC SPECIES

A number of effects will occur from treatments implemented within the watersheds of the Nutrioso WUI action area. The Cumulative Watershed Effects Analysis (April 6, 2005) provided for the Nutrioso WUI, describes the short-term and long-term effects anticipated from the proposed treatments.

“The management activities envisioned as elements of the Nutrioso WUI project included road construction or reconstruction, timber stand thinning by hand or mechanical means, skidding and decking of logs, on-site chipping and transport of tree boles and slash, various types of slash treatment, and prescribed burns for fuel hazard reduction, grassland restoration and ecological recovery of fire dependent vegetation communities. These activities can have short term and/or long term direct effects on watershed functions by the exposure of bare mineral soil, compaction of soil, changing the permeability of soils, removal or disturbance of ground cover, interception of lateral flows at cut banks, concentration of overland flows, reduction of canopy interception of precipitation, reduction of transpiration, changes in distribution of snow pack, changing filtering capacity of riparian vegetation, reducing streambank vegetation and other factors maintaining stream bank stability, reducing large wood available for channel maintenance, changing the input of allochthonous organic materials to streams, increasing the input of ash and fire related compounds, and various other direct effects. Consequent indirect effects can then occur to the watershed functions mentioned above.”

Chiricahua leopard frog

Mechanical treatments will be limited to areas outside of the SMZ and riparian and wetland areas within the Nutrioso WUI boundary; however, construction of four new road segments that cross intermittent or perennial reaches are proposed, and there are also exceptions described in the Riparian BMPs that allow stream crossings in designated areas and mechanical treatments within riparian and wetland areas pending approval by a Forest Officer (the acres or percent of stream crossings and mechanical treatments were not provided). Where these exceptions apply, CLF (in all developmental stages) may incur direct impacts from the equipment used for mechanical treatments and road construction and the actions related to those treatments (e.g. equipment crossing streams, falling trees, skidding, etc.). Potential direct effects to CLF include injury and/or death from mechanical equipment and falling trees and woody debris in unsurveyed areas where the species occurs.

Potential indirect effects to CLF habitat will include increased sediment and ash from mechanical and prescribed burning treatments and road construction within the SMZ and riparian and wetland areas. Inflow of ash and sediment into a waterbody is likely to smother eggs and tadpoles, resulting in the loss of individuals and reproductive potential. Sediment and ash flow can also inhibit respiration in macroinvertebrates, resulting in reduced density and composition of macroinvertebrates (a primary food resource for the frogs). A reduction in the amount of prey can ultimately affect CLF numbers and reproduction. The implementation of Riparian and Road BMPs will minimize these potential indirect effects; however, we anticipate that BMPs will not eliminate indirect effects to CLF from ash and sediment generated from mechanical and prescribed burning treatments and road construction.

The short-term and long-term direct effects to the watershed functions (mentioned in the quote above) will indirectly affect CLF habitat within the Nutrioso WUI action area. However, sub-watersheds within the action area will not be affected concurrently due to operational and timing restrictions. Sediment, ash, increased water flows, reduction in streambank vegetation, and reduction in large wood available for channel maintenance all contribute to habitat degradation and reduction in available CLF habitat. These habitat modifications will adversely affect

suitable CLF habitat within the action area, and any frogs present. However, we can not be certain that this species currently exists within the action area.

Little Colorado spinedace and its Critical Habitat

Under Riparian BMP 1, stream channels may be crossed at designated crossings as approved by a Forest Officer. The designated crossing locations were not identified in the BAE; therefore, spinedace may incur direct impacts if designated crossings are located in occupied habitat. Potential direct effects to spinedace may include: injury and/or death from road crossings, mechanical equipment, and falling trees and woody debris.

Construction of four new road segments will cross Milligan Creek, a tributary to Riggs Creek, Auger Creek, and two unnamed intermittent channel crossings (both channels crossing include one road segment). All crossings are 2.0 miles or greater from downstream occupied spinedace habitat. All SMZ and Road BMPs will be followed during construction of these new roads. Sediment from road construction activities will occur; however, due to the distance to occupied spinedace habitat and the implementation of BMPs we are not certain the level of sediment transported downstream from the impact area will adversely affect spinedace or its habitat.

The short-term and long-term effects from the Nutrioso WUI treatments described in the Cumulative Watershed Effects Analysis (April 6, 2005) will reduce the quality of substrate for spawning, reduce the quality of pool habitat, and reduce the quality and quantity of aquatic macroinvertebrates (a major food source for spinedace) in spinedace occupied and designated critical habitat. The majority of short-term and long-term effects will occur after ground disturbance activities (mechanical and prescribed burning treatments and road construction) followed by large seasonal variations in water discharge (between mid-February to the beginning of May) within the action area.

The reduction in the quality of substrate for spawning and pool habitat is directly related to the management activities described in the Cumulative Watershed Effects Analysis and the large seasonal variations in water discharge. The large seasonal variations in water discharge will coincide with spinedace spawning activities (early summer continuing at reduced levels until early fall, as indicated by Minckley 1973). These reductions in the quality of substrate and pool habitat will be the result of increased sediment and ash from management activities in occupied and critical habitat. The spinedace Recovery Plan (USFWS 1997) states: "Increased deposition of sediment in spinedace habitat is believed to be detrimental to long-term spinedace survival." Fine sediment effectively fills the interstices of substrate and ultimately reduces macroinvertebrate density (Rinne 1996 and references cited therein). A reduction in macroinvertebrate density is also expected due to the reduction in leaf litter and wood component, by "*reducing streambank vegetation and other factors maintaining stream bank stability, reducing large wood available for channel maintenance, and changing the input of allochthonous organic materials to streams*" (Cumulative Watershed Effects Analysis, 2005). These effects, combined with existing poor riparian conditions will result in a further reduction in aquatic macroinvertebrates.

We anticipate the short-term and long-term effects from the Nutrioso WUI treatments will adversely affect spinedace and its critical habitat primary constituent elements consisting of clean, permanent flowing water, with pools and a fine gravel or silt-mud substrate.

In the June 2005 Forest Service Southwestern Region LRMP biological opinion, the Forest Service has agreed to implement all conservation measures for the spinedace. Conservation measure #1, which applies to the Nutrioso WUI project, is designed to reduce and/or remove adverse impacts at the project level, although it is understood that not all projects will be able to meet this standard (USFWS 2005). The other conservation measures for the spinedace are considered separate actions that the Forest Service will implement independently from the Nutrioso WUI project. We have reviewed the proposed Nutrioso WUI project to determine if the goal of implementing projects with beneficial, insignificant, or discountable effects to spinedace has been met. Although several BMPs for the watershed will be implemented, given the adverse effects expected to occur and the 10-year life of this project, we concluded that the conservation goals will not be realized.

Loach Minnow and its Proposed Critical Habitat

There will be no direct effects to loach minnow or its proposed critical habitat from treatments within the Nutrioso WUI. However, surface run-off from combined treatments 5A1, 5WL, 6A, 6B (see Appendix B for treatment descriptions), and road construction (three segments) located in the upper northeast portions of the Upper Black River 5th code watershed are likely to occur downstream within the headwaters of Boneyard Creek, within the sub-alpine riparian community. At present, the sub-alpine riparian community may not be able to absorb short-term increased run-off from the combined treatments 5A1, 5WL, 6A, 6B, and road construction. Mechanical thinning and prescribed burns within and adjacent to riparian areas will likely increase sediment production within the headwaters of Boneyard Creek. The three new road segments are not located within or adjacent to riparian areas; however, the surface disturbance and subsequent erosion may increase sediment production within the headwaters of Boneyard Creek. An increase in sediment combined with existing poor riparian conditions has the potential to increase embeddedness and reduce spawning habitat and cover for loach minnow occupied, suitable, and proposed critical habitat. Many of the effects of the combined treatments will likely dissipate due to the implementation of BMPs and distance to occupied and proposed critical habitat. However, due to the riparian habitats inability to absorb short-term surface run-off conditions within the headwaters of Boneyard Creek, adverse effects to loach minnow and its proposed critical habitat are likely to occur.

CUMULATIVE EFFECTS

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

The current private land status in the Nutrioso WUI project area is typified by relatively sparse developments; however, there are numerous subdivisions and a significant number of new homes are being built in the area. Housing density has potential to become a major impact to the sub-watersheds once all available land has been built upon.

The cumulative effect of increasing total impermeable areas such as roofs, roads, pavement, corrals, and urban drainage, will impact stream channel morphology as well as water quality over

time. Urban storm water runoff contains a wide variety of automotive and household chemicals (Nutrioso WUI - Watershed and Soils Specialist Report, 2005).

State actions include a research project by AGFD that will study black bear (*Ursus americanus*) use within part of the NWUI project area and the project's impact on bears. Cumulative private actions include continuing residential and business development, some of which is within floodplains and on steep slopes, as these areas are not precluded from development by Apache County ordinances. Private land grazing by cattle, horses, and llamas is also occurring.

CONCLUSION

After reviewing the current status of the MSO, CLF, spinedace, and loach minnow, the environmental baseline for the action area, the effects of the proposed Nutrioso WUI treatments and the cumulative effects, it is the FWS's biological opinion that the Nutrioso WUI, as proposed, is not likely to jeopardize the continued existence of the MSO, CLF, spinedace, and loach minnow, and is not likely to destroy or adversely modify designated critical habitat for MSO, spinedace; and is not likely to destroy or adversely modify proposed critical habitat for loach minnow. No critical habitat has been designated for CLF; therefore, none will be affected.

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.

We present this conclusion for MSO for the following reasons:

1. The total number of protected/restricted habitat acres treated by prescribed burning and mechanical thinning is only 0.2 percent of the total UGM RU acres.
2. Habitat altering activities will not occur in Rudd Creek and Water Canyon PACs.
3. The WMSC contains a "Timing of Logging Restriction" for the MSO for no tree removal from March 1 through August 31.
4. Prescribed burning activities within MSO PACs will occur outside of the March 1 through August 31 breeding season.
5. Overall, the project will improve forest health in this area of high fire danger.
6. Hauling is prohibited during the breeding season within 0.25 mile of MSO nest sites and within 0.25 mile of the MSO PAC boundary when the nest location cannot be determined.
7. Molly's Nipple PAC is the only PAC treated with mechanical thinning and prescribed burning, all remaining PACs within the Nutrioso WUI will be treated with low-intensity prescribed burning only.
8. Critical habitat was excluded from the original Nutrioso WUI boundary and therefore only 3,348 acres of the total 562,988 acres of MSO critical habitat within the Upper Gila

Mountains RU-10 will be impacted. After short-term disturbance, these treatments are expected to improve overall Forest health in the long term.

9. PCE numbers one, three, and five will maintain a level that is consistent with the needs for MSO forest structure and maintenance of adequate prey species.

We present this conclusion for CLF for the following reasons:

1. Occupied habitat is not known to occur within the action area.
2. The Nutrioso WUI action area is not located within suitable dispersal distance from known occupied habitat.

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

1. The Forest Service has included riparian, upland, and road related BMPs in the proposed action to minimize the amount of ash and sediment within Rudd Creek, Nutrioso Creek, and their tributaries within the Nutrioso WUI boundary.
2. Within the Rudd Creek 6th code watershed mechanical treatments will be limited to 2,000 acres within any one year period. This 2,000 acres will include all Forest Service lands within the watershed and will minimize disturbances to the watershed in coordination with the other numerous projects in the area (Eagar South and Nutrioso WUIs).
3. Auger Creek (located within the Auger 6th code watershed) flows into Nutrioso Creek between the Milk Creek and Colter Creek confluences. Thinning and harvest activities in the Auger 6th code watershed will be limited to 2,000 acres within any two year period and to 3,000 acres within any four year period.

We present this conclusion for the loach minnow for the following reasons:

1. Occupied habitat is approximately 5.2 river miles from the Nutrioso WUI boundary, and proposed critical habitat begins approximately 2.9 river miles from the Nutrioso WUI boundary.
2. Riparian, upland, and road related BMPs will minimize the amount of ash and sediment within Boneyard Creek and its tributaries within the Nutrioso WUI boundary.
3. The conservation values of the proposed critical habitat will be retained.

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

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is

defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is 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 ASNF so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The ASNF has a continuing duty to regulate the activity covered by this incidental take statement. If the ASNF (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 ASNF 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)].

AMOUNT OR EXTENT OF TAKE

Mexican spotted-owl

The FWS anticipates eight adult MSO associated with four PACs will be taken as a result of this proposed action. The incidental take is expected to be in the form of harm and harassment.

	Incidental Take Number by PAC			
Description of Take	Molly’s Nipple PAC	Colby PAC	Auger PAC	Escudilla PAC
Harm and/or	2MSO			
Harassment		2 MSO	2 MSO	2 MSO

Multiple treatments (mechanical thinning and prescribed burning) will occur within Molly’s Nipple PAC during the course of ten years. The number of treatments per year within the PAC is not anticipated to be consecutive entries; however, the number of entries and total acres treated for each treatment type was not available for this consultation. For this reason, the FWS anticipates a total of four entries² (mechanical and/or prescribed burning) not to exceed five entries within Molly’s Nipple PAC for the 10-year duration of the project. Incidental take of MSO (in the form of harm) in Molly’s Nipple PAC will occur from significant habitat modifications that result in impaired behavioral patterns, including feeding and sheltering from the combination of treatments within the 0.5 mile boundary of private land. These treatments

² One entry is considered all mechanical and/or prescribed burning treatments completed between September 1 and February 28.

will remove PCE's within and surrounding the 100-acre nest core and adversely affect foraging MSO within the PAC. Treatments beyond the 0.5 mile of private land will incidentally take MSO (in the form of harassment) within the PAC from significant disruptions in normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. The effects of the combined treatments (within the 0.5 mile boundary and beyond the 0.5 mile boundary) are expected to reach the level of harm and/or harassment.

Colby, Auger, and Escudilla PACs all occur beyond the 0.5 mile boundary of private land. For the same reasons mentioned above concerning the uncertainty of timing and number of burn entries within each PAC, the FWS anticipates take of two adult MSO for Colby PAC, two adult MSO for Auger PAC, and two adult MSO for Escudilla PAC. Incidental take in all of these PACs will occur from prescribed burning and associated smoke effects within the PACs (and within the 100-acre core) and noise disturbance from mechanical thinning operations outside of the PAC boundaries. Prescribed burning will result in significant effects to MSO nesting through BA reductions (below recommended levels in the RP) and through prey habitat reductions (below recommended levels in PCE numbers four and six). These modifications are not expected to return to pre-project levels within the 10-year timeframe of the Nutrioso WUI project. Noise and smoke impacts are expected to significantly disrupt the normal MSO behavior patterns which include, but are not limited to, breeding, feeding or sheltering. The effects of the combined treatments within and surrounding Colby, Auger, and Escudilla PACs are expected to reach the level of harassment.

Chiricahua leopard frog

The FWS does not anticipate the proposed action will incidentally take any CLF. We believe this information for the following reasons:

1. Occupied CLF habitat is not known to occur in the Nutrioso WUI action area.
2. Short-term and long-term effects to suitable and potential habitat will be reduced by riparian, upland, and road related BMPs, and riparian livestock exclusions in lower Rudd and Nutrioso creeks.
3. Short-term and long-term effects to suitable and potential habitat are likely. However, we are not reasonably certain the species will occur in the action area during the life of the project.

Little Colorado spinedace

We anticipate that the proposed actions covered by this Biological Opinion are reasonably certain to result in incidental take of Little Colorado spinedace. Some level of incidental take is expected to occur within the action area as a result of thinning and burning activities due to subsequent changes in water quality, and habitat structure from short-term increases in sediment delivery via channelized flows into occupied Little Colorado spinedace habitat. Because of the inherent biological characteristics of aquatic species such as Little Colorado spinedace, the likelihood of discovering take attributable to these actions is very small. The anticipated level of incidental take cannot be directly quantified because of the unknown numbers of Little Colorado spinedace in the project area and the difficulty detecting Little Colorado spinedace due to eggs,

fry, and fish being small, blending into their environment, and occurring underwater in a flowing river. Therefore, we define incidental take in terms of habitat conditions, and use surrogate measures to identify when take has been exceeded. We anticipate that take will occur throughout those portions of Rudd and Nutrioso creeks and their tributaries included within the proposed action area. The authorized level of incidental take of Little Colorado spinedace from the proposed action will be exceeded if any of the following conditions occur:

1. There are declines in stream functioning conditions within Little Colorado spinedace occupied, critical, and/or suitable habitat portions of Nutrioso and Rudd Creeks as measured by Proper Functioning Condition (PFC) surveys, which are attributable to the proposed action.
2. The effects to Little Colorado spinedace are greater than those disclosed in the project Biological Assessment and Evaluation (BAE) as anticipated from planned implementation of Best Management Practices (BMPs) or the effectiveness of the implemented BMPs.
3. There is a decline in Little Colorado spinedace constituent elements due to the proposed action. GAWS survey data will be used as baseline data for the constituent element measures. Future surveys will be accomplished by Region 3 Stream Inventory Protocol.

Loach minnow

The FWS does not anticipate the proposed action will incidentally take any loach minnow. We conclude this for the following reasons:

1. Only a small segment of the Upper Black River 5th code watershed will be treated with mechanical thinning and prescribed burning.
2. Occupied habitat for loach minnow occurs 5.2 river miles below the Nutrioso WUI boundary.
3. Considering the riparian, upland, and road related BMPs, the known distance to occupied habitat, the amount of watershed impacts, and AMP livestock exclusions, we are not reasonably certain the influx of sediment and/or ash from the proposed treatments will reach a level of take for the loach minnow.
4. We can not be reasonably certain that the level of impacts will reduce the availability of habitat for any life stages of loach minnow.

EFFECT OF THE TAKE

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to MSO or spinedace or result in destruction or adverse modification of MSO critical habitat or proposed loach minnow critical habitat. No incidental take is anticipated for CLF or loach minnow.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

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

The following reasonable and prudent measures and terms and conditions are necessary and appropriate to minimize take of MSO:

1. The ASNF shall monitor incidental take resulting from the proposed action and report to the AESO the findings of that monitoring.
 - a. Monitoring, as described in the current MSO survey protocol, when project treatments are within or adjacent to a PAC shall occur one year prior to spring or one season prior to fall.
 - b. The ASNF shall submit annual monitoring reports to the AESO by January 1 following the first year of treatment. These reports shall briefly document, for the previous calendar year, the effectiveness of the terms and conditions and locations of listed species observed, and, if any are found dead, the suspected cause of mortality. The report shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions. The report shall make recommendations for modifying or refining these terms and conditions to enhance listed species protection.
2. The ASNF shall work with the FWS to increase the size of Mollys Nipple PAC to include MSO restricted habitat acres outside of the 0.5 mile boundary of private land. The new expansion area should provide suitable MSO dispersal habitat (available for breeding, feeding, nesting, and roosting) following the reduction and removal of currently protected habitat within the 0.5 mile boundary of private land.
 - a. The ASNF shall submit the revised PAC boundary and report to the Arizona Ecological Services Field Office prior to treatment within the Mollys Nipple PAC.

The following reasonable and prudent measure(s) and terms and conditions are necessary and appropriate to minimize take of Little Colorado spinedace:

1. Protect riverine and riparian habitat within Rudd Creek and Nutrioso Creek, and their tributaries from significant effects using BMPs, appropriate mitigation measures, or site specific riparian and stream management guidelines.
 - a. The ANSF shall not begin project disturbing actions until implementation and effectiveness monitoring forms are developed and approved to monitor BMPs. The Forest Service shall develop monitoring forms for in-channel and stream management zone observations that are indicators of excessive sediment delivery to streams due to the proposed action.

- b. Manage riparian areas and streamside management zones adjacent to and upstream of spinedace populations as natural or man-made buffers to minimize indirect effects to spinedace. The ANSF shall adjust applications of BMPs and/or treatment parameters (such as intensity of prescribed burns, width of buffer zones, timing of future entries, etc.), as necessary, to assure that sediment and ash delivery to streams within spinedace habitat is minimized.
 - c. The ANSF shall identify treatment areas during and after initial entries of project implementation where BMPs, as implemented, may have been insufficient to prevent ash or sediment from entering streams of concern.
 2. The ANSF shall monitor the project area and other areas that could be affected by the proposed action to ascertain take of individuals of the species and/or loss of its habitat. This monitoring will be accomplished using the following protocol:
 - a. The ANSF shall perform field verifications to ensure that there are adequate buffers for sediment and ash flow.
 - b. The ANSF shall monitor both the implementation and effectiveness of Best Management Practices using standard BMP monitoring protocols.
 - c. The ANSF shall complete both PFC and Level II Stream Surveys (USFS Region 3 protocol) on Rudd Creek and within occupied, critical, and/or suitable habitat portions of Nutrioso Creek.
 - d. The ANSF shall submit annual monitoring reports to the Arizona Ecological Services Field Office by January 1st every year. These reports shall briefly document for the previous calendar year the actions completed, BMP implementation and effectiveness monitoring forms, effectiveness of the terms and conditions and locations of listed species observed, and, if any are found dead, suspected cause of mortality. The report shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions. The report shall make recommendations for modifying or refining these terms and conditions to enhance listed species protection.

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. ANSF 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, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202,

telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and 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 you continue to identify factors that limit the recovery potential of the spinedace on lands under their jurisdiction and work to correct them.
2. We recommend that you apply for instream flow water rights to ensure perennial flow in streams with spinedace habitat.

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 the conference for loach minnow proposed critical habitat. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation if the proposed critical habitat is designated. The request must be in writing. If the FWS reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during the conference, the FWS will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

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

The FWS appreciates the ASNFs efforts to identify and minimize effects to listed species from this project. For further information please contact Ryan Gordon (x225) or Debra Bills (x239).

Please refer to the consultation number, 02-21-05-F-0385, in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: District Ranger, Alpine Ranger District, Alpine, AZ
Forest Biologist, Alpine Ranger District, Alpine, AZ (Attn: Linda WhiteTrifaro)
Forest Biologist, Alpine Ranger District, Alpine, AZ (Attn: Bill Wall)
Shaula Hedwall, Fish and Wildlife Service, Flagstaff, AZ

Branch Chief, Arizona Game and Fish Department, Phoenix, AZ

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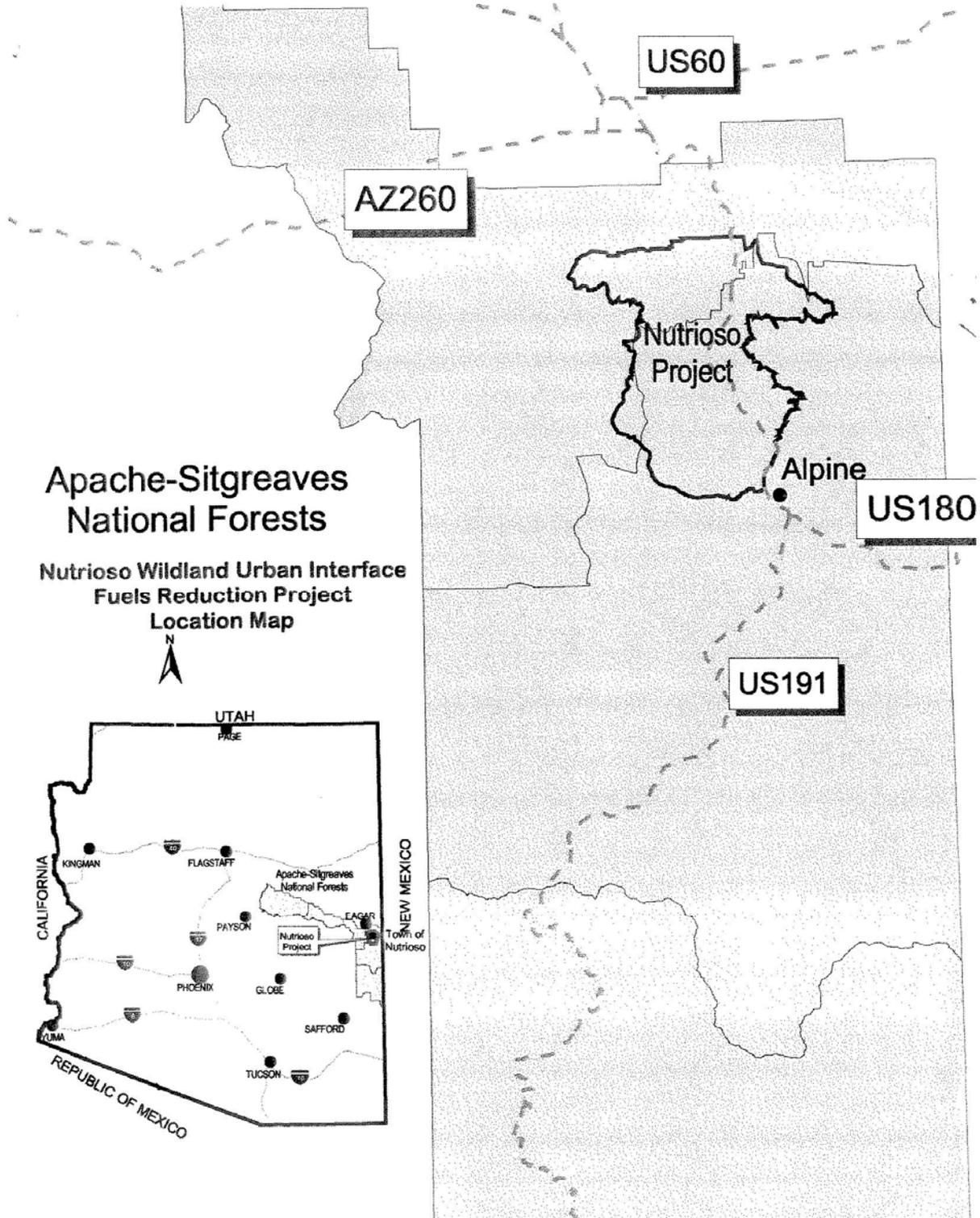
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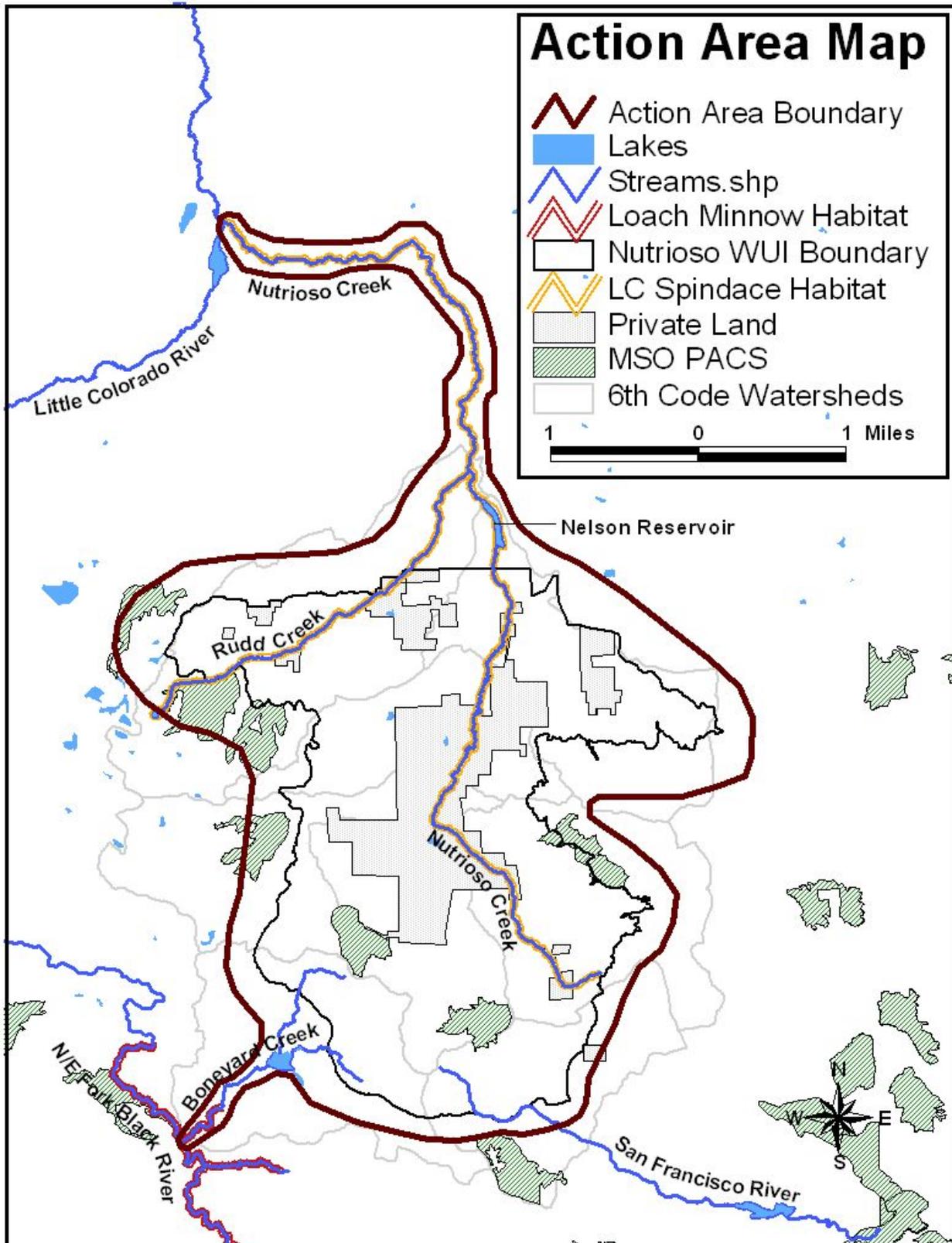
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FIGURES

1. Location Map



2. Action Area Map



APPENDIX A

CONCURRENCE

Southwestern Willow Flycatcher

We concur with your conclusion that this project may affect, but is not likely to adversely affect the Southwestern Willow Flycatcher. Suitable and potential southwestern willow flycatcher (SWFL) habitat does not occur within the Nutrioso WUI project area. Surveys on the ASNF have been completed from 1993 through 2004. In 1994, a single male was detected in the Nutrioso Wetland area. Since then, no SWFL have been detected (in 1997, surveys were not completed in this area). Although previous surveys in the Nutrioso Wetland do not indicate occupancy, this site has potential to be occupied within the timeframe of this project (ten years), although when or if this will occur is unknown.

The Nutrioso Wetland area is located south of Nelson Reservoir and approximately 0.25 mile north of the Nutrioso WUI boundary. This area is considered suitable SWFL habitat. Because the Nutrioso Wetland is outside of the treatment area, no direct effects to SWFL habitat will occur. Indirect effects from smoke may occur during prescribed burning treatments in units 4A and 6B within the Nutrioso WUI project area. However, because of the distance (approximately 0.25 mile) to suitable habitat from prescribed burning and smoke related restrictions required by the Arizona Department of Environmental Quality (ADEQ), smoke effects will be limited. Although smoke related impacts to SWFL are expected, we do not anticipate the level of smoke disturbance will adversely affect SWFL. In addition, the ASNF has committed to the following conservation measures to further limit impacts to SWFL.

1. Prescribed burning in units 4A and 6B will occur outside of the period between May 1 and August 15, unless surveys have been completed and results are negative.
2. If prescribed burning treatments in units 4A and 6B are considered (between May 1 and August 15), SWFL surveys shall be conducted in the Nutrioso Wetland prior to burning treatments. If SWFL are located in the Nutrioso Wetland the Forest shall follow recommendation number one.

Bald Eagle

Bald eagles forage at Nelson Reservoir and Nutrioso Reservoir in the winter and during the breeding season. Nelson Reservoir is located within private land and Nutrioso Reservoir is located outside of the Nutrioso WUI project boundary but in the action area. No winter roost sites are known within the action area; however, winter day-time perch areas are documented in the action area. All day-time perch locations are within private land or outside of the project area and will not be directly affected by mechanical or prescribed burning treatments; therefore, direct impacts to bald eagles will be insignificant and discountable. An increase in noise disturbance is likely to occur from logging trucks and mechanical treatments within the vicinity of forage and day-time perch locations; however, we do not anticipate the increased level of noise disturbance will adversely affect foraging and/or perching bald eagles. We concur with your conclusion that this project may affect, but is not likely to adversely affect bald eagles.

APPENDIX B

Exhibit 1: Treatments within 0.5 Mile of Private Land

Treatment	Vegetation	Slash
<p>3A1</p> <p>AA, MC, OW, PP</p> <p>Slopes <40%</p> <p>Boles removed</p> <p>5,166 acres</p>	<p>Target crown spacing for conifers ranges from 10-25' and averages 15-20'. The crown spacing will be primarily achieved by thinning conifers 3.0' tall to 16" dbh. Conifers >16" dbh will be retained, except those that are heavily to severely diseased, insect infested, facing imminent mortality, and/or trees that act as ladder fuels. In stands where oak and aspen occur, they will not be cut. Where appropriate, these species may be considered as residual trees in the target crown spacing when thinning conifers. Where conditions are appropriate, groups or clumps of trees may be left un-thinned, except for removing ladder fuels, and considered as a single unit with appropriate crown spacing around it. Areas may also be treated with periodic low intensity prescribed burns where feasible.</p>	<p>All boles >3.9" dib from the thinning will be removed from the project area. All other created and pre-existing slash will be mechanically treated (chipped, etc.), removed, or piled and burned; or otherwise utilized for soil stabilization. All snags within 300' of private land boundaries and along key fire control roads will be felled. Beyond the 300' strip, only conifer snags <12" may be cut.</p>
<p>3A2</p> <p>AA, MC, OW, PP</p> <p>Slopes <40%</p> <p>Currently without road access, boles cannot be removed</p> <p>2,304 acres</p>	<p>Target crown spacing for conifers ranges from 10-25' and averages 15-20'. The crown spacing will be primarily achieved by thinning conifers 3.0' tall to 16" dbh. Conifers >16" dbh will not be cut except those that are heavily to severely diseased, insect infested, facing imminent mortality, and/or trees that act as ladder fuels. In stands where oak and aspen occur, they will not be cut. Where appropriate these species may be considered as residual trees in the target crown spacing when thinning conifers. Where conditions are appropriate, groups or clumps of trees may be left un-thinned, except for removing ladder fuels, and considered as a single unit with appropriate crown spacing around it. In some areas the target BA will be exceeded due to the number of existing trees greater than 16" dbh. If access becomes available the defined areas will be treated under 3A1. Areas may also be treated with periodic low intensity prescribed burns where feasible.</p>	<p>All created and pre-existing slash <16" diameter will be treated, i.e., piled and burned, or otherwise utilized for soil stabilization. Bark beetle prevention measures will be implemented as necessary. All snags within 300' of private land boundaries and along key fire control roads will be felled. Beyond the 300' strip, only conifer snags <12" may be cut.</p>
<p>3B</p> <p>AA, MC, OW, PP</p> <p>Slopes >40%</p> <p>1,578 acres</p>	<p>Areas may be treated with periodic low intensity prescribed burns where feasible. This treatment will retain old growth conditions that occur on 7 acres. There are an additional 106 acres of potential old growth that are also allocated within this treatment.</p>	<p>No treatment except with prescribed fire.</p>

Treatment	Vegetation	Slash
3C Grassland Restoration Slopes <25% Boles may be removed 3,129 acres	Restoration is designed to promote and restore grasslands. All conifer trees >16" dbh will be retained. Retain all pinyon trees >12" drc and juniper trees >16" drc. Where oak and aspen occur, they will not be cut. Areas may also be treated with periodic low intensity prescribed burns where feasible.	Boles and created slash may be removed (except in the Greenwood Area) or lopped and scattered, or piled and burned, or utilized for soil stabilization. Bark beetle prevention measures will be implemented as necessary. Conifer snags <12" dbh may be cut.
4A PJ Slopes <40% Boles may be removed 1,677 acres	Target crown spacing ranges from 20-35', however, all pinyon pines >12" drc and all other tree species >16 " drc will be retained. Conifers over these diameters may be cut if heavily to severely diseased, insect infested, or facing imminent mortality. In stands where oak and aspen occur, they will not be cut. Alligator junipers (primarily) and pinyon pine (secondarily), when present, will be favored over other conifers. Areas may also be treated with periodic prescribed burns where feasible.	Slash will be lopped and scattered, or piled and burned, or utilized for soil stabilization. On slopes <25%, woody material may be removed. Conifer snags <12" dbh may be cut.
4B PJ Slopes >40% 1,260 acres	Areas may be treated with periodic prescribed burns where feasible. In the Greenwood Area, this treatment will be applied on some slopes less than 40%.	No treatment except with prescribed fire.
4GW PJ Slopes <40% No Mechanical treatment and no boles removed 1,216 acres	Target crown spacing ranges from 20-35', however, all pinyon pines >12" drc and all other tree species >16 " drc will be retained. Conifers over these diameters may be cut if heavily to severely diseased, insect infested, or facing imminent mortality. In stands where oak and aspen occur, they will not be cut. Alligator junipers (primarily) and pinyon pine (secondarily), when present, will be favored over other conifers when trees are left in place. Areas may also be treated with periodic prescribed burns where feasible.	Slash will be lopped and scattered, or piled and burned, or utilized for soil stabilization.

Total acres proposed for treatment within 0.5 mile of state and private land = approximately 16,330 analysis acres within 0.5 mile of state and private lands

Exhibit 2: Treatments Beyond 0.5 mile of Private Land

Treatment	Vegetation	Slash
<p>4A</p> <p>PJ Slopes <25%</p> <p>Boles may be removed</p> <p>955 acres</p>	<p>Target crown spacing ranges from 20-35', however, all pinyon pines >12" drc and all other tree species >16 " drc will be retained. Conifers over these diameters may be cut if heavily to severely diseased, insect infested, or facing imminent mortality. In stands where oak and aspen occur, they will not be cut. Alligator junipers (primarily) and pinyon pine (secondarily), when present, will be favored over other conifers when trees are left in place. Areas may also be treated with periodic prescribed burns where feasible. Modification of this treatment will be made to retain old growth conditions that occur on 230 acres. There are no potential old growth acres allocated in this treatment.</p>	<p>Slash will be lopped and scattered, or piled and burned, or utilized for soil stabilization. On slopes <25%, woody material may be removed. Conifer snags <12" dbh may be cut.</p>
<p>4B</p> <p>PJ Slopes <25%</p> <p>No Boles removed</p> <p>327 acres</p>	<p>Where necessary, target crown spacing ranges from 20-35', however, all pinyon pines >12" drc and all other tree species >16 " drc will be left. In stands where oak and aspen occur, they will not be cut. Alligator junipers (primarily) and pinyon pine (secondarily), when present, will be favored over other conifers. Areas may also be treated with periodic prescribed burns where feasible. Modification of this treatment will be made to retain old growth conditions that occur on 198 acres. There are an additional 84 acres of potential old growth that are also allocated within this treatment.</p>	<p>Slash will be lopped and scattered, or piled and burned, or utilized for soil stabilization.</p>
<p>4C</p> <p>PJ Slopes >25%</p> <p>643 acres</p>	<p>Areas may be treated with periodic prescribed burns where feasible. This treatment will retain old growth conditions that occur on 82 acres. There are an additional 183 acres of potential old growth that are also allocated within this treatment.</p>	<p>No treatment except with prescribed fire.</p>
<p>5A1</p> <p>AA, MC, OW, PP Slopes <40%</p> <p>Boles removed</p> <p>12,274 acres</p>	<p>Target crown spacing for conifers ranges from 10-25' and averages 15-20'. The crown spacing will be primarily achieved by thinning conifers 3.0' tall to 16" dbh. Conifers >16" dbh will not be cut except those that are heavily to severely diseased, insect infested, and trees that act as ladder fuels. In stands where oak and aspen occur, they will not be cut. Where appropriate, these species may be considered as residual trees in the target crown spacing when thinning conifers. Where conditions are appropriate, groups or clumps of trees may be left un-thinned, except for removing ladder fuels, and considered as a single unit with appropriate crown spacing around it. Areas may also be treated with periodic low intensity prescribed burns where feasible. Modification of this treatment will be made to retain old growth conditions that occur on 312 acres. There are an additional 739 acres of potential old growth that are also allocated within this treatment.</p>	<p>All boles >3.9" dib from the thinning will be removed from the project area. All other created and pre-existing slash will be mechanically treated (chipped, etc.), removed, or piled and burned; or otherwise utilized for soil stabilization. All snags within 300' of key fire control roads may be cut. Beyond this 300' strip, only conifer snags <12" may be cut. Bark beetle prevention measures will be implemented as necessary.</p>

Treatment	Vegetation	Slash
<p>5A2</p> <p>AA, MC, OW, PP Slopes <40% No road access-boles cannot be removed</p> <p>2,459 acres</p>	<p>Areas may be treated with periodic low intensity prescribed burns where feasible. This treatment will retain old growth conditions that occur on 75 acres. There are an additional 1198 acres of potential old growth that are also allocated within this treatment.</p>	<p>No treatment except with prescribed fire.</p>
<p>5B</p> <p>AA, MC, OW, PP Slopes >40%</p> <p>No boles removed</p> <p>2,389 acres</p>	<p>Areas may be treated with periodic low intensity prescribed burns where feasible. This treatment will retain old growth conditions that occur on 117 acres. There are an additional 1323 acres of potential old growth that are also allocated within this treatment.</p>	<p>No treatment except with prescribed fire.</p>
<p>5C</p> <p>Within PACs</p> <p>1,720 acres</p>	<p>Areas may be treated with periodic low intensity prescribed burns where feasible. This treatment will retain old growth conditions that occur on 208 acres. There are an additional 1486 acres of potential old growth that are also allocated within this treatment.</p>	<p>No treatment except with prescribed fire.</p>
<p>5WL</p> <p>AA, MC, PP, OW</p> <p>ALL SLOPES</p> <p>802 acres</p>	<p>Areas may be thinned from below to maintain a minimum 110 basal area (BA), retaining the largest trees possible. Areas currently less than 110 BA will not be thinned. In stands where oak and aspen occur, they will not be cut. Areas may also be treated with periodic low intensity prescribed burns where feasible. This treatment will retain old growth conditions that occur on 37 acres. There are an additional 765 acres of potential old growth that are also allocated within this treatment.</p>	<p>Boles >3.9" dib from the thinning may be removed from the project area. All other created and pre-existing slash may be mechanically treated (chipped, etc.), removed, or piled and burned; or otherwise utilized for soil stabilization. Bark beetle prevention measures will be implemented as necessary. All snags within 300' of key fire control roads may be cut. Beyond the 300' strip along key fire control roads, all snags will be retained.</p>

Treatment	Vegetation	Slash
<p>6A</p> <p>Restoration - Presettlment</p> <p>Slopes <40%</p> <p>Boles removed</p> <p>1,396 acres</p>	<p>Restoration is designed to promote and protect pre-settlement (PS) trees and stand conditions. All PS trees will be retained; younger trees within competitive distances will be removed unless needed for replacement (R). R trees will be identified based on remnant evidence. Average of ~1.5 trees >15.9" dbh or 2-3 trees <16" dbh will be used for Rs. Where appropriate and where pre-settlement evidence is lacking, additional healthy trees may be left. In stands where oak and aspen occur, they will not be cut. Areas may also be treated with periodic low intensity prescribed burns where feasible. Modification of this treatment will be made to retain old growth conditions that occur on 11 acres. There are no potential old growth acres allocated in this treatment.</p>	<p>All boles >3.9" dib from the thinning will be removed from the project area. All other created and pre-existing slash will be mechanically treated (chipped, etc.), removed, or piled and burned; or otherwise utilized for soil stabilization. All snags within 300' of key fire control roads will be cut. Beyond the 300' strip along key fire control roads, all snags will be retained. Bark beetle prevention measures will be implemented as necessary.</p>
<p>6B</p> <p>Grassland Restoration</p> <p>Slopes <25%</p> <p>Boles may be removed</p> <p>1,457 acres</p>	<p>Restoration is designed to promote and restore grasslands. All conifer trees >16" dbh will be retained. Retain all pinyon trees >12" drc and juniper trees >16" drc. Where oak and aspen occur, they will not be cut. Areas may also be treated with periodic low intensity prescribed burns where feasible.</p>	<p>Boles and created slash may be removed (except in the Greenwood Area) or lopped and scattered, or piled and burned, or utilized for soil stabilization. Bark beetle prevention measures will be implemented as necessary. All snags within 300' of key fire control roads will be cut. Beyond the 300' strip along key fire control roads, all snags will be retained.</p>

BA = basal area

dbh = diameter breast height

dib = diameter inside the bark

drc = diameter root collar

AA = Aspen

MC = mixed-conifer

OW = oak woodlands

PJ = pinyon/juniper

PP = ponderosa pine

APPENDIX C

The information provided below was copied from the ASNFs biological assessment for the Nutrioso WUI project. Copies of all literature cited within this section should be requested from the ASNFs.

VALUES, ECOLOGICAL DESIRED FUTURE CONDITIONS, AND CURRENT EXISTING CONDITIONS FOR AQUATIC HABITATS

Value as Headwater Streams

The streams within Nutrioso watershed are comprised of headwater (generally orders 1-3) and mid-sized transitional zones (generally orders 4-6). Most common and the most important are the headwater streams as depicted on 1:24,000 scale topographic maps and are generally < 3 to 5 mi² (~ 8 to 13 km²) in drainage area. They are the key interface between the surrounding landscape and larger water bodies as they make up more than half of the total channel length in a watershed. As such, land use can greatly affect the rate and quality of material supplied to reaches downstream. Healthy headwater streams provide habitat to relatively distinct and diverse invertebrate assemblages, and by assimilating nutrients, organic matter, and sediments, they export high quality water in the form of goods and services (e.g., water supply, recreation, waste assimilation, flood control, and ecological values) (Pond 2002). The shredder functional group of aquatic macroinvertebrates are important indicators of healthy allochthonous input (leaves, wood, etc. from outside of the channel) and necessary for breakdown of leaf litter. Organic matter from riparian areas may supply more than 95% of the energy for headwater streams. Loss of litter inputs to these streams result in dramatic declines in diversity and productivity throughout their associated food webs (Richardson 2000).

Value as Mid-sized transitional zones

These areas are reaches that transition from riparian dominated channels that depend on shading and allochthonous detritus to a dependence on autochthonous primary production (from within the channel such as photosynthesis and microbial metabolism) and organic transport from upstream (Vannote 1980). Clear water and clean substrate are important factors for photosynthesis and aquatic macroinvertebrates (grazers and filter-collectors).

Value as a Riparian Area

Riparian vegetation is essential for building and maintaining the stream structure necessary for productive aquatic habitats (Platts 1991). Well-vegetated areas where there is a layer of duff or organic litter on the soil surface provides much greater infiltration rates than areas that are poorly vegetated areas with minimal organic litter. Streamside vegetation promotes bank stability and its shading is a major control of water temperature (Leopold 1997). The meadow herbaceous component must have a two-dimensional "mat" function in order to be effective in moderating temperature fluctuations, reduce organic matter export, and retain sediment within the bank and active flood plain (Richardson 2000). With the ability of the herbaceous vegetation to lie down, combined with an extensive root system and organic litter, these mats (grasses and wetland vegetation) reduce the water velocity along the stream edge, and thus provide the necessary bank stability during high flows (Obedzinski 2001). All concave banks should be well vegetated with deeply rooted plants (Platts 1991).

Tall herbaceous vegetation provides cover for aquatic insects and fish along with habitat for adjacent terrestrial insects in small 1st and 2nd order meadow streams. Terrestrial insects are important food for trout and other fish species (Van Eimeren 1998, Platts 1991, and Harper 1978). Nakano has shown that terrestrial invertebrate inputs to the stream occurred primarily during the summer when aquatic biomass was near its lowest. This across-habitat prey flux accounted for 26% and 44% of the annual total energy budget of bird and fish assemblages, respectively (Nakano 2001).

Ecological Desired Future Condition (EDFC)

The EDFC is based on managing these riparian areas for resilience, which is the ability to recover to the range of conditions that the system experienced before the disturbance (Lugo et al. 1999). The EDFC should be assessed at the sub-basin level (i.e., Rudd, Auger, and Paddy creeks) and at a time scale fitting to the natural disturbance regime (Reeves 2003) such as fire and flood. Properly functioning riparian systems have: 1) stable stream banks, 2) good water quality, 3) a high water table, 4) high productivity of terrestrial biomass, 5) accretion of soil organic matter, 6) perennial vegetation, 7) native vegetation, 8) sustained aquatic fauna, and 9) a soil-geologic matrix that promotes water retention and base flows (Obedzinski 2001).

Biotic Riparian Communities

Generally there are two types of riparian communities within the Nutrioso watershed. These riparian areas can be defined as sub-alpine wetlands³ and cold temperate wetlands (Brown 1994), which are part of the Arizona New-Mexico Province (Bailey, 1995). Elevations range from 9400 ft at the headwaters of Nutrioso Creek to 7140 ft at the ASNFs boundary at Nutrioso Creek.

Sub-alpine Wetlands Community

The active flood plain associated with sub-alpine wetlands would consist of patchy willows within a dominant sedge community. The woody riparian component within an alpine meadow is generally absent (Brown 1994). The associated uplands would be considered to be a coniferous forest community (Bailey 1995) with a dominance of firs in the upper reaches gradually turning to a pine forest at the lower reaches. These meadows are often associated with high water tables, beaver dams, and frequent streamside marshy areas within the low gradient reaches. Ciénegas or small marshy ponds are common features (Brown 1994). Native species of concern would include Apache trout, northern leopard frogs, Arizona copper, and spotted skipperling.

Channel systems are predominantly low to moderate in sinuosity, very low width depth ratios, low to moderately steep gradients, and gravel dominate bed materials with finer stream bank materials. Channels are hydraulically efficient with high sediment transport capacity due to extensive riparian meadow vegetation and stream banks that are densely matted. Rosgen classification would be an E5 stream type in a valley type X (Rosgen 1996).

³ Brown refers to this type of community as Artic-Boreal Wetlands.

Cold temperate wetlands for the Alpine and Springerville Ranger districts have a range in elevations from 8700 ft to 6200 ft. These elevations appear to be a shift of approximately 500 ft higher from Brown's generalization for the Southwest (Brown 1994). Most of these areas can be sub-classified as montane riparian wetlands. A smaller portion of riparian areas within the lower reaches of Nutrioso Creek including lower reaches of its adjacent tributaries which are dominated by valley grasslands contain Great Basin Riparian wetland communities.

Montane Riparian Wetlands

Montane "canyon bottom forest" occur along perennial and intermittent streams, usually 8200 to 7500 ft. Riparian deciduous species include cottonwoods, alders, willows, and interspersed upland shrubs and trees. Streamside vegetation is often of the younger age classes and/or scrubby in appearance. One to several species of shrub willows may dominate the riparian vegetation. Montane riparian native species of concern include Apache trout, speckled dace, northern and Chiricahua leopard frogs, false ameleus mayfly, White Mountain water penny beetle, and narrow-headed garter snake.

Channel types consist of steep (>4%), narrow canyon reaches. Sinuosity, width/depth ration, and entrenchment are low (Rosgen A channels). The other channel type is lower in gradient (2-4%) and has moderate width/depth ratios, sinuosity, and entrenchment ratios within narrow valley bottoms (Rosgen B5 and some B4 channels). These lower gradient (B) channels are relatively stable where dense riparian vegetation is present. Large wood is an important component for fisheries habitat. Both these channel types (A and B) are sediment transport reaches with little depositional features as would be found in the lower reaches.

Great Basin Riparian Wetlands

Lower portions of valleys that have wide valley bottoms and are or were dominated by grasslands would include the Great Basin Riparian wetland communities which contain riparian scrublands that may be linear in appearance, dominated by willows, or younger age classes of cottonwoods. Species of concern that would likely occur within this community include Little Colorado spinedace, Chiricahua leopard frogs, Southwestern toad, and narrow-headed garter snake.

Channel types are predominantly low to moderate in sinuosity, variable in width depth ratios, low to moderately steep gradients, with predominately sand bed and banks. Due to the lack of reference reaches, width/depth ratios, channel stability, and substrate dominance can not be determined. It is likely that these channels may alternate between lower (E5) to more moderate (C5) width/depth ratios depending on fluctuating precipitation or "drought" conditions. When precipitation is above normal, channels are likely to narrow with the predominance of extensive riparian meadow vegetation and stream banks that are densely matted. During "drought" conditions (lower than average precipitation) channels may widen with less incision than present conditions. Variability would be dampened if channels had a dominance of woody vegetation over herbaceous and likely tend toward a dominance of the C5 channel type. Dominant vegetation types within the riparian areas are presently in dispute in regards to wide grassland dominated valleys. Variability in sediment transport capacity would also occur depending on channel types. E5 channels are hydraulically efficient with high sediment transport capacity due to extensive riparian meadow vegetation and stream banks that are densely matted. Herbaceous

dominated C5 channels tend to have higher rates of lateral adjustments and therefore sediment supply may be significantly higher. The presence of woody vegetation and its corresponding root structure may reduce this variability between stream types and increase sorting and presence of gravel substrate.

Disturbance at the watershed and reach scale

Under EDFC, disturbance would be throughout the drainages, but usually at the local or reach scale. In other words, flashy floods are usually localized and the disturbance would be at the sub-drainage to reach scale. Stream power varies, often dramatically from these localized events. These changes in stream power are influenced by variations in gradient, valley width, vegetation, roughness, and channel type. Therefore, past disturbances at these localized areas would be at all levels of recovery, but usually would not be homogenous throughout the drainage.

Nutriosio Creek

Surveys between 1994 and 2000 (AZGF 2001) indicate that Nutriosio Creek is not meeting ASNFs standards regarding satisfactory riparian condition, shade, siltation, and bank stability. Due to the creek's generally incised channels and poor riparian condition, it will not adequately process large scale or chronic disturbances within its drainage.

Headwater reach IV is characterized to be within the sub-alpine riparian community type. However the steep gradients of this reach is absent of meadows with narrow channels highly interspersed with upland conifers, spruce, and aspen. Reach III is within the montane riparian community and reaches I and II are within the Great Basin riparian communities.

Rudd Creek

Surveys in 1994 (AZGF 2001) indicate that Rudd Creek is not meeting ASNFs standards regarding siltation, and bank stability. The upper reaches do meet ASNFs standards regarding satisfactory riparian condition and canopy cover. Due to the creek's generally incised channels and poor riparian condition, it is not likely to handle large scale or chronic disturbances within its drainage.

Portions of the sub-alpine meadow headwater reach (VI) have been modified through past development of stock ponds and reservoirs from marshes and/or ciénegas. These events have locally reduced water tables and modified wetland meadow communities towards grassland communities, often with a dominance of non-native Kentucky bluegrass. As a result, defined channels have formed within these meadows and the naturally high sediment transport capacity has been lost. Recovery is slowly occurring and is highly dependant on precipitation, vehicle use, and grazing management. Reaches IV and V are within the montane riparian community. Reach III has the adjacent grassland community and sinuosity of a Gradient Basin riparian community. This reach also has the narrow valley and elevation of a montane riparian community. Reach I and II are within the Great Basin community.

Benton Creek

Surveys in 1994 (AZGF 2001) indicate that Benson Creek is meeting ASNFs standards regarding satisfactory riparian condition and canopy cover. The upper reaches do not meet

ASNFs standards regarding siltation and bank stability. Due to the creek's generally steep gradient and lack of large wood, it is not likely to handle large scale or chronic disturbances within its drainage.

The sub-alpine meadow headwater reach (VI) is similar to the headwater reach of Rudd Creek with three stock ponds associated with this meadow. Reaches IV and V are within the sub-alpine riparian community. Due to its steep gradient and narrow valley, it lacks the dominance of true riparian vegetation and meadows. Reaches II and III are within the montane riparian community and so is reach I, although with its wider valley and lower gradient, reach I has some sub-alpine meadow herbaceous components.

Milligan Creek

Observation from aerial photos indicated poor riparian condition and incised channels. No surveys are known for this drainage. This drainage is adjacent to Eagar South WUI.

The sub-alpine to montane riparian headwater reach (III) is often within 150 ft from a road and is associated with a number of road crossings. Reach II is within mostly private land of Milligan Valley and would have more of the elements of a sub-alpine meadow community if not for the incised condition of the channels. Reach I is within the montane riparian community and would also have more of a meadow community component if it were not for the deeply incised channel.

Riggs Creek

Observation from aerial photos indicated poor riparian condition and incised channels. No surveys are known for this drainage.

The headwater reaches (IV) are with the sub-alpine riparian community. The steep gradients of this upper portion of this reach is absent of meadows with narrow channels highly interspersed with upland conifers, spruce, and aspen. The lower portion of the reach contains three meadows that are seasonal wet. Reach II is within the montane riparian community type and reach I and II are within the Great Basin riparian community type.

Colter Creek

Surveys in 1994 (AZGF 2001) indicate that Colter Creek is not meeting ASNFs standards regarding embeddedness and canopy cover. The upper reaches are marginal in meeting ASNFs standards regarding satisfactory riparian condition and bank stability. Both forks of the headwater reaches have roads running through their meadows. There appears to be a lack of large wood within the channels.

Multiple headwater reaches (reach IV) are within the sub-alpine riparian community. These reaches are within wide to narrow riparian meadows, often have marshes as their origin. Reaches II and III are within the montane riparian community. Reach I is either within the montane riparian community based on elevation or within the Great Basin riparian community base on upland pinyon juniper and pine vegetation types. More likely, it is a montane riparian community type but has lost its woody vegetation from lowering of the water table over time.

Auger Creek

Only the upper end of reach III and reach IV was surveyed and had satisfactory riparian conditions and canopy cover in relation to the ASNFs Forest Plan. It did not meet ASNFs standards for channel stability and embeddedness. This may be due to the numerous roads, road crossings, past timber harvests, and Datil soils within the upper reaches. The lower reaches are confined by roads and connected to multiple ponds and wetlands. The lowest reach is presently Nutrioso Reservoir, at least during low flow. The Auger Canyon road (FS81) crossing and Hwy 191 appears to be the major flow restriction and for the reach above Nutrioso Reservoir (reach II).

The multiple headwater reaches of V are within the sub-alpine riparian community type. However the steep gradients of this reach is absent of meadows with narrow channels highly interspersed with upland conifers, spruce, and aspen. Reach IV is within the montane riparian community and interspersed with meadows. Reaches II and III are within the montane riparian community interspersed with lentic (still water) seasonal wetlands. These reaches could be classified within the Great Basin riparian community, if it is believed that woody vegetation would not likely be present under EDFC. Reach 1 is Nutrioso reservoir, at least during low to moderate flows.

Davis Creek

The headwater tributaries start at small, steep sub-alpine meadows within the Escudilla wilderness. This steep, narrow reach (VII) runs through aspen stands after leaving the meadow and is generally absent of riparian woody species. Reaches V and VI are within a narrow band of montane riparian community. Reaches III and IV are incised channels within the Great Basin riparian community. A good portion of Davis Creek is diverted to Reagan Reservoir at the upper end of reach IV. Reach II is likely within the montane riparian community because the channel runs through a steep, narrow canyon. Reach I is highly ephemeral and is a low gradient, open valley grassland of the Great Basin riparian community.

Watts Creek

The headwater tributary starts at small, steep sub-alpine meadows within the Escudilla wilderness. The upper portion of this steep, narrow reach (IV) runs through pockets of aspen stands after leaving the meadow and is generally absent of riparian woody species. The lower segments of this reach are within the montane riparian community along with reach III. Reaches I and II are within the Great Basin riparian community. Reach II is incised and reach I is highly ephemeral.

Woods Creek

The headwater tributaries (reach III) are within the sub-alpine riparian community and run through steep, narrow valleys. The floodplain is generally absent of riparian woody species but contain extensive pockets of aspen. Reach II begins in a sub-alpine meadow community where the two tributaries of reach III meet and quickly drops in to a montane riparian community. Reach I is within the Great Basin riparian community where its channel is incised.

Paddy Creek

The lower reaches within the WUI boundary are perennial and occupied by rainbow trout and speckled dace. Forest road 8065 follows the perennial drainage for most of its length.

The headwater reach IV is within the sub-alpine meadow community (Terry Flat). Reaches II and III are within the montane riparian communities. The upper end of reach I is within the montane riparian community and transitions into the Great Basin Riparian community at its lower end.

Cover in headwater grassland/meadows are considered low compared to historic conditions (White 2002). This assessment indicates the likelihood that the high source of fines and suspended sediment within the perennial portions of Paddy Creek, even during low flows, are likely from overland flow related to inadequate ground cover within these grassland/meadows. Normally, these grassland/meadows would be considered high quality buffers to overland flow.

Hulsey Creek

Headwater reach V is with the sub-alpine riparian community. However the steep gradients of this reach is absent of meadows with narrow channels highly interspersed with upland conifers, spruce, and aspen. Reach IV is within the montane riparian community and interspersed with pockets of alpine meadows. Reach III is Hulsey Lake and stocked with rainbow trout. The upper half of reach I and reach II are within the montane riparian community. The lower half of reach I is within the Great Basin riparian community.

Milk Creek

No fish were found in Milk Creek during the 1994 survey. Headwater reaches (III-IV) are within the sub-alpine riparian community. However the steep gradients of this reach is absent of meadows with narrow channels highly interspersed with upland conifers, spruce, and aspen.

Reach II is within the montane riparian community and reach I is within the Great Basin riparian community. Reaches I and II are somewhat transitional between montane and Great Basin riparian community types.

Boneyard (Black River) and San Francisco headwaters associated with NWUI

The following statements are qualitative in nature since there have been no known stream surveys within these headwaters. For the uppermost reaches, channel stability appears to be meeting ASNFs standards and canopy cover may be below but near the standard. Embeddedness appears high and riparian condition may also be below satisfactory related to ASNFs standards. This may be due to the numerous roads, road crossings, past timber harvests, and Datil soils within the upper reaches. The reaches below the uppermost tributaries are within Williams Valley. Here, the drainage channels are in slightly incised with poor cover due to lack of high quality, fibrous-rooted over hanging riparian plants and minimal undercut banks. Also channels are wider and shallower than would be expected (high width/depth ratios).

Cover from the adjacent grassland/meadows are considered low compared to historic conditions (White 2002). This assessment indicates the likelihood that the high source of fines and suspended sediment within the perennial portions of Boneyard Creek, even during low flows, are

likely from overland flow related to inadequate ground cover within these grassland/meadows. Normally, these grassland/meadows would be considered high quality buffers to overland flow.

The upper headwater reaches are sub-alpine riparian community types interspersed with narrow grassland meadow bottoms, especially the south aspect drainages. These reaches are steep, narrow and are generally absent of the meadow bottoms. They are also lacking of riparian species and interspersed with pines to mixed conifers depending on aspect. The drainages within Williams Valley are sub-alpine meadow riparian communities.

Sub-alpine Wetland Community

The sedge community is usually sparse within the active channel and none existence outside of the active channel. Often, there is a dominance of non-native Kentucky blue grass which reduces the retainment of sediment from surface runoff. The densely “matted” sod layer is absent as well as the height and cover needed for a diverse terrestrial insect habitat and effective retention of organic matter. Vegetative cover for aquatic species is very low.

The water tables are at most stable and frequently detached from the channel. Beaver dams are absent and streamside marshy areas are sparse to none existent. Ciénegas or small marshy ponds are rare, though remnant sites can be identified near or within the small alluvial fans of side drainages. Overall habitat complexity is low for these headwater streams along with the retention of organic litter.

Channels are often incised (Rosgen G5) and with unstable banks and poor sediment transport capacity. However, all necessary functional components of this community type appear to be present and natural recovery should occur if stresses from surface runoff and herbivory continue to be abated.

Montane Riparian Wetlands

General conditions of the riparian wetlands within the Nutrioso watershed not meeting ASNFs standards for bank stability, embeddedness, canopy cover, and riparian conditions. The canopy cover is discontinuous and low. Retainment and recruitment of large wood within the floodplain, along with organic litter, is low. This also correlates with low taxa richness of shredders (macroinvertebrate functional group), which indicates inadequate amounts of coarse particulate organic matter (CPOM).

Width/depth ratio and entrenchment are higher than expected, due to frequent incised reaches. Lower than expected bank stability is likely related to channel incision and poor connection with its floodplain.

Density and connectivity with roads appear to be correlated with the condition of the floodplain as indicated by Rudd and Benton creeks. These creeks were at or near ASNFs riparian standards and had low road density and connectivity. Nutrioso, Colter, and Auger creeks have significantly more road connectivity and density and are not meeting the ASNFs riparian standards.

Great Basin Riparian Wetlands

The 1995 macroinvertebrate sample sites indicated total abundance, species diversity, scrapers (grazers) taxa richness, and filter collectors were low for these medium size streams. This indicates a low primary productivity to community respiration ratio (P/R). Lack of upstream nutrient cycling is an important factor along with excessive siltation. These mid-sized transition zones are the result of the following geomorphic and vegetative changes over time.

Generally these reaches with sandy materials are incised, looking like entrenched, moderately steep, (G5) or deeply incised in gentle terrain (F5) channels. Rosgen's example of channel adjustments from E4 to F4 is a good description of this shift (Rosgen 1996). As previously mentioned, adjustments between E5 and C5 would be within the natural range of variability.

The losses of vegetative cover and entrenchment within the sub-alpine and great basin riparian communities along with the reduction of woody vegetation and entrenchment within the montane riparian communities have led to shifts past these natural adjustments. This jump to the G5-F5-E5 stages has resulted from higher than natural bank erosion rates and low sediment transport capacity. This likely scenario has given the present condition of poor riparian cover and pool quality, highly incised channels, high embeddedness, channel instability, and slow recovery.

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APPENDIX D

Formal Consultation History, Rangewide, for the Little Colorado spinedace.

Consultation #	Date	Name	Anticipated Incidental Take
02-21-88-F-0029	May 22, 1989	US Route 180/Arizona 666	Yes, death to approximately 8% of the population and loss of 500 linear ft of habitat
02-21-88-F-0029 R1	April 30, 1991	Reinitiaion of US Route 180/Arizona 666	Yes, death to approximately 8% of the population and loss of 275 linear ft of habitat
02-21-92-F-0403	August 2, 1995	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-92-F-0403	November 20, 1995	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-96-F-339	July 31, 1996	Greer River Reservoir Dam	None anticipated
02-21-01-F-0425	May 6, 1997	Buck Springs Range Allotment Management Plan	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-88-F-167	March 30, 1998	Phoenix Resource Management Plan for the Bureau of Land Management	None anticipated
02-21-97-F-343	March 31, 1998	Bank Stabilization on the Little Colorado River South of St. Johns, Arizona	Yes, take of 5 adults or juveniles Little Colorado spinedace anticipated
000089RO	February 2, 1999	Regional ongoing grazing activities on allotments (Buck Springs, Colter Creek, Limestone, South Escudilla)	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
2-21-96-F-422 and 423	April 16, 1999	Amendment No 1 Phoenix District Az Grazing EIS Upper Gila San Simon	None anticipated
02-21-99-F-0167	July 1, 1999	McCain and Sears Whip Bank Stabilization on the Little Colorado River	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided

02-21-92-F-0403	May 25, 2001	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
2-21-01-F-218	August 21, 2001	Upper Little Colorado River Riparian Enhancement Demonstration Project	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-02-0220	October 4, 2002	Crayfish Study in Nutrioso Creek *	Yes, take of 10 Little Colorado spinedace anticipated
02-21-01-101	April 19, 2002	Apache trout reintroduction	None anticipated
2-21-01-F-0425	April 30, 2003	Buck Springs Allotment Management Plan	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-03-0369	October 16, 2003	Replacement of Little Colorado River Bridge #1184 State Route 87	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-03-F-0210	September 3, 2004	BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management	None anticipated
02-22-03-F-0366	June 10, 2005	Region 3 Forest Service Continued Implementation of the Land and Resource Management Plans for the 11 Southwestern Forests and Grasslands	Yes, take anticipated; not possible to quantify. FWS concludes that IT of LCS will be exceeded if there is a loss of one population in the current number of spinedace populations on NFS lands without being off-set by newly established populations.

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