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In Reply Refer To:
AESO/SE
02-21-03-F-0210

September 3, 2004

E-Mail Transmission
Memorandum

To: State Director, Bureau of Land Management, Phoenix, Arizona
(Attn: Ted Cordery and Hilary Boyd)

From: Field Supervisor

Subject: Biological and Conference Opinion for the BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated April 9, 2004, received by us on April 13, 2004, and modified by email dated May 25, 2004. At issue are impacts that may result from the proposed BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management to 31 listed species and designated critical habitat for nine species, one proposed species, and proposed critical habitat for two species. In response to your request, we are also providing recommendations for three candidate species (Appendix A). The species and their critical habitat considered in this opinion are listed in Table 1.

In your memorandum, you requested our concurrence that the proposed action is not likely to adversely affect the California brown pelican (*Pelecanus occidentalis californicus*); masked bobwhite (*Colinus virginianus ridgewayi*); northern aplomado falcon (*Falco femoralis septentrionalis*); bonytail chub (*Gila elegans*); beautiful shiner (*Cyprinella formosa*); Yaqui catfish (*Ictalurus pricei*); black-footed ferret (*Mustela nigripes*); jaguar (*Panthera onca*); ocelot (*Felis pardalis*); Sonoran pronghorn (*Antilocapra americana sonoriensis*); the nonessential, experimental population of the Mexican gray wolf (*Canis lupus baileyi*); and designated critical habitat for the bonytail chub, Yaqui chub, beautiful shiner, and Yaqui catfish. You also requested our recommendations on your determination that the proposed action is not likely to adversely affect the candidate species relict leopard frog (*Rana onca*) and black-tailed prairie dog (*Cynomys ludovicianus*). Except for lesser long-nosed bat, we provided our concurrences with these determinations by memorandum dated May 28, 2004.

This biological and conference opinion is based on information provided in the March 2004 biological evaluation, the March 2004 environmental assessment, the BLM's Final

Environmental Impact Statement, Vegetation Treatment on BLM Lands in Thirteen Western States (May 1991), telephone conversations, email correspondence, conference calls, and other sources of information. Literature cited in this biological and conference opinion is not a complete bibliography of all literature available on the species of concern, fire treatments and fire effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

This section summarizes significant steps in the consultation process. Additional correspondence, email transmissions, telephone conversation records, and conference calls that occurred between November 2002 and August 2004 are documented in the administrative record for this consultation.

- November 20, 2002: You sent us a memorandum advising us that you were initiating a land use plan amendment and requesting early coordination.

- May 16, 2003: You requested verification of the list of species that would not be affected by the project, the area of analysis, and level of detail for species analysis. We replied with this verification on May 29, 2003.

- May 28, 2003: We signed the consultation agreement regarding the consultation process for this project.

- July to September 2003: We reviewed and provided comments on preliminary draft and draft biological evaluations.

- December 8, 2003: We received your December 4, 2003, cover memorandum, biological evaluation, and request to initiate formal consultation.

- January 14, 2004: We requested additional information and clarification of the biological evaluation, via email.

- April 13, 2004: We received a revised biological evaluation and request to initiate formal consultation.

- May 25, 2004: By email, you changed your determination of effect for lesser long-nosed bat to may affect, likely to adversely affect.

- May 28, 2004: We responded with a memorandum initiating formal consultation and concurring with determinations that the action would not likely adversely affect 11 listed species and 4 designated critical habitats. We also provided recommendations for two candidate species.

- June 1, 2004: The U.S. District Court for the District of New Mexico ruled in New Mexico Cattlegrowers Association, *et al.,* versus U.S. Fish and Wildlife Service, *et al.*, that critical habitat for spikedace and loach minnow be vacated in its entirety. We have not yet received final interpretation from our legal council regarding the effective date of this order. Therefore, we have included an analysis of the proposed actions' effects on critical habitat for these species in this biological opinion.

- August 19, 2004: We sent you a draft biological opinion.

- August 30, 2004: We received your August 27, 2004 comments on the draft biological opinion.

- September 3, 2004: We sent you the final biological opinion.

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BIOLOGICAL AND CONFERENCE OPINION

INTRODUCTION

This document represents the U.S. Fish and Wildlife Service's (FWS) biological and conference opinion on the proposed Bureau of Land Management (BLM) Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management, in accordance with section 7 of the Endangered Species Act (Act) of 1973, (16 U.S.C. 1531-1544), as amended. At issue are the effects to 31 listed species and designated critical habitat for nine species, one proposed species, and proposed critical habitat for two species. At your request we are also providing recommendations for three candidate species (Appendix A). The species and their critical habitats considered in this opinion are listed in Table 1.

Section 7(b)(3)(A) of the Act requires that the Secretary of the Interior issue biological opinions on Federal agency actions that may affect listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the Act also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to result in jeopardy or adverse modification of critical habitat. This biological opinion addresses impacts to Federally-listed or proposed species and does not address the overall environmental acceptability of the proposed actions.

DESCRIPTION OF THE PROPOSED ACTION

The purpose of this section is to describe the proposed action that is the subject of this consultation, providing the background information needed to analyze the potential effects on listed and proposed species. The description of the actions is from BLM's *Biological Evaluation of the Proposed Arizona Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management*, March 2004 (BE), the environmental assessment for this proposal (BLM 2004), *Interagency Standards for Fire and Fire Aviation Operations 2004* (National Interagency Fire Center 2004), and BLM's *Arizona Record of Decision for Vegetation Treatment on BLM Lands in Thirteen Western States* (BLM 1991). BLM proposes to amend existing decisions in seven land use plans (LUPs) in Arizona concerning fire, fuels, and air quality management. This amendment will update the decisions to comply with the National Fire Plan, the 2001 Federal Wildland Fire Management Policy, and to fully integrate Department of the Interior (DOI) and BLM resource program fire and fuels management direction and guidance. The LUP amendment allocates BLM-administered land in Arizona to two categories, where fire use is suitable and where it is not, and establishes desired future conditions for vegetation communities that can be attained through fire and fuels management. The two actions being considered in this biological opinion are:

- *Fire and fuels management treatments:* These include prescribed fire, wildland fire use, and mechanical, chemical, and biological vegetative treatments used as tools to achieve desired future conditions, meet resource objectives, and reduce hazardous fuels on BLM-administered land inside and outside the Wildland-Urban Interface (WUI). General and

species-specific conservation measures (Appendix B) that minimize effects to listed or proposed species and their critical habitats will be implemented as part of these projects.

- *Fire suppression:* Fire suppression actions will continue in areas that are not suitable for implementing wildland fire use or when conditions are not suitable for wildland fire use. Under the proposed action, general and species-specific conservation measures (Appendix B) will be implemented unless protection of human life or safety or valuable property warrant another response.

This programmatic consultation considers the general resource management objectives and constraints (standard operating procedures, guidelines, and conservation measures) set forth in the LUP amendment. The projected term of this plan is approximately 10 years, until the seven existing LUPs are revised. Timing of future LUP revisions will vary geographically depending on long-term land use planning schedules.

Fire management plans comprise the next level of planning. These strategic plans will be developed by BLM in Arizona to describe the fire management program for each of four fire planning areas. BLM fire management plans will identify locations by vegetation type for the two land allocations: areas for using prescribed fire; wildland fire use; and mechanical, biological, or chemical methods to maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires, and meet resource objectives. They will also identify areas for full suppression of wildfire and areas to exclude from prescribed fire, chemical, mechanical, and/or biological treatments. Since fire management plans are strategic plans and not decision-level documents, neither National Environmental Policy Act (NEPA) compliance nor consultation under section 7 of the Act will be completed for these plans.

Implementation plans are site-specific plans and include fuels management plans, prescribed fire plans, and fire use plans. They will identify the project location, prescriptions, and tools that will be used for specific projects. Specific projects that may affect listed or proposed species or designated or proposed critical habitats will be subject to consultation in the future. Consultation for multiple projects planned over a three- to five-year period may be batched together or completed on a case-by-case basis. Fire management plans will identify locations suitable for wildland fire use. Fire use plans will identify the prescriptions and conditions under which wildland fire use may be considered. Fire use plans will undergo future site-specific consultation, where they may affect listed or proposed species or designated or proposed critical habitat. Conservation measures (Appendix B) developed during this consultation will be carried forward into fire management and implementation plans.

Currently, fire suppression actions on BLM-administered land that may affect listed or proposed species or their critical habitats require emergency consultation or conferencing under section 7 of the Act. Through this consultation, we have developed a protocol for use during and after wildfire response:

BLM will contact the appropriate FWS biologist as soon as practical once a wildfire starts if they determine that a listed species or critical habitat could be affected by the fire or fire suppression

activities. FWS will work with BLM during the emergency response to apply the appropriate conservation measures and make other site-specific recommendations. If the general framework for fire suppression actions as described in this consultation cannot be applied during the suppression activities (e.g., conservation measures, terms and conditions, standard operating procedures, etc.), BLM will consult on an emergency basis after the fire on any activities that may have affected the listed species or habitat. If this framework is followed, BLM will report to FWS on the actions taken and effects to the species and its habitat following the fire, but no further consultation on that incident would be required.

Reporting requirements are outlined in that section at the end of this biological and conference opinion.

Action Area

The action area includes all BLM-administered land in Arizona and land in California along the Colorado River administered by BLM's Arizona State Office. BLM in Arizona is responsible for fire and fuels management on approximately 12 million acres of public lands. Fire and fuels management activities will occur on BLM-administered lands. Fire suppression activities may be initiated on BLM-administered lands and move to adjacent lands. The action area also includes land in California and Nevada bordering the Colorado River, in Utah bordering the Arizona Strip Field Office, and in New Mexico bordering the Safford Field Office where effects from fire suppression and fire and fuels management activities on the adjacent BLM-administered land may occur. Federal lands administered by other agencies and State, Tribal, and private lands that adjoin BLM-administered land are also considered part of the action area. In general, these are lands immediately adjacent to, downslope from, downstream of, or downwind from BLM-administered land where effects to the watershed, post-fire floods, ash flows, and elevated sedimentation may occur.

BLM-administered land in Arizona supports 12 main biotic communities (after Brown 1994): Chihuahuan Desert Scrub, Mohave Desert Scrub, Great Basin Desert Scrub, Lower Sonoran Desert Scrub, Upper Sonoran Desert Scrub, Great Basin Pinyon-Juniper Woodland, Madrean Evergreen Woodland, Plains and Great Basin Grassland, Semidesert Grassland, Montane Conifer Forest, Riparian, and Interior Chaparral (BLM 2004). Each community varies in annual precipitation and temperature regimes, elevation, and historical fire regimes. A wide variety of land uses occur in the area, include rights-of way for roads and utilities, mining operations, cultural and historical sites, designated wilderness, national monuments and other special management areas, livestock grazing, recreation, wild horses and burros, and wildlife habitat.

Conservation Measures

Firefighter and public safety is the first priority in every fire management activity. Setting priorities among protecting human communities, community infrastructure, other property and improvements, and natural and cultural resources must by based on the values to be protected, human health and safety, and costs of protection (*2001 Federal Wildland Fire Management Policy*). Conservation measures (Appendix B) have been developed as part of the proposed

action to provide Statewide consistency in reducing the effects of fire management activities on listed, proposed, and candidate species and their habitats. Conservation measures will be implemented during all wildland fire use, prescribed fire, and mechanical, chemical, and biological treatments.

The *2001 Federal Wildland Fire Management Policy* States, in part, that fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of the fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to the fire. Conservation measures will be implemented during fire suppression to the extent possible, unless firefighter and public safety preclude following these measures, or protection of property outweighs the resource values being protected.

Changes to the conservation measures proposed in the BE were made during this consultation and are reflected in the list of measures included in Appendix B of this biological and conference opinion.

Fire Suppression

Fire suppression consists of the response actions taken to suppress wildland fires. These actions use a range of firefighter forces, tools, and equipment, depending on firefighter and public safety concerns, resources at risk, current and predicted fire behavior, weather conditions, available firefighting resources, and cost. Firefighters may use hand tools to build fire line to mineral soil; clear flammable debris, limbs, or vegetation; or smother hot spots. Areas may be burned out or backfired to create a black line to control fire spread. Bulldozers, engines, and water or retardant drops may be used to control fires that are torching, crowning, or spotting. Bulldozers create wider fire lines and clear or widen roads for access and firebreaks. Engines are used for spraying water or retardants along roads or for hose lays in locations inaccessible to vehicles. Aircraft (fixed wing or helicopters) drop retardants, foams, or water on fires, ferry firefighters in and out of remote locations, and monitor fire spread and conditions. In addition, fire managers make decisions during fire suppression that affect the direction or intensity of wildfire, and these decisions can affect whether certain areas burn and if these areas burn intensely.

Small fires may only require a small number of firefighters and a few engines; larger, more complex fires may require hundreds of firefighter and support personnel, heavy equipment, and aircraft. Depending on the location of the fire, the number of firefighters and overhead crew, and duration of the suppression activities, camps may be established near the fire for firefighters and support personnel. Helicopter pads may also be cleared.

BLM will use suppression tactics that limit damage or disturbance to the landscape and habitat, consistent with firefighter and public safety and protection of property and resources. Protection priorities are: (1) human life, and (2) property and natural/cultural resources. If it becomes necessary to prioritize between property and natural/cultural resources, this is done based on the

relative values to be protected, commensurate with fire management costs. When suppression actions are required in wilderness areas, wilderness study areas, and areas being managed for wilderness characteristics, minimum impact suppression tactics (MIST) (National Interagency Fire Center 2004) will be used and coordinated with the area's management objectives and guidelines. MIST will also be followed in all areas with known Federally protected species or habitat (conservation measure FS-1, Appendix B).

Use of fire retardants or foams will be avoided within 300 feet of waterways, in accordance with Environmental Guidelines for Delivery of Retardant or Foam Near Waterways (National Interagency Fire Center 2004). The FWS Washington D.C. Office issued a concurrence letter in 2001 to the National Office of Fire and Aviation that aerial application of retardant or foam outside of 300 feet of a waterway may affect, but is not likely to adversely affect, listed threatened or endangered species, and no further consultation for aquatic species is necessary. FWS extended this concurrence to December 31, 2002. Further consultation has not been completed. Exceptions to the guidelines are:

1. When alternative line construction tactics are not available due to terrain, congestion, life and property concerns, or lack of ground personnel, it is acceptable to anchor the foam or retardant application to the waterway. When anchoring a retardant or foam line to a waterway, the most accurate method of delivery will be used to minimize foam or retardant in the waterway.

2. Deviations from the guidelines are acceptable when life or property is threatened and the use of retardant or foam can be reasonably expected to alleviate the threat.

3. When potential damage to natural resources outweighs possible loss of aquatic life, the agency administrator may approve a deviation from the guidelines.

If the agency administrator decides to deviate from these guidelines, he/she shall determine whether there have been any adverse effects to listed species or their habitat and, if so, shall initiate emergency consultation with FWS as required by 50 CFR 402.05.

Fire and Fuels Management Treatments

Under the proposed action, BLM will establish the following desired future conditions for vegetation communities:

- Fire is recognized as a natural process in fire-adapted ecosystems and is used to achieve objectives for other resources;

- Fuels in WUI areas are maintained at non-hazardous levels to provide for public and fire fighter safety;

- Prescribed fire activities comply with Federal and State air quality regulations;

- Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function, and fuel loads are maintained below levels that are considered to be hazardous. Table 3.1 in the BE (pp. 10-11) includes a description of the desired future condition for each vegetation community.

BLM-administered public lands will be assigned to one of two land use allocations for fire management (BE, Figure 3.1). The allocations are based on the desired future condition of vegetation communities, ecological conditions, and ecological risks. Allocation 1 (wildland fire use) includes areas suitable for wildland fire use for resource management benefit, and there are few or no constraints for its use. Where fuel loading is high but conditions are not initially suitable for wildland fire, or in WUI areas, hazardous fuel loads will be reduced by mechanical, chemical or biological means to meet resource objectives. Where conditions are suitable, unplanned and planned wildfire may be used in combination with the other treatments to achieve desired objectives, such as to improve vegetation, wildlife habitat, or watershed conditions, maintain non-hazardous levels of fuels, or reduce the hazardous effects of unplanned wildland fire.

Allocation 2 (non-wildland fire use) includes areas not suitable for wildland fire use for resource benefit, where another treatment or suppression is required to prevent threats to life or property. It includes areas where fire never played a large role historically in the development and maintenance of the ecosystem, and some areas where fire return intervals are very long. It also includes areas (including some WUI areas) where an unplanned ignition could negatively affect the ecosystem unless another treatment is used. In areas where fuel loading is high, BLM will use mechanical, biological, or chemical treatments and some prescribed fire to maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires, and meet resource objectives. BLM will also emphasize prevention and education programs to reduce human-caused fires.

Although site-specific implementation plans have not yet been developed, BLM has made preliminary projections of which treatments may occur in habitats occupied by listed or proposed species (Appendix C). Final treatments and acreages will be determined during pre-project planning and environmental analyses in fire use plans and site-specific project level plans. However, these preliminary projections form a basis for determining the scope of effects to species at this programmatic level.

Manual and Mechanical Treatments

Manual methods include cutting, clearing, or pruning herbaceous and woody vegetation with hand tools (handsaw, axe, shovel, rake, machete, grubbing hoe, mattock, brush hook, and hand clippers) or hand-operated power tools (chain saws and power brush saws). The objective is to remove or cut target plants over relatively small areas. Workers will cut plants above ground level; cut plants at ground level; pull, grub, or dig out root systems to prevent resprouting; remove competing undesired vegetation; or place mulch around desired vegetation to limit the growth of competing plants. There is less soil disturbance and removal of non-target vegetation

with hand and power tools than with other methods. Manual treatments are combined with discussions of mechanical methods in this biological and conference opinion.

Mechanical treatments use equipment (bulldozers; disc plows; chains and cables; and tractors with mowers, beaters, crushers, choppers, or shredder attachments) to remove, kill, or inhibit the growth of undesirable herbaceous and woody vegetation. Mechanical treatment is generally followed with reseeding to reduce growth of these species. Heavy equipment tends to be noisy and causes more soil disturbance than other treatment methods; it also increases water infiltration through soil manipulation and removal of vegetative cover. However, the amount of soil disturbance and non-target herbaceaous and woody vegetation that is removed varies with the objective of the treatment, type of equipment used, soil type, and terrain. Woody debris will usually be piled and burned following these treatments to reduce hazardous fuels.

Biological Treatments

Biological treatments will occur only through use of grazing animals and are part of the proposed action. Biological treatments will only be implemented when grazing will have no effect on listed, proposed, or candidate species. Therefore, the effects of biological treatments to listed or proposed species or critical habitats are not analyzed in this opinion.

Chemical Treatments

BLM may use the following herbicides: atrazine; bromacil; bromacil + diuron; chlorsulfuron; clopyralid; 2,4-D, dicamba; dicamba + 2,4-D; diuron; glyphosate; glyphosate + 2,4-D; hexazinone; imazapyr; mefluidide; metsulfuron methyl; picloram; picloram + 2,4-D; simazine; sulfometuron methyl; tebuthiuron; and triclopyr. Treatments will follow the standard operating procedures and project design features of the BLM *Vegetation Treatment on BLM Lands in Thirteen Western States FEIS* (BLM 1991, pages 1-19 through 1-37). Buffer strips will be used adjacent to dwellings, domestic water sources, agricultural land, streams, lakes, and ponds; and where needed to protect listed, proposed, and candidate species. A minimum buffer strip 100 feet wide will be provided for aerial application, 25 feet for vehicle application, and 10 feet for hand application. Any deviations must be in accordance with the Environmental Protection Agency (EPA)-approved label for the herbicide. Within 10 feet of water where application is critical, herbicides will be wiped on individual plants.

Herbicides will be applied aerially (with helicopters or fixed wing aircraft) or from the ground (using vehicles with spray booms or by hand with manual applicators). Herbicide applications will be scheduled and designed to minimize potential impacts on non-target plants and animals, while remaining consistent with the objectives of the vegetation treatment program. The rates of application will depend on the target species, presence and condition of non-target vegetation, soil type, depth to the water table, presence of other water sources, and the label requirements.

Prior to treatment, BLM will consult with FWS on a project-level basis to eliminate or minimize effects to listed or proposed threatened or endangered species. In June 2004, FWS Region 2 completed “Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S

Fish and Wildlife Service" (USFWS 2004). BLM will consider and incorporate this guidance during project-specific consultations.

Prescribed Burning

Prescribed burning is the planned application of fire to wildland fuels in their natural or modified State, under specific conditions of fuels, weather, and other variables, which allow the fire to remain in a predetermined area and to achieve site-specific fire and resource management objectives. Treatments will be implemented in accordance with BLM procedures in Interagency Standards for Fire and Aviation Operations (National Interagency Fire Center 2004), as updated annually.

Prior to conducting a prescribed burn, BLM will conduct an inventory and assessment of site-specific conditions (live and dead vegetation densities, dead and down woody fuel loads, soil types, etc.) and prepare a written plan that includes an analysis of historical and present fire management, identifies resource objectives, and identifies people responsible for overseeing the fire. NEPA analysis and compliance with the Act and other pertinent regulations will be conducted for this plan.

The prescribed fire boundary may be reinforced to ensure the fire remains within the treatment area. This may include blacklining or fire line construction, maintaining roads, and improving wildlife or stock trails by limbing trees and clearing debris, using hand tools, power tools, and other equipment. The fire is ignited with hand held devices, vehicle-mounted equipment, or by air, in accordance with the plan's prescription (weather conditions, fuel moistures, etc).

Following the fire, the fire treatment area is monitored to ensure the prescribed fire has met the objectives of the approved prescribed fire plan.

Wildland Fire Use (Appropriate Management Response)

Appropriate management response includes a range of management responses to naturally ignited wildland fires, from full fire suppression to managing fires for resource benefits (wildland fire use). Any wildland fire can be aggressively suppressed and any fire that occurs in an area designated for fire use can be managed for resource benefits if it meets the prescribed criteria from an approved fire use plan. Management of a wildland fire may range from monitoring from a distance to ensure the fire remains within the prescribed area and conditions, to a variety of mitigation actions (constructing fire lines, backburning, water drops, etc.) that direct or limit fire spread, contain the fire to a defined area, or ensure public safety.

Prior to managing a wildland fire for resource benefits, a fire use plan will be prepared based on the land use allocations; relative risk to resources, the public and firefighters; potential complexity; and the ability to defend management boundaries. The plan will identify conditions for managing for wildland fire use and prescriptions that will be applied to these fires. The plan will be subject to NEPA analysis and compliance with the Act and other pertinent regulations.

STATUS OF THE SPECIES

The purpose of this section is to summarize the best available information regarding the current rangewide status of each species analyzed in this document. Therefore, this biological and conference opinion contains abbreviated assessments of the status of each species. We used the best available information in our analyses for each species. Additional information regarding each species is contained in the administrative record for this consultation and other sources of information cited for each species.

Chiricahua leopard frog

We listed the Chiricahua leopard frog as a threatened species without critical habitat on June 13, 2002 (USFWS 2002). We included a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. 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).

This frog is distinguished from other members of the *Rana pipiens* complex by a combination of distinctive characters, coloration, a distinctive call, and body size (Platz and Mecham 1979, Davidson 1996, Stebbins 2003). The Ramsey Canyon leopard frog (*Rana subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it reportedly grows to a larger size and has a distinct call that is typically given under water (Platz 1993). Recent genetic work suggests *R. subaquavocalis* and *R. chiricahuensis* may be conspecific (Goldberg *et al.* in review).

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 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, and northern Durango (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997, Sredl and Jennings *in press*). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable; however, the distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae*) in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). 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 remaining localitites 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).

Northern populations of the Chiricahua leopard frog along the Mogollon Rim and in the mountains of west-central New Mexico are disjunct from those in southeastern Arizona, southwestern New Mexico, and Mexico. Recent genetic analyses support describing the northern populations as a distinct species (Benedict and Quinn 1999, Platz and Grudzien 1999).

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 to 1978) (Hale and May 1983). From 1983 to 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 subsequent extensive surveys from 1994 to 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). In New Mexico, the species was found at 41 sites from 1994 to 1999; 31 of those were verified extant during 1998 to 1999 (Painter 2000). During May to August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994 to 1999 (C. Painter, pers. comm. 2000). The species has been extirpated from about 75 percent of its historical localities in Arizona and New Mexico. The status of the species in Mexico is unknown.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl *et al.* 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations were lost due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations. As numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Also, most of the larger source populations along major rivers and in cienega complexes have disappeared.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. Evidence exists to show substantial movements of leopard frogs in Arizona, via movement of frogs or passive movement of tadpoles along stream courses. In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (*Rana blairi*) leopard frogs for 5 miles or more along East Turkey Creek in the Chiricahua Mountains. In August 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in the San Bernardino Valley, Arizona; they believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen *et al.* (1996) found small numbers of Chiricahua leopard frogs at two locations in Arizona that supported large populations of nonnative predators; the likely source of these animals were populations 1.2 to 4.3 miles distant. Streams are important dispersal corridors for young northern leopard frogs (Seburn *et al.* 1997). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Recent evidence suggests a chytridiomycete skin fungi, *Batrachochytrium dendrobatidis*, is

responsible for global declines of frogs, toads, and salamanders (Speare and Berger 2000, Longcore *et al.* 1999, Berger *et al.* 1998, Daszak 2000, Hale 2001). Although the cause of death is uncertain, a thickening of the skin on the feet, hind legs and ventral pelvic region is thought to interfere with water and gas exchange, leading to death of the host (Nichols *et al.* 2001). In Arizona, chytrid infections have been reported from four populations of Chiricahua leopard frogs (M. Sredl, AGFD, pers. comm. 2000), as well as populations of other several other frogs and toads (Bradley *et al.* 2002, Hale 2001, Davidson *et al.* 2000, Sredl and Caldwell 2000, Morell 1999). In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and patterns of decline at 3 other populations are consistent with chytridiomycosis (R. Jennings, pers. comm. 2000). Die-offs occur during the cooler months from October to February. High temperatures during the summer may slow reproduction of chytrids to a point at which the organism cannot cause disease (Bradley *et al.* 2002). Rollins-Smith *et al.* (2002) also showed that chytrid spores are sensitive to antimicrobial peptides produced in ranid frog skinches The effectiveness of these peptides is temperature dependent and other environmental factors probably affect their production and release (Matutte *et al.* 2000).

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined; however, there is increasing evidence for amphibian population declines correlated with chytrid infections (Carey *et al.* 2003). It is clear that Chiricahua leopard frog populations can exist with the disease for extended periods. The frog has coexisted with chytridiomycosis in Sycamore Canyon, Arizona, since at least 1972. At a minimum, the presence of fungus is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. It may well prove to be an important contributing factor in observed population decline, and because of the interchange of individuals among subpopulations, metapopulations of frogs may be particularly susceptible. Rapid death of all or most frogs in stock tank populations in a metapopulation of Chiricahua leopard frogs in Grant County, New Mexico, was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. In these two cases, symptoms of moribund frogs matched those of frogs that died from chytridiomycosis. The disease has now been documented to be associated with the Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for chytridiomycosis in Arizona (1972) roughly corresponds to the first observed mass die-offs of ranid frogs in Arizona.

The origin of the disease is unknown, but epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) (Berger *et al.* 1998), and analysis of genetic variability (Morehouse *et al.* 2003), suggest recent introduction of the disease into native populations and the disease subsequently becoming enzootic in some areas. Virulence of the pathogen or host susceptibility may be affected by environmental factors (Berger *et al.* 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other conditions that cause stress (Carey *et al.* 2001, Daszak 2000, Pounds and Crump 1994).

If this fungus proves to be a new introduction, its rapid colonization has likely been facilitated by human actions. The fungus does not have an airborne spore, so it must spread via other means.

Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in Australia and bullfrog in the USA) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000, Mazzoni *et al.* 2003). Free-ranging healthy bullfrogs with low-level chytriodiomycosis infections have been found in southern Arizona (Bradley *et al.* 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people, among aquatic sites, chytridiomycosis may be carried with them (Collins *et al.* 2003). Other native or nonnative frogs may serve as disease vectors or reservoirs of infection, as well (Bradley *et al.* 2002). Chytrids could also be spread by people (and terrestrial animals) moving among various tanks and/or by personnel sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. We and the Arizona Game and Fish Department (AGFD) use preventative measures to ensure the disease is not spread by aquatic sampling methods.

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 (in press).

Cactus ferruginous pygmy-owl

We listed the Arizona population of the pygmy-owl as an endangered distinct population segment on March 10, 1997 (USFWS 1997) without critical habitat. The listing rule (USFWS 1997) and administrative record contain detailed discussions of the factors affecting the pygmy-owl that we believe are responsible for the species' decline and endangered status. The Cactus Ferruginous Pygmy-Owl Recovery Team was convened in September 1998. A draft recovery plan was released for public comment in January 2003 (USFWS 2003).

In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999, in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona (USFWS 1999). The listing and designation of critical habitat were followed by several years of intensive litigation in Federal Court, the results of which are detailed in the administrative record for this consultation. At this writing, the pygmy-owl is listed as endangered, and its critical habitat status is "proposed".

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). A complete description of the primary constituent elements of proposed critical habitat and the proposed critical habitat units can be found in the

Federal Register announcement of the proposed rule to designate critical habitat for the pygmy-owls (USFWS 2002).

A detailed description of the life history and ecology of the pygmy-owl can be found in the Birds of North America (Proudfoot and Johnson 2000), Ecology and Conservation of the Cactus Ferruginous Pygmy-owl in Arizona (Cartron and Finch 2000), and in other information available from the Arizona Ecological Services Field Office website (arizonaes.fws.gov). The life history of pygmy-owls is detailed in prior consultations, occurs in the administrative record for this consultation, and is incorporated herein by reference. This section contains primarily those aspects of the species' life history (breeding and dispersal seasons, sources of mortality, habitat preferences, dispersal requirements, etc.) directly relevant to (and mentioned in) our analysis of the effects of the proposed action.

The pygmy-owl's courtship and nesting period occurs from February through June. Fledging and dispersal occurs from June through August. Once established by males, territories contain several potential nest-roost cavities from which responding females select a nest; thus, cavities/acre may be a fundamental criterion for habitat selection. Pygmy-owls exhibit a high degree of site fidelity once territories (the area defended) and home ranges (the area used throughout the year) have been established (AGFD 2003), so it is important that habitat characteristics within territories and home ranges be maintained over time in order for them to remain suitable. This is important for established pygmy-owl sites, as well as new sites established by dispersing pygmy-owls. Pygmy-owls are more likely to be affected by projects within their home range because of the species' strong site fidelity. Behaviorally, the option to seek alternative areas outside of the supposed 280-acre home range (Johnson 2000, Proudfoot 1996, Proudfoot, pers. comm.) appears limited, particularly for males. Banded and telemetered juvenile pygmy-owls in Arizona have dispersed from 1.4 miles to over 100 miles (Abbate *et al.* 1999, Abbate *et al.* 2000, AGFD 2004). Outside of the potentially aberrant 100 mile dispersal distance, the maximum documented dispersal distance is 21.8 miles (AGFD 2002b).

Juvenile owls typically disperse from natal areas in July and August and do not appear to defend a territory until September. They typically fly from tree to tree instead of long flights and may move up to 1 mile or more in a night (Abbate *et al.* 1999). Trees of appropriate size and spacing appear to be necessary for successful dispersal, but specific data describing this pattern are currently unavailable. Once dispersing male pygmy-owls settle in a territory (the area defended by a pygmy-owl), they rarely make additional movements outside of their home range. For example, spring surveys have found male juveniles in the same general location as observed the preceding autumn (Abbate *et al.* 2000), but unpaired female dispersers may make additional movements that sometimes continue into the subsequent breeding season (AGFD 2003). The ability and opportunity for pygmy-owls to disperse within population segments (behaving perhaps as metapopulations), as well as emigrate to adjacent population segments is likely important for the long-term persistence of pygmy-owls in Arizona.

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators that occur on BLM lands include great horned owls (*Bubo virginianus*), Harris' hawks

(*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), and screech-owls (*Otus kennicottii*) (Abbate *et al.* 2000, AGFD 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Cover near nest sites may be important for young to fledge successfully (Abbate *et al.* 1999, AGFD 2003, Wilcox *et al.* 1999, Wilcox *et al.* 2000).

Knowledge of the species' habitat associations is critical in determining the effects of the proposed action. Pygmy-owls were historically recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson *et al.* 1987, Johnson *et al*. 2003). Plants present in these riparian communities included cottonwood, willow (*Salix* spp.), ash, and hackberry (*Celtis* spp.), although this may have reflected a site-selection bias among early researchers. Recent records have documented pygmy-owls in a variety of vegetation communities such as riparian woodlands, mesquite (*Prosopis velutina*) bosques (Spanish for woodlands), Sonoran desertscrub, semidesert grassland, and Sonoran savanna grassland communities (see Brown 1994 for a description of these vegetation communities). Currently, pygmy-owls are thought to reside primarily within the Arizona Upland Subdivision of the Sonoran desert, particularly Sonoran desertscrub (Phillips *et al.* 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). This subdivision's major components include saguaros (*Carnegiea gigantea*), organ pipe cactus (*Stenocereus thurberi*), rarely cordon (*Pachycereus pringlei*), blue paloverde (*Parkinsonia florida =Cercidium floridum*), foothills paloverde (*P. microphylla = C. microphyllum*), ironwood (*Olneya tesota*), mesquites (*Prosopis* spp.), and acacias (*Acacia* spp.) (Brown 1994). Saguaros appear to be the preferred nest substrate (Abbate *et al.* 1996, 1999, 2000, AGFD 2003).

Within these communities, pygmy-owls appear to occur primarily within areas of high plant species diversity, high structural diversity, and the presence of tall canopy (Wilcox *et al.* 2000, Flesch 2003a, Swarth 1914, Karalus and Eckert 1974, Monson and Phillips 1981, Johnsgard 1988, Enriquez-Rocha *et al.* 1993, Proudfoot and Johnson 2000). Vegetation structure may be more important than species composition (Wilcox *et al.* 1999, Cartron *et al.* 2000a). Perch substrates used by pygmy-owls for calling are typically the tallest trees available within a home range, although pygmy-owls have also been noted calling from within saguaro cavities (Flesch 2003a).

Pygmy-owls formerly ranged throughout Arizona from as far north as New River (Fisher 1893). The species resided in riparian and xeroriparian forests along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Riparian-associated pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (Hunter 1988, AGFD 2002a). Records from the eastern portion of the pygmy-owl's range include an 1876 record from Camp Goodwin (nearby current-day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also on the Gila River. Pygmy-owls have been found as far west as the Cabeza Prieta Tanks, Yuma County in 1955 (Monson 1998).

Precipitous population declines have occurred since the early surveys. Hunter (1988) found fewer than 20 verified records of pygmy-owls in Arizona for the period of 1971 to 1988. Documentation of the total number of pygmy-owls and their current distribution in Arizona is

incomplete. Survey and monitoring work in Arizona resulted in documenting 41 adult pygmy-owls in 1999, 34 in 2000, 36 in 2001, 24 in 2002, and, most recently, 21 in 2003 (AGFD 2002a). Data for 2004 are not yet available. Table 2 summarizes the numbers of pygmy-owls detected in Arizona since 1993. We believe that more pygmy-owls exist in Arizona, but systematic surveys have not been conducted in all areas of potential habitat. Recent survey information has shown pygmy-owls to be more numerous adjacent to and near the Arizona border in Mexico (Flesch and Steidl 2000). There is also considerable unsurveyed habitat on the Tohono O'odham Nation, and we feel that these Tribal lands may support meaningful numbers of pygmy-owls.

Despite the lack of comprehensive, rangewide surveys, information gathered over the past few years indicates that pygmy-owls occur in Arizona in low numbers and are patchily distributed across southern Arizona. They occur in four main areas of the State, and numbers found within each area tend to vary on an annual basis. Based on personal observations and anecdotal information, Russell and Monson (1998) recorded no decline in numbers from Sonora, Mexico. Data collected from Mexico are presently insufficient to determine meaningful trends, but it is likely that for the pygmy-owl to persist in Arizona, additional pygmy-owls need to be located, productivity needs to be expanded, and population support from Mexico or artificial augmentation is probably required. Recent genetic work (Proudfoot and Slack 2001) may indicate that the pygmy-owls in Texas are genetically distinct from the pygmy-owls in Arizona, possibly to the subspecies level. Pygmy-owl populations in Texas are geographically separated from Arizona and currently provide no genetic or demographic support for Arizona populations.

Since listing in 1997, about 165 Federal agency actions in Arizona have undergone informal consultation regarding the potential effects of their projects to pygmy-owls. These are actions that included sufficient measures to avoid or minimize impacts to the pygmy-owls so that the effects were insignificant or discountable. At least 49 Federal agency actions have undergone formal section 7 consultation throughout the pygmy-owl's range. Of these, only one resulted in a draft jeopardy opinion, and that was resolved as a non-jeopardy final opinion. Six formal consultations anticipated incidental take of one or more pygmy-owls; however, only "take" in the form of harassment was authorized. Given the extremely low number of known pygmy-owls in Arizona, lethal "take" of even a single owl would make it difficult to avoid jeopardizing the species. Since 1997, we have provided technical assistance to hundreds of projects that do not have a Federal nexus, primarily single-family residences. These actions have no legal requirement to follow the recommendations we provide under technical assistance and we have no way of monitoring if or to what extent the recommendations are incorporated. They may or may not contribute to the conservation of the pygmy-owl, but they certainly contribute to ongoing effects to pygmy-owl habitat. Stochastic events, such as fire, drought, and spikes in predator populations, also continue to adversely affect the distribution and extent of pygmy-owl habitat.

California condor

We listed the California condor as endangered on March 11, 1967 (32 FR 4001). Critical habitat was designated in California on September 24, 1976 (41 FR 187). Critical habitat has not been designated outside of California.

The California condor is a member of the family Cathartidae or New World vultures, a family of seven species, including the closely related Andean condor (*Vultur gryphus*) and the turkey vulture (*Cathartes aura*) (USFWS 1996). California condors are among the largest flying birds in the world. Adults weigh approximately 10 kilograms (22 pounds) and have a wing span up to 2.9 meters (9.5 feet). Adults are black except for prominent white underwing linings and edges of the upper secondary coverts. The head and neck are mostly naked, and the bare skin is gray, grading into various shades of yellow, red, and orange. Males and females cannot be distinguished by size or plumage characteristics. The heads of juveniles up to 3 years of age are grayish-black, and their wing linings are variously mottled or completely dark. While 5 to 6 year-old individuals are essentially indistinguishable from adults, full development of adult wing patterns may not be complete until 7 to 8 years of age.

Fossil records indicate that California condors once ranged over much of the southern United States, south to Nuevo Leon, Mexico and east to Florida. Evidence indicates that condors nested in west Texas, Arizona, and New Mexico during the late Pleistocene. When European man first arrived in western North America, California condors occurred only in a narrow Pacific coast strip from British Columbia, Canada to Baja California Norte, Mexico. Condors were observed until the mid-1800s in the Columbia River Gorge and until the early 1930s in northern Baja California.

Sight records for Arizona (Phillips *et al.* 1964) include: the Colorado River at Fort Yuma (September 1865), Pierce's Ferry on the Colorado River (March 1881), Cave Creek in the Chiricahua Mountains (March 1881), Santa Catalina Mountains (1885), between Ash Creek and Bumblebee (March 1885), Yuma County (prior to 1935), and near Williams (1924).

The California condor remains one of the world's rarest and most imperiled vertebrate species. Despite intensive conservation efforts, the wild California condor population declined steadily until 1987, when the last free-flying individual was captured. During the 1980s, captive condor flocks were established at the San Diego Wild Animal Park and the Los Angeles Zoo, and the first successful captive breeding was accomplished at the former facility in 1988. Following several years of increasingly successful captive breeding, captive-produced condors were first released back to the wild in California in early 1992 and in Arizona starting in 1996. As of June 2004, 242 condors existed. There were 145 in the captive population, 47 in the wild in California, 45 in Arizona, and 5 in Baja California.

In 2001, reintroduced condors in Arizona began to demonstrate reproductive behavior in Grand Canyon National Park. One pair produced an egg that did not result in surviving progeny. Two pairs exhibited nesting behavior in 2002, with one known egg produced, but both of those nests also failed to result in surviving young condors. In 2003, one fledgling was produced in Grand Canyon National Park and it still is alive and well. In 2004, two chicks have been confirmed, one at a nest site in Grand Canyon National Park and the second at a nest site on BLM land.

Consultations on construction and a variety of fire projects have been completed with Grand Canyon National Park. Several conservation measures intended to protect condors were

developed during those consultations. Consultations on Resource Management Plans (RMPs) with the BLM Arizona Strip Field Office are ongoing.

Southwestern willow flycatcher

We listed the southwestern willow flycatcher as endangered, without critical habitat, on February 27, 1995 (FWS 1995). Critical habitat was later designated on July 22, 1997 (FWS 1997a). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (FWS 1997b). On May 11, 2001, the 10th circuit court of appeals set aside designated critical habitat in those States under the 10th circuit's jurisdiction (New Mexico). FWS subsequently set aside critical habitat designated for the southwestern willow flycatcher in all other States (California and Arizona) until it can re-assess the economic analysis. A new proposal for critical habitat is expected to be published in September 2004.

A final recovery plan for the southwestern willow flycatcher was signed by the FWS Region 2 Director on August 30, 2002, and was released to the public in March 2003. This plan describes reasons for endangerment and the current status of the flycatcher, recovery actions, management needs, and recovery goals. Range-wide, the southwestern willow flycatcher recovery plan has designated different recovery units, each of which list numerous management units (FWS 2002). Each recovery and management unit has specific recovery criteria in order to down or de-list the flycatcher.

The southwestern willow flycatcher breeds in dense riparian habitat from sea level in California to just over 8,000 feet in Arizona and southwestern Colorado. Southwestern willow flycatchers primarily use coyote, Geyer's, and Goodding's willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolia*) and live oak (*Quercus agrifolia*) for nesting. Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types have been identified for the flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

Throughout its range, the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge *et al.* 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Sogge *et al.* 1997). Typically one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge *et al.* 1997).

The Recovery Plan (FWS 2002) includes a description of the riparian patches used by nesting southwestern willow flycatchers. These riparian patches vary widely in size and shape, from as small as 0.25 acre along the Rio Grande to 175 acres on the upper Gila River in New Mexico. Mean patch size is 21.2 acres and the median size is 4.4 acres. Flycatchers do not typically nest in narrow strips of riparian vegetation less than 33 feet wide, although they may use these strips if they extend out into larger patches, and during migration. Flycatchers often cluster their territories into small portions of riparian sites, and large parts of these sites may be irregularly occupied or not occupied at all. Territories are often bordered by additional habitat that is not

defended as breeding territory, but may be important in attracting flycatchers to the site and/or providing an environmental buffer from wind or heat, for post-nesting use, and for dispersal.

Declining southwestern willow flycatcher numbers have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (Sogge *et al.* 1997, McCarthey *et al.* 1998). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton *et al.* 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge *et al.* 1997).

Willow flycatcher nests are parasitized by brown-headed cowbirds (*Molothrus ater*), which lay their eggs in the host's nest. Brown-headed cowbird parasitism of southwestern willow flycatcher broods has been documented throughout its range (Whitfield 1990, Sferra *et al.* 1995). Cowbird eggs hatch earlier than those of many passerine hosts, thus giving cowbird nestlings a competitive advantage Mayfield 1977, Brittingham and Temple 1983). Flycatchers can attempt to renest, but these attempts often result in reduced clutch sizes, delayed fledging, and reduced nest success (Whitfield 1994). Whitfield and Strong (1995) found that flycatcher nestlings fledged after July 20 had a significantly lower return rate; cowbird parasitism was often the cause of delayed fledging.

The species has been the subject of several formal consultations including projects on grazing, recreation, and other types of projects. Non-Federal actions including groundwater pumping and urban development compete for the limited aquatic and riparian resources. Specific information on trends in population is generally not available, but annual surveys are conducted in many areas in Arizona.

Yuma clapper rail

We listed the Yuma clapper rail as an endangered species on March 11, 1967 under the Endangered Species Preservation Act of 1966 (Public Law 89-669). Only populations found in the United States were listed as endangered; those in Mexico were not listed under the 1966 law or the subsequent Endangered Species Act of 1973 (as amended). Critical habitat has not been designated for the Yuma clapper rail. The Yuma Clapper Rail Recovery Plan was issued in 1983 (USFWS 1983).

The Yuma clapper rail is a 14-16 inch long marsh bird with a long, down-curved beak. Both sexes are slate brown above, with light cinnamon underparts and barred flanks. The Yuma clapper rail is distinguished from other clapper rail subspecies using distributional data, plumage color, and wing configurations (Banks and Tomlinson 1974). The Yuma clapper rail is a secretive species and is not often seen in the wild. It does have a series of distinctive calls that are used to identify birds in the field. Frequency of calls or responsiveness to taped calls varies seasonally.

Habitat for the Yuma clapper rail includes freshwater and brackish marshes with dense vegetation, dominated by cattails that include both mats of old material and more open stands. The Yuma clapper rail is the only clapper rail subspecies that breeds in freshwater. The most productive areas consist of uneven-aged stands of cattails interspersed with open water of variable depths (Conway *et al.* 1993). Other important factors in the suitability of habitat include the presence of vegetated edges between marshes and shrubby riparian vegetation (saltcedar or willow thickets) (Eddleman 1989), with stable or slowly changing water levels preferred over conditions with large and rapid water level fluctuations. Water flow in the open channels within the marsh is desirable (Todd 1971; Tomlinson and Todd 1973). Yuma clapper rails will use quiet backwater ponds, flowing stream or riverside areas, irrigation canals and drainage ditches, reservoirs and small lakes or other small marshlands where cattail habitat is available. Natural and artificially constructed marshes can provide suitable habitat.

The breeding season for the Yuma clapper rail runs from February though early July (Todd, 1986, USFWS 1983). The start of the survey season, March 15, is used as the official beginning of the breeding season. Nests are constructed in marsh vegetation or low growing riparian plants at the edge of the water. Non-native (introduced) crayfish (*Procamberus clarki*) form the primary prey base for Yuma clapper rails today (Todd 1986). Prior to the introduction of crayfish, isopods, aquatic and terrestrial insects, clams, plant seeds, and small fish dominated the diet. Once believed to be highly migratory (with most birds thought to spend the winter in Mexico), telemetry data showed most rails do not migrate (Eddleman 1989). Very little is known about the dispersal of adult or juvenile birds, but evidence of populations expanding northward along the lower Colorado River, the Salton Sea, and central Arizona over the last 80 years indicates that Yuma clapper rails can effectively disperse to new habitats provided that habitat corridors exist between the old and new sites (Rosenberg *et al.* 1991).

Additional life history information is found in the Recovery Plan (USFWS 1983), Todd (1986), Eddleman (1989), and Rosenberg *et al.* (1991).

The Yuma clapper rail has two major population centers in the United States: the Salton Sea and surrounding wetlands in California, and the lower Colorado River marshes from the border with Mexico to Havasu National Wildlife Refuge (NWR). Smaller numbers of rails are found along the lower Gila River in Yuma County, the Phoenix metropolitan area (including portions of the Gila, Salt and Verde rivers) in Maricopa County, Roosevelt Lake in Gila County, Picacho Reservoir in Pinal County, and the Bill Williams River in La Paz County, Arizona (USFWS annual survey data). Yuma clapper rails have also recently been documented from southern Nevada in Clark County (McKernan and Braden 2000; Tomlinson and Micone 2000) and the Virgin River in Washington County, Utah and Mohave County, Arizona (McKernan and Braden 2000).

Annual survey data compiled by FWS for the period 1990 through 2003 documented between 464 and 1076 rails observed (via calls or visual observation) at the survey sites. Surveys in 2003 documented 809 birds. These figures are of actual birds and are not extrapolated to provide a population estimate. The unlisted Yuma clapper rail population in Mexico was estimated to contain 6300 birds (Hinojosa-Huerta *et al.* 2000), and the amount of movement between the two populations is unknown.

Declines in actual numbers heard or seen on survey transects since the early 1990s have not been positively connected to any event on the lower Colorado River or Salton Sea; however, changes in habitat quality caused by overgrown marsh vegetation is likely a factor influencing changes in population size over time as habitat quality changes. Habitat restoration through mowing or burning over-age cattail stands is under evaluation in several locations to determine future management needs.

New information that may affect the life history of the Yuma clapper rail involves selenium levels in the crayfish, the primary prey species. Levels of selenium in crayfish from Yuma clapper rail habitats were high enough to cause concern for potential reproductive effects (Roberts 1996, King *et al.* 2000). No adverse effects from selenium have been observed; however, due to the clapper rail's secretive nature, nests are very difficult to find and young birds hard to observe. Additional monitoring is under consideration at this time.

Federal actions that may have adverse effects to the Yuma clapper rail undergo section 7 consultation, per the Act. These actions include issuance of Clean Water Act section 404 permits for dredging or filling in wetlands, and placement of seawalls or other shoreline modifications on all rivers and streams within the U.S. range of the species. The number of such actions varies between river systems.

Actions by the Bureau of Reclamation (BOR) in managing the lower Colorado River have the greatest potential to destroy large marsh habitats or disturb individual birds during dredging, bank stabilization, and other channel maintenance activities. Past Federal actions to construct dams, diversion structures, and other management actions have increased the amount and longevity of marsh habitats in several locations on the lower Colorado River. These same actions eliminate the variable physical conditions that provide for marsh regeneration, and habitat quality is reduced over time. Measures are in place under biological opinions issued for Reclamation's maintenance activities to reduce or eliminate adverse effects of current management on remaining marshes. Changes to water releases in the lower Colorado River are in part subject to Reclamation oversight and are also addressed for reduction of effects and replacement of lost habitat. Effects to the Salton Sea Yuma clapper rail habitats from changes in water flow to the Sea that have a Federal nexus are being addressed under section 7.

Habitat conservation planning requires FWS to consult under section 7 prior to issuing a section 10 permit to allow take of species by non-Federal parties. Conservation for Yuma clapper rails at Roosevelt Lake, Salton Sea, and on the lower Colorado River are a part of ongoing habitat conservation planning efforts in those areas.

Bald eagle

We listed the bald eagle south of the 40th parallel as endangered under the Endangered Species Preservation Act of 1966, on March 11, 1967 (USFWS 1967), and reclassified it to threatened status on July 12, 1995 (USFWS 1995). No critical habitat has been designated for this species. Although not considered a separate subspecies, the bald eagle in the southwestern United States has been considered as a distinct population for the purposes of consultation and recovery efforts under the Act. A recovery plan has been developed for bald eagles in the Southwest recovery region (USFWS 1982). We determined that bald eagles in the Southwest recovery region are part of the same bald eagle population found in the rest of the lower 48 States (USFWS 1995). On July 6, 1999, we proposed delisting the bald eagle in the lower 48 States, including Arizona, stating that the number of breeding paris in the Southwest recovery unit has more than doubled in the last 15 years (USFWS 1999).

The bald eagle is a large bird of prey that historically ranged and nested throughout North America except extreme northern Alaska and Canada and central and southern Mexico. The bald eagle occurs in association with aquatic ecosystems, frequenting estuaries, lakes, reservoirs, major rivers systems, and some seacoast habitats. Generally, suitable habitat for bald eagles includes those areas that provide an adequate food base of fish, waterfowl, and/or carrion, with large trees for perches and nest sites. In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and offer good perch trees and night roosts (USFWS 1995).

An estimated one-quarter to one-half million bald eagles occurred on the North American continent when Europeans first arrived. Initial eagle population declines probably began in the late 1800s and coincided with declines in numbers of waterfowl, shorebirds, and other prey species. Nesting habitat was modified or destroyed, and killing of bald eagles was also prevalent. These factors reduced bald eagle numbers until the 1940s when bald eagles were protected under the Bald Eagle Protection Act (16 U.S.C. 668). The Bald Eagle Protection Act slowed the decline of bald eagle populations by prohibiting numerous activities that adversely affected eagles and increasing public awareness of their plight. The widespread use of dichloro-diphenyl-trichloroethane (DDT) and other organochlorine compounds in the 1940s for mosquito control and as a general insecticide caused additional declines in bald eagle populations. DDT accumulated in individual birds following ingestion of contaminated food. DDT breaks down into dichlorophenyl-dichloroethylene (DDE) and accumulates in the fatty tissues of adult females, leading to impaired calcium release necessary for eggshell formation. Thinner eggshells led to reproductive failure, which is considered a primary cause of declines in the bald eagle population. DDT was banned in the United States in 1972 (USFWS 1995). Bald eagles have increased in number and expanded in range since the banning of DDT and other persistent organochlorine compounds, and due to habitat protection and additional recovery efforts. The breeding population exceeded 5,748 occupied breeding areas in 1998 (USFWS 1999).

Although the bald eagle has been reclassified to threatened and the status of the birds in the Southwest is on an upward trend, the Arizona population remains small and susceptible to a variety of threats. Human disturbance of bald eagles is a continuing threat that may increase as

numbers of bald eagles increase and human development continues to expand into rural areas (USFWS 1999). The bald eagle population in Arizona is exposed to hazards from the regionally increasing human population. These include extensive loss and modification of riparian breeding and foraging habitat through clearing of vegetation, changes in groundwater levels, groundwater pumping, surface water diversion, alteration of natural hydrologic regimes, changes in water quality, and alteration of prey base from exotic aquatic species. Threats persist in Arizona largely due to the proximity of bald eagle breeding areas to major human population centers and recreation areas. In addition, because water is a scarce resource in the Southwest, recreation is often concentrated along rivers and streams. Some of the continuing threats and disturbances to bald eagles include entanglement in monofilament fishing line and fish tackle; overgrazing and related degradation of riparian vegetation; malicious and accidental harassment including shooting, disturbance from off-road vehicles and recreational activities (especially watercraft), and low-level aircraft overflights; alteration of aquatic and riparian systems for water distribution systems and maintenance of existing water development features such as dams or diversion structures; collisions with transmission lines; poisoning; and electrocution (Beatty and Driscoll 1999; Stalmaster 1987).

All breeding areas in Arizona are located in close proximity to reservoirs, regulated river systems, or free-flowing rivers and creeks. The alteration of natural river systems has had both beneficial and detrimental affects to the bald eagle. While large portions of riparian forests were inundated or otherwise destroyed following construction of dams and other water developments, the reservoirs created by these structures enhance habitat for bald eagle prey species: waterfowl and native and non-native fish species.

Occupied territories in Arizona continue to increase. In 2002, 37 eaglets fledged in Arizona, the most ever recorded in a single year (Koloszar, *et al.* 2002). Three new breeding areas (Lynx, Oak Creek, and Granite Reef) and one reoccupied historical breeding area (Needle Rock) were found in 2002. One additional breeding area (Bulldog) was discovered in 2003. The 2003 breeding season produced 25 fledglings in Arizona. Preliminary information indicates that 40 of the 46 known breeding territories were occupied in 2004. Birds in these breeding territories produced 59 eggs, with a new record of 42 young successfully fledging (AGFD unpubl. data 2004).

In addition to breeding bald eagles, Arizona provides habitat for wintering bald eagles, which migrate through the State between October and April each year. In 2004, 402 bald eagles were counted, including 236 adults, 147 subadults, and 19 of unknown age.

Mexican spotted owl

We listed the Mexican spotted owl (MSO) as a threatened species in 1993 (USFWS 1993). The primary threats to the species were cited as even-aged timber harvest and the threat of 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 (USFWS 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 (USFWS 1993) and in the Recovery Plan (USFWS 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, multi-canopied forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

Since the owl was listed, we have completed or have in draft form a total of 135 formal consultations for the MSO. These formal consultations have resulted in a total anticipated incidental take of 325 MSO protected activity centers (PACs) plus an additional unknown number of MSOs. 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 (NPS), 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 (implementation of the Region 3 Forest Plans without adopting the Recovery Plan and the release of site-specific owl location information) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO.

The United States range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The primary administrator of lands supporting the MSO in the United States is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). Forest Service Regions 2 and 4 (including 2 National Forests in Colorado and 3 in Utah) support fewer owls. According to the Recovery Plan, 91% of MSO known to exist in the United States between 1990 and 1993 occurred on lands administered by the Region 3 of the Forest Service.

A reliable estimate of the numbers of owls throughout its entire range is not currently available (USFWS 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USFWS (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico; however, Ganey *et al.* (2000) estimates approximately 2,950 ± 1,067 (SE) MSOs in the Upper Gila Mountains RU alone. The Forest Service Region 3 most recently reported a total of approximately 987 protected activity centers (PACs) established on National Forest December 1, 2003). Based on this number of MSO sites, total numbers in the United States may range from 987 individuals, assuming each known site was occupied by a single MSO, to 1,960 individuals, assuming each known site was occupied by a pair of MSOs. The Forest Service Region 3 data are the most current compiled information available to us; however, surveys efforts in areas other than

National Forest system lands have likely resulted in additional sites being located in all Recovery Units.

Researchers studied MSO population dynamics on one study site in Arizona (n = 63 territories) and one study site in New Mexcio (n = 47 territories) from 1991 through 2002. The initial publication of the findings reported that both study populations were declining at ≥10% a year and that owl survival rates in Arizona may be declining over time (Seamans *et al.* 1999). The authors noted two possible reasons for the population decline were declines in habitat quality and regional trends in climate. The Final Report, titled "Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations," (*in press*) found that reproduction varied greatly over time, while survival varied little. The estimates of the population rate of change (Λ) indicated that the Arizona population was stable (mean Λ from 1993 to 2000 = 0.995; 95% Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6% (mean Λ from 1993 to 2000 = 0.937; 95% Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20%) fluctuations in numbers from year to year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the MSO is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

The current condition of MSO habitat within Arizona is a result of historical and recent human use, as well as climate change, vegetative species conversion, and wildfires. As Stated in the 1996 Forest Plan Amendments biological opinion, a precise assessment of baseline owl habitat is difficult to assemble. Based on a regional habitat mapping exercise conducted in 2001, there is an approximate total of 6.6 million acres of MSO habitat on National Forest Lands in the Southwestern Region. This figure included approximately 935 PACs (588,000 acres), other protected habitat (2.1 million acres), and restricted habitat (3.9 million acres) (USFWS, April 2001). Though we have received more current information regarding PAC delineation and occupancy (987 PACs have been delineated on Region 3 National Forest lands as of December 1, 2003), we consider the estimate of PAC acres and habitat to be fairly accurate for Forest Service lands, but deficient in accounting for habitat and PACs on other public lands.

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. Livestock and wild ungulate grazing is prevalent throughout Region 3 National Forest lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all public lands, especially in meadow and riparian areas. There is anecdotal information and research which indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior. Fuels reduction treatments, though critical to reducing the risk of catastrophic wildfire, can have short-term adverse affects to MSO through habitat modification and disturbance. As the population grows, especially in Arizona, small communities within and adjacent to public lands are being developed. This trend may have detrimental effects to MSO by further fragmenting habitat and increasing disturbance during the

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

Currently, high intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Mexican spotted owl habitat in the southwestern United States has been shaped over thousands of years by fire. Since MSO occupy a variety of habitats, the influence and role of fire has most likely varied throughout the owl's range. In 1994, at least 40,000 acres of nesting and roosting habitat were impacted to some degree by catastrophic fire in the Southwestern Region (Sheppard and Farsnsworth 1995). Between 1991 and 1996, the Forest Service estimated that approximately 50,000 acres of owl habitat has undergone stand-replacing wildfires (G. Sheppard, Forest Service, pers. comm.). However, since 1996, fire has become catastrophic on a landscape scale and has resulted in hundreds of thousands of acres of habitat lost to stand-replacing fires. This is thought to be a result of unnatural fuel loadings, past grazing and timber practices, and a century of fire suppression efforts. The 2002 Rodeo-Chediski fire, at 462,384 acres, burned through approximately 55 PACs on the Tonto and Apache-Sitgreaves National Forests and the White Mountain Apache Reservation. Of the 11,986 acres of PAC habitat that burned on National Forest lands, approximately 55% burned at moderate to high severity. Based on the fire severity maps for the fire perimeter, Tribal and private lands likely burned in a similar fashion. We define moderate severity burn as high scorch (trees burned may still have some needles) and high severity burn as completely scorching all trees (trees completely dead).

The BLM manages MSO habitat in two recovery units:

Colorado Plateau Recovery Unit

The Colorado Plateau RU is the largest of the six recovery units, extending from southwestern Utah, through northern Arizona into northwestern New Mexico, and a small portion of the southwestern corner of Colorado. In northern Arizona and New Mexico, owls have been reported in both canyon and montane habitats. Owl habitat in this RU appears to be in the form of isolated, geographically segregated patches. Recent records of MSO exist for the Grand Canyon and Kaibab Plateau in Arizona; the Chuska Mountains, Black Mesa, and Fort Defiance Plateau on the Navajo Reservation; and, the Zuni Mountains and Mount Taylor in New Mexico. Currently, the Forest Service has designated 22 MSO PACs in this RU on the Mount Taylor Ranger District, Cibola National Forest. Suitable habitat and designated critical habitat on public lands managed by the BLM Arizona Strip Field Office are within the Colorado Plateau RU.

The distribution of MSO within this RU appears to be highly fragmented. The disjunct owl distribution may be a natural occurrence due to the spatial arrangement of habitat, the result of past management, a reflection of inadequate survey efforts, or a combination of all three. Potential threats in the southeastern portion of this RU (Arizona and New Mexico) include

timber harvest and/or intensive fuels reduction treatments; overgrazing; catastrophic fire; and oil, gas, and mining development.

Basin and Range - West Recovery Unit

This RU encompasses a small portion of New Mexico and the majority of southern Arizona and is the second largest RU in the United States. The base of the Mogollon rim is the northern border of this RU. The western boundary defines the western extent of the MSO's range. Land ownership within this RU is a mosaic of public and private lands, with the MSO primarily occupying Forest Service lands. The Forest Service has designated 154 PACs on the Coronado, Tonto, Prescott, and Apache-Sitgreaves National Forests. Suitable habitat and designated critical habitat in the Hualapai Mountains managed by the BLM Kingman Field Office and designated critical habitat units managed by the BLM Tucson Field Office are also within this RU.

The RU is characterized by numerous mountain ranges, which rise abruptly from the broad, plain-like valleys and basins. In southern Arizona, these mountain ranges are often referred to as the Sky Islands. Vegetation ranges from desert scubland and semi-desert grassland in the valleys upwards to montane forests (chaparral and pine-oak woodlands at low and middle elevations and ponderosa pine, mixed-conifer, and spruce-fir forests at higher elevations). Within the Sky Islands, MSO habitat is characterized by woodland habitat and territories occur in both heavily forested terrain and in areas with hardwood and conifer stringers dominated by Madrean evergreen woodland. In general, much of the MSO habitat occurs in forested, steep-slope canyons and drainages. The mature trees throughout much of the forest outside of these canyons and drainages have been partially or completely harvested.

The primary threats to MSO within this RU are catastrophic wildfire, recreation, and livestock grazing (USDI 1995). This RU has experienced multiple wildfires that have influenced MSO habitat. The Clark Peak, Gibson Canyon, Miller, Noon, Rattlesnake, Shovel, Bullock, and Oversite fires burned at varying intensities throughout MSO PACs on the Coronado National Forest. The Four Peaks/Lone Fire was a catastrophic, high-intensity wildfire on the Tonto National Forest that burned through two MSO PACs. In 2003, there were two fires that burned at high-intensity across significant acreage that included MSO habitat. The Aspen Fire on the Coronado National Forest burned approximately 85,000 acres and partially burned nine MSO PACs and the Helen's 2 Fire burned approximately 3,500 acres and impacted three MSO PACs within Saguaro National Monument.

Mexican spotted owl Proposed Critical Habitat

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR).

On November 18, 2003, based on the October 10, 2003 decision in *Center for Biological Diversity* v. *Norton*, Civ. 01-409 TUC DCB (D. Ariz.), we re-proposed critical habitat for the MSO. The final rule was published in the Federal Register on August 31, 2004, and becomes effective on September 30, 2004. The primary constituent elements for MSO critical habitat are determined from studies of their habitat requirements and information provided in the Recovery Plan (USDI 1995). Since owl habitat can include both canyon and forested areas, primary constituent elements were identified in both areas. The primary constituent elements that occur in mixed conifer, pine-oak, and riparian forest types, as described in the Recovery Plan, have the following attributes:

- High basal area of large-diameter trees;
- Moderate to high canopy closure;
- Wide range of tree sizes suggestive of uneven-age stands;
- Multi-layered canopy with large overstory trees of various species;
- High snag basal area;
- High volumes of fallen trees and other woody debris;
- High plant species richness, including hardwoods;
- Adequate levels of residual plant cover to maintain fruits, seeds, and regeneration to provide for the needs of Mexican spotted owl prey species.

For canyon habitat, the primary constituent elements include the following attributes:

- Cooler and often more humid conditions than the surrounding area;
- Clumps or stringers of trees and/or canyon wall containing crevices, ledges, or caves;
- High percent of ground litter and woody debris;
- Riparian or woody vegetation (although not at all sites).

Desert pupfish

We listed the desert pupfish as an endangered species, with critical habitat, on April 30, 1986 (FWS 1986b). The name desert pupfish is often incorrectly applied to all 10 pupfish species in the American Southwest (Williams *et al.* 1989, Pister 1996). In Arizona, there are three pupfish species: desert pupfish (*Cyprinodon macularius)*; Quitobaquito pupfish (*C. eremus*, Echelle *et. al.* 2000); and an extinct form, the Santa Cruz pupfish (*C. arcuatus*, Minckley *et. al.* 2002). Critical habitat has been designated in Arizona at Quitobaquito Spring and in California along parts of San Felipe Creek, Carrizo Wash, and Fish Creek Wash (FWS 1986b) in the vicinity of the Salton Sea (Moyle 2002). Critical habitat for desert pupfish is not located within the action area.

The desert pupfish is a member of the family Cyprinodontidae. Desert pupfish are usually less than 3.0 inches in total length (TL); adults are more often 1.6-2.0 inches TL. Males are larger than females and become bright blue during the breeding season.

Under the proper conditions, desert pupfish may begin breeding as early as six weeks of age, but most breeding does not occur until their second summer (Moyle 2002). Male pupfish are intensely territorial during the breeding season. The males patrol and defend individual territories that are 5.4 to 22 square feet and in water less than 3 feet deep (Barlow 1961, Minckley 1973, Moyle 2002).

The desert pupfish breeding system includes consort-pair breeding and territoriality (FWS 1993c). Territoriality develops in large habitats with high primary productivity, limited breeding substrates, and high population densities. Consort-pair breeding usually occurs in habitat with low primary productivity, low population density, or abundant breeding habitat (Kodric-Brown 1981). Female desert pupfish lay only one egg at a time (Constanz 1981). One female may produce 50-800 eggs in one season (Crear and Haydock 1971). The life span of an individual is one to three years in the wild (Minckley 1973, Moyle 2004, Kynard and Garrett 1979).

Larval desert pupfish feed on invertebrates (Crear and Haydock 1971). Adult pupfish are omnivorous and may feed on algae, invertebrates, detritus, and plants (Cox 1966, 1972; Naiman 1979). Pupfish are active during the day. Desert pupfish have been found in a variety of habitats, from the margins of large rivers to springs and cienegas. Pupfish can survive extremely harsh conditions that are lethal to most other fishes. They can survive temperatures up to 113°F (Lowe *et al*. 1967), dissolved oxygen concentrations to 0.1-0.4 mg/l (Barlow 1958), and high salt concentrations of 68 g/l (Lowe *et al*. 1967). Pupfish can also tolerate sudden changes in both temperature and salinity (Kinne 1960, Lowe and Heath 1969).

Historical distribution of desert pupfish included the Gila River basin, lower Colorado River, Rio Sonoyta basin, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888, Garman 1895, Gilbert and Scofield 1898, Evermann 1916, Thompson 1920, Jordan 1924, Coleman 1929, Jaeger 1938, Miller 1943, Minckley 1973, 1980; Black 1980, Turner 1983, Miller and Fuiman 1987). Historical collection localities occurred in Mexico in Baja California and Sonora and in the United States in California and Arizona. Populations and distribution probably expanded and contracted historically as regional and local climatic conditions varied.

Thirteen natural populations persist; nine of these are in Mexico. Approximately 20 transplanted populations exist in the wild (FWS 1993c), though this number fluctuates widely due to climatic variation and the establishment (and failure) of refugium populations (Moyle 2002). Many natural and transplanted populations are imperiled by one or more threats. Threats to the species include loss and degradation of habitat through groundwater pumping or diversion, contamination of agricultural return flows, predation and competition from nonnative fish species, populations outside of historical range, populations of questionable genetic purity, restricted range, small populations, and environmental contaminants (FWS 1984a, Moyle 2002).

Aspects of the natural history and habitat of desert pupfish in Arizona are similar to those of the Gila topminnow. In Arizona, desert pupfish and Gila topminnow were historically known from similar habitats, (though the former was not as widespread, and the two species are managed together by the Arizona Game and Fish Department (Weedman and Young 1997, Voeltz and

Bettaso 2003). The status of this species is therefore similar to that of the Gila topminnow, described below.

Gila topminnow

We listed the Gila topminnow as endangered on March 11, 1967, without critical habitat (USFWS 1967). The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonindigenous fishes (Miller 1961, Minckley 1985). Life history information can be found in the 1984 recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and references cited in the plans and in this biological opinion.

Gila topminnow was listed in 1967 as *Poeciliopsis occidentalis*. The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, are collectively known as the Sonoran topminnow. Both subspecies are protected under the Act. Recent information presented by Minckley (1999) and others (Minckley 1973, Quattro *et al.* 1996), considers the two subspecies to be separate species. Regardless of their taxonomy, both species or subspecies are protected under the Act.

Male Gila topminnows are smaller than females, rarely greater than one inch [25 millimeters (mm)] in total length, while females are larger, reaching two inches (50mm total length). Body coloration is tan to olivaceous, darker above, lighter below, and often white on the belly. Breeding males are usually darkly blackened, with some golden coloration of the midline, and with orange or yellow at base of the dorsal fins. Fertilization is internal and sperm packets are stored which may fertilize subsequent broods. The brood development time is 24 to 28 days. Two to three broods in different stages develop simultaneously in a process known as superfetation. Gila topminnows give birth to one to 31 young per brood (Schoenherr 1974). Larger females exhibit greater fecundity and produce more offspring (Minckley 1973).

Gila topminnows mature a few weeks to many months after birth depending on when they are born and water temperature. They breed primarily from March to August, but some pregnant females occur throughout the year (Schoenherr 1974). Some young are produced in the winter months. Minckley (1973) and Constantz (1980) reported that Gila topminnow eat bottom debris, vegetation, amphipods, and insect larvae when available.

Gila topminnow and many other poeciliids can tolerate a wide variety of physical and chemical conditions. They are successful colonizers in part because of this tolerance and in part because one gravid female can start a population (Meffe and Snelson 1989). Minckley (1969, 1973) described their habitat as edges of shallow aquatic habitats, especially where abundant aquatic vegetation exists. Gila topminnows rarely co-occur with mosquitofish (*Gambusia affinis*), as the latter is aggressive and preys upon young topminnow and harasses adults (Schoenher 1974, Minckley *et al.* 1977).

Gila topminnows are known to occur in streams fluctuating from 43 to 97° Fahrenheit, pH from 6.6 to 8.9, dissolved oxygen levels of 2.2 to 11 milligrams/liter, and can tolerate salinities approaching those of sea-water (Meffe *et al.* 1983). Topminnow can burrow under mud or aquatic vegetation when water levels decline (Deacon and Minckley 1974, Meffe *et al*. 1983). Sonoran topminnows, *Poeciliopsis occidentalis*, regularly inhabit springheads with high loads of dissolved carbonates and low pH (Minckley *et al.* 1977, Meffe 1983, Meffe and Snelson 1989). This trait has helped protect small populations of topminnows from mosquitofish which are usually rare or absent under these conditions.

To summarize Gila topminnow habitat requirements, this fish needs: 1) unpolluted water that can have wide variation in temperature, pH, and salinity; 2) shallow water with abundant aquatic plants including algae that provide cover and habitat for invertebrate prey; 3) channel morphology that prevents habitats from scouring severely, which otherwise may remove this weak swimmer from its habitat; 4) habitat areas free of nonnative competitors and predators; and 5) areas with slow currents and soft bottoms.

Gila topminnows are highly vulnerable to adverse effects from nonindigenous aquatic species (Johnson and Hubbs 1989). Predation and competition from nonindigenous fishes have been a major factor in their decline and continue to be a major threat to the remaining populations (Meffe *et al.* 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997). The native fish fauna of the Gila basin and of the Colorado basin overall, was naturally depauperate and contained few fish that predated on competed with Gila topminnow (Carlson and Muth 1989). With the introduction of many predatory and competitive nonindigenous fish, frogs, crayfish, and other species, Gila topminnow could no longer survive in many of their former habitats, or the small pieces of those habitats that had not been lost to human alteration. Both large (Bestgen and Propst 1989) and small (Meffe *et al.* 1983) nonindigenous fish cause problems for Gila topminnow, as can nonindigenous crayfish (Fernandez and Rosen 1996) and bullfrogs.

Historically, Gila topminnow were abundant in the Gila River drainage and the species was once referred to as "…one of the commonest fishes in the southern part of the Colorado River drainage basinches" (Hubbs and Miller 1941). Gila topminnow eventually declined to only 15 naturally occurring populations. Bagley *et al.* (1991) reported only nine remaining natural topminnow sites. More recently, 15 natural Gila topminnow populations were reported, with 12 considered extant (Table 3) (Weedman and Young 1997). Only three (Cienega Creek, Monkey Spring, Cottonwood Spring) have no nonindigenous fish present and therefore can be considered secure from nonindigenous fish threats (Abarca *et al.* 1994). There have been at least 178 wild sites stocked (sometimes on multiple occasions) with Gila topminnow; however, topminnows persist at only 20 of these localities. Of the 20, one site is outside topminnow historical range and four now contain nonindigenous fish (Weedman and Young 1997). Of the more than 300 reestablishments conducted by the Arizona Game and Fish Department (AGFD) and others, only 21 remain extant (Brown and Abarca 1992).

The *Sonoran Topminnow Recovery Plan* (FWS 1984) established criteria for down- and de-listing. Criteria for downlisting were met for a short period; however, due to concerns regarding the status of several populations, downlisting was delayed. Subsequently, the number of reestablished populations dropped below that required for downlisting, where it has remained. A draft revised recovery plan for the Gila topminnow is available (Weedman 1999). The plan's short-term goal is to prevent extirpation of the species from its natural range in the US and reestablish it into suitable habitat within historical range. Downlisting criteria require a minimum of 82 reestablished populations, some of which must persist at least 10 years.

The status of the species is poor and declining. Gila topminnow has gone from being one of the most common fishes of the Gila basin to one that exists at no more than 32 localities (12 natural and 20 stocked). Many of these localities are small and highly threatened, and topminnow have not been found in some recent surveys at these sites.

Razorback sucker

We listed the razorback sucker as an endangered species on October 23, 1991 (USFWS 1991) and designated critical habitat for this species on March 21, 1994 (USFWS 1994). The Razorback Sucker Recovery Plan was completed in 1998 (USFWS 1998) and recovery goals were updated in 2002 (FWS 2002). Critical habitat includes portions of the Colorado, Duchesne, Green, Gunnison, San Juan, White, and Yampa rivers in the Upper Colorado River Basin, and the Colorado, Gila, Salt, and Verde rivers in the Lower Colorado River Basinches

The razorback sucker was once abundant in the Colorado River and its major tributaries throughout the Basin, occupying 3,500 miles of river in the United States and Mexico (USFWS 1993). Records from the late 1800s and early 1900s indicate the species was abundant in the lower Colorado and Gila River drainages (Kirsch 1889, Gilbert and Scofield 1898, Minckley 1983, Bestgen 1990). Loss of habitat, due to alteration of natural flows and changes to temperature and sediment regimes and introduction of nonnative fishes that prey on razorback sucker eggs, fry, and juveniles, are the primary threats to the species (USFWS 1991). Recruitment into the adult population has been virtually eliminated in most areas.

Since 1997, significant new information on recruitment into the wild razorback sucker population in Lake Mead indicates that some degree of successful recruitment is occurring (Holden *et al.* 2000). Recruitment has not been documented elsewhere in the species' remaining populations.

Adult razorback suckers use most of the available riverine habitats, although there may be an avoidance of whitewater type habitats. Main channel habitats used tend to be low velocity areas such as pools, eddies, nearshore runs, and channels associated with sand or gravel bars (Bestgen 1990). Razorback suckers also use backwaters, oxbows, sloughs, and flooded bottomlands adjacent to the main channel. From studies conducted in the Upper Colorado River basin, habitat selection by adult razorback suckers changes seasonally. Adults move into pools and slow eddies from November through April, use runs and backwaters during May, use backwaters, eddies, and flooded gravel pits during June, and use runs and pools from July

through October. In early spring, adults also may use flooded bottomlands. They use relatively shallow water (about 3 feet deep) during spring, and deeper water (5 to 6 feet deep) during winter.

Data from radio-telemetered razorback suckers in the Verde River showed they used shallower and slower velocity waters than in the upper basin. They avoided areas less than 1.3 feet deep, but selected depths between 2.0 and 3.9 feet, which likely reflected a reduced availability of deeper waters compared to the larger upper basin rivers. However, use of slower velocities (mean of 0.1 feet per second) may have been an influence of rearing in hatchery ponds. Similar to the upper basin, razorback suckers were found most often in pools or runs over silt substrates, and avoided substrates of larger material (Clarkson *et al.* 1993).

Razorback suckers have been observed spawning along the shorelines of lower Colorado River reservoirs. Razorback suckers spawn during the period January 1 to June 30 in relatively shallow water (3 to 15 feet deep) over mixed substrates that range from silt to cobble.

Habitat needs of larval and juvenile razorback sucker are reasonably well known. In reservoirs, larvae are found in shallow backwater coves or inlets (USFWS 1998). In riverine habitats, captures have involved backwaters, creek mouths, and wetlands. These environments provide quiet, warm water where there is a potential for increased food availability. During higher flows, flooded bottomland and tributary mouths may provide these types of habitats.

Razorback sucker diet varies depending on life stage, habitat, and food availability. Larvae feed mostly on phytoplankton and small zooplankton, and in riverine environments, on midge larvae. Diet of adults taken from riverine habitats consisted chiefly of immature mayflies, caddisflies, and midges, along with algae, detritus, and inorganic material (USFWS 1998).

Razorback sucker Critical Habitat

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). The primary constituent elements identified in the final rule (USFWS 1994) as necessary for the survival and recovery of the razorback sucker include, but are not limited to, the habitat components that provide the following:

Water: This includes a quantity of water of sufficient quality (i.e. temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc) that is delivered to a specific location in accordance with a hydrologic regime that is required for a particular life stage.

Physical Habitat: This includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use for spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottomlands, side

channels, secondary channels, oxbows, backwaters, and other areas in the 100-year flood plain, which when inundated provide spawning, nursery, feeding and rearing habitats, or access to these habitats.

Biological Environment: Food supply, predation, and competition are important elements of the biological environment. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to the introduced non-native fish species in many areas.

Virgin River chub

We listed the Virgin River chub as endangered on August 24, 1989 (USFWS 1989). We designated critical habitat for both the woundfin and Virgin River chub on January 26, 2000 (USFWS 2000). Critical habitat for both species is the main stem of the Virgin River and its 100-year floodplain, extending from the confluence of La Verkin Creek, Utah to Halfway Wash, Nevada. The Virgin River Fishes Recovery Plan (USFWS 1995) includes recovery actions for both the woundfin and Virgin River chub.

The Virgin River chub is a silvery medium-sized minnow averaging 8 inches in length, but growing to 18 inches. The Virgin River chub occurs in the main stem of the Virgin River from Pah Tempe Springs in Utah to at least the Arizona-Nevada border. Historically, Virgin River chub were found in the lower Virgin River in Nevada down as far as the confluence with the Colorado River, but few have been found recently. Considered an abundant species in the early 1900s, Virgin River chub are now uncommon to rare throughout their occupied range. Threats to the species include habitat alteration (water impoundments and diversions); diseases; floods; hazardous materials spills; and competition from nonnative fishes, especially the red shiner. Its very limited distribution makes this species particularly vulnerable to these threats.

The Virgin River chub is most often associated with deep runs or pool habitats with slow to moderate velocities and large boulders or instream cover, such as root snags. Both adults and juveniles are associated with these habitats; however, the larger adults are found most often in the deeper pools within the river.

Virgin River chub have experienced a general decline in Utah, Arizona, and Nevada, particularly since the mid-1980s. Hardy *et al.* (1989) noted that declines may be due to droughts and other natural climatic changes. Natural droughts may be exacerbated by water development, including diversions, and increasing domestic use of water. More recent data are being analyzed to determine the current status of Virgin River chub and to determine if declining trends continued through the late 1990s.

The Virgin River Resource Management and Recovery Program in Utah includes applied funding for management and conservation of the Virgin River chub. Arizona and Nevada have been working on development of a focused sampling protocol for the chub to improve the data that are collected from the spring and fall survey efforts.

Virgin River chub Critical Habitat

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). The primary constituent elements identified in the final rule (USFWS 2000) as necessary for the survival and recovery of the Virgin River chub include, but are not limited to, the habitat components that provide the following:

Water:

1. Water quality characterized by natural seasonally variable temperature, turbidity, and conductivity.

2. Hydrologic regime characterized by the duration, magnitude, and frequency of flow events capable of forming and maintaining channel and instream habitat necessary for particular life stages at certain times of the year.

3. Flood events inundating the floodplain necessary to provide the organic matter that provides or supports the nutrient and food sources for the listed fishes.

Physical habitat:

1. River channels, side channels, secondary channels, backwaters, springs, and other areas that provide access to these habitats;

2. Areas with slow to moderate velocities, within deep runs or pools, with predominately sand substrates, particularly habitats which contain boulders or other instream cover.

Biological environment:

1. Seasonally flooded areas that contribute to the biological productivity of the river system by producing allochthonous (humus, silt, organic detritus, colloidal matter, and plants and animals produced outside the river and brought into the river) organic matter which provides and supports much of the food base of the listed fishes.

2. Few or no predatory or competitive nonnative species in occupied Virgin River fishes' habitats or potential reestablishment sites.

Woundfin

We listed the woundfin as endangered on October 13, 1970 (USFWS 1970). We designated critical habitat for both the woundfin and Virgin River chub on January 26, 2000 (USFWS 2000). Critical habitat for both species is the main stem of the Virgin River and its 100-year floodplain, extending from the confluence of La Verkin Creek, Utah to Halfway Wash, Nevada. A recovery plan was approved in July 1979 and subsequently revised on March 1, 1984. The Virgin River Fishes Recovery Plan (USFWS 1995) constitutes the current recovery plan for both the woundfin and Virgin River chub.

The woundfin is a small silver minnow about 14 inches long with a flat head, fairly large fins and a sharp dorsal fin spine. The woundfin inhabits shallow, warm, turbid, fast-flowing water and is capable of withstanding high salinities and relatively warm water temperatures. Threats to the species include habitat destruction and the introduction of nonnative fishes.

Adult woundfin often occur in runs and waters adjacent to riffles, usually with sand or small gravel substrates. Larvae are found in backwaters or slowly moving water along the stream margin, and often are associated with dense growths of filamentous algae. Juveniles use habitats that are slower and deeper than those characteristics of adults. Woundfin greater than 1.6 inches total length are found most frequently at depths between 0.48 and 1.4 feet, in currents ranging from 0.78 to 1.6 feet per second, over sand-gravel substrate (Hardy *et al.* 1989). Woundfin feed on a variety of items including filamentous algae, detrital material, seeds, and aquatic insects (Cross 1975, Winget and Baumann 1977, Greger and Deacon 1988).

Native fishes of the Virgin River Basin, including woundfin, are adapted to survive in a highly variable hydrological system. Both extreme high and extreme low flows result in reduced population abundance of these native fishes; however, this population has survived under these natural variations. The many water diversions in the Virgin River Basin exacerbate drought conditions by making extreme low flows more common, extending their length, and increasing their intensity. This reduces the number of years with flows sufficient for good recruitment that is needed for the population to replenish after drought events.

Woundfin presently range from Pah Tempe Springs on the mainstem of the Virgin River and the lower portion of La Verkin Creek in Utah, downstream to Lake Mead in Nevada. Woundfin have experienced declines in both occupied range and abundance. In addition, current data, both published and unpublished, indicate that the decline in woundfin population is continuing. The existing woundfin population numbers are largely a result of augmentation efforts in Arizona and Nevada since the late 1990s. About 11,200 woundfin were stocked in the Nevada portion of the Virgin River in 1999 and 4,500 woundfin were stocked there in 2000 (Holden and Golden 2000, Nevada Division of Wildlife 2001). The most recent stocking effort, in November 2003, stocked approximately 5,000 woundfin into the Beaver Dam reach of the Virgin River.

In Utah, there have been significant efforts to restore the woundfin population. The recently approved Virgin River Resource Management and Recovery Program provides applied funding for research and management activities to recover the woundfin in Utah. These activities include provisions for minimum flows, creation of fish barriers, and rotenone poisoning projects to eliminate non-native fish species, especially the red shiner, from woundfin habitats. The

disappearance of the woundfin from Arizona and Nevada is strongly correlated with the spread of red shiner in the late 1970s and early 1980s. Unfortunately, red shiners were found in previously treated habitats in 2002, which raised questions about short and long-term additional management needs. In Arizona and Nevada, ongoing work stocking hatchery-produced young woundfin in the Mesquite to Bunkerville reach is combined with mechanical removal of red shiner, exploring this option for future management.

Woundfin Critical Habitat

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). The primary constituent elements identified in the final rule (USFWS 2000) as necessary for the survival and recovery of the woundfin include, but are not limited to, the habitat components that provide the following:

Water:

1. Water quality characterized by natural seasonally variable temperature, turbidity, and conductivity.

2. Hydrologic regime characterized by the duration, magnitude, and frequency of flow events capable of forming and maintaining channel and instream habitat necessary for particular life stages at certain times of the year.

3. Flood events inundating the floodplain necessary to provide the organic matter that provides or supports the nutrient and food sources for the listed fishes.

Physical habitat:

1. River channels, side channels, secondary channels, backwaters, springs, and other areas that provide access to these habitats;

2. Areas inhabited by adult and juvenile woundfin include runs and pools adjacent to riffles that have sand and sand/gravel substrates;

3. Areas inhabited by juvenile woundfin are generally deeper and slower. When turbidity is low, adults also tend to occupy deeper and slower habitats.

4. Areas inhabited by woundfin larvae include shoreline margins and backwater habitats associated with filamentous algae.

Biological environment:

1. Seasonally flooded areas that contribute to the biological productivity of the river system by producing allochthonous (humus, silt, organic detritus, colloidal matter, and plants and animals produced outside the river and brought into the river) organic matter which provides and supports much of the food base of the listed fishes.

2. Few or no predatory or competitive nonnative species in occupied Virgin River fishes' habitats or potential reestablishment sites.

Yaqui chub

We listed the Yaqui chub as endangered with critical habitat on August 31, 1984 (FWS 1984b). Critical habitat includes "all aquatic habitat on the San Bernardino NWR". The designation of critical habitat occurred before the acquisition and creation of the Leslie Canyon NWR. The Yaqui chub habitat within Leslie Canyon NWR has not been designated as critical habitat.

The Yaqui chub is a medium sized fish of the family Cyprinidae (the minnows) (Minckley 1973). Until recently, *Gila purpurea* was thought to occur in the basins of the Ríos Sonora, Matape, and Yaqui in Arizona and Sonora, México (Hendrickson *et al*. 1980). In 1991, biologists recognized that the chub in the Ríos Sonora and Matape and the Río Yaqui system downstream from San Bernardino Creek is a different species, *G. eremica* (DeMarais 1991). *G. purpurea* is endemic to San Bernardino Creek in Arizona and Mexico and probably the Willcox Playa basin in Arizona (Varela-Romero *et al*. 1990, DeMarais 1991). It currently occurs in Bathhouse Spring, Black Draw, House Pond, Mesquite Pond, North Pond, Oasis Pond, Robertson Ciénega, Twin Pond, and Two PhD Ponds on the San Bernardino National Wildlife Refuge (San Bernardino NWR memorandum dated May 26, 1994). Only a few individual chubs were caught in Robertson Cienega during the 1994 monitoring effort. Some of those populations have been stocked into enhanced or artificially created habitats as part of the recovery program. The population in Leslie Creek was stocked in 1969 with individuals taken from Astin Spring (Minckley and Brooks 1985). Fish from Astin Spring stock (via Leslie Creek) and raised at our Dexter National Fish Hatchery were stocked in Turkey Creek in the Chiricahua Mountains (Coronado National Forest) in 1986 and 1991.

Habitat preferences for Yaqui chub vary by life stage. Young fishes prefer marginal habitats and the lower ends of riffles. Adults prefer the deepest, most permanent pools, undercut banks next to large boulders, debris piles, and roots of large riparian trees (Hendrickson *et al*. 1980). Diet consists mostly of algae, insects, and detrital material (Galat and Gerhardt 1987).

Breeding males are a bluish-grey color while females are straw-yellow to light brown color (Minckley 1973). Spawning is protracted throughout the warmer months, with greater activity in spring. Reproductive potential is high and large populations develop quickly from a few adults (DeMarais and Minckley 1993). Growth to maturity is rapid, often within the first summer of life.

Decline of the Yaqui chub probably began with regional arroyo cutting in the late 1800s. Rio San Bernardino incised its floodplain more than 25 feet, and streamside marshlands (cienegas) were drained, except where locally maintained by springs or artesian wells. Livestock grazing impacted these wetlands, contributing to watershed deterioration. Other reasons for decline include natural conditions (drought, floods, wildfire) or elimination due to competition with introduced nonnative fishes (rainbow trout, green sunfish). The Yaqui chub approached extinction in the late 1960s due to habitat loss, but survived largely due to human intervention including transplantation; hatchery production; habitat acquisition, renovation, and creation; and successful reestablishment. Severe drought in the mid-1970s further depleted Yaqui chub populations (DeMarais and Minckley 1993). The Yaqui chub continues to be threatened by infestations of the nonnative Asian tapeworm (*Bothriocephalus acheilognathi*) (FWS 2004a) and other parasites (FWS 2004b).

San Bernardino and Leslie Canyon NWR personnel surveyed eight native fish ponds and streams on the refuges and Slaughter Ranch from March 2 through April 12, 2004 (FWS 2004b). They trapped a total of 2,226 Yaqui chub, distributed within the North Fork Enclosure (290 fish), North Fork Black Draw (290 fish), Oasis (132 fish), House Pond (1,036 fish), and Leslie Canyon (478 fish). Diseased natives fishes (including Yaqui topminnow, Yaqui chub, and/or longfin dace) were found in over half of the native fish populations surveyed, including the North Fork Enclosure site. The House Pond population at the Slaughter Ranch had the highest percentage of native fish (18%) infected with trematodes that cause black grub (the appearances of black spots in the skin of fishes), and Leslie Creek had the highest percentage of fish (27%) infected with yellow grub caused by the *Clinostomum marginatum* trematode.

During electrofishing surveys conducted by the Forest Service and FWS in 1996, 1997, and 1998 within the upper reaches of West Turkey Creek, Yaqui chub were found in low numbers (2 to 19 individuals), but were surviving and reproducing. Since Yaqui chub fry and young of the year were found, we presume that suitable habitat conditions for these fish existed. Nonnative fish were also found during these surveys, but their distribution and composition were variable. The 1996 surveys found rainbow trout along with longfin dace and Yaqui chub. The 1997 results reflected a significant presence of fathead minnow along with Yaqui chub, but no trout nor dace. Neither nonnative species nor longfin dace were found in 1998. Surveys were confined to pool habitat within the upper 1 mile of West Turkey Creek.

We issued a Section 10 permit in 1998 and approved the Habitat Conservation Plan (HCP) for the private El Coronado Ranch, which provides the best habitat for the chub in the West Turkey Creek watershed (Minckley and Duncan 1998). The goals of the HCP include watershed management, improving riparian condition, allowing continued operation of the ranch, and conservation and recovery of native species. The Section 10(a)(1)(B) permit covers incidental take of Yaqui chub, Yaqui catfish, and the Yaqui form of longfin dace, should it ever be listed. Implementation of the HCP should lead to improved watershed and habitat conditions for native fish in the watershed. Management on the El Coronado Ranch under the HCP will improve the baseline by managing water diversions and water systems to enhance the survival of the species included in the plan; eliminating nonnative predators and competitors of native fish species; minimizing the adverse impacts of livestock grazing in the watershed on native fish habitat;

avoiding adverse modifications to the watershed on private land that may negatively influence native fish habitats or indigenous fishes; and allowing agency access to the ranch for monitoring, sampling, research, and other activities related to management of species and habitats of concern.

Forest Road 41 parallels West Turkey Creek, ending with a trailhead at the Wilderness boundary. This is one of four trailheads that access wilderness recreation trails from West Turkey Creek. Also, along with the El Coronado Ranch, there are 14 recreational summer homes, two semi-developed campgrounds, and several dispersed camping sites in use within the Canyon on your lands. The West Turkey Creek Native Fish Habitat Renovation Project underwent formal consultation on February 4, 1999 (02-21-99-F-130). Its goal is to maintain West Turkey Creek as a native fishery and remove nonnative fishes. The two treatments conducted so far were apparently successful (W. Minckley, ASU, pers. comm. 1999).

In 1994, because of the Rattlesnake Fire on the Coronado National Forest, significant quantities of ash and other debris were transported downstream into West Turkey Creek. Nevertheless, the resident (nonnative) rainbow trout (*Oncorhynchus mykiss*), and (native) longfin dace (*Agosia chrysogaster*) and Yaqui chub survived. This event did not impact the watershed equally. The majority of the debris flows affected the lower reaches of West Turkey Creek via Saulsbury and Ward Canyons. The watershed still is continuing to heal and recover.

Livestock grazing on the Forest Service's Turkey Creek allotment is permitted to the El Coronado Ranch. Permitted use is for 66 cows/calves year-long and an additional 25 cows from September through December. The grazing system involves a "best pasture" system. In 1997, the permittee applied for non-use because of drought, and in 1998, applied for only 25 percent of the permitted use. Livestock are not excluded from West Turkey Creek. No grazing occurs within the West Turkey Creek Recreation Area (Yaqui chub habitat) during the summer months, but grazing is allowed in the fall and winter. Use any other time tends to be transitory because there is little forage produced in that area (FWS 1999a). Most livestock use is on the allotment in the watershed above Turkey Creek, including its tributaries.

Actions underway at San Bernardino National Wildlife Refuge help maintain populations of the species in the United States. Yaqui chub populations in West Turkey Creek occur largely on the private El Coronado Ranch. Conservation, ranch management, and recovery actions for the Yaqui chub, Yaqui catfish (*Ictalurus pricei*), and longfin dace are detailed in the HCP, which will continue for 25 years. Management for this species in Mexico is minimal.

Yaqui topminnow

We listed the Sonoran topminnow (*Poeciliopsis occidentalis*) as endangered on March 11, 1967. The Yaqui form was originally described as a full species (Girard 1859). Minckley (1969) recognized the Gila and Yaqui forms as subspecies of *Poeciliopsis occidentalis*. A publication by Minckley (1999) considers the Gila topminnow and Yaqui topminnow to be separate species, *P. occidentalis* and *P. sonoriensis*, respectively (Hedrick 2002). Critical habitat has not been designated for this species.

The Yaqui topminnow (*P. o. sonoriensis*) is a small, live-bearing fish of the family Poeciliidae (Minckley 1973). It is found throughout the Río Yaqui and adjacent drainages in Arizona and Sonora, México, but is listed only in the United States' portion of its range (Hendrickson *et al*. 1980, Juarez-Romero *et al*. 1988, Campoy-Favela *et al*. 1989). Its historical range in the United States encompassed the lower to mid-elevation reaches of the Río Yaqui basin, including Whitewater and Black Draws. Much of the habitat in those areas has been lost to water diversion, downcutting of streams, draining of backwaters, vegetation clearing, channelization, grazing, groundwater pumping, and other human uses of the natural resources (FWS 1984). In addition, nonnative fish have been introduced in many portions of historical range in the United States. The mosquitofish (*Gambusia affinis*) is particularly damaging and was first found in the United States portion of the Río Yaqui basin in 1979 (Hendrickson *et al*. 1980, Meffe *et al*. 1983, Galat and Robertson 1992). Mosquitofish are currently extirpated from San Bernardino NWR.

In the United States, Yaqui topminnow are presently found only on the San Bernardino NWR and Leslie Canyon NWR. Additional information can be found in the *Rio Yaqui Fishes Recovery Plan* (FWS 1995). The status of the species is tenuous but stable within NWR boundaries. San Bernardino and Leslie Canyon NWR personnel surveyed eight native fish ponds and streams on the refuges and Slaughter Ranch from March 2 through April 12, 2004 (FWS 2004b). Trapping resulted in a total of 795 Yaqui topminnow distributed within the North Fork Enclosure (637 fish), East Middle (154 fish), Tule pond (3 fish), and Hay Hollow (1 fish). Diseased natives fishes (including Yaqui topminnow, Yaqui chub, and/or longfin dace) were found in over half of the native fish populations surveyed, including the North Fork Enclosure site. The House Pond population at the Slaughter Ranch had the highest percentage of native fish (18 percent) infected with trematodes that cause black grub (the appearances of black spots in the skin of fishes), and Leslie Creek had the highest percentage of fish (27 percent) infected with yellow grub caused by the *Clinostomum marginatum* trematode.

Little Colorado spinedace

We listed the Little Colorado spinedace as threatened with critical habitat 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 four inches long) 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.

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

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

As would be expected for a species adapted to fluctuating physical conditions, the spinedace is found in a variety of habitats (Blinn and Runck 1990, Miller 1963, Miller and Hubbs 1960, Nisselson and Blinn 1989). It is unclear whether occupancy of these habitats 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 and shade 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 still found in the streams it is known from historically (Chevelon, Silver, Nutrioso, East Clear Creek, and the LCR proper), but 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. Unfortunately, although we have surveyed Silver Creek in 2003 and 2004, we have been unable to locate any fish 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.

Spinedace are currently considered rare in East Clear Creek (Denova and Abarca 1992). However, recent conservation actions in 2000 by the AGFD and the Coconino National Forest have led to the reintroduction of spinedace into three tributaries (Yeager Canyon, Houston Draw, and General Springs) of this drainage. Houston Draw and General Springs dried up and have not been monitored to determine the success of the stocking effort, although it is believed these stockings were unsuccessful. Sampling of Yeager Canyon in October, 2001 located seven young-of-the-year and eight adult spinedace.

The current drought conditions are confounding cooperative recovery efforts for the Little Colorado spinedace in the East Clear Creek watershed. Recent inspections have found drying of the stream courses within the watershed. Of particular concern at this point are Dines Tank, West Leonard Canyon, and Yeager Canyon. The Forest Service and AGFD salvaged spinedace from both sites in 2002. A pool in Dane Canyon held water throughout the summer of 2002 and 57 of the spinedace salvaged from West Leonard Canyon were stocked into Dane Canyon in August 2002.

Native fishes associated with spinedace include speckled dace (*Rhinichthys osculus*), bluehead sucker (*Pantosteus discobolus*), Little Colorado sucker (*Catostomus* sp.), roundtail chub (*Gila robusta*), and Apache trout (*Oncorhynchus gilae apache*) (USFWS 1998). The list of non-native fishes is much larger and includes species with varying degrees of incompatibility with the spinedace's long-term survival. The presence of non-natives was one of the primary reasons the species was listed, and may contribute to the disjunct distribution patterns observed and the spinedace's retreat to what may be suboptimal habitats. Non-native fish may compete with, prey upon, harass, and alter habitat utilized by native fish. In the last 100 years, at least ten non-native fish species have been introduced into spinedace habitats. These include rainbow trout (*Oncorhynchus mykiss*), fathead minnow (*Pimephales promelas*) and golden shiner (*Notemigonus crysoleucus*). Surveys in East Clear Creek have documented the presence of these three non-native species and brown trout (*Salmo trutta*) in the watershed (Denova and Abarca 1992). Data from research experiments and field observations indicate that at least the rainbow trout is a predator and potential competitor with the spinedace (Blinn *et al*. 1993).

Since the spinedace was listed, the Rudd Creek population was discovered. There is currently one refugial population of East Clear Creek spinedace (located at the Flagstaff Arboretum), totaling about 340 individuals. There are no refugial populations for the other two genetic subgroups. All of the known populations have decreased since 1993 and drought conditions continue to put additional strain on all known populations.

Our information indicates that, rangewide, 17 formal consultations have been completed or are underway for actions affecting Little Colorado spinedace (Table 4). Adverse effects to Little Colorado spinedace have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects to Little Colorado spinedace. However, the species is still declining.

Loach minnow

We listed the loach minnow as a threatened species on October 28, 1986 (USFWS 1986a). The Loach Minnow Recovery Plan was completed in 1991 (USFWS 1991a). Habitat destruction and competition and predation by nonnative aquatic species have severely reduced its range and abundance. Although the loach minnow is currently listed as threatened, we have found that a petition to up list the species to endangered status is warranted. A reclassification proposal is pending; however, work on this reclassification is precluded due to work on other higher priority listing actions (USFWS 1994).

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Loach minnow occurs in small to large perennial streams. It is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al*. 1988; Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feeds exclusively on aquatic insects (Schrieber 1978, Abarca 1987). Loach minnow live between two and three years with reproduction occurring primarily in the second summer of life (Minckley 1973, Sublette *et al*. 1990). Spawning occurs in March through May (Britt 1982, Propst *et al*. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al*. 1988, Vives and Minckley 1990).

Recent biochemical genetic work on loach minnow indicates that there are substantial differences in genetic makeup between remnant loach minnow populations (Tibbets 1993). Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Based upon her work, Tibbets (1992, 1993) recommended that the genetically distinctive units of loach minnow should be managed as separate units to preserve the existing genetic variation.

The status of loach minnow is declining rangewide. It is currently restricted to 419 miles of streams, which represents only 15 to 20 percent of its historical range (USFWS 2000). 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 the Tularosa rivers in New Mexico (USFWS 2000).

Our information indicates that, rangewide, more than 155 consultations have been completed or are underway for actions affecting both loach minnow and spikedace. The majority of these opinions concerned the effects of grazing (approximately 34 percent), roads and bridges (approximately 15 percent), or agency planning (approximately 15 percent). The remaining 36 percent of consultations dealt with timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues.

Critical habitat for loach minnow is described with spikedace critical habitat, below.

Spikedace

We listed the spikedace as a threatened species on July 1, 1986 (USFWS 1986b). A recovery plan was also completed in 1991 (USFWS 1991b). Although the spikedace is currently listed as threatened, we found that a petition to up list 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). Habitat destruction along with competition and predation from introduced nonnative species are the primary causes of the species decline (Miller 1961, Williams *et al*. 1985, Douglas *et al*. 1994).

The spikedace is a small silvery fish whose common name alludes to the well-developed spine in its dorsal fin (Minckley 1973). Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the Middle Gila and Upper Gila rivers, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh *et al*. 1990, Sublette *et al*. 1990, Jakle 1992, Knowles 1994, Rinne 1999). The species also occurs in the Upper Verde River, but appears to be declining in numbers. It has not been documented in the Verde River since 1999 despite annual surveys, and additional survey work is needed to determine its current status.

Spikedace live in moderate to large perennial streams with flowing water of slow to moderate velocities over sand, gravel, and cobble substrates (Propst *et al*. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst *et al*. 1986). Spikedace begin spawning from March through May with some yearly and geographic variation (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). Actual spawning has not been observed in the wild, but spawning behavior and studies of captive fish indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace live about two years with reproduction occurring primarily in one-year old fish (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). They feed primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh *et al*. 1989).

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

The status of spikedace is declining range wide. It is now restricted to approximately 289 miles of streams, and its present range is only 10 to 15 percent of its historical range. Within occupied areas, it is common to very rare, but is presently common only in Aravaipa Creek and some parts of the Upper Gila River in New Mexico (USFWS 2000).

Loach Minnow and Spikedace Critical Habitat

We designated critical habitat for loach minnow and spikedace on April 25, 2000 (USFWS 2000). Critical habitat included portions of the Verde, Black, Middle Gila, San Pedro, San Francisco, Tularosa, Blue, and Upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks, and several tributaries of those streams. On June 1, 2004, the United States District Court for the District of New Mexico ruled in New Mexico Cattle Growers Association, *et al.*, vs. U.S. Fish and Wildlife Service, *et al.*, that critical habitat for loach minnow and spikedace be vacated in its entirety. We have not yet received final interpretation from our legal council regarding the effective date of this order.

We intend to redesignate critical habitat for the loach minnow and spikedace, following completion of a new economic analysis. No official timeline has been determined for redesignation of critical habitat; however, our ability to complete the redesignation will be dependent on adequate funding for listing activities. The Regional Office estimates that work on a proposed rule would begin in 2006 to 2007. Critical habitat will likely be redesignated during the life of this action.

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). Although critical habitat may no longer be in place, these constituent elements still outline the key components of suitable habitat for this fish, because they identify the primary features required for the physiological, behavioral, and ecological needs of the species. The primary constituent elements identified in the final rule (USFWS 2000) as necessary for the survival and recovery of the loach minnow include, but are not limited to, the habitat components that provide the following:

1. Permanent, flowing, unpolluted water.

2. Living areas for adult loach minnow with moderate to swift flow velocities in shallow water with gravel, cobble, and rubble substrates.

3. Living areas for juvenile loach minnow with moderate to swift flow velocities in shallow water with sand, gravel, cobble and rubble substrates.

4. Living areas for loach minnow fry with slow to moderate flow velocities in shallow water with sand, gravel, cobble substrates and abundant instream cover.

5. Spawning areas for loach minnow with slow to swift flow velocities in shallow water with uncemented cobble and rubble substrate.

6. Low amounts of fine sediment and substrate embeddedness.

7. Riffle, run, and backwater components present in aquatic habitat.

8. Low to moderate stream gradients.

9. Water temperatures in the approximate range of 1 to 30 degrees C (35 to 85 degrees F) with natural diurnal and seasonal variation.

10. Abundant aquatic insect food base.

1. Periodic natural flooding.

2. A natural unregulated hydrograph or, if flows are modified or regulated, then a hydrograph that demonstrates an ability to support a native fish community.

3. Habitat devoid of non-native aquatic species detrimental to loach minnow or habitat in which detrimental non-native species are at levels which allow the persistence of loach minnow.

The primary constituent elements identified in the final rule (USFWS 2000) as necessary for the survival and recovery of the spikedace include, but are not limited to, the habitat components that provide the following:

1. Permanent, flowing, unpolluted water.

2. Living areas for adult spikedace with slow to swift flow velocities in shallow water with shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at downstreatm riffle edges.

3. Living areas for juvenile spikedace with slow to moderate flow velocities in shallow water with moderate amounts of instream cover.

4. Living areas for larval spikedace with slow to moderate flow velocities in shallow water with abundant instream cover.

5. Sand, gravel, and cobble substrates with low to moderate amounts of fine sediment and substrate embeddedness.

6. Pool, riffle, run, and backwater components present in the aquatic habitat.

7. Low stream gradient.

8. Water temperatures in the approximate range of 1 to 30 degrees C (35 to 85 degrees F) with natural diurnal and seasonal variation.

9. Abundant aquatic insect food base.

10. Periodic natural flooding.

11. A natural unregulated hydrograph or, if flows are modified or regulated, then a hydrograph that demonstrates an ability to support a native fish community.

12. Habitat devoid of non-native aquatic species detrimental to spikedace or habitat in which detrimental non-native species are at levels which allow the persistence of loach minnow.

The appropriate and desirable levels of these factors may vary seasonally and are 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.

Arizona cliffrose

We listed the Arizona cliffrose as endangered under the Act on May 29, 1984 (USFWS 1984a). Critical habitat has not been designated. The Arizona Cliffrose Recovery Plan was completed in 1994 (USFWS 1994b). The species was listed when only two populations were known to exist, both subject to impacts from browsing and road maintenance, and one potentially impacted by mining (USFWS 1984a). This species has narrow habitat requirements and occurs in four widely separated areas in central Arizona: near Bylas (Graham County), the Horseshoe Lake vicinity (Maricopa County), near Burro Creek (Mohave County), and near Cottonwood in the Verde Valley (Yavapai County) (Rutman 1992). These sites differ slightly in elevation and

associated vegetation, but all sites have limestone soils (generally white but also reddish in color) derived from Tertiary lakebed deposits. At each site Arizona cliffrose is part of a locally unique vegetation community (Anderson 1993).

The largest known population of Arizona cliffrose and the type locality is the Burro Creek population that occurs on BLM-administered lands. The Kingman Resource Management Plan (BLM 1993) was approved in 1995 and established the 1,119-acre Clay Hills Area of Critical Environmental Concern (ACEC). This ACEC contains the largest subpopulation of Arizona cliffrose in the Burro Creek area, but does not contain two smaller, more recently discovered nearby subpopulations. In 1989, BLM constructed a fence that excludes cattle and burros from approximately 700 acres of the ACEC. Approximately 310 acres of the exclosure includes occupied Arizona cliffrose habitat and encompasses the larger subpopulation.

All Arizona cliffrose populations have experienced declines due to human-caused actions. Mining and mining-related activities are a serious threat to the long-term survival of this species, particularly in the Burro Creek area. All Arizona cliffrose populations have roads and/or utility rights-of-way within or near them. Construction of roads and utility corridors has caused losses across the range of Arizona cliffrose (Phillips *et al.* 1980). Grazing by livestock, feral animals, and wildlife threatens the long-term survival of Arizona cliffrose (Phillips 1986, Phillips *et al.* 1980, Rutman 1992, USDI 1984, USFWS 1994).

Brady pincushion cactus

We listed the Brady pincushion cactus was as endangered on October 26, 1979 (USFWS 1979). Critical habitat has not been designated. A recovery plan was completed for the species in 1985.

Brady pincushion cactus is a small, semiglobose cactus with one (occasionally more) stems as tall as 2.4 inches and 2.0 inches in diameter (USFWS 1985). Its areoles are elliptic and densely white or yellow-villous. There are usually no central spines, but each areole has 14 to 15 whitish radial spines, each 0.2 inch long and arranged in a pectinate (resembling a comb) fashion. The straw-yellow flowers are about 1.0 inch in diameter. The green top-shaped fruit turns brown at maturity. During the dry season, the plants largely retract into the soil.

Brady pincushion cactus is a narrow endemic occupying a geographic area of about 17,000 acres on the Colorado Plateau in Coconino County, Arizona. It occurs on benches and terraces in the Navajoan Desert near Marble Canyon of the Colorado River. It occurs on plateaus flanking both sides of the river from below Lees Ferry to the vicinity of Bedrock Canyon, a distance of about 25 miles. Very local, discrete populations are scattered along the rim on both sides of Marble Canyon and tributary canyons, and they may be found up to three miles from the canyon rim. Populations occur on the Glen Canyon National Recreation Area, BLM lands, private lands, the Navajo Nation, and possibly Grand Canyon National Park. Plants have been located on only 10 to 20 percent of the potential habitat that has been surveyed. The total estimated population could be as high as 10,000 individuals.

The threats to Brady pincushion cactus include collection, off-road vehicles, uranium mining, and livestock grazing (USFWS 1985). Natural factors such as its limited distribution and restricted gene pool make the species more vulnerable to stochastic events, like long-term drought, that may reduce population numbers to a non-recoverable level. Illegal collection has been a serious threat for this plant. Unfortunately, populations of this plant are well known and easily accessible from the highway by dirt roads or cross-country hiking.

The recovery plan for this species focuses on removing threats (off-road vehicle activity, livestock grazing, etc.) from occupied habitat. In 2001, the BLM set up transects through Brady pincushion populations to assess if trampling from livestock was affecting the plants. Monitoring conducted during 2003 showed that no plants were known to be killed by trampling, but several were stepped on (Hughes 2003).

Brady pincushion cactus is restricted to habitat composed of Kaibab limestone chips overlying soil derived from Moenkopi shale and sandstone outcrops. Chert and quartzite pebbles eroded from the Shinarump member of the Chinle Formation are also present at some sites. The rock chips that overlay the soil have clear crystalline coatings and a whiter color that appears distinct from the adjacent brown limestones where few or no Brady pincushion cactus are found. Habitat for Brady pincushion cactus is found at elevations of 3861 to 4488 feet, which is the elevation of the Kaibab Formation. The plants grow in gravelly alluvium on the gently sloping benches in exposed situations.

The vegetation where Brady pincushion cactus occurs is generally open and sparse, and characterized by low shrubs, grasses, and annuals. The biotic community is the Great Basin Desert Scrub. Dominant plant species include shadscale (*Atriplex concertifolia*), snakeweed (*Gutierrezia sarothrae*), Mormon tea (*Ephedra viridis*), and desert trumpet *(Eriogonum inflatum*).

The densest populations of the cactus on BLM lands occur along Soap Creek, Badger Creek, the north side of North Canyon and Rider Canyon rims, and the rims of Marble Canyon leading into Soap and Rider canyons. It can also be found in suitable habitat to about 0.5 to 1.0 mile from canyon rims such as at a small mesa north of Soap Creek. Forty miles of these rims have been inventoried by belt transect, and 600 live cacti have been counted (BLM undated). Monitoring data were collected in 2003 (Hughes) by the BLM. Observed mortality ranged from 2 to 14 percent; recruitment ranged from 3 to 19 percent. The majority of plants fall in the adult size class (0.6 to 1.2 inches). The populations in the plots seem stable, and the report States that the cacti seem to be doing well despite the droughty conditions of the past few years.

The Navajo Nation and the NPS monitor this cactus in the Jackass Canyon and Lees Ferry areas, respectively. Roth (2000), according to BLM (undated), reported that on the Navajo Nation "the cacti population increased steadily from 1991 to 1993. During the winter of 1993/1994 a film crew severely disturbed the site causing a dramatic drop in the plant numbers, decreasing the number of plants from 114 to 97." Recovery at the site appears to be slow. After an insect infestation that killed at least seven cacti in 1998 and five in 1999, the total number of plants was only 96 in 1999. During the 2000 monitoring season there were 99 plants in the seven study

plots. Two of these plants were considered to be new recruits and two were rediscovered. The overall health of the cacti in the Jackass Canyon plots, as measured by appearance or vigor, rebounded between 1999 and 2000. That followed a period of low vigor during the 1998 and 1999 season that may have been a response to a beetle infestation. At least 85 percent of the cacti were rated in excellent condition. Most of the remaining plants were in good condition, while one was in fair condition. None were in poor condition. In her 2004 monitoring report Roth States that there has been 27 percent mortality of plants since the drought of 2002. Recruitment remains low. There is still considerable disturbance to these populations from human activities. Roth (2000, 2004) concluded that this population of Brady pincushion cactus is extremely vulnerable to human-caused disturbance.

Spence (1993), according to BLM (undated), reported the following on the population at Lees Ferry in Glen Canyon National Recreation Area: "There was no change in the population size... between 1992 and 1993. Mortality (8 individuals) was balanced with new seedlings (8 individuals). Based on this, projections would show a stable population indefinitely... Although the population size remained stable, size class frequencies changed from 1992 to 1993. The 1993 population was older and significantly larger..." Spence Stated that the major threat to the populations in the Lees Ferry location was off-road vehicle activity. The Lees Ferry population appears to be stable.

Holmgren milk-vetch

We listed the Holmgren milk-vetch as endangered in September 2001 (USFWS 2001). Critical habitat has not been designated for this species, and a recovery plan has not been written. At the time of listing, Holmgren milk-vetch was known from three small populations; two in Washington County, Utah and one from adjacent northwest Mohave County, Arizona. Significant portions of the habitat are subject to disturbance from off-road vehicles and urban development. Mineral withdrawal and weedy invasion of degraded habitat are also cited as threats.

Holmgren milk-vetch was first collected by Melvin Ogden in 1941. The species was rediscovered by Rupert Barneby and the Holmgrens in 1979. Holmgren milk-vetch is a stemless herbaceous perennial and is a member of the Fabaceae (Pea) family. It produces leaves and small purple flowers in the spring. The foliage subsequently dies back to the roots after the flowering season. Pinnately compound leaves arise directly from the root crown and are pressed close to the ground. The leaves are 1.5 to 5.1 inches long, and have 9 to 15 leaflets. The flowers are 0.7 to 0.9 inches long and have the distinct pea-like flower. The flowers are borne in a raceme inflorescence, usually with 6 to 16 flowers. The flower stalk is 0.8 to 3.6 inches long and arises directly from the root crown. The flowering stalk is erect when the flowers are open and prostrate when the plant produces fruit. The fruit pods are 1 to 2 inches long. Seeds are retained in the pods even after the margins split open (USFWS 2001).

Holmgren milk-vetch grows on shallow, sparsely vegetated soils derived from the Virgin limestone member of the Moenkopi Formation. It is found in the Great Basin desert shrub community with the following dominant species: desert goldenhead (*Acamtopappus*

sphaerocephalus), burrobush (*Ambrosia dumosa*), range ratany (*Krameria parviflora*), and wolfberry (*Lycium andersonii*). Holmgren milk-vetch can be found at elevations of 2,700 to 2,800 feet.

At the time of listing, the species' primary population was found along the Arizona/Utah border, approximately seven miles south of St. George, Utah. Population numbers fluctuate based on rainfall, but this population was estimated to contain 9,000 to 10,000 individuals in years with a wet winter (Stubben 1997). The second population is south of Santa Clara, about 5 miles west of St. George, Utah and estimated to contain 1,000 individuals. The third population is from Purgatory flat, about 9 miles west of St. George, Utah and estimated to have 30 individuals. The small number of populations and restricted habitat of this species make it vulnerable to human-caused and natural disturbances.

Urban expansion of St. George, Utah, highway expansion, and power line construction have already reduced significant portions of occupied and potential habitat (USFWS 2001). Monitoring studies in Utah have shown that there is a low survivorship of seedlings. The populations support very few adults, and there is concern that the seed bank will eventually be depleted as fewer and fewer adult plants contribute seeds to the population. Seedling recruitment seems high, but few survive to produce seeds (Van Buren, pers.comm. 2004). Van Buren (pers. comm. 2004) estimates that one-third of the known habitat has been destroyed, and that within the next ten years urban development in St. George, Utah will destroy 30 to 50 percent of the remaining occupied habitat. There has been a decline in the overall range and population numbers in Utah (R. Van Buren, Utah Valley State College, pers. comm. 2004).

In Arizona, Holmgren milk-vetch occurs on BLM and Arizona State lands. The BLM has been monitoring populations since 1998. The highest number of individuals recorded was 283 plants in 1992. The monitoring plot numbers decreased dramatically to one plant in 1998 and since then there have been no plants in the plot. Overall, plants in the plot decreased significantly between 1993 and 1994; there was 75 percent mortality of the adult plants in that year. Trends in the data show a similar pattern to Van Buren's work in Utah; there seemed to be a reasonable amount of seedling germination, but very few, if any, survived to the following year. The BLM did not indicate how many individuals exist outside of the monitoring plot, so we are not able to determine if the trend in the plot applies to other Holmgren milk-vetch plants in the area. We also do not know the status of Holmgren milk-vetch on Arizona State lands.

Jones cycladenia

We listed the Jones cycladenia as threatened in 1986 (USFWS 1986). The taxon occurs in three general areas in the Canyonlands section of southeastern Utah and on BLM lands in Mojave County, Arizona. At the time of listing, populations in Utah were estimated to support approximately 7,500 individuals. More than half of those plants were on lands managed by the BLM, approximately 2,500 on NPS lands at Glen Canyon National Recreation Area and Capitol Reef National Park, and approximately 500 on Utah State land. The populations in Arizona were known from an 1882 collection, but subsequent surveys could not relocate these populations. The Arizona populations were rediscovered in 1993. No critical habitat has been designated.

The species is vulnerable due to its rarity, and it is threatened by impacts from mineral and oil and gas exploration. Most of the geologic formations in which Jones cycladenia occurs have been historically mined for uranium (Sipes and Tepedino 1996). Off-road vehicle use is listed as a threat. Sipes (1994) claimed that the main threat to its existence is habitat degradation by bicycles and off-road vehicles.

Jones cycladenia is an herbaceous perennial four to six inches tall with clumps of bright green leaves and rose-colored flowers. It is a member of the Apocynaceae family. The taxon grows on barren clay hills forming the steep side slopes and bases of mesas in the canyon country. The plant reproduces asexually and can over winter as rhizomes underground, re-emerging when the weather warms up.

Pollination studies conducted by Sipes and Tepedino (1996) suggest that Jones cycladenia low reproductive rate may be influenced by a lack of pollinator visits, or that the original pollinator has become disassociated with Jones cycladenia. The majority of reproduction is vegetative and the plant is self-incompatible. For this reason, protection of every group of clones is important. The plant has a reduced ability to replace individuals lost to habitat degradation or stochastic events. The lack of sexual reproduction may also limit the plant's ability to colonize new sites.

Populations in Arizona are located in northeast Mojave County, near the Utah border. On BLM lands, populations are in Woodbury and Potter canyons, on saline soils of the Chinle formation. Elevations range from 4,400 to 6,000 feet in desert scrub and juniper plant communities (Arizona Rare Plant Committee 2001).

BLM has been monitoring populations of Jones cycladenia since 1993. A review of the monitoring information shows that plants in the plots remained fairly stable through 2001, but showed a significant decline in the number of asexual propagules (ramets) in 2002. That trend has continued. The BLM has hypothesized that the drought is affecting these populations. The plot that is exposed to more harsh conditions (south-facing slope) has experienced the greatest decline in reproductive vigor.

Populations in Utah occur mainly on lands managed by the BLM and NPS. NPS has been monitoring populations of Jones cycladenia in Glen Canyon NRA, but we do not have the results of the monitoring. We do not know the status of the populations on BLM or State lands in Utah.

Nichol Turk's head cactus

We listed the Nichol Turk's head cactus as endangered on October 26, 1979 (USFWS 1979). Actions associated with mining, recreation, urbanization, and illegal collection of individuals and seeds are specific threats documented as impacting this taxon.

Nichol Turk's head cactus is a blue-green, low growing succulent that is generally found as a single stem with eight ribs, spiraling around from the base to the apex. Pink to magenta flowers bloom near the apex of the stem in late April and early May and fruits appear dry with a dense

cover of wooly, white hairs in late May. The largest of the individuals range in height from 16 to 20 inches and 5 to 8 inches in diameter. Each areole along the ribs consists of a rosette of 5 radial spines and 3 central spines. The variety *nicholli* was described first by Lyman Benson (1969). It can be distinguished from variety *horizonthalonius* by larger stems, differences in the central spines, and larger seeds.

Populations of Nichol Turk's head cactus have been documented in the Waterman Mountains south of Silver Bell, Arizona, the Vekol Mountains in southwestern Pinal County, Arizona (USFWS 1986), Koht Kohl Hills in northeastern Pima County (Schmalzel and Francisco 2000), and the Sierra del Viejo of northwestern Sonora, Mexico (Yatskievych and Fisher 1984). Extent of habitat in the Waterman and Vekol mountains is estimated to be 5,000 and 5,700 acres, respectively (USFWS 1986). The Sonora, Mexico population is apparently very small. The combined number of individuals from all known populations was estimated in 1985 to be near 10,000 (C. May, pers. comm. 1986). The cactus could potentially occur on small outcrops of limestone deposits in the southern Santa Rosa Mountains and parts of the Comobabi Mountains of Pima County, and the Vaiva Hills in Pinal County.

Available data indicate that the cactus grows on alluvial fans, inclined terraces, and saddles derived from limestone material at elevations of 3,200 to 3,829 feet. (Phillips *et al.* 1979) in the Arizona uplands subdivision of the Sonoran desert scrub vegetation type (Brown 1982). Some variation in the limestone-derived, carbonic soils has been observed in the Vekol Mountains with individuals occurring on both the Lozier and Tencee soil series. Carbonatic soils consist of greater than 40 percent calcium carbonate.

Plants are typically found in open areas with few trees or shrubs on limestone derived soils. Regardless of whether limestone soils are present, the cactus is less abundant at the base of the alluvial fans where canopy cover of trees and shrubs increases. Individuals at the base of alluvial fans grow, flower, and survive at lower rates than at higher elevations. Dominant plant species associated with Nichol Turk's head cactus include foothill palo verde (*Parkinsonia microphylla*), triangleleaf bursage (*Ambrosia deltoidea*), white ratany (*Krameria grayi*), brittlebush (*Encelia farinosa*), prickly pear cactus (*Opuntia* sp.), saguaro (*Carnegia gigantea*), ocotillo (*Fouqueria splendens*), and buckhorn cholla (*Cylindropuntia acanthocarpa*).

In the United States, Nichol Turk's head cactus is known to occur on lands managed by the BLM, the State of Arizona, the Tohono O'odham Nation, as well as private lands. Monitoring plots were set up on the Tohono O'odam Nation in 1997. We do not know if these plots have been revisited since then. The BLM also has monitoring plots set up in the Waterman Mountains (1981); the plots have been visited intermittently, but there is no summary of the data collected to date. Schmalzel and Francisco (2000) collected data from the BLM plots in 1997 and concluded that the cacti grow very slowly. They estimated that the plant spends 11 to13 years in the seed to 0.75 inch size class. Monitoring plots have also been established by Clayton May and the University of Arizona in the Waterman Mountains. Clayton May summarized his information for the 1986 recovery plan; we do not have anything more current on these monitoring plots.

Several actions have resulted in the loss of cacti and habitat. The largest loss of individuals was associated with the operation of the Happy Jack mine. In the early 1980's, the unauthorized blading of an airstrip and erosion associated with the construction of roads resulted in the estimated loss of 350 Nichol Turk's head. In July 2004, trespass (widening an existing airstrip) onto adjacent Tohono O'odham lands from a private mine in the Vekol Mountains resulted in the loss of Nichol Turk's head (S.Villegas, Tohono O'odham Nation, pers. comm. 2004). Recreational activities have also contributed to the loss of individuals, on BLM and Tohono O'odham lands. Finally, illegal collection has been documented from the BLM monitoring plots.

Peebles Navajo cactus

We listed the Peebles Navajo cactus as endangered on October 26, 1979 (USFWS 1979) without critical habitat. A recovery plan was completed for the species in 1984.

Seven species of *Pediocactus* occur within the Columbia River Basin, Great Basin, Rocky Mountains, and Colorado Plateau with six of the seven species occurring as restricted endemics (AGFD 1999). Peebles Navajo cactus, also formerly referred to as the Navajo plains cactus, is a very small, solitary globose cactus with one stem up to 1 inch tall and averaging 0.74 inch in diameter (USFWS 1984). The cactus retracts underground when precipitation is limited. On the areole, an average of four corky (or spongy), radial spines may appear as a twisted cross (Arizona Rare Plant Committee, 2001, Benson 1962, 1969). Each spine is approximately 0.2 inch long. The flowers are yellow to yellow-green and average approximately 1 inch in diameter. Unlike the very similar Fickeisen plains cactus (*Pediocactus peeblesianus* var. *fickeinseniae*), there are no central spines on the areole. The fruits are tan at maturity and dehisce usually by both a dorsal slit and by a ring around the apex; a distinguishing trait of the genus *Pediocactus* (Benson 1962, 1969; USFWS 1984, Arizona Rare Plant Committee 2001).

Peebles Navajo cactus is an endemic species to Arizona occupying a very small geographic area (7 miles in length by 1 mile in width) extending northwest to southeast within the immediate vicinity of Joseph City and Holbrook, Navajo County, Arizona (USFWS 1984). The species occupies low hills in the Plains and Great Basin Grassland biotic community from near Joseph City extending northwest to the Marcou Mesa region northwest of Holbrook (Brown and Lowe 1980, AGFD 1999). The cactus occurs between 5,100 and 5,650 feet above sea level. There are believed to be five known populations, totaling about 1000 individual plants, 70 percent of them occurring on private lands (USFWS 1984). Three of the five discrete known populations occur on private property with the remaining populations occurring on BLM (Safford Field Office) property within the Apache Butte grazing allotment (USFWS 1984, AGFD 1999), and Arizona State lands (Marcou Mesa); these lands may have recently been exchanged and may now be under BLM management.

The most recent population monitoring data were compiled in Phillips and Phillips (1997), which discussed population trends in four monitoring plots as a 13-year overview. Germination events have been strongly associated with rainfall and have remained sporadic, occurring every few years, over this timeframe (Phillips and Phillips 1997). Phillips and Phillips (1997) also noted slow growth rates with average reproductive maturity occurring at age 8 or older. Population

monitoring data indicate that the total number of plants present in all plots has doubled from 1985 to 1997 and that in certain years, the proportion of seedlings and juveniles to adult plants was markedly higher, indicating germination events (Phillips and Phillips 1997).

It occurs in exposed, sunny areas in gravelly substrate derived from the Shinarump Member of the Chinle Formation, on gently sloping to flat hilltops (AGFD 1999, Stuart *et al.* 1972). Peebles Navajo cactus prefers soil conditions consisting of pale yellow to yellow-orange fine to course-grained friable sandstone (Stuart *et al.* 1972). Pebbles of quartz, quartzite and chert are also commonly associated with the species (AGFD 1999).

The vegetation where Peebles Navajo cactus occurs is generally open and sparse, and characterized by low shrubs, grasses, and annuals (USFWS 1984). The distribution of the species occurs in an ecotone between the Plains and Great Basin Grassland and the Great Basin Desert Scrub biotic communities (Brown and Lowe 1980, USFWS 1984, AGFD 1999). Plant species associated with Peebles Navajo cactus include shadscale (*Atriplex concertifolia*), four-winged saltbush (*A. canescens*), Mormon tea (*Ephedra viridis* and *E. cutleri*), snakeweed (*Gutierrezia sarothrae*), rabbitbrush (*Chrysothamnus nauseosus*), sagebrush (*Artemisia bigelovii* and *A. tridentate*), galleta (*Hilaria jamesii*), beehive cactus (*Coryphantha vivipara*), Whipple devil claw (*Sclerocactus whipplei* var. *whipplei*), several species of prickly pear and cholla cactus (*Opuntia* sp.) as well as juniper (*Juniperus* sp.) (USFWS 1984, AGFD 1999).

Threats to the Peebles Navajo cactus are both anthropogenic and natural. Due to the extreme rarity of the species, it is in demand by collectors (both domestic and international), and removal of plants from native habitats has been documented by Newland (1979). Livestock grazing is also a perceived threat through trampling, primarily on private lands during wet conditions when the plants are emergent (Phillips *et al.* 1979, USFWS 1984). The BLM's livestock grazing management has maintained a proactive approach to protecting known populations by constructing fencing, however, trespass cattle are inevitably of concern. Gravel mining and urban development are large-scale threats to the species (AGFD 1999). The construction of roads and the subsequent access to preferred habitat is also of concern to the conservation of the species. Rock and petrified wood collectors, ranchers, and OHV recreationists use the myriad of roads within the geographic distribution of the species for various purposes (USFWS 1984). These various activities often lead to trampling and crushing of individual plants as well as both soil erosion and compaction of the species' habitat.

Natural threats to the Peebles Navajo cactus include vulnerability to stochastic events due to its significantly limited geographic distribution, a restricted genetic pool, and a low number of individuals, making the species susceptible to extinction (AGFD 1999). Drought has also proven to adversely impact the species due, directly, to issues pertaining to limited precipitation and indirectly, to increased predation by herbivorous mammals ((Phillips and Phillips 1997, M. Falk, FWS, pers. comm. 2003). Small mammalian herbivores such as rabbits (*Sylvilagus* sp. and *Lepus* sp.) have been observed eating Peebles Navajo cactus as vegetative preferences in diet shift in response to drought conditions (Phillips and Phillips 1997; M. Falk, FWS, pers. comm. 2003; B. Phillips, Forest Service, pers. comm. 2003). For the most part, the habitat in which the

species occurs is not fire adapted, lacks a significant fine fuels component, and is not likely to carry a wildfire even in drought conditions.

Pima pineapple cactus

We listed the Pima pineapple cactus as endangered on September 23, 1993 (USFWS 1993), without critical habitat. Factors that contributed to the listing include habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution and plant species rareness, illegal collection, and difficulties in protecting areas large enough to maintain functioning populations. The biological information below is summarized from the proposed and final rules, and other sources.

Pima pineapple cactus is a low-growing hemispherical cactus with adults varying in stem diameter from 2.0 to 8.3 inches and height from 1.8 to 18.0 inches. Individuals are considered adults when they reproduce sexually. Plants can be either single or multi-stemmed with yellow flowers blooming with the summer rains. Clusters of Pima pineapple cactus stems are formed primarily from vegetative clones produced at the plant base (Benson 1982, Roller 1996). The diagnostic field character of this taxon is the presence of one stout, straw-colored, hooked central spine. Radial spines extend laterally around the central spine and average 10 to 15 spines on large cacti and six on small cacti (Benson 1982).

Groups of flowers begin to bloom for single day periods five to seven days after the first monsoon rains. Flowering is triggered by as little as 0.12 inch of precipitation. Generally flowers begin opening midmorning and close at dusk (Roller 1996).

Pima pineapple cactus occurs south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. It is distributed at very low densities throughout both the Altar and Santa Cruz valleys, and in low-lying areas connecting the two valleys.

Habitat fragmentation and isolation may be an important factor limiting future seed set of this cactus. Recent data show that the species cannot successfully self pollinate *in situ* and is reliant on invertebrate pollinators. One hypothesis is that the spatial distribution pattern of individual Pima pineapple cacti within a given area may regulate pollinator visitations, resulting in more successful cross-pollination and subsequent seed set over the population (Roller 1996). If the pollinators are small insects with limited ability to fly over large distances, habitat fragmentation may contribute to a decrease in pollinator effectiveness with a subsequent decrease in seed set and recruitment.

Extrapolations from recent (1992 to 1997) surveys of known Pima pineapple cactus locations suggest that the cactus may be more numerous than previously thought. Projections based only on known individuals may underestimate the total number of individuals. This in no way indicates that the cactus is not rare or endangered. Pima pineapple cactus is widely dispersed in very small clusters across land areas well suited for residential, commercial, or mining development. Field observations suggest a great deal of land area within the range boundaries would not support Pima pineapple cactus today due to historical human impacts. Thus,

populations are already considerably isolated from each other in many portions of the range, and population size and apparent recruitment varies significantly across its range.

Populations of Pima pineapple cacti are patchy, widely dispersed, and highly variable in density. The higher population densities have only been documented at three sites. Compared to other surveys, two of these sites are very small in scale and range from 1 to 3 plants per acre. Other densities across the majority of the plant's range vary between one plant per 4.6 acres and one plant per 21 acres (Mills 1991, Ecosphere 1992, Roller 1996).

Land areas surrounding developed parts of Green Valley and Sahuarita, Arizona, (including adjacent areas of the San Xavier District of the Tohono O'odham Nation) may be important for the conservation of this species within its range. This area could be defined as an ecotone boundary between semidesert grassland and Sonoran desertscrub.

Generally, the Pima pineapple cactus grows on gentle slopes of less than 10 percent and along the tops (upland areas) of alluvial bajadas nearest to the basins coming down from steep rocky slopes. The plant is found at elevations between 2,360 and 4,700 feet. (Phillips *et al.* 1981, Benson 1982, Ecosphere 1992), in vegetation characterized as either or a combination of both the Arizona upland of the Sonoran desertscrub and semidesert grasslands (Brown 1982).

Transplanted individuals are not considered as functioning within the context of a self-sustaining population. Efforts to transplant individual cacti to other locations have only had limited success and the mortality rate has been high, especially after the first year. Furthermore, once individuals are transplanted from a site, it is considered extirpated because those individuals functioning in that habitat are irretrievably lost. We view transplanting cacti as a measure of last resort for conserving the species. Transplanting will be recommended only when on-site and off-site habitat conservation is not possible and the death of cacti is unavoidable.

The area of habitat reviewed under section 7 of the Act between 1987 and 2000 (i.e., habitat developed or significantly modified beyond the point where restoration would be a likely alternative) is approximately 24,429 acres, which represents 43 percent of the total area surveyed to date. In 1998, more than 1,100 acres of Pima pineapple cactus habitat were lost including 353 acres from the Las Campanas Housing Development project, and 752 acres from the ASARCO, Inc. Mission complex project. In 2000, 586 acres of habitat were lost with the expansion of a State prison in Tucson. In 2001, 177 acres of habitat were lost through development, but 888 acres of occupied and suitable habitat were conserved through conservation easements. In 2002, 383 acres of Pima pineapple cactus habitat were destroyed for development, but 36 acres were protected in the conservation bank, and an additional 258 acres of habitat were conserved in private conservation easements. In 2003, one subdivision resulted in the loss of 858 acres of suitable Pima pineapple cactus habitat and set aside 784 acres of occupied habitat in a conservation easement. We are aware of housing developments along Valencia Road, Pima County, Arizona, in the vicinity of T15S, R12E, section 15 and surrounding areas that support Pima pineapple cactus. These developments affect several hundred acres of habitat and have not been evaluated through the section 7 consultation process. The number of acres lost through

private actions, not subject to Federal jurisdiction, is not known, but given the rate of urban development in Pima County, we believe it is significant.

Most of the documented habitat loss has occurred south of Tucson down through the Santa Cruz Valley to the town of Amado. This area is critical for the future recovery of the species. The expansion of urban centers, human population, and mining activities will continue to eliminate habitat and individuals, and result in habitat fragmentation.

The protection of habitat and individuals is complicated by the varying land ownership within the range of this species. An estimated 10 percent of the potential habitat for Pima pineapple cactus is held in Federal ownership. The remaining 90 percent is on Tribal, State, and private lands. Most of the Federally-owned land is either at the edge of the plant's range or in scattered parcels. The largest contiguous piece of Federally-owned land is the Buenos Aires National Wildlife Refuge, located at the southwestern edge of the plant's range at higher elevations and lower plant densities. The primary threat to the status of this species throughout its range is the accelerated rate (i.e., since 1993) at which this prime habitat is being developed, fragmented, or modified.

Prescribed fire can have a negative effect if not planned properly. The invasion of Lehmann lovegrass combined with fire is a threat to Pima pineapple cactus. Continuous distributions of fuels and greater biomass near the apex of individual plants are believed to increase mortality following fire (Roller and Halvorson 1997). Fire can lead to increases in Lehmann lovegrass densities and distributions; correspondingly, fire intensity and fire frequency increases with Lehmann lovegrass populations (McPherson 1995).

In summary, monitoring has shown that the range-wide status of the Pima pineapple cactus appears to have been recently affected by threats that have completely altered or considerably modified more than a third of the species' surveyed habitat, and have caused the elimination of nearly 60 percent of documented locations. Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to detrimentally impact the habitat. The remaining habitat also is subject to degradation or modification from current land management practices, increased recreational use when adjacent to urban expansion (i.e., off-road vehicle use and illegal collection), and the continuing aggressive spread of nonnative grasses into habitat. Habitat fragmentation and degradation will likely continue into the foreseeable future based on historical data and growth projections produced by the Pima County Association of Governments (1996). There is very little Federal oversight on conservation measures that would protect or recover the majority of the potential habitat. Even some areas that have been the subject of section 7 consultations have been modified and may not be able to support viable populations of the Pima pineapple cactus over the long-term.

Kearney's blue star

We listed the Kearney's blue star as endangered in 1989 because of its low density and restricted range (USFWS 1989). No critical habitat has been designated. Kearney's blue star is an

herbaceous perennial with alternate lance-shaped leaves and erect, pubescent stems that rarely branch. The plant can be up to 12-14 inches ft. tall and 3 ft. across and is a member of the Apocynaceae family. Terminal flower clusters bloom in April, are a pale blue color, and individual flowers are about 0.5 inches in length. Fruits are follicles, 1.2 to 3.9 inches long, commonly found in pairs extending beyond the leaves at the terminal ends of branches in June and July. Seeds are cork-like cylinders, approximately 0.3 inches long with tapered ends (Phillips and Brian 1982).

Kearney's blue star is known only from the Baboquivari Mountains in Pima County, Arizona. It has been found in South, Brown, and Thomas canyons. Originally thought to exist in only South Canyon, several large populations have been found recently (Donovan 1998). Donovan located 11 new populations comprised of 390 individuals. The average number of plants in each of these populations is 35. He also discovered a population of 300 individuals in Brown Canyon in 1996. Kearney's bluestar in South Canyon on the Tohono O'odham Nation are thought by some to be extirpated, but we have no confirmation of this.

In 1988, we contracted with Southwestern Field Biologists to conduct a transplant project for Kearney's bluestar in Brown Canyon. In 1988, 76 plants were transplanted, but high mortality necessitated another planting effort in 1989 with an additional 105 plants. A large flood in June 1990 destroyed the plants and the habitat, with a loss of 75 percent of the transplants. As of 1988, there were only 50 plants remaining.

Kearney's bluestar grows in oak woodland between 4,000 and 6,000 feet in elevation. The dominant species associated with the bluestar are: Emory oak (Quercus emoryi), Mexican blue oak (Q. oblongifolia), catclaw acacia (Acacia greggi), sotol (Dasylirion wheeleri), shindagger agave (Agave schottii), and various perennial grass species. The species appears to do best on open, steep slopes of unconsolidated material. It does not seem to prefer a specific soil type. The plants are found on slopes between 20 to 30 degrees.

The major threats to the species seem to be heavy insect predation and watershed degradation associated with improperly managed livestock grazing or post-fire effects.

Siler pincushion cactus

We listed the Siler pincushion cactus as endangered on November 26, 1979 (USFWS 1979). We reclassified it as a threatened species on December 27, 1993 (USFWS 1973). A recovery plan for the species was completed in 1985. No crticial habitat has been designated.

Siler pincushion cactus is a small, solitary or occasionally clustered, globose cactus about 5 inches tall (with exceptional specimens reaching 18 inches) and 3 to 4 inches in diameter (occasionally larger). The central spines are brownish-black at the tip, becoming gray to white with age. Flowers are yellowish with maroon veins, 0.75 to 1 inch in diameter, and the cactus blooms in the spring. Plants may be single-stemmed or clustered.

The range of Siler pincushion cactus is associated with gypsiferous clay and sandy soils of the Moenkopi Formation. About 90 percent of known plants occur on the Shnabkaib Member of this formation. These layers tend to form rounded hills and often support sparser vegetation than adjacent areas of different substrate. Relatively dense clusters of plants are known to occur in several areas. Individual plants are widely separated in other areas of the Moenkopi Formation that are marginally suitable for this species.

Its habitat is characterized by desert scrub vegetation in transitional areas between the Navajoan Desert, Sagebrush Desert and the Mohavean Desert. The species is found at elevations between 2,800 to 5,400 feet on all aspects of the hills and on slopes varying from 0 to 80 degrees.

Most of the habitat of this species is contained within BLM's Arizona Strip District. A small amount occurs in the Cedar City District of BLM, Utah. The species may also occur on the Kaibab-Paiute Indian Reservation and some private property. All known habitat and plants occur in northern Mohave and northwestern Coconino counties, Arizona, and Kane and Washington counties, Utah.

Threats to the species include illegal collection, herbivory by an unknown species of animal, gypsum and uranium mining and exploration, off-highway vehicle (OHV) disturbance, and degradation of the habitat due to livestock use. Each of these threats is discussed below.
OHV damage is probably the most significant threat to Siler pincushion cactus. This activity occurs mostly around the St. George, Utah, and the Fredonia, Arizona areas. OHV enthusiasts are attracted to the area because the low, rounded hills offer appropriate terrainches Unfortunately, the Moenkopi soils are friable, easily impacted, and take a long time to recover in the desert climate. Siler pincushion cactus populations are relatively dense in the St. George, Utah area where the OHV traffic is occurring and the potential for significant adverse affects is high, but the proportion of the population or habitat affected has never been quantified. For several years, BLM has had some success in diverting the OHV use away from the cactus habitat and has closed the area to OHV use. The area near Fredonia is near the town dump and is also heavily used by target shooters. The area is severely degraded and the potential for losing the cactus population there is high.

When the species was listed, gypsum mining and exploration was believed to threaten Siler pincushion cactus. In 1985, BLM investigated the mineral potential of the gypsum deposits within a portion of the species' range. The mineral reports (Cormier 1985, Swapp 1985) indicated the low economic value of the gypsum deposits, reducing the threat of gypsum mining to low or non-existent in Washington County (near St. George, Utah) and near Lost Spring and Yellowstone Mesa in Mohave County, Arizona.

Slier pincushion cactus is illegally taken from the wild despite the protection of a number of Federal and State laws. The species is protected from international trade by the Convention on International Trade of Endangered Species (CITES). The Arizona Native Plant law prohibits take of plants except for scientific or commercial purposes. The Lacey Act protects plants and animals against interState transport and commerce when the plants or animals are taken in violation of State laws. Despite this legal protection, enforcement is difficult because many

populations are remote or the operator moves quickly. As a result, the amount of plants lost to illegal collection is unknown and unquantifiable.

Herbivory of Siler pincushion cactus plants contributes significantly to mortality in at least one area. This herbivory has been documented during demographic studies by the BLM. The source of herbivory appears to be small rodents (L. Hughes, BLM, pers. comm. 1988), which are attracted to the area due to the availability of water and presence of plant cover (cattle have been excluded from the spring site).

Cattle do not eat the cactus, but trampling, particularly of small plants, is a possibility, especially with dense populations near water. The BLM has observed some mortality of Siler pincushion cactus in these situations. Livestock have an unknown affect on the watershed condition of Siler pincushion cactus habitat. The cactus occurs on a large number of allotments with varying range conditions and trends. Some cacti in allotments with fair or poor condition with a static or downward trend may be affected by livestock use. Trampling and habitat degradation can be a serious problem near areas where livestock congregate because of the availability of water.

Huachuca water umbel

We listed the Huachuca water umbel as an endangered species on January 6, 1997 (USFWS 1997). Critical habitat was designated on the upper San Pedro River; Garden Canyon on Fort Huachuca; and other areas of the Huachuca Mountains, San Rafael Valley, and Sonoita Creek on July 12, 1999 (USFWS 1999).

The Huachuca water umbel is an herbaceous, semiaquatic perennial plant with slender, erect leaves that grow from creeping rhizomes. The leaves are cylindrical, hollow with no pith, and have septa (thin partitions) at regular intervals. The yellow/green or bright green leaves are generally 0.04 to 0.12 inch in diameter and often 1 to 2 inches tall, but can reach up to 8 inches tall under favorable conditions. Three to ten very small flowers are borne on an umbel that is always shorter than the leaves. The fruits are globose, 0.06 to 0.08 inch in diameter, and usually slightly longer than wide (Affolter 1985). The species reproduces sexually through flowering and asexually from rhizomes, the latter probably being the primary reproductive mode. An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants that then may reroot in a different site along aquatic systems.

The Huachuca water umbel was described first by Hill (1926) based on the type specimen collected near Tucson in 1881. Hill applied the name *Lilaeopsis recurva* to the specimen, and the name prevailed until Affolter (1985) revised the genus. Affolter applied the name *L. schaffneriana* ssp. *recurva* to plants found west of the continental divide.

The Huachuca water umbel has been documented from 27 sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Haas and Frye 1997, Saucedo 1990, Warren *et al.* 1989, Warren *et al.* 1991, Warren and Reichenbacher 1991, FWS files). The plant has been extirpated from six of the 27 known sites.

The 21 extant sites occur in four major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora. All sites are 3,500 to 6,500 feet in elevation.

The Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs. In upper watersheds that generally do not experience scouring floods, the umbel occurs in microsites where interspecific plant competition is low. At these sites, the umbel occurs on wetted soils interspersed with other plants at low density, along the periphery of the wetted channel, or in small openings in the understory. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of Huachuca water umbel occurs, is an example of a site that meets these conditions. The types of microsites required by the umbel were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800's to early 1900's. Habitat on the upper San Pedro River is recovering, and Huachuca water umbel has recently been found along short reaches of the main channel.

In stream and river habitats, Huachuca water umbel can occur in backwaters, side channels, and nearby springs. After a flood, it can rapidly expand its population and occupy disturbed habitat until interspecific competition exceeds its tolerance. This response was recorded at Sonoita Creek in August 1988, when a scouring flood removed about 95 percent of the Huachuca water umbel population (Gori *et al.* 1990). One year later, the umbel had recolonized the stream and was again codominant with watercress, *Rorippa nasturtium-aquaticum* (Warren *et al.* 1991). The expansion and contraction of Huachuca water umbel populations appear to depend on the presence of “refugia” where the species can escape the effects of scouring floods, a watershed that has an unaltered hydrograph, and a healthy riparian community that stabilizes the channel.

Density of umbel plants and size of populations fluctuate in response to both flood cycles and site characteristics. Some sites, such as Black Draw, have a few sparsely-distributed clones, possibly due to the dense shade of the even-aged overstory of trees, dense nonnative herbaceous layer beneath the canopy, and deeply entrenched channel. The Sonoita Creek population occupies 14.5 percent of a 5,385 square foot patch of habitat (Gori *et al.* 1990). Some populations are as small as 11 to 22 square feet. The Scotia Canyon population, by contrast, has dense mats of leaves. Scotia Canyon contains one of the larger Huachuca water umbel populations, occupying about 57 percent of the 4,756 feet perennial reach (Gori *et al.* 1990, Falk and Warren 1994).

While the extent of occupied habitat can be estimated, the number of individuals in each population is difficult to determine because of the intermeshing nature of the creeping rhizomes and the predominantly asexual mode of reproduction. A population of Huachuca water umbel may be composed of one or many genetically distinct individuals.

Overgrazing, mining, hay harvesting, timber harvest, fire suppression, and other activities in the nineteenth century led to widespread erosion and channel entrenchment in southeastern Arizona streams and cienegas when above-average precipitation and flooding occurred in the late 1800's and early 1900s (Bahre 1991, Bryan 1925, Dobyns 1981, Hastings and Turner 1980, Hendrickson and Minckley 1984, Martin 1975, Sheridan 1986, Webb and Betancourt 1992,

Hereford 1993). A major earthquake near Batepito, Sonora, approximately 40 miles south of the upper San Pedro Valley, resulted in land fissures, changes in groundwater elevation and spring flow, and may have preconditioned the San Pedro River channel for rapid flood-induced entrenchment (Hereford 1993, Geraghty and Miller, Inc. 1995). These events contributed to long-term or permanent degradation and loss of cienega and riparian habitat on the San Pedro River and throughout southern Arizona and northern Mexico. Much habitat of the Huachuca water umbel and other cienega-dependent species was presumably lost at that time.

Wetland degradation and loss continues today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, chaining, agriculture, mining, sand and gravel operations, road building, nonnative species introductions, urbanization, wood cutting, and recreation all contribute to riparian and cienega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population.

Dredging extirpated the Huachuca water umbel from House Pond, near the extant population in Black Draw (Warren *et al.* 1991). The umbel population at Zinn Pond in St. David near the San Pedro River was probably lost when the pond was dredged and deepened. This population was last documented in 1953 (Warren *et al.* 1991).

Livestock grazing can affect the umbel through trampling and changes in stream hydrology and loss of stream bank stability, but existence of the umbel appears to be compatible with well-managed livestock grazing (USFWS 1997). In overgrazed areas, stream headcutting can threaten cienegas where the umbel occurs. Such headcutting occurs at Black Draw just south of the international boundary and at Los Fresnos, in the San Rafael Valley, Sonora. Groundwater pumping has eliminated habitat in the Santa Cruz River north of Tubac, and threatens habitat in the San Pedro River. Portions of the San Pedro River occupied by the umbel could be dewatered within a few years unless measures are implemented very soon to halt or mitigate groundwater pumping in the Sierra Vista-Fort Huachuca area (ASL 1998). Severe recreational impacts in unmanaged areas can compact soils, destabilize stream banks, and decrease riparian plant density, including densities of the Huachuca water umbel. Populations occurring in Bear Canyon in the Huachuca Mountains have been impacted by trampling and OHVs.

A suite of nonnative plant species has invaded wetland habitats in southern Arizona (Stromberg and Chew 1997); including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases their effect on the umbel is unclear, but in certain microsites, the nonnative Bermuda grass, *Cynodon dactylon*, may directly compete with the umbel. Bermuda grass forms a thick sod in which many native plants are unable to establish. Watercress is another nonnative plant now abundant along perennial streams in Arizona. It is successful in disturbed areas and can form dense monocultures that can outcompete Huachuca water umbel populations.

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, the restriction of this taxon to a relatively small area in

southeastern Arizona and adjacent Sonora increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction. Populations are in most cases isolated, as well; this makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Shafer 1990, Wilcox and Murphy 1985).

Huachuca water umbel Critical Habitat

The following areas are designated as critical habitat for Huachuca water umbel: 1.25 miles of Sonoita Creek, 2.7 miles of the Santa Cruz River, 3.4 miles of Scotia Canyon, 3.8 miles of Garden Canyon, and 33.7 miles. of the San Pedro River. There are other smaller reaches of streams on the Coronado National Forest that are included in the critical habitat designation.

Effects analyses must determine if the proposed action would destroy or adversely modify proposed critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). The primary constituent elements identified in the final rule (U. S. Fish and Wildlife Service 1999a) as necessary for the survival and recovery of the Huachuca water umbel include, but are not limited to, the habitat components which provide the following:

1. Sufficient perennial base flows to provide a permanently wetted substrate for growth and reproduction of Huachuca water umbel;

2. A stream channel that is stable and subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for water umbel expansion;

3. A riparian plant community that is stable over time and in which nonnative species do not exist or are at a density that has little or no adverse effect on resources available for water umbel growth and reproduction; and

4. Refugial sites in each watershed and in each stream reach, including but not limited to springs or backwaters of mainstem rivers, that allow each population to survive catastrophic events and recolonize larger areas.

Hualapai Mexican vole

We listed the Hualapai Mexican vole as an endangered species without critical habitat in November 1987 (USFWS 1987). The factors for listing the subspecies included its rarity and restricted habitat along with threats posed by (1) drought; (2) elimination of ground cover (grasses, sedges, rushes, and forbs) around open water and seeps primarily due to grazing, human recreation (e.g., camping and off-road vehicle activities); (3) water development; and (4)

activities that cause or exacerbate erosion (e.g., road construction, overuse by livestock, concentrated recreation). The Hualapai Mexican vole is also listed as endangered on the Arizona Game and Fish Department's list of Threatened Native Wildlife in Arizona.

The Hualapai Mexican vole is a thick-set, blunt-nosed, short-legged rodent, with a short tail, and small ears obscured by coarse, dark cinnamon-brown fur. Two other subspecies of Mexican vole occur in the United States (*M. m. mogollonensis* and *M. m.* Navaho. The Hualapai Mexican vole was first described in 1938 by E. A. Goldman. Although Hoffmeister (1986) accepted the taxonomy, he considered it to be a "poorly defined subspecies, in part because the sample size is so small." A total of fifteen Hualapai Mexican voles were observed or handled between 1923 and 1984 (USFWS 1991). Several studies (Frey and LaRue 1993, Frey and Yates 1993, 1995) have reviewed the taxonomy of the subspecies of *M. mexicanus* and tentatively concluded that populations outside of the Hualapai Mountains may be appropriately assigned to the taxon currently known as the Hualapai Mexican vole. These questions continue to be investigated through genetic analysis (Busch *et al.* 2001). Pending peer review of the genetic studies, the FWS considers only those voles in the Hualapai Mountains to be Federally-listed and subject to section 7 consultation. Additionally, the FWS will continue to refer to the Federally-listed subspecies as Hualapai Mexican vole until it is determined that a technical correction of the common and scientific name is appropriate according to FWS policy.

Very little life history information is available for this subspecies; therefore, the recovery plan (USFWS 1991) assumes the life history of the Hualapai Mexican vole is similar to that of the Mexican vole (*Microtus mexicanus*). Hualapai Mexican voles are likely active year-round. Signs of their presence include runways (tunnel-like paths between burrows or feeding sites), burrow entrances, scat, and grass cutting (Spicer *et al.* 1985, Kime *et al.* 1995). Based on capture patterns and the extensive, interconnected networks of runways, Spicer *et al.* (1985) believe the subspecies is colonial.

Hualapai Mexican voles are typically found within or near the pine-oak vegetation belt (Kime *et al.* 1995). Average precipitation in this zone is between 20.1 and 25.2 inches. Vole sites have been found between 5,397 and 8,399 feet in elevation in the Hualapai Mountains (USFWS 1991). At the time the recovery plan was completed (following a somewhat dry period), the total area of known occupied habitat was believed to be as small as 314 acres within an area approximately four miles from east to west and 15 miles from north to south, roughly centered along the main ridge of the mountain range. Further surveys (Kime et al 1994, 1995; Boyett 2001) have extended their range to an area approximately 7 by 18 miles. These surveys also showed that the subspecies occurs at more sites and in more varied habitat types within the Hualapai Mountains than was previously thought.

At the time of the recovery plan, the Hualapai Mexican vole was generally associated with moist grass-sedge areas along permanent or semi-permanent waters fed by springs or seeps in either open forest or chaparral. Good cover of grasses, sedges, and forbs was characteristic of this waterside vole habitat, which is found in narrow bands paralleling watercourses. Kime *et al.* (1995) found that voles also use dry grassy areas on moderate to steep slopes with mainly north-facing aspects. Gambel oak was present at most capture sites and ponderosa pine was present at

these sites or in adjacent areas. New Mexico locust (*Robinea neomexicana*), mountain snowberry (*Symphoricarpos oreophilus*), and other plants were identified as frequently occurring at occupied habitat sites. Vole sites were also characterized by aspect, ranging from 290 to 114 degrees, and slope ranging from 0 to 41 percent.

The presence or absence of *Microtus* is likely determined by vegetation more than any other single environmental factor (Rose and Birney 1985). The presence of fairly dense grass cover is considered important, if not critical, for this subspecies. Boyett (2001) found a strong relationship between the local distribution of Hualapai Mexican voles and the microhabitat. He found that Hualapai Mexican voles were associated with areas in which understory trees and abundant grass, forb, and low shrub cover were present.

Microtus diets usually consist of green plant material when it is available. Observations from runway surveys in the Hualapai Mountains suggest that this subspecies has a typical vole diet of forbs and grasses (USFWS 1991).

Reproductive characteristics of the Hualapai Mexican vole are assumed to be similar to those of other *M. mexicanus* subspecies, which have relatively small litters. Pregnant females of *M. mexicanus* are present from at least late spring through summer (USFWS 1991). Limited data from New Mexico suggest that *M. mexicanus* has a "seasonally restricted" breeding period between May and November; however, pregnant *M. mexicanus* were captured in Coahuila, Mexico in January in 1956 (Keller 1985). Keller (1985) suggests that the characterization of *M. mexicanus* as a seasonally restricted breeder should be tentative, pending further data collection.

Population levels of other *Microtus* fluctuate on annual and perennial cycles, and this is likely the case for Hualapai Mexican voles (USFWS 1991). Hualapai Mexican vole cycles may correspond with precipitation and the resulting growth of vegetation (Spicer *et al.* 1985). To date, estimations of population sizes and/or stability have not been made or are not available. In 1998, survey results suggested that vole populations are capable of increasing rather rapidly in response to favorable rainfall. After abundant rainfall in the winter of 1997-98, voles were documented at several new localities, including some in habitats not previously considered to be typical for the vole (e.g., shrub dominated areas and areas with no woody vegetation), and were more easily observed than in prior years (R. Winstead, AGFD, pers. comm. 2001). Boyett (2001) found Hualapai Mexican voles in both xeric and mesic areas, such as open grass-shrub covered slopes and grass-sedge vegetation along drainages, respectively, consistent with previous observations (Getz 1985, Spicer *et al.* 1985, Kime *et al.* 1995).

Most known Hualapai Mexican vole habitat is now excluded from cattle grazing. Near the northern end of the vole's distribution, an exclosure comprising about ten sections of BLM-administered, Mohave County (Hualapai Mountain County Park), and private land encompasses nearly half of all known sites, and probably more than half of the total area of known habitat. An approximately 2200-acre exclosure protects a cluster of sites at Pine Flat, an area of fairly heavy recreational use. A 10-acre exclosure in Crow Canyon protects the southernmost and easternmost known locality. A partial exclosure, using fencing and natural barriers, is intended to preclude livestock access to vole habitat on and around Pine Peak. Preliminary monitoring

indicates that this partial exclosure has been effective at excluding livestock for the past two years. On the Yellow Pine Allotment, BLM has installed a small exclosure around Jeep Spring and a partial exclosure that protects habitat above Jeep Spring. Outside of the Yellow Pine Allotment, two known Hualapai Mexican vole localities are currently open to livestock grazing. These are at Dean Peak (the northernmost known locality, on Arizona State land) and Wabayuma Peak (the westernmost known locality, within a BLM wilderness area).

Lesser long-nosed bat

We listed the lesser long-nosed bat (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in a Federal Register notice, dated September 30, 1988 (USFWS 1988). Critical habitat has not been designated for this species.

The lesser long-nosed bat is a small, leaf-nosed bat with a long muzzle, a long tongue, and hovering flight ability. These features are adaptations to feed on nectar from the flowers of columnar cacti, such as the saguaro and organ pipe cactus, and from paniculate agaves, such as Palmer's agave (*Agave palmeri*), and Parry's agave (*A. parryi* Hoffmeister 1986), *A. desertii* (Engelman 1875), and *A. schotti.*

The lesser long-nosed bat is migratory and does not appear to hibernate. It is found throughout its historical range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County), and south to the international boundary. Roosts in Arizona are occupied from late April to September (Cockrum and Petryszyn 1991); the bat has only rarely been recorded outside of this time period in Arizona (USFWS 1995, Hoffmeister 1986). In spring, adult females, most of which are pregnant, arrive in Arizona and gather into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar cacti. The colonies disband in July and August after the young are weaned; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains and recently the Galiuro Mountains (T. Snow, pers. comm. 2000) but they also occur with adult females and young of the year at maternity sites (USFWS 1995). Throughout the night between foraging bouts, both bats of sexes will rest in temporary night roosts (Hoffmeister 1986).

Potential threats which may contribute to the decline of lesser long-nosed bat populations are excess harvesting of agaves in Mexico, the collection of cacti in the U.S., the conversion of habitat for agricultural uses, livestock grazing, wood-cutting, and other development. This species of bat is particularly vulnerable to disturbances due to many individuals using only a small number of communal roosts.

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall is Palmer's agave, which typically occurs on rocky slopes or hill tops, scattered

within the desert grassland and oak woodland communities within the elevation range of 3,000 to 6,000 feet (Gentry 1982). Parry's agave reaches higher elevations than Palmer's, extending from grasslands into oak woodland, chaparral, pine-oak forests, and mixed conifer with an elevation range of approximately 4,900 to 8,200 feet (Gentry 1982). Like Palmers' agave, Parry's is typically found on rocky slopes (Gentry 1982). Concentrations of paniculate agaves are generally found on the rocky, shallow soils of hills and ridges. Palmer's and Parry's agaves are also found scattered in areas of deep, heavy soils within grasslands or where there may be thick stands of shrubs, mesquite, oak, and other trees.

The ecology of Palmer's agave appears to be poorly understood, especially how it is affected by livestock use and fire (L. Slauson, pers. comm. 1997; W. Hodgson, pers. comm. 1997). Agaves are perennial succulents. Agave seeds germinate readily with adequate moisture, typically in open areas with limited competition from other plants (T. Burgess, pers. comm. 1997). Palmer's agave is relatively slow growing, often taking 20 or more years before initiating the single reproductive event in its life (Slauson 1996, 1999). A flowering stalk erupts from the rosette of a mature plant, growing rapidly through the spring and early summer. During the summer, 8 to 12 flowering panicles are displayed on the upper third of a stalk, three to five feet tall (Gentry 1982). Slauson (1996, 1999) completed a pollination ecology study of Palmer’s agave, finding that many pollinator species contribute to establishing seed set. Lesser long-nosed bats have been recorded visiting individual blooming Palmer's agaves more than 1,000 visits per night (R. Sidner, pers. comm. 1997; Y. Petryszyn, pers. comm. 1999), while they may not visit other agaves at all (L. Slauson, pers. comm. 1997). Bat visits generally last less than one second (Slauson 1999). Apparently there are many factors that influence the year a particular plant may bloom, with precipitation levels one to several years before blooming of special importance. In the Peloncillo Mountains, about 2 to 5 percent of the agave population flowers each year (P. Warren, pers. comm. 1997). Palmer's agave may occasionally produce off-sets (vegetative reproduction or cloning of "pups" produced from rhizomes) though this is less likely than for many other agave species (W. Hodgson, pers. comm. 1997). Parry's agave freely produces off-sets (Gentry 1982).

The importance of Parry’s agave, as well as desert agave and amole, as a forage resource for *Leptonycteris* bats is unknown. Parry’s agave generally occurs at higher elevations than Palmer’s agave, and occurs in forest openings. Benson and Darrow (1982) note that it typically flowers in June and early July, which is before the lesser long-nosed bat arrives at roosts in southeastern Arizona. Jim Rorabaugh (USFWS 1999) noted many Parry’s agave in flower high in the Huachuca Mountains on the crest trail during late July in 1997. It may be that agaves at higher elevations bloom later than at lower sites, and could potentially be blooming and be used as a forage resource when lesser long-nosed bats arrive in July or early August. Parry’s agave may be very important as a forage plant for those bats that arrive in southeastern Arizona during late spring and early summer.

The lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. These bats often forage in flocks. Nectar of these cacti and agaves is a high-energy food. Concentrations of some food resources appear to be patchily distributed on the landscape, and the nectar of each plant species used is

only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, semi-desert grasslands and shrublands, and into the oak woodland (Gentry 1982).

Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. Seasonally available food resources may account for the seasonal movement patterns of the bat. This bat species is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles and in Mexico at 25 miles and 38 miles, one way (V. Dalton, pers. comm. 1997; Y. Petryszyn, pers. comm. 1997). Data suggests that a substantial portion of the lesser long-nosed bats at the Pinacate Cave in Sonora fly 25 to 31 miles each night to foraging areas in Organ Pipe Cactus National Monument (USFWS 1995). Horner *et al.* (1990) found that lesser long-nosed bats commuted 15.5 miles between an island maternity roost and the mainland in Sonora. The authors suggested that bats regularly flew at least 47 miles each night. Nightly mobility studies via radio-tracking were conducted on lesser long-nosed bats at Bahia Kino, Sonora, Mexico, in 1989 and 1990 (Sahley *et al*. 1993 and unpubl. data). The bats fed on the Mexican mainland and flew for six hours to roost each night on Isla Tiburon, a round trip of about 100 to 125 miles (USFWS 1995). Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (Y. Petryszyn, pers. comm. 1997).

In her study of the foraging ecology of lesser long-nosed bats, Ober *et al.* (2000) found that bats flew an average of 11.3 miles from their day roosts to their core-use areas. The bats spent the majority of the night foraging in these core-use areas before returning to their day roosts in the morning. Core-use areas are defined as the smallest area that accounted for 50 percent of locations collected for each individual (n= 60) throughout 1998 and 1999. Core-use areas are estimated to range in size from 7.4 to 103.7 acres. Home ranges were also calculated; they are defined as the smallest area that accounted for 95 percent of all locations collected for each bat. Home ranges varied widely, from 430 to 12,992.5 acres.

Data from Ober *et al*. (2000) found that home range size did not vary with changes in density of flowering *A. palmeri* or with density of both live and dead standing agave inflorescences. The density of flowering and dead standing agave in home ranges of adult bats was greater than that available in the surrounding landscape, indicating that bats seem to select areas that have high food abundance as well as evidence of high food abundance in previous years. The density of flowering *A. palmeri* (plants/ha) inside bat home ranges was 2.6 to 5.4 in 1998 and 0.2 to 3.0 in 1999. Despite this variation in agave flowering density, the sizes of home ranges and core use-areas were similar for bats in those years. This suggests that the size of home ranges and core use-areas are not strongly influenced by fluctuations in resource abundance (Ober *et al*. 2000). The bats did exhibit site fidelity.

Lesser long-nosed bats typically consume 150 percent of their body mass in nectar per night in captivity (Ober *et al*. 2000). The small size of individual *A. palmeri* flowers force bats to visit many flowers each night. *Agave palmeri* flowers produce nectar for five consecutive nights, and

each stalk can produce 1,600 to 2,240 flowers during the flowering season (Slausen 1999). Agaves in a patch will flower asynchronously; therefore, a patch of agaves can provide rich nectar resources for weeks. This likely explains why data from Ober *et al*. (2000) showed observations of bats returning to the same core-use areas on consecutive nights.

We define a roost as any cave, mine, building, etc, that is used by any number of bats, anytime. A maternity roost is a site where pregnant bats give birth and raise their young. A primary roost is a site with greater than 50 bats documented on a fairly regular basis, and for which we have relatively recent data. A large roost is a site with about 450 or greater bats. A small roost is a site with less than 50 bats documented in use, and for which available information is 20 or more years old.

Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, has contributed to the current endangered status of the species. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (USFWS 1995). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the factors are that determine selection of roost locations, the species appears to be sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days; however, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interactions with other bat species may also influence lesser long-nosed bat roost requirements.

There were 16 known large roost sites in Arizona and Mexico in 1995 (USFWS 1995). According to surveys conducted in 1992 and 1993, the estimated number of bats occupying these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by over 150,000 lesser long-nosed bats, and of these, just over 100,000 are found at just one natural cave at Pinacate National Park, Sonora, Mexico (Cockrum and Petryszyn 1991). Disturbance of these and other large (greater than 450 bats) roosts, or removal of the food plants associated with them, could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species (USFWS 1995).

Desert tortoise (Mojave population)

On August 4, 1989, we published an emergency rule listing the Mojave population of the desert tortoise as endangered (USFWS 1989). On April 2, 1990, we determined the Mojave population of the desert tortoise to be threatened (USFWS 1990). The Mojave population includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Sonoran Desert in California. Reasons for the determination included loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and off-highway vehicle (OHV) activity have degraded additional habitat. Also cited as threatening the desert

tortoise's continuing existence were illegal collection by humans for pets or consumption, upper respiratory tract disease (URTD), predation on juvenile desert tortoises by common ravens (*Corvus corax*) and kit foxes (*Vulpes macrotis*), and collisions with vehicles on paved and unpaved roads. Fire is an increasingly important threat to desert tortoise habitat. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s. Fires in Mojave Desert scrub degrade or eliminate habitat for desert tortoises (Appendix D of USFWS 1994).

The desert tortoise is a large, herbivorous, hard-shelled reptile found in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. Desert tortoises reach eight to 15 inches in carapace length. Adults have a domed carapace and relatively flat, unhinged plastron. Shell color is brownish, with yellow to tan scute centers. The forelimbs are flattened and adapted for digging and burrowing. Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 2 to 8 inches, where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner 1982, Turner and Brown 1982). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982).

Desert tortoises are most active during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rainstorms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. The size of desert tortoise home ranges varies with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 25 to 200 acres (Berry 1986). Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than seven miles at a time (Berry 1986). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for tortoise survival. During droughts, tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators. Desert tortoises possess a combination of life history and reproductive characteristics that affect the ability of populations to survive external threats. Tortoises may require 20 years to reach sexual maturity (Turner *et al*. 1984, Bury 1987).

The desert tortoise is most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, it is found in succulent scrub, cheesebush scrub, blackbrush scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub, and scrub-steppe vegetation types of the desert and semidesert grassland complex (USFWS 1994). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and overwintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Region, tortoises occur most commonly on gently sloping terrain with soils ranging from sand to sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, tortoises can be found in steeper, rockier

areas. In Arizona, tortoises are considered to be active from approximately March 15 through October 15. Further information on the range, biology, and ecology of the desert tortoise can be found in Berry *et al.* (1984), Burge (1978), Burge and Bradley (1976), Bury (1982), Bury and Germano (1994), Bury *et al*. (1994), Germano *et al*. 1994, Hovik and Hardenbrook (1989), Karl (1981, 1983a, 1983b), Luckenbach (1982), USFWS (1994), and Weinstein *et al*. (1987).

Data collected at permanent study plots indicate that tortoise populations have declined both in numbers of tortoises found during surveys and in densities of live tortoises at most sites since the plots were first established 20 to 30 years ago (Brown *et al*. 1999, Berry *et al*. 2002). Declines of greater than 50 percent and up to 96 percent have occurred regardless of initial tortoise densities. Increases in shell-skeletal remains have been found to correspond with declines in numbers and densities of live tortoises (with the exception of certain plots where poaching has been documented) (Berry 2003).

Declines in tortoise densities appear to correspond with increased incidence of diseases in tortoise populations at several sites. The Goffs permanent study plot suffered 92 to 96 percent decreases in tortoise density between 1994 and 2000 (Berry 2003). The high prevalence of disease in Goffs tortoises likely contributed to this decline (Christopher *et al*. 2003). URTD has not yet been detected at permanent study plots in the Sonoran Desert of California, but is prevalent at study plots across the remainder of the species' range (Berry 2003) and has been shown to be a contributing factor in population declines in the western Mojave Desert (Brown *et al.* 1999, Christopher *et al*. 2003). High mortality rates at permanent study plots in the northeastern and eastern Mojave and Sonoran Deserts appear to be associated with incidence of shell diseases in tortoises (Jacobson *et al.* 1994). Low levels of shell diseases were detected in many populations when the plots were first established, but were found to increase during the 1980s and 1990s (Jacobson *et al*. 1994, Christopher *et al*. 2003). A herpesvirus has recently been discovered in desert tortoises, but little is known about its effects on tortoise populations at this time (Berry *et al*. 2002, Origgi *et al*. 2002).

Disease is a natural phenomenon in wild populations of animals, and can contribute to population declines by increasing mortality and reducing reproduction; however the effects of disease may be enhanced by natural and/or anthropogenic changes in habitat. For example, the proliferation of alien plants within the range of the tortoise has had far-reaching impacts on tortoise populations. Tortoises have been found to prefer native vegetation over aliens (Jennings 1993). Alien annual plants in desert tortoise critical habitat in the western Mojave Desert were found to compose greater than 60 percent of the annual biomass (Brooks 1998). The reduction in quantity and quality of forage may stress tortoises and make them more susceptible to drought- and disease-related mortality (Jacobson *et al*. 1991, Brown *et al*. 1994). In addition, malnutrition has been associated with several disease outbreaks in both humans and turtles (Borysenko and Lewis 1979).

Over the past few decades, alien annual grasses have become more abundant and widespread in the Mojave Desert. Their spread has been associated with a concomitant increase in fire frequency and intensity that has resulted in the conversion of large tracts of desert scrub into alien annual grassland that is less suitable for tortoises (Brooks and Berry 1995). Prior to the

spread of alien annual grasses, fires in desert scrub vegetation burned out quickly due to the naturally patchy distribution of plants and open space. Alien annual grasses provide sufficient fuel to carry fires, especially in the intershrub spaces that are mostly devoid of native vegetation (USFWS 1994, Brooks 1998, Brown and Minnich 1986). Dry lightning storms provide a natural ignition source for fires; however increased human activity in tortoise habitat has also contributed to increased fire frequency due to human caused fires, especially near towns and roads (Tracy 1994). Areas that have been burned by especially hot fires or that have burned repeatedly no longer support desert tortoises. The proliferation of alien annual plants and frequency of fire may increase in the future due to increased levels of urbanization and atmospheric nitrogen and carbon dioxide (Brooks and Esque 2002).

On February 8, 1994, we designated approximately 6.4 million acres of critical habitat for the Mojave population of the desert tortoise in portions of California, Nevada, Arizona, and Utah (59 FR 5820-5846, also see corrections at 59 FR 9032-9036), which became effective on March 10, 1994. Critical habitat is designated by the FWS to identify the key biological and physical needs of the species and key areas for recovery, and focuses conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the primary constituent elements of critical habitat, consisting of the biological and physical attributes essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats.

Effects analyses must determine if the proposed action would destroy or adversely modify proposed critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). The primary constituent elements identified in the final rule (USFWS 1994) as necessary for the survival and recovery of the desert tortoise include, but are not limited to, the habitat components which provide the following:

> Sufficient space to support viable populations within each of the six recovery units (RUs), and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

A total of 338,700 acres were designated as critical habitat in Arizona. Critical habitat units (CHUs) were based on recommendations for Desert Wildlife Management Areas (DWMAs) outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (USFWS 1993). These DWMAs are also identified as "desert tortoise areas of critical environmental concern (ACECs)" by the BLM. Because the CHU boundaries were drawn to optimize reserve design, the CHU may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements.

On June 28, 1994, we approved the final Desert Tortoise Recovery Plan (USFWS 1994). The Desert Tortoise Recovery Plan (Recovery Plan) divides the range of the desert tortoise into 6 RUs and recommends establishment of 14 DWMAs throughout the RUs. Within each DWMA, the Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the Recovery Plan recommends that land management within all DWMAs should restrict human activities that negatively impact desert tortoises (U.S. Fish and Wildlife Service 1994). DWMAs/ACECs have been designated by the BLM through development or modification of their land use plans in Arizona, Nevada, Utah, and parts of California. In Arizona, desert tortoise habitat is managed primarily under the Mojave Amendment to the BLM's Arizona Strip Resource Management Plan that was prepared to implement the Recovery Plan. The BLM Arizona Strip Field Office designated 167,065 acres of desert tortoise habitat as ACECs.

Information contained in the following summary of desert tortoise RUs was obtained primarily from the Recovery Plan (USFWS 1994). RUs are presented in order from greatest to least degree of threats.

The Western Mojave RU is located completely in California and is exceptionally heterogeneous and large, with elevations ranging from 1,500 to over 6,000 feet. It includes the Western Mojave, Southern Mojave, and Central Mojave regions, each of which has distinct climatic and vegetational characteristics. Unlike all other RUs, rainfall in the West Mojave RU occurs primarily in the fall and winter and produces winter annuals that are the main food source of tortoises. Above ground activity coincides with the availability of winter annuals in the spring. Tortoises in this RU occupy flats, valleys, mountainous slopes, rock outcrops, badlands, sand dunes, lava flows, alluvial fans, and rolling hills. Vegetation in this unit is characterized by creosote bush scrub, Mojave saltbush-allscale scrub, Indian rice grass scrub-steppe, hopsage scrub, big galleta scrub-steppe, cheesbush scrub, blackbrush scrub, and psammophytic (dune sand plant) communities. Many major threats in this RU are related to the heavy human use the area receives. Major threats not common to all RUs include collecting, vandalism, uncontrolled dogs, OHV activity, urban and residential development, raven predation, cattle and sheep grazing, mining, limited military activities, limited agricultural development, and fragmentation and mortality caused by highways, roads, and railroads.

The Northeastern Mojave RU occurs primarily in Nevada, but it also extends into California along the Ivanpah Valley and into extreme southwestern Utah and northwestern Arizona. Vegetation within this unit is characterized by creosote bush scrub, big galleta scrub-steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations). Topography is varied, with flats, valleys, alluvial fans, washes, and rocky slopes. Much of the northern portion of the RU is characterized as basin and range, with elevations from 2,500 to 12,000 feet. Desert tortoises in this RU typically eat summer and winter annuals, cacti, and perennial grasses. Major threats not common to all RUs include sheep and cattle grazing, mining, agricultural development, utility corridors, limited military activities, OHV activity, and fragmentation and

mortality caused by highways and roads. The increase in alien annuals is a particularly important threat in certain areas of this RU.

The Eastern Mojave RU is located primarily in California, but it also extends into Nevada, with elevations ranging from 1,600 to over 4,700 feet. Tortoises in this RU are active in late summer, early fall, and spring due to the winter and summer rains that support two distinct annual floras. Tortoises typically feed on summer and winter annuals, cacti, perennial grasses, and herbaceous perennials. Vegetation in this unit is characterized by big galleta scrub-steppe, succulent scrub, creosote bush scrub, cheesebush scrub, and Indian rice grass scrub-steppe communities. Tortoises in this RU occupy flats, valleys, alluvial fans, bajadas, and rocky slopes. Major threats not common to all RUs include OHV activity, urban and residential development, cattle grazing, raven predation, utility corridors, mining, vegetation harvest, and fragmentation and mortality caused by highways, roads, and railroads.

The Upper Virgin River RU encompasses all desert tortoise habitats in Utah except the Beaver Dam Slope, Utah population. This RU encompasses the extreme northeastern edge of the species' range where tortoises experience long, cold winters and mild summers during which tortoises are continually active. Topography is complex, consisting of canyons, mesas, sand dunes, and sandstone outcrops. Vegetation within this unit is a transitional mixture of sagebrush scrub, creosote bush scrub, blackbrush scrub, and psammophytic (dune sand plant) communities. Tortoises typically feed on summer and winter annuals, perennial grasses, and some cacti. Due to the small size of this RU, intensive management will be necessary, even after recovery, to ensure a reasonable probability of long-term population persistence. Major threats not common to all RUs include the loss of habitat due to development in adjacent communities, OHV activity, cattle grazing, and fragmentation and mortality caused by highways and roads.

The Eastern Colorado RU is also located completely in California. Tortoises in this RU occupy well-developed washes, desert pavements, piedmonts, flats, valleys, alluvial fans, and rocky slopes. Vegetation within this unit is characterized by relatively species-rich succulent scrub, creosote bush scrub, and blue palo verde-ironwood-smoke tree communities. Plant communities are typical of the Sonoran Desert, with elevations ranging from 400 to 4,500 feet. Tortoises typically feed on summer and winter annuals and some cacti. Major threats not common to all RUs include OHV activity, military activities, raven predation, vandalism, domestic sheep grazing, agricultural development, mining, and fragmentation and mortality caused by highways, roads, railroads, and diversion dikes along InterState 10.

The Northern Colorado RU is located completely in California. Topography in this RU includes flats, valleys, bajadas, desert pavements, rocky slopes, and washes. Tortoises typically feed on both summer and winter annuals. Vegetation within this unit is characterized by succulent scrub, creosote bush scrub, and blue palo verde-smoke tree communities. This unit includes elements of both Sonoran Desert and Mojave Desert floras, with elevations ranging from about 600 to 4,700 feet. Major threats not common to all RUs include cattle and wild burro grazing, and fragmentation and mortality caused by highways, roads, and the Colorado River Aqueduct.

Recovery of the desert tortoise may occur at the RU level, which allows populations within each

of the six recovery units to be recovered and delisted individually. Similarly, the jeopardy and adverse modification standards may be applied within or across RUs; thus, proposals to implement the Recovery Plan in portions of an RU cannot be evaluated with regard to jeopardy or adverse modification in a section 7 consultation without an understanding of proposed or existing management prescriptions occurring elsewhere in the RU.

Long-term monitoring of desert tortoise populations is a high priority recovery task as identified in the Recovery Plan. From 1995 to 1998, pilot field studies and workshops were conducted to develop a monitoring program for desert tortoise. In 1998, the Desert Tortoise Management Oversight Group chose line distance sampling as the appropriate method to determine rangewide desert tortoise population densities and trends. Monitoring of populations using this method is underway across the range of the desert tortoise. Successful rangewide monitoring will enable

managers to evaluate the overall effectiveness of recovery actions and population responses to these actions, thus guiding recovery of the Mojave desert tortoise.

Although recovery of the tortoise will focus on DWMAs/ACECs, section II.A.6 in the Recovery Plan and section 2(b) of the ESA provide for protection and conservation of ecosystems on which Federally listed threatened and endangered species depend, which includes both recovery and non-recovery areas. The Mojave Desert ecosystem, of which the desert tortoise and its habitat are an integral part, consists of a dynamic complex of plant, animal, fungal, and microorganism communities and their associated nonliving environment interacting as an ecological unit (Noss and Cooperrider 1994). Actions that adversely affect components of the Mojave Desert ecosystem may directly or indirectly affect the desert tortoise. The Recovery Plan further States that desert tortoises and habitat outside recovery areas may be important in recovery of the tortoise. Healthy, isolated tortoise populations outside recovery areas may have a better chance of surviving catastrophic effects such as disease, than large, contiguous populations (U.S. Fish and Wildlife Service 1994).

The General Accounting Office Report titled *Endangered Species: Research Strategy and Long-Term Monitoring Needed for the Mojave Desert Tortoise Recovery Program* (U.S. General Accounting Office 2002) directed the FWS to periodically reassess the Recovery Plan to determine whether scientific information developed since its publication could alter implementation actions or allay some of the uncertainties about its recommendations. In response to the GAO report, Interior Appropriation Congressional directed language, and in light of new information, the FWS initiated a review of the current Recovery Plan. In March 2003, the Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) was assembled to review the existing 1994 Recovery Plan and prepare an Assessment Report that will recommend where and to what degree the Recovery Plan needs to be revised. The final report will be used as the basis for revising the Recovery Plan.

The Draft Desert Tortoise Recovery Plan Assessment (USFWS 2004) determined that no data or analyses are currently effective for estimating status or trends in tortoise populations, habitat of tortoise in RUs, or threats to tortoise regionally. The assessment did however conclude that available data for the Western Mojave RU yielded a significantly negative trend in adult density estimates over time. Information in our files indicates that tortoise populations continue to decline range-wide.

New Mexico ridge-nosed rattlesnake

We listed the New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*) as a threatened species on August 4, 1978 (USFWS 1978). Critical habitat was also designated in Bear, Spring, and Indian canyons of the Animas Mountains from 6,048 to 8,320 feet elevation. The species has a very limited range and is threatened by habitat destruction and alteration and collecting. At the time of listing, this subspecies was not known to occur in the Peloncillo Mountains that lie across the border of New Mexico and Arizona, but has since been found in the range.

The New Mexico ridge-nosed rattlesnake is a small (maximum of 2.19 feet total length) montane species known only from the Animas Mountains, Hidalgo County, New Mexico; Peloncillo

Mountains, Hidalgo County, and Cochise County, Arizona; and the Sierra San Luis, Sonora and Chihuahua, Mexico (Campbell *et al.* 1989, Painter 1995, Degenhardt *et al.* 1996, Keegan *et al.* 1999). *Crotalus willardi obscurus* is one of five subspecies of the ridge-nosed rattlesnake found from montane areas of southeastern Arizona and southwestern New Mexico, south through the Sierra Madre to Zacatecas, Mexico. The first specimen of *C. w. obscurus* was collected by ornithologist Joe Marshall in the Sierra San Luis in 1952 (Greene 1997, Marshall 1957). The first collection from the Animals Mountains was in 1957 (Bogert and Degenhardt 1961). *C. w. obscurus* was first discovered in the Peloncillo Mountains in the form of an apparent hybrid *Crotalus willardi X lepidus* collected in 1987 (Campbell *et al.* 1989). The subspecies was first documented in the Arizona portion of the Peloncillo Mountains on October 24, 1996. *C. w. obscurus* may also occur in the Sierra Pulpita in Chihuahua (Barker 1991). Early collections were referred to as *C. w. silus.* Harris (1974) first used the name *C. w. obscurus* for specimens collected from the Animas Mountains. *C. w. obscurus* is closely related to *C. w. silus*, but the two can be distinguished based on a variety of scalation and coloration traits; the two are also distinct biochemically (Harris and Simmons 1976, Barker 1992).

Crotalus willardi obscurus is an inhabitant of insular woodlands that were more widespread and continuous during Pleistocene glaciation events (Maldonado-Koerdell 1964, Barker 1992, Van Devender 1995). A Pleistocene fossil *Crotalus willardi* from the San Pedro River Valley (Mead 1975) suggests ridge-nosed rattlesnakes tracked the distribution of the woodlands. When climates warmed and became drier, the ranges of this and other montane woodland reptiles, such as *Elgaria kingii*, *Eumeces callicephalus*, *Phrynosoma douglasii,* presumably contracted with that of the woodland communities and are now isolated on mountain tops in the Madrean region. Isolation and subsequent evolution have contributed to subspecific differences within *Crotalus willardi* (Barker 1992). *Crotalus willardi obscurus* has been found in steep, rocky canyons with intermittent streams or on talus slopes at elevations ranging from approximately 5,200-8,500 feet (Campbell *et al.* 1989, Barker 1991, Painter 1995, Degenhardt *et al.* 1996, A. Holycross, Arizona State University, pers. comm., 1997), and likely occurs as low as 5,000 feet in the Peloncillo Mountains (Holycross 1999).

Females mate in summer or fall, ovulation and fertilization probably occurs early the subsequent spring, followed by a 4-5 month gestation. Young snakes are live born probably in late July through August (Holycross and Goldberg 2001). Mean litter size is 5.4, litter sizes for *C. willardi* range from 2-9 (Applegarth 1980, Holycross and Goldberg 2001). Fecal samples from 246 New Mexico ridge-nosed rattlesnakes and a literature record identified 95 identifiable prey species. Juvenile snakes primarily feed on spiny lizards (*Sceloporus* sp.) and centipedes (*Scolopendra* spp.), and some juveniles exhibit fellow tails that may be used to lure prey (Holycross 2000). Adults prey mostly on small mammals, spiny lizards, and passerine birds (Holycross *et al.* 2002). Based on more limited samples, other workers have come to similar conclusions regarding the diet of *C. w. obscurus* (Applegarth 1980, Barker 1991).

The subspecies occurs in three (or more), small disjunct populations. As a result, its viability is sensitive to habitat destruction or modification, and collection. After publication of the Animas locality in 1961 (Bogert and Degenhardt 1961), the area was reportedly heavily collected. Harris

and Simmons (1976) reported encountering 15 collectors from six States during August 1974 in the Animas Mountains. FWS (1985) estimated that as many as 130 New Mexico ridge-nosed rattlesnakes may have been collected in the Animas Mountains between 1961 and 1974. Collection during this period may have significantly affected the Animas population (Harris and Simmons 1976, USFWS 1985). The Animas Mountains are privately owned, access to habitat areas is now strictly controlled, and the *C. w. obscurus* population there is now protected from collection. The majority of the subspecies' suitable habitat in the Peloncillo Mountains is managed by the Coronado National Forest and the BLM and is open to public use, providing greater opportunities for the detriment of illegal collection.

Fire is an important threat to the subspecies and its woodland habitat (Smith *et al.* 2001, Barker 1991). Large, high intensity, stand-replacing fire occurred in the snake's habitat in the Animas Mountains in 1989 (Swetnam and Baisan 1996) and in the Sierra San Luis in 1989 (Barker 1991) and before 1952 (Marshall 1957). The 1997 escaped Maverick prescribed fire in the Peloncillo Mountains burned woodlands at high intensities in two of the 12 areas where *C. w. obscurus* had been observed in that mountain range. Overgrazing can result in negative effects for the subspecies (USFWS 1985, 1999) due to reduction in snake hiding cover and prey cover and habitat reduction and alteration, and mining, commercial and recreational development, and logging practices remain potential threats (USFWS 1985). J. Jarchow [pers. comm. in Johnson (1983)] found that *C. w. willardi* suffers from a variety of diseases and pathogenic organisms; however, there is no evidence documented that shows ridge-nosed rattlesnake populations are threatened by disease (USFWS 1985). Relatively small litter size and long female reproductive cycles suggest that New Mexico ridge-nosed rattlesnake populations are not capable of rapid growth, making them particularly sensitive to factors causing population decline (Holycross 2001, Holycross and Goldberg 2001).

Further information on the taxonomy, range, distribution, biology, and threats to the New Mexico ridge-nosed rattlesnake can be found in Applegarth (1980), Barker (1992, 1991), Campbell *et al.* (1989), Degenhardt (1972), Degenhardt *et al.* (1996), Johnson (1983), Painter (1995), Holycross (2002, 2000, 1998, 1996, 1995a & b), Holycross and Douglas (1997), Holycross and Goldberg (2001), and Smith *et al.* (2001).

Gila chub

We proposed the Gila chub for listing as endangered with critical habitat on August 9, 2002 (USFWS 2002). Historically, Gila chub have been recorded from rivers, streams, and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona, and northern Sonora, Mexico (Miller and Lowe 1967, Rinne and Minckley 1970, Minckley 1973, Rinne 1976, DeMarais 1986, and Propst 1999, Weedman *et al.* 1996). Today the Gila chub has been restricted to small, isolated populations scattered throughout its historical range.

Decline of Gila chub is due to habitat loss from past and current dewatering of rivers, springs, and cienegas (e.g. from diversions, impoundments, and groundwater pumping), poor land

management practices (e.g. livestock grazing) resulting in erosion and arroyo formation, and the concomitant introduction of predacious and competing nonindigenous fish species (Miller 1961, Minckley 1985). Life history information can be found in the status review (Weedman *et al.* 1996), the proposed rule (USFWS 2002), and references cited there.

The Gila chub is a small-finned, deep-bodied, chunky, darkly colored member of the minnow family Cyprinidae. Adult males average about 6 inches in total length; females can exceed 8 inches. Gila chub commonly inhabit pools in smaller streams, springs, and cienegas, and can survive in small artificial impoundments (Miller 1946, Minckley 1973, Rinne 1975). Highly secretive, preferring quiet, deeper waters, especially pools, or remaining near cover like undercut banks, terrestrial vegetation, boulders, and fallen logs, they feed on large and small aquatic and terrestrial invertebrates and sometimes other small fishes, organic debris, aquatic plants and diatoms (Rinne and Minckley 1991).

Gila chub occur in New Mexico only in Turkey Creek (Grant County); in Arizona, they occur in Indian, Larry, Little Sycamore, Silver, Spring, Sycamore, and Walker creeks and Lousy Canyon (Yavapai County), Sabino Canyon (Pima County), Sheehy Spring (Santa Cruz County), Cienega Creek (Pima and Santa Cruz Counties), Redfield and Bass canyons (Graham and Cochise Counties), Babocomari River (Santa Cruz and Cochise counties), the San Carlos and Blue rivers, (Gila and Graham counties), Harden Cienega and Dix creeks, (Greenlee County), Eagle Creek (Graham and Greenlee Counties), and Bonita Creek (Graham County); in Mexico, Gila chub occur in Cienega los Fresnos and Cienega la Cienegita (Varela-Romero *et al.* 1992, Weedman *et al.* 1996).

Of all the known extant Gila chub populations, most are small. Only one, Cienega Creek, is considered stable and secure; about two thirds are considered stable but threatened, and a third are unstable and threatened (Weedman *et al.* 1996). Reestablishment of Gila chub has been attempted in three Arizona sites; two are believed to be extant, Lousy Canyon and Larry Creek, tributaries to the Agua Fria River.

Our records indicate that, rangewide, seven informal or formal consultations have been completed or are underway for actions affecting Gila chub (Table 5).

Gila chub Proposed Critical Habitat

Proposed critical habitat for Gila chub includes approximately 333.6 km (207.8 mi) of stream reaches in Arizona and New Mexico, organized into seven river units. The stream segments within each of the seven units are defined longitudinally by upstream and downstream limits (see USFWS 2002) and laterally by the area of bankfull width of the particular stream, plus 300 feet on either side of the stream's edge at bankfull (see Rosgen 1996 for a discussion of bankfull). Briefly, the seven units are: the Upper Gila River Unit, that includes Turkey Creek in Grant County New Mexico, and Dix, Harden Cienega, Eagle, and East Eagle Creeks in Graham and Greenlee counties, Arizona; the Middle Gila River Area, that includes Mineral Creek, Blue River and Bonita Creek in Gila and Maricopa counties, Arizona; the Babocomari River Area, that

includes O'Donnell Canyon, and Turkey Creek/Post Canyon Creek in Cochise County, Arizona; the Lower San Pedro River Area, that includes Bass, Hot Springs, and Redfield canyons in Cochise, Graham, and Pima counties, Arizona; the Lower Santa Cruz River Area, that includes Cienega Creek, Mattie Canyon, Empire Gulch, and Sabino Canyon in Pima County, Arizona; the Upper Verde River Area, that includes Walker Creek, Red Tank Draw, Spring Creek, and Williamson Valley Wash in Yavapai County, Arizona; and the Agua Fria River Area that includes Little Sycamore, Sycamore, Indian, Silver, and Larry creeks and Lousy Canyon in Yavapai County, Arizona.

Effects analyses must determine if the proposed action would destroy or adversely modify proposed critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). Primary constituent elements of critical habitat for Gila chub were identified in the final rule (USFWS 2002) as necessary for the survival and recovery of this species.

Each stream segment contains at least one of the primary constituent elements or requires special management consideration. In the proposed rule, we discussed the biological needs of the species upon which the primary constituent elements are based, listed seven primary constituent elements for the species, and discussed the specific elements in each of the proposed stream segments (USFWS 2002). The seven primary constituent elements are summarized here: 1) perennial pools, eddies, and higher velocity areas in headwaters, springs, and cienegas of smaller tributaries; 2) suitable water quality for spawning, including temperatures ranging from 20 to 26.5°C (68 to 79.7°F); 3) suitable water quality, including low levels of contaminants and sedimentation, for all other aspects of Gila chub life history; 4) adequate food base; 5) sufficient cover for sheltering; 6) a low enough level of nonnative species such that Gila chub are able to survive and reproduce; and 7) streams that maintain a natural flow pattern sufficient to support Gila chub.

The constituent elements of proposed critical habitat are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of Gila chub. 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 morphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

For additional information about the Gila chub see Desert Fishes Team (2003), Minckley and DeMaris (2000), Propst (1999), Weedman *et al.* (1996), Rinne and Minckley (1991), DeMaris (1986), and Minckley (1985, 1973)

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 WITHIN THE ACTION AREA

Chiricahua leopard frog

In the action area, the Chiricahua leopard frog is known currently or historically from cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations above about 4,000 feet in elevation in southeastern Arizona (Pima, Santa Cruz, and Cochise counties), and in a northern group of populations from the Coconino National Forest along the Mogollon Rim into western New Mexico. In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, with the remainder being 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).

Based on Painter (2000) and the latest information for Arizona, the species is still extant in most major drainages in Arizona and adjacent areas of 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 southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter, pers. comm. 2000).

The only extant populations of Chiricahua leopard frog on BLM lands of which we are aware are at Cienega Creek/Empire Cienega, Pima County, where the species is found in the creek and in adjacent stock tanks. Chiricahua leopard frogs could potentially occur elsewhere on BLM lands.

The species was found on or near BLM lands 2.5 miles north of Courtland, Cochise County, in 1977, but has not been found there since. Chiricahua leopard frogs have been found near BLM lands in Guadalupe Canyon, Cochise County, as recently as 1994, and they still possibly occur at this locality and elsewhere in the Peloncillo Mountains on Coronado National Forest and private lands. The species occurred on the upper San Pedro River, but has not been observed there since 1979 and is probably excluded by an abundance of non-native predators. The frog was found in Redfield Canyon/Jackson Canyon in the Galiuro Mountains in 1991, but has not been found there since. The frog occurred at many locations in the Galiuro Mountains in the 1990s, but populations have crashed there for unknown reasons, and currently the species is only known from two sites on the northeastern slope, which is not close to any BLM lands.

Other BLM or adjacent lands in the action area where the frog could potentially occur include: Cochise County: 1) Mule Mountains (no records for the species, but poorly surveyed due to limited access – old records nearby in the Sulphur Springs Valley), 2) Swisshelm Mountains (extant population nearby in Leslie Canyon), 3) northeastern Chiricahua Mountains (recent records from near Portal and Paradise; however, populations appear to have drastically declined over the last decade and the species may be extirpated from that mountain range); Graham County: 4) upper Bonita Creek (1980's records for the species near Tule Tubs and Ash Creek on the San Carlos Reservation suggest the species could be present in Bonita Creek); Navajo County: 5) Chevelon Creek (old records for this drainage – there are scattered BLM parcels along Chevelon Creek); Pima County: 6) Baboquivari Mountains (records as recent as 2000 – there are scattered BLM parcels at high elevation nearby), 7) Coyote Mountains (adjacent to Baboquivari Mountains), 5) Las Guijas Mountains (near several extant or recently extant populations in the vicinity of Arivaca and Buenos Aires National Wildlife Refuge.

Cactus ferruginous pygmy-owl

BLM-administered lands in central and southern Arizona support suitable pygmy-owl habitat, including Sonoran desertscrub, semidesert grasslands, Sonoran savannah, as well as riparian and xeroriparian systems along watercourses. These habitat types exist within portions of the BLM-administered lands within the Yuma, Safford, Phoenix, and Tucson Field Offices, with the greatest amount of pygmy-owl habitat existing within the latter two. Figure E.1 in Appendix E of the BE contains a gap analysis map and a table listing the acres of each Arizona vegetation community present on Public Lands. While the gap analysis is more general than Brown (1994), portions of two vegetation communities- upland Sonoran desert scrub and semidesert grassland- appear to correspond with the habitats in which pygmy-owls are known to occur. Thus defined, BLM-administered lands in Arizona and thus, the action area, include 3,280,602 acres of upland Sonoran desert scrub habitat and 757,634 acres of semidesert grassland. The actual amount of pygmy-owl habitat contained within these communities is appreciably less, as neither the species' current or historical ranges include the entirety of the respective habitat types.

An unknown number of pygmy-owls occur on BLM-administered lands. No pygmy-owls have been detected on BLM lands during project-specific surveys. Project clearance surveys are limited in scope; wide-ranging, systematic pygmy-owl surveys of BLM lands have not been

conducted. We must therefore consider the survey efforts of other agencies. From 1998 to 2003, an average of 26 pygmy-owls (ranging from 11 to 37 individuals) have been detected annually within dispersal distance to of BLM lands in Northwest Tucson, in the Avra Valley, on the Buenos Aires National Wildlife Refuge (NWR), in Organ Pipe Cactus National Monument, and in the Altar Valley within Arizona and Sonora, Mexico. We are currently aware of 16 individual pygmy-owls being tracked by AGFD, FWS, and National Park Service staff. All 16 of these pygmy-owls, or their potential progeny, are capable of dispersing to BLM lands. The maximum documented dispersal distance noted in prior consultations was 34.8 km (21.8 mi) (AGFD 2002b). In early 2004, AGFD staff tracked a female pygmy-owl born in late 2003 that traveled a sinuous route of approximately 130 km (80 mi) (Abbate, pers. comm.). This dispersing pygmy-owl's route may have crossed BLM lands near the Sierrita Mountains, west of Tucson, and the Silverbell Mountains, possibly including the Ironwood Forest National Monument. The current location for this particular pygmy-owl is not known as her transmitter has failed, but she was last detected southwest of Casa Grande. Three other pygmy-owls reside within 21.8-mile (and 80-mile) dispersal distances from BLM lands in and near the Tortolita Mountains in Marana. The appreciable acreage of unsurveyed habitat on BLM lands and the largely unimpeded ability for pygmy-owls to disperse to those lands renders it likely that the species occurs on BLM-administered lands. Pygmy-owls located on State lands in the Altar Valley and within Organ Pipe Cactus National Monument are also within dispersal distance to BLM lands in the Coyote Wilderness and the Ajo area, respectively. It is also likely that any not-yet-detected pygmy-owls that occur on BLM lands exist in exceedingly low densities, as noted elsewhere in the species' range in Arizona.

Because the action area includes all BLM-administered lands in the State of Arizona, adjacent lands, and downstream areas that could be indirectly affected, it is likely that the majority of the 16 currently-tracked, known pygmy-owls are located within the action area. While it is likely that additional pygmy-owls occur in the action area, it is unlikely that there are large numbers of individuals. The pygmy-owl's status thus remains precarious due to its rarity and the compromised nature of many potential dispersal corridors.

All five proposed pygmy-owl critical habitat units (CHU) contain BLM-administered lands subject to the proposed LUP Amendment. Proposed CHU-1 is situated southeast of the Tucson metropolitan area and is bisected north to south by State Route (SR) 286. The greatest proportion of CHU-1 is occupied by State lands and the Buenos Aires NWR; very little BLM land is contained within the unit. Proposed CHU-2 is situated west/northwest of Tucson between InterState 10 (I-10) and the Tohono O'odham Nation and includes the western unit of Saguaro National Park, State lands, private lands, and an appreciable acreage of BLM-administered lands. Proposed CHU-3 is located east of I-10 within and north of Tucson and Marana. BLM lands within proposed CHU-3 are situated around the periphery of the Tortolita Mountains. Approximately one-third of the acreage of proposed CHU-4, located west of SR 79 is BLM land. The Cabeza Prieta NWR and Organ Pipe Cactus National Monument form the bulk of proposed CHU-5 south and east of Ajo, but an appreciable acreage of BLM land surrounding Ajo is also within the unit.

California condor

A nonessential experimental population of condors was established in northern Arizona and portions of Utah and Nevada on October 16, 1996 (USFWS 1996). The designated nonessential experimental population area is bounded by InterState 40 on the south, U.S. Highway 191 on the east, InterState 70 on the north, and InterState 15 to U.S. Highway 93 on the west. For BLM lands in Arizona, the nonessential experimental population area contains almost all of the land administered by the Arizona Strip Field Office and portions of the land administered by the Kingman Field Office.

The nonessential experimental population status applies to condors only when they are within the experimental population area. For the purposes of section 7 consultation, when condors are on lands not within the National Wildlife Refuge System or the National Park System, but within the experimental population area, they are treated as if proposed for listing. When condors are on National Wildlife Refuge or National Park System lands within the designated experimental population area, they are treated as a threatened species. Any condors outside of the experimental population area are fully protected as endangered.

The first release of condors to the wild in the nonessential experimental population area occurred in northern Arizona on December 12, 1996. A five-year review of the effort indicates that, as of January 2002, 47 condors had been released in nine release events (Arizona Condor Review Team 2002). Reintroduction efforts have been complicated by predation, lead poisoning, bird-human interactions, and shootings. As of the date of the published review, 18 birds had died and four had been returned to captivity due to behavioral concerns. After the first five years, there were 25 free-flying condors in northern Arizona with an additional eleven individuals in a flight pen for release early in 2002. As of June 2004, 45 condors were in Arizona, including a juvenile that was born in the wild in 2003.

The primary site for release of condors in the experimental population area is on BLM-administered lands atop the Vermilion Cliffs (Coconino County, Arizona). There is also a secondary release site on the Hurricane Rim that was used for two years. Although it is not currently used, the site could be used again in the future. One possible but failed nest site occurred on BLM land in 2003. Based on behavior of condors, a nest site in the Vermilion Cliffs is indicated for 2004.

Most condor activity has occurred within the designated experimental population area (Arizona Condor Review Team 2002). Condors of all ages travel throughout the Grand Canyon complex and along the Colorado River corridor. Recently, condors have been foraging on the Kaibab Plateau and occasionally flying into southern Utah. As of the date of the five-year review, condors had moved out of the experimental population area at least six times. The longest movement was to Flaming Gorge Reservoir on the Wyoming/Utah border. Other significant movements include: three birds to Grand Mesa and two to Mesa Verde National Park in western Colorado; one bird to Milford, Utah; one bird to Cedar City, Utah; and one bird to near Parker Dam on the Arizona/California border. Condors are capable of traveling long distances in short

periods of time. The frequency of significant movements and the likelihood of dispersal can be expected to increase.

Southwestern willow flycatcher

Portions of the Lower Colorado River and Gila Recovery Units occur within the action area. The following is a description of management units within these recovery units that fall within the action area and Table 10 contains known locations and status of flycatcher sites on BLM land.

Lower Colorado River Recovery Unit (RU)

Parker-Southerly International Boundary Management Unit (MU): BLM's Yuma and Lake Havsau Field Offices are located within this MU. Southwestern willow flycatcher habitat in this MU is primarily monotypic exotic (salt cedar) along the Lower Colorado River and associated backwaters. There are three sites in Arizona in this MU and one in California; since 2000, one territory was documented in Arizona adjacent to BLM land. In 2004, 240 migrants were detected in this MU.

Hoover to Parker MU: This MU contains lands administered by the Lake Havasu Field Office, National Park Service, and FWS [Havasu National Wildlife Refuge (NWR)]. Flycatchers have only been documented nesting at Topock Marsh (Havasu NWR) within this MU (2001, 20 nests; 2002, 10 nests; 2003, 9 nests), with an average of 3.5 pairs at each site (Sogge *et al*. 2003). One site is located on BLM land on the California side of the Colorado River and one in Arizona; neither has been occupied since 1996. All other sightings in this MU have been migrants.

Virgin MU: The portions of this MU that occur in the action area are those reaches of the Virgin River and Beaver Dam Wash located in Arizona and the Lake Mead delta in Nevada. One territory was located on BLM land in 2001 (Smith *et al.* 2002); no breeding was observed. No birds were found during surveys in 2002 (Smith *et al.* 2003), and one migrant was surveyed in 2003. This habitat patch, approximately 26 acres, is located at the Beaver Dam Wash confluence. It consists primarily of native vegetation: willow, cottonwood and velvet ash. Elsewhere there are six additional unoccupied patches on BLM land, consisting of mixed native species and salt cedar, located from the Virgin River Gorge downstream to the Nevada State line; the largest patch is 4 acres in size (M. Herder, BLM, pers. comm. 2004). Where breeding is occurring elsewhere in this MU, there is an average of 4.3 pairs per site (Sogge *et al.* 2003).

Bill Williams MU: This MU includes flycatcher habitats along the Big Sandy River, Santa Maria River (Kingman Field Office) and the Bill Williams River (Lake Havasu Field Office). The two major habitat areas occur within this MU on or adjacent to BLM land: the Big Sandy River at Wikieup (17 nests located on private land in 2003), and Brown's Crossing-Alamo Wildlife Area at the confluence of the Big Sandy and Santa Maria rivers (15 nests located in the AGFD wildlife management area in 2003). A few flycatchers nest at Monkey Head on the Bill Williams and

Colorado River confluence (Bill Williams NWR). There is an average of 4.7 pairs per site in this MU (Sogge *et al.* 2003).

Gila RU

Middle Gila/San Pedro MU: BLM land in the Tucson and Safford Field Offices located in this MU are scattered along the San Pedro River and Middle Gila River. Since 2002, numbers of nests along the Middle Gila River have declined: 44 nests were located in 2002, 21 nests in 2003, and as of June 24, 2004 only 10 nests have been located. The San Pedro River, administered by the BLM's San Pedro Project Office (Tucson Field Office), supports breeding flycatchers. As of the second survey period this year (June 24, 2004), 147 territories with 116 pairs and 108 nests were found on the San Pedro River. This is an increase of 14 territories, 12 pairs, and 27 nests from 2003 (Smith *et al.* 2004). There is an average of 5.2 pairs per site in this MU (Sogge *et al.* 2003).

Yuma clapper rail

Within the action area, the Yuma clapper rail occupies marsh habitats along the lower Colorado River from the border with Mexico north to Littlefield, Arizona, on the Virgin River (Yuma, La Paz, and Mohave counties, Arizona). Clapper rails also occur along the Bill Williams River below Alamo Dam, the Gila River up to the confluence with the Salt River, portions of the Salt, Gila and possibly lower Verde rivers, and Picacho Reservoir.

Annual surveys are conducted along the lower Colorado River. In 2003, surveyors counted 325 rails: 86 in Havasu NWR, 10 in the Bill Williams River Delta, 3 in the Palo Verde Division, 61 in Cibola NWR, 46 in Imperial NWR, and 119 in the Laguna Division (surveys were not done in the Imperial Division in 2003).

Bald eagle

Within the action area, there are seven bald eagle breeding areas on, or adjacent to, BLM-administered lands. The Granite Basin, Coolidge, and Winkelman breeding areas are up and downstream of Coolidge Dam along the Gila River and near the Gila/San Pedro River confluence. The Granite Basin breeding area was discovered in 1999, and is believed to be dependent solely on the Gila River. The eagles failed to hatch eggs in 1999 and 2001, and were present but did not lay eggs in 2000, 2002, or 2003. This territory was unoccupied in 2004 (AGFD unpubl. data 2004). The Winkelman breeding area was discovered in 1995 and this pair failed to hatch eggs in their only nesting attempts in 1996 and 1997. The Winkelman breeding area has been unoccupied since 1999. The Coolidge breeding area, first used in 1985, is located upstream of Coolidge Dam. Although successful in 2003, this pair's nest failed during the previous five nesting seasons. In 2004, this breeding area produced one young bird that subsequently died (AGFD unpubl. data 2004).

Two breeding areas sites are located at the Alamo Lake Wildlife Area, Alamo and Ives Wash (both within Lake Havasu Field Office). These nests have been monitored since the late 1980s. Both nests were occupied in 2003 and 2004 (AGFD unpubl. data 2004). Eagles at these two sites have fledged a total of 31 young since monitoring began.

Eagles in the Lake Pleasant breeding area (within Phoenix Field Office), which was first documented in 1979, have fledged 16 young birds. The nest was successful in 2004 with one young fledged (AGFD unpubl. data 2004).

Devil's Post (Upper Burro Creek) breeding area (Kingman Field Office) is considered an historical site due to non-use for 10 consecutive years. The site was occupied from 1987 to 1992 but the pair failed every year to fledge young.

Mexican spotted owl

There are no PACs designated on BLM-administered lands in Arizona. The BE States that less than 15% of the potential habitat managed by the Arizona Strip Field Office is considered restricted habitat (mature ponderosa pine-Gambel oak). However, lands administered by the Kingman Field Office include protected steep-slope MSO habitat (mixed-conifer and pine-oak forest on slopes >40%) and pure pine. No total acreage for how much MSO habitat exists on BLM land was given in the BA.

The Arizona Strip Field Office conducted surveys for MSO in potential habitat. Complete surveys were conducted in restricted and other forest and woodland habitat between mid-April and July at Black Rock Mountain (1992), Parashant (1992), and Mt. Trumbull/Mt. Logan (1978, 1991, 1992, 1998, 1999, 2000, and 2003). No MSO were detected during any of these surveys. Dr. David Willey and Dan Spotskey modeled Mexican spotted owl habitat based on vegetation type, slope, elevation, aspect, and other factors in 1997 and 2000 (Willey and Spotskey 1997, 2000). While their 1997 "over-inclusive" model (M. Herder, BLM, pers. comm.) indicated some of the forested areas on the Arizona Strip had the potential to support nesting or roosting owls, the more conservative 2000 model did not identify any of these areas as potential nesting habitat. However, the 2000 model is probably under-inclusive of potential MSO habitat.

The Arizona Strip Field Office also conducted surveys in canyon habitats, as described in Recovery Plan, and in the GIS habitat models created by Willey and Spotskey (1997, 2000). Although all sites identified in the 1997 Spotsky-Willey model have not been surveyed, the 1997 model is probably over-inclusive (as Stated above). Canyon areas surveyed included Paria Canyon (1991, 1992, and 2003), Soap Creek (1991 and 1992), Water Canyon (1992), Chamberlain Canyon (1992), and portions of Hacks and Grama Canyons (1992). No MSO were detected during any of these surveys. Habitat in these areas generally consists of steep-walled canyons. These canyon habitats tend to be wide and open, unlike the narrow, shaded slot canyons where owls have been found at nearby Zion National Park (Rinkevich 1991). The BLM believes that these canyons are too hot and dry to provide suitable habitat for owls.

The Kingman Field Office conducted MSO surveys in protected steep-slope, restricted, and pure pine habitats along two survey routes in the Hualapai Mountains. No MSO were detected during these surveys (1995, 1996, 1997, 2000, and 2001). However, not all potential habitat for the MSO in the Hualapai Mountains has been surveyed and there is a history of MSO in the 1950s and 1970s in this area.

Based on the survey results from both the Arizona Strip and Kingman Field Offices, the BLM believes that MSO do not currently nest on BLM-administered public lands in Arizona. However, the BLM believes that MSO do occasionally use these areas for wintering and dispersal habitat. We believe that though surveys in some areas are sufficient to infer absence, the lack of or insufficient surveys in additional habitat provide reasonable certainty that MSO may occur on BLM administered lands during the timeframe of this action.

Proposed Critical Habitat

Proposed critical habitat on BLM-administered lands in Arizona includes Great Basin desertscrub, Great Basin piñon-juniper woodlands, montane conifer forest in the north (along the Grand Canyon), and madrean evergreen woodland and montane conifer forest in the south near the San Pedro Riparian National Conservation Area. The BLM States that these forested and canyon areas within the proposed critical habitat unit boundaries are "other forest and woodland types," as defined by the Recovery Plan and thus are not considered critical habitat for the MSO (66 CFR 8541). These sites are more typical of grassland or low-elevation pinyon-juniper woodland, rather than montane, mixed conifer or pine-oak forest habitat. In addition, the BA States that the canyon habitats are considered too hot and dry to provide suitable habitat for the species. However, based on limited surveys in these areas, it is difficult to infer with certainty that MSO are not using canyon habitat on the Arizona Strip, as they have been documented doing so in canyon habitat in other parts of their range.

Desert pupfish

BLM lands represent a large proportion of the former range of the desert pupfish, the only two extant reestablished sites, and many of the remaining suitable, but unoccupied, habitat. The status of the desert pupfish in the action area is therefore similar to the status of the species throughout its range. Furthermore, Gila topminnow and desert pupfish historically co-occurred and share similar adaptations to arduous habitat conditions. The environmental baseline for these species is largely similar to that described for the Gila topminnow.

The desert pupfish is currently known from two sites within the action area, Cold Springs along the Gila River near Safford, and Lousy Canyon in the Agua Fria drainage on the Agua Fria National Monument; both are on lands administered by BLM (Voeltz and Bettaso 2003). These sites represent the only two extant reestablished desert pupfish sites in Arizona. The Cold Springs and Lousy Canyon sites are managed by the BLM's Safford and Phoenix field offices, respectively, and represent critical efforts in the recovery of the desert pupfish. Both sites appear stable, with Lousy Canyon being notable in containing an intact ichthyofauna of desert pupfish,

Gila topminnow, and Gila chub. Voeltz and Bettaso (2003) reported on the Statewide status of the desert pupfish, the partial results of which are presented in Table 6.

Gila topminnow

BLM lands support a large proportion of the Gila topminnow's former range, several of the currently occupied sites, and much of the remaining suitable, but unoccupied habitat. The status of the Gila topminnow in the action area is therefore similar to the status of the species throughout its range, as described in the "Status of the Species, Gila topminnow" section, above.

Cienega Creek, located partially on BLM lands in Pima County southeast of the Tucson metropolitan area, is one of the last places in Arizona supporting an intact native fish fauna that is uncontaminated by nonindigenous fish, though bullfrogs are now present (J. Simms, BLM, and D. Caldwell, pers. comm., 2001). Cienega Creek provides habitat essential for the survival of the Gila topminnow (Weedman 1999). It is one of nine extant natural topminnow sites (Bagley *et al.* 1991), and one of only three natural sites not contaminated by mosquitofish.

In addition, Cienega Creek supports by far the largest population of topminnow in the U.S. A fall population estimate for Cienega Creek was 2.5 million topminnow, conservatively, for 6.5 miles of perennial habitat sampled. Another 1.1 miles of topminnow habitat in Mattie Canyon and 0.9 mile in Empire Gulch, tributaries to Cienega Creek, were not included in this estimate. Some areas of warmer groundwater discharge held extremely high densities of topminnow (Simms and Simms 1992). We issued a final biological opinion on October 19, 2001 (02-21-02-F-014), on the reestablishment of Gila topminnow and longfin dace (*Agosia chrysogaster*) to Empire Gulch within the Las Cienegas National Conservation Area (NCA). Reestablishments began immediately and both species persist at this writing (Voeltz and Bettaso 2003). We completed the *Las Cienegas NCA Resource Management Plan Biological Opinion* on October 4, 2002 (02-21-02-F-162), and found that implementation of the proposed action would not jeopardize the continued existence of the Gila topminnow.

While Cienega Creek supports the most robust Gila topminnow population, there are several other reestablished populations, failed sites recommended for reestablishment, failed sites not recommended for reestablishment, and new sites recommended for reestablishment on Public Lands in Arizona. Collectively, these sites are managed by the Phoenix, Tucson, and Safford field offices. Voeltz and Bettaso (2003) reported on the Gila topminnow's status Statewide, the partial results of which are presented in Table 3.

Razorback sucker

Razorback suckers persist in the Lower Colorado River in Lakes Mead, Mohave, and Havasu, and in the mainstem between these reservoirs and downstream of Lake Havasu. In the Gila, Salt, and Verde rivers of interior Arizona, stocking activities have created small populations, but no recruitment of wild-born young has been observed into these populations. The wild adults in the Lake Mohave population were estimated at 9,087 individuals in 1999 with an additional 3,104

repatriated sub-adults captured on the spawning grounds along with the adults (Pacey and Marsh 1999). Population estimates of wild or stocked individuals for other Colorado River sites are not available, but these populations are very small.

Spawning by razorback suckers has been documented in lakes Mead and Mohave. Large recruitment events occurred after lakes Mead and Mohave filled in the 1930s and 1950s, respectively, and created the adult populations currently found in these lakes (summarized in Minckley *et al.* 1991). The Lake Mead population is estimated at 100 to 200 individuals (Welker and Holden 2003). Recruitment into the Lake Mohave population has not occurred since the 1950's. This population was estimated at 60,000 adults in the 1980s, 2,698 in 2002, and 475 in 2004 (Pacey and Marsh 1999, Marsh *et al.* 2003, Marsh 2004). Wild populations in Lake Havasu and the river between Parker and Imperial dams are extremely small and past stocking activities with marked fish, especially in the Parker Dam to Imperial Dam reach, confuse the identification of fish captured there. Old adults comprise these populations; recent declines in wild fish numbers are attributed to these adults dying of old age. None of the populations are confirmed to be self-sustaining, with recent recruitment of wild-bred young documented only in Lake Mead (Welker and Holden 2003). Five adults were found and removed from the Colorado River Indian Tribe (CRIT) Main Canal in January 1993 (Marsh 1993). Captures of small razorback suckers in canals below Parker Dam may also represent some recruitment occurring in this area (summarized in FWS 2001). Razorback populations in reservoirs out approximately 40 to 50 years after formation of the reservoir as fish reach the end of their life span.

Augmentation of wild-bred or hatchery-bred sub-adults occurs in most populations in the Lower Colorado River. The current Lake Mead estimate does include some stocked fish; however, the majority are wild fish as there is only very limited stocking into this population. In Lake Mohave, the population of stocked fish is estimated at 1,017 to 2,494 based on 1999-2002 data (Marsh 2004). Dr Marsh also notes that because there is a 3-4 year time lag between stocking the sub-adults in Lake Mohave and when they first appear in stocking areas, this estimate does not contain individuals from more recent stockings. Estimates for populations derived from stocking in Lake Havasu and the Parker Dam-Imperial Dam reach on the Lower Colorado River are not available.

Critical habitat in the action area includes the Lower Colorado River between Hoover and Davis dams including Lake Mohave to its full pool elevation, and the river and 100-year floodplain between Parker Dam and Imperial Dam. Critical habitat on the Gila River and it's 100-year flood plain from the Arizona-New Mexico to Coolidge Dam, including San Carlos Reservoir to the full pool elevation. The Verde and Salt rivers do not contain critical habitat within the action area.

Virgin River chub and Woundfin

Within the action area, Virgin River chub currently range in the Virgin River from the Arizona/Utah border to at least the Arizona/Nevada border, and woundfin from the Arizona/Utah border to Lake Mead, Nevada.

Stocking efforts for woundin in the Virgin River are described in the "Status of the Species, Woundfin" section. Woundfin numbers in the lower Virgin River fluctuate greatly, depending on stocking rates and environmental conditions. Woundfin numbers between the Bunkerville and Mesquite diversions in June of 2000 were estimated to be 625 adults, with a standard error of 97. A total of 242 young of the year were captured during this sampling effort. During four sampling trips between May and August 2000, up to 50 woundfin were captured during each sampling in a five-mile stretch below the Riverside Bridge (Holden and Golden 2000).

Current sampling methods for Virgin River chub are inadequate for estimating population numbers in the Virgin River because chub are uncommon and generally occur in deep pools associated with runs. However, seining efforts for woundfin in 2000 and 2001 between the Mesquite and Bunkerville diversions in Arizona and Nevada resulted in the capture of 22 individual Virgin River chub. Surveys in 2002 have captured 361 chub in the river above the action area (USFWS unpublished data). Of these 361 fish, 358 were captured in the vicinity of Beaver Dam Wash and the remaining 3 were captured above the Mesquite Diversion. The Beaver Dam Wash inflow scours a large pool at its confluence with the Virgin River; providing chub habitat in this particular area (M. Herder, BLM, pers. comm. 2004).

The latest surveys for woundfin and Virgin River chub occurred in spring 2004. Holden (2004) sampled the entire reach from above Beaver Dam Wash downstream to the Mesquite Diversion. Twenty-eight woundfin and 88 Virgin River chub were sampled. A standard survey done for status reports, at the Beaver Dam confluence and at Cedar Pockets, failed to capture any woundfin and sampled only 20 Virgin River chub (Benedict 2004a). Surveys at three sites in Nevada in May 2004 also failed to sample woundfin or Virgin River chub (Benedict 2004b).

Yaqui chub and Yaqui topminnow

Given the potential for downstream influence, Yaqui chub and topminnow habitat in both the Leslie Canyon and San Bernardino NWRs are within the action area.

The San Bernardino NWR is located on the U.S.-Mexican border in Cochise County, Arizona. Situated at 3,720 to 3,920 feet elevation in the bottom of a wide valley, the refuge encompasses a portion of the headquarters of the Yaqui River, which drains primarily western Chihuahua and eastern Sonora, Mexico. FWS acquired the 2,309-acre ranch in 1982 to protect the water resources and provide habitat for endangered native fishes. Four Yaqui fish species (Yaqui chub, Yaqui topminnow, Yaqui catfish, and beautiful shiner) are Federally listed as either threatened or endangered. All aquatic habitat on San Bernardino NWR is designated as critical habitat for Yaqui chub and the threatened beautiful shiner, and one ictalurid, the threatened Yaqui catfish. The known constituent elements for the Rio Yaqui fishes include clean, small permanent streams and spring pools without exotic fishes and backwater areas of springs with overgrown cutbanks and accumulations of detritus, which are necessary for feeding and shelter (FWS 1984). The 2,770-acre Leslie Canyon area was established in 1988 to add additional protection for the Rio Yaqui fishes. It does not contain critical habitat.

The San Bernardino and Leslie Canyon NWRs are situated within the Basin and Range geologic region, characterized by linear mountain ranges that are separated by broad, flat basins. The region was impacted by relatively recent volcanic activity, leaving volcanic plugs and cinder cones visible throughout the San Bernardino Valley. Earthquakes have further altered the region and helped allow the flow of many springs and seeps. All of these dynamic geological events have played major roles in shaping the valley, catching and storing crucial water, and determining the variety of plants and animals present.

The San Bernardino Valley once supported permanently flowing creeks, springs, and marshy wetlands. In addition, the giant sacaton grassland in the valley was once described as "a luxuriant meadow some eight or ten miles long and a mile wide." The dependable source of water and grass made the area not only invaluable to a huge diversity of fish and wildlife, but also a center of human activity for centuries.

With expanding settlement beginning in the late 1800's came farming, mining, and livestock production, all of which competed for the same precious water. While the extensive wetlands here once provided historical habitat for eight different kinds of native fish, the lowering water table led to severe changes in the habitat and eventually, local extinctions of many species.

The riparian and wetland areas of the San Bernardino and Leslie Canyon NWRs have declined from what they were historically (Hastings and Turner 1965, Lanning 1981) and are part of a region-wide decline (Lowe 1964, Carothers *et al*. 1974, Hendrickson and Minckley 1984). Early accounts show that San Bernardino Creek/Black Draw had, at most, a small channel (see Lanning 1981 and Davis 1982), as opposed to the large, incised channel present today.

Little Colorado spinedace

The BLM administers land adjacent to and within the Little Colorado main stem, Silver Creek, and Chevelon Creek drainages. Currently, all three of these drainages area considered to be occupied by the Little Colorado spinedace, although distribution is patchy and dependent upon the presence of water, and absence or low levels of nonnative fishes and crayfish. The BLM is currently contracting with the AGFD to conduct surveys in Silver Creek. As of July 8, 2004, AGFD had located only three native fish (2 Little Colorado suckers and one bluehead sucker) and no spinedace. They are continuing to conduct surveys this summer. However, we are very concerned about the status of the Silver Creek spinedace since we have not located fish in the drainage since 1997 and we do not have a refugium population for these fish. Spinedace are currently known from areas in the Little Colorado River near St. Johns, upstream of its confluence with Nutrioso Creek and near the confluence of Chevelon Creek and the Little Colorado River. In 1999, BLM personnel surveyed the reaches of the Little Colorado River and Silver Creek that traverse BLM-administered land and no spinedace were located.

Loach minnow and Spikedace

Occupied loach minnow habitat on, or downstream of, BLM-administered lands includes the Gila River (Pinal County segment), Aravaipa Creek, Eagle Creek, San Pedro River and the San Francisco River near its confluence with the Gila River. Spikedace occupy the Middle Gila/Lower San Pedro/Aravaipa System, its population status ranging from rare to common. Only one occupied site, Aravaipa Creek in Aravaipa Canyon, is within or downstream from BLM-administered lands (Safford Field Offices) in Arizona. All other occupied or suitable habitat is located upstream from public lands, or in drainages owned or managed by other agencies or landowners, and not adjacent to public lands

Arizona cliffrose

Arizona cliffrose is endemic to Arizona. In the action area, the species occurs in four widely separated areas in central Arizona: near Bylas, the Horseshoe Lake vicinity, near Burro Creek, and near Cottonwood in the Verde Valley. The largest known population of Arizona cliffrose and the type locality is the Burro Creek population on BLM administered lands.

Brady pincushion cactus

The status of the species in the action area is the same as described in the range-wide "Status of the Species" section for BLM lands.

Holmgren milk-vetch

The status of the species in the action area is the same as described in the range-wide "Status of the Species" section for BLM lands.

Jones cycladenia

The status of the species in the action area is the same as described in the range-wide "Status of the Species" section for BLM lands.

Nichol Turk's head cactus

The only BLM lands that support Nichol Turk's head cactus are in the Waterman Mountains. The BLM designated a 3,100-acre ACEC in 1989 to protect Nichol Turk's head cactus populations and habitat in the Waterman Mountains. Populations in the Waterman Mountains are now included within the boundaries of the Ironwood National Monument. The BLM has also finalized a mineral withdrawal from the ACEC (1998), thus protecting the species from mining activity inside the ACEC. BLM lands within Ironwood NM were withdrawn from mineral entry in 2000. A Habitat Management Plan has been developed for this species. Populations of Nichol Turk's head cactus on BLM lands have remained relatively stable, but there has been a decrease in numbers, attributed to the drought (J. Anderson, BLM, pers. comm. 2004).

Plants and habitat have been lost to limestone quarry activities in the Waterman Mountains. In the early 1980's the unauthorized blading of a landing strip removed an estimated 350 plants on BLM lands. The BLM took action against this individual.

Peebles Navajo cactus

The status of the species in the action area is the same as described in the range-wide "Status of the Species" section for BLM lands.

Pima pineapple cactus

The BLM manages scattered parcels of land within the range of Pima pineapple cactus. In 1998, some survey work took place on BLM grazing allotments to determine if suitable habitat existed in 20 allotments that fall within the delineated range of Pima pineapple cactus. These surveys were the result of commitments made in the Safford BLM biological opinion on livestock grazing (02-21-96-F-160). The BLM interpreted this conservation measure as a means to determine if suitable habitat was present; not to inventory the suitable habitat for individual Pima pineapple cactus. As a result, no systematic inventory of Pima pineapple cactus has taken place on BLM lands. A few individuals were located on grazing allotments thought to have some suitable habitat. The BLM does not monitor or have any conservation management plans for Pima pineapple cactus.

Kearney's blue star

The largest population of Kearney's blue star (over 300 individuals) is in the upper reaches of Brown Canyon on BLM land. There are a few other scattered locations (20-30 plants) in Thomas Canyon. Thomas Canyon locations may be located in designated BLM wilderness. The BLM has paid a contractor to establish monitoring plots for Kearney's blue star, but these plots have not been established yet.

Siler pincushion cactus

The BLM has monitored populations of Siler pincushion cactus since 1985. Hughes' (2001) summary of the monitoring showed that for the period between 1985 and 1998, the size of Siler pincushion cactus individuals shifted from predominately large individuals to more juveniles. Recruitment and survival of young plants was high for this period. Mortality of older plants was offset by survival of the seedlings. The 2003 monitoring results indicate that Siler pincushion cactus populations are relatively stable. Effects from the drought are not evident. Mortality is low. None of the monitored cacti were trampled by livestock.

Huachuca water umbel

Huachuca water umbel populations are found on the Empire Cienega allotment and the San Pedro River Conservation Area (SPRCA). No monitoring data are available for the Empire Cienega allotment, but the extent of Huachuca water umbel in Empire Gulch is much larger than the one patch discovered by Warren in 1996 (P.Titus, pers. comm. 2003). Huachuca water umbel in the SPRCA has been monitored since 2000. The latest report (2001) documents 43 patches of the water umbel along 31.7 miles within the SPRCA. This was the first comprehensive survey along the San Pedro. Approximately 40% of these patches are new locations. All of these patches are within designated Huachuca water umbel critical habitat.

The entire 33.7 miles of critical habitat on the San Pedro River is within the San Pedro River Conservation Area. There are no other areas of BLM land designated as critical habitat for the water umbel.

Hualapai Mexican vole

See "Status of the Species, Hualapai Mexican vole", as the action area encompasses the known range of the subspecies.

Lesser long-nosed bat

BLM-administered lands supporting lesser long-nosed bat habitat (food and shelter) are primarily within the Tucson Field Office; a small patch of bat habitat occurs within the Safford Field Office. Lesser long-nosed bats occur on Federal, Tribal, State, and private lands adjacent to BLM-administered lands in southeastern Arizona.

BLM-administered lands that support bat habitat are primarily larger areas located in the semidesert grassland areas of the State. These vegetation communities are fire-adapted; they coevolved with fire events that promoted their evolution. Scattered patches of Sonoran desertscrub and Chihuahuan desertscrub also occur on BLM-administered lands; these vegetation communities are not fire-adapted and are more likely to suffer greater negative effects by fire, short- and long-term, than semidesert grasslands.

Leptonycteris bats require suitable forage plants (paniculate agaves and columnar cacti) and suitable roost sites. Mines and caves occurring across Arizona provide suitable sites for post-maternity roosts for lesser long-nosed bats. Bat foraging habitat in Arizona and New Mexico is found where paniculate agaves and saguaro occur. Agaves are found in varying densities and age classes within the broad vegetation community classification of desertscrub, desert grassland, interior chaparral, oak woodland, pinyon-juniper woodland, pine-oak woodland, and mixed conifer. The primary agave used by the bat is Palmer's agave, which BLM estimates is widely scattered over 1,000,000 acres at densities from less than 10 to greater than 200 individuals per acre, generally between the elevations of 3,000 to 6,000 feet. Parry's agave occurs between 5,000 to 8,200 feet, and begins blooming in mid-spring.

The typical fire regime for BLM-administered lands with bat foraging vegetation communities is considered to be functioning within or near to the historical fire regime (35 to 100+ year frequency, with mixed severity) (BE). Invasion of grasses and shrub species have increased the fuel loadings in habitats used by foraging bats. This has increased the severity and likelihood of intense wildfires in bat foraging habitats.

Three bat maternity roosts are known to exist in southern Arizona. Several post-maternity roosts (not the same as a maternity colony), which house from many thousands to only a few individual bats, are known from various locations in different mountain ranges in southern Arizona. These roosts are generally occupied from July through September, though the bats have been recorded in southeastern Arizona in April (USFWS 1999), and the species may remain into October (Sidner 1999). Based on distances lesser long-nosed bats have been known to travel from roost sites to foraging areas, potential foraging habitat may extend in a 40 mile radius from roosts. Data from Ober *et al*. (2000), from bats in the Huachuca Mountains of southeastern Arizona, suggests that bats forage within an average distance of 11 miles from their day roosts. Complete and thorough surveys for the species have not been conducted in much of the southern portion of Arizona and many potential roost sites (mines, caves, bridges, and abandoned structures) remain unexamined.

Chiricahua Mountains

At a minimum, four primary roost sites are known in the Chiricahua Mountains. Additional records exist for several other bat locations known in and close to this range and in the surrounding areas where lesser long-nosed bats have been observed (AGFD 2000). These sites represent locations where a few individual bats were recorded foraging and occurring at temporary roosts to two roost sites containing greater than 1,000 bats, and a third roost site with greater than 3,000 bats. There are ongoing efforts to survey for lesser long-nosed bats in the general area by AGFD, although not all potential roost sites have been found or investigated.

Dragoon Mountains

At least one primary roost site is known from this range. This mountain area includes large areas of desert grassland, prime habitat for Palmer's agave. Surveys for lesser long-nosed bats in association with mines have been conducted within the Dragoon area, but the entire range has not been surveyed.

Galiuro Mountains

Male lesser long-nosed bats were detected here in 2000 (T. Snow, pers. comm.). The roost site has not yet been located. We are not aware of any intensive bat survey work completed in the Galiuro Mountains.

Huachuca Mountains

Numerous records of lesser long-nosed bats, and large and primary roost sites, are known from throughout the Huachuca Mountains. Many thousands of bats have been documented at roosts, including those on Forest Service, National Park Service, Department of Defense (Fort Huachuca), and private lands. Several large (greater than 450 bats) post-maternity roosts are found within or near the Huachuca Mountains (Fort Huachuca, Coronado National Memorial, Mustang Mountains). Other large roosts in the Santa Rita Mountains and Patagonia area are within foraging flight distance of the Huachuca Mountains. Fort Huachuca has conducted many surveys, monitoring studies, and other investigations. Roosting lesser long-nosed bats have been recorded at Fort Huachuca from late July into October, annually. Bat numbers typically peak in early September (Sidner 1999). A lesser long-nosed bat banded at Wren Bridge on Fort Huachuca was found the next night at the Patagonia Bat Cave, showing that individuals of this species move relatively long distances, and bats foraging and roosting in the Huachuca Ecosystem Management Area (EMA) are part of a larger regional population (Howell 1996, Sidner 1999). Several studies have been conducted, and others are currently underway, on Coronado National Memorial. Howell (1996) suggests there are many potential roost sites in the Huachuca Mountains where hundreds of nectar feeding bats could roost without being detected. Lesser long-nosed bats have also been recorded from the vicinity of Canelo Hills, Turkey Creek, and the Patagonia Mountains, in the Huachuca area.

Peloncillo Mountains

Within the Peloncillo Mountains and areas west to San Bernardino Ranch, there are a few records of lesser long-nosed bats. These records report two to four individuals per site. Within the Peloncillo Mountains there are recent reports from the Baker Canyon vicinity and a 1970 record from a cave in Guadalupe Canyon. About 50 bats suspected to be *Leptonycteris* were reported from the Cowboy Flat area. In 1997, a biological opinion was completed for the Maverick Prescribed Burn, which included a large portion of the Peloncillo Mountains. As part of that consultation, various investigations were conducted in the Peloncillo Mountains to address the question of the effects of fire on paniculate agaves and the use of agaves by bats. Occupied day roosts are known from the neighboring Chiricahua Mountains to the north, and Animas Mountains (in New Mexico) to the east. Slauson *et al*. (1998) reported very low rates of bat use of observed agaves in the Cowboy Flat area.

Pinaleno Mountains

Though apparently suitable lesser long-nosed bat foraging habitat is found throughout the Pinaleno area, we are aware of only one record of a lesser long-nosed bat from this vicinity. A juvenile male was captured in the south end of the Pinaleno Mountains during the fall in 1986. We are not aware of any intensive bat survey work completed in the Pinaleno Mountains. This area is further than 40 miles from any known lesser long-nosed bat roost.

Santa Catalina Mountains

Both the Santa Catalina and Rincon mountain ranges are included in this designation. While there are no recent records of lesser long-nosed bats in this area, older records exist of this bat being found in low numbers from a few scattered localities within the mountains. Extant roost sites are known from private property near the Coronado National Forest boundary. One maternity roost site (in Saguaro National Park, East) has many observational records where the numbers of lesser long-nosed bats fluctuated widely from year to year, from several hundred to zero. There are two roost sites on BLM lands within forging distance of this set of mountains. The Santa Catalina and Rincon mountains support foraging habitat for the bat, especially on their lower and intermediate elevation slopes.

Santa Rita Mountains

At least three locations for lesser long-nosed bat, and at least two large roost sites, are known from the Santa Rita Mountains. Several records exist of foraging bats within this range. The roost, associated with Sawmill Canyon, has had up to several hundred bats present. Foraging bats have been reported using hummingbird feeders in Madera Canyon. Surveys completed for lesser long-nosed bat in the Santa Rita Mountains have not thoroughly covered the area. The large roost at Patagonia Bat Cave is within close foraging distance of the Santa Rita Mountains. Due to the distribution of past bat records in the Santa Rita area, including large roosts (Cave of the Bells, currently unoccupied; and an unnamed mine audit within one mile of this cave), we believe the Santa Rita EMA provides foraging habitat for lesser long-nosed bats, and we suspect additional undiscovered roosts exist in the Santa Rita Mountains.

Santa Teresa Mountains

There are no known lesser long-nosed bat records from the Santa Teresa Mountains. The Santa Teresa Mountains are very rugged and are believed to provide suitable foraging habitat for the bat. We are not aware of any bat survey work conducted in this mountain range. The Santa Teresa range is further than 40 miles from any known lesser long-nosed bat roost.

Tumacacori Mountains

We are aware of one lesser long-nosed bat roost site from within the Tumacacori Mountains, in the Pajarito Mountains. The closest known bat sites nearby are near Patagonia, about 15 miles away. About half of the eastern side of the range is within the potential 40 miles foraging distance of bats from their day roosts in the Patagonia area. Paniculate agaves are found throughout the area, and saguaro cacti are at lower elevations. This range is located in the general geographic corridor between maternity colonies to the west and summer roost areas farther to the east. Little survey work for this species has been completed in this rugged mountain complex.

Whetstone Mountains

Red Cave, a primary lesser long-nosed bat roost site, exists in the Whetstone Mountains, and another primary roost site was found in the Mustang Mountains (south of the Whetstones) in 2002. These bats are known to have traveled from roosts in the Huachuca Mountains to the Mustangs. The Whetstone Mountains are believed to provide suitable foraging habitat for the lesser long-nosed bat and possibly undiscovered roost locations. We are not aware of any intensive bat survey work completed in the Whetstone Mountains.

Winchester Mountains

There are no known lesser long-nosed bat records from the Winchester Mountains. Two lesser long-nosed bat observations have been recorded from the neighboring Galiuro and Pinaleno mountains. The Winchester Mountains are believed to provide suitable foraging habitat for the bat. We are not aware of bat survey work conducted in this mountain range.

Desert tortoise (Mojave population)

Proposed fire suppression activities would occur in northwestern Mohave County, Arizona, in an area bordered by the Colorado River on the south, the Utah border on the north, the Grand Wash Cliffs on the east, and the Nevada border on the west. Within this area, the most important desert tortoise habitat occurs within the Mohave Desert scrub community. The creosote bush series of Mohave Desert scrub occurs between 1,500 to 4,000 feet in elevation and averages 5 to 10 inches of precipitation annually (Turner 1982). The most common perennial plants in this series on the Arizona Strip are creosote, *Larrea tridentata*; white bursage, *Ambrosia dumosa*; range ratany, *Krameria parviflora*; and galleta grass, *Hilaria rigida*. Annual grass and forb production is dependent on precipitation and varies from zero to as high as 4,000 pounds per acre. Desert tortoise habitat is also found within the blackbrush series of Mohave Desert scrub (Turner 1982).

Proposed fire suppression activities would also occur in tortoise habitat within the management areas of the Lake Havasu and Yuma Field Offices in California on lands in the eastern-most portions of San Bernardino, Riverside, and Imperial counties, immediately upslope of the lower Colorado River. Desert tortoise habitat in these areas occurs within the Lower Colorado River Valley subdivision of Sonoran Desert scrub. This is the largest and most arid subdivision of the Sonoran Desert, with vegetation communities characterized as typically open and simple (Turner and Brown 1982).

Areas of particularly high annual production are most likely to carry fire. These areas occur primarily on the eastern and northern portions of the Pakoon Basin, but may occur in tortoise habitat throughout the action area during years of unusually high annual grass and forb production. Annual production and the chance of catastrophic fire is typically much lower elsewhere within desert tortoise habitat, including the Beaver Dam Slope, Virgin Slope, the west side of the Pakoon Basin, and lands in the California portion of the action area. The BLM has

also identified several interface areas where tamarisk is invading washes adjacent to desert tortoise habitat, increasing the likelihood of wildland fire spreading from tamarisk into tortoise habitat.

Information on desert tortoise distribution and abundance in the action area is derived primarily from study plots and triangular, 1.5 mile by 30 feet, line transects. The plot data detail densities, demographics, and trends at specific sites, while the transect data provide distributional information and rough estimates of relative density throughout the range of the tortoise within the action area.

Survey data within the action area is available for four study plots in Arizona, three of which have been surveyed multiple times. The Pakoon Basin Plot is two square miles in size and has been surveyed once, in 1991, at which time 10 live tortoises were found. The recapture phase of the survey was not conducted. Results of surveys at the three other study plots in Arizona (one square mile in size) indicate that all three plots have experienced significant die-offs.

Six live tortoises were located in a 2001 survey of the Beaver Dam Exclosure Plot on the Beaver Dam Slope (Walker and Woodman 2002). Previous surveys of this plot detected 31 live tortoises in 1996, 20 live tortoises in 1989, and 22 live tortoises in 1980. Tortoise densities on this plot were estimated in 1996 (45), 1989 (20), and 1980 (32). Insufficient numbers of tortoises were located in 2001 to estimate density. The 2001 survey report concluded that there is likely no longer a reproductively viable population of tortoises on this study plot, and that the die-off appears to be the result of disease.

Thirty-seven live tortoises were located in a 2002 survey of the Littlefield Plot on the Beaver Dam Slope (Young *et al*. 2002). Previous surveys of this plot detected 80 live tortoises in 1998 and 46 live tortoises in 1993. Tortoise densities on this plot were estimated in 2002 (49), 1998 (49), and 1993 (56). The 2002 survey report concluded that the site may be in the middle of a die-off due to the high number of carcasses found since the site was last surveyed in 1998.

Nine live tortoises were located during the mark phase of a 2003 survey of the Virgin Slope Plot on the Virgin Slope (Goodlett and Woodman 2003). The surveyors determined that the confidence intervals of the population estimate would be excessively wide and not lead to an accurate population estimate, so the recapture phase was not conducted. Previous surveys of this plot detected 41 live tortoises in 1997 and 15 live tortoises in 1992. Tortoise densities on this plot were estimated in 1997 (38) and 1992 (35). The 2003 survey report concluded that the site may be at the end of a die-off that began around 1996-1997.

Transects conducted throughout the range of the tortoise on the Arizona Strip since 1975 suggest the tortoise occurs on approximately 300,000 acres interspersed among large areas of unsuitable habitat (BLM 1995). Transect data suggest that the greatest relative abundance of tortoises occurs on the Beaver Dam Slope, the Virgin Slope near Littlefield, and in the southern and western portions of the Pakoon Basinches Plot and transect data indicate that tortoise densities within the action area are low to moderate, usually less than 50 per square mile.

We designated 338,700 acres of critical habitat for the desert tortoise in Arizona. Of this, 288,800 acres were designated on BLM lands. Also designated as critical habitat are 43,600 acres of Lake Mead National Recreation Area immediately south of BLM lands in the Pakoon Basin, and scattered State and private parcels. No critical habitat for the tortoise is designated in the California portions of the action area managed by the Yuma and Lake Havasu Field Offices. The action area includes portions of the Northeastern Mojave, Northern Colorado, and Eastern Colorado RUs.

New Mexico ridge-nosed rattlesnake

Holycross and Smith (2001) evaluated habitat of *C. w. obscurus* in the Peloncillo Mountains and prepared a map of core *C. w. obscurus* habitat. Habitats were mapped as: a) habitats 3 and 4 (probably or likely supports a deme of *C. w. obscurus***),** b) habitats 1 and 2 (very unlikely or unlikely that *C. w. obscurus* occurs there), and c) habitats identified as possible habitat, but which burned destructively in the Maverick prescribed fire and no longer contain habitat characteristics. Habitats 3 and 4 occur in canyons and woodland patches from Skeleton Canyon on the north to the headwaters of Baker Canyon, near Little Bunk Robinson Spring, on the south. Few habitats rated as 1 and 2 were noted; these were limited to four patches between Geronimo Trail and Skeleton Canyon. Eighteen patches were identified that burned (intensely) in the escaped Maverick prescribed fire, including numerous woodland patches within a mile of Geronimo Trail, an area about a mile east of Cedar Spring, and woodland patches near Bunk Robinson Peak. Patches identified as possible habitat, but not evaluated in the field, were mostly at lower elevations south and east of Bunk Robinson Peak and east and west of the higher-elevation areas of the Peloncillo Mountains between Skeleton Canyon and Bunk Robinson Peak.

The subspecies is found primarily in areas of Madrean evergreen woodland and Petran montane coniferous forest (Brown 1982, Pase and Brown 1982). Dominant vegetation characterizing the habitat of this subspecies includes several species of oak (*Quercus* spp.), Douglas fir (*Pseudotsuga menziesii*), Apache pine (*Pinus engelmannii*), Chihuahua pine (*P. leiophylla* var. *chihuahuana*), Arizona madrone (*Arbutus arizonica*), manzanita (*Arctostaphylos pungens*), and grasses (Degenhardt 1972, Barker 1991, Degenhardt *et al.* 1996, Holycross 1998). Access to rock shelters with moderate interstitial spaces is probably a key habitat component (Barker 1991); however, the subspecies also uses perennial bunch grasses for cover (Painter 1995). New Mexico ridge-nosed rattlesnakes apparently move less frequently, move relatively short distances, and show high fidelity to specific rock shelter sites as compared to other rattlesnake species (Barker 1991, Holycross 1995a and 1995b).

Encounter rates by experienced herpetologists suggest the densest populations may occur in the portions of the Sierra San Luis, with comparatively moderate and low densities in the Animas and Peloncillo mountains, respectively (Holycross 1998). Densities probably vary greatly within mountain ranges, and encounter rates may not be indicative of population densities. Surveys for this subspecies require great effort and intensity, resulting in about 33 person-hours per sighting, on the average, to locate a specimen (Smith *el al*. 2001). There is a possibility that the

subspecies occurs on BLM-administered lands that have not undergone high-intensity surveys; thus, the possibility remains that the subspecies might be in or very near the action area year-round, with the highest rates of snake surface activity occurring between July through October. Holycross and Smith (2001) identified 8 habitat polygons on BLM lands south west of Bunk Robinson Peak. Half of these habitat polygons were rated as probably occupied based upon habitat and the rest were burned in the Maverick fire. This area was also burned as part of the Baker II prescribed fire in 2003.

Gila chub

Within the action area, BLM lands represent a large proportion of the range of the Gila chub and much suitable unoccupied habitat. Gila chub occupy headwaters, springs, and cienegas of smaller tributaries that have perennial flow, deeper pools and eddies, and good cover such as overhanging vegetation and undercut banks, in the Agua Fria, Gila, San Pedro, Santa Cruz, and Verde drainages. Specifically, Gila chub occupy, or critical habitat has been proposed in, 19 localities in the action area (Table 7). Because Gila chub are a secretive species (Rinne and Minckley 1991) and most of the known recent and historical locations continue to lack extensive surveys since the status review by Weedman et. al (1996), the species may persist in some of the locations now considered extirpated, and may occur in localities as yet undiscovered. Although Gila chub have not been found in some of the localities listed in Table 5 in recent years, these streams may still be occupied, given the secretive nature of this species, and a general lack of comprehensive surveys.

As described in the "Status of the Species, Gila chub" section, proposed critical habitat reaches are defined in the proposed rule to list the species (USFWS 2002) with linear endpoints and laterally as the stream at bankfull width including a 300-foot buffer on either side of the stream. There are 114 miles of proposed critical habitat on our near BLM lands in the action area (Table 7). We have incomplete information on the condition of the primary constituent elements of proposed critical habitat on BLM lands; however, all of the critical habitat units in the action area contain one or more of the primary constituent elements.

Recently, three Gila chub populations have been lost, two due to excessive amounts of vegetation and reduced streamflow that is causing anoxic conditions, and another from excessive sedimentation. Both Empire Gulch and the upper reaches of Cienega Creek were fenced to exclude cattle grazing 10 years ago. Due to reduced streamflow from drought, a lack of significant flood flows, and an overgrowth of vegetation, anoxic conditions eliminated Gila chub. Nearby Mattie Canyon also lost its Gila chub population due to the failure of a 20 foot tall gully plug in October 2000, resulting in excessive sedimentation to the stream (J. Simms, BLM, pers. comm., 2004).

Two populations have recently been threatened by fire. In July 2003, the Aspen Fire resulted in ash-laden runoff that eliminated all fish habitat in Sabino Canyon in the Santa Catalina Mountains near Tucson. An emergency salvage effort conducted by the Forest Service, FWS, and AGFD removed 950 Gila chub from the system before the first runoff events of the 2003

monsoon. These fish are currently being held at several facilities until conditions in Sabino Canyon are once again suitable for fish. Gila chub were later found in Sabino Canyon in July 2004 (several adults, and numerous juveniles), indicating that the species had managed to persist despite the fire (D. Hall, University of Arizona, pers. comm., 2004). Consideration is being given to using the salvaged fish as a source population for reestablishing the species in other sites in the Santa Cruz drainage (D. Mitchell, AGFD, pers. comm., 2004). The 2003 Dry Lake Complex Fire in the Gila National Forest in New Mexico burned substantial portions of Turkey Creek drainage, a tributary to the Gila River that contains the only extant population of Gila chub in New Mexico. Turkey Creek has not been surveyed since the fire, thus the status of the Gila chub in that system, and to what extent fire has affected it, is unknown (M. Meyers, FWS, pers. comm. 2004).

Reestablishment of Gila chub has been successful in two sites in Arizona: Lousy Canyon and Larry Creek, tributaries to the Agua Fria River, were stocked with 200 Gila chub from Silver Creek, a nearby tributary to the Agua Fria, in July 1995. The species is thriving in both sites (T. Hughes, BLM, pers. comm. 2004).

B. FACTORS AFFECTING SPECIES ENVIRONMENT WITHIN THE ACTION AREA

Chiricahua leopard frog

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 nonnative 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 Technical and Stakeholder Subgroups of the Chiricahua Leopard Frog Recovery Team are developing a recovery plan for this species. The current draft of the recovery plan contains a "Mitigation Protocol" for projects affecting the frog, including fire projects. Appendix C contains excerpts from the Protocol. The Cienega Creek area is recognized as a "recovery focal area" in the draft recovery plan.

On June 10, 2004, we completed reinitiation of formal consultation with BLM on the Gila Box RNCA Plan. The consultation (02-21-92-F-0070-R2, 02-21-96-F-0160-R7) included development and implementation of a fire management plan and objectives for that plan, but did not analyze specific fire or fuels projects. Many of the terms and conditions in the Gila Box RNCA Plan consultation have been incorporated as part of the proposed action for this consultation. This biological opinion supplements the fire management portions of the consultation for the Gila Box RNCA Plan.

Cactus ferruginous pygmy-owl

The status of the pygmy-owl in Arizona is tenuous. The number of adult pygmy-owls documented in Arizona has never exceeded 50 since regular survey and monitoring work began in 1993. In both 2002 and 2003, the number of known pygmy-owl nests in the State was three and four respectively, down from the highest number, 13, documented in 2001. Although sample size is low and the monitoring period short, available data suggests that there may be a declining trend in population that has somewhat corresponded with recent drought conditions. However, in and around more-urban portions of the action area, drought should not have such a marked effect due to artificial water sources, enhanced vegetation, and increased prey availability. Observations by researchers in Mexico may indicate a similar population decline just south of the U.S. Mexico border (A. Flesch, pers. comm).

Lands within CHU-3, which is within the action area, have been subject to rapid growth and urbanization. Existing natural habitats have been lost and fragmented. Growth in the Town of Marana, the primary jurisdiction within the action area, exceeded 400% during the past decade. Oro Valley, also within CHU 3, had 310% growth during that same time period. While some recent development projects have used lower housing densities or clustered development, many of the residential subdivisions being developed are high density (4 to 6 houses/acre). Many of the roads in the action area are slated for expansion or improvement, and at least one new highway interchange is under development. Some sites within CHU 3 have been designated for pygmy-owl conservation as a result of completed section 7 consultations. The BLM lands within the action area are not expected to receive such heavy development pressure, and the management of vegetation presents an opportunity to improve habitat conditions in rural and remote areas.

California condor

The overall decline in California condor numbers has been attributed to illegal collection of eggs and birds, poisoning from predator control, lead poisoning, effects of DDT and other organochlorines, and development in open country needed by condors for foraging. Their slow rate of reproduction and high numbers of years spent reaching breeding maturity make condor populations more vulnerable to these threats.

Since their reintroduction in the experimental population area, a few condors were killed when they were illegally shot. There have also been instances where several condors have ingested lead, which can lead to injury or death. The suspected exposure is from lead bullets or shot remaining in animal carcasses that condors feed upon. There have also been some incidents of other unfavorable interactions between condors and humans, primarily associated with human recreation.

The Vermilion Cliffs are rugged sandstone cliffs located on the Paria Plateau, providing the necessary remoteness, ridges, ledges, and caves favored by condors. The Paria Plateau is typified by Great Basin Conifer Woodland, dominated by juniper and piñon pine. Great Basin Desertscrub occurs along the Vermilion Cliffs, dominated by sagebrush and rabbitbrush. Species diversity is low, with shrubs occurring more frequently than woodland or forest. The Vermilion Cliffs and Paria Plateau are considered functioning in or near their historical fire regime, which is at a 35-100+ year frequency, with mixed severity. Several fires were reported for the area from 1980-2002.

Although condors are usually within the experimental population area, at any time a condor can move beyond the boundaries and be within BLM-administered lands outside that area. Because condors can travel long distances, the birds could occasionally fly to lands administered by any of the other BLM Arizona Field Offices that are within the project area.

Southwestern willow flycatcher

The most significant factor affecting southwestern willow flycatchers within the action area is habitat loss through fragmentation and vegetation modification. Large stands of breeding habitat have been lost through development, inundation from dams, and river channel modification. Groundwater pumping, water diversions and river channelization have lowered water table depths to a degree that precludes establishment and maintenance of native riparian species. Control or removal of the natural river flood regime has eliminated the major mechanism for cottonwood and willow regeneration and establishment. Yearlong or improper (growing season) livestock grazing has negatively impacted regeneration of native species used for nesting. Unpalatable or less desirable vegetation (i.e., seepwillow, screwbean mesquite, arrowweed) that lack the structure and density needed for nesting habitat have replaced preferred species in many locations.

The replacement of native riparian species with exotics such as salt cedar has changed the fire regime that normally occurs in these areas. Cottonwood and willow are not fire-adapted; stands are often killed as a result of wildfire. In regulated rivers, spring floods do not occur to allow for cottonwood and willow regeneration. Species such as salt cedar become established. Salt cedar not only supports wildfire, it aggressively re-sprouts after burning. Fire frequency in salt cedar is higher than in native vegetation. Wildfires, especially in the summer, have a direct effect on nesting southwestern willow flycatchers. Indirectly, when salt cedar stands are repeatedly burned, their suitability as nesting habitat is lost until adequate re-growth occurs.

Despite habitat alteration and loss being implicated as a cause for the decline of riparian bird species in the Southwest, the southwestern willow flycatcher often nests in habitats dominated by salt cedar (Owen and Sogge 2002). In Arizona, over 75% of southwestern willow flycatcher nests located between 1995 and 2000 were located in a salt cedar tree (Paradzick *et al.* 2001). However, the majority of nests (70 to 76% from 2001 to 2003) are located in mixed stands where either native species or salt cedar is dominant; monotypic salt cedar stands were used much less (14 to18 %) (Smith *et al.* 2002, Smith *et al.* 2003, and Smith *et al.* 2004). Recent studies (Owen and Sogge 2002 and Drost *et al.* 2001) indicate that not only does salt cedar provide adequate nesting habitat, insect numbers are also sufficient in salt cedar to provide food for adults and young willow flycatchers.

Emphasis should be placed on using Gooddings willow when reestablishing native riparian vegetation for nesting habitat. Willow is preferred over cottonwood as a nest substrate; in 2001, 79 nests were found in willow versus 2 in cottonwood; in 2002, 82 nests were in willow versus 11 in cottonwood; and in 2003, 105 nests were in willow versus 13 in cottonwood (Smith *et al.* 2002, Smith *et al.* 2003, and Smith *et al.* 2004). If the goal of riparian restoration is to replace willow flycatcher nesting habitat that consists mainly of salt cedar, then the preferred nesting habitat vegetation should be used. If migratory habitats are being restored, the species used for restoration may not be as important an issue.

Appendix H.of the Recovery Plan, "Exotic plant species in riparian ecosystems of the US Southwest" (USFWS 2002), discusses different scenarios when active and passive exotic species control should occur in occupied or unoccupied suitable habitats. The major factors to consider are whether or not the stressors that preclude native riparian vegetation establishment can be controlled or eliminated. In cases where these stressors cannot be controlled, the Recovery Plan recommends that salt cedar not be removed in occupied or unoccupied suitable habitats (USFWS 2002).

Yuma clapper rail

Yuma clapper rails prefer dense stands of cattails with access to open water and shorelines for foraging. Cattail habitat that becomes too dense with large amounts of previous-year dead material forming a thatching mat is less suitable for clapper rails because birds have difficulty accessing the interior of the stand. When the Colorado River had a natural hydrograph with high and low water cycles, marshes were created and destroyed with regularity and seldom were in

place long enough to become overgrown. With the control of river conditions since the construction of Hoover Dam, natural river processes are constrained and marshes are stabilized. Such stability enables overgrowth to occur.

Bald eagle

Bald eagle nests at Alamo Lake, Ives Wash (Alamo Lake Wildlife Area) and Lake Pleasant are affected by heavy recreational use by anglers and boaters. Discarded monofilament fishing line poses a threat to birds in these areas. Striped bass have become established in Lake Pleasant. To what degree this species affects availability of other fish bald eagle prey upon is unknown. Due to the mixed land ownership around Lake Pleasant, there is the potential for future residential development. Currently the city of Peoria is investigating acquisition of State land near Lake Pleasant for development.

Disturbance to bald eagles from recreational activities at the Granite Basin and Coolidge nest sites is expected to increase. BLM has proposed to allow rafting and kayaking outfitters to begin to operate their businesses on the Gila River below Coolidge Dam and has proposed improvements to recreational facilities (USFWS 2003). This increased recreation could negatively influence eagle nesting and foraging success.

The Winkelman, Coolidge, and Granite Basin breeding areas are affected by Coolidge Dam operations, increased recreation, nest tree mortality and lack of recruitment, and possibly contaminants from mining operations. The Gila River in this reach is dry, inhibiting recruitment of cottonwood trees for future nesting. Bald eagles at the Winkelman breeding area are also exposed to high levels of mercury in the fish they feed upon from nearby San Carlos Reservoir.

Mexican spotted owl

Current activities within the action area include livestock grazing, recreation, and vehicle use. These activities generally occur on established roads and trails, though some off-trail hiking may occur. Recreation use is relatively high in the Hualapai Mountains due to the County Park and their proximity to Kingman, and relatively low in the Arizona Strip due to the remote and steep topography of the area. A popular area that contains MSO habitat, Paria Canyon, is on a permit system, which controls the number and timing of hikers in the canyon. This system most likely reduces recreational impacts to the area and results in better protection of the area if owls are using the canyon.

Desert pupfish

The two currently occupied, reintroduced sites with desert pupfish in Arizona are both within the action area. These sites exist under a continual risk of extirpation from stochastic events such as fire or flood, or from nonnative species invasions, chronic drought, water withdrawal, and/or land use practices. The BLM's action area also contains seven failed sites recommended for restocking as well as seven sites recommended for evaluation for future reestablishment.

Baseline conditions within Cold Springs and Lousy Canyon are described in the section Gila topminnow section, below. Further, the BLM has engaged in desert pupfish recovery actions. The stocking of desert pupfish into Lousy Canyon is discussed in the Gila topminnow section, below. Mesquite Spring, in Pinal County, was also stocked with desert pupfish with approval of our December 27, 1990, Biological Opinion, Mesquite Spring Rehabilitation and Supplemental Desert Pupfish Stocking (File number 02-21-91-F-009). The site has since failed, but has been recommended for restocking (Voeltz and Bettaso 2003)

Gila topminnow

Prior section 7 consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. The baseline conditions for the sites within the action area identified in Table 3 have been largely influenced through interagency consultation with the BLM.

BLM lands represent an appreciable proportion of the current range of occurrence for the Gila topminnow. While only one natural population exists on BLM lands (Cienega Creek), there are six reestablished populations and numerous opportunities for reestablishment in failed and new sites.

The natural population of Gila topminnow in Cienega Creek and the reestablished population in Empire Gulch are within the BLM's Empire Cienega Allotment. The allotment is in the Improve category and acreages of Bureau lands in excellent, good, fair, and poor condition are 7,308, 22,654, 6,576, and 0, respectively. Range condition trend is upward. The BLM determined in 1996 (BLM 1996a) that range condition and hydrologic function in the Empire Cienega allotment may not improve appreciably without fire disturbance.

The Cold Springs Gila topminnow locality consists of two small, spring-fed constructed pools. The upper pond was constructed in 1983, the lower pond in 1985. Gila topminnow were originally reestablished in the upper pond but were present in both ponds by 1989. In 2003, Gila topminnow were found only in the lower pond (Voeltz and Bettaso 2003). Cold Spring Seep is situated in the Day Mine Allotment. The effects of livestock management on the Day Mine allotment were analyzed in our September 26, 1997, Programmatic Biological Opinion for the Safford/Tucson Field Offices' Livestock Grazing Program, Southeastern Arizona (02-21-96-F-160). The Day Mine allotment, is in the Improve category, and is 96% BLM land. Total acreage in the allotment is 57,491. The BLM acreages in excellent, good, fair, and poor condition are 900, 44,098, 6,402, and 3,856, respectively. Range condition trend is upward. Past monitoring has shown little sign of cattle in or around Cold Spring Seep. The spring is not located in a drainage that can be scoured by flood events (BLM 1996a). Nonnative red shiners (*Notropis lutrensis*) were detected in 1998 but were removed shortly thereafter. A two-track road provides access to within approximately 300 feet of the spring. An existing biological opinion (02-21-90-F-018) addresses stocking of desert pupfish and maintenance of Cold Spring Seep, a recovery

action for the species. Cold Spring Seep was scheduled to be fenced to exclude livestock in 1997.

AD Wash is located within the 11 L Allotment, and its management is guided by the Phoenix RMP and Black Canyon Habitat Management Plan (HMP). The stream occupies a narrow canyon within torturous topography. Livestock cannot access the habitat occupied by Gila topminnow, but the system is vulnerable to flood scouring. Surveys conducted in October 2003 indicate that Gila topminnow persist in the stream, though they are absent from the more upstream habitats (Voeltz and Bettaso 2003).

Lousy Canyon is a spring-fed perennial stream situated within a boulder-strewn gorge on the Agua Fria National Monument. Its management is governed by the Phoenix RMP, and will be subject to new management once a RMP is prepared specifically for the Monument. Like AD Wash, above, the stream's confined topography renders livestock unable to access the corridor. Gila topminnow have remained present in the stream through the current, chronic drought, being detected most recently in October 2003 (Voeltz and Bettaso 2003).

Tule Creek is within the Boulder Creek and Two Shoe Allotments and is partially buffered from the effects of livestock grazing by an exclosure, though the structure is vulnerable to removal during infrequent floods of large magnitude. Management is determined by the Phoenix RMP. The Gila topminnow within Tule Creek are also protected from invasions of nonnative fishes from the Agua Fria River and lake Pleasant by a fish barrier. The species was initially reestablished to Tule Creek in 1968, and has been present at the site continuously since restocking in 1981 (Voeltz and Bettaso 2003).

Yerba Mansa Spring is located in the Bill Williams River drainage upstream of Alamo Lake, outside of the natural range of the species. The constructed, spring-fed wetland has supported Gila topminnow since at least 1984 (Voeltz and Bettaso 2003), though its location precludes the site from contributing to attainment of down-listing criteria.

The AD Wash, Lousy Canyon, Tule Creek, and Yerba Mansa Spring sites were addressed during formal consultation on the Phoenix RMP; we issued our Biological Opinion and Concurrences for Phoenix Resource Management Plan and Environmental Impact Statement on March 30, 1998 (02-21-88-F-167). The non fire-related actions related to threatened and endangered species will remain as consulted upon until such time that the RMPs are revised.

The Gila topminnow's status within the action area is not necessarily secure; fish have not persisted at the currently-occupied sites for a sufficiently long-term, and may lack the ability to survive the current, chronic drought. The history of reestablishment of Gila topminnow illustrates that even sites that were thought to be secure may fail for various reasons. Fortunately, the BLM has periodically demonstrated a proactive and oftentimes successful approach to conservation and recovery of the species. Lousy Canyon was stocked with Gila topminnow (and desert pupfish) under authorization of our November 24, 1998, Formal Consultation on the Reintroduction of Gila Topminnow and Desert Pupfish into Three

Tributaries of the Agua Fria River (02-21-99-F-031). Conversely, Gila topminnow on BLM lands are widely dispersed, and in some cases vulnerable to events beyond BLM's control. Such actions would include invasions or unauthorized introductions on nonnative fishes (Cold Springs) and stochastic events such as floods. Infrequent yet large floods have transported topminnow (AD Wash) or destroyed structures intended to minimize the effects of livestock use (Tule Creek). The risk associated with maintaining Gila topminnow for the long-term across such a diversity of sites renders the species status within the action area as tenuous as it is rangewide.

Razorback sucker

The razorback sucker has declined in numbers largely due to the introduction and proliferation of nonnative fishes such as flathead catfish, black bullhead, channel catfish, and carp through predation and competition food and space. Before large numbers of non-native fish were stocked into reservoirs, razorback sucker spawning resulted in successful recruitment.

Riverine habitat in several reaches of the Lower Colorado River was eliminated with the construction of Hoover, Davis, and Imperial dams. These reservoirs continue to provide suitable habitat for razorback suckers, but dam operations directly affect spawning and nursery areas. Fluctuating water levels inundate and expose spawning beds. Terrestrial vegetation can become established at low water levels and provide habitat during high levels. These same fluctuations prevent or limit establishment of emergent or aquatic vegetation.

The remaining river reaches have also been altered hydrologically. Water temperatures have decreased and water clarity has increased compared to conditions before dam construction. Pollutants such as petroleum products and runoff from developed recreation facilities or urban areas may reduce water quality for razorback suckers in shallow water areas near developments. Recent environmental contaminant information from Las Vegas Bay indicates endocrine dysfunction in carp may be resulting from personal care product residues entering Lake Mead from Las Vegas Wash. Razorback suckers are now being tested for evidence of this contamination.

Giant salvinia (*Salvinia molesta*), an exotic weed, has invaded many backwater habitats. Heavy growths may block channels and shallow water areas, lower dissolved oxygen levels, and interfere with spawning.

Virgin River chub and Woundfin

The Virgin River chub and woundfin have declined in numbers largely due to the introduction and proliferation of nonnative fishes such as red shiner and loss or degradation of habitat. The red shiner appears to have the greatest negative impacts to woundfin through competition for food and space and predation on larvae (USFWS 1995).

Activities that have contributed to loss or degradation of habitat include channelization of watercourses, water impoundments, and water diversion projects, which have resulted in loss and alteration of water flow, and alterations in temperature and sediment. Low flows, higher water temperatures and increased water clarity are believed to have contributed to woundfin, Virgin River chub and other native fish declines in the lower Virgin River (Golden and Holden 2004). The recent drought has resulted in lower than normal flows. Lower flows have increased critical thermal maximum water temperatures that exceed woundfin tolerances several times during low-flow years (Holden and Golden 2004).

Water clarity; from low flows, bank stabilization by salt cedar, and sediment trapping at Quail Creek Reservoir (Utah), decreases habitat suitability for woundfin and Virgin River chub. These species become more susceptible to predation in clear water. Salt cedar establishment along the Virgin River has narrowed and deepened the river channel, reducing the shallow, broad sand substrate habitats preferred by woundfin and rearing life-stages for all native fishes (Hardy *et al.* 2003)

Virgin River chub and woundfin are vulnerable to further declines from the ongoing and planned urban and water development projects to meet the needs of a rapidly growing human population in the Virgin Valley, Nevada, Beaver Dam-Littlefield communities in Arizona, and Washington County, Utah.

Earlier consultations between the FWS and Arizona Strip Field Office occurred regarding fire suppression along the Virgin River. Informal consultation on the Arizona Strip District RMP as amended (02-21-02-I-0270) listed plan decisions discussing fire suppression in woundfin and chub habitats. The FWS concurred that the following decisions would not likely adversely affect these species:

1. Fires would be suppressed with minimum surface disturbance.

2. Avoid use of foams and retardants in riparian areas.

3. Ensure that native fish are protected from unintended consequences such as being sucked into pump hoses or adversely impacted by fuel spills.

4. Provide an on-the-ground “Resource Advisor” to work with the fire team to address specific resource issues.

Yaqui chub and Yaqui topminnow

Many ongoing management actions are occurring on the Refuges and on adjacent private lands. Eroded, downcut stream channels are being restored through the placement of rock-filled, wire-basket gabions and through cottonwood (*Populus* spp.) and willow (*Salix* spp.) plantings. Old agricultural fields are being reclaimed to recreate valuable cienega wetland conditions. Damaged uplands are being re-vegetated with native grasses. Invasive, non-native species are being

removed or controlled. Mosquitofish have been removed and Yaqui fishes have been reestablished (Minckley and Brooks 1985; FWS 1987, 2003). The Refuges also implement fire management actions for resource benefit, primarily to reduce mesquite and increase the occurrence of grasslands. These actions are similar to those proposed by the BLM. Countering these beneficial actions is the recent (2003) development of extensive pistachio (*Pistacia* spp.) orchards in Sonora, south of the San Bernardino NWR. Water use in these agricultural developments may threaten wetlands and Yaqui topminnow habitat on this refuge (FWS 2004).

Prior section consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. There have been nine formal consultations involving Yaqui chub and Yaqui topminnow since 1991 (Table 8). These consultations included spring restoration, livestock grazing, fire management planning, habitat renovation and reintroduction of these fishes, and changes to the Arizona Water Quality Standards. The consultations involving livestock grazing and fire management each included measures to reduce adverse effects and minimize take of Yaqui topminnow and thus resulted in non-jeopardy determinations. Several actions have also resulted in meaningful improvements in the environmental baseline of the respective Yaqui fishes. In particular, the Coronado National Forest's 1999 West Turkey Creek Native Fish Habitat Renovation Project (02-21-99-F-0130) and the San Bernardino and Leslie Canyon NWRs' 2003 Tule Spring Restoration (02-21-03-F-0261) improved and expanded habitat for these species and, thus, contributed to recovery.

Little Colorado spinedace

Factors affecting spinedace habitat within the action area include livestock grazing, water diversions and groundwater pumping, water quality, competition and predation from nonnative fishes and crayfish, and drought. These factors are not unique to the Little Colorado drainage, but are extremely widespread throughout the main stem and in Silver and Chevelon creeks. Though the BLM and some private land owners have recently begun to fence livestock out of Silver Creek on the Washboard Wash Allotment, which will result in beneficial effects to the riparian area, the impacts listed above are prevalent throughout the area. In addition, there are currently on-going discussions regarding potential increased groundwater and surface water withdrawl from Chevelon Creek and the Little Colorado River that may result in adverse affects to the spinedace and its habitat within the action area.

Loach minnow and Spikedace

Threats to these species within the action area include streamflow depletion from drought, riparian and stream habitat alteration, loss of instream cover, and non-native fish competition and predation. Aravaipa Creek supports the most protected loach minnow and spikedace populations due to special use designations on BLM land, substantial ownership by The Nature Conservancy, and planned construction of fish barriers to prevent invasion of nonnative fish species.

Arizona cliffrose

Mining and mining-related activities are a threat to the long-term survival of this species in the Burro Creek area. The largest Burro Creek population (approximately 10,000 plants) is within

the exclosure and ACEC and withdrawn from mineral entry. The two smaller subpopulations are outside of the fence and still open to mineral entry. Grazing by livestock and wildlife also threatens the long-term survival of Arizona cliffrose. The main Burro Creek population was completely enclosed with a barbed wire fence to exclude burros and cattle in the spring of 1989. The two small subpopulations are lightly grazed, and have been under a monitoring system since 1992 (J. Anderson, BLM, pers comm., June 10, 2004).

Brady pincushion cactus

The BLM established the Marble Canyon ACEC for Brady pincushion in 1995. It is 10,700 acres and protects the majority of known occupied Brady pincushion habitat on BLM lands. A Habitat Management Plan (HMP) has been developed for this species. Populations seem stable on BLM lands and efforts to reduce off-road vehicle activity have been successful. Signs have been posted and the BLM has reported that they have seen very little unauthorized vehicle use along the rim (L. Hughes, BLM, pers. comm. 2004).

Activities on BLM lands affecting Brady pincushion cactus were addressed in the Arizona Strip Resource Management Plan formal consultation (02-21-88-F-127). Livestock grazing activities on the Kane Ranch allotment were addressed through formal consultation (02-21-99-F-002). Non-jeopardy conclusions were made for both of these projects.

Holmgren milk-vetch

The BLM has not developed any conservation management actions for this species outside this consultation. Populations of Holmgren milk-vetch are inside of BLM grazing allotments, and the potential exists for plants to be trampled by livestock. However, due to drought conditions, the allotments were not stocked in the last few years (L Hughes, BLM, pers. comm. 2004). Off – road vehicle activity can harm Holmgren milk-vetch and degrade habitat, but the BLM has not seen that type of use in the areas yet. At the current rate of habitat loss for this species in Utah, the population in Arizona will have significant conservation status and will contribute to the recovery of the species. Developing a recovery plan is a high priority for us, and BLM will be participating in that process.

Jones cycladenia

Jones cycladenia populations on BLM lands occur in remote locations and are not currently experiencing negative effects from mining or recreational activities (L. Hughes, BLM, pers. comm. 2004). Drought seems to be the primary factor affecting the populations. Populations of Jones cycladenia are within the Cane Bed allotment, but there seems to be no observed effect from livestock grazing on these plants. There have been no other formal consultations done for this species.

Nichol Turk's head cactus

Some populations of Nichol Turk's head cactus have been affected by the increased use of Ironwood National Monument as a transportation corridor for undocumented aliens. Footpaths

and tire tracks are appearing throughout the area. It is only a matter of time before individual cacti are run over. The BLM has proposed to construct a fence in the area to reduce this impact, but the fence has yet to be built. A resource management plan is in the initial planning stages for Ironwood National Monument, and, hopefully, threats of this type will be addressed.

Past mining activities have affected Nichol Turk's head cactus. We have formally consulted with the BLM on the following mining activities: 02-21-83-F-0002 and 02-21-84-F-0087 (Mining Plans of Operation, patented claims in the Waterman Mountains); 02-21-92-F-0001 (ASARCO land exchange, Ray Mine); and 02-21-94-F-0186 (expansion of the Cyperus mine on the Tohono O'odman Nation). Grazing activities were consulted on in 02-21-89-F-0166 (CRMP for Cocoraque and Aqua Dulce Ranches) and 02-21-96-F-160 (Safford programmatic biological opinion on livestock grazing). Effects from a residential development on Tohono O'odham lands were addressed in 02-21-95-F-0046. We also consulted on the BLM's Habitat Management Plan (02-21-84-F-0084). None of these projects jeopardized the continued existence of Nichol Turk's head cactus.

Peebles Navajo cactus

The BLM established the Tanner Wash ACEC in the 1989 to protect the known populations on BLM lands. Private lands (75-80 %) are included within the boundaries of the ACEC, even though BLM has no management control over those lands. BLM is hoping to acquire the lands. In the meantime, Arizona Public Service (APS), one of the private land owners, has requested a zoning change from Navajo County for 200 acres inside the ACEC. The fate of those lands is not known at this time. The ACEC is fenced from livestock use and to protect the populations from off-road vehicle use. A Habitat Management Plan has been completed.

Sand and gravel operations are a threat to this species. There is an active operation on lands adjacent to the ACEC; in fact, land has been mined right up to the ACEC boundary (J. Anderson, BLM, pers. comm. 2004). The owners of this mining operation have requested access to BLM lands within the ACEC for mining purposes. The BLM has not granted this request. To date, there have been no other formal consultations on projects that may adversely affect Peebles Navajo cactus.

Pima pineapple cactus

Livestock grazing is the main activity occurring on BLM lands that support Pima pineapple cactus. The effects of livestock grazing were discussed in the Safford BLM biological opinion covering livestock grazing activities (02-21-96-F-160). Unauthorized off-road vehicle activity is also affecting Pima pineapple cactus on BLM lands. We observed Pima pineapple cactus that had been damaged (run over) and habitat degraded by unauthorized off-road use on BLM lands near Three Points, Pima County, Arizona. This same activity is likely to be occurring on other BLM parcels. Much of the potential Pima pineapple cactus habitat on BLM lands is subject to intense use by undocumented aliens and the Border Patrol. We have observed many new roads, footpaths, and illegal dumping of trash in areas on Arizona State lands, where much of the suitable habitat for Pima pineapple cactus exists. BLM parcels are adjacent to Arizona State lands and are probably being used in a similar manner. These activities are contributing to

overall habitat degradation and may be facilitating the movement of non-native species (e.g., bufflegrass (*Pennisetum ciliare*)) into desert scrub and grassland communities that support Pima pineapple cactus. It is not known how pervasive or widespread these activities are on BLM lands since no monitoring of Pima pineapple cactus or habitat is taking place. Due to the isolated nature of BLM parcels in Pima pineapple cactus habitat, these parcels may be candidates for land exchanges. We know of one land exchange that has taken place, and one that was proposed for BLM lands known to have Pima pineapple cactus. Land exchanges to private developers may result in the loss of plants and habitat, along with increased fragmentation of Pima pineapple cactus habitat.

Kearney's blue star

Donovan (1998) reported that most of the populations on BLM lands are isolated enough to be protected from human disturbances. He listed potential threats to be trampling by livestock, watershed degradation, small population size and limited distribution, and effects from fire. The effects from livestock grazing were evaluated in the Safford BLM biological opinion on livestock grazing. In that opinion, one of the conservation measures was that no livestock grazing would be authorized by the BLM for the Baboquivari allotment (the population in Brown Canyon is in that allotment) through December 31, 2006, pending a BLM decision to cancel livestock grazing on that allotment. We know of no other activities in the action area that may be affecting Kearney's blue star.

Siler pincushion cactus

A Habitat Management Plan for Siler pincushion cactus was completed in 1987. The BLM has four ACECs that have been designated to protect Siler pincushion cactus and its habitat. The Fort Pearce ACEC protects 900 acres, the Johnson Spring ACEC protects 2,400 acres, the Lost Spring Mountain ACEC protects 9,800 acres, and the Moonshine Ridge ACEC protects 5,500 acres. Mining withdrawals have been completed for these areas. The ACECs are fenced, but some of the fences have been cut and continue to be cut. Unauthorized off-road vehicle use remains a concern for this species, and the BLM has increased patrol of areas that support dense populations of Siler pincushion cactus. With the expansion of nearby St. George, increases in off-road vehicle use will surely increase. The BLM is considering fencing a Siler pincushion cactus population on Warner Ridge to protect it from off-road vehicle trespass (L. Hughes, BLM, pers. comm. 2004).

The following formal consultations have been completed for Siler pincushion cactus: Valley Wash pipeline (02-21-90-F-0147), RMP for the Arizona strip (in which the Habitat Management guidelines for Siler pincushion cactus were formalized and grazing guidelines were set for Siler pincushion habitat) (02-21-88-F-0127), and an 80-acre land sale in Fredonia (02-21-83-F-0022).

Huachuca water umbel

Huachuca water umbel populations can be affected by improper livestock grazing. Trampling of plants and bank habitat can negatively affect this species. The effects from livestock grazing were analyzed in the Safford BLM grazing opinion (02-21-96-F-160). It would seem that the

level of grazing on the Empire Cienega allotment is compatible with Huachuca water umbel, as the population seems to be increasing in Empire Gulch. Empire Gulch is not within designated critical habitat.

Trespass cattle have been a problem in the SPRCA. By 1997, a total of 79 trespass cattle had been removed from the SPRCA, but it is not known if trespass cattle continue to be a problem for this area.

Portions of the SPRCA are heavily used by recreationists and undocumented aliens. Fires have become more common in the SPRCA. It is not known if these activities are currently affecting water umbel populations. The patches of water umbel seem to be increasing in the SPRCA; more monitoring of the species distribution in the SPRCA is needed before any conclusions can be made.

The replacement of the Hereford Bridge may affect water umbel populations as this is a site for Huachuca water umbel in the SPRCA. The BLM is coordinating with our office on this project.

Hualapai Mexican vole

Because of the extent of Federal lands in the action area, most activities that may affect Hualapai vole or their habitat are Federal actions (i.e., BLM). In addition to exclusion from grazing activities (see "Status of the Species, Hualapai Mexican vole"), the following provides a summary of the section 7 consultations regarding the Hualapai Mexican vole within the action area. We refer the reader to these opinions for more detailed descriptions of these actions and their effects on the Hualapai vole and its habitat.

On March 8, 1991, we issued a biological opinion (consultation number 02-21-91-F-0089) on the BLM Kingman Resource Area Resource Management Plan (RMP) and its effects on the vole and other listed species. The RMP is a 20-year guide for management directions and programs within the resource area. On September 11, 1995, we issued a concurrence (consultation number 02-21-95-I-0401) on the BLM Kingman Field Office 5-Year Hayden Peak Communications Site Road Maintenance Plan and its effects on the Hualapai Mexican vole and other listed species. In 2003, the BLM formally consulted with this office regarding the effects of the revised Hayden Peak Communications Sites Road Maintenance Plan to the Hualapai vole. The biological opinion was issued on October 31, 2003 (consultation number 02-21-95-F-0401-R1).

The BLM formally consulted with the FWS regarding the effects of implementation of a prescribed fire program within land administered by the Kingman Field Office of the Bureau of Land Management. The biological opinion was issued on December 14, 2001 (consultation number 02-21-01-F-0241). The action area encompasses the known range of the subspecies. Effects to the Hualapai Mexican vole were thought to occur through (1) injury and/or death during the treatment from smoke inhalation and/or fire and (2) harm, injury, and/or death after treatment due to temporary loss or degradation of habitat and increased predation. The proposed action was also thought to have beneficial effects to the vole by (1) increasing the suitability of currently unoccupied areas as the undergrowth returns within 2-4 years of treatment and (2) reducing the potential for catastrophic wildfires. The FWS concluded that the proposed action

was not likely to jeopardize the continued existence of the vole. Take of the Hualapai Mexican vole was anticipated as a result of the proposed action, in the form of habitat burned. We anticipated that no more than 100 acres of ponderosa pine would be burned annually for the next 10 years, resulting in a temporary loss of foraging habitat for the vole. The level of take would be exceeded if the following occur: (1) treatment escapes into occupied vole habitat or (2) greater than 100 acres of ponderosa pine is treated during any annual burn season. In order to minimize take, the following reasonable and prudent measures were issued:

(1) Minimize the effects of the prescribed fire on the Hualapai Mexican vole; and

(2) Minimize temporary and long-term impacts to treated sites and the adjacent habitat.

In addition to the above consultations, several informal consultations have resulted in either no effect, a beneficial effect, or were not likely to adversely affect the Hualapai vole.

The Arizona Game and Fish Department has conducted a tremendous amount of work concerning the distribution, genetics, and Hualapai Mexican vole's habitat. The Arizona Game and Fish Department believes that there is enough new information available to justify de-listing the species. The Department is currently conducting a taxonomic review of the species. This information will be used for a status review of the species, possibly later this year.

Lesser long-nosed bat

Significant population declines of this species (declining numbers of migrating bats and sizes and numbers of maternity colonies) continue to be noted in Arizona and Sonora, Mexico. This may be due to roost disturbance (deliberate or accidental) and bat exclusion from roost sties (by gates or filling in of caves and mines). Another factor may be the local over-harvesting of native agaves in northern Mexico (BE). Bat population declines are also associated with the deliberate eradication or destruction of roost sites because of lack of knowledge about bat species in Mexico (i.e., they are believed to be vampire bats) (M. Coffeen, FWS, pers. comm. 2003).

Desert tortoise (Mojave population)

The section entitled "Status of the Species, Desert Tortoise" provides a general listing of the factors that have contributed to the declining status of the desert tortoise. These factors are primarily human-caused, many of which occur in the action area.

Important factors contributing to the decline of tortoises on the Beaver Dam Slope include OHV recreation, proliferation of roads and routes, mortality of tortoises on roads, particularly Highway 91, collection of tortoises, diseases including URTD and shell diseases, proliferation of alien annual plants, and reduced habitat quality due to a long history of cattle grazing, mining, and increasing development near Beaver Dam and Littlefield, Arizona (USFWS 1994, USFWS files). Many of the same factors are present on the Virgin Slope, located south of the Virgin River and north and west of the Virgin Mountains, although to a lesser degree. However, the Virgin Slope has experienced tremendous development pressure as the rapidly growing community of Mesquite, Nevada expands into Arizona. The Virgin River communities in

Arizona have prepared the Virgin River Communities Area Plan that estimates the population of the area at 900 full-time and 600 part-time residents. This plan details their intent to form a single incorporated city with a projected population reaching 25,000 or more by 2020 (Virgin River Communities Ad Hoc Area Plan Development Committee 1998).

The Pakoon Basin experiences relatively few human-caused factors that have contributed to the declining status of the tortoise due to its remote nature and limited access. Increasing OHV activity, cattle grazing, and disease continue to affect tortoises and their habitat in this area. Loss and/or degradation of tortoise habitat due to wildfire may be the most significant threat to tortoises in the Pakoon Basinches Over 100,000 acres of tortoise habitat, primarily in the northeastern portion of the basin, have burned since the 1940's.

Formal consultations have been completed with the BLM within the action area on range improvements, grazing management, rights-of-ways, wilderness and resource management plans, emergency and programmatic fire suppression, and a variety of construction projects. Consultation on the BLM Arizona Strip Field Office Resource Management Plan is ongoing.

New Mexico ridge-nosed rattlesnake

The portion of the action area that intersects the range of the New Mexico ridge-nosed rattlesnake is within the Malpai Borderlands area in the southeastern corner of Arizona. This rangeland is actively grazed and currently managed on a landscape scale through the coordinated efforts of private landowners, Arizona State Land Department, BLM, and U.S. Forest Service. As part of this cooperative management strategy, two prescribed burns have been conducted in this area, Maverick Burn and the Baker II Burn. The Maverick burn escaped the fire lines and resulted in impacting habitat in several of the core habitats identified by Holycross and Smith (2000) (see discussion above). While excessive cattle grazing has been identified as a factor that could alter habitat, section 7 consultation for grazing on Federal lands has already been completed. Illegal collection of this animal does occur in this population and remains a threat. However, most of this activity occurs in areas along major roads through the Peloncillo Mountain range, and not on the BLM-administered lands or immediately adjacent.

Gila chub

The action area encompasses a large portion of the range of the Gila chub, thus many of the factors affecting the species are the same as those described in the status of the species section. Habitat loss and degradation has occurred concurrent with invasion of nonindigenous fish species. Anthropogenic changes include past and current dewatering of rivers, springs, and cienegas, diversion of water channels, impoundments, and regulation of flow, and land management activities, including livestock grazing and fire management. Poor land use practices have promoted erosion and arroyo formation and the introduction of predacious and competing nonindigenous fish species (Miller 1961, Minckley 1985).

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). Fire suppression and a decrease in fine fuels due to poorly managed livestock grazing has also caused shrub invasion in desert grasslands (Humphrey 1958, Cable 1967, Wright and Bailey 1982, Kaib *et al.* 1996). These changes may have also resulted in changes to the aquatic ecosystem components of these landscapes, most likely by reducing streamflow and riparian vegetation. An experiment to impose a more natural fire regime in desert grassland indicates that the increase in abundance and cover of shrubs in desert grasslands may have adversely affected watersheds to the detriment of native fishes (Gori and Backer, in press).

We have completed five conferences on this species in the action area, and two of these have anticipated take. The Coronado National Forest conference on ongoing grazing anticipated take would occur to the Sabino Canyon and O'Donnell Creek populations in the form of harm from cattle accessing and overgrazing enclosures containing occupied stream segments, and from mortality due to construction, development, or maintenance projects. The Las Cienegas National Conservation Area Resource Management Plan anticipated take would occur in the form of mortality, injury, pursuit, capture, collection, trapping, and harassment from control of nonindigenous species, maintenance of roads and trails, use of agricultural fields, livestock management, the introduction or increase of nonindigenous species, fence maintenance, and construction of utility lines. The Agua Fria National Monument Plan anticipated take would occur in the form of harm, harassment, or mortality from cattle grazing and vehicle crossings.

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.

Both general and species-specific conservation measures (Appendix B) have been developed as part of the proposed action to minimize effects. In the case of fire suppression, these conservation measures will be followed unless the protection of human life or property outweigh the need to protect other resources. Our analysis of effects for fire suppression activities assumes the conservation measures will be implemented. If a situation warrants suppression action outside of the scope of these measures and a Federally-listed species is affected, BLM will consult on their actions on an emergency basis.

Both adverse and beneficial effects may occur from wildland fire use and prescribed fire activities. However, the use of wildfire and prescribed fire as management tools are

discretionary actions. As such, the effects of the proposed action include the effects of the managed fire itself, as well as any suppression or rehabilitation that may accompany it. This differs from the effects associated with fire suppression, where the wildfire is considered a baseline-level effect and only the effects of suppression activities and general effects of rehabilitation are considered.

It is possible that a wildland fire use or prescribed fire could escape. We understand that this is not the intent of such projects and that an escaped fire situation will trigger immediate suppression decisions and activities. In this case, coordination with us and any subsequent emergency consultation will be conducted under the fire suppression procedures outlined in this biological and conference opinion.

Chiricahua leopard frog

Fire suppression activities and methods will be used in, or immediately adjacent to, riparian habitats occupied by the Chiricahua leopard frog. BLM will not implement wildland fire use, prescribed fire, or mechanical or chemical treatments within, or immediately adjacent to, riparian habitats occupied by the Chiricahua leopard frog during the life of the LUP Amendment (Appendix C), although these treatments could be chosen for use in habitats upstream or upslope from known, occupied sites.

Any of the areas and populations described in the Environmental Baseline could potentially be affected by the proposed action. These are primarily in southeastern Arizona in the jurisdictions of the Tucson and Safford Field Offices. Most important of these is the Cienega Creek/Empire Cienega area where a population of Chiricahua leopard frogs is extant. The frogs at this site coexist at low density with bullfrogs, and chytridiomycosis is known from this population. Hence, designing and implementing fire projects in the Cienega Creek/Empire Cienega area in ways that minimize the potential for benefiting bullfrog populations, and to prevent spread of chytridiomycosis beyond that area, are paramount for protection of the frog. Because frogs are known from this site, death or injury of leopard frogs in accordance with the mechanisms described above is reasonably likely to occur, if fire suppression is conducted in the area.

The other areas of potential frog occupancy noted in the environmental baseline could also be affected by fire suppression or other fire projects. Any work in the Swisshelm Mountains upstream of Leslie Canyon could affect the extant population of Chiricahua leopard frogs at the Leslie Canyon NWR. Frogs could be affected during future fire and fuels management actions in the Gila Box RNCA. Frog populations and habitats in the Peloncillo Mountains, including those at Guadalupe Canyon, are in the planning area for the Peloncillo programmatic fire plan, for which the Coronado National Forest has lead. The planning area includes BLM lands in the Peloncillo Mountains and the Safford Field Office is a cooperator. We anticipate that site-specific fire projects will be covered under the biological opinion for that plan.

Fire, fire suppression, and fire management treatments can result in significant impacts to Chiricahua leopard frogs and their habitats. Fire, and subsequent degradation of watershed condition immediately after fires, can result in dramatically increased runoff, sedimentation, debris flow scour aquatic habitats in canyon bottoms or bury them in debris, and ash flow that

can creating toxic conditions. After the Rattlesnake wildlfire, a large 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 (T. Beatty, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitats are largely absent now, and the only breeding leopard frog populations occur in artificial tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. In Romero Canyon, Catalina Mountains, Pima County, Arizona, lowland leopard frogs (*Rana yavapaiensis*) and their habitat were severely reduced or eliminated due to runoff and sedimentation following the Aspen Fire in 2003. Loss of occupied habitat also occurred in Buehman Canyon and probably other localities in the Catalina Mountains due to recent catastrophic fires (Wallace 2003). At Saguaro National Park East, similar loss of lowland leopard frog habitat has also occurred due to post-fire sedimentation and ash flow (D. Swann, pers. comm. 2002). Smoke diffusion into water and ash flow can result in high levels of phosphorus and nitrogen (Spencer and Hauer 1991) with potentially toxic effects to frogs.

Suppression of wildfire, as needed, would help prevent the watershed damage and associated indirect effects described above. However, fire suppression activities can also affect any frogs in the area, including impacts of placing crew camps and equipment staging areas in or near frog habitats and using heavy equipment in frog habitats. In addition, fire managers make decisions during fire suppression that affect the direction or intensity of wildfire, and these decisions can affect whether areas on, or upstream of, frog habitats burn and if these areas burn intensely. Frogs would primarily be affected at breeding sites, but as discussed in the Status of the Species section, they have been known to move overland or along intermittent drainages and may be found at temporary pools that are sometimes miles from breeding habitats. Frogs could be affected in these areas as well. Chiricahua leopard frogs could also be affected by use of water from occupied sites for water sources to suppress fire, water drops over Chiricahua leopard frog habitat, or potential chemical contamination of frogs and their occupied habitats from retardant drops.

Conservation measures (Appendix B) will be implemented as much as safely possible to minimize or eliminate direct effects to the Chiricahua leopard frog from fire suppression actions; however, an Incident Commander may need to balance the implementation of conservation measures to protect the frogs with the use of aggressive fire suppression tactics in riparian or adjacent upland habitats to prevent greater loss of these habitats from the wildfire. More aggressive tactics in these areas could increase the time, scope, or intensity of the negative effects of the wildfire and suppression activities on the Chiricahua leopard frog.

Conservation measure AM-5 will minimize the use of water from occupied sites for fire suppression activities, except as necessary to abate immediate fire threat or loss of life or property, thus minimizing effects to the species from this activity. RA-8 and 9 would minimize potential introduction of nonnative predators and disease from such activities. If deemed necessary by the Incident Commander, using water sources occupied by Chiricahua leopard frogs during fire suppression efforts may result in mortality from driving through the river; release of toxic substances into the water from pumps, vehicles, or other sources; direct loss of

individual frogs or larvae taken into pumps or helicopter water buckets; loss of habitat (water quantity) from dewatering during low flow periods; or the spread of disease or exotic (nonnative) predatory species (*e.g.*, bullfrogs, nonnative fishes, crayfish) among different water sources. Conversely, water drops can, in some circumstances, be used instead of hand lines ("wet-lining") to control fire movement. This tactic should result in less impact to soil, litter, and vegetation than hand line construction both in riparian and adjacent upland habitats, which would minimize increases in soil or ash erosion and silt moving into adjacent aquatic habitats occupied by the frog.

Fire retardant drops will be restricted in or near riparian and aquatic habitats, especially sites occupied by Federally protected species, such as the Chiricahua leopard frog, in accordance with conservation measure RA-6. Fire retardant is an ammonium-based chemical containing nitrogen, phosphorous, and a corrosion inhibitor composed of sodium ferrocyanide. Retardant is known to be toxic to aquatic life in relatively high concentrations, including leopard frogs (Calfee and Little 2003). When rivers or streams have high or adequate flows during suppression efforts, the chemical effects of the retardant would have minimal effects on water quality, due to dilution from the water flows during and after fire suppression actions. Stagnant aquatic sites with little or no water flow to dilute the retardant would have a greater adverse effect on the frogs. Implementing conservation measure RA-6 will prevent retardants from entering aquatic sites occupied by the Chiricahua leopard frog, and will help to eliminate negative effects to the frog from this activity.

Since larval and adult Chiricahua leopard frogs occur in stock tanks, ponds, and streams, and because BLM will minimize use of these treatments in habitats immediately adjacent to occupied sites, wildland fire use, prescribed fires, and mechanical treatments would rarely directly affect leopard frog eggs, larvae, or adults. Fire suppression activities on upland terrestrial habitats used during wildland fire use or prescribed fire to control these fires to their management boundaries could affect frogs as described above, but the use of these fire management tools will only occur under conditions that meet predetermined prescriptions.

No studies have been conducted evaluating effects of pesticides on the Chiricahua leopard frog. Many studies are available for other amphibians [see Sparling (2003) for a recent review of the role of contaminants in amphibian decline]; however, these studies often examine acute toxicity in the laboratory rather than the entire range of effects, including sublethal responses and interactions or additive effects with other environmental stressors in the field, that can alter population dynamics. There are no Federal regulatory criteria on toxicants for amphibians. A variety of studies have shown that amphibians in general, and leopard frogs and other ranid frogs specifically, are sensitive to a variety of chemicals [see review in Sparling (2003)]. There is growing evidence that the deleterious effects of UV radiation and chemicals may interact or be additive as well (Akins and Wofford 1999, Monson *et al.* 1999). BLM has not proposed specific chemicals to be used in vegetation management near frog habitat, thus, we cannot specifically evaluate the effects of their proposal on the Chiricahua leopard frog. Conservation measures will help prevent these chemicals from entering the aquatic habitats used by the Chiricahua leopard frog. Herbicide applications will be scheduled and designed to minimize potential direct effects. BLM does not anticipate using chemical treatments in habitats immediately adjacent to occupied sites. Aquatic habitats occupied by the frog will be buffered from aerial application of

chemicals; however aerial application on nearby project areas could inadvertently strike some occupied sites, resulting in chemical contamination of water sources and frogs, and associated mortality or sublethal effects. Hand-application of herbicides may be used in riparian areas (*e.g.,* to control tamarisk regrowth) upstream of some sites, but drift-inhibiting agents will be used to prevent herbicides from entering aquatic habitats occupied by frogs. This treatment will typically not be used around stagnant water sources (*e.g.,* stock tanks) occupied by the frogs, as these sites generally do not need fuels reduction or habitat restoration. Pre-project planning, buffers, and other conservation measures would render the potential for direct impacts to this species from this activity so low as to be discountable.

Other negative effects to the Chiricahua leopard frog from fire suppression activities or fire management actions are anticipated to be indirect and result from soil or ash inflow into occupied waters from suppression or project activities that occur upslope or upstream from occupied sites. An inflow of ash and sediment into a water body is capable of smothering eggs and tadpoles, resulting in a change in numbers of individuals. Sediment and ash flow can also inhibit respiration in macroinvertebrates, resulting in reduced density and composition of macroinvertebrates (a primary food source for the frogs). A reduction in the amount of prey can ultimately affect leopard frog numbers and reproduction. These indirect effects have the capability of affecting the numbers and reproduction of the species and may result in a change in its distribution, if isolated populations are locally extirpated and recolonization from adjacent sites is not feasible. In order to minimize these indirect effects on Chiricahua leopard frogs, several conservation measures (Appendix B) will be implemented for the proposed fire and fuels management activities. These conservation measures are expected to reduce the scope and intensity of effects to the species numbers, reproduction, and distribution.

Conversely, Chiricahua leopard frogs may experience positive interdependent effects from aggressive fire suppression actions within riparian or upland habitats. Fire suppression activities may minimize the amount of vegetation lost from catastrophic wildfires, which would contribute to the soil and ash flow into occupied sites. The species may also experience positive interrelated effects from post-fire rehabilitation and restoration activities near some occupied sites. These are aimed to quickly restore riparian and terrestrial vegetation, thereby protecting the aquatic habitat.

In summary, there may be a variety of adverse effects to Chiricahua leopard frogs, and conservation measures are unlikely to eliminate the adverse effects of fire suppression where the species occurs, or of other treatments near the occupied sites. Over time, implementing fire and fuels management activities would reduce the risk of catastrophic fires in riparian or upland habitats that would result in large-scale losses of vegetation. Because small, disjunct populations, such as with the Chiricahua leopard frog, are at higher risk of local extirpation from catastrophic events, this long-term improvement would assist in protecting their aquatic habitats and potentially stabilizing frog populations, thereby providing an overall positive effect to the species.

Cactus ferruginous pygmy-owl

The scope of activities described in the LUP Amendment (fire suppression, wildland fire use, prescribed fire, and mechanical and chemical treatment) could adversely affect pygmy-owls and/or the species' habitat to differing degrees depending on the activity and location. BLM will not implement wildland fire use, prescribed fire, or mechanical or chemical treatments in habitats occupied by pygmy-owls. However, these actions could occur in currently-unoccupied habitats or in areas near occupied habitat. Conservation measures, both general and specific to pygmy-owls (Appendix B), have been proposed and are intended to avoid or minimize these adverse effects. The following sections include analyses of the proposed action's effects to pygmy-owls on an activity-by-activity basis, with recognition given to the low probability of such effects acting upon individuals of such a rare and patchily-distributed species.

Fire Suppression

While not fire-adapted, the Sonoran desert's scrublands do experience occasional ignitions from natural and human-caused events. Based on wildfire history and current fuel loads, fire suppression activities are likely to be implemented within, or in the general vicinity of, pygmy-owl habitat on multiple occasions during the intended 10-year timeframe of this consultation. The invasion of nonnative annual grasses compounds the situation by providing a continuous fuel source not necessarily present in undisturbed habitat. It must be noted that the majority of effects analyzed herein, while occurring in pygmy-owl habitat, may not actually affect individual pygmy-owls. Definitive, protocol-level pygmy-owl surveys will be lacking in most instances, but the pygmy-owl's extreme rarity renders it unlikely that fire suppression will occur in occupied pygmy-owl habitat.

Wildfire is a threat to pygmy-owl habitat in riparian, xeroriparian, semidesert grassland, and desertscrub ecotypes. The wildfire season overlaps with the February 1 to July 31 pygmy-owl breeding season. Wildfire can also precipitate direct mortality of both adult and juvenile pygmy-owls, reduce prey-bases, and isolate occupied home ranges from one another. Suppression and post-fire rehabilitation of wildfire in these ecosystems are therefore desirable for the conservation of the species. Conversely, suppression and rehabilitation activities can also be accompanied by adverse effects on pygmy-owl habitat.

Aerial application of water and/or fire retardant to suppress wildfires can adversely affect pygmy-owl habitat and, if sites are occupied, individual pygmy-owls. Using helicopter bucket drops or air tanker retardant drops from low-flying aircraft in the vicinity of occupied pygmy-owl habitat would disturb habitat and could displace or kill birds. In addition, water or retardant drops could result in nest abandonment, and thus mortality of nestlings, if the drop hit a nest tree or cactus. The probability of a water drop striking an occupied nesting substrate is expected to be so low as to be discountable. The ignition of backfires could kill adult pygmy-owls and their offspring should the backfire advance in such a manner that the owls' glide-and-perch flight style is not accommodated. Cutting nest trees, and in rare instances columnar cacti, during fire break construction could also remove habitat or injure or kill pygmy-owls, if they were present. We believe that backburning will be a seldem-used suppression technique within most desert ecotypes. Further, there is a low likelihood such suppression measures would be pursued in occupied habitat.

Direct and indirect impacts on pygmy-owl habitat from the fire suppression techniques described above will not necessarily be fully minimized in the short-term when firefighting occurs in structurally complex desertscrub and riparian communities. The effects of fire suppression activities in the columnar cacti and/or woody species-rich Sonoran desertscrub communities may be longer term or more intense. These vegetation communities have much longer recovery periods from activities that highly disturb the soils or vegetation, thereby having a longer-term effect on the pygmy-owls that may inhabit them. Such effects could be of greater magnitude in grasslands where nest cavities are uncommon. Many mesquite trees in the Altar Valley are too young to have developed cavities and, thus, the semidesert grassland ecosystem is likely to be nest-site limited. Post-fire annual grass invasions may create a community type-shift that permanently excludes the native woody vegetation (Alford 2001). It is thought that relict saguaros provide substrates adjacent to some semidesert grasslands in the Altar Valley; it is thus expected that conservation measures intended to protect Sonoran desertscub (see below) will preclude elimination of appreciable numbers of potential saguaro nest sites.

Pygmy-owls and their habitat may experience positive interdependent effects from aggressive fire suppression actions within riparian or desertscrub habitats because overall loss of habitat from catastrophic wildfire will be lessened. Post-fire rehabilitation also presents an opportunity to restore habitat lost to wildfire, particularly in riparian areas. By communicating during a fire suppression action (FS-2), BLM and FWS may develop and implement additional conservation measures to address specific fire suppression activities' adverse effects on the pygmy-owl during incidents. Consultation regarding specific post-fire rehabilitation and restoration activities should also result in minimizing effects.

Terraces adjacent to ephemeral washes often contain or support vegetation that differs from the surrounding uplands in either species composition, or in density and/or structural complexity. Much of this xeroriparian habitat is suitable for pygmy-owls. In such situations, the presence of water is not permanent, but the effects of ephemeral water on vegetation are permanent. Riparian and xeroriparian ecosystems important to the pygmy-owl include the floodplain and "first terrace" vernally-adapted broadleaf species (i.e. cottonwood and willow), the "second terrace", and mesquite bosques. These areas constitute habitat for the pygmy-owl, and thus will be included in implementation of general conservation measures for both fire suppression and fuels management treatments: FS-1 through FS-7, FT-1 through FT-5, RR-1, RR-2, RR-4 through RR7, and FP-1 through FP-3.

Fire and Fuels Management Treatments

Many habitats used by cactus ferruginous pygmy-owls in Arizona are severely altered from a variety of causes, leaving these non-fire-adapted habitats at risk to catastrophic wildfires. At particular risk are desert ecosystems invaded by nonnative buffelgrass and red brome, both of which can: (1) decrease the fire return interval via increased fuel loading; and (2) concomitantly precipitate ecosystem-scale vegetation community changes adverse to pygmy-owls (Alford 2001). In these situations, fire or vegetation management techniques may be used to restore and maintain these habitats, to reduce accumulated hazardous fuels, and/or reduce the chance of catastrophic fire. These effects are beneficial to the pygmy-owl.

Direct effects from these fire management activities are considered to be minimal at the regional scale, in part because some of the activities are largely excluded from the pygmy-owl's Sonoran desertscrub habitat, or because activities occurring within other pygmy-owl habitats (semidesert grassland, xeroriparian and riparian sites, etc.) will be implemented concurrently with avoidance and minimization measures. Implementation of conservation measures (FT-1 through FT-5, and RA-12 through RA-14), including pre-project surveys and restrictions on timing and locations of activities within suitable or occupied habitat, would minimize direct effects to the pygmy-owl.

Wildland Fire Use and Prescribed Fire

The use of wildfire for resource benefits or the application of prescribed fire in or near pygmy-owl habitat could directly affect pygmy-owls, if they are present. The adverse effects of these fire management techniques are similar to those described for fire suppression. Wildland fire use and prescribed fire often include application of actions similar to those noted for wildfire suppression (backburns, construction of fire line, water or retardant drops, removal of ladder fuels and woody debris, etc.). These actions can variously harass pygmy-owls, reduce prey availability, and destroy habitat. Such effects would be greater during the February 1 to July 31 pygmy-owl breeding season, as these actions adjacent to occupied sites could precipitate the loss of nestlings or fledglings, which would be unable to flee. The immediate post-fire reductions in pygmy-owl prey availability could result in increased pygmy-owl foraging time, which would increase energy expenditure and expose the species to additional predation risk. The increased predation risk would be greater if the fire appreciably reduced the structural complexity of foraging habitat; hiding cover would be lost. The aforementioned effects are unlikely to be experienced by individual pygmy-owls due to the species' rarity and patchy distribution. Longer-term post-fire effects are largely beneficial.

The BLM will implement wildland fire use and prescribed fire treatments accompanied by various conservation measures intended to avoid impacts or minimize effects on the pygmy-owl. These include conservation measures FT-1 through FT-5, FP-1 through FP-3, and RA-12 through RA-14. The prohibition of wildland fire use and prescribed fire treatments within pygmy-owl habitat during the February through July breeding season (FP-1) minimizes the risk of mortality of nestling and fledgling-class pygmy-owls. There would still be effects similar to those described above for wildfire and fire suppression: reduced habitat complexity, temporarily reduced forage base, increased predation risk, loss of trees or cactus containing nest cavities, etc., though it is not anticipated these effects will be experienced by individual pygmy-owls.

Conservation measure FP-1 also indicates that wildland fire use and prescribed fire may be pursued within pygmy-owl habitat if surveys have concluded that pygmy-owls do not occur in the project area. It is unlikely that protocol surveys (which require two years of effort) will be completed in areas where natural ignition of these fires occurs. The wildfire season largely occurs during the February through July pygmy-owl breeding season, though there is some potential for late summer wildfires to ignite as lightning-intensive, precipitation-poor monsoon storms occur. Prescribed fire is a pre-planned effort, and thus incorporates sufficient time for pre-project pygmy-owl surveys. Both wildland fire use and prescribed fire will incorporate "mitigation plans" (FP-2) during site-specific, pre-project consultation. These mitigation plans

should include measures that minimize effects to all pygmy-owl habitat. Post-treatment rehabilitation and restoration actions (RR-1) and Burned Area Emergency Rehabilitation (BAER) actions (RR-6) can be implemented as well.

The BE States that wildland fire use and prescribed fire will not be pursued in non-fire adapted habitats. The Sonoran desertscrub, which contains an appreciable portion of historical and current pygmy-owl habitat, is specifically identified as a non-fire adapted community in the BE. Fire-free periods in the Sonoran Desert are greater than 250 years, and saguaro cactus lacks a post-fire stimulation of flowering and seed production (Thomas 1991). Organ pipe cactus is likely to be similarly maladapted for frequent fire. Blue paloverde may require 20 years to recover to pre-fire densities (Cave 1982, Loftin 1987), and may be permanently excluded if the post-fire community's fire return interval is reduced by the invasion of flammable annual grasses. The suppression of fires within Sonoran desertscrub is a long-term beneficial effect, and the exclusion of wildland fire use and prescribed fire avoids further adverse effects.

The remaining habitats in which pygmy-owls occur are the semidesert grasslands and Sonoran savannah. These Sonoran savannah grasslands are fire-adapted, fire-climax communities. Within the Buenos Aires NWR, pygmy-owls have been detected exclusively within and adjacent to riparian broadleaf forests, xeroriparian mesquite bosques, or within intergrades with columnar cacti from adjoining Sonoran desertscrub biomes. This association between pygmy-owl occurrence and habitat types is expected to be similar on BLM lands within the semidesert grassland ecosystem. Pygmy-owl habitat also exists in locations where past fire suppression and/or intensive livestock grazing has reduced fire frequency and facilitated invasion of mesquites outside of terrace- situated bosques. Use of fire to return such sites to grasslands could result in a loss of pygmy-owl habitat. The conservation measures governing wildland fire use and prescribed fire treatments in riparian areas (FP-2 and RA-1 through RA-14) would minimize the extent of riparian habitat subject to managed fire. Conservation measures applied to prescribed fire projects would minimize effects by avoiding occupied habitat via pre-project surveys (FP-1) and/or preparing mitigation plans (FP-2) that we will approve through a consultation process. Post-fire rehabilitation and restoration activities (RR-1) and BAER (RR-6) present additional opportunities to restore riparian pygmy-owl habitat. We anticipate that use of fire for vegetation management in these ecosystems can be limited in extent such that adverse effects will be of a small scale; BLM manages a relatively small acreage of semidesert grasslands within the range of the pygmy-owl and loss of riparian vegetation would be minimized.

Raptors may respond favorably to wildland fire, particularly if prey species increase in response to increased post-fire forage (Smith 2000, Ream 1981, Kaufman *et al*. 1982). Many of the species preyed upon by pygmy-owls, such as lizards, snakes, and small rodents, reside in burrows and may escape the immediate effects of fast moving and/or low-intensity fires. Rodents and ground-feeding birds, such as mourning doves and quail, may thrive in post-fire conditions involving appreciable setting of seed and sprouting of new shoots. While this appears to be a beneficial effect, post-fire forage species recovery could increase the occurrence of Cooper's hawks. This accipiter, a predator of pygmy-owls, also responds favorably to fire (Dodd 1988). Further, the loss of perching substrates from which pygmy-owls hunt may reduce the ability of pygmy-owls to capitalize on post-fire increases in prey abundance.

Mechanical and Chemical Treatments

Mechanical and chemical treatment of semidesert grasslands/Sonoran savannah is expected to be more widespread than treatment of Sonoran desertscrub. Pygmy-owl occurrence in semidesert grasslands is primarily within riparian systems (broadleaf forest), xeroriparian systems (mesquite bosque), and along the transition between grassland and saguaro-dominated desertscrub. The amount of BLM-administered land that supports semidesert grassland and that may support pygmy-owls is limited to the patchwork of BLM lands along the margins of the Altar Valley, both within and outside of CHU-1, especially in proximity to the Buenos Aires NWR.

Chemical treatments are bound by conservation measures intended to minimize their adverse effects. These treatments: (1) would not occur where the owls reside (based on pre-project surveys: FT-3, FP-1); (2) would be conducted during the pygmy-owl's August through January non-breeding seasons (FP-1); and/or (3) would include the implementation of a mitigation plan (FP-3) to minimize the adverse effects. Loss of habitat patches from mechanical treatments in riparian woodlands, mesquite bosques, upland habitats, or xeroriparian habitats suitable for pygmy-owls or in proposed critical habitat would be reduced by rehabilitation actions that, once implemented, would create potential habitat, such as planting native riparian vegetation (e.g., cottonwoods, willows, mesquite); however, it may be several years before the structure of the vegetation creates suitable habitat for the owls. Since few pygmy-owls are known to nest on BLM lands in Arizona, the probability of any effects to the species from these fuels management activities is low.

Conservation measures RA-12, RA-13, and RA-14 include measures to avoid or minimize effects to riparian habitat. Pre-planned vegetation management activities will only be conducted in habitat unoccupied by pygmy-owls or, if occupancy is unknown, only during the August through January non-breeding season (FP-1). In situations where treatments are proposed to occur during the breeding season or if pygmy-owls are present, BLM will prepare "mitigation plans" that contain additional measures necessary to avoid or minimize adverse effects on pygmy-owl and submit these to us for approval.

Indirect effects to the pygmy-owl are likely to occur when treatments modify habitat. Treatments within Sonoran desertscrub habitat are most likely to be focused on removal of nonnative, invasive grasses to reduce fuels, increase fire return intervals, and enhance conditions for native vegetation (microphyllous trees, columnar cacti) required by pygmy-owls. Such treatments are expected to have minimal adverse effects as they will occur only in unoccupied habitat or during the non-breeding season (see conservation measure FP-1). Furthermore, post-treatment sprouting of new vegetation may stimulate increases in the rodent populations and attract graminivorous birds such as mourning doves, thus benefiting pygmy-owls. As described above, such prey-base increases can also benefit raptors that prey upon pygmy-owls. The long-term, beneficial effect of vegetation treatments in Sonoran desertscrub is the reduced threat of catastrophic wildfire.

All Treatments

The potential exists for pygmy-owls to experience indirect effects from increases in human recreational activity (e.g., OHV use, hunting, mountain biking, hiking, birding, camping, etc.) resulting from new access due to construction of temporary roads or firebreaks for fire suppression or fire management treatments. However, implementing conservation measures FT-4 and RR-5 that restrict off-road travel and require temporary access routes, skid trails, and off-road tracks to be closed and rehabilitated, would eliminate these effects.

Indirect effects to the pygmy-owl would be primarily due to changes in habitat quality from the proposed fire management activities. Because the proposed fire management activities will not occur in known occupied pygmy-owl sites, the probability of negative indirect effects would be low. Using the variety of proposed fire management actions, as appropriate, to restore or enhance riparian woodlands, mesquite bosques, semidesert grasslands, and annual grass-invaded desertscrub habitats, and continuing aggressive fire suppression tactics, as necessary, would result in positive, long-term effects to pygmy-owls and their proposed critical habitat. Vegetation composition and structure would be improved over time. The risk of catastrophic wildfires would be reduced by reducing non-native annual grasses that carry fires in desertscrub habitats, and by reducing fuel loads, including tamarisk, which is highly flammable and aggressively resprouts after fires. Because use of these fire management techniques would be selective and implemented in phases, a range of variability in both suitable habitat and critical habitat would be retained. The short-term direct loss of habitat in one location would be balanced with retention of current habitat conditions in nearby locations, allowing pygmy-owls to relocate among suitable habitat patches. In addition, the long-term rehabilitation or restoration of treated and burned sites with native vegetation in riparian and mesquite habitats would create potential habitat for the pygmy-owl. These activities may allow pygmy-owls to reoccupy sites within their historical range, which would improve the distribution of the species on public lands in Arizona.

In summary, there may be a variety of adverse effects to pygmy-owl; conservation measures are anticipated to be effective in reducing those effects. The circumstances by which these adverse effects would actually occur will depend on factors including ecological restrictions on the use of fire as a management tool, the rarity of the pygmy-owl, and the distribution of BLM lands within various vegetation communities. Wildland fire use and prescribed fire may also have beneficial effects by reducing fuels through controlled measures and thus the likelihood of high intensity fires.

Proposed Critical Habitat

Wildfire suppression tactics necessary to maintain the integrity of fire lines, such as tree or understory removal, could remove some components of proposed critical habitat. Potential direct effects to primary constituent elements of critical habitat in all five proposed CHUs from fire suppression activities include the following: (1) reduction of preferred habitat acreage; (2) falling or burning of trees or columnar cactus containing cactus ferruginous pygmy-owl nest cavities; (3) reduction or loss of multilayered canopy structure in the habitat; and (4) increased human disturbance of cactus ferruginous pygmy-owl habitat, thus impeding dispersal and other

behavioral patterns. The BLM has proposed conservation measures (FS-1 through FS-7, RA-1 through RA-4, RA-7, and FP-3) that will be implemented to the extent possible in habitats that support pygmy-owls and in proposed critical habitat to minimize or eliminate the direct effects from fire suppression actions. Rehabilitation and restoration actions will be subject to additional conservation measures (RR-1 through RR-6 and RA-11) that would avoid and minimize the adverse effects of fire suppression, and of the rehabilitation itself.

Effects of wildland fire use and prescribed fire to proposed pygmy-owl critical habitat would be similar, but likely smaller in magnitude, to the effects of fire suppression described above. Figure 3.1 of the BE shows fire use and non-fire use areas within Arizona. These fire vegetation treatments are likely only to occur on BLM lands within proposed CHU-1. Applying conservation measures (FP-, FP-2, RR-1, RR-6, and RA-1 through RA-14) would minimize the effects of wildland fire use and prescribed fire within proposed CHU-1.

Mechanical and chemical treatment techniques could occur in any of the five proposed pygmy-owl CHUs, as each CHU contains BLM-administered land. The potential direct effects of vegetation treatment on proposed critical habitat on these BLM-administered lands would be similar to those described for fire suppression activities, though unplanned effects on habitat would be largely precluded by pre-implementation planning. Implementation of conservation measures FT-1 through FT-5 and RA-12 through RA-14 for all proposed actions would minimize disturbance of pygmy-owls in space and time. The BE's proposed development of site-specific conservation measures or exclusion based on habitat types and conditions (i.e. no wildland fire use or prescribed fire in Sonoran desertscrub) would typically preclude permanent loss of primary constituent elements within each CHU.

California condor

Although the BE focused on the designated experimental population area, this analysis also includes other BLM lands within the action area where condors may occasionally occur.

Fire suppression, wildland fire use, prescribed fire, and mechanical and chemical treatments will be used in, or immediately adjacent to, habitat occupied by California condors during the life of the LUP. Fire and fuels management activities may increase the potential for condor habituation to humans, collisions of condors and aircraft, damage of condor habitat, and disturbance of condors by personnel, aircraft, and smoke.

The mobility of condors makes the possibility of direct injury or mortality from fire itself relatively low. There is a potential for smoke from adaptively managed wildfires or prescribed fires to disturb breeding or foraging condors. Condors are highly mobile birds, able to travel many miles in a day, and they use very large home ranges. Because of their mobility, and the fact that they are not closely tied to one small habitat area, effects from smoke during fire treatments would be relatively minor. However, smoke presents a major disturbance or hazard if large amounts are generated near, or flow towards, nesting condors. Large amounts of smoke or chronic occurrence of smoke during the breeding season could cause condors to alter their behavior, resulting in failure of the nest. Because condors find their food visually, smoke could

potentially make it harder for foraging birds to locate carcasses and make it harder for flying condors to see obstacles, such as electrical transmission lines, putting the birds physically at risk.

It is likely that condors will be attracted to areas with high levels of human activity associated with fire management. The attraction to human activity may increase the potential for interaction between condors and humans, which would be of concern if non-permitted personnel haze the birds, or if the birds become habituated to humans.

Noise and activity associated with fire suppression and fire management activities (e.g., ground firefighting, use of aircraft, crew staging areas) could potentially disturb condors in the project area. Studies of the physiological and behavioral responses of condors to noise and visual stimuli have not been undertaken. The nesting locations of California condors on the Vermilion Cliffs would make the potential for effects from fire suppression activities to nest sites and the breeding birds, young, or eggs relatively low. However, the normal behavior of breeding birds may be altered due to fire activities. Disturbance due to these activities could range from none at all to flushing birds from perching, roosting, scavenging, or nesting sites.

Condors and aircraft (used during fire suppression or fire management activities) will likely share the same airspace at some point. Although no collisions or near-collisions are known for Arizona, the potential does exist. Increased aviation activity associated with, and the possible attraction of condors to, fire suppression or fire management activity would increase the overall risk of a collision.

Fire suppression and fire and fuels management activities have the potential to damage condor roosting habitat within the project area. Some roost sites, such as large trees or snags, could be damaged or lost during fire suppression, prescribed burning, wildland fire use, or mechanical or chemical treatments. However, because many roosting sites are available throughout the project area, and because condors demonstrate flexibility in use of roosts, damage to roost sites may be relatively minimal.

Aerially-applied fire retardant may be used in suppression activities, or to control management areas during prescribed burning and wildland fire use. Retardant that is dropped on carcasses could contaminate these condor food sources.

There may be direct effects to condors or long-term changes to their nesting, roosting, or foraging habitats from chemical treatments. However, the direct effects of these treatments would be minimized if appropriate application and sufficient buffer zones are implemented.

Because of the implementation of conservation measures, the potential for effects from fire suppression or the proposed fire and fuels management activities is expected to be relatively low. However, direct adverse effects could still result from collisions with aircraft, disturbance at nest or roost sites by fire personnel or vehicles, ingestion of retardant or other debris following suppression or fire treatments, smoke inhalation, and modification or loss of breeding or foraging habitat. These actions may directly or indirectly affect the numbers, distribution, or reproduction of California condors.

Southwestern willow flycatcher

Fire Suppression

Fires during the southwestern willow flycatcher breeding season can affect both nesting birds and juveniles (USFWS 2002). In most cases, adults and most juveniles should be able to escape oncoming fire. However, during a 2004 fire along the Gila River, one adult flycatcher was found dead following the fire (G. Beatty, FWS, 2004). Adults would likely leave the area and may attempt to breed again the same season if suitable habitat remains, but late breeders have lower overall productivity rates (Holcomb 1974, Whitfield and Strong 1995). Nestlings and juveniles may suffer mortality if nest sites are burned over, or juveniles cannot escape the fire.

Fire can change both the structural and species composition of a riparian stand. Along the Lower Colorado and Bill Williams rivers, fires have contributed to the replacement of many native species including Fremont cottonwood, quail bush, and salt bush by tamarisk (Anderson *et al.* 1977, Busch 1995). Tamarisk can be killed by very hot or frequent fires, but it usually resprouts quickly following fire. Some native species also resprout after fire, but dominance of tamarisk can develop a fire cycle that results in the loss of native trees and shrubs (Anderson *et al.* 1977).

Flycatcher breeding success can be impaired for several years following a fire, depending on fire size and severity, rate of vegetation regrowth, post-fire changes in vegetation structure and insect community structure and productivity. Owen and Sogge (1997) documented a reduction in occupied territories for two years following a fire in Colorado, reducing the local population size and overall breeding success.

Although most of the fire effects to southwestern willow flycatchers occur from wildfires themselves, fire suppression actions including backburning, water drops, road construction, and firebreak construction may directly affect breeding birds through harassment or mortality. Backburning, bulldozing, and water drops are the most likely fire suppression actions to be used to suppress fires in riparian areas. Fire lines are generally cut or constructed through lower density vegetation than that used for nesting. Adults should be able to escape the effects of these actions. Nestlings may suffer mortality if nests are disturbed, trees are cut, or nests are burned over by backfires.

Although southwestern willow flycatcher nesting is quite limited on BLM-administered land (according to 2004 unpublished survey data, territories were detected only on the San Pedro and Virgin rivers), fires that start in upland sites on BLM land adjacent to riparian stands may travel into stands that are under differing land ownership. In these cases, BLM typically continues fire suppression actions unless another landowner takes responsibility for the fire (State, other Federal, or private).

Conservation measures (Appendix B) will be applied during fire suppression actions, unless human safety or protection of property or other valuable resources render their implementation infeasible. Conservation measures RA-2 and RA-3 (Appendix B) would minimize loss of occupied habitat by preparing fire management plans that specify wildland fire suppression guidance. Conservation measure RA-2 requires qualified resource advisors to be available to

coordinate fire suppression activities. Air attack fire suppression action effects will be minimized with the implementation of WF-2, which limits unnecessary low level flights and river corridor flight times, and requires that landing sites be located at least 0.25 mile from occupied sites (RA-7). RA-6 would also limit disturbance by requiring that chemical retardants not be applied to riparian areas within 300 yards of open water. Habitat fragmentation and destruction would be minimized by WF-3, WF-5, RR-5, and RA-4, which limit fire line and road construction in riparian habitats. Conservation measure RA-4 emphasizes using natural barriers or openings to manage riparian fires, and FS-1, FS-2, FS-3, and FS-6 ensure coordination among biologists, resource advisors, the Incident Commander, and firefighters to minimize effects to listed species. Applying these measures should minimize loss of nest patches to fire suppression actions, unless applying the suppression actions themselves would reduce overall losses of birds and habitat.

Rivers and streams in many areas are the largest source of available water for fire suppression efforts. Water is often pumped directly from the river or dipped by helicopter water buckets. Conservation measures WF-2 and RA-8 would minimize harassment and disturbance to breeding and migrating willow flycatchers from these actions, but nests could be lost or habitat disturbed if water is dropped or pumped onto a nest or into a habitat patch. As an alternative, water drops originating from portable water tanks can be used instead of hand lines ("wet-lining") to control fire movement. This would result in fewer soil, litter, and vegetation impacts than hand line or mechanized fire line construction, both in riparian and adjacent upland habitats.

Fire suppression actions have the potential to affect migrating willow flycatchers, if these actions occur from late April to mid-June during the northern migration period or from July to September during southern migration. Noise and disturbance associated with suppression actions, as well noise and smoke from the fire, would cause birds to leave the area, but these actions would be localized, small in nature, and overall insignificant and discountable to the migrating habits of flycatchers and, as a result, would not affect reproduction or survival.

Willow flycatchers may experience positive interdependent effects from aggressive fire suppression actions within riparian habitats. Fire suppression actions should minimize the amount of vegetation lost from catastrophic fires. Backburns may also be used to halt a rapidly-spreading fire, protect habitat areas, or prevent more extensive habitat losses from the wildfire itself. Reducing the vegetative cover loss from a wildland fire would decrease future peak runoff events and erosion that may affect habitat suitability.

While fires in riparian areas are more common today than in pristine times, fires in riparian communities are less common that those in other forested types or in grass or shrublands. From 1980 to 2003, out of 8081 wildfires in Arizona, 395 fires were located in or within 0.25 mile of riparian habitat. Fires in occupied southwestern willow flycatcher habitat have been infrequent. Since 1993, four known incidents in Arizona have occurred in occupied locations and affected southwestern willow flycatchers; these were along the San Pedro (PZ Ranch, Bridge Fire) and Gila rivers (White Canyon, Kearney). At least five other wildfires have occurred near southwestern willow flycatcher habitat, but either habitat patches were not affected or suppression efforts prevented any occupied habitat from burning, and no known nest or occupied habitat was destroyed (wildfires located at Topock Marsh, Picacho Reservoir, San Pedro River, Las Cienegas NCA). While fire has not occurred frequently in flycatcher habitat, there is

considerable concern about the vulnerability of this habitat to fire, especially in riparian areas dominated by salt cedar.

Since 1980, out of 35 fires located in riparian habitat in Arizona, fire size has ranged from less than 0.1 acre to 1,313 acres. Mean fire size was 86.1 acres; median size was 1 acre. On BLM-administered lands, there have been 25 fires ranging in size from 0.1 acre to 1,313 acres. Mean fire size was 114.2 acres and median size was 1 acre.

The same components that largely prevented riparian fires in more pristine times (high moisture content of riparian vegetation, free-flowing rivers, and a mosaic of habitat with open spaces comprised of rocky or sandy soil) may contribute to the lack of frequent fire in occupied flycatcher habitat. Occupied habitat often contains a higher moisture content compared to riparian vegetation of poorer quality, and is therefore less likely to burn. Additionally, southwestern willow flycatchers are widely distributed and occur in small numbers. While adverse effects from fires to southwestern willow flycatchers have occurred, these incidents have been rare. Although effects from fire suppression actions are expected to be infrequent, and fire suppression actions have contributed to reducing the total acreage of habitat burned, adverse effects from fire suppression actions have occurred in the past.

A wildfire along the Middle Gila River in June 1995 (White Canyon Fire, consultation number 02-21-95-F-0356) completely burned one habitat patch occupied by at least three southwestern willow flycatchers. Three other habitat patches were also likely impacted by smoke and flames from the wildfire. BLM had completed surveys one week prior to the fire, knew that the wildfire was occurring in occupied habitat, and contacted FWS shortly after the fire began. We provided BLM several recommendations during emergency consultation. These included using water from unoccupied areas, keeping helicopters as far from occupied habitat patches as possible, and setting no backfires, if possible. BLM incorporated all of these measures during their suppression action to reduce incidental take. Based on pre- and post-fire survey data, we concluded that four pairs of southwestern willow flycatchers were taken as a result of fire suppression actions. One pair was taken at two habitat patches that were within several hundred yards of water bucket fill sites, and two pairs were taken through harassment from water drops at two habitat patches that were burning. We determined that it was unlikely that take in the form of harm or killing occurred because of the careful suppression measures.

Fire and Fuels Management Treatments

The proposed action discusses prescribed fire and other treatments to control salt cedar along the lower Colorado River, Virgin River, and other major river drainages. Appendix C includes the projected treatment acres within occupied southwestern willow flycatcher habitat. Approximately 5,600 acres (1,900 acres prescribed fire, 2,200 acres mechanically treated, and 1,500 acres chemically treated) may be treated during the life of this plan. However, because flycatcher habitat can progress rapidly from potential or suitable to occupied habitat, the acres projected for treatment in occupied habitat may change over the 10-year life of the LUP Amendment. During this consultation, individual field offices provided more specific information about potential sites for prescribed fire and fuels management treatments in occupied

or suitable southwestern willow flycatcher habitat. This information is also included in Appendix C.

BLM proposes a number of general and species-specific conservation measures (Appendix B) to avoid or minimize effects from fire and fuels management treatments on southwestern willow flycatchers and their habitat. Conservation measure FT-3 requires pre-project surveys and clearances for Federally protected species for each project site prior to implementation; all applicable conservation measures will be implemented in areas with suitable habitat, until a survey is conducted. Direct effects to the species are avoided through conservation measures WF-4 and WF-7, which limit treatments to the non-breeding season in occupied or unsurveyed habitat. If BLM were to treat occupied habitats during the non-breeding season, there could be indirect effects to willow flycatchers through habitat modification; however, BLM field offices have indicated that these treatments will not occur in occupied habitat during any time of year (Appendix C). Within 0.5 mile of occupied or unsurveyed habitat during the breeding season, WF-6 allows prescribed burning only when smoke will be carried away from occupied or unsurveyed habitat. WF-5 limits road construction in habitat areas to limit fragmentation of habitat during project implementation. Willow flycatchers would also benefit from post-treatment or rehabilitation activities that quickly restore riparian and terrestrial vegetation (RR-1 through RR-6).

Southwestern willow flycatchers frequently nest in habitats that are dominated by salt cedar (Owen and Sogge 2002). Areas selected for fuels management treatments within suitable, unoccupied habitat in salt cedar must be selected to meet criteria that would improve the likelihood of successful establishment of plant species that will maintain or develop into suitable habitat. In suitable, unoccupied habitat, nesting habitat features may be lost until native trees and shrubs are established. The scale of these effects depends on the availability of other suitable habitat in the vicinity, the size of the treatment block, and the acres treated each year. Salt cedar removal that allows the establishment of native species such as arrowweed and quailbush, which do not provide southwestern willow flycatcher habitat, would be detrimental to willow flycatchers and perhaps other riparian bird species.

The BE did not discuss proposed prescribed fire or wildland fire use outside of but adjacent to southwestern willow flycatcher habitats. Large portions of the Big Sandy, Santa Maria, Colorado, Gila, San Pedro and Virgin River watershed within the project area are located at higher elevations containing other vegetation communities (chaparral, desert grassland, pinyon-juniper, and ponderosa pine) that may be treated in the future. The channel morphology of these large rivers is a result of bankfull flows from very large watersheds. Large wildland fire use or prescribed fires have the potential to result in higher peak runoff events into these riparian systems. However, given the large watershed size outside of the project area, it is unlikely that prescribed burns or wildland fire use would measurably increase peak flows into these rivers. Individual fire plans should include treatment area sizes, locations within the river watershed, and measures to ensure that peak flows, and their consequent deposition of ash and sediment into riparian and aquatic systems, are not increased.

In summary, implementation of conservation measures is expected to miminize effects to southwestern willow flycatchers from fire suppression and proposed fire and fuels management

activities. Adverse effects to southwestern willow flycatchers could occur from fire suppression and prescribed fire treatments that may directly or indirectly affect their numbers, distribution, or reproduction. Prescribed fire may also have beneficial effects by reducing fuels through controlled measures, and thus reduce the likelihood of high intensity fires.

Yuma clapper rail

Fire Suppression

Under the proposed action, all human-caused and naturally-ignited wildfires occurring in Yuma clapper rail habitat would be suppressed. Because wildfires may occur year round in these areas, fire suppression activities may affect clapper rails at any time of the year. Suppression activities near clapper rail habitat may include firefighters moving along the edge of marshes; fireboats accessing these areas from the river to apply water; and aircraft on overflights, sling loading materials, or dropping water. Suppression activities such as lighting backfires or mechanically clearing a firebreak are not techniques usually used in marshes and are not proposed for use in clapper rail habitats under this program (H.Boyd, BLM, pers. comm. 2004). During the breeding season, noise from suppression actions may disturb clapper rails and cause them to move from the area; however, noise from the fire itself may disturb birds as well. Loss of eggs and/or hatchlings from fire suppression actions is unlikely. Rails nest in the interior of cattail stands and would not be likely to flush from a nest as a result of activities on the periphery of a stand. During other periods of the year, suppression actions could disturb clapper rails, but rails would likely move out of the area into adjacent habitats.

Fire and Fuels Management Activities

BLM does not propose to implement wildland fire use and mechanical and chemical treatments in habitats occupied by Yuma clapper rails during the life of this LUP Amendment (Appendix C). Although these treatments could occur in adjacent areas, non-marsh areas do not serve as habitat for Yuma clapper rail. It is unlikely that birds or their marsh habitat would be affected because conservation measures (Appendix B, RA-12 to 14) should be sufficient to avoid effects.

Over the life of the plan, BLM proposes prescribed burning within 100 acres of Yuma clapper rail habitat (Appendix C). Prescribed burns will be conducted during the period September 1 to March 15, outside of the breeding and molting season (conservation measure CR-2). Project areas may be treated mechanically to create a fire line prior to prescribed burning. Mechanical treatment will occur within the footprint of the burn area and outside of the breeding season (H. Boyd, BLM, pers. comm. 2004). Prescribed fires and associated mechanical treatments would temporarily eliminate clapper rail habitat within the burned areas. Cattail leaves die or senesce above ground in the winter providing dry fuels for burning; green re-growth occurs in spring. Cattail re-growth within these sites would resume immediately if burns are done in winter to early spring (Sojda and Solberg 1993). Cattail densities may actually increase immediately after the prescribed burning before returning to pre-fire levels three to four years post-fire (Ponzio *et al.* 2004).

Fire alone, unless roots were destroyed, has been found to provide little or no long-term cattail control (Nelson and Dietz 1966, Beule 1979). Most cattail fires only burn the above ground biomass and do little to control cattail (Nelson and Dietz 1966). Total removal of cattail is not the management objective for these projects since cattails, when limited in distribution, provide food and habitat for Yuma clapper rails and other wetland wildlife species. Weller (1975) reported that maximum avian use and production in a marsh occurs when a 50:50 cover to open water ratio exists with interconnected and well-interspersed pools larger than 30 feet in diameter. Vogl (1973) described considerable wildlife responses to decadent and dead emergent vegetation removal by prescribed fire due to the new availability of open water, soils, and food that was previously inaccessible.

Survey information from Imperial NWR indicates that clapper rails move among areas of suitable habitat, with differences in rail locations seen between surveys during the same year and between years. The exact number of clapper rails that may be present within a cattail stand is unknown. In addition to a short-term loss of habitat, effects would include increased noise from fire crews and equipment and, depending on wind conditions, some smoke passing over the area. Prescribed burns will take place during the non-breeding season, so adults would be able to fly to escape a localized fire. BLM will coordinate with FWS in determining the number of acres to burn in any one year (conservation measure RA-14), so birds displaced by the fires would have adjacent habitat available to establish nesting territories for the next breeding season.

BLM also proposes prescribed burning in riparian habitats adjacent to sites occupied by rails, either during the breeding and molting season or the non-breeding season. Smoke and activity during these burns could disturb clapper rails. Efforts to protect adjacent clapper rail habitat from the spread of fire are part of the proposed action (conservation measure FT-1) and would limit the risk of losing these adjacent habitats.

In summary, implementation of the conservation measures would reduce, but not eliminate, adverse effects resulting from fire suppression and prescribed fire activities.

Bald eagle

BLM does not propose implementing wildland fire use, prescribed fire, or mechanical or chemical treatments within habitats occupied by nesting or wintering bald eagles during the life of the LUP Amendment. Fire suppression may occur within and adjacent to habitats used by bald eagles.

Fire Suppression

Conservation measures (Appendix B) will be applied during fire suppression actions, to the extent possible, considering human safety and protection of valuable property and resources. Conservation measures BE-1 and BE-5 implement a 0.5 mile buffer zone to minimize disturbance by firefighters and aircraft use to nesting bald eagles. BE-3 and BE-5 impose a 0.25 mile buffer restricting human activity and a 0.5 mile buffer restricting aircraft activity around winter roosts, respectively. Fire retardant drops will be restricted in or near riparian and aquatic

habitats and sites occupied by bald eagles (RA-6). These measures would minimize disturbance effects to nesting and wintering eagles from fire suppression activities: fireline construction, firefighter presence, fire retardant drops, helicopter water bucket use, and aircraft use.

Three of the seven breeding areas (Alamo, Ives Wash, and Devils' Post) contain nest sites located on cliffs and would not be directly affected by fire suppression actions. While Alamo Lake would likely be used as a water source during fire suppression, the appropriate buffer zones (BE-1 and BE-5) would minimize disturbance. The Devil's Post breeding area would not be affected by the proposed action because the area lacks dense vegetation capable of carrying a fire and sufficient open water in Burro Creek for helicopter dipping.

The Lake Pleasant and Coolidge breeding area nests contain sparse desert vegetation with little threat of wildfire. However, as in the case at Alamo Lake, conservation measures (BE-1, BE-3, and BE-5) would minimize disturbance if Lake Pleasant or San Carlos Reservoir were used as a water source for fires elsewhere.

The Granite Basin and Winkelman breeding areas have only thin stands of salt cedar and phragmites with little threat of a large fire; it is unlikely that fire suppression will occur in these areas. In addition, there is no open water in this portion of the Gila River for use during fire suppression. Aircraft collecting water upstream at San Carlos Reservoir for fires located elsewhere will avoid these nest sites (conservation measures BE-1 and BE-5).
Fire suppression could have a beneficial effect by protecting existing nests and other mature cottonwood from wildfire. By suppressing wildfires, wildfires will burn smaller areas and the consequent detrimental impacts to the watershed would be lessened. Effects of large, high-intensity wildfires include reduced water quality from excessive runoff, heavy sediment-laden runoff, and loss of fishes that are fed upon by eagles. Heavy runoff may also alter the river channel, causing it to degrade and down cut. Future regeneration of nest tress could be affected as a result of a lowered water table causing tree mortality, scouring of seedlings and young trees, and reduced flood plain area for future seedling establishment and regeneration.

In summary, implementing the general and species-specific conservation measures would reduce the adverse effects of fire suppression actions on the bald eagle.

Mexican spotted owl

Fire and Fuels Management Treatments

The Recovery Plan encourages land management agencies to conduct fuels reduction projects within MSO habitat and provides guidelines for these actions that will aid in reducing fuels, but still maintain habitat and minimize effects to MSO. These actions are supposed to protect owl habitat over the long-term by reducing the likelihood of severe crown fire; however, short-term effects from fuels reduction treatments can adversely affect owls directly or indirectly by affecting their prey. This project proposes to mechanically thin and burn approximately 26,000 acres of MSO habitat. At this time, the BLM has not developed prescriptions for the mechanical thinning, prescribed burning, or wildland fire use. Therefore, we have made assumptions

regarding these treatments that may or may not occur in site-specific projects. No chemical treatments will be conducted in MSO habitat.

Prescribed burning or thinning activities may indirectly affect the spotted owl by changing the owl's habitat structure (snags, downed logs, woody debris, multi-storied canopies, dense canopy cover, etc), and potentially result in relocation of owls. In addition, the proposed activities may change the structure of spotted owl prey species' habitat, affecting the abundance and composition of prey species. Although treatments, especially prescribed burning, may have adverse effects to prey species and their habitat in the short-term, the proposed treatments may increase the diversity of vegetative conditions that in turn provide for a diverse prey base. As Stated above, the BLM has not developed specific prescriptions for project areas. However, the desired future condition (Table 3.1 in the BE) for conifer forest and riparian habitats, which contain protected steep-slope and restricted MSO habitat, States that ladder fuels and downed woody debris will be limited or not present. This implies that canopy cover will be reduced, multi-storied canopy layers may be reduced or lost entirely, and that coarse woody debris will be absent following treatments. The loss of these types of patch habitats may result in adverse affects to MSO habitat and MSO that may be present on BLM-administered lands.

Activities associated with fuels reduction treatments can directly affect the MSO through auditory or visual disturbance. This disturbance can disrupt activities such as breeding, feeding, and roosting. The response of wildlife to noise disturbance is complex, being neither uniform nor consistent. Delaney *et al.* (1997) reviewed literature on the response of owls and other birds to noise and concluded the following: (1) raptors are more susceptible to disturbance-caused nest abandonment early in the nesting season; (2) birds generally flush in response to disturbance when distances to the source are less than approximately 200 feet and when sound levels are in excess of 95 dBA; and (3) the tendency to flush from a nest declines with experience or habituation to the noise, although the startle response cannot be completely eliminated by habituation.

Owls have more sensitive hearing than other birds (Bowles 1995). If noise arouses an animal, it has the potential to affect its metabolic rate by making it more active. Increased activity can, in turn, deplete energy reserves (Bowles 1995). Noisy human activity can cause raptors to expand their home ranges, but often birds return to normal use patterns when the humans are not present (Bowles 1995). Such expansions in home ranges could affect the fitness of the birds, and thus their ability to successfully reproduce and raise young. Species that are sensitive to the presence of people may be displaced permanently, which may be more detrimental to wildlife than recreation-induced habitat changes (Hammitt and Cole 1987, Gutzwiller 1995, Knight and Cole 1995). If animals are displaced from areas that are essential for reproduction and survival, then that population will decline. Likewise, if animals are disturbed while performing behaviors such as foraging or breeding, that population will also likely decline (Knight and Cole 1995).

Birds may respond to disturbance during the breeding season by abandoning their nests or young; by altering their behavior such that they are less attentive to the young, which increases the risk of young being preyed upon; by disrupting feeding patterns; or by exposing young to adverse environmental stress (Knight and Cole 1995). There is also evidence that disturbance can result in lost foraging time that, in turn, may cause some raptors to leave an area or to not

breed at all (Knight and Cole 1995). Though the BLM has not detected nesting MSO in surveyed habitat, unsurveyed habitat that may support MSO does exist and the potential for current or future occupancy is relatively high.

The effects of fire (prescribed and wildfire) include both negative and beneficial effects on MSO habitat. Beneficial aspects include increased response of herbaceous vegetation after a fire. Negative effects include the loss of MSO prey habitat components such as herbaceous cover, down logs, and snags. The effects of fire on the prey base of the spotted owl are complex and are dependent on the variations in fire characteristics and in prey habitat. Fire intensity, size, and behavior are influenced by numerous factors such as vegetation type, moisture, fuel loads, weather, season, and topography. Fire can effectively alter vegetation structure and composition, thereby affecting small mammal habitat. The initial effects of fire may be detrimental to rodent populations as cover and plant forage species would be reduced.

However, population responses by small mammals to fire-induced changes in their habitat vary. For example, deer mouse populations might increase immediately following fire and then decrease through time (Ward and Block 1995). Campbell *et al.* (1977) noted that populations of peromyscid mice decreased immediately following fire in an Arizona ponderosa pine forest that removed one-fourth (moderately burned) to two-thirds (severely burned) of the basal area; populations then returned to pre-fire numbers two years following the burn. Further, no differences were found in rodent populations between moderately and severely burned areas. They concluded that the effects of the fire that they studied were short-term, and the short-term positive numerical responses of mice were attributed to an increase in forage, particularly grasses and forbs after the fire (Ward and Block 1995). Small mammal diversity and densities are typically depressed for one to three years after a fire (Wright and Bailey 1982). Biswell *et al.* (1973) suggested that rodent populations would be less affected during fall fires, because at that time of year rodents have accumulated seed caches that will mitigate loss of food sources. Predation of surviving rodents that are part of the diet of the spotted owl may increase immediately after the fire. In one study in northern California, radio-collared northern spotted owls spent considerable time in burned-over areas. This activity was assumed to be due to easy capture of prey (Patton and Gordon 1995). Our own observations and limited research (Bond *et al.* 2002) indicate that MSO tend to stay within their historical home range in the short-term following wildfire. This is most likely due to spotted owls' high site-fidelity (Bond *et al.* 2002, Forsman *et al.* 1984).

The net effect of prescribed fires on MSO foraging is unclear: a fire that removes the tree canopy would likely render a portion of the area unusable for foraging by owls, but if the spatial extent of crown loss is limited, a mosaic is created that could provide a diversity of prey for the owl and actually be beneficial (Ward and Block 1995). Although owl prey species evolved in ecosystems where fire is a natural process, fire has been excluded from most southwestern ecosystems during the 20th century, resulting in systems where fire behavior may deviate substantially from natural conditions. Effects of fire on small mammals under present environmental conditions are unclear (Ward and Block 1995).

Fire Suppression and Fire Management Treatments

Direct effects from fire suppression actions to MSO depend upon their proximity to occupied habitat and their timing during the breeding season. Disturbance to MSO from tanker overflights and firefighters will be greatest the closer these actions occur to the owl's core area (see discussion of disturbance, above). Late in the breeding season fire suppression actions are less likely to result in the direct death of an adult MSO or juveniles because of their mobility during fire or suppression actions. However, suppression actions occurring through the first two-thirds of the breeding season could result in the death of nestlings or juveniles due to their lack of mobility (as compared to adults). Prescribed fire, wildland fire use, and emergency suppression could directly kill nestlings or juveniles through the managed fire or through the management actions used to control or suppress the fire, such as fireline construction and aerial retardant or water drops. The likelihood of this mortality is low because surveys completed to date have not detected resident MSO.

Temporary indirect effects to MSO present on BLM land may occur from smoke, heat, noise, and a reduction in MSO prey species (due to changes in prey species habitat) because areas that may be used by MSO could be treated. Because the proposed action emphasizes low to moderate intensity burns, and BLM will implement conservation measures (Appendix B) such as surveying PACs before implementation of prescribed burns and adjusting actions if necessary, these indirect effects are unlikely to adversely affect the survival or reproduction of any owls that may be in the area.

Smoke, heat, and noise in or near MSO habitat within the project area may result in adult MSO or juveniles (late breeding season) moving, or in other temporary changes in their activities to avoid these impacts, but would be minimal and likely only occur during implementation of the proposed action. These disturbances may impact nestlings or juveniles (early in the breeding season) because of their lack of mobility. These disturbances may result in additional stress and disruption of activities (including feeding), but these effects would be temporary, and stress and activities would return to pre-disturbance levels. Smoke, heat, and noise impacts are greatly reduced with implementation of the conservation measures.

In summary, we believe that MSO and MSO habitat will likely be adversely affected in the near-term, and perhaps long-term, through impacts to protected steep-slope and restricted habitat from actions associated with fire suppression, wildland fire use, mechanical thinning, and prescribed fire, which may result in disturbance during the breeding season, temporary degradation of habitat due to reduction in canopy cover, the removal and/or loss of large trees, and loss of snags and coarse woody debris.

Mexican spotted owl Critical Habitat

The BLM States that forested and canyon areas within the proposed critical habitat unit boundaries are "other forest and woodland types," as defined by the Recovery Plan and thus are not considered critical habitat for the MSO (66 CFR 8541). The sites consist of grasslands, low-elevation pinyon-juniper woodlands, and wide canyons. The BLM believes that the canyon habitats are considered too hot and dry to provide suitable habitat for the species, and that there

is no MSO protected or restricted habitat within the proposed critical habitat boundaries on BLM managed lands. Per the proposed critical habitat rule, if habitat within the proposed boundaries does not meet the definition of protected or restricted habitat, then the area is not considered critical habitat. However, though the BLM States that they have no critical habitat per the definition, they do make a determination that the proposed action may adversely affect proposed critical habitat. Therefore, we have included an analysis of effects.

Proposed critical habitat unit CP-10 is located in north-central Arizona, and is predominantly within the boundaries of Grand Canyon National Park. However, it includes an area along Kanab Creek managed by the BLM Arizona Strip Field Office. The BLM States that there is no protected or restricted habitat within this area. However, based on limited surveys, it is difficult to infer with certainty that MSO are not using canyon habitats on the Arizona Strip, such as the area along Kanab Creek. In addition, we did not receive habitat evaluations for this area. The BLM also manages land within six to ten miles of the San Pedro RNCA that is proposed critical habitat. This project proposed to mechanically thin and burn approximately 26,000 acres of MSO habitat, but an unknown portion of proposed critical habitat. At this time, the BLM has not developed prescriptions for the mechanical thinning, prescribed burning, or wildland fire use. No chemical or biological treatments will be conducted in any MSO habitat.

As Stated above, prescribed burning, thinning, and wildland fire use may directly affect owls through loss of habitat (reduction in canopy cover and multi-storied canopy layers) or indirectly affect the spotted owl by changing the structure of their prey species' habitat (loss of ground litter and woody debris), affecting the abundance and composition of prey species. Although treatments, especially prescribed burning, may have adverse effects to prey species and their habitat in the short-term, the proposed treatments may increase the diversity of vegetative conditions that in turn provide for a diverse prey base. Currently, the BLM has not developed specific prescriptions for project areas and we do not know if any treatments will occur within currently proposed critical habitat. However, the desired future condition (Table 3.1) for conifer forest and riparian habitats, which contain protected steep-slope and restricted MSO habitat, States that ladder fuels and downed woody debris will be limited or not present. This implies that canopy cover will be reduced, multi-storied canopy layers may be reduced or lost entirely, and that coarse woody debris will be absent following treatments. The loss of these types of patch habitats may result in adverse effects to MSO proposed critical habitat.

The BLM States in the BAE that fire suppression actions, such as the construction of fire lines or fuel breaks, could directly affect the primary constituent elements of proposed critical habitat on lands adjacent to BLM-administered lands. Adverse effects from suppression may include the loss of large trees and snags, reduction in canopy closure, and loss of coarse woody debris.

General Effects on Fishes

The status of threatened and endangered fishes in the American Southwest is precarious, and in many cases, declining (Deacon and Minckley 1974; Minckley 1985; Minckley and Deacon 1991; Rinne and Minckley 1991; Mueller and Marsh 2002; Desert Fishes Team 2003; Rieman *et al*. 2003). Fire suppression, wildland fire use, prescribed fire, and mechanical and chemical vegetation management are generally understood to precipitate adverse effects on the physical

and biological components of aquatic habitats (Meehan 1991). To a degree, all fishes respond similarly to such perturbations. This section includes a general analysis of the effects of the proposed action on fishes. Special emphasis is placed on the response of fishes of the arid American Southwest and northwestern Mexico, where such data exist. This section supplements the species-specific effects analyses for the desert pupfish, Gila topminnow, razorback sucker, Virgin River chub, woundfin, Yaqui topminnow, Yaqui chub, Little Colorado spinedace, loach minnow, spikedace, Gila chub, and their respective critical habitat, as appropriate.

Adverse Effects of Wildfire Suppression, Wildland Fire Use, and Prescribed Fire – Fishes

The proposed action may directly and indirectly, as well as beneficially and adversely, affect fish. The effects of fire suppression, wildland fire use, and prescribed fire are similar in nature, though likely of differing magnitudes, depending on the location and duration of the respective activity and the status of the respective species.

Fire can directly affect fish. Fish mortalities can occur from increases in water temperatures to lethal levels, fire induced changes in pH, increased ammonium levels from smoke gases absorbed into surface waters, and increased phosphate levels leached from ash (Brown 1989, Gresswell 1999, Norris *et al.* 1991, Rinne 1996, Rieman and Clayton 1997, Spencer & Hauer 1991). Most negative effects to aquatic species after fire are indirect and are due to the immediate loss or alteration of habitat.

Fire removes vegetation and consumes organic components of ground cover, thus changing the physical and chemical properties of watersheds and the streams and wetlands to which they contribute.

Fires affect subsurface and surficial hydrology. The removal of vegetation can trigger an immediate increase in water yield and storm-flow discharge (Swanston 1991). After a fire, water previously consumed by evapotranspiration is available to enter stream channels through runoff and infiltration. In the arid Southwest and in the lowland and mid-elevation streams within the action area, effects on total water yield are expected to be of relatively small magnitude and short duration due to the relatively low water requirements of desert-adapted vegetation and post-fire vegetative recovery, respectively. Increases in water yield are expected to be greater in medium-to-high elevation sites. Modest and temporary increases in water yield can result in incremental increases in wetted habitat for listed fishes. However, loss of vegetation and other forms of organic ground cover are typically accompanied by a suite of adverse effects that outweigh any gain in water yield.

Fires can cause elevated peak flow runoff from watersheds that have had appreciable amounts of ground cover removed, thus concentrating overland flow and reducing infiltration (Ffolliott *et al.* 2004). Runoff effects are further exacerbated in watersheds within which soils have been rendered hydrophobic and impervious by the liberation of wax-like substances from burned vegetation.

Smoke contributes nitrogen and ammonia to aquatic ecosystems. Ammonia is toxic to fish. The absorption of smoke and nitrogen into the water depends on how long the smoke lingers near the

water. Fires also generate ash, and incomplete combustion of materials creates charcoal. Elevated peak flow volumes and velocities are associated with increased transport of ash and nutrients (Ffolliott *et al.* 2004). Heavy ash and soot loads in water clog the gills of fish and lead to acute and chronic chemical effects. The runoff of ash contributes phosphoric nutrients to aquatic ecosystems, and the presence of charcoal in water is associated with reduced dissolved oxygen concentrations. Both ammonia and phosphorus levels have been documented to be above lethal limits to fish during fires (Spencer and Hauer 1991). Changes in the pH and dissolved oxygen can render habitat unsuitable for fish. As nutrient-filled ash flows into streams, it changes the pH and nutrient level of the water (Karle 2000). Minshall *et al.* (1989) speculated that chemical toxicity from smoke or ash would cause fish mortality in second and third order streams. These effects can be short-term; soon after a fire, and usually associated with post-fire precipitation, streams adjacent to burned areas often show peak concentrations of nitrogen and phosphorous. These peak chemical concentrations, however, generally do not last for more than two weeks (Fredriksen 1971; Brown *et al.* 1973). As vegetation reestablishes itself in the burned area, fewer nutrients are available to be flushed into streams because the plants are taking up the nutrients for growth and they are stabilizing the soil that decreases erosion rates.

Erosion of soils from upland areas can contribute to bank erosion in stream channels and siltation of riparian and aquatic plants. Soil erosion also leads to increased sediment-loading in streams. Short-term pulses of sediment and large woody debris, often associated with post-fire landslides and debris flows, may be beneficial. Over time, large woody debris and sediment are moved downstream by fluvial processes, which can form productive aquatic habitats (Reeves *et al.* 1995, Benda *et al.* 2003, Miller *et al.* 2003; Minshall 2003). Excessive sediment-loading, however, is detrimental to aquatic species (Newcombe and MacDonald 1991). Post-fire erosional processes that deliver sediment to streams over long periods of time due to roads, fire lines, or the lack of re-vegetation, can have long-term negative effects on aquatic ecosystems (Lotspeich *et al.* 1970; DeByle and Packer 1972).

Studies have shown that large, post-fire hydrologic events can extirpate local fish populations (Novak and White 1990; Propst *et al.* 1992; Bozek and Young 1994; Rinne 1975 and 1996; Rieman *et al.* 1997). Recolonization rates depend on the proximity and relative location of refuges, access from refuges to disturbed areas (i.e. no fish barriers), and the occurrence of complex life history traits and overlapping generations (Gresswell 1999; Dunham *et al.* 2003). Dunham *et al*. (2003) suggested that vulnerability of fish to fire is contingent, in part, on the amount and distribution of habitat (habitat fragmentation); species in highly degraded and fragmented systems are likely to be most vulnerable to fire and fire-related disturbance. There is widespread fragmentation of native fish habitat in Arizona. Dunham *et al*. (2003) also implicated fire as a factor in facilitating invasions by nonnative fishes. Isolated fish populations are at a much higher risk of extinction because they cannot recolonize after a large disturbance (Rinne 1996). Additionally, effects on small headwater streams are more severe because entire drainages are burned at these smaller spatial scales, in contrast to larger stream orders, where relatively smaller proportions of the drainage burn. While desert fishes are adapted to the flashy, turbid conditions prevalent during floods (Minckley and Meffe 1987), transport of species such as Gila topminnow has occurred.

In situations where native fishes escape local extirpation from hydrologic events, they may still experience changes to the riparian and fluvial system that can render their habitat temporarily uninhabitable. Loss of riparian vegetation reduces shading, which increases water temperatures. Minshall *et al.* (1989) found small temperature changes in shallow ponds and small steams located in severe wildfire areas within coniferous systems (including the Yellowstone fires). They concluded the impact of fire on streams varies proportionally with the intensity and extent of fire behavior, including spread within a given watershed and the vegetation and fuel type being consumed. High stream temperatures correlate with reduced dissolved oxygen, and high levels of nitrates and nitrogen can cause eutrophication (Ffolliott *et al.* 2004). Southwestern native fishes, and the endemic poecilliids and cyprinids in particular, have been documented to persist in highly adverse conditions (Deacon and Minckley 1974, Meffe *et al.* 1983, Meffe and Snelson 1989, Minckley *et al.* 1977). Regardless of this adaptation, the tenuous status of many of the listed fishes makes such challenges undesirable. Any degradation from baseline conditions will affect the recovery of the species, which requires numerous, widely-distributed, and self-sustaining replicates.

Fires can alter aquatic food webs to the detriment of native fishes. Periphyton biomass has been documented to decrease initially after a fire but then increases due to increased light availability and increased temperature (Minshall *et al.* 1990). Periphyton biomass would hypothetically decrease gradually to pre-fire levels as riparian vegetation reestablishes itself and increases stream shading (Minshall *et al.* 1989). Stream size also had an effect with small stream sizes being influenced more than larger stream sizes (Robinson *et al.* 1994). No studies have been conducted on the long-term effects of fire on periphyton communities.

The effects of fire on macroinvertebrates have been well studied since the early 1980s (La Point *et al.* 1983; Minshall *et al.* 1989; Roby 1989; Roby and Azuma 1995; Minshall *et al.* 1990; Richards and Minshall 1992; Jones *et al.* 1993; Lawrence and Minshall 1994; Robinson *et al.* 1994; Minshall *et al.* 1995; Mihuc *et al.* 1996; Minshall *et al.* 1997; Minshall 2003; Spencer *et al.* 2003). Macroinvertebrate communities are strongly influenced by substrate instability associated with post-fire erosional processes. Effects include changes in functional feeding groups (La Point 1983), more annual variation (Richards and Minshall 1992), abundance, diversity, and species richness (Roby 1989; Lawrence and Minshall 1994; Minshall *et al.* 1995; Mihuc *et al.* 1996; Minshall 2003). Changes can persist for many years. Roby (1989) found that diversity was lower in burned streams compared to reference streams nine years after a fire. Species best adapted to post-fire stream conditions can be characterized as those that prefer a broad range of physical habitat (Mihuc *et al.* 1996). Taxa that require specialized habitats respond much slower to disturbances such as fire (Mihuc *et al.* 1996).

In addition to temporary effects on fish habitat, post-fire fluvial adjustments can remove native fish habitat. Post-fire, sediment- and debris-bulked peak flows can result in downcutting of channels. Once downcut, subsequent floodflows may be contained entirely within the channel and unable to inundate now-perched floodplains (Rosgen 1996). Native fishes that require access to low-velocity floodplains to avoid being transported downstream and/or to colonize upstream areas will be adversely affected. Lateral erosion of stream channels will increase width to depth ratios, resulting in decreased unit velocities in the cross section. These decreased unit velocities will result in the deposition of larger particle sizes, often cobbles in systems formerly

dominated by gravels, and boulders in systems formerly dominated by cobbles. This aggradation of sediment can fill pools and other persistent features, reducing or eliminating habitat for native fishes.

In many places on BLM lands, rivers or streams containing Federally-protected fish species are the largest source of available water for fire suppression efforts. Using these water sources during fire suppression efforts may result in fish mortality from driving through the river; release of toxic substances into the water from pumps, vehicles, or other sources; direct loss of individual fish taken into pumps or helicopter water buckets; loss of habitat (water quantity) from dewatering during low flow periods; or the spread of diseases, parasites, or alien, predatory species (e.g., bullfrogs) among different water sources. Conversely, water drops can, in some circumstances, be used instead of hand lines ("wet-lining") to control fire movement. This tactic would result in less impact to soil, litter, and vegetation than hand line construction both in riparian and adjacent upland habitats, which would minimize increases in soil or ash erosion and siltation of adjacent streams, seeps, and ponds.

Fire suppression efforts within riparian habitats also include building dry fire breaks using either hand lines or heavy equipment; physical trampling, vehicle use, and occasional road construction for access; and, in some cases, backfiring to reduce available fuel loads. The immediate loss of riparian vegetation from fire suppression reduces the ability of the riparian vegetation to provide shade-cover, food sources, stabilize stream channels, reduce siltation, maintain near stream microclimates, and other important functions that directly affect fish and their habitats.
The use of fire retardant during suppression efforts can adversely affect fishes. Fire retardants and suppressant foams are known to be toxic to aquatic species (Adams and Simmons 1999, Buhl and Hamilton 1998, Gaikowski *et al.* 1996, Norris and Webb 1989). The surfactant portion of foam suppressants has been studied and was determined to be detrimental to aquatic life because it decreases water tension, thereby decreasing the aquatic organism's ability to obtain life-sustaining oxygen (Sanchez *et al.* 1991, Lewis and Suprenant 1983, McDonald *et al.* 1997). The toxic component of retardant chemicals in aquatic systems is ammonia (McDonald *et al.* 1996), and fish are less tolerant than are macroinvertebrates. Ammonia (NH_3) is highly soluble and typically results when fertilizers or retardants are added to water. When ammonia dissolves in water, a chemical equilibrium is maintained between NH_3, which is the more toxic form, and ionized ammonia (NH_4^+). The chemical balance between these two forms of ammonia is determined by pH, temperature, and total ammonia concentration.

The toxicity of some chemicals is known to be photo-enhanced in the presence of natural solar ultraviolet light (UV) (Oris and Giesy, 1985, Pelletier *et al.*, 1997). Toxicity of some chemicals used in fire retardants, such as sodium ferrocyanide (a corrosion inhibitor), may increase with exposure to UV. Recent studies of the interactive effects of UV and fire retardant chemicals on three aquatic species, juvenile rainbow trout, southern leopard frog (*Rana sphenocephala*) tadpoles, and boreal toads (*Bufo boreas*) showed a significant increase in mortality when exposed to UV light and fire retardants in the laboratory (Little and Calfee 2000, Calfee and Little 2003).

Fire retardant chemicals and suppressant foams are typically applied to ridge top vegetation and adjacent to natural fire barriers such as roads, meadows, and rock outcrops. Aquatic

environments are located in canyon bottoms which, in most instances, are difficult to reach with large fixed-wing aircraft. Therefore, aquatic environments are not areas where fire chemicals are typically applied. Retardant is never intentionally dropped into surface waters. However, factors such as firefighter or public safety, or structure protection, may require the use of retardant directly adjacent to aquatic areas. When this is necessary, the retardant is typically applied perpendicular to the stream channel. Conservation measure RA-6 commits the BLM to avoiding the use of retardant in riparian habitats and within 300 feet of aquatic habitats; consequently the risk of retardant harming threatened and endangered fishes aquatic species is appreciably reduced. In addition, implementation of the proposed action would further reduce the potential occurrence of fire and fire suppression activities within habitat of listed species.

The construction of roads and fire lines during suppression actions can also affect aquatic ecosystems. Roads, trails, and fire lines can act as relatively impermeable surfaces and, when connected into a network, can result in changed peak flow dynamics as well as increased sediment-loading in adjacent streams. These processes may be aggravated by the fact that temporary roads and fire lines are seldom engineered to include proper drainage, culverts or armored fords, or drainage buffers (Furniss *et al.* 2000). Activities associated with vehicles and equipment within or near occupied habitat would likely result in habitat destruction and mortality of listed native fishes.

There exist case studies of the effects of wildfire on native fishes in Arizona. Flooding subsequent to the catastrophic 1990 Dude Fire on the Tonto National Forest was found to dramatically affect water quality, macroinvertebrates, and fish populations. Fish stocked after the floods grew more rapidly than normal (Rinne and Medina 1992). Sediment movement was the most important post-wildfire physical effect. Increased sediment-loading can smother spawning substrates, obliterate pools, aggrade channels (deposition), degrade or downcut channels (through bulked-flood flow scour). The effects on fish populations are thought to be caused by a recruitment failure, such as occurred with the Gila trout (*Onchorhynchus gilae*) population in dude creek, which illustrates the long-term nature of these impacts.

After the 1994 Rattlesnake Fire on the Coronado National Forest, severe, large-scale, stand-altering fire behavior occurred with subsequent extremes in soil runoff on a landscape-scale, acute erosion, and heavy sedimentation in deep pools important for survival of Yaqui chub (*Gila purpurea*), as well as sharp population declines of all fish normally found in West Turkey Creek in the Chiricahua Mountains.

The Dude and Rattlesnake fires were severe, but perhaps atypically so. The effects of such uncontrolled wildfires reached levels appreciably adverse to fishes. The suppression of catastrophic wildfires such as these on BLM lands is, therefore, highly desirable. Reduction of fuel loading via implementation of wildland fire use and prescribed fire can be used to reduce the risk of future wildfires. Therefore, this aspect of the proposed action is beneficial, despite short- to medium-term adverse effects.

BLM proposes various conservation measures to avoid and minimize the effects of wildfire suppression, prescribed fire, and mechanical and chemical vegetation treatments (Appendix B).

General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems.

The effects of fire suppression on listed native fishes would be minimized by the BLM's implementation of conservation measures FS-1 through FS-7, RA-1 through RA-10, and, when pursuing restoration activities RR-1 through RR-6. The effects of water withdrawal and retardant drops would be minimized by implementation of conservation measures RA-6 and RA-8 through RA-10. Implementation of best management practices or standard operating procedures (RA-6) would minimize the risk that retardant or foam will enter listed native fish habitat in lethal concentrations.

Many native fish are vulnerable to invasions by nonnative species (Minckley and Meffe 1987) and inter-source transfer of water can facilitate introductions. Conservation measures RA-8 to RA-10 would reduce the chance of contamination of water sources by nonnative species or accidental fuel spills, and the spread of diseases or parasites.

The effects of wildfire and wildfire suppression would be further minimized through the implementation of post-fire rehabilitation and restoration activities. These actions will include implementation of conservation measures RR-1 through RR-6. The hydrologic effects (elevated runoff, sedimentation, etc.) of wildfire, wildfire suppression, and, to an extent, wildland fire use and prescribed fire, would be minimized by the RR-prefixed conservation measures.

Conservation measure FT-1 describes developing an emergency salvage protocol in the event that fish salvage is necessary following fire suppression or fire management treatments. Although emergency salvage would result in large losses of fish from the effects of high water flows, ash, and sedimentation, fish could be harassed, injured, or killed during the salvage efforts.

Wildland fire use also includes elements and effects common to fire suppression. The BLM does not expect there will be direct, adverse effects on riparian habitat from wildland fire use, as the BE States that wildland fire use would not occur in riparian areas that provide habitat for Federally-protected fish species. Nonetheless, use of wildland fire in upland habitats can indirectly affect riparian and aquatic habitats. The use of wildland fire could include burning, the application of water and retardants, the movement of personnel, staging of materials, etc., similar to fire suppression activities. The effects of these actions on riparian and aquatic environments are similar to those described above for fire suppression, but are expected to be of lesser magnitude due to the discretionary application of wildland fire use; the authorized officer can decide whether or not to manage a wildfire for fire use depending on the conditions and resources in the area. Wildland fire use will also be accompanied by implementation of each conservation measure described above; we assume that if conditions are such that these measures cannot be implemented during management of the fire, the fire will be suppressed. Prescribed fire is also subject to the same conservation measures.

Adverse Effects of Mechanical and Chemical Treatment

The proposed vegetation treatments would result in the removal of riparian or upland vegetation located adjacent to, upstream of, or upslope from Federally-protected fish species and suitable or critical habitats. Direct effects from these treatments would be similar to those described for wildland fire use and prescribed fires; however, the amount of vegetation removed would typically be less and more precise than the fire treatments. Mechanical removal would cause greater disturbance to vegetation, and the use of heavy machinery would also be more likely to disturb soils that would potentially erode or run off into streams. Use of heavy equipment for mechanical vegetation within or near streams would result in greater direct effects compared to the other vegetation treatments. Site-specific assessments would determine if and when mechanical treatments are an appropriate management tool to restore riparian and terrestrial habitats that are adjacent to, upstream of, or upslope from listed fishes. Implementing manual vegetation removal (using hand tools), would more effectively minimize direct effects to fish species, since retention of more vegetation would reduce the likelihood of decreased bank stability, increased sedimentation, and increased water temperatures. Mortality of fish would be less likely to occur with this treatment. Direct effects on listed native fishes are expected to be short-term and minimal.

While chemical herbicides can be acutely toxic to fish or their prey base (Norris *et al.* 1991), implementing the conservation measures would reduce the likelihood that these chemicals will enter habitat occupied by listed species. Herbicide applications will be scheduled and designed to minimize potential effects to non-target plants, as well as fish species. Aquatic habitats will typically be buffered from aerial application of chemicals; however, aerial drops could inadvertently strike some aquatic habitats, resulting in chemical contamination of water sources and fish. Hand-application of herbicides will be used in riparian areas (*e.g.,* to control tamarisk regrowth), but would use drift-inhibiting agents and application methods to prevent herbicides from entering aquatic habitats. Direct effects on fish and wildlife species would be short-term, localized, and minimal, since direct mortality is unlikely, and sufficient vegetation would be retained to prevent adverse effects to fish habitats.

Certain physical effects of these vegetation management actions can be similar to those management actions that involve fire. In situations where appreciable amounts of vegetation are removed, these non-fire management actions can trigger varying degrees of hydrologic response, including those associated with increased runoff (discussed above). The presence of personnel and equipment can affect habitat. The effects of non-fire vegetation management actions on peak flows, sediment-loading, and fluvial features, however, are expected to be less severe, as the actions are: (1) pre-planned and specifically implemented to avoid and minimize effects; (2) do not consume massive amounts of non-living organic ground cover; (3) create no hydrophobicity in soils.

Mechanical and chemical vegetation treatments will involve appreciable pre-planning and can be applied with high precision to the landscape. We typically know the locations occupied by each listed native fish species on BLM lands, so pre-planning and focused implementation of the conservation measures can assure minimization of adverse effects on species and their habitats. Conservation measures FT-1 and FT-3 ensure that vegetation management plans (including

prescribed fire, analyzed above) incorporate minimization measures for aquatic species and that all applicable conservation measures will be applied to habitat where occupancy is undetermined.

Beneficial Effects of Fire Suppression and Fire Management Treatments

The proposed action is expected to beneficially affect native fish in the action area. The longest-term benefit will be the reduced potential for, and intensity of, wildfires.

The Nature Conservancy and BLM are studying the effects of prescribed fire in the Muleshoe Ranch Conservation Management Area, a 20,250-hectare ranch in the desert grassland of southern Arizona. Seven perennial streams occur on the ranch, as well as five species of native fish. Since beginning the project in 1991, they have found that prescribed fire increases perennial grasses and decreases shrub cover, and that these changes result in a dramatic improvement in watershed condition (live herbaceous cover and total ground cover have increased significantly over unburned plots). The effect on aquatic habitat has also been significant: emergent, floating and overhanging vegetation increased by 27 percent; undercut bank increased from 0 meters per 500 meters in 1995 to 46.1 meters per 500 meters in 1999; and the mean maximum depth of pools increased by 9 cm. Native fish populations have also increased: the density of adult native fishes increased by 5.6 percent per year, and Gila chub population growth rate increased by 47 percent per year from 1991 to 1999. These results are even more significant considering the period of study was characterized by below average summer rainfall and reduced stream flows (Gori and Backer in press).

Likewise, vegetation removal could also have benefits for native fish, in particular, tamarisk removal. Tamarisk has been recognized for some time as a threat to dewatering native fish habitats in desert riparian areas due to its high rates of evapotranspiration (Schoenherr 1988). Tamarisk removal could help restore flows to desert aquatic ecosystems. A number of successful projects have been completed in California, the most impressive of these being Eagle Borax Spring. Tamarisk invasion had eliminated the spring in the early 1970s. By 1982, tamarisk removal was complete and surface water flows were restored to the spring, creating marsh vegetation and habitat for migratory waterfowl (Neill 1996).

Desert pupfish

BLM does not propose any wildland fire use or chemical or mechanical treatments within watersheds where desert pupfish occur. The effects of wildfire suppression and prescribed fire to desert pupfish are similar to those described for the Gila topminnow and listed native fishes in general. Please also refer to the sections “General Effects on Fishes” and “Effects of the Proposed Action, Gila topminnow”. The following narrative describes only the effects of the proposed action that are specifically relevant to the desert pupfish.

BLM proposes various conservation measures to avoid or minimize the effects of wildfire suppression and prescribed fire on desert pupfish. General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems, and species-specific conservation measures DP-1 to

DP-4 apply to desert pupfish (Appendix B). The analysis of the effects of the general conservation measures is contained in the "General Effects on Fishes" section.

Conservation measure DP-2 quantifies prescribed fire effects by stating that prescribed burns will be conducted over no more than one-half of the watershed of each desert pupfish natural or reintroduction site in a two-year period (excluding buffers to the streams and/or spring habitats) and that repeat treatments will occur at greater than two-year intervals. This means that the entire watershed of a given desert pupfish site, except for buffers, could be burned over a four-year period. The BE (Appendix C) also projects up to 5,000 acres of prescribed fire treatment within desert pupfish habitat over the 10-year duration of the LUP amendment. Adverse effects such as increased runoff and sedimentation can accumulate following the first prescribed fire if fires are repeated frequently and vegetation does not have an opportunity to recover. Conservation measure RA-14 (B) States that fuels management projects will, in consultation with FWS and AGFD staff, determine and implement an "appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream." Careful design of buffers should reduce these effects.

Desert pupfish are adapted to high turbidity, low dissolved oxygen, elevated temperatures, and other arduous conditions, but there are likely to be instances during which individual fish are injured by occlusion of gill filaments, reduced prey base, juvenile mortality, or transport from their initial habitat into other, less-suitable sites. The effects could reach the scale where individual desert pupfish are killed, though the species' high fecundity may render losses only in the short-term.

The most serious consequence of any of the proposed action's activities would be the extirpation of desert pupfish from a locality. The fragmented nature of Arizona's fluvial systems makes it unlikely that desert pupfish will be able to recolonize a site from which they are removed, absent human intervention via salvage and/or reintroduction.

Effects on desert pupfish are, to a large extent, minimized by the proposed conservation measures. However, injury or death of desert pupfish could occur during the 10-year duration of the proposed LUP amendment. The suppression of wildfire and the application of prescribed fire within watersheds supporting populations of desert pupfish can be expected to result in varying degrees of effects, including elevated runoff and the contribution of elevated levels of ash and sediment to streams and springs. The most adverse hydrologic effects are expected to be associated with wildfire, rather than from fire suppression or prescribed fire. As such, suppression of wildfires and treatments intended to reduce the risk of wildfires are desirable, and could contribute to longer-term recovery of the species if the shorter-term effects of that treatment are sufficiently minimized.

Gila topminnow

BLM does not propose any wildland fire use or chemical or mechanical treatments within watersheds where Gila topminnow occur. The effects of wildfire suppression and prescribed fire to Gila topminnow are similar to those described for listed native fishes in general. The

following narrative describes only the effects of the proposed action that are specifically relevant to the Gila topminnow.

BLM proposes various conservation measures to avoid or minimize the effects of wildfire suppression and prescribed fire on Gila topminnow. General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, and RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems, and species-specific conservation measures GT-1 through GT-6 apply to Gila topminnow (Appendix B). The analysis of the effects of the general conservation measures is contained in the "General Effects on Fishes" section.

Conservation measure GT-2 quantifies prescribed fire effects by stating that prescribed burns will be conducted over no more than one-half of the watershed of each Gila topminnow natural or reintroduction site in a two-year period (excluding buffers to the streams and/or spring habitats) and that repeat treatments will occur at greater than two-year intervals. This means that the entire watershed of a given Gila topminnow site, except for buffers, could be burned over a four-year period. The BE (Appendix C) also projects up to 5,000 acres of prescribed fire treatment within Gila topminnow habitat over the 10-year duration of the LUP amendment. Adverse effects such as increased runoff and sedimentation can accumulate following the first prescribed fire, if fires are repeated frequently and vegetation does not have an opportunity to recover. Conservation measure RA-14 (B) States that fuels management projects will, in consultation with FWS and AGFD staff, determine and implement an "appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream." Careful design of buffers should reduce these effects.

Gila topminnow are adapted to high turbidity, low dissolved oxygen, elevated temperatures, and other arduous conditions, but there are likely to be instances during which individual fish are injured by occlusion of gill filaments, reduced prey base, juvenile mortality, or transport from their initial habitat into other, less-suitable sites. The effects could reach the scale where individual Gila topminnows are killed, though the species' high fecundity may render losses only in the short-term.

The most serious consequence of any of the proposed action's activities would be the extirpation of Gila topminnow from a locality. The fragmented nature of Arizona's fluvial systems make it unlikely that Gila topminnow will be able to recolonize a site from which they are removed, absent human intervention via salvage and/or reestablishment.

Effects on Gila topminnow are, to a large extent, minimized by the proposed conservation measures (see above and "Effects on Fishes" section). However, injury or death of Gila topminnow may occur during the 10-year duration of the proposed LUP amendment. The suppression of wildfire and the application of prescribed fire within watersheds supporting populations of Gila topminnow can be expected to result in varying degrees of effects, including elevated runoff and the contribution of elevated levels of ash, sediment, and contaminants to streams and springs. The most adverse hydrologic effects are expected to be associated with wildfire, rather than from fire suppression or prescribed fire. As such, suppression of wildfires and treatments intended to reduce the risk of wildfires is desirable, and could contribute to

longer-term recovery of the species if the shorter-term effects of that treatment are sufficiently minimized.

Razorback sucker

The effects of wildfire suppression, prescribed fire, and fire management treatments to razorback sucker are similar to those described for listed native fishes in general ("General Effects on Fishes"). The following narrative describes only the effects of the proposed action that are specifically relevant to the razorback sucker.

BLM proposes various conservation measures to avoid or minimize the effects of wildfire suppression and fire and fuels management treatments on razorback sucker. General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems, and species-specific conservation measures RS-1 and RS-2 apply to razorback sucker (Appendix B). The analysis of the effects of the general conservation measures is contained in the "General Effects on Fishes" section.

Fire Suppression

Numerous wildfires have occurred within salt cedar and *Phragmites* along the Lower Colorado River. From 1980 through 2003, 939 fires occurred along the Colorado River from Davis Dam to the International Boundary with Mexico. Eight fires greater than 100 acres burned from 1998 through 2003 (D. Repass, BLM, pers. comm. 2004). Fires along the mainstem of the Colorado River in this area are usually suppressed aerially (helicopters and single engine air tankers) and/or with fireboats, fire engines and fire crews.

Fire suppression effects to razorback sucker will be similar to those described in "General Effects on Fishes": increased sediment, ash, or debris; alterations in water chemistry; and decreased water quality. Because of higher flow volumes and velocity in the mainstem of the Colorado River, these effects would be greater in side channels, backwaters, and seasonally flooded areas, including these areas of critical habitat, than in the mainstem of the river.

Conservation measure RA-6 avoids use of fire retardant and foam within 300 feet of water bodies, and conservation measure RA-9 requires the use of containment systems to prevent fuel spills. These measures would minimize the negative effects to water quality during fire suppression activities.

Fire suppression actions may disturb razorback suckers if suppression actions occur in shallow backwaters or along lake shorelines when razorback suckers have congregated for spawning during winter and spring. The presence and activity of fireboats within these areas could force razorback suckers from the area, but would be unlikely to kill or injure fish, or result in reduced reproduction. Fireboats are not expected to remain in these areas, so these disturbances should be temporary and limited to the duration of fire suppression efforts in the area.

The biological evaluation did not discuss fire suppression along the mainstem of the Lower Colorado River and its potential effects on razorback sucker or critical habitat. Fire suppression could affect the primary constituent elements of designated critical habitat through water contamination with chemical and petroleum products. Residue from use of retardant and foam may be carried as drift, depending upon wind speed and direction. Conservation measures RA-6 avoids the use of fire retardant and foam within 300 feet of aquatic habitats or in riparian areas and would limit this drift, as well avoid direct application into critical habitat. Conservation measure RA-9 requires the use of containment systems to prevent fuel spills and would minimize petroleum effects to water quality. Large amounts of ash resulting from fires in salt cedar are not likely to enter the river because dams along the Colorado River control flooding into terraces where salt cedar occurs. Limited amounts of ash and sediments could flow into the river from adjacent riparian areas and uplands, but considering the size of the watershed and river flows, these effects to the physical and water quality aspects of critical habitat would be minimal.

Fire and Fuels Management Treatments

The BLM is planning minimal prescribed fire (100 acres), mechanical (10 acres), and chemical (10 acres) treatments along the banks of Lakes Mohave and Havasu. Prescribed fire effects to razorback sucker would be similar to those described in "Effects on Fishes": increases in sediments, ash, or debris, changes in water chemistry, and decrease in water quality. Because of the small acreage of prescribed burning planned along the Colorado River and the large watershed and flows in the river, these effects will be expected to be much less in the mainstem Colorado River than in smaller rivers and streams. These water quality changes could affect razorback suckers and critical habitat in backwaters and seasonally flooded areas. Conservation measures RA-12 through RA-14 would minimize effects from prescribed burning.

Chemical treatments are proposed for salt cedar along the Lower Colorado River. Garlon 4 (triclopyr) and Arsenal (imazapyr) are the two herbicides approved for use on BLM lands that are labeled for salt cedar control and removal (BLM 1991). Triclopyr is rated as a class 2 pesticide for warm-water fish; imazapyr is rated as class 0. FWS guidance (USFWS 2004) recommends larger buffer zones for application of triclopyr near large water bodies than the BLM currently proposes (recommended 20 to 350 feet, depending on the application method); buffer zones proposed for application of imazapyr should be sufficient to avoid adverse effects. Depending on the actual location of application, pesticide formulation, and dilution rate, effects could include reduction in food sources, behavioral changes, and sublethal effects (endocrine disruption). The small amount of treatment area proposed in razorback sucker habitat should render these effects insignificant, both on the fish and critical habitat (water quality).

Mechanical treatments are also proposed. Effects from these treatments will be similar to those described for "General Effects on Fishes", with loss of shoreline vegetation resulting in increased overland flow into the river and increased sedimentation. The small acreage proposed for treatment compared to the large watershed of this river and current flows would render these effects insignificant on the species and critical habitat.

The proposed salt cedar treatments (prescribed fire, mechanical, and chemical) would likely have little effect on the primary constituent elements of critical habitat. Treatment sites are located

outside of the river channel. Regulation of the river prevents these sites from being flooded, reducing the amount of ash and other fire residue that could enter crticial habitat.
Due to the large, regulated flows, lack of natural channel movements or adjustments, and the presence of non-native sport fish in the Colorado River, it is unlikely that fire treatments, as described, would affect the physical habitat or biological environment constituent elements of critical habitat.

Effects on razorback sucker, are to a large extent, minimized by the proposed conservation measures (see above and "General Effects on Fishes" section). However, disturbance to razorback sucker on spawning areas may occur during the 10-year duration of the proposed LUP amendment. The suppression of wildfire and fire and fuels management treatments within watersheds supporting populations of razorback suckers could also result in varying degrees of effects, but the small treatment sizes over the duration of the LUP amendment would result in only very small increases in levels of ash, sediment, and contaminants to the Colorado River.

Virgin River chub and Woundfin

The effects of wildfire suppression, prescribed fire, and mechanical and chemical treatments to Virgin River chub and woundfin are similar to those described for listed native fishes in general ("General Effects on Fishes"). The following narrative describes only the effects of the proposed action that are specifically relevant to Virgin River chub and woundfins.

BLM proposes various conservation measures to avoid or minimize the effects of wildfire suppression and fire and fuels management treatments on Virgin River chub and wounfinches General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, and RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems and Virgin River chub and woundfin habitats (Appendix B). An analysis of the effects of these conservation measures is contained in the "General Effects on Fishes" section.

<u>Fire Suppression</u>

Wildfires have occurred within salt cedar on the Virgin River in the past. Because of the intensity and safety concerns associated with these fires, aggressive suppression actions are not generally taken in salt cedar unless valuable resources (e.g. southwestern willow flycatcher habitat), homes, or public safety is in danger. In the past, water has not often been drafted from the river during these suppression actions; large engines are usually used when more aggressive suppression actions are attempted. Smaller pumps may result in mortality of Virgin River chub if the fish are pumped up from pools along with the water and sprayed onto a fire. Mortality of woundfin would be unlikely because they occur in shallower water where pumping would not occur. BLM will take measures to minimize taking fish while drafting water (conservation measure RA-8). Fire trucks have also been able to obtain water from fire stations in the area. Helicopters would not dip water from the Virgin River because the river is not deep enough or wide enough to do so safely (M. Herder, BLM, pers. comm. 2004).

Fire suppression actions could affect designated critical habitat by contaminating water quality with retardants or petroleum products. Conservation measure RA-6, which avoids the use of fire

retardant and foam within 300 feet of open water or within riparian areas, would limit drift and direct application to critical habitat. Conservation measure RA-9, which requires the use of containment systems to prevent fuel spills, would be implemented to minimize negative effects to water quality in critical habitats. Other fire suppression effects to water quality would be similar to those described in the section on general effects for Federally protected fish species; increases in sediments, ash, or debris, alteration of water chemistry, and decreases in water quality decrease. However, surface-disturbing fire suppression actions (such as constructing fire breaks) within salt cedar are likely to be limited because of the difficulty of suppressing fires in these areas, so these effects are unlikely to be significant in the river and these fishes' critical habitat.

Conservation measure RA-8 prevents unused water from fire suppression activities from being dumped back in the river and into critical habitat, which would reduce the spread of disease and the likelihood introducing additional nonnative competitors or predators.

Fire and Fuels Management Treatments

The BLM anticipates treating salt cedar along the Virgin River and its tributaries, using prescribed fire and mechanical and chemical treatment methods. Conservation measure FT-3 (Appendix B) will require an inventory for these species prior to any treatments. The earliest treatment is planned for 2006; no more than 300 acres will be treated in a year. Limiting the treatment area to this size would significantly reduce the likelihood of elevated flows and consequent changes to the flow regime and water quality. Potential for successfully restoring native vegetation will be determined at sites proposed for treatment. Salt cedar treatments along the river channel may allow the river to develop wider, shallower channels with increased turbidity and sand substrate habitats that woundfin prefer.

Chemical treatments are proposed for salt cedar along the Virgin River. Garlon 4 (triclopyr) and Arsenal (imazapyr) are the two herbicides approved for use on BLM lands that are labeled for salt cedar control and removal (BLM 1991). Triclopyr is rated as a class 2 pesticide for warm water fish; imazapyr is rated as class 0. FWS guidance (White 2004) recommends larger buffer zones for application of triclopyr near large water bodies than the BLM currently proposes (recommended 20 to 350 feet, depending on the application method); buffer zones proposed for application of imazapyr should be sufficient to avoid adverse effects. Depending on the actual location of application, pesticide formulation, and dilution rate, effects could include reduction in food sources, behavioral changes, and sublethal effects (endocrine disruption). FWS recommended buffers should be considered during development of the site-specific project plans to ensure that adverse effects to these fish and their critical habiat (water quality) are avoided.

The proposed vegetation treatments may beneficially affect the primary constituent elements of physical habitat (presence or riffles, pools, and preferred substrates in designated critical habitat). Downstream of the Beaver Dam Wash confluence, the river channel is stabilized by salt cedar, creating narrow, deeper channels with decreased turbidity and increased substrate size. BLM has proposed salt cedar removal along narrowed portions of the active channel; this will create the shallower, sandier, more turbid habitats recognized as primary constituent elements of physical habitat in woundfin critical habitat (Hardy *et al*. 2003).

The biological evaluation did not discuss proposed prescribed fire or wildland fire use outside of riparian and upland desert scrub habitats. However, large portions of the Virgin River watershed within the action area, including Fort Pierce Wash, are located at higher elevations containing other vegetation communities (sagebrush, pinyon-juniper, blackbrush, and ponderosa pine) that may be treated in the future. The Virgin River channel morphology is a result of bankfull flows from a 5,090 square mile watershed, most of which is in Utah. Appendix C (Table C-2) lists acreages by treatment proposed by the Arizona Strip Field Office over the next 10 years, within the watershed of the Virgin River (H. Boyd, BLM, pers. comm. 2004).

Large prescribed fires have the potential to result in higher peak runoff events into riparian systems. However, given the large watershed size outside of the project area, it is unlikely that prescribed burns would significantly increase peak flows into the Virgin River. The 5,500 acres of projected prescribed burning in the Virgin River HUC are broken into four parcels: 400 acres, 600 acres, 700 acres and 3,500 acres. Seventy-five percent of the proposed projects in the Fort Pierce HUC are located in the upper reaches of this watershed. A network of stock tanks and reservoirs in Fort Pierce Wash will help store sediment and dissipate flow energy in the event of a large flood flow. Site-specific individual fire plans will include treatment area sizes, locations within the Virgin River watershed, and an analysis of the project impacts on Virgin River peak flows and effects on Virgin River fishes.

Effects on Virgin River chub and woundfin are, to a large extent, minimized by the proposed conservation measures (see above and "General Effects on Fishes" section). However, injury or death of Virgin River chub could occur if they are pumped from the river during fire suppression actions. The suppression of wildfire and fire and fuels management treatments within watersheds supporting populations of Virgin River chub and woundfin could also result in varying degrees of effects, but the small size of areas that would be treated each year would reduce the potential for increasee levels of ash, sediment, and contaminants into the Virgin River. The most adverse hydrologic effects are expected to be associated with wildfire, rather than from fire suppression, prescribed fire, or mechanical or chemical treatments. As such, suppression of wildfires and treatments intended to reduce the risk of wildfires are desirable, and could contribute to longer-term recovery of the species if the shorter-term effects of that treatment are sufficiently minimized.

Yaqui chub and Yaqui topminnow

BLM does not plan to use wildland fire use, prescribed fire, or mechanical or chemical treatments in the watersheds where these species occur. The effects of wildfire suppression on fishes are described in the section "Effects on Fishes". In addition to the general effects described in that section, the Yaqui chub and Yaqui topminnow are expected to respond to the effects of fire suppression activities in a manner comparable to other *Gila* species. In particular, the Yaqui chub will respond similarly to its conspecific, the Gila chub, and the Yaqui topminnow similarly to the Gila topminnow. Please refer to the effects analyses for these species as well. The differences in the effects analyses among these species are based on: 1) the differing population-level response given the rarity of the Yaqui chub and Yaqui topminnow and their

restricted range in the United States; and 2) the relatively low probability that fire suppression actions will occur on BLM lands adjacent to the Leslie Canyon NWR.

The BE includes a determination that effects to Yaqui chub and Yaqui topminnow on San Bernardino NWR lands would be discountable. We agree with this determination; there is an approximately one square mile parcel of BLM-administered land situated about seven miles upstream from the Yaqui chub and Yaqui topminnow habitat within San Bernardino NWR. The BLM has proposed no fire management activities on this parcel, and any indirect effects from wildfire suppression activities are expected to be negligible at that distance. A second group of BLM parcels adjoin the Leslie Canyon NWR, and there may be adverse effects on Yaqui chub and Yaqui topminnow in that site.

BLM determined that because critical habitat for the Yaqui chub is limited to the San Bernardino NWR and any BLM actions will be at least seven miles away and separated by topography, the proposed action would not likely adversely affect critical habitat for this species. We concurred with this determination in our May 28, 2004, memorandum.

BLM proposes various conservation measures to avoid or minimize the effects of wildfire suppression and fire and fuels management treatments on these species. General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, and RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems (Appendix B). No species-specific conservation measures were proposed for these two species. An analysis of the effects of the general conservation measures is contained in the "General Effects on Fishes" section.

Discussions with William Radke, the San Bernardino and Leslie Canyon NWR Refuge Manager, indicated that BLM lands adjoining the Leslie Canyon NWR are limited in extent, disjunct, and characterized by semi-desert grassland interspersed with yucca (*Yucca* spp.), rather than the Sacaton grass-dominated bottoms and broadleaf riparian forests characteristic of lands immediately adjoining Leslie Creek. This renders both Yaqui chub and Yaqui topminnow and their habitat largely buffered from the direct effects of potential actions on BLM lands in the stream's watershed. Furthermore, Mr. Radke Stated that the BLM has identified their lands adjacent to the Leslie Canyon NWR for disposal, and that FWS is currently in negotiation with the BLM to acquire the properties. If the lands are acquired by the Leslie Canyon NWR, fire and fuels management would become the responsibility of the FWS (W. Radke, FWS, pers. comm. 2004).

While the adverse effects of wildfire suppression would be minimized by applying the conservation measures, they cannot be completely avoided. Yaqui chub and Yaqui topminnow, like their conspecifics Gila chub and Gila topminnow, are adapted to high turbidity, low dissolved oxygen, elevated temperatures, and other arduous environmental conditions, but there are likely to be instances, following fire suppression actions such as backburning or fireline construction, during which individual fish are injured by occlusion of gill filaments, reduced prey base, juvenile mortality, or transport from their initial habitat into other, less-suitable sites. The effects could reach the scale where individual Yaqui chub or Yaqui topminnow are killed, though both species' high fecundity may result in only short-term reductions to the populations.

The most serious consequence of fire suppression activities would be the extirpation of Yaqui chub or Yaqui topminnow from Leslie Creek and Leslie Canyon NWR. Because of the fluvial distance between Leslie Creek and other occupied habitat in San Bernardino NWR, it is unlikely that Yaqui chub or Yaqui topminnow would be able to recolonize a site from which they are removed, absent human intervention via salvage and/or reestablishment.

The proposed action's effects on Yaqui chub and Yaqui topminnow are, to a large extent, minimized by the proposed conservation measures (Appendix B). The suppression of wildfire within the Leslie Creek watershed, however, can be expected to result in minimal but measurable effects, including elevated runoff and the contribution of elevated levels of ash and sediment to the stream, thus affecting both Yaqui chub and Yaqui topminnow.

Although BLM does not propose fuel treatments in these areas, the most adverse hydrologic effects to these fish would be expected to be associated with wildfire rather than with fuel treatments or fire suppression activities. Therefore, suppression of wildfires and treatments intended to reduce the risk of wildfires are desirable and could contribute to recovery, as long as the effects of the treatments are sufficiently minimized.

Little Colorado spinedace

BLM proposes various conservation measures to avoid or minimize the effects of wildfire suppression and fire and fuels management treatments on these species. General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, and RA-1 through RA-14 will govern activities that could affect riparian and aquatic ecosystems (Appendix B). An analysis of the effects of the general conservation measures is contained in the "General Effects on Fishes" section.

Fire Suppression

Fire suppression actions may result in adverse affects to the Little Colorado spinedace and its designated critical habitat. Direct impacts to spinedace may occur from suppression actions occurring on or adjacent to BLM-administered lands in Silver Creek and the main stem Little Colorado River. Little Colorado spinedace and critical habitat in Chevelon Creek may be indirectly affected by fire suppression actions that occur upstream on BLM land. This segment of critical habitat is located downstream from approximately 1 square mile of land administered by the BLM Safford Field Office. Though wildfire may occur on or adjacent to BLM land within the range of the spinedace, it is far more likely that adverse effects from wildfire and/or suppression actions that impact spinedace and critical habitat would occur in the forested headwaters of these drainages. These areas are located many miles from BLM-administered land.

Fire and Fuels Management Treatments

The BLM is not planning to implement wildland fire use or conduct vegetation treatments or prescribed fire operations on BLM-administered lands within the basins where the Little

Colorado spinedace and its critical habitat occur (Appendix C). Therefore, there will be no direct or indirect effects to the species or its critical habitat from these activities.

Loach minnow and Spikedace

The BLM is not proposing wildland fire use or any mechanical or chemical treatments on BLM-administered lands within basins (watersheds) where loach minnow or spikedace occur. Fire suppression activities may occur on BLM lands where these species occur, specifically the Aravaipa Canyon area. Prescribed burning may occur above this canyon on the rim top.

The proposed action could affect portions of occupied habitat within these river channels and lands within their 100-year floodplain (as determined by Federal Emergency Management Agency) or flood-prone areas [the valley widths covered by twice the maximum bankfull depth (Rosgen 1996)], resulting in effects to these species. Either the 100-year floodplain or the flood-prone area includes the space needed for a river to laterally migrate and maintain proper sinuosity and gradient to support the primary habitat features for these species. Lateral movement must be able to occur in order for a river or stream to be in proper functioning condition.

Fire Suppression

The effects of wildfire suppression on fishes are described in the section "General Effects on Fishes". Fire suppression activities that could affect loach minnow and spikedace include backfiring to reduce fire spread and intensity, handline and mechanized (including heavy equipment) fire line construction in the uplands, removal of snags and logs for firefighter safety, temporary road construction in the uplands, and retardant drops. Conservation measures to minimize these effects during fire suppression activities (FS-1 to FS-7 and RA-1 to RA-10; Appendix B) will be applied to these activities. Because of the steepness and lack of access within Aravaipa Canyon, surface-disturbing activities would be limited to the uplands along the rim top. Aerial retardant would not be applied within 300 feet of the canyon bottom (conservation measure RA-6). Although these activities could reduce vegetative cover and compact soils on the rim top and increase and/or concentrate runoff, effects to loach minnow and spikedace and their habitat within the canyon would be minimal.

Rivers and streams in many areas are the largest source of available water for fire suppression efforts. Water is often pumped directly from the river or dipped by helicopter water buckets. However due to the wilderness designation of Aravaipa Canyon, low water levels, narrow canyons with aviation safety concerns, helicopters would not dip water from loach minnow and spikedace habitats in Aravaipa Creek. Water for helicopter bucket drops originates from portable water tanks (pumpkins) and water tender trucks (M. Pater, BLM, pers. comm. 2004). Conversely, these water drops, originating from pumpkins, can be used instead of hand lines ("wet-lining") to control fire movement. This would result in less soil, litter, and vegetation impacts than hand line or mechanized fire line construction, both in riparian and adjacent upland habitats, and would minimize increases in soil or ash erosion and siltation into adjacent fish habitats.

Wildfires in this area are infrequent. Over the last 20 years there have been two wildfires on the rim tops above Aravaipa Canyon. Within the canyon, the upland slopes contain the Sonoran Desert vegetation community. Except during years with above average winter precipitation (which results in high production of winter annuals), fires are typically infrequent and low intensity in this community (McLaughlin and Bowers 1982). Historically, fires within the canyon have been very infrequent and small in size. Sparse vegetation and rock outcrops limit fire spread.

Loach minnow and spikedace may experience positive interdependent effects from fire suppression actions by minimizing the amount of vegetation lost from catastrophic wildfires, if they were to occur. Reducing the vegetative cover lost from a wildland fire would decrease future peak runoff events, erosion, and sedimentation in streams within the watershed. Loach minnow and spikedace may also experience positive interrelated effects from post-fire rehabilitation and restoration activities, which would quickly restore riparian and terrestrial vegetation. Rehabilitation work to reduce runoff, erosion, and sedimentation would benefit recovery of these habitats. Rehabilitation and restoration goals and objectives will be tailored to the specific site addressed and appropriate section 7 consultations will be initiated.

Fire Management Treatments

Although the BE indicates that prescribed fire activities are not planned in this watershed, Safford Field Office may conduct pinyon-juniper and grassland burns to remove trees and shrubs and enhance semi-desert grassland condition (Mark Pater, BLM, pers. comm. 2004). These burns would be located on the mesa rims above Aravaipa Canyon. Previous and proposed prescribed fires average 3,000 acres in size (from 1,500 to 8,000 acres). These burns include the entire treatment area; not all of this area is burned. In the past, prescribed fires have been patchy, leaving a mosaic of burned and unburned vegetation. Large ash accumulations do not occur in these areas after burning; grasses typically leave little ash due to the fineness of fuels and their almost complete biomass removal by fire. Trees are relatively sparse and result in limited ash. Therefore, deterioration of water quality in Aravaipa Creek is not expected after prescribed burning. Depending upon the pre-burn grass densities, increased runoff because of decreased infiltration in the uplands may occur. Fires in many vegetation communities may create water-repellant soils from the volatilization of organic matter. However, fuels that burn quickly, such as grasses, do not generally form water repellant soil layers (Wright and Bailey 1982). Prescribed burns are not proposed for the canyon slopes above Aravaipa Canyon, where the Sonoran Desert vegetation community occurs. The large distance between rim top and canyon bottom should buffer the force of increased runoff from the upper drainages to the creek. In addition, BLM prescribed fire plans require that buffer zones be established above drainages on the rim top to limit and reduce runoff and erosion into the canyon (M. Pater, BLM, pers. comm. 2004).

Loach Minnow and Spikedace Critical Habitat

The BLM is not proposing wildland fire use or mechanical treatments on public lands within basins (watersheds) where loach minnow and spikedace critical habitats occur. In some portions of the unoccupied critical habitats, water may be dipped by helicopter water buckets or pumped

directly from the rivers during fire suppression efforts. Conservation measure RA-8 would minimize these effects to critical habitat.

Wildfire and fire suppression effects to these critical habitats would be similar to those described in the section on general effects on fishes; these include increases in sediments, ash, or debris, changes in water chemistry, and decrease in water quality. Conservation measures RA-6 (which avoids the use of fire retardants and foams near water bodies) and conservation measure RA-9 (which requires the use of containment systems to prevent fuel spills) would be implemented to minimize negative effects to water quality within critical habitats.

Rehabilitation or restoration work in and along stream reaches (e.g., removal of burned trees and downed logs if necessary for safety reasons) could result in negative effects to critical habitat, including increased channel sedimentation, stream bank destabilization, and channel widening. Conservation Measure RA-1, which retains large, downed woody debris and snags, will be implemented to minimize these effects.

Chemical treatments are proposed for salt cedar along the San Pedro River and Gila River (Gila Box RCA) where critical habitat has been designated; Garlon 4 (Triclopyr) and Arsenal (Imazapyr) are the two herbicides approved for use on public lands that are labeled for salt cedar control and removal (BLM 1991). All herbicide use will follow guidelines and restrictions described in Appendix D in the BE.

Loach minnow and spikedace critical habitats could experience positive interdependent fire suppression effects within the surrounding and adjacent upland and riparian habitats. The actions that minimize vegetation lost from wildfires could negate the short and long-term negative effects from wildfire. Critical habitats could also experience interrelated effects from post-fire rehabilitation and restoration activities. Over the long-term, critical habitats could experience long-term positive effects from restoration or rehabilitation activities that retain downed logs and burned trees or that accelerate the return of riparian or terrestrial habitats to healthier natural conditions. These activities contribute to the overall health of an area following a wildfire, and therefore protect or improve critical habitat.

In summary, the proposed action's effects on loach minnow and spikedace and their critical habitat are, to a large extent, minimized by the proposed conservation measures (Appendix B). The suppression of wildfire within the watershed where these species occur is expected to be infrequent and restricted because of terrainches However, there may be minimal but measurable effects, including elevated runoff and the contribution of elevated levels of ash and sediment to the stream, thus affecting both loach minnow and spikedace.

Although BLM does not propose fuel treatments in these areas, the most adverse hydrologic effects to these fish would be expected to be associated with wildfire rather than with fuel treatments or fire suppression activities. Therefore, suppression of wildfires and treatments intended to reduce the risk of wildfires are desirable and could contribute to recovery, provided the effects of the treatments are sufficiently minimized.

Effects on Plants

The analysis of effects to plant species is divided into three sections. In the first section, we analyze the effects to those plant species that have narrow distributions, and occur in very small populations within vegetation communities that are not fire-adapted. Plants included in this section are Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Jones cycladenia, Nichol Turk's head cactus, and Peebles Navajo cactus. In the second section, we discuss plant species that occur over much wider ranges or in habitat types that support fire. The third section deals with aquatic plant species.

The action area for the plant analysis includes all BLM lands and surrounding lands within two miles. It is reasonable to assume that effects from fire suppression activities may extend onto adjacent non-BLM lands. This is more likely in those areas where BLM parcels are interspersed with private and State lands.

Effects on Narrow Endemic Plants: Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Jones cycladenia, Nichol Turk's head cactus, Peebles Navajo cactus

The BLM is proposing to suppress wildfire in areas that support populations of Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Jones cycladenia, Nichol Turk's head cactus, and Peebles Navajo cactus. The plant communities that support these populations are not fire-adapted, and wildland fire use and prescribed fire will not be employed in these areas. The likelihood of wildfire occurring within occupied habitat is infinitely small, with a return interval of 112 years (Schussman and Gori 2004). There are no mechanical or chemical treatments proposed for these areas. As such, the only effects considered in this analysis would occur from wildfire suppression actions.

All of the plant species (Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Jones cycladenia, Nichol Turk's head cactus, and Peebles Navajo cactus) analyzed in this section occur in extremely restricted areas with relatively few populations. All of these plant species also occur in habitat types that would not support wildfire. In fact, plant populations of Brady pincushion cactus, Holmgren milk-vetch, and Jones cycladenia have experienced no wildfire in recent history (L. Hughes, BLM, pers. comm. 2004).

The BLM has committed to mapping these plant populations with a 100-meter (328 feet) buffer and avoiding these areas for wildfire suppression efforts. The majority of these plant populations occur in very isolated areas of Arizona where there are no structures or human communities. The threat of property damage is miniscule, reducing the need to suppress wildfires if they were to occur. There is the possibility, if wildfires are suppressed in these areas, for plants known to occur on adjacent State or private property to be affected by suppression activities. Plants may be trampled or crushed by equipment or fire personnel. The BLM is committed to staying on existing roads and not using sites known to support populations of these species for the staging of equipment or personnel. Again, because the vegetation communities that support these plant species are not fire prone, the effect from fire suppression activities on adjacent non-BLM lands is anticipated to be minor.

Wildfire suppression activities that may be undertaken in areas surrounding known populations of these species may have indirect effects. The actions may result in soil erosion, a type change of existing vegetation, and lead to the potential increase of non-native invasive species. We feel that these indirect effects are unlikely due to the low probability of fire occurring in these vegetation types.

Invasive species are becoming more of a concern in areas throughout Arizona. At this time, there are no known populations of invasive species in areas that support these plant species (B. Phillips, USFS, pers. comm. 2004; H. Schussman, TNC, pers. comm. 2004), which is mainly due to the low overall productivity of the soils in these vegetation communities. This low productivity is one of the reasons why these plant communities are not fire-adapted; they do not support continuous stands of fine fuels or woody vegetation that support fire.

Effects of on Wide-ranging or Fire-Adapted Plants: Pima pineapple cactus, Kearney's blue star, Siler pincushion cactus

BLM has committed to mapping known and potential habitat to ensure protection and avoidance of Pima pineapple cactus, Siler pincushion cactus, and Kearney's blue star populations during fire suppression activities. The BLM is not proposing to use wildland fire or prescribed burns, mechanical or chemical treatments in the habitats of Pima pineapple cactus or Kearney's blue star. They are proposing to use wildland fire use for habitat benefit in Siler pincushion habitat. No prescribed fires, mechanical or chemical treatments will be undertaken in Siler pincushion habitat. Conservation measures PL-2 – PL-4 provide additional protections by providing for 100-meter (328 feet) buffers around plants and habitats of Pima pineapple cactus, Kearney's blue star, and Siler pincushion cactus. Within these buffers, there will be no staging of equipment or personnel, and no off-road vehicle use. Implementation of these measures will greatly minimize direct effects to Pima pineapple cactus, Kearney's blue star, and Siler pincushion cactus. A few individuals may be harmed, but it is anticipated that this number will be insignificant and will not affect the overall status of these plant populations.

Indirect effects on Pima pineapple cactus and Siler pincushion cactus include the potential increase of non-native grasses in Sonoran desert scrub and grassland and Great Basin grassland. Non-native species of concern are Lehmann lovegrass and bufflegrass in the habitat of Pima pineapple cactus and cheatgrass brome (*Bromus tectorum*) in Siler pincushion habitat. These species have a tendency to colonize disturbed areas, including areas that have been burned. Disturbance from fire suppression activities (building fire line, creation of roads, and the transport of non-native seed on vehicles) can also introduce non-native grasses into Pima pineapple and Siler pincushion cactus habitats. There is no evidence to support the hypothesis that frequent burning will reduce the density of Lehmann lovegrass (E. Gieger pers. comm.). The potential that non-native grasses could become the dominant grass species in some portions of Pima pineapple cactus and Siler pincushion habitat exists. The increase in density of Lehmann lovegrass, bufflegrass, or cheatgrass could result in increased fire intensity and frequency that could be detrimental to individual Pima pineapple and Siler pincushion cacti. Changes in grassland community composition, from native grasses (with which the species have co-evolved) to non-native grasses may lead to other ecological changes that may have unforeseen, and long-lasting, consequences for the plant communities and the species they support.

Kearney's blue star is often found on relatively steep slopes composed of unconsolidated material. Non-native grass invasions are not a problem for Kearney's blue star populations because the elevation limits for bufflegrass and Lehmann lovegrass are below where Kearney's blue star populations are found. Kearney's blue star populations would be susceptible to overall watershed degradation, especially after a high intensity fire. It is not unusual for soil and rocks to be displaced after a fire, especially with heavy rains. These erosive forces could displace a Kearney's blue star population. The effects of fire on Kearney's blue star have not been studied. Fire may benefit the species by reducing competition and allowing for colonization of new sites. Kearney's blue star produces ramets (new plants) from underground runners and may quickly recover from fire by sending up new shoots. Research and monitoring are needed to determine the interaction of fire with Kearney's blue star population dynamics.

Huachuca Water Umbel and Critical Habitat

The BLM is proposing to suppress wildfire, as needed, in areas that support Huachuca water umbel. Wildland fire use will not be used. Prescribed fire (limited to 500 acres, Statewide) will be used in areas that support tamarisk. There will be no chemical or mechanical treatments in Huachuca water umbel habitats.

The conservation measures proposed for Huachuca water umbel (as discussed in previous sections) should adequately protect known populations of water umbel. Locations will be mapped and 100-meter (328 feet) buffers established around known sites. This should minimize the direct effects from fire suppression activities. The possibility exists that a new patch of water umbel may be affected by suppression activities. We anticipate that this will be a minor effect, as there are patches of water umbel distributed along the entire SPRCA, providing a source for recolonization. It is unlikely that a suppression effort would affect the entire length of the SPRCA. The removal of tamarisk would provide a long-term benefit to Huachuca water umbel as the dense canopy associated with tamarisk precludes the use of those areas as habitat for water umbel.

The analysis is the same for critical habitat; constituent elements (mainly bank stabilization) may be affected, but we anticipate this effect to be localized and not affecting the entire stretch of critical habitat in the SPRCA. The BLM is proposing to not drive vehicles through wet areas, so occupied critical habitat should not be affected.

Fires occurring upstream of water umbel have the potential to affect downstream populations. If a high-intensity fire removes enough vegetation, increased water and sediment flows could displace water umbel populations in the SPRCA. Huachuca water umbel has some tolerance for flooding; patches can move downstream and recolonize other areas. A very large flood in 1999 removed many patches of water umbel in the SPRCA, but the overall density of patches did not decrease the following year. We anticipate that properly managed fire in the upper watershed should have minimal downstream effects to water umbel and its critical habitat.

Hualapai Mexican vole

The BLM does not plan to implement wildland fire use in the Hualapai Mountains. The BLM already consulted on prescribed fire and mechanical treatments within the Hualapai Mountains. Please refer to the biological opinion written on December 14, 2001, (02-21-01-F-0241) for a detailed analysis of effects for theses actions. The BLM does not plan any additional prescribed fire or mechanical treatments in the Hualapai Mountains beyond what has already been consulted on.

Fire suppression may occur in occupied Hualapai Mexican vole habitat. The Bureau of Land Management has committed to conservation measures (HV-1 to HV-5, Appendix B) that would minimize the direct effects to voles from fire suppression activities. Conservation measure HV-2 would minimize effects by locating staging areas outside occupied vole habitats and constructing fire lines around occupied vole habitats, as safety permits. Water and retardant drops would have an adverse effect on Hualapai Mexican voles if they occurred over occupied habitat. Some voles could be struck by water or retardant drops, resulting in injury or chemical contamination, or could be disturbed by the low-flying aircraft. Conversely, water drops can, in some circumstances, be used instead of hand lines to control fire movement. This tactic would result in less impact to soil, forest litter, and vegetation than hand line construction and, therefore, would have less impact on voles, both in intensity and duration. Hand line construction within occupied vole habitat would remove and disturb soil and forest litter. Removal of forest litter and vegetation could also lead to soil erosion and increased siltation in suitable or occupied vole habitat. Any fire suppression action that requires the felling of snags to protect human safety and the integrity of the fire line could potentially kill some voles. Direct impacts from most of these fire suppression techniques would be short-term, temporary, and localized, particularly if occupied vole habitats are avoided to the extent possible and rehabilitation of fire lines is completed.

Lesser long-nosed bat

BLM anticipates implementing wildland fire use and prescribed fire in lesser long-nosed bat foraging habitats, but will not use mechanical or chemical treatments in these areas. When warranted, fire suppression actions will be conducted and may occur within key bat foraging habitats, potentially affecting lesser long-nosed bats. BLM has incorporated species-specific conservation measures (LB-1 to LB-6) into the proposed action that will minimize effects to the lesser long-nosed bat from these activities (Appendix B).

<u>Fire Suppression</u>

Fire suppression activities will include full implementation of the conservation measures for the lesser long-nosed bat (Appendix B). Fire suppression activities are not anticipated to affect known bat maternity or roost sites because these sites (typically in caves, mines, tunnels, and old buildings) are not in areas affected by fire suppression actions. Statewide surveys for bats on BLM-administered lands have not been conducted, so it is possible that unknown bat maternity or roost sites occur in these areas.

Roads created for fire activity access may allow public access to bat maternity or roost sites. Roads created by BLM actions will be gated, closed, and/or rehabilitated to minimize roost access (conservation measure RR-5). BLM will locate any suppression activity sites (such as staging areas, fire camps, or other high-human activity bases) as far as feasible from known bat maternity and roost sites (conservation measure FS-5).

BLM anticipates that any nighttime fire suppression activities needed to contain or control fire could disturb foraging bats (by noise, lights, or other human activity). These nighttime tactics will be short-duration, low-intensity, and minimally disturbing to any nighttime foraging bats because fire suppression activities are often greatly reduced during nighttime hours. Air operations would not disturb foraging bats because air operations will not be conducted during nighttime hours.

Daytime fire suppression activities include use of air operations (including water and retardant drops), creation of dry firebreaks (hand lines or heavy equipment), soil compaction by people and vehicles, road construction for access and subsequent road closure, and backfiring to reduce available fuel loads. These tactics will only directly affect foraging bats if the actions remove greater than 20 percent of key food source plants (e.g., columnar cacti or agaves) within bat foraging habitats. BLM does not anticipate this will occur because these types of vegetation typically do not need to be removed for safety reasons or to maintain the integrity of firelines during suppression actions. The conservation measures for the lesser long-nosed bat (LB-1, LB-3, LB-4) will be implemented to the extent possible in bat foraging habitat to further minimize or eliminate direct effects from fire suppression actions.

Fire and Fuels Management Treatments

Proposed fire management actions will be used to restore and maintain typical vegetation communities, to reduce accumulated hazardous fuels, and reduce the chance of catastrophic fire on BLM-administered lands within the range of the lesser long-nosed bat. Site-specific assessments will be used to determine if and when fire management actions are appropriate in bat foraging habitat.

Wildland fire use, prescribed fire, and mechanical and chemical treatments are not expected to disturb or affect known maternity colonies or roost sites because these bats roost in caves, mines, and old buildings, and these actions will not be conducted in or within 0.5 mile of such areas. Because the bats forage at dusk, nighttime hours, and very early dawn, wildland fire use and prescribed fire are not anticipated to directly disturb foraging bats, unless monitoring or suppression activities for these activities need to be conducted at night.

Foraging bats may be disturbed by wildland fire use or prescribed fire if these activities damage columnar cacti and agaves. To minimize or eliminate the direct effects of wildland fire use and prescribed fire on the lesser long-nosed bat and its food sources, the conservation measures will be implemented, requiring pre-project surveys (LB-2) and the planned protection of key foraging areas and plants (LB-1, LB-3 through LB-6).

The primary indirect effects to the lesser long-nosed bat from fire suppression and the proposed fire management activities would be from loss of key food resources (columnar cacti and agave).

The potential severity of effects to *Leptonycteris* bats resulting from the reduction in forage resources is dependent on the importance of forage plants in a specific area to reproduction, survival, and growth of the bat. Densities of flowering agave plants, within bat home ranges, varied between an average of 1.4 plants per acre in 1998 to 0.3 plants per acre in 1999 (Ober *et al.* 2000). Areas supporting these densities of agaves, especially within 11 miles of roost sites, are probably very important for bats.

The invasion of alien grass and shrub species have altered the fuel loadings in bat foraging areas, increasing the risk and severity of wildland fires within such vegetation communities. Wildfires can cause rapid and profound changes in the vegetation communities that support bat food sources, short- and long-term, because the agave and columnar cactus species that provide critical food sources may take decades or centuries to recover from fire. Fires historically burned less hot than they do today, causing increased severity and intensity, and taking food sources longer to recover. Historically, wildfires burned in a mosaic pattern, leaving islands of bat food sources scattered over the landscape. Due to hotter, more intense wildfire, the mosaic pattern disappears and the food sources are now often lost to wildfire.

Across the action area, saguaros occur in varying densities on the lower slopes of mountains in south-central Arizona, especially in the Tumacacori and Santa Catalina mountain ranges; however, by mid-summer when most bats arrive on the Coronado National Forest from maternity roosts farther to the west, saguaros have completed flowering and no longer provide a food source for the lesser long-nosed bat. Saguaros may be impacted both directly and indirectly by fire. Saguaros occur on slopes, bajadas, and in valleys. Nurse plants, which shade sensitive saguaro seedlings, may be reduced by fire, and germination sites may be adversely altered due to soil heating, erosion, and reduced infiltration.

An important factor for *Leptonycteris* bats is the reliable availability every year of agave flowering stalks. In southeastern Arizona, Palmer's and Parry's agaves are the only reliable food source for long-nosed bats in middle to late summer. Agaves are patchily distributed over the landscape, and the presence of flowering agaves naturally fluctuates from year to year. Nectar feeding bats are opportunistic foragers, taking advantage of local floral resources. During the breeding season, lesser long-nosed bats may fly great distances in search of food resources, and later in the season they may shift roost sites and foraging areas based on the presence (or absence) of flowering agaves (USFWS 1999). The distance the bats will forage from a roost site appears to be related to the size of the colony and the available floral resources (USFWS 1999). Lesser long-nosed bats are generally still present in southeastern Arizona after the bats have left their maternity colonies and migrated to southeastern Arizona and southwestern New Mexico in mid-to late summer when agaves are in flower.

The dietary specialization of lesser long-nosed bats during their time in southeastern Arizona makes them vulnerable to fluctuations in the availability of floral resources across space and time. Ober *et al*. (2000) also investigated energetic requirements of lesser long-nosed bats. The high annual variability of nectar influences their ability to meet their energy demands. In 1998 when resource abundance was low, bats spent 66 percent less time roosting and 120 percent more time foraging compared to 1999, when resource abundance was higher. Intuitively, bats spend more time foraging when resources are not as common. Reductions in food resources,

caused by seasonal fluctuations in rainfall and possibly exacerbated by fire, may force bats to commute farther for resources, roost in substandard roosts, or increase competition among individual bats for food. These effects would be very detrimental to juvenile bats. In years when floral resources are low, as in drought years, the energy expended by bats is higher. This may affect the long-term survival of the bat.

Agaves can persist in fire-prone native grasslands in bare areas or refugia that burn lightly or not at all. Such refugia are less common in Lehmann lovegrass stands. Howell (1996) also noted a negative relationship between the proportion of agave seedlings and ramets and the amount of Lehmann lovegrass. She suggested that Lehmann lovegrass appears to suppress agave recruitment independent of fire effects. The mechanism of suppression is unclear, but Howell (1996) suggests Lehmann lovegrass may compete effectively with agaves for nutrients, moisture, or light. If agave densities are reduced due to elevated fire effects or suppression of recruitment caused by Lehmann lovegrass invasion, forage resources of the lesser long-nosed bat will be reduced. Agaves in desert grasslands have evolved with fire, but unnatural, high-fire frequency can lead to decline or elimination of agave populations (Howell 1996). Howell (1996) found that a fire frequency of three to six per decade on Fort Huachuca is "clearly too high to allow sexual reproduction to persist in the agave community... too high to permit seedling establishment and too high to allow even the fast growing clones to achieve reproductive status."

Lesser long-nosed bats may experience positive, long-term effects from wildfire suppression actions taken within bat foraging vegetation communities. By minimizing the amount of suitable bat foraging habitat and key food plants damaged or destroyed by wildfires, more food sources can remain on the landscape post-fire and be available to the bats. Because the key food plants for these bats are also important ecosystem components to many other wildlife species, and because these columnar cacti and agaves are typically intolerant of fire, BLM proposes to only allow wildland fire use or prescribed fire for resource benefit under very tight prescriptions that would protect the integrity of these vegetation communities. The conservation measures would further minimize or eliminate any long-term loss of bat food resources, which would aid in minimizing the indirect threat of affecting the bat species' numbers, reproduction, and distribution. BLM proposes to allow wildland fire use and prescribed fire within bat foraging habitat, where appropriate and compatible, to restore range conditions. BLM also proposes to continue fire suppression where necessary to reduce the spread of wildfires, which in the long-term, would reduce the threat of catastrophic wildfires that could cause large-scale, long-term losses of bat foraging habitat.

Agave mortality due to fire may affect the abundance and distribution of blooming agaves on the landscape for many years into the future, especially if there is high mortality within certain age and size classes. Although fire may affect the availability of blooming agaves, nectar production and sugar content of surviving plants is little affected. Data from Slauson *et al*. (1998) taken from work conducted in the Peloncillo Mountains found that nectar production and sugar content did not differ between unburned agaves and burned agaves with up to 80 to 90 percent of the leaf area burned. The complexity of variables influencing agave flowering may mask the effects of a fire on agave flowering for several years after a fire. In addition, natural recruitment of agaves may be episodic and the effects of fire on the agave seed bank in the soil are unknown.

Desert tortoise, Mojave population

Under the proposed action, fire suppression would occur on public lands managed by the Arizona Strip, Yuma, and Lake Havasu Field Offices in habitats occupied by desert tortoises and their designated critical habitat. Fire management activities including wildland fire use, prescribed fire, or mechanical, chemical, or biological treatments will not be conducted in suitable or occupied tortoise habitat or their designated critical habitat during the life of the Land Use Plan (Appendix C), although they may be conducted adjacent to these habitats. The conservation measures Appendix B will be implemented to the extent possible and are expected to minimize or eliminate the effects of wildfire suppression activities on the desert tortoise and its suitable, occupied, and critical habitat.

Fire Suppression

Wildfire suppression activities occurring in desert tortoise suitable, occupied, and designated critical habitat may directly affect the species and its habitat. Construction of fire lines and establishment of crew camps, equipment staging areas, and aircraft landing/fueling sites may result in death or injury of tortoises, and burrows and clutches of eggs could be destroyed at these locations. Fire-support vehicles may crush or injure tortoises while traveling on- and off-road, and burrows and clutches of eggs may be destroyed by fire vehicles during off-road travel. These activities may also disturb or compact soils needed for tortoise shelter, or otherwise degrade tortoise suitable and critical habitat.

Backfires may ultimately minimize the extent of a fire; however, they have the potential to degrade or destroy tortoise habitat and kill or injure tortoises in the path of the backfire. Tortoises may be killed or injured due to direct contact with flames, exposure to high temperatures, and smoke inhalation.

Fire retardants proposed for use during suppression actions within desert tortoise habitat include water, iron oxide slurry, a fugitive retardant consisting of phosphorus and red dye, and a surfactant foam that facilitates penetration of water into fuels. With the exception of water, which is considered benign or beneficial for tortoises and their habitat, the effects of these retardants on tortoise populations are unknown.

Tortoises may be captured and displaced from the area impacted by fire suppression activities. Fire personnel could illegally collect tortoises for pets, removing them from the wild population. Tortoises that are physically moved out of project areas to prevent mortality or injury could be inadvertently harmed if not handled properly. Urine and large amounts of urates are frequently voided during handling and may represent a severe water loss, particularly to juveniles. Overheating can occur if tortoises are not placed in the shade when ambient temperatures equal or exceed temperature maximums for the species. Displaced tortoises may reenter project areas and be injured or moved againches

The negative effects of wildfire suppression activities on tortoises may be elevated during periods of highest tortoise activity (March 15 to October 15) when clutches of eggs may be

affected and tortoises are more likely to be above ground. Periods of highest tortoise activity also coincide with fire season within the action area.

Decisions made during suppression activities may affect the direction or intensity of the fire and the quantity and quality of tortoise habitat burned. Suppression activities should stress the protection of occupied tortoise habitat, particularly areas of relatively pristine stands of native shrubs and grasses. Islands of unburned habitat within burns should also be protected because these areas likely provide refugia and seed sources for future recolonization by native plants and tortoises. Implementation of conservation measure DT-15 should provide adequate protection of these areas.

Under certain circumstances, it may not be possible to implement all conservation measures included in the BE to minimize or eliminate the effects of wildfire suppression activities on desert tortoises and their suitable, occupied, and/or critical habitat. Incident Commanders may need to weigh implementation of conservation measures against the use of aggressive fire suppression tactics in and adjacent to tortoise habitat to minimize the negative effects of wildfire on tortoises and their habitat, which are usually greater in scope and intensity than the negative effects of suppression actions. Rapid suppression of wildfire may reduce the amount of tortoise habitat lost and/or degraded due to the fire. Rapid fire suppression may also minimize the magnitude of the agency response needed to suppress the fire and the associated negative effects to tortoises.

Fire suppression activities may result in indirect effects to the tortoise and its suitable and/or critical habitat. These indirect effects have the capability of affecting the numbers and reproduction of the species and may result in a change in its distribution. Backfires and other habitat degrading suppression activities may alter habitat structure, such as altered forage quality and/or quantity, loss of thermal refugia, habitat fragmentation, and increased erosion and flooding. An increase in predation may occur due to loss of cover and greater periods of surface exposure as more time and energy may be devoted to foraging. Refuse left by fire crews in tortoise habitat may also attract predators of desert tortoises, particularly common ravens (*Corvus corax*) and coyotes (*Canis latrans*). Implementation of conservation measure DT-14 should significantly reduce or eliminate these predator attractants.

Temporary roads and fire lines created during fire suppression activities may provide access routes for recreationists. Use of these new routes may facilitate OHV use and associated damage to suitable and/or critical habitat, as well as crushing of tortoises by vehicles and illegal collection of tortoises as pets.

Fire and Fuels Management Treatments

Wildland fire use, prescribed fire, and mechanical and chemical treatments will not be conducted within desert tortoise suitable, occupied, or designated critical habitat. These treatment activities conducted adjacent to tortoise habitat may ultimately reduce the frequency and magnitude of fires within tortoise habitat by reducing fuel loads and the subsequent likelihood of fire spreading into tortoise habitat.

The tortoise may also experience positive interrelated effects of post-fire rehabilitation where implemented and successful.

New Mexico ridge-nosed rattlesnake

Fire suppression activities will occur in suitable habitat potentially used by New Mexico ridge-nosed rattlesnakes. BLM expects to implement wildland fire use and prescribed fire activities in this subspecies' suitable habitat, but not mechanical or chemical treatments, during the life of this LUP amendment (10 years). Since mechanical and chemical treatments will not occur in rattlesnake suitable habitat, these activities are not anticipated to affect the subspecies.

Fire suppression activities that occur in rattlesnake suitable habitat could directly affect the subspecies. Lightning-ignited fires typically occur during periods of rattlesnake surface activity (July though October, annually). Ridge-nosed rattlesnakes could be killed or injured physically or chemically during water or retardant drops or by construction of fireline by hand tools or machines. Suppression activities could also result in loss of snake shelters and rock access.

Wildland fire use and prescribed fire activities in rattlesnake suitable habitat could directly affect the subspecies. Snakes could possibly be caught and burned by these fires if present and in the area and above ground. Prescriptions for wildland fire use or prescribed fires that occur in rattlesnake suitable habitat are intended to allow for only those fires predicted to burn with lowered intensities (conservation measure RN-3, Appendix B). High intensity fires that burn outside the lowered prescriptions could have greater effects to rattlesnakes; these would be aggressively suppressed. In the early years of implementation, we would expect that the existing high accumulations of fuel loads could result in burns of greater intensity than the natural range of variability for the sites. If possible, prior to wildland fire use, prescribed burns will be conducted to reduce the unnaturally high fuel loads and to avoid catastrophic wildfires and loss of canopy cover (conservation measure RN-2, Appendix B).

Ridge-nosed rattlesnakes could be killed or injured during surface disturbing activities associated with fire management actions, if snakes are present in the area or above ground. Higher mortality could be expected during periods of surface activity for the rattlesnake, typically July through October, annually. Prescribed fires will be timed to avoid these active periods and reduce direct effects. We understand that the unpredictable timing of wildfire starts is not controllable; we also understand that BLM's analysis of these and other factors are part of the decision-making process.

It is possible that an adaptively managed wildfire or a prescribed fire could escape off BLM-administered lands (that may not be occupied by rattlesnakes) into adjacent higher-elevation sites on FS-administered lands (that may be occupied by rattlesnakes), potentially killing or injuring snakes. We understand this is not the intent of adaptively managed wildfire or a prescribed fire, and an escaped fire situation will trigger immediate suppression decisions and activities.

While the subspecies has not been located on BLM-administered lands to date, indirect effects to ridge-nosed rattlesnakes from fire suppression activities, and wildland fire use and prescribed fire will likely occur. The potential exists for an increase in snake predation due to loss of

ground cover and greater periods of surface exposure as more time and energy may be devoted to foraging. There may be changes in availability of snake prey (arthropods, lizards and small mammals), rattlesnake distribution or reproductive patterns, and long-term alteration of rattlesnake suitable habitat. Small mammal densities and diversities are frequently depressed for one to three years after a fire (Smith 2000, Cunningham *et al.* 2001). Because of the fragmented nature of the subspecies' habitat (Holycross and Smith 2001), the low number of New Mexico ridge-nosed rattlesnakes in the area, and the disjunct nature of the subspecies' population in the Peloncillo Mountains, disturbance to suitable habitat on public lands or loss of individuals in a deme could also indirectly affect the subspecies by decreasing the opportunity for dispersal between demes and reducing the likelihood of finding suitable mates.

Conversely, ridge-nosed rattlesnakes may experience positive interdependent effects from fire suppression actions that minimize the amount of suitable habitat lost by large, high intensity wildfires occurring in these habitats. Fire suppression activities that prevent wildfires from moving from BLM-administered lands to adjacent Forest Service-administered lands could be expected to preserve more of the rattlesnake suitable habitat and reduce the chances of injury and mortality to the subspecies. When non-disturbing, post-fire rehabilitation and restoration activities are implemented within rattlesnake suitable habitats, additional benefits could occur for the subspecies. Well-planned vegetation management could improve conditions by increasing the frequency of native perennial grasses and providing cover for rattlesnakes and their prey species. With time, the successful implementation of the proposed fire management activities within rattlesnake suitable habitat is anticipated to promote reestablishment and restoration of the grass and woodland communities used by the subspecies and its prey species.

Gila chub

BLM does not plan to implement wildland fire use or mechanical or chemical treatments in watersheds occupied by Gila chub. The effects from fire suppression and prescribed fire actions to Gila chub are similar to those described for listed native fishes in general, and are described in the section entitled "General Effects on Fishes", above. The following narrative describes only the effects of those aspects of the proposed action that are specifically relevant to the Gila chub and to Gila chub proposed critical habitat.

BLM proposes various conservation measures (Appendix B) to avoid and minimize the effects of wildfire suppression, prescribed fire, and mechanical and chemical vegetation treatments. General conservation measures FS-1 through FS-7, FT-1 through FT-5, RR-1 through RR-6, and RA-1 through RA-14 will be applied to activities that could affect riparian and aquatic ecosystems. Species-specific conservation measures have been developed to address effects on Gila chub: GC-1, GC-2, and GC-3. The analysis of the effects of these general Conservation Measures is contained in the "General Effects on Fishes" section.

BLM projects up to 5,000 acres of prescribed fire treatment within Gila chub habitat over the 10-year duration of the LUP amendment (Appendix C). This acreage is exclusive of buffers, and its magnitude indicates that it may include watersheds surrounding unoccupied sites suitable for reintroduction. Adverse effects such as increased runoff and sedimentation can accumulate following the first prescribed fire, if fires are repeated frequently and vegetation does not have an

opportunity to recover. Conservation measure RA-14 (B) States that fuels management projects will, in consultation with FWS and AGFD staff, determine and implement an "appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream." Careful design of buffers should reduce these effects. We anticipate that the conservation measures proposed, along with additional site-specific measures developed in lower level planning documents (i.e. implementation plans), will serve to further minimize any adverse affects from prescribed fire and vegetation treatments.

Proposed Critical Habitat

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02).

Effects on critical habitat of Gila chub from the proposed action are similar to effects on the species and the "Effects on Fishes" section. The direct and indirect effects of the proposed action on Gila chub critical habitat would generally be short-term. Although landscape and watershed level changes from large fires can last for many years, the proposed action should minimize the risk of large wildfires.

Adverse effects of the proposed action on fishes and on Gila chub described previously could affect the primary constituent elements of critical habitat of Gila chub in the following ways: (1) alteration of habitat, including a loss of perennial pools, undercut banks, overhanging vegetation, and submerged vegetation, due to sedimentation and hydrologic alterations including increased overland flow and loss of channel stability; (2) altered water quality, including elevated temperatures, excessive sedimentation, reduced dissolved oxygen, increased pH, or via contaminants; and (3) a loss of food base, invertebrates and algae, from water quality and hydrologic alterations.

Beneficial effects of the proposed action on fishes and on Gila chub described previously could affect the primary constituent elements of critical habitat of Gila chub in the following ways: (1) the reduced potential for and intensity of future wildfires, and their associated adverse effects; (2) improved habitat conditions, including more pools, deeper pools, increased cut banks, increased overhanging vegetation, increased root wads and downed logs due to watershed improvements including riparian development and channel stability, reduced overland flow and sediment transport, and increased watershed cover due to conversion of shrub-dominated uplands to perennial grassland and improvement of fire regimes in headwater forests; and (3) improved water quality due to aforementioned watershed changes.

The proposed action's effects on Gila chub and proposed critical habitat are, to a large extent, minimized by the proposed conservation measures. There remains the possibility that injury or death of Gila chub will occur during the 10-year duration of the proposed LUP amendment. The suppression of wildfire (including construction of roads and firelines and backburning) and

application of prescribed fire can be expected to result in varying degrees of effects, including elevated runoff and the contribution of elevated levels of ash and sediment to streams and springs.

Gila chub are adapted to higher order streams with good water quality, so there are likely to be instances during which individual fish are injured by occlusion of gill filaments, reduced prey base, juvenile mortality, or transport from their initial habitat into other, less-suitable sites. The effects could reach the scale where individual Gila chub are killed. Although due to the high fecundity of this species, such losses may be only short-term.

The most serious consequence of any of the proposed action's activities would be the extirpation of Gila chub from a locality. The fragmented nature of Arizona's fluvial systems make it unlikely that Gila chub will be able to recolonize a site from which they are removed, absent human intervention via salvage and/or reestablishment. BLM can minimize this risk by working with AGFD and FWS to implement salvage operations if wildfire or other elements of the proposed action threaten Gila chub populations, to the extent practicable, and where human health and safety permit (conservation measure FI-1).

The most adverse hydrologic effects are expected to be associated with wildfire, rather than with fire suppression or prescribed burns. As such, suppression of wildfires and treatments intended to reduce the risk of wildfires is desirable, and could contribute to longer-term recovery of the species if the shorter-term effects of that treatment are sufficiently minimized.

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.

Chiricahua leopard frog

While the entire range of the Chiricahua leopard frog is within the action area for the proposed LUP amendment, only the southern form of the frog occurs on, or downstream from, BLM-administered lands within the action area. The frog's southern range has a checkerboard-type pattern of land ownership involving Federal, State, and private landholders. Both forms of the frog have been affected by activities on State and private lands that have cumulatively contributed to its decline. Many of these activities, such as livestock grazing, human population expansion and associated infrastructure development, and recreation (including OHV use), are expected to continue on State and private lands within the range of the species. These activities could continue to introduce nonnative species, such as bullfrogs, crayfish, and fish that would prey on, or compete with, the Chiricahua leopard frog, and the chytrid fungus that could harm the species. These activities could also continue to contribute to fragmentation, major manipulations, and pollution of the frog's wetland habitats.

Cactus ferruginous pygmy-owl

The action area overlaps or adjoins areas subject to ongoing residential and commercial development pressures within populated areas; State, local, and private development or land management actions are expected to continue at various intensities throughout the action area.

Wildfire suppression, wildland fire use, prescribed fire, and mechanical or chemical fuel treatments have occurred and will continue to occur on State or private lands adjacent to BLM lands, particularly in the Altar Valley, which is characterized by a patchwork of State, private, and Federal ownership. The effects of such actions on State and private lands are expected to be similar to those described in "Effects of the Action, Cactus ferruginous pygmy-owl", but potentially of greater magnitude if avoidance and minimization measures are not fully implemented.

While cumulative effects are likely to occur on State, Tribal, and private lands adjoining the action area, the most well-understood cumulative effects, and those most likely to harm pygmy-owls, are related to urban development within northern Pima and southern Pinal counties.

With the recent EPA transfer of the section 402 Clean Water Act National Pollutant Discharge Elimination System (NPDES) program to the State of Arizona, the number of projects with a Federal nexus has been reduced. Single-family residence construction typically does not have a Federal nexus, and thus does not undergo consultation under section 7. Cumulative effects considered in our analysis include residential subdivisions, single-family residences, and commercial projects where zoning, development plans, subdivision plats, or impact fee assessments make them reasonably certain to occur, but no Federal nexus is anticipated. Areas where these cumulative effects are anticipated to occur include areas where pygmy-owl breeding home ranges and dispersal pathways have been documented. Cumulative effects are likely to continue to further fragment habitat.

The northwest Tucson portion of the action area has been subject to significant development activities, and while development will likely continue at some level, there have been a number of recent lower-density developments proposed, such as Butterfly Mountain and Saguaro Canyon Ranch. In addition, some development projects have clustered development at higher densities, leaving larger blocks of undisturbed desert and wash vegetation (Dove Mountain and Sky Ranch). Both of these approaches reduce the level of cumulative effects on pygmy-owls. Some areas have been planned at lower density development than previous plans, but build-out at these lower densities is dependent on a number of factors including market, existing zoning, and intentions of the landowner. Much of the private land in the area is zoned for low-density residential uses that would have reduced effects on the pygmy-owl. However, past development has often occurred on parcels with low-density zoning that was rezoned to a higher density. Based on projects with which we are familiar, this trend is likely to continue, but probably to a reduced extent.

Other cumulative effects include habitat degradation caused by grazing of State Trust lands, unregulated OHV use, and construction of wildcat subdivisions.

These cumulative effects will contribute to fragment habitat because most occur adjacent to roadways and will increase the linear extent of unsuitable habitat across the action area. The areas where we anticipate cumulative effects will occur support known breeding home ranges for the pygmy-owl, as well as dispersal habitat and pathways. This will reduce available pygmy-owl breeding habitat, but will also reduce habitat connectivity and the opportunity of pygmy-owl movements to and from BLM lands throughout the action area. The effects of wildfire suppression, wildland fire use, prescribed fire, and mechanical and chemical fuel treatments could result in significant and adverse cumulative effects if such efforts are not coordinated with similar activities being conducted by Federal land management agencies. This is particularly relevant in the Altar Valley, where: (1) the Buenos Aires NWR is engaging in a significant prescribed fire program, (2) large blocks of BLM-administered lands are intermixed with State and private land, and (3) various adverse effects occur south of the International boundary in Mexico.

We do not anticipate that the implementation of the proposed action, including the conservation measures, will expand or exacerbate the identified cumulative effects.

California condor

Condors will continue to be vulnerable to injury or death from shooting by humans, ingestion of lead from animal carcasses, and other human-condor interactions on a variety of land ownerships. Because the birds can travel long distances to forage, agricultural activities or infrastructure development on State, Tribal, and private lands could potentially affect alternate foraging and roosting habitat. Condors could also be affected by incidental predator control, and by construction of roads and residential structures in open areas needed by condors for foraging.

Southwestern willow flycatcher

Because of the recent EPA transfer of the section 402 Clean Water Act National Pollutant Discharge Elimination System (NPDES) program to the State of Arizona, further economic development of private lands near rivers will require less Federal permitting. Continued development may lead to more public use of rivers and shoreline areas. Increases or changes in cowbird foraging areas (construction of corrals, grazing of domestic stock, placement of bird feeders) and habitat fragmentation may increase the parasitism rate and decrease southwestern willow flycatcher productivity. Continued and future conversion of floodplain and near shore lands will likely eliminate opportunities to restore floodplains to develop willow flycatcher habitat. Increased recreation, camping, off-road vehicle use, and river trips may harass and disturb breeding birds or impact nesting habitats. This continued recreation also increases wildfire potential in these areas. Water diversions proposed by Tribes, private, State, or local groups may reduce water to maintain downstream habitats.

Yuma clapper rail

Future non-Federal actions include heavy recreational use of the lower Colorado River corridor and unauthorized uses. Recreational activities include boating, fishing, water-skiing, picnicking, and camping. Unauthorized uses include long-term camping, dumping trash and littering, and

cutting firewood in adjacent areas. These activities increase the potential for disturbance to Yuma clapper rails, degradation or loss of marsh habitats, and human-caused fires.

Bald eagle

While the bald eagle occurs throughout the action area for the proposed LUP amendment, there are only seven breeding areas that occur on or downstream from BLM-administered lands. In some cases, bald eagle breeding areas are surrounded by a checkerboard pattern of land ownership including Federal, State, and private landowners. Bald eagles are susceptible to activities on State and private lands that have cumulatively contributed to its decline. Many of these activities, such as livestock grazing, water impoundments and diversions, human population expansion and associated infrastructure development, and recreation activities (including OHV use, rafting, boating and fishing), are expected to continue on State and private lands within the bald eagle's range. These activities will continue to affect bald eagle productivity by disturbing nesting birds, eliminating nest trees (either though direct destruction or indirectly by interfering with future nest tree recruitment), and introducing and supporting nonnative fish species that prey on native fish that bald eagles feed upon.

Mexican spotted owl

Future actions within the action area that are reasonably certain to occur include urban growth and development, recreation, road construction, fuels-reduction treatments, research, livestock grazing, and other associated actions. These actions have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat (including areas of proposed critical habitat), cause disturbance to breeding MSO, and would contribute as cumulative effects to the proposed action.

General Cumulative Effects on Fishes: Desert pupfish, Gila topminnow, Razorback sucker, Virgin River chub, Woundfin, Yaqui chub, Yaqui topminnow, Little Colorado spinedace, Loach minnow, Spikedace, Gila chub

Unregulated activities on Federal and non-Federal lands, such as the trespass of livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Cumulative effects to native fishes include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of Federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a Federal nexus, and recreation. Some of these activities, such as irrigated agriculture are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-Federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat

through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the American Fisheries Society (AFS) adopted a position Statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the Act, that Statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, pose a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

Desert pupfish

Cumulative effects to desert pupfish are similar to those described above. There are no additional cumulative effects occurring in either of the desert pupfish localities.

Gila topminnow

Cumulative effects to Gila topminnow are similar to those described above. There are unique, regional cumulative effects that have a disproportionate effect on Gila topminnow: urbanization, recreation, and grazing within the basins containing Gila topminnow in the upper Santa Cruz River Valley south of Tucson. These actions are resulting in a deteriorating status for the Gila topminnow.

Razorback sucker

Because of the recent EPA transfer of the section 402 Clean Water Act National Pollutant Discharge Elimination System (NPDES) program to the State of Arizona, further economic development of private lands near rivers will require less Federal permitting. Continued development will lead to more public use of the river and shoreline areas. Continued and future conversion of floodplain and near shore lands will eliminate opportunities to restore historical wetlands and flood plains for fish habitats. Continued visitation and recreation could affect water quality from increased petroleum product spills and contaminants as well as discharge of treated and un-treated sewage. Recreation activities may also result in increased disturbances to fish and their spawning areas.

Virgin River chub and Woundfin

State and private lands checkerboard the river reaches occupied by the woundfin and Virgin River chub. The Virgin River valley in Arizona and Nevada is likely to experience additional urbanization over the near future. Use of existing water supplies, both surface and groundwater, from agricultural uses to municipal uses may occur. This would reduce water quantity and quality, and destroy spawning and critical habitats. Additional groundwater use will occur as the population of the area increases.

Development is expected to continue along the Virgin River in Arizona. Housing and other construction change the land use patterns around the river and adjacent to critical habitat. Recreation activities also fragment, modify, or destroy upland or riparian vegetation and negatively affect water quality and quantity. Anglers may release nonnative species into the system, increasing competition for food and predation on these fish. Current agricultural and livestock grazing practices may result in draining or development in floodplains or further water diversions.

Fire management actions upstream or on adjacent State and private lands may reduce catastrophic wildfire potential. Because the conservation measures may not be implemented during these actions, suppression activities may result in increased effects from vegetation loss and negative changes to water and habitat quality.

Yaqui chub and Yaqui topminnow

The cumulative effects that may impact listed species on the San Bernardino and Leslie Canyon NWRs are difficult to assess. Effects that are reasonably certain to occur are associated with expected population growth of the Douglas, Arizona and Agua Prieta, Sonora region. Associated effects may include pollution, increased visitation to the refuge, groundwater depletion, illegal traffic, greater likelihood for introduction and transport of nonindigenous species, and increased resource use and degradation. Decreases in the flows of the artesian wells on San Bernardino NWR have already been documented in response to groundwater pumping in Mexico (USFWS 1995). Groundwater declines have the greatest potential to impact the aquatic resources of the refuge. However, development in the San Bernardino Valley is minimal in both the United States and Mexico at this time.

All known populations of the Yaqui topminnow in the United States occur within drainages managed by the San Bernardino NWR. Non-permitted, unregulated activities on Federal lands, such as the trespass of livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within the watersheds of Yaqui chub and Yaqui topminnow sites are cumulative, and can adversely affect both species through a variety of avenues.

Yaqui chub also occur on the El Coronado Ranch, which contains private lands. Actions on the El Coronado Ranch have been identified for a 25-year period through an HCP. Our granting of a section 10(A)(1)(b) incidental take permit to the El Coronado Ranch has rendered those actions Federal. There are, however, remaining cumulative effects. The illegal transplanting of exotic fish and amphibians also occurs on the El Coronado Ranch and will likely continue to be a problem, although aggressive nonnative aquatic species control methods may aid in reducing their spread. The Arizona Game and Fish Commission may close this drainage to fishing in the future, also reducing the spread of nonnative species.

Little Colorado spinedace

Future actions within the action area that are reasonably certain to occur include urban growth and development, recreation, road maintenance, fuels-reduction treatments, ungulate grazing,

and other associated actions. These actions have the potential to reduce the quality of habitat for the spinedace and contribute as cumulative effects to the proposed action.

Loach minnow and Spikedace

Development, recreation, and changes in land uses around occupied reaches and habitat that further fragment, modify, or destroy upland or riparian vegetation negatively affect water quality and quantity and the primary constituent elements of critical habitat. Increased development, agricultural activities, and livestock grazing practices may result in the drainage, development, or diversions of wetland and aquatic habitats that reduce water quantity and quality, and destroy spawning and critical habitats. Introductions of nonnative fish by anglers and other recreationists into occupied reaches and critical habitat increase resource competition and direct mortality from predation.

Fire management actions on State or private lands adjacent to or upstream from occupied sites or reaches may reduce catastrophic wildfire potential. These actions may also cause direct mortality through suppression actions and indirect effects from vegetation loss and its negative changes to water quality and habitat quality.

Narrow Endemic Plants: Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Jones cycladenia, Nichol Turk's head cactus, Peebles Navajo cactus

The majority of the populations of these six plant species occur on Federal lands, and effects from land management activities would be subject to section 7 consultation. We are aware that populations of Holmgren milk-vetch, Peebles Navajo cactus, Nichol Turk's head cactus, Brady pincushion cactus, and Arizona cliffrose also occur on non-Federal lands, some of which are adjacent to BLM lands and are considered in be within the action area for the proposed action.

Holmgren milk-vetch and Jones cycladenia are known from Arizona State land, the Peebles Navajo cactus from private property adjacent to BLM lands, and Arizona cliffrose from Tribal lands. Any cumulative effects that may be incurred by the species would likely occur to those plants located on private land, adjacent to BLM land. Populations on State or private land have no protection and the land can be sold for development. They are often not protected by fences and unrestricted off-road vehicle activities are likely. Mining and sand and gravel operations can take place on private lands, as is currently taking place near the ACEC for Peebles Navajo cactus. We know of no other activities that may be affecting these plant populations on non-Federal lands.

Wide-ranging or Fire-Adapted Plants: Pima pineapple cactus, Kearney's blue star, Siler pincushion cactus

The majority of Pima pineapple cactus habitat occurs on Arizona State lands, some of it adjacent to BLM lands. State lands have no protection and may be sold for development. Urban development contributes to loss of individuals and fragments populations, especially populations that exist on different land ownerships. The same can be said for Siler pincushion cactus and its habitat. Off-road vehicle use also occurs on State land. This activity, often unsupervised,

contributes to habitat degradation and loss of plants. Erosion, leading to the formation of gullies and headcuts, can form on adjacent State lands and spread onto BLM lands. Livestock grazing on State and private lands, if not properly managed, can contribute to Pima pineapple cactus and Siler pincushion cactus habitat degradation. Trails and trash dumping associated with undocumented aliens traffic has been observed in Pima pineapple cactus habitat. Trails may act as vector points for the movement of invasive species into Pima pineapple cactus habitat. Kearney's blue star populations are remote and, to date, have not been affected by undocumented alien traffic. The populations are too steep to be affected by off-road vehicle use. We know of no other cumulative effects that may affect populations of Siler pincushion cactus, Pima pineapple cactus, and Kearney's blue star.

Huachuca water umbel

Water withdrawals in the surrounding area may affect water umbel and its critical habitat. Draw down of the aquifer can have long-lasting effects by reducing the base flow and the amount of perennial water in the SPRCA. We know of no other cumulative effects that may affect Huachuca water umbel in the action area. Surrounding State and private lands do not support habitat for this species.

Hualapai Mexican vole

Lands within the range of the Hualapai Mexican vole are a checkerboard of BLM lands, and State, city, county, and private lands. Recreational use of the Hualapai Mountains on all land ownerships is expected to continue or increase slightly in the future. BLM has management authority and responsibility for recreational impacts on the lands they manage. However, recreation and other activities in the Hualapai Mountain County Park and private lands may affect the Hualapai Mexican vole as well. Future housing development and grazing is likely to occur on private and State lands within and adjacent to Hualapai Mexican vole occupied, suitable, and potential habitat. Cumulative effects from these activities on State and private lands would include disturbance of occupied or suitable sites; alteration or elimination of ground cover, especially around open water and seeps; or increased erosion from road construction, livestock grazing, and concentrated recreation that alters or destroys suitable habitat. The additional development of housing and recreation on State and private lands in the area may also increase the potential for wildfires from human-ignition sources.

Lesser long-nosed bat

Land ownership within the range of the lesser long-nosed bat in Arizona is a checkerboard of Federal, State, and private lands. Activities on State and private lands within the action area that may contribute to cumulative effects to the species may include disturbance or destruction of roosts from unregulated recreation (e.g., cave or mine exploration) or closing or gating of mines for human safety; as well as disturbance or destruction of key foraging plants from recreation activities (e.g., OHVs), agricultural clearing, or grazing; legal or illegal collection of cacti and agaves for landscaping; and human expansion and its associated infrastructure development.
Desert tortoise, Mojave population

The BLM and National Park Service (Lake Mead National Recreation Area) manage the majority of tortoise habitat in the action area, intermixed with smaller patches of State and private lands. Considerable acreage between InterState 15 and the Virgin River, near Beaver Dam and Littlefield, and in the vicinity of Mesquite, Nevada are privately owned. Continued development of these non-Federal lands is anticipated. Other cumulative effects contributing to the species decline include livestock grazing and recreation (such as OHV use), and are expected to continue on State and private lands within the action area.

New Mexico ridge-nosed rattlesnake

Forest Service and BLM manage the majority of lands within the subspecies' range. Small, privately owned lands are intermixed with Federally-administered lands in the lower elevations of the Peloncillo Mountains. Habitat and snake disturbance; snake injury or mortality; and habitat fragmentation, degradation, or destruction from grazing and recreation activities on these small, privately owned parcels could affect the small, disjunct populations of New Mexico ridge-nosed rattlesnake within the action area. Conversely, fuel reduction and fire management activities on these private lands conducted in similar ways to this proposed action could contribute longer-term positive effects by reducing the potential for catastrophic wildfires, particularly in those situations where a fire spreads from private to Federal lands.

Gila chub

Cumulative effects to Gila chub are similar to those described as general cumulative effects on fishes, above.

CONCLUSIONS

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 the conservation measures (Appendix B, general and species-specific conservation measures) that were incorporated into the project design.

Chiricahua leopard frog

After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Chirichaua leopard frog. No critical habitat for this species has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. All proposed fire management activities that may lead to take of Chiricahua leopard frogs have conservation measures (Appendix B) included that should minimize adverse effects to the species.

2. The ecological condition of the areas scheduled for prescribed fire and wildland fire for resource benefit are anticipated to slowly improve during the 10-year plan lifespan.

3. Fire suppression, as proposed, will help prevent degradation of watersheds and aquatic sites where the Chiricahua leopard frog occurs.

Cactus ferruginous pygmy-owl

After reviewing the current status of the cactus ferruginous pygmy-owl and its proposed critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our opinion that the action, as proposed, is not likely to jeopardize the continued existence of the cactus ferruginous pygmy-owl. It is our conference opinion that the proposed development is not likely to result in the destruction or adverse modification of proposed critical habitat. We base our conclusions on the following:

1. The project site is likely to contain pygmy-owl territories (nesting habitat), and foraging and dispersal habitat, but the pygmy-owl's scarcity and patchy distribution render direct effects on occupied habitat an extremely rare event.

2. The BLM's proposal to pursue fire suppression and exclude wildland fire use and prescribed fire in Sonoran desertscrub minimizes the permanent loss of this habitat type.

3. Conservation measures (Appendix B) will be implemented to minimize habitat disturbance and alterations during the February through July pygmy-owl breeding season. Conservation measures will also minimize the indirect effects of fire suppression and fuel management treatments on pygmy-owls and the species' habitat.

4. The development and implementation of mitigation and rehabilitation plans will reduce the effects on critical habitat and will provide opportunities to enhance or restore the critical habitat's primary constituent elements.

5. Mechanical and chemical treatments will reduce type conversion and reduce the risk of catastrophic wildfire within pygmy-owl habitat.

California condor

After reviewing the current status of the California condor, the environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California condor. No critical habitat has been designated for this species; therefore none will be affected. We base our conclusion on the following:

1. Conservation measures (Appendix B) will be implemented to minimize the effects of the proposed action on condors.

Southwestern willow flycatcher

After reviewing the status of the southwestern willow flycatcher, the environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species. No critical habitat has been designated; therefore none will be affected. We base our conclusion on the following:

1. Occupied southwestern willow flycatcher habitat currently occurs on BLM-administered land on the San Pedro and Virgin rivers; in addition, sites on the Middle Gila River were occupied in 2003. Occupied sites adjacent to BLM land occur on the Colorado, Big Sandy, and Santa Maria rivers. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions. These measures have been effective in the past in reducing the amount and extent of take.

2. Fuel management treatments of exotic vegetation will only occur within unoccupied habitat. Proposed salt cedar projects within suitable habitats on the San Pedro River are currently under separate consultation with us.

Yuma clapper rail

After reviewing the current status of the Yuma clapper rail, the environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Yuma clapper rail. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

2. The prescribed burns will not permanently remove clapper rail habitat and will contribute to the long-term maintenance of suitable habitat within the action area.

3. Substantial amounts of suitable habitat remain adjacent to the areas to be burned to provide habitat for resident clapper rails until the burned areas recover.

4. Within clapper rail habitat, the proposed prescribed fires will not occur during the breeding and molting season so no young or flightless adults would be at risk. During the non-breeding season, adults are able to fly and escape a localized fire.

5. Adjacent to clapper rail habitat, BLM will take measures to ensure that fire management activities do not affect clapper rail habitat.

Bald eagle

After reviewing the status of the bald eagle, the environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the bald eagle. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions, as well as to nesting and roosting areas.

2. The long-term effects of fire suppression may be beneficial by reducing acreage of riparian and upland habitat destroyed by wildfire.

3. The current nest densities in breeding areas on public lands are very low, and it is unlikely that more than one nest would ever be within the vicinity of fire suppression activities at the same time.

Mexican spotted owl

After reviewing the current status of the Mexican spotted owl and its critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Mexican spotted owl or adversely modify or destroy proposed critical habitat. We base our conclusion on the following:

1. Though surveys across BLM-administered lands in Arizona have not been completed in all potential Mexican spotted owl habitats, surveys completed to date have not located resident Mexican spotted owls.

2. The proposed action is intended to protect Mexican spotted owl habitat from damage resulting from a severe crown fire, preserving its use by nesting, dispersing and/or foraging Mexican spotted owls.

Desert pupfish

After reviewing the current status of the desert pupfish and its designated critical habitat, the environmental baseline for the action area, effects of the proposed action on fishes in general and specifically on the desert pupfish, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the desert pupfish. Critical habitat has been designated for this species but none will be affected. We base our conclusion on the following:

2. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat.

3. The desert pupfish is a hardy species able to tolerate wide extremes in environmental conditions. It is highly fecund and thus able to regain prior levels of abundance following perturbations.

4. The risk of catastrophic wildfire within watersheds containing desert pupfish sites will be reduced.

5. Critical habitat is not located in the action area.

Gila topminnow

After reviewing the current status of the Gila topminnow, the environmental baseline for the action area, the effects of the proposed action on fishes in general and specifically on the Gila topminnow, and the cumulative effects, it is our opinion that the action, as proposed, will not jeopardize the continued existence of the Gila topminnow. No critical habitat has been designated; thus none will be affected. We base our conclusion on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat.

2. The Gila topminnow is a hardy species able to tolerate wide extremes in environmental conditions. It is highly fecund and thus able to regain prior levels of abundance following perturbations.

3. The risk of catastrophic wildfire within watersheds containing Gila topminnow sites will be reduced.

Razorback sucker

After reviewing the status of the razorback sucker and its designated critical habitat, the environmental baseline for the action area, effects of the proposed action on fishes in general and specifically on the razorback sucker, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of this species or destroy or adversely modify designated critical habitat. We base our conclusions on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

Virgin River chub

After reviewing the status of the Virgin River chub and its designated critical habitat, the environmental baseline for the action area, effects of the proposed action on fishes in general and specifically on the Virgin River chub, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Virgin River

chub or destroy or adversely modify designated critical habitat. We base our conclusions on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

2. Treatment sizes will be limited during any single year. Vegetation removed during prescribed fire or mechanical or chemical treatments will not impact large portions of the Virgin River watershed and, with conservation measures applied, are not expected to significantly affect water quality or flows to impact the Virgin River chub or its critical habitat.

Woundfin

After reviewing the status of the woundfin and its designated critical habitat, the environmental baseline for the action area, effects of the proposed action on fishes in general and specifically on the woundfin, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the woundfin or cause destruction or adverse modification of designated critical habitat. We base our conclusions on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

2. Treatment sizes will be limited during any single year. Vegetation removed during prescribed fire or mechanical or chemical treatments will not impact large portions of the Virgin River watershed and, with conservation measures applied, are not expected to significantly affect water quality or flows to impact the woundfin or its critical habitat.

Yaqui chub

After reviewing the current status of the Yaqui chub, the environmental baseline for the action area, the effects of the proposed action on fishes in general and specifically on the Yaqui chub, and the cumulative effects, it is our opinion that the action, as proposed, will not jeopardize the continued existence of the Yaqui chub. Critical habitat for this species has been designated at the San Bernardino NWR. The proposed action will not affect that area; therefore no destruction or adverse modification of that critical habitat is anticipated. We base our conclusion on the following:

1. Wildland fire use, prescribed fire, and mechanical and chemical treatments are not proposed within the Leslie Creek watershed.

2. Conservation measures (Appendix B) will be implemented to minimize effects from fire suppression activities to watersheds as well as riparian and aquatic habitat.

3. The probability that wildfire suppression will be applied to lands in the watersheds including Yaqui chub habitat is low. The risk of elevated runoff attributable to fire suppression and significantly reducing water quality is also low.

Yaqui topminnow

After reviewing the current status of the Yaqui topminnow, the environmental baseline for the action area, the effects of the proposed action on fishes in general and specifically on the Yaqui topminnow, and the cumulative effects, it is our opinion that the action, as proposed, will not jeopardize the continued existence of the Yaqui topminnow. No critical habitat has been designated for this species; therefore none will be affected. We base our conclusion on the following:

1. Wildland fire use, prescribed fire, and mechanical and chemical treatments are not proposed within the Leslie Creek watershed.

2. Conservation measures (Appendix B) will be implemented to minimize effects from fire suppression activities to watersheds as well as riparian and aquatic habitat.

3. The probability that wildfire suppression will be applied to lands in the watersheds including Yaqui topminnow habitat is low. The risk of elevated runoff attributable to fire suppression and significantly reducing water quality is also low.

Little Colorado spinedace

After reviewing the status of the Little Colorado spinedace and its designated critical habitat, the environmental baseline for the action area, effects of the proposed action on fishes in general and specifically on the Little Colorado spinedace, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Little Colorado spinedace or destroy or adversely modify critical habitat. We base our conclusion on the following:

1. No wildland fire use, vegetation removal, or prescribed burning will occur in Little Colorado spinedace habitat or designated critical habitat.

2. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

Loach minnow

After reviewing the current status of the loach minnow and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action on fishes in general and specifically on the loach minnow, and the cumulative effects, it is our opinion that the action, as proposed, will not jeopardize the continued existence of the loach minnow or adversely modify critical habitat. We base our conclusion on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

2. Since water from Aravaipa Canyon will not be used during fire suppression activities, there will be no effects from water drafting to loach minnow.

3. Loach minnow occupy only one site, the Aravaipa Canyon Wilderness, on BLM-administered lands. Natural fire occurrence is low due to predominance of Sonoran Desert vegetation within the canyon. Human-caused fires are also unlikely since access into the canyon is controlled by the BLM.

4. Prescribed fires are not proposed within Aravaipa Canyon. Vegetative buffers will be used to protect drainages flowing into the canyon during prescribed burns on the rim.

Spikedace

After reviewing the current status of the spikedace and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action on fishes in general and specifically on the spikedace, and the cumulative effects, it is our opinion that the action, as proposed, will not jeopardize the continued existence of the spikedace or adversely modify critical habitat. We base our conclusion on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat from fire suppression actions.

2. Since water from Aravaipa Canyon will not be used during fire suppression activities, there will be no effects from water drafting to spikedace.

3. Spikedace occupy only one site, the Aravaipa Canyon Wilderness, on BLM-administered lands. Natural fire occurrence is low due to predominance of Sonoran Desert vegetation within the canyon. Human-caused fires are also unlikely since access into the canyon is controlled by the BLM.

4. Prescribed fires are not proposed within Aravaipa Canyon. Vegetative buffers will be used to protect drainages flowing into the canyon during prescribed burns on the rim.

Arizona cliffrose

After reviewing the current status of the Arizona cliffrose, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Arizona cliffrose. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The majority of the BLM plant populations, from a limited monitoring program conducted by the BLM, show stable population trends.

2. Future cumulative effects that could adversely affect some of the plant populations on non-BLM lands include development, unrestricted off-road vehicle use, mining, and sand and gravel operations.

3. The BLM is committed to avoiding the known populations of Arizona cliffrose while conducting fire suppression activities in the area of these plant populations. We anticipate that the effect from suppression activities will be minor because the vegetation type where these plant populations are found is not fire prone; therefore the likelihood of suppression activities occurring near these populations is very low.

4. Because the vegetation community in which this plant occurs is not fire-adapted, the BLM will not use wildland fire or prescribed fire in habitats supporting this species. BLM will also not use any mechanical or chemical treatments in these areas.

Brady pincushion cactus

After reviewing the current status of the Brady pincushion cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Brady pincushion cactus. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The majority of the BLM plant populations, from a limited monitoring program conducted by the BLM, show stable population trends.

2. Future cumulative effects that could adversely affect some of the plant populations on non-BLM lands include development, unrestricted off-road vehicle use, mining, and sand and gravel operations.

3. The BLM is committed to avoiding the known populations of Brady pincushion while conducting fire suppression activities in the area of these plant populations. We anticipate that the effect from suppression activities will be minor because the vegetation type where these plant populations are found are not fire prone; therefore the likelihood of suppression activities occurring near these populations is very low.

4. Because the vegetation community in which this plant occurs is not fire-adapted, the BLM will not use wildland fire or prescribed fire in habitats supporting this species. BLM will also not use any mechanical or chemical treatments in these areas.

Holmgren milk-vetch

After reviewing the current status of the Holmgren milk-vetch, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of

Holmgren milk-vetch. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The majority of the BLM plant populations, from a limited monitoring program conducted by the BLM, show stable population trends.

2. Future cumulative effects that could adversely affect some of the plant populations on non-BLM lands include development, unrestricted off-road vehicle use, mining, and sand and gravel operations.

3. The BLM is committed to avoiding the known populations of Holmgren milk-vetch while conducting fire suppression activities in the area of these plant populations. We anticipate that the effect from suppression activities will be minor because the vegetation type where these plant populations are found are not fire prone; therefore the likelihood of suppression activities occurring near these populations is very low.

4. Because the vegetation community in which this plant occurs is not fire-adapted, the BLM will not use wildland fire or prescribed fire in habitats supporting this species. BLM will also not use any mechanical or chemical treatments in these areas.

Jones cycladenia

After reviewing the current status of the Jones cycladenia, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Jones cycladenia. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The majority of the BLM plant populations, from a limited monitoring program conducted by the BLM, show stable population trends.

2. Future cumulative effects that could adversely affect some of the plant populations on non-BLM lands include development, unrestricted off-road vehicle use, mining, and sand and gravel operations.

3. The BLM is committed to avoiding the known populations of Jones cycladenia while conducting fire suppression activities in the area of these plant populations. We anticipate that the effect from suppression activities will be minor because the vegetation type where these plant populations are found are not fire prone; therefore the likelihood of suppression activities occurring near these populations is very low.

4. Because the vegetation community in which this plant occurs is not fire-adapted, the BLM will not use wildland fire or prescribed fire in habitats supporting this species. BLM will also not use any mechanical or chemical treatments in these areas.

Nichol Turk's head cactus

After reviewing the current status of the Nichol Turk's head cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Nichols Turk's head cactus. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The majority of the BLM plant populations, from a limited monitoring program conducted by the BLM, show stable population trends.

2. Future cumulative effects that could adversely affect some of the plant populations on non-BLM lands include development, unrestricted off-road vehicle use, mining, and sand and gravel operations.

3. The BLM is committed to avoiding the known populations of Nichol Turk's head cactus while conducting fire suppression activities in the area of these plant populations. We anticipate that the effect from suppression activities will be minor because the vegetation type where these plant populations are found are not fire prone; therefore the likelihood of suppression activities occurring near these populations is very low.

4. Because the vegetation community in which this plant occurs is not fire-adapted, the BLM will not use wildland fire or prescribed fire in habitats supporting this species. BLM will also not use any mechanical or chemical treatments in these areas.

Peebles Navajo cactus

After reviewing the current status of the Peebles Navajo cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Peebles Navajo cactus. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The majority of the BLM plant populations, from a limited monitoring program conducted by the BLM, show stable population trends.

2. Future cumulative effects that could adversely affect some of the plant populations on non-BLM lands include development, unrestricted off-road vehicle use, mining, and sand and gravel operations.

3. The BLM is committed to avoiding the known populations of Peebles Navajo cactus while conducting fire suppression activities in the area of these plant populations. We anticipate that the effect from suppression activities will be minor because the vegetation type where these plant populations are found are not fire prone; therefore the likelihood of suppression activities occurring near these populations is very low.

4. The BLM will not use wildland fire or prescribed fire in habitats supporting this species. BLM will also not use any mechanical or chemical treatments in these areas.

Pima pineapple cactus

After reviewing the current status of the Pima pineapple cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Pima pineapple cactus. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The status of Pima pineapple cactus on BLM lands is not known because there are no monitoring plans in place. Potential habitat has been delineated, so fire conservation measures can be applied to those locations. Due to the scattered nature and paucity of BLM parcels (compared to State and private lands) within Pima pineapple cactus' known range, we anticipate that the effects from this action will be minor.

2. Future cumulative effects to Pima pineapple cactus that could adversely affect some of the plant populations on non-BLM lands include urban development, improper livestock grazing, and ongoing and future trails and trash dumping associated with undocumented aliens, which also often result in the invasion of non-native species.

3. The BLM has committed to mapping potential habitat and known locations of Pima pineapple cactus and avoiding these areas during fire suppression. Direct effects will be minimized by placing 100-meter buffers around known plants and populations and avoiding these areas with equipment and personnel. We anticipate that a few individual plants may be affected, but given the overall status of the species, we feel that it will not jeopardize the continued existence of any of this species.

4. The BLM will not use wildland fire or prescribed fire in habitats supporting Pima pineapple cactus. The BLM has chosen not to burn in Sonoran desert grassland habitat that supports Pima pineapple cactus because of the potential to burn, and possibly kill, Pima pineapple cactus. BLM will also not use any mechanical or chemical treatments in habitats supporting this species.

Kearney's blue star

After reviewing the current status of the Kearney's blue star, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Kearney's blue star. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The status of Kearney's blue star seems secure, given that are few threats due to its remote location.

2. The BLM is committed to mapping potential habitat and known locations of Kearney's blue star and avoiding these areas during fire suppression. Direct effects will be minimized by placing 100-meter buffers around known plants and populations and avoiding these areas with equipment and personnel. We anticipate that a few individuals plants may be affected, but given the overall status of the species, we feel that it will not jeopardize the continued existence of the species.

3. Because the vegetation community in which this plant occurs is not fire-adapted, the BLM will not use wildland fire or prescribed fire in habitats supporting Kearney's blue star. The BLM will also not use any mechanical or chemical treatments in habitats supporting this species.

Siler pincushion cactus

After reviewing the current status of the Siler pincushion cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Siler pincushion cactus. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The status of Siler pincushion habitat, from a limited monitoring program conducted by the BLM, shows stable population trends.

2. Future cumulative effects to Siler pincushion cactus that could adversely affect some of the plant populations on non-BLM lands include urban development, and improper livestock grazing.

3. The BLM is committed to mapping potential habitat and known locations of Siler pincushion cactus and avoiding these areas during fire suppression. Direct effects will be minimized by placing 100-meter buffers around known plants and populations and avoiding these areas with equipment and personnel. We anticipate that a few individual plants may be affected, but given the overall status of the species, we feel that it will not jeopardize the continued existence of any of this species.

4. BLM will not use any mechanical or chemical treatments in habitat supporting Siler pincushion cactus.

Huachuca water umbel

After reviewing the current status of Huachuca water umbel and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the actions, as proposed, is not likely to jeopardize the continued existence of Huachuca water umbel or adversely modify critical habitat. We base our conclusions on the following:

1. Based on limited monitoring information, Huachuca water umbel populations in the action area are stable, and are on an upward trend.

2. Cumulative effects include water withdrawals for development in Sierra Vista and surrounding communities.

3. The BLM is proposing to protect the known locations and critical habitat for this species. It is anticipated that direct effects to plants and critical habitat will be localized and minimal. A few plants may be affected by suppression activities, but the overall density of Huachuca water umbel in the action area should not be greatly reduced by the proposed action. The effects to critical habitat should be temporary in nature and localized.

Hualapai Mexican vole

After reviewing the current status of Hualapai Mexican vole, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Hualapai Mexican vole. No critical habitat has been designated for this species; therefore, none will be affected. We base our conclusion on the following:

1. The amount of Hualapai Mexican vole habitat anticipated to be affected by the proposed action is not expected to have a significant effect on the species' overall numbers, distribution, or reproductive potential.

2. The direct and indirect impacts of the proposed action have been minimized through project conservation measures.

3. The proposed use of wildland fire use and prescribed fire is likely to increase the amount of suitable habitat within the subspecies' range within 2 to 4 years after treatment and is likely to reduce the potential for severe, stand-altering wildfires.

Lesser long-nosed bat

After reviewing the current status of the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the lesser long-nosed bat. No critical habitat has been designated for this species; thus, none will be affected. We base our conclusion on the following:

1. The proposed action is not anticipated to affect any roost sites or maternity roosts.

2. BLM's implementation of conservation measures (Appendix B) is expected to greatly reduce fire effects to bat food sources.

3. In the short-term, some bat food sources (agaves) are expected to be damaged or destroyed due to the proposed actions, including backburning, trail or road building, or burning (in light fire prescriptions). That loss is anticipated to be 20 percent or less of these plants in bat foraging habitats.

4. In the long-term, bat food sources are expected to benefit from the proposed action, which should reduce the likelihood of catastrophic wildfires within bat foraging habitats.

Desert tortoise, Mojave population

After reviewing the current status of the desert tortoise and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the desert tortoise, nor destroy or adversely or adversely modify critical habitat.

1. All proposed fire suppression and fire management activities that may lead to take of the desert tortoise have conservation measures (Appendix B) included that should minimize adverse effects to the species.

1. Fire suppression and fire management activities, as proposed, will help prevent degradation and loss of desert tortoise suitable, occupied, and critical habitat.

New Mexico ridge-nosed rattlesnake

After reviewing the current status of the New Mexico ridge-nosed rattlesnake, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the New Mexico ridge-nosed rattlesnake and is not likely to destroy or adversely modify designated critical habitat. Critical habitat for this subspecies has been designated in the Animas Mountains; however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated. We base our conclusion on the following:

1. Populations of the subspecies currently known to exist are located in the higher elevations of Forest Service-administered lands, not on BLM-administered lands.

2. We expect that short-term effects will be minimized by implementing the general and species-specific conservation measures (Appendix B) included in the proposed action.

3. Long-term effects are expected to aid in improving rattlesnake suitable habitat and the subspecies' prey base, in addition to reducing the risk of catastrophic fire.

Gila chub

After reviewing the current status of the Gila chub and its proposed critical habitat, the environmental baseline for the action area, the effects of the proposed action on fishes in general and specifically on the Gila chub, and the cumulative effects, it is our opinion that the action, as proposed, action will not jeopardize the continued existence of the Gila chub, and will not destroy or adversely modify proposed critical habitat. We base our conclusions on the following:

1. Conservation measures (Appendix B) will be implemented to minimize effects to riparian and aquatic habitat.

2. The risk of catastrophic wildfire within watersheds containing Gila chub sites will be reduced.

INCIDENTAL TAKE STATEMENT

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

The measures described below are non-discretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. If this conference opinion for Gila chub is adopted as a biological opinion following listing, these measures, with their implementing terms and conditions, will also be nondiscretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to any applicants, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take Statement. If the BLM fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the BLM must report the progress of the action and its impact on the species to the FWS as specified in the incidental take Statement [50 CFR §402.14(i)(3)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally-listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE

The BLM Arizona Statewide LUP Amendment for Fire, Fuels, and Air Quality Management consists of programmatic standards, requirements, and guidelines for wildland fire management and fuels reduction treatments. This plan includes mandatory standards and recommended guidance to minimize effects to listed and proposed species and their habitats. The BE States that under this guidance, actions that adversely affect 32 listed or proposed species may occur. The level of these adverse effects to individuals of some of these species is expected to rise to the level of take. However, implementing the general and species-specific conservation measures (Appendix B) will greatly limit these adverse effects.

BLM proposes two general forms of fire and fuels management activities in this LUP amendment, those whose locations and details cannot be planned in advance (fire suppression actions in response to a wildfire) and those that can be planned in advance (wildland fire use, prescribed fire, and mechanical and chemical treatments). We anticipate that incidental take of some species may occur from one or both of these forms of activities.

For those species for which we anticipate incidental take could occur, we are exempting take related to fire suppression actions in this opinion. Although the specific location of future wildfires and their consequent fire suppression actions cannot be predicted, based on fire history information and the frequency of natural fire regimes, the likelihood of wildfires occurring in an area can be reasonably foreseen.

BLM has projected acres to be managed for wildland fire use and treated using prescribed fire and mechanical and chemical methods within habitats of listed and proposed species (Appendix C). However, because of the broad scale of this planning effort, site-specific locations for these projects and wildland fire use activities have not been identified. These potential projects and activities will be designed to fit within the standards, requirements, and guidelines developed for this program, and will require future review and documentation. The effects analysis has been conducted at this broad, programmatic scale, and the results are used here to identify the maximum extent of incidental take that may result from the implementation of BLM's program. However, the exact incidental take that will occur to individuals of some species is not known at this time, so we are unable to exempt take related to fire and fuels management treatments (prescribed fire, wildland fire use, and mechanical and chemical treatments) in this opinion. The incidental take exemption associated with these projects will be provided when BLM identifies the specific locations and provides project descriptions during future site-specific consultations for these actions. Further direction on these site-specific consultations is included in Appendix E.

A summary of anticipated incidental take is presented in Table 9.

Chiricahua leopard frog

Fire Suppression

We anticipate that incidental take of Chiricahua leopard frogs could occur as a result of fire suppression actions. The effects resulting in take are reasonably certain to occur where the Chiricahua leopard frog occurs on or near BLM lands where fire suppression may occur, including Cienega Creek/Empire Cienega, Guadalupe Canyon-Peloncillo Mountains, and Leslie Canyon. The incidental take is expected to be in the form of harassment, harm, or mortality resulting from:

1. Use of frog-occupied water sources in fighting wildfires, resulting in direct mortality to frogs or spread of nonnative organisms or chytrid fungus.

2. Increased silt reaching streams due to erosion from the loss of riparian and upland vegetation due to fire suppression actions such as backburns and construction of hand or bulldozer lines or other potential effects as noted in this opinion.

3. Any post-fire salvage conducted under the Terms and Conditions, below.

We anticipate Chiricahua leopard frogs could be taken at one of the three sites notes above, without extirpation, as a result of suppression actions. We anticipate an undetermined number of Chiricahua leopard forgs could also be taken during emergency salvage operations. The authorized level of incidental take of Chiricahua leopard frogs from emergency salvage operations will not be considered to be exceeded if salvage is conducted in accordance with the protocol developed for this species.

Fire Management Treatments

We do not anticipate wildland fire use, prescribed fire, or mechanical or chemical treatments could result in incidental take of Chiricahua leopard frogs because the conservation measures are expected to be effective in preventing such take from occurring.

Effects from the proposed project and any incidental take at locations other than the three sites noted above have not been considered in this opinion. If Chiricahua leopard frogs are found in areas other than Cienega Creek/Empire Cienega, Guadalupe Canyon-Peloncillo Mountains, and Leslie Canyon that may be affected by the proposed action, BLM should reinitiate consultation.

Cactus ferruginous pygmy-owl

Fire Suppression and Fire Management Treatments

We do not anticipate that incidental take of the pygmy-owl will occur.

We will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified hereinches.

California condor

Fire Suppression, Wildland Fire Use and Prescribed Fire

We anticipate that incidental take of California condors could occur as a result of fire suppression, wildland fire use, or prescribed fire. Because all the condors that occur in the project area are known and are monitored on a daily basis, determining take (particularly death, harm, or harassment through disturbance of behavior) of individuals will be relatively straightforward. Therefore, we expect that the death or injury of one condor as a result of the project will be detectable. In addition, the take of even one individual would represent a significant loss to recovery of California condors. Any project that is likely to result in incidental take of condors should be immediately reevaluated if or when such take occurs. If death or injury of one individual, or disturbance of one nest site occurs as a result of these projects, reinitiation of consultation on the proposed action will be required.

We anticipate that one California condor could be taken as a result of the propsed actions. The incidental take is expected to be in the form of harassment, injury, or death resulting from interaction with humans during fire activities on the ground, collision with aircraft activity associated with fire actions, or inundation of a nest site by smoke, altering behavior to significantly affect breeding, feeding, and sheltering.

Mechanical and Chemical Treatments

We do not anticipate that mechanical or chemical treatments could result in incidental take of California condors.

We will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified hereinches.

Southwestern willow flycatcher

Fire Suppression

BLM has proposed fire suppression actions that, when wildfires occur, are expected to reduce the overall adverse effects to southwestern willow flycatchers and their habitat. Although we are unable to determine where or when incidental take of southwestern willow flycatchers could occur as a result of fire suppression actions, take as a result of these actions has occurred in the

past. We anticipate that the take of southwestern willow flycatchers will be difficult to detect because finding a dead or impaired specimen is unlikely. Survey data may not be available prior to a wildfire ignition; however, locations of existing territories on or adjacent to BLM land are known. The level of incidental take can be anticipated by the loss of essential elements in the habitat and long-term disturbance that may affect the reproductive success and survival of the southwestern willow flycatcher within the project area. The average number of pairs per site within the Middle Gila/San Pedro MU, where territories on BLM-administered land were found in 2004, is 5.2. Fire suppression actions within one habitat site would likely remove all habitat within the site and/or disturb all birds within the site. We anticipate that five pairs (ten southwestern willow flycatchers) and their eggs and young could be taken as a result of the proposed action. The incidental take is expected to be in the form of harassment, harm, and mortality resulting from:

1. Harassment through long-term disturbance from fire suppression actions in occupied southwestern willow flycatcher habitat associated with the proposed action. Southwestern willow flycatchers present during fire suppression actions would be directly impacted, resulting in disrupted reproduction, and/or loss of habitat that provides for the essential elements of survival.

2. Harm through the loss of southwestern willow flycatcher nesting habitat due to temporary habitat loss that may result from backburning, bulldozing, aircraft use, and/or water drops during fire suppression that remove southwestern willow flycatcher habitat components (multi-storied canopy, dense vegetation) to the extent that the habitat patch is no longer suitable for nesting by southwestern willow flycatchers.

3. Mortality of southwestern willow flycatcher eggs or young in nests from fire suppression actions in occupied southwestern willow flycatcher habitat.

Fire Management Treatments

We do not anticipate that wildland fire use, prescribed fire, or mechanical or chemical treatments of salt cedar could result in incidental take of southwestern willow flycatchers. These treatments are not planned in occupied southwestern willow flycatcher habitat.

This level of anticipated take is based on BLM's proposal to not treat suitable/occupied habitat and may change in the future if currently unsuitable habitat develops into suitable habitat and becomes occupied by southwestern willow flycatchers. We recommend reinitiation of consultation if projects are proposed in suitable/occupied habitat.

We will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified hereinches.

Yuma clapper rail

Fire Suppression

We do not anticipate that fire suppression actions could result in incidental take of Yuma clapper rails. Because of the nature of the fire suppression actions that would be taken in and around marsh habitats, the suppression actions themselves would not result in a loss of habitat for the Yuma clapper rail. Any disturbance to individual clapper rails from fire suppression actions would not be measurable.

Fire Management Treatments

We anticipate that incidental take of Yuma clapper rails could occur as a result of prescribed fire. We anticipate this incidental take will be difficult to detect because specific project areas have not been identified, the species is secretive, it occurs in dense vegetation unsafe to access during a fire, and dead or impaired birds would not likely be found following a fire. BLM proposes using prescribed fire within 100 acres of Yuma clapper rail habitat during the course of this plan (Appendix C). Prescribed burns will not take place during the breeding/molting season (conservation measure CR-2), so there would be no direct loss of birds. Take of this species can be anticipated by loss of 100 acres of habitat to prescribed burns within a two-year period. Pre-project surveys are part of the proposed action (conservation measure FT-3). The amount of harassment can also be quantified based on the number of birds detected during these pre-project surveys. This will be the level of take due to harassment anticipated as a result of each site-specific project, and will be determined during site-specific consultation for these projects. The incidental take is anticipated to be in the form of harassment resulting from temporary loss of habitat from prescribed burns, resulting in loss of cover and food in the burned area for up to two years.

We do not anticipate wildland fire use or mechanical or chemical treatments could result in incidental take of Yuma clapper rails because the conservation measures are expected to be effective in preventing such take from occurring.

We will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified hereinches

Bald eagle

Fire Suppression

We do not anticipate fire suppression could result in incidental take of bald eagles because the conservation measures are expected to be effective in preventing such take from occurring. These measures will minimize disturbance at nest and roost sites, and prevent damage to trees used for nesting and roosting.

Fire Management Treatments

We do not anticipate wildland fire use, prescribed fire, or mechanical or chemical treatments could result in incidental take of bald eagles because the conservation measures are expected to be effective in preventing such take from occurring.

We will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified hereinches

Mexican spotted owl

Fire Suppression and Fire and Fuels Management Treatments

We anticipate that incidental take of MSO could occur as a result of fire suppression, wildland fire use, prescribed fire, and mechanical treatments. We anticipate that the take of MSOs will be difficult to detect because finding a dead or impaired specimen is unlikely, especially due to the remote nature of most of the MSO habitat in the action area. However, the level of incidental take can be anticipated by the loss of essential elements in the habitat and long-term disturbance that may affect the reproductive success and survival of the MSO within the project area. We anticipate that two MSO (one pair) could be taken as a result of the proposed action. The incidental take is expected to be in the form of harm and harassment resulting from:

1. Harm through long-term disturbance from actions in unsurveyed MSO habitat associated with the proposed action. Unknown MSO may be present during wildland fire use, mechanical treatments, prescribed fire and/or suppression actions, which may result in direct impacts to owls, disrupted reproduction and/or the ability of the habitat to provide for essential elements of survival for resident MSO.

2. Harm through the reduction of MSO nesting and roosting habitat due to temporary habitat loss that may result from mechanical thinning, prescribed or wildland fire, and/or fire suppression actions that result in the removal of MSO habitat components (multi-storied canopy, coarse woody debris, snags) to the extent that at least near-term survival of MSO within that habitat is not likely.

3. Harassment through the reduction of the habitat suitability for prey species, thus limiting the availability of prey for owls. Habitat suitability will be decreased through the loss of coarse woody debris and herbaceous vegetation following prescribed fires. These actions could impair the ability of MSO to survive and/or successfully raise young.

We will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in

compliance with the terms and conditions (including amount and/or number) specified hereinches

Desert pupfish

Fire Suppression

We anticipate that incidental take of desert pupfish could occur as a result of fire suppression actions. We anticipate that any take of desert pupfish will be difficult to detect and quantify for a number of reasons: they have a small body size, they are relatively secretive, and they occur in remote sites unsafe to access during or following fire. Accordingly, we are quantifying take incidental to fire suppression in terms of the discrete desert pupfish population likely to be affected at each occupied site. Take would be primarily in the form of:

1. Injury to the species from the increased runoff in backfired areas or hand and bulldozer lines, and/or areas burned due to discretionary, safety- and tactic-based decisions against direct-attack, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

The authorized level of incidental take of desert pupfish from fire suppression actions will be exceeded if the effects of fire suppression result in significant changes to temperature, pH, dissolved oxygen, total dissolved solids, and/or turbidity due to suppression efforts, and subsequent comprehensive surveys for desert pupfish within known occupied drainages within one year after fire suppression activities have taken place fail to document the species, indicating the extirpation of a population has occurred. We anticipate an undetermined number of desert pupfish could also be taken during emergency salvage operations. The authorized level of incidental take of desert pupfish from emergency salvage operations will not be considered to be exceeded if salvage is conducted in accordance with the protocol developed for this species.

Fire Management Treatments

We anticipate that incidental take of desert pupfish could occur as a result of prescribed fire. There are currently two occupied sites within the action area, both of which could be affected by prescribed fire during the 10-year implementation period for the LUP amendment. We anticipate that any take of desert pupfish will be difficult to detect and quantify for a number of reasons: they have a small body size, they are relatively secretive, and they occur in remote sites unsafe to access during or following fire. Accordingly, we are quantifying take incidental to prescribed burning in terms of the discrete desert pupfish population likely to be affected at each occupied site. Take would be primarily in the form of:

1. Injury to the species from the increased runoff in burned areas, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

The level of take is defined by BLM's proposed prescribed fire rotation in the watersheds for these sites: up to one-half of the watershed of each desert pupfish natural or reintroduction site may be burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments will occur at greater than two-year intervals (Appendix B: conservation measure DP-2), with no more than a total of approximately 5,000 acres of prescribed fire near desert pupfish habitat (Appendix C). We thus anticipate that desert pupfish inhabiting either of the two sites could be incidentally taken by the direct and indirect effects of prescribed fire, with individual fishes experiencing effects ranging from harassment to mortality, on two occasions during the 10-year term of the LUP.

We do not anticipate wildland fire use or mechanical or chemical treatments could result in incidental take because these actions are not planned in the watersheds where this species occurs.

Gila topminnow

The incidental take of Gila topminnow associated with all management actions, including fire management, within the Las Cienegas NCA (Cienega Creek and Empire Gulch population sites) was already authorized within our October 4, 2002, *Las Cienegas NCA Resource Management Plan Biological Opinion*. This incidental take Statement pertains to all other BLM-administered lands in the action area.

<u>Fire Suppression</u>

We anticipate that incidental take of Gila topminnow could occur as a result of fire suppression actions. We anticipate that any take of Gila topminnow will be difficult to detect and quantify for a number of reasons: they have a small body size; they are relatively secretive; and they occur in remote sites unsafe to access during or following fire. Accordingly, we are quantifying take incidental to fire suppression in terms of the discrete Gila topminnow population likely to be affected at each occupied site. Take would be primarily in the form of:

1. Injury to the species from the increased runoff in backfired areas or hand and bulldozer lines, and/or areas burned due to discretionary, safety- and tactic-based decisions against direct-attack, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

The authorized level of incidental take of Gila topminnow from fire suppression actions will be exceeded if the effects of fire suppression result in significant changes to temperature, pH, dissolved oxygen, total dissolved solids, and/or turbidity due to suppression efforts, and subsequent comprehensive surveys for Gila topminnow within known occupied drainages within one year after fire suppression activities have taken place fail to document the species, indicating the extirpation of a population has occurred. We anticipate an undetermined number of Gila topminnow could also be taken during emergency salvage operations. The authorized level of incidental take of Gila topminnow from emergency salvage operations will not be considered to be exceeded if salvage is conducted in accordance with the protocol developed for this species.

Fire Management Treatments

We anticipate that incidental take of Gila topminnow could occur as a result of prescribed fire. There are currently seven occupied sites within the action area, any of which could be affected by prescribed fire during the 10-year implementation period for the LUP amendment. We anticipate that any take of Gila topminnow will be difficult to detect and quantify for a number of reasons: they have a small body size; they are relatively secretive; and they occur in remote sites unsafe to access during or following fire. Accordingly, we are quantifying take incidental to prescribed burning in terms of the discrete Gila topminnow population likely to be affected at each occupied site. Take would be primarily in the form of:

1. Injury to the species from the increased runoff in burned areas, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

The level of take is defined by BLM's proposed prescribed fire rotation in the watersheds for these sites: up to one-half of the watershed of each Gila topminnow natural or reintroduction site may be burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments will occur at greater than two-year intervals (Appendix B: conservation measure GT-2), with no more than a total of approximately 5,000 acres of prescribed fire near Gila topminnow habitat (Appendix C). We thus anticipate that Gila topminnow inhabiting any of the seven sites could be incidentally taken by the direct and indirect effects of prescribed fire, with individual fishes experiencing effects ranging from harassment to mortality, on two occasions during the 10-year term of the LUP.

We do not anticipate that wildland fire use or mechanical or chemical treatments could result in incidental take because these actions are not planned in the watersheds where this species occurs.

This program-level amount of incidental take does not supercede and is not in addition to that already authorized in our October 4, 2002 biological opinion on management of the Las Cienegas NCA (02-21-02-F-0162).

Razorback sucker

Fire Suppression

We anticipate that incidental take of razorback suckers could occur as a result of fire suppression actions. We anticipate that all the spawning areas within backwaters, or along the river channel or lake shore subject to fireboat activity for fire suppression could be disturbed during each wildfire event, during the period January through June, resulting in a temporary disruption of the spawning activity. The incidental take is expected to be in the form of harassment resulting from fireboats accessing shorelines through active spawning areas. We do not anticipate this take to rise to the level of physical injury or mortality.

Fire and Fuels Management Treatments

We do not anticipate that wildland fire use, prescribed fire, or mechanical or chemical treatments could result in incidental take of razorback suckers.

Virgin River chub

Fire Suppression

We anticipate that incidental take of Virgin River chub could occur as a result of fire suppression actions. We anticipate that take will be difficult to detect and quantify because dead fish would be difficult to find. We anticipate that take could occur in the form of water drafting at up to two pools of deep water within the same reach of the Virgin River, per wildfire incident. The incidental take is expected to be in the form of harassment from or injury to fish in a pool, or mortality of fish pumped from pools and spayed onto a fire.

Drafting would likely remove or disturb all chub the first time that it is used; therefore, drafting may continue from the same pool for the duration of the suppression activity without further take of chub.

Fire and Fuels Management Treatments

We do not anticipate that implementation of prescribed fires or mechanical or chemical treatments will result in incidental take of Virgin River chub.

Woundfin

Fire Suppression

We do not anticipate that fire suppression activities could result in incidental take of woundfinches

Fire and Fuels Management Treatments

We do not anticipate that implementation of prescribed fires or mechanical or chemical treatments could result in incidental take of woundfinches

Yaqui chub

Fire Suppression

We anticipate incidental take of Yaqui chub could occur as a result of fire suppression. We anticipate that up to 25 percent of a given year's population of Yaqui chub could be incidentally taken due to the indirect effects of fire suppression at any time during the 10-year term of the LUP amendment. The actual number of individuals taken as a result of fire suppression actions may vary based on annual variation in climatic and hydrologic conditions, and will be determined from Refuge-wide surveys. The incidental take is expected to be in the form of:

1. Injury to the species from the increased runoff in backfired areas or hand and bulldozer lines, and/or areas burned due to discretionary, safety- and tactic-based decisions against direct-attack, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

Fire Management Treatments

We do not anticipate that the proposed fire management treatments could result in the incidental take of Yaqui chub because no treatments are proposed in the watersheds containing this species.

Yaqui topminnow

Fire Suppression

We anticipate incidental take of Yaqui topminnow could occur as a result of fire suppression. We anticipate that up to 25 percent of a given year's population of Yaqui topminnow could be incidentally taken due to the indirect effects of fire suppression at any time during the 10-year term of the LUP amendment. The actual number of individuals taken as a result of fire suppression actions may vary based on annual variation in climatic and hydrologic conditions, and will be determined from Refuge-wide surveys. The incidental take is expected to be in the form of:

1. Injury to the species from the increased runoff in backfired areas or hand and bulldozer lines, and/or areas burned due to discretionary, safety- and tactic-based decisions against direct-attack, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

Fire and Fuels Management Treatments

We do not anticipate that the proposed fire management treatments could result in the incidental take of Yaqui topminnow because no treatments are proposed in the watersheds containing this species.

Little Colorado spinedace

Fire Suppression and Fire and Fuels Management Treatments

We do not anticipate that the proposed action could result in incidental take of Little Colorado spinedace. Currently, we cannot be reasonably certain that the species occurs in areas that may be directly or indirectly impacted by wildfire suppression actions on or adjacent to BLM-administered lands. However, the status of this species is tenuous. If the BLM or FWS locates spinedace in areas adjacent to or downstream from areas that BLM wildfire suppression actions may affect, this determination may change, and we recommend reinitiating consultation.

Loach minnow

Fire Suppression

We do not anticipate that fire suppression actions could result in incidental take of loach minnow because conservation measures are expected to be effective in preventing such take from occurring.

Fire Management Treatments

We do not anticipate that prescribed fires could result in incidental take of loach minnow. Prescribed fires may be conducted on the rim above Aravaipa Canyon, but not within the canyon. Vegetative buffers will be used to protect drainages flowing into the canyon during prescribed burning on the rim.

We do not anticipate that the other proposed fire management treatments could result in the incidental take of loach minnow because no other treatments are proposed in the watersheds containing this species.

Spikedace

Fire Suppression

We do not anticipate that fire suppression activities could result in incidental take of spikedace because conservation measures are expected to be effective in preventing such take from occurring.

Fire Management Treatments

We do anticipate that prescribed fires could result in incidental take of spikedace. Prescribed fires may be conducted on the rim above Aravaipa Canyon, but not within the canyon. Vegetative buffers will be used to protect drainages flowing into the canyon during prescribed burning on the rim.

We do not anticipate that the other proposed fire and fuels management treatments could result in the incidental take of spikedace because no other treatments are proposed in the watersheds containing this species.

Hualapai Mexican vole

Fire Suppression

We anticipate that incidental take of Hualapai Mexican voles could occur as a result of fire suppression actions. We anticipate that the take of voles will be difficult to detect because voles have a small body size; finding a dead or impaired specimen is unlikely; losses may be masked by seasonal fluctuations in numbers or other causes; and the species occurs in habitat that makes detection difficult. We will use suitable or occupied habitat as a surrogate measure of take. The periphery of the overall range is approximately 80,000 acres. However, within that area Hualapai Mexican voles have been captured or observed in 14 separate areas of the Hualapai Mountains. Informal discussions with Bill Boyett (BLM, Kingman Field Office) helped determine the amount of habitat that may be altered due to wildfire suppression actions, based on wildfire history. We anticipate that no more than 50 acres of suitable or occupied habitat will be altered or destroyed due to fire suppression activities during 5-year intervals for the next 10 years. This is a total of 100 acres altered due to fire suppression activities for the life of the LUP amendment. We would not expect the wildfire suppression activity to occur at equal intensity across the range of the species. Instead, in some years there may be more wildfires that require suppression than in other years. Therefore, the amount of anticipated habitat loss is averaged over 5-year intervals to account for the differences in year-to-year variations. The incidental take is expected to be in the form of harassment or injury to voles from fire suppression actions that temporarily result in loss of foraging habitat and cover.

Fire Management Treatments

The Service completed a biological opinion in December 14, 2001 (02-21-01-F-241) for a proposed prescribed burn program within four vegetation communities located on BLM-

administered lands within Mohave and east Yavapai counties in northwestern Arizona, within Kingman Field Office boundaries. That opinion issued a take Statement for fuels treatment activities in Hualapai Mexican vole habitat. The BLM proposes no additional fuels treatment activities in this area, and we anticipate that that opinion covered any incidental take that may occur as the result of prescribed or mechanical treatments within suitable Hualapai Mexican vole habitat. Please refer to that biological opinion for more detailed information.

Lesser long-nosed bat

Fire Suppression, Wildland Fire Use, and Prescribed Fire

We anticipate that incidental take of lesser long-nosed bats could occur as a result of fire suppression, wildland fire use, and prescribed fire. We anticipate this take will be difficult to detect because the species is wide-ranging and finding a dead or impaired specimen is unlikely. However, take of this species can be anticipated by loss of greater than 20 percent of agave and columnar cacti within the fire perimeter due to fire suppression actions, or within the treatment area during any wildland fire use or prescribed fire situation. The incidental take is expected to be in the form of harassment of any foraging lesser-long nosed bats within 0.5 mile of areas that experience fire suppression actions, wildland fire use, or prescribed fire, because even short-term loss of some bat food sources (agaves, saguaros) may alter the feeding behavior and foraging distances of lesser long nosed bats in the action area.

Mechanical and Chemical Treatments

We do not anticipate the mechanical or chemical treatments could incidentally take any lesser long-nosed bats because the conservation measures are expected to be effective in preventing such take from occurring.

Desert tortoise, Mojave population

Fire Suppression

We anticipate that incidental take of desert tortoises could occur as a result of fire suppression. We anticipate that the following take of desert tortoises could occur, with individuals experiencing effects ranging from harassment, harm, injury, and/or mortality, as a result of the fire suppression actions (a tortoise refers to one desert tortoise or one clutch of desert tortoise eggs):

1. Four desert tortoises every two years resulting from the following activities: a) operation of vehicles and equipment; b) development of crew camps, equipment staging areas, and aircraft landing/fueling sites; c) construction of firelines; d) use of retardants; and e) setting of backfires.

2. Ten desert tortoises every five years as a result of moving animals from harm's way during fire suppression activities.

Fire and Fuels Management Treatments

We do not anticipate the proposed wildland fire use, prescribed fire, or vegetation treatments could incidentally take any Mojave desert tortoises. These activities will not be conducted within suitable, occupied, or designated desert tortoise critical habitat.

New Mexico ridge-nosed rattlesnake

Fire Suppression and Fire Management Treatments

We do not anticipate the proposed action could result in incidental take of New Mexico ridge-nosed rattlesnakes because the subspecies typically inhabits higher elevations, and the specimens located to date in the Peloncillo Mountains do not occur on BLM-administered lands.

Gila chub

The incidental take of Gila chub associated with all management actions, including fire management, within the Las Cienegas NCA (Cienega Creek and Empire Gulch population sites) was already authorized within our October 4, 2002 Las Cienegas NCA Resource Management Plan Biological Opinion. Any anticipated take within the Agua Fria National Monument Plan will be authorized in our Agua Fria National Monument Plan Biological Opinion (currently being prepared). This incidental take Statement pertains to all other BLM-administered lands in the action area.

Fire Suppression

We anticipate that incidental take of Gila chub could occur as a result of fire suppression actions. We anticipate that any take of Gila chub will be difficult to detect and quantify for a number of reasons: they have a small body size, they are relatively secretive, and they occur in remote sites unsafe to access during or following fire. Accordingly, we are quantifying take incidental to fire suppression in terms of the discrete Gila chub population likely to be affected at each occupied site. Take would be primarily in the form of:

1. Injury to the species from the increased runoff in backfired areas or hand and bulldozer lines, and/or areas burned due to discretionary, safety- and tactic-based decisions against direct-attack, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2 Mortality of those individuals transported from a site into unsuitable habitat.

3 Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

The authorized level of incidental take of Gila chub from fire suppression actions will be exceeded if the effects of fire suppression result in significant changes to temperature, pH, dissolved oxygen, total dissolved solids, and/or turbidity due to suppression efforts, and

subsequent comprehensive surveys for Gila chub within known occupied drainages within one year after fire suppression activities have taken place fail to document the species, indicating the extirpation of a population has occurred. We anticipate an undetermined number of Gila chub could also be taken during emergency salvage operations. The authorized level of incidental take of Gila chub from emergency salvage operations will not be considered to be exceeded if salvage is conducted in accordance with the protocol developed for this species.

Fire Management Treatments

We anticipate that incidental take of Gila chub could occur as a result of prescribed fire. There are currently 19 occupied sites within the action area, any of which could be affected by prescribed fire during the 10-year implementation period for the LUP amendment. We anticipate that any take of Gila chub will be difficult to detect and quantify for a number of reasons: they have a small body size; they are relatively secretive; and they occur in remote sites unsafe to access during or following fire. Accordingly, we are quantifying take incidental to prescribed burning in terms of the discrete Gila chub population likely to be affected at each occupied site. Take would be primarily in the form of:

1. Injury to the species from the increased runoff in burned areas, resulting in physiological effects of reduced water quality and loss of habitat through sedimentation.

2. Mortality of those individuals transported from a site into unsuitable habitat.

3. Injury or mortality during emergency salvage operations conducted under Conservation Measure FI-1 and the Terms and Conditions, below.

The level of take is defined by BLM's proposed prescribed fire rotation in the watersheds for these sites (same project locations as desert pupfish and Gila topminnow): up to one-half of the watershed of each site may be burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments will occur at greater than two-year intervals (Appendix B: conservation measures DP-2, GT-2), with no more than a total of approximately 5,000 acres of prescribed fire in these watesheds (Appendix C). We thus anticipate that Gila chub inhabiting any of the 19 sites could be incidentally taken by the direct and indirect effects of prescribed fire, with individual fishes experiencing effects ranging from harassment to mortality, on two occasions during the 10-year term of the LUP.

We do not anticipate wildland fire use or mechanical or chemical treatments will result in incidental take because these actions are not planned in the watersheds where this species occurs.

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 Chiricahua leopard frog, cactus ferruginous pygmy-owl, California condor, southwestern willow flycatcher, Yuma clapper rail, bald eagle, Mexican spotted owl, desert pupfish, Gila topminnow, razorback sucker, Virgin River chub, woundfin, Yaqui chub, Yaqui topminnow, Little Colorado spinedace, loach minnow, spikedace, Hualapai

Mexican vole, lesser long-nosed bat, desert tortoise, or New Mexico ridge-nosed rattlesnake; or destruction or adverse modification of critical habitat for razorback sucker, Virgin River chub, woundfin, Little Colorado spinedace, loach minnow, spikedace, desert tortoise, or New Mexico ridge-nosed rattlesnake. Critical habitat has been proposed for the cactus ferruginous pygmy-owl, Mexican spotted owl, and Gila chub, but none will be adversely modified or destroyed.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the BLM 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.

Chiricahua leopard frog

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

2. Minimize effects of injury and mortality of Chiricahua leopard frogs from fire suppression actions.

   A. The BLM shall cooperate with other agencies to develop emergency protocols to decrease impacts of fire suppression on the Chiricahua leopard frog. Emergency protocols shall include appropriate agency contacts, a list of facilities that can hold any salvaged frogs, sources of equipment needed (e.g. sampling gear, trucks), and how to address human health and safety issues.

   B. If incidental take of Chiricahua leopard frogs is likely to occur due to suppression actions, BLM shall cooperate with us and other appropriate agencies to collect and salvage frogs, <u>if collection and salvage operations can be accomplished safely.</u> Salvaged frogs shall be held at a facility approved by us until conditions at the site are once again suitable for the species. BLM shall renovate/restore the population site(s) and aid in the frog's re-entry into the original site(s). If repatriation is not possible due to extreme effects at the site, BLM shall coordinate with us to locate or restore a substitute site. Once conditions are suitable for the frog or a substitute site has been selected, the salvaged frogs shall be reintroduced. BLM shall coordinate the salvage and release with us and AGFD.

   C. If salvage is not a workable option and a frog population site is lost due to fire suppression actions, BLM shall coordinate with FWS to renovate and re-supply the site with genetically similar frogs (if available) in a timely manner post-fire.

3. Monitor affected frog population sites to determine the effects of the fire suppression to Chiricahua leopard frog habitat.

A. The BLM shall monitor frog population sites affected by fire suppression actions for two years post-fire, and send the results of presence/absence and general ecosystem status to the FWS Arizona Ecological Services Field Office, in a brief report, by February of each year.

Cactus ferruginous pygmy-owl

Absent the finding of incidental take of the pygmy-owl, there are no Reasonable and Prudent Measures or Terms and Conditions.

California condor

We determine that the proposed action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of California condors. All reasonable measures to minimize take have been incorporated into the project description. Therefore, no reasonable and prudent measures are included in this incidental take Statement.

Southwestern willow flycatcher

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of southwestern willow flycatchers:

1. Minimize the effects of harassment, harm, and mortality to southwestern willow flycatchers.

   A. In cooperation with us, and using guidance from the southwern willow flycatcher recovery plan, BLM shall incorporate the elements recommended for fire risk evaluation and planning into its Fire Management Plans for all current flycatcher breeding sites on or adjacent to BLM-administered lands. This planning effort shall be initiated prior to the 2006 wildfire season.

   B. If additional sites become occupied over the life of the LUP Amendment, BLM shall include them in the yearly Fire Management Plans in cooperation with us, prior to the next wildfire season.

Yuma clapper rail

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of Yuma clapper rail:

2. Minimize disturbance to Yuma clapper rails during prescribed fire activities.

   A. To allow for a better estimate of the number of birds in the affected area, BLM or their designated representative shall conduct surveys of the site to be prescribed burned during the breeding season prior to the burn. Since prescribed fires would be conducted during September to March, the surveys shall be done the preceding March to May.

Mexican spotted owl

We determine that the proposed action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of MSOs. All reasonable measures to minimize take have been incorporated into the project description. Therefore, no reasonable and prudent measures are included in this incidental take Statement.

Desert pupfish

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

1. Minimize the effects of harassment and mortality of desert pupfish.

   A. BLM shall coordinate all fire suppression actions in the watersheds for this species with FWS.

   B. If incidental take of desert pupfish is likely to occur due to suppression actions, BLM shall cooperate with us and other appropriate agencies to collect and salvage fish, <u>if collection and salvage operations can be accomplished safely.</u> Salvaged fish shall be held at a facility approved by us until conditions at the site are once again suitable for the species. BLM shall renovate/restore the population site(s) and aid in the re-entry of the species into the original site(s). If repatriation is not possible due to extreme effects at the site, BLM shall coordinate with us to locate or restore a substitute site. Once conditions are suitable for the fish or a substitute site has been selected, the salvaged fish shall be reintroduced. BLM shall coordinate the salvage and release with us and AGFD.

2. Minimize the loss of desert pupfish habitat.

   A. The BLM shall monitor the effects of fire suppression actions on desert pupfish using protocols in Voeltz and Bettaso (2003) (i.e. ocular surveys, dip-netting, trapping, seining, electrofishing, etc., as applicable). Where fire suppression actions may have resulted in fish mortality, the BLM shall investigate fire suppression related fish mortality and determine if there have been measurable reductions in abundance from that determined by Voeltz and Bettaso (2003) or subsequent, annual AGFD status reviews. The BLM shall monitor post-fire levels of sediment, debris, and fire-fighting chemicals at desert pupfish sites to ensure the habitat remains capable of supporting these fish. This monitoring shall occur as soon as practicable after the fire and shall be coordinated with FWS staff.

   B. BLM shall send the results of this monitoring in a brief report to us by February of each year following monitoring efforts.

Gila topminnow

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

1. Minimize the effects of harassment and mortality of Gila topminnow.

   A. BLM shall coordinate all fire suppression actions in the watersheds for this species with FWS.

   B. If incidental take of Gila topminnow is likely to occur due to suppression actions, BLM shall cooperate with us and other appropriate agencies to collect and salvage fish, if collection and salvage operations can be accomplished safely. Salvaged fish shall be held at a facility approved by us until conditions at the site are once again suitable for the species. BLM shall renovate/restore the population site(s) and aid in the re-entry of the species into the original site(s). If repatriation is not possible due to extreme effects at the site, BLM shall coordinate with us to locate or restore a substitute site. Once conditions are suitable for the fish or a substitute site has been selected, the salvaged fish shall be reintroduced. BLM shall coordinate the salvage and release with us and AGFD.

2. Minimize the loss of Gila topminnow habitat.

   A. The BLM shall monitor the effects of fire suppression actions on Gila topminnow using protocols in Voeltz and Bettaso (2003) (i.e. ocular surveys, dip-netting, trapping, seining, electrofishing, etc., as applicable). Where fire suppression actions may have resulted in fish mortality, the BLM shall investigate fire suppression related fish mortality and determine if there have been measurable reductions in abundance from that determined by Voeltz and Bettaso (2003) or subsequent, annual AGFD status reviews. The BLM shall monitor post-fire levels of sediment, debris, and fire-fighting chemicals at Gila topminnow sites to ensure the habitat remains capable of supporting these fish. This monitoring shall occur as soon as practicable after the fire and shall be coordinated with FWS staff.

   B. BLM shall send the results of this monitoring in a brief report to us by February of each year following monitoring efforts.

Razorback sucker

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of razorback sucker:

1. Minimize the effects of harassment of razorback sucker.

   A. The BLM shall coordinate all fire suppression actions along and adjacent to the Lower Colorado River and lakes Havasu and Mohave with FWS, during the razorback sucker spawning season (January 1 to June 30).

B. The BLM shall report to us on the number of active spawning areas disturbed in fire reports submitted to us by February of each year following the wildfire incident.

Virgin River chub

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of Virgin River chub:

1. Minimize the effects of harassment and mortality of Virgin River chub.

   A. BLM shall coordinate all fire suppression actions along, and adjacent to, the Virgin River and its tributaries with the FWS.

   B. BLM shall use screens with a maximum mesh size of 1 inch if pumping water from the Virgin River during fire suppression activities.

Yaqui chub

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

1. Minimize the effects of harassment and mortality of Yaqui chub.

   A. BLM shall coordinate all fire suppression actions within watersheds containing this species and near the San Bernardino or Leslie Canyon NWRs with the Refuge staff.

   B. If incidental take of Yaqui chub is likely to occur due to suppression actions, BLM shall cooperate with us and other appropriate agencies to collect and salvage fish, <u>if collection and salvage operations can be accomplished safely.</u> Salvaged fish shall be held at a facility approved by us until conditions at the site are once again suitable for the species. BLM shall renovate/restore the population site(s) and aid in the re-entry of the species into the original site(s). If repatriation is not possible due to extreme effects at the site, BLM shall coordinate with us to locate or restore a substitute site. Once conditions are suitable for the fish or a substitute site has been selected, the salvaged fish shall be reintroduced. BLM shall coordinate the salvage and release with us and AGFD.

Yaqui topminnow

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of Yaqui topminnow:

1. Minimize the effects of harassment and mortality of Yaqui topminnow.

   A. BLM shall coordinate all fire suppression actions within watersheds containing this species and near the San Bernardino or Leslie Canyon NWRs with the Refuge staff.

B. If incidental take of Yaqui chub is likely to occur due to suppression actions, BLM shall cooperate with us and other appropriate agencies to collect and salvage fish, if collection and salvage operations can be accomplished safely. Salvaged fish shall be held at a facility approved by us until conditions at the site are once again suitable for the species. BLM shall renovate/restore the population site(s) and aid in the re-entry of the species into the original site(s). If repatriation is not possible due to extreme effects at the site, BLM shall coordinate with us to locate or restore a substitute site. Once conditions are suitable for the fish or a substitute site has been selected, the salvaged fish shall be reintroduced. BLM shall coordinate the salvage and release with us and AGFD.

Hualapai Mexican vole

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of Hualapai Mexican voles:

1. Monitor affected vole population sites to determine the effects of fire suppression activities on this species.

   A. BLM shall monitor presence/absence and general ecosystem status of affected vole population sites for two years post-fire, and send the results of presence/absence and general ecosystem status to us in a brief report, by February each year.

Lesser long-nosed bat

We determine that the proposed action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of lesser long-nosed bats. All reasonable measures to minimize take have been incorporated into the project description. Therefore, no reasonable and prudent measures are included in this incidental take Statement.

Desert tortoise, Mojave population

We determine that the proposed action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of desert tortoises. All reasonable measures to minimize take have been incorporated into the project description. Therefore, no reasonable and prudent measures are included in this incidental take Statement.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The BLM must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

PROPOSED SPECIES REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

Gila chub

The prohibitions against taking Gila chub found in section 9 of the ESA do not apply until the species is listed. However, the FWS recommends that the agency implement the following reasonable and prudent measures and terms and conditions. If this conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions will be nondiscretionary.

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

1. Minimize the effects of harassment and mortality of Gila chub.

   A. BLM shall coordinate all fire suppression actions in the watersheds for this species with FWS.

   B. If incidental take of Gila chub is likely to occur due to suppression actions, BLM shall cooperate with us and other appropriate agencies to collect and salvage fish, <u>if collection and salvage operations can be accomplished safely.</u> Salvaged fish shall be held at a facility approved by us until conditions at the site are once again suitable for the species. BLM shall renovate/restore the population site(s) and aid in the re-entry of the species into the original site(s). If repatriation is not possible due to extreme effects at the site, BLM shall coordinate with us to locate or restore a substitute site. Once conditions are suitable for the fish or a substitute site has been selected, the salvaged fish shall be reintroduced. BLM shall coordinate the salvage and release with us and AGFD.

2. Minimize the loss of Gila chub habitat.

   A. The BLM shall monitor the effects of fire suppression actions on Gila chub in areas affected by fire suppression actions. Monitoring shall determine presence/absence and abundance (catch per unit effort or population estimates) of Gila chub using accepted methods of fisheries sampling (e.g. hoop nets, electrofishing, seines). Where fire suppression actions may have resulted in fish mortality, the BLM shall investigate fire suppression related fish mortality and determine if there have been measurable reductions in abundance from annual AGFD status reviews. The BLM shall monitor post-fire levels of sediment, debris, and fire-fighting chemicals at Gila topminnow sites to ensure the habitat remains capable of supporting these fish. This monitoring shall occur as soon as practicable after the fire and shall be coordinated with FWS staff.

   B. During this monitoring, BLM shall measure water quality at all sites surveyed for Gila chub. Water quality data will include temperature, pH, dissolved oxygen, total dissolved solids, and turbidity.

C. The BLM shall send the results of this monitoring in a brief report to us by February of each year following monitoring efforts.

REPORTING REQUIREMENTS

Fire Suppression

By February of each year following a fire suppression event that may have affected a listed species and/or resulted in incidental take, BLM shall report to us in the following manner:

1. Provide a cover memorandum that specifies that BLM has determined that the fire suppression actions were consistent with this biological opinion. Include a request to append the report to this biological opinion and the associated incidental take Statement, as appropriate, to fulfill your consultation requirements for that fire event.

2. Provide specific information in your fire report describing coordination with us during the fire event, the fire suppression actions that were taken, and the location and timing of these actions. Include an analysis of the effects of these actions on listed species and/or designated critical habitats.

3. Describe implementation of relevant conservation measures, reasonable and prudent measures, and terms and conditions.

4. Describe any additional avoidance or minimization measures that were implemented during the fire event.

5. Describe any take that may have occurred.

Reports should be submitted to the Arizona Ecological Services Field Office, Phoenix.

Fire and Fuels Management Treatments

Annual or other reporting requirements related to wildland fire use, prescribed fire, and mechanical and chemical treatments will be identified during future consultations for these actions.

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. The recommendations provided here do not necessarily represent complete fulfillment of the BLM's section 2(c) or 7(a)(1) responsibility for these species. In furtherance of the purposes of the Act, we recommend implementing these discretionary actions.

Chiricahua leopard frog

We recommend that BLM:

1. Continue to actively participate in the recovery of this species.

2. Fund, aid, or establish research or study projects for this species.

3. Educate employees and your public users about this species.

Cactus ferruginous pygmy-owl

We recommend that BLM:

1. Seek recommendations from us in the initial stages of a wildfire. BLM Resource Advisors should specifically request current information regarding the presence of pygmy-owls or pygmy-owl territories within the fire area so that effects can be minimized.

2. Protect habitat found to be suitable for the pygmy-owl from detrimental effects of their fire suppression actions, to the extent permitted considering firefighter safety and protection of human life and property.

3. Renew the pygmy-owl habitat evaluation, mapping, and survey effort proposed as a conservation measure during prior consultations, most recently for the October 23, 2003, Biological Opinion entitled *Livestock Grazing on 18 Allotments Along the Middle Gila River Ecosystem* (File number 02-21-00-F-0029) and adapt the protocols to the actions proposed under the LUP amendment. We recommend that BLM seek FWS input to develop a protocol whereby pygmy-owl habitat that is highly susceptible to wildfire (i.e. WUI areas and/or annual grass-invaded Sonoran desertscrub) and likely to be the site of aggressive fire suppression activities is surveyed prior to wildfire ignition so that avoidance and minimization efforts can be planned in advance. The submission and approval of said protocol should occur prior to the onset of the 2005 fire season.

4. Conduct or fund studies using both monitoring and telemetry, to determine pygmy-owl habitat use patterns and relationships between pygmy-owls, fire and fuels management activities throughout applicable BLM-administered lands in Arizona. Surveys involving simulated or recorded calls of pygmy-owls require an appropriate permit from the FWS. Contact AGFD for State permitting requirements.

5. Work with the FWS, U.S. Forest Service, and AGFD in a cooperative effort to refine the FWS's habitat profile and delineation of distribution for the pygmy-owl. The habitat profile should include habitat features necessary to support breeding populations for owls and a profile for the subset of Sonoran Desert scrub that is likely to support pygmy-owls. The BLM should then map suitable habitat within the planning area.

6. Continue to actively participate in regional planning efforts, such as Pima County's Sonoran Desert Conservation Plan (SDCP) and the Town of Marana's HCP, and other conservation efforts for the pygmy-owl.

7. Assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved by the FWS.

8. Monitor the effectiveness of conservation measures associated with issuance of special use permits.

California condor

We recommend that BLM:

1. Implement the protective measures for California condors that are contained in the July 2004 "Recommended Protection Measures for Pesticide Applications in The Southwest Region of the U.S. Fish and Wildlife Service" when conducting chemical treatments.

2. Continue to actively participate in the recovery of the species.

3. Educate employees and your public users about this species.

Southwestern willow flycatcher

We recommend that BLM:

1. Continue supporting and participating in southwestern willow flycatcher survey and monitoring efforts on BLM-administered lands in Arizona.

2. Work towards restoring native riparian vegetation in sites that have the potential to support future breeding habitat for this species.

3. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in rivers supporting willow flycatcher habitat on or downstream of BLM-

administered lands in order to protect and maintain these habitats, if such rights have not been previously obtained.

4. Do not consider land exchanges that would transfer riparian area river channels, floodplains, and terraces out of Federal ownership, and carefully examine all exchanges that could affect water flows (either groundwater or surface water) to ensure that development on those lands would not affect riparian habitats.

5. Implement the protective measures for southwestern willow flycatchers that are contained in the July 2004 "Recommended Protection Measures for Pesticide Applications in The Southwest Region of the U.S. Fish and Wildlife Service" when conducting chemical treatments.

6. Conduct southwestern willow flycatcher surveys in suitable habitat in order to be able to determine how best to manage fuel loads adjacent to or in riparian areas, in order to protect southwestern willow flycatchers and their habitat before fire occurs.

Yuma clapper rail

We recommend that BLM:

1. Evaluate past surveys for Yuma clapper rails as part of the planning for prescribed fire projects to document reduction in clapper rail use of the site that may be related to reduction in habitat quality. Post-project surveys should also be conducted to document the regrowth of cattail habitats and occupancy by clapper rails. This information would enhance our knowledge of the appropriate management cycle to maintain clapper rail habitat along the Colorado River.

2. After fire suppression is completed in Yuma clapper rail habitat, review any available survey records of the burn site and record in the fire report the number of rails recorded from the vicinity during these surveys.

Bald eagle

We recommend that BLM:

1. Contact FWS at the onset of the bald eagle breeding season to determine if any new areas or nest sites need to be avoided in the coming fire season's suppression actions.

2. Protect and improve potential and existing habitats for bald eagle population maintenance and expansion [Recovery Plan Prime Objective 2 (USFWS 1982)].

3. Determine essential habitat needed for the continued existence of the southwestern bald eagle; including non-nesting habitat, maintain suitable habitats, and upgrade potential habitats.

4. Protect potential and future bald eagle habitats by mapping these areas and making this information available for use in future fire suppression activities, both in and outside of bald eagle habitats. Potential nest trees are not limited to those within existing bald eagle breeding areas. Any rivers or impoundments that contain suitable fish populations to serve as a food source, with existing large cottonwood trees or the potential to support such habitats, should be mapped.

5. Continue to support the Bald Eagle Nest Watch Program and participate in the Southwest Bald Eagle Management Committee.

6. Prepare and implement BAER plans for burned areas that have the potential to cause future erosion problems in the watershed, riparian, or aquatic areas. Objectives of these plans, within watersheds containing bald eagle breeding areas and/or potential habitat, would be to reduce erosion and sedimentation into these habitats.

7. Coordinate with Bureau of Reclamation and/or U.S. Army Corps of Engineers, to construct roost and perch poles at Alamo Lake, Lake Pleasant and San Carlos Reservoir to replace natural roosts and perches lost by inundation or decay. Such structures would improve foraging efficiency by wintering and breeding eagles, possibly increasing their productivity.

Mexican spotted owl

We recommend that the BLM:

1. Work with us and AGFD to design fuels reduction treatments in MSO habitat. We further recommend using a multi-aged silvicultural prescription with the intent to increase the degree of spatial clumpiness within these areas. We are defining "spatial clumpiness" as the degree to which the residual stand is characterized by discrete groups of trees with interlocking crowns separated by forest openings. In addition, we recommend that lighting techniques and prescribed fire boundaries are chosen to minimize the loss of coarse woody debris, snags, large trees, and Gambel oak (where it occurs).

Desert pupfish

We recommend that BLM:

1. Continue to actively pursue reestablishment of desert pupfish on BLM lands.

2. Collaborate with AGFD to remove nonnative aquatic species from waters on BLM lands to benefit native fish and other native aquatic species.

3. Conduct or fund studies using both monitoring and telemetry, to determine the effects of fire the aquatic ecosystems in which desert pupfish occur. Surveys involving capture of desert pupfish require an appropriate permit from the FWS. Contact AGFD in regard to State permitting requirements.

4. Continue to actively participate in regional planning efforts, such as Pima County's Sonoran Desert Conservation Plan (SDCP), the Town of Marana's HCP, and other conservation efforts for the desert pupfish.

5. Assist in the implementation of recovery tasks identified in the Desert Pupfish Recovery Plan.

6. Monitor the effectiveness of conservation measures associated with issuance of special use permits.

Gila topminnow

We recommend that BLM:

1. Collaborate with AGFD to remove nonnative aquatic species from waters on BLM lands to benefit native fish and other native aquatic species.

2. Conduct or fund studies using both monitoring and telemetry, to determine the effects of fire on the aquatic ecosystems in which Gila topminnow occur. Surveys involving capture of Gila topminnow require an appropriate permit from the FWS and AGFD.

3. Continue to actively participate in regional planning efforts, such as Pima County's Sonoran Desert Conservation Plan (SDCP) and other conservation efforts for the Gila topminnow.

4. Assist in the implementation of recovery tasks identified in the Gila Topminnow Recovery Plan.

5. Monitor the effectiveness of conservation measures associated with issuance of special use permits.

Razorback sucker

We recommend that BLM:

1. Continue to support and participate in the Lower Colorado River Giant Salvinia Task Force Action Plan to reduce the effects of this exotic plant on razorback suckers.

Virgin River chub

We recommend that BLM:

1. Continue to support inventories and monitoring of occupied Virgin River chub habitat and designated critical habitat.

2. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in the Virgin River for Virgin River chub, woundfin, and other aquatic and riparian species, if such rights have not been previously obtained.

3. Do not consider land exchanges out of Federal ownership within the Virgin River corridor. Any exchanges that could affect water flows (either groundwater or surface water) should be carefully examined to ensure that future development on those lands would not affect surface flows in the river.

4. Implement the applicable protective measures for this species that are contained in the July 2004 "Recommended Protection Measures for Pesticide Applications in The Southwest Region of the U.S. Fish and Wildlife Service" when conducting chemical treatments.

Woundfin

We recommend that BLM:

1. Continue to support inventories and monitoring of occupied woundfin habitat and designated critical habitat.

2. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in the Virgin River for Virgin River chub, woundfin, and other aquatic and riparian species, if such rights have not been previously obtained.

3. Do not consider land exchanges out of Federal ownership within the Virgin River floodplain. Any exchanges that could affect water flows (either groundwater or surface water) should be carefully examined to ensure that future development on those lands would not affect surface flows in the river.

4. Implement the applicable protective measures for this species that are contained in the July 2004 "Recommended Protection Measures for Pesticide Applications in The Southwest Region of the U.S. Fish and Wildlife Service" when conducting chemical treatments.

Yaqui chub

We recommend that BLM:

1. Cooperate with the San Bernardino and Leslie Canyon NWRs to conduct or fund studies using both monitoring and telemetry, to determine the effects of fire on the aquatic ecosystems in which Yaqui chub occur. Surveys involving capture of Yaqui chub require an appropriate permit from the FWS. Contact AGFD for State permitting requirements.

2. Continue to actively participate in regional planning efforts, such as those underway by the Malpai Borderlands Group, and other conservation efforts for the native fishes of the Yaqui Basinches

3. Assist in the implementation of recovery tasks identified in the Yaqui Fishes Recovery Plan.

4. Monitor the effectiveness of conservation measures associated with issuance of special use permits.

5. Coordinate any future wildland fire use, prescribed fire, and mechanical and chemical treatments near San Bernardino or Leslie Canyon NWRs with refuge staff.

Yaqui topminnow

We recommend that BLM:

1. Cooperate with the San Bernardino and Leslie Canyon NWRs to conduct or fund studies using both monitoring and telemetry, to determine the effects of fire on the aquatic ecosystems in which Yaqui topminnow occur. Surveys involving capture of Yaqui topminnow require an appropriate permit from the FWS. Contact AGFD for State permitting requirements.

2. Continue to actively participate in regional planning efforts, such as those underway by the Malpai Borderlands Group, and other conservation efforts for the native fishes of the Yaqui Basinches

3. Assist in the implementation of recovery tasks identified in the Yaqui Fishes Recovery Plan.

4. Monitor the effectiveness of conservation measures associated with issuance of special use permits.

5. Coordinate any future wildland fire use, prescribed fire, and mechanical and chemical treatments near San Bernardino or Leslie Canyon NWRs with refuge staff.

Little Colorado spinedace

We recommend that BLM:

1. Continue to assist the FWS and AGFD to locate Silver Creek spinedace and establish a refugium population.

2. Work with the FWS and AGFD to control nonnative aquatic species (fish and crayfish) on BLM-administered lands in potential Little Colorado spinedace habitat.

3. Continue to assist the FWS and AGFD to assist private landowners with riparian restoration projects along Silver Creek and within the Little Colorado River watershed.

Loach minnow

We recommend that BLM:

1. Within watersheds containing loach minnow critical habitat, prepare and implement Emergency Fire Rehabilitation or BAER plans for areas burned that have the potential to cause future erosion on upland and aquatic areas. Objectives of these plans would be to reduce erosion and sedimentation into aquatic habitats.

2. Inventory and monitor the existing (pre-wildland fire or fire suppression) constituent elements of occupied loach minnow habitats and critical habitats. This information would provide a baseline to compare wildland fire and fire suppression affects after they have occurred to occupied habitats and critical habitats.

3. Continue to support inventories and monitoring of occupied loach minnow habitat. This could include unsurveyed and incompletely surveyed sites.

4. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in occupied loach minnow streams and designated critical habitats, if such rights have not been previously obtained.

Spikedace

We recommend that BLM:

1. Within watersheds containing spikedace critical habitat, prepare and implement Emergency Fire Rehabilitation or BAER plans for areas burned that have the potential to cause future erosion on upland and aquatic areas. Objectives of these plans would be to reduce erosion and sedimentation into aquatic habitats.

2. Inventory and monitor the existing (pre-wildland fire or fire suppression) constituent elements of occupied spikedace habitats and critical habitats. This information would provide a baseline to compare wildland fire and fire suppression affects after they have occurred to occupied habitats and critical habitats.

3. Continue to support inventories and monitoring of occupied spikedace habitat. This could include unsurveyed and incompletely surveyed sites.

4. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in occupied spikedace streams and designated critical habitats, if such rights have not been previously obtained.

Plants: Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Jones cycladenia, Nichol Turk's head cactus, Peebles Navajo cactus, Pima pineapple cactus, Kearney's blue star, Siler pincushion cactus, Huachuca water umbel

We recommend that the BLM:

1. Monitor the effects of suppression activities on all populations of listed plants within the action area.

2. Monitor the effects of fire suppression activities on the spread of non-native species within the action area.

3. Actively participate in the recovery of, and any revision of the recovery plan for, listed plant species on BLM lands.

4. Fund, aid, or establish research or study projects regarding fire ecology and conservation listed plant species on BLM lands.

5. Educate employees and your public users about listed plant species.

Hualapai Mexican vole

1. We recommend that BLM design a study to determine if and when voles move into the treated areas. Additionally, we recommend that the study be designed to compare pre-burn population distribution to post-burn distribution to determine whether Hualapai Mexican vole locations have shifted or increased their range into treated areas.

Lesser long-nosed bat

We recommend that BLM:

1. Continue to educate all personnel associated with the proposed action about the needs of the lesser long-nosed bat and its food sources.

2. Survey for lesser long-nosed bats and roosts on BLM-administered lands that have not been surveyed in the last five years.

Desert tortoise, Mojave population

We recommend that BLM:

1. Fund, aid, or establish research to determine methods for reducing alien annual grasses in desert tortoise habitat.

2. Fund, aid, or establish research to determine the effects of chemical fire retardants on the desert tortoise and its habitat.

3. Continue to actively participate in the recovery of the desert tortoise.

4. Assist in implementation of recovery tasks identified in the Recovery Plan.

New Mexico ridge-nosed rattlesnake

We recommend that BLM:

1. Actively participate in the recovery of this subspecies.

2. Fund, aid, or establish research or study projects for this subspecies.

3. Educate employees and your public users about this subspecies.

Gila chub

We recommend that BLM:

1. Coordinate with us in development and implementation of a recovery plan for the Gila chub.

2. Coordinate with us and the AGFD to translocate or introduce Gila chub into suitable habitat.

3. Conduct, or fund, or otherwise support comprehensive surveys for the Gila chub in all potential or suitable habitats on BLM lands.

4. Coordinate with us and AGFD to begin an aggressive program to control nonnative aquatic species on BLM lands.

5. Conduct or fund studies using both monitoring and telemetry, to determine the effects of fire the aquatic ecosystems in which Gila chub occur. Surveys involving capture of Gila chub require an appropriate permit from the FWS. Contact AGFD for State permitting requirements.

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

BIOLOGICAL OPINION

This concludes formal consultation on the action outlined in your 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.

CONFERENCE OPINION

This concludes the conference for BLM's Proposed Statewide LUP Amendment for Fire, Fuels, and Air Quality Management. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation if the proposed species is listed or 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.

After listing as threatened or endangered and any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take Statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the proposed species has occurred. Modifications of the opinion and incidental take Statement may be appropriate to reflect that take. No take of the proposed species may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation. Although not required, we recommend that the Federal agency implement the reasonable and prudent measures and terms and conditions herein prior to our final listing decision. If the species is subsequently listed, implementation of reasonable prudent measures and terms and conditions in any conference opinion adopted as a biological opinion, is mandatory. Please note that if the species is listed, surveys or other activities that involve capture or other forms of take of this species will require appropriate permits from us and Arizona Game and Fish Department.

BLM requested a conference report for the California condor, considered as a proposed species on BLM-administered lands within the designated nonessential experimental population [10(j)] area. We have prepared a combination biological opinion/conference report for the California condor that also considers potential effects to this species outside of the 10(j) area. This concludes formal consultation for the California condor, both within and outside of the

designated 10(j) population area. Please note that reinitiation of formal consultation criteria also apply to reinitiation of formal conferencing for this species.

The FWS appreciates the BLM's efforts to identify and minimize effects to listed species from this project. For further information, please contact Brenda Smith at (928) 226-0614 (x101) or Steve Spangle at (602) 242-0210. Please refer to the consultation number, 02-21-03-F-0210, in future correspondence concerning this project.

/s/ Steven L. Spangle

cc's with disc:
Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Fish and Wildlife Service, Phoenix, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Field Supervisor, Fish and Wildlife Service, Carlsbad, CA
Field Supervisor, Fish and Wildlife Service, Salt Lake City, UT
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM
Field Supervisor, Fish and Wildlife Service, Reno, NV

cc's referred to website:
Bob Broscheid, Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Rebecca Davidson, Arizona Game and Fish Department, Phoenix, AZ
Regional Director, Bureau of Indian Affairs, Phoenix, AZ (*w/disc)
Chairman, Ak-Chin Indian Community, Maricopa, AZ
Chairman, Chemehuevi Tribe, Havasu Lake, CA
Chairperson, Cocopah Tribe, Somerton, AZ
Chairman, Colorado Indian Tribes, Parker, AZ
President, Fort McDowell Yavapai Nation, Fountain Hills, AZ
Chairperson, Fort Mojave Indian Tribe, Needles, CA
Governor, Gila River Indian Community, Sacaton, AZ
Chairperson, Havasupai Tribe, Supai, AZ
Chairman, Hopi Tribe, Kykotsmovi, AZ
Chairperson, Hualapai Tribe, Peach Springs, AZ
Chairperson, Kaibab Band of Paiute Indians, Fredonia, AZ
President, Navajo Nation, Window Rock, AZ
Chairman, Pascua Yaqui Tribe, Tucson, AZ
President, Quechan Tribe, Yuma, AZ
President, Salt River Pima-Maricopa Indian Community, Scottsdale, AZ
Chairperson, San Carlos Apache Tribe, San Carlos, AZ
Chairperson, Tohono O'Odham Nation, Sells, AZ
Chairperson, Tonto Apache Tribe, Payson, AZ
Chairman, White Mountain Apache Tribe, Whiteriver, AZ

Chairman, Yavapai Apache Nation, Camp Verde, AZ
President, Yavapai-Prescott Tribe, Prescott, AZ
President, San Juan Southern Paiute Tribe, Tuba City, AZ

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TABLE 1

Table 1. Species and critical habitats considered in the biological and conference opinion and report for the BLM Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management.

Common Name	Scientific Name	**Federal Status**	**Critical Habitat**
Chiricahua leopard frog	*Rana chiricahuensis*	threatened	
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	endangered	proposed
California condor	*Gymnogyps californianus*	endangered, 10(j) population[1]	
Southwestern willow flycatcher	*Empidonax traillii extimus*	endangered	
Yuma clapper rail	*Rallus longirostris yumanensis*	endangered	
Bald eagle	*Haliaeetus leucocephalus*	threatened	
Mexican spotted owl	*Strix occidentalis lucida*	threatened	designated
Desert pupfish	*Cyprinodon macularius*	endangered	
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	endangered	
Razorback sucker	*Xyrauchen texanus*	endangered	designated
Virgin River chub	*Gila seminuda*	endangered	designated
Woundfin	*Plagopterus argentissimus*	endangered	designated
Yaqui chub	*Gila purpurea*	endangered	
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	endangered	
Little Colorado spinedace	*Lepidomeda vittata*	threatened	designated
Loach minnow	*Tiaroga cobitis*	threatened	designated
Spikedace	*Meda fulgida*	threatened	designated
Arizona cliffrose	*Purshia subintegra*	endangered	
Brady pincushion cactus	*Pediocactus bradyi*	endangered	
Holmgren milk-vetch	*Astragalus holmgreniorum*	endangered	
Huachuca water umbel	*Lilaeopsis schaffneriana* ssp. *recurva*	endangered	designated
Kearney's blue star	*Amsonia kearneyana*	endangered	
Nichol Turk's head cactus	*Echinocactus horizonthalonius* var. *nicholii*	endangered	
Peebles Navajo cactus	*Pediocactus peeblesianus*	endangered	

[1] Designated as a nonessential experimental population under section 10(j) of the Act, this population of California condors is treated as a proposed species on BLM lands within the 10(j) area and as an endangered species outside of this area.

	var. *peeblesianus*		
Pima pineapple cactus	*Coryphantha scheeri* var. *robustispina*	endangered	
Jones cycladenia	*Cycladenia humilis* var. *jonesii*	threatened	
Siler pincushion cactus	*Pediocactus sileri*	threatened	
Hualapai Mexican vole	*Microtus mexicanus hualpaiensis*	endangered	
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	endangered	
Mojave desert tortoise	*Gopherus agassizii (xerobates)*]	threatened	designated
New Mexico ridge-nosed rattlesnake	*Crotalus willardi obscurus*	threatened	
Gila chub	*Gila intermedia*	proposed endangered	proposed
Yellow-billed cuckoo	*Coccyzus americanus*	candidate	
Acuna cactus	*Echinomastus erectocentrus* var. *acunensis*	candidate	
Fickeisen plains cactus	*Pediocactus peeblesianus* var. *fickeiseniae*	candidate	

TABLE 2

Table 2. Numbers and distribution of documented pygmy-owl locations 1993 - 2003 (Abbate *et al*. 1996, 1999, 2000, AGFD 2002a).

Area	Year	Sites	Adults	Young
Northwest Tucson	1993-1997	9	19	6
	1998	4	7	11
	1999	6	10	16
	2000	8	11	11
	2001	5	8	10
	2002	9	9	2
	2003	4	4	0
Pinal County	1993-1997	2	6	1
	1998	2	2	0
	1999	3	5	5
	2000	2	3	5
	2001	0	0	0
	2002	1	1	0
	2003	0	0	0
Altar Valley	1998	2	4	unknown
	1999	14	18	11
	2000	6	8	4
	2001	11	18	12
	2002	8	10	7
	2003	5	9	16
Organ Pipe Cactus National Monument and Cabeza Prieta National Wildlife Refuge	1993-1997	2	2	0
	1998	1	2	4
	1999	3	4	unknown
	2000	6	8	0
	2001	7	10	5
	2002	3	4	0
	2003	5	6?	0

TABLE 3

Table 3. Gila topminnow sites on BLM-administered lands, or containing BLM lands in their watershed, as reported by Voeltz and Bettaso (2003).

Site Name	**County**	**Field Office**	**Comments**
Extant Natural Populations			
Cienega Creek	Pima	Tucson	Las Cienegas National Conservation Area
Reestablished Sites			
AD Wash	Yavapai	Phoenix	
Cold Springs	Graham	Safford	
Empire Gulch	Pima	Tucson	Las Cienegas National Conservation Area
Lousy Canyon	Yavapai	Phoenix	Agua Fria National Monument
Tule Creek	Yavapai	Phoenix	
Yerba Mansa Spring	La Paz	Phoenix	Outside of historical range
Failed Site Recommended for Restocking			
Aravaipa Creek	Graham, Pinal	Tucson	
Badger Springs	Yavapai	Phoenix	Public Lands in watershed
Big Spring	Graham	Safford	
Cow Creek	Yavapai	Phoenix	Private land intermixed
Green Tanks (Rattlesnake Spring)	Gila	Safford	
Howard Well	Graham	Safford	
Humbug Creek	Yavapai	Phoenix	
Little Nogales Spring	Pima	Tucson	Tributary to Cienega Creek
Martin Well	Graham	Safford	
Mescal Warm Spring	Gila	Phoenix	
Nogales Spring	Pima	Tucson	Tributary to Cienega Creek
Redfield Canyon	Graham	Tucson	Muleshoe Cooperative Management Area - The Nature Conservancy
Tule Creek (Unnamed Spring 1E)	Yavapai	Phoenix	
Tule Creek Seep (2E)	Yavapai	Phoenix	
Watson Wash	Graham	Safford	
Failed Sites			
Pupfish Spring	Yavapai	Phoenix	
Sites Evaluated For Future Reestablishment			
Bass Canyon	Cochise, Graham	Safford	Muleshoe Cooperative Management Area - The Nature Conservancy

Bleak Spring	Graham, Pinal	Safford	Aravaipa Preserve - The Nature Conservancy
Larry Creek	Yavapai	Phoenix	
Oak Grove Canyon	Graham, Pinal	Safford	Aravaipa Preserve - The Nature Conservancy
Parson's Grove	Graham, Pinal	Safford	Aravaipa Preserve - The Nature Conservancy
Secret Spring	Cochise, Graham	Safford	Muleshoe Cooperative Management Area - The Nature Conservancy
Unnamed Pond near Bitter Creek	Yavapai	Phoenix	Requires reevaluation
Virgus Canyon at Sycamore Canyon Confluence	Pinal	Safford	

TABLE 4

Table 4. Formal consultations completed or underway for actions affecting Little Colorado spinedace.

Consultation #	Date	Name	Anticipated Incidental Take
02-21-88-F-0029	May 22, 1989	US Route 180/Arizona 666	Yes, death to approximately 8% of the population and loss of 500 linear feet of habitat
02-21-88-F-0029 R1	April 30, 1991	Reinitiaion of US Route 180/Arizona 666	Yes, death to approximately 8% of the population and loss of 275 linear feet of habitat
02-21-92-F-0403	August 2, 1995	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-92-F-0403	November 20, 1995	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-96-F-339	July 31, 1996	Greer River Reservoir Dam	None anticipated
02-21-01-F-0425	May 6, 1997	Buck Springs Range Allotment Management Plan	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-88-F-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
02-21-96-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
02-21-01-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
02-21-01-F-0425	April 30, 2003	Buck Springs Allotment Management Plan	Yes, take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-03-0369	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

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

TABLE 5

Table 5. Agency actions that have undergone formal and informal section 7 conferencing and levels of incidental take anticipated for the Gila chub in Arizona and New Mexico, both within and outside the BLM LUPAmendment action area (CHA = Critical Habitat Area).

Action (CHU)	Year	Federal Agency	Incidental Take Anticipated	In Action Area
Coronado National Forest – Ongoing Grazing (Area 3 – Babocomari River and Area 5 – Lower Santa Cruz River	2002	USFS	Take in the form of harm due to habitat alteration, and mortality of 20 individuals	X
Las Cienegas NCA Resource Management Plan (Area 5 – Lower Santa Cruz River)	2002	BLM	Take in the form of mortality, injury, pursuit, capture, collection, trapping, or harassment of 155 individuals annually; multiple occurrence of 500 individuals; and a one time loss of 1000 individuals	X
Bull Gap Road Project, Gila Box NCA (Area 2 – Middle Gila River)	2003	BLM	None	X
Kearny Camp, Serna Cabin, and Lee Trail Road Improvements, Gila Box NCA (Area 2 – Middle Gila River)	2003	BLM	Informal conference	X
Agua Fria National Monument Plan (Area 7 – Agua Fria River)	2004	BLM	Take in the form harm, harassment and mortality (draft – should be completed in August 2004)	X
Harden Cienega Grazing Allotment (Area 1 – Upper Gila River)	2004	USFS	None	
New Mexico Department of Game and Fish - research proposal to examine population structure of *Gila robusta* complex (Area 1 – Upper Gila River)	2004	FWS	Informal conference	

TABLE 6

Table 6. Desert pupfish sites on BLM-administered lands in Arizona, or containing BLM lands in their watershed, as reported by Voeltz and Bettaso (2003).

Site Name	County	Field Office	Comments
Extant Natural Populations			
None			
Reestablished Sites			
Cold Springs	Graham	Safford	
Lousy Canyon	Yavapai	Phoenix	Agua Fria National Monument
Failed Site Recommended for Restocking			
Green Tanks (Rattlesnake Spring)	Gila	Safford	
Howard Well	Graham	Safford	
Martin Well	Graham	Safford	
Tule Creek (Unnamed Spring 1E)	Yavapai	Phoenix	
Tule Creek Seep (2E)	Yavapai	Phoenix	
Failed Sites			
Mesquite Spring	Pinal	Phoenix	
Pupfish Spring	Yavapai	Phoenix	
Sites Evaluated For Future Reestablishment			
Bleak Spring	Graham, Pinal	Safford	Aravaipa Preserve - The Nature Conservancy
Larry Creek	Yavapai	Phoenix	
Oak Grove Canyon	Graham, Pinal	Safford	Aravaipa Preserve - The Nature Conservancy
Parson's Grove	Graham, Pinal	Safford	Aravaipa Preserve - The Nature Conservancy
Secret Spring	Cochise, Graham	Safford	Muleshoe Cooperative Management Area - The Nature Conservancy
Unnamed Pond near Bitter Creek	Yavapai	Phoenix	Requires reevaluation
Virgus Canyon at Sycamore Canyon Confluence	Pinal	Safford	

TABLE 7

Table 7. Localities with extant Gila chub populations or proposed Gila chub critical habitat on or near BLM lands, miles of critical habitat miles present, and year of last survey that documented species occurrence. The drainage is in parentheses.

Location	Proposed Critical Habitat Present (miles)	Last Year Found
Indian Creek (Agua Fria)	Yes (3.3 mi)	2001
Larry Creek (Agua Fria)	Yes (0.5 mi)	2003
Little Sycamore Creek (Agua Fria)	Yes (0.75 mi)	2002
Lousy Canyon (Agua Fria)	Yes (0.18 mi)	2003
Silver Creek (Agua Fria)	Yes (4.2 mi)	2003
Sycamore Creek (Agua Fria)	Yes (11.5)	2002
Bonita Creek (Gila)	Yes (39.6 mi)	2004
Mineral Creek/Devil's Canyon (Gila)	Yes (8.9 mi)	2000
Cienega Creek BLM (Santa Cruz)	Yes (19.0 mi)	1999
Cienega Creek Preserve (Santa Cruz)	Yes (19.0 mi)	2003
Empire Gulch (Santa Cruz)	Yes (3.2 mi)	2001
Mattie Canyon (Santa Cruz)	Yes (2.4 mi)	2002
Babocomari River @ T4 Spring (San Pedro)	No	2003
Bass Canyon (San Pedro)	Yes (3.4 mi)	2001
Hot Springs Canyon (San Pedro)	Yes (069 mi)	2004
O'Donnell Creek (San Pedro)	Yes (2.4 mi)	2001
Turkey Creek and Post Canyon (San Pedro)	Yes (5.7 mi)	1989
Redfield Canyon (San Pedro)	Yes (2.2 mi)	2004
Red Tank Draw (Verde)	Yes (6.7 mi)	1995

TABLE 8

Table 8. Recent section 7 consultations on proposed actions affecting fishes of the Yaqui Basinches

Date	Agency	Project	File Number
July 15, 2003	FWS	Tule Spring Restoration	02-21-03-F-0261
October 24, 2002	Forest Service (FS)	Reinitiation of Biological Opinion 02-21-98-F-399; Continuation of Livestock Grazing on the Coronado National Forest	02-21-98-F-399-R1
March 22, 2001	FS	Amendment to the November 16, 1999, biological opinion (BO) (02-21-98-F-286) on the Johnson Peak Fire Management Plan	02-21-98-F-286
July 29, 1999	FS	On-going and Long-term Grazing on the Coronado National Forest	02-21-98-F-399
February 4, 1999	FS	West Turkey Creek Native Fish Habitat Renovation Project	02-21-99-F-130
December 11, 1998	Environmental Protection Agency	Approval of the 1996 modifications to the Arizona Water Quality Standards	02-21-92-F-550 and 02-21-96-F-187
November 3, 1997	FWS	Reintroduction of the Yaqui catfish and Yaqui sucker on the San Bernardino NWR	02-21-97-F-143
May 29, 1997	FWS	San Bernardino NWR Asian Tapeworm Eradication	02-21-97-F-051
January 30, 1991	FWS	Replacement of an artesian well at Cienega Spring on the San Bernardino NWR	02-21-91-F-059

TABLE 9

Table 9. Summary of the amount, extent, and type of incidental take by species over the 10-year LUP Amendment period (refer to the incidental take Statements for each species for details).

Species	**Wildfire Suppression[2,3]**	**Wildland Fire Use**	**Prescribed Fire**	**Mechanical/ Chemical Treatments**
Chiricahua leopard frog	I, M at 1 site without extirpation; I, M emergency salvage at 1 site	0	0	0
Cactus ferruginous pygmy-owl	0	0	0	0
California condor	H, I, M of 1 individual			0
Southwestern willow flycatcher	H, I, M of 5 pairs and their eggs and young at 1 site	0	0	0
Yuma clapper rail	0	0	L, 100 acres treated per 2-year period; H, # based on pre-project surveys	0
Bald eagle	0	0	0	0
Mexican spotted owl	H, I, 2 MSO (1 pair)			
Desert pupfish	I, M, extirpation at 1 site; I, M emergency salvage at 1 site	0	I, M, L, 2 times per 10 years at each site	0
Gila topminnow	I, M, extirpation at 1 site; I, M emergency salvage at 1 site	0	I, M, L, 2 times per 10 years at each site	0
Razorback sucker	H, spawning areas disturbed per fire event from January through June	0	0	0
Virgin River chub	H, I, M, water drafting at up to 2 pools per wildfire	0	0	0
Woundfin	0	0	0	0

[2] Incidental take anticipated due to wildfire suppression actions during wildfire events.
[3] H=Harassment, I=Injury (Harm), M=Mortality, L=Habitat loss

Yaqui chub	I, M, 25% of annual population; I, M emergency salvage at 1 site	0	0	0
Yaqui topminnow	I, M, 25% of annual population; I, M emergency salvage at 1 site	0	0	0
Little Colorado spinedace	0	0	0	0
Loach minnow	0	0	0	0
Spikedace	0	0	0	0
Hualapai Mexican vole	H, I, L, 50 acres per 5 years	0	See consultation 02-21-01-F-241	
Lesser long-nosed bat	H, up to 20% agave/columnar cacti lost in fire/treatment area within 0.5 mi of habitat			0
Mojave desert tortoise	H, I, M, 4 tortoises every 2 years; H, handling 10 tortoises every 5 years	0	0	0
New Mexico ridge-nosed rattlesnake	0	0	0	0
Gila chub	I, M, extirpation at 1 site; I, M emergency salvage at 1 site	0	I, M, L, 2 times per 10 years at each site	0

TABLE 10

Table 10. Status of known occupied southwestern willow flycatcher sites on BLM land within the action area, including sites in California along the lower Colorado River.

Rec Unit[1]	Mgmt Unit[2]	Site Name	Year and number of flycatcher territories									
			94	95	96	97	98	99	00	01	02	03
LCR[3]	BW[4]	Browns Xing			5	5	5	10	12	16	12	24
LCR	BW	Lower Big Sandy	4	4	-	4	6	8	7	3	1	7
LCR	BW	Santa Maria	1		4	1	1	5	5	2	0	1
LCR	H to P[5]	BR Lagoon	-	-	-	-	0	1	-	-	-	-
LCR	H to P	Neptune	-	-	1	0	0	0	0	0	0	0
LCR	PtoSIB[6]	Ehrenburg	-	-	1	0	0	0	0	0	0	0
LCR	P to SIB	Gila confluence 1	-	-	-	-	0	2	0	0	0	0
LCR	P to SIB	Headgate Dam	-	-	-	-	1	0	0	0	-	-
LCR	P to SIB	Mittry Lake	-	-	2	-	0	0	0	0	0	1
LCR	Virgin	Littlefield	-	-	-	-	-	-	-	1	0	0
Gila	UpGila[7]	Fort Thomas	0	-	-	2	2	2	-	7	10	22
Gila	UpGila	Guthrie	-	-	-	-	-	-	-	-	3	0
Gila	SP/Gila[8]	Gila River 31	-	0	1	0	0	-	-	-	-	-
Gila	SP/Gila	Gila River 33	-	0	1	0	0	0	0	-	-	-
Gila	SP/Gila	Gila River 15	-	-	-	1	1	1	1	0	0	0
Gila	SP/Gila	Dripping Springs	-	-	-	-	0	1	0	0	0	0
Gila	SP/Gila	Malpais Hills	-	-	-	-	1	2	3	2	8	11
Gila	SP/Gila	SR 90	-	-	-	1	0	0	0	0	0	0

[1]Rec Unit = Southwestern Willow Flycatcher Recovery Unit
[2]Mgmt Unit = Southwestern Willow Flycatcher Management Unit
[3]LCR=Lower Colorado River
[4]BW=Bill Williams
[5]H to P = Hoover to Parker
[6]P to SIB = Parker to Southerly International Border
[7]San Pedro/Gila Management Unit

APPENDIX A (RECOMMENDATIONS FOR CANDIDATE SPECIES)

STATUS OF THE SPECIES

YELLOW-BILLED CUCKOO (*Coccyzus americanus occidentalis*)

The western continental United States distinct population segment of the yellow-billed cuckoo (western yellow-billed cuckoo) is a candidate species under the Act (USFWS 2002). In response to a petition to list the species submitted in February 1998, on July 25, 2001, the FWS issued a 12-month "warranted but precluded" finding (meaning that listing of the species is warranted but precluded by higher priority listing actions (USFWS 2001). Historically, the western yellow-billed cuckoo occupied and bred in riparian zones from western Washington (possibly southwestern British Columbia) to northern Mexico, including Oregon, Washington, southwestern Idaho, California, Nevada, Utah, western Colorado, Arizona, New Mexico, and western Texas. Today, the species is absent from Washington, Oregon, and most of California, is likely extirpated in Nevada, is rare in Idaho and Colorado, and occurs in the balance of its range in riparian habitats that are much reduced from their previous extent and are heavily affected by human use (USFWS 2002).

The yellow-billed cuckoo is a medium-sized, slender bird (about 12 inches in length and weighing about 2 ounces) of the Family Cucilidae, whose members are characterized in part by zygodactyl feet (with two toes pointing forward and two backward). The species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill that is blue-black with yellow on the base of the lower mandible. Plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail feathers are boldly patterned with black and white below. The legs are short and bluish-gray, and adults have a narrow, yellow eye ring. Juveniles resemble adults, except the tail patterning is less distinct, and the lower bill may have little or no yellow. Males and females differ slightly, as males tend to have a slightly larger bill.

The western yellow-billed cuckoo is associated primarily with cottonwood-willow dominated riparian habitats (Hamilton and Hamilton 1965, Gaines 1974, Gaines and Laymon 1984, Laymon and Halterman 1986, 1987, 1989; Halterman 1991; Halterman and Laymon 1994, 1995). Cottonwood-willow is the predominant and preferred habitat, but very tall screwbean-honey mesquite stands are also used. In addition, yellow-billed cuckoos have been found to use a mixture of saltcedar and cottonwood/willows (Corman and Magill 2000). Gaines (1974) found that vegetation density, distance to water, and the length and width of the habitat area were important characteristics when surveying for cuckoos. Western yellow billed cuckoos breed in large blocks of riparian habitats (particularly woodlands with cottonwoods and willows). Dense understory foliage appears to be an important factor in nest site selection, and cottonwood trees are an important element of foraging habitat in areas where the species has been studied in California (Halterman 1991).

The yellow-billed cuckoo arrives on the breeding grounds beginning in mid- to late May (Franzreb and Laymon 1993). Nesting activities usually take place between late June and late July, but may begin as early as late May, and continue to late August, depending on the season. Nest building takes 2-4 days. Nests are typically built in willow or mesquite thickets 4 to10 feet

(but as high as 35 feet) above the ground, are usually well-hidden by foliage, and are almost always near water. Incubation begins as soon as the first egg is laid, and lasts 11 days. Clutch size is usually two or three eggs, and development of the young are very rapid, with a breeding cycle of 17 days from egg-laying to fledging young. The young are fed large food items such as green caterpillars, tree frogs, katydids, and grasshoppers for the 6-7 day nestling period. After fledging the young are dependent on the adults for at least 2 weeks.

Principal causes of riparian habitat losses are conversion to agricultural and other uses, dams and river flow management, stream channelization and stabilization, and livestock grazing. Available breeding habitats for yellow-billed cuckoos have also been substantially reduced in area and quality by groundwater pumping and the replacement of native riparian habitats by invasive non-native plants (particularly saltcedar) (Groschupf 1987; Rosenberg *et al.* 1991). Estimates of riparian habitat losses in the west as a result of the factors described above range from 90 to 99 percent in California, 90 percent in New Mexico, and 90 to 95 percent in Arizona (USFWS 2001). In Arizona, the greatest losses of riparian have occurred along the lower Colorado River valley and its major tributaries at elevations below about 3,000 feet (USFWS 2001). Cuckoo numbers appear to have declined substantially in Arizona. In 1976 an estimated 846 yellow-billed cuckoo pairs occupied the lower Colorado River and five of its major tributaries (USFWS 2001), while in 1999, just 172 cuckoo pairs and 81 unmated adults were located during surveys of 221 miles of riparian habitat (Corman and Magill 2000). Specific declines in cuckoo numbers in Arizona have been documented along the lower Colorado River and the Bill Williams River delta (Rosenberg *et al.* 1991).

Nevertheless, Arizona is thought to contain the largest remaining cuckoo population in the western States (USFWS 2002). Currently in Arizona, cuckoos occur in a scattered fashion throughout the central, east-central, west central, and southeastern parts of the State, with the majority of known populations occurring along the San Pedro, Verde, and Agua Fria rivers and Cienega Creek in Pima, Pinal, Cochise, and Yavapai counties, and Sonoita Creek in Santa Cruz County (Corman and Magill 2000).

Conservation Recommendations for Yellow-billed cuckoo

We recommend that the BLM:

1. Apply the conservation measures for southwestern willow flycatcher (conservations measures WF-1 to WF-7) for occupied and/or suitable yellow-billed cuckoo habitat.

2. Map and survey potential, suitable, and occupied yellow-billed cuckoo habitat to determine where management actions should occur.

3. Avoid using prescribed fire during yellow-billed cuckoo breeding season in suitable or occupied habitats.

4. Implement the applicable protective measures for this species that are contained in the July 2004 "Recommended Protection Measures for Pesticide Applications in The Southwest Region of the U.S. Fish and Wildlife Service" when conducting chemical treatments.

ACUNA CACTUS (*Echinomastus erectrocentus* var. *acunensis*)

Acuna cactus can be up to 7 inches tall and 4 inches in diameter. The stems are spherical when young becoming ovoid-cylindrical when mature. The areoles are borne on the tubercles. The central spines are maroon or mauve, and upturned. The plant blooms in the spring (March) and the flowers are rose-pink, lavender, or pink-purple. Acuna cactus seems to be restricted to well-drained knolls and gravel ridges between major washes in the Palo Verde-Saguaro plant association of the Sonoran Desert. Populations are known to occur in Organ Pipe Cactus National Monument, the Coffeepot Mountains (BLM lands), Arizona State lands, and private lands. Acuna cactus is also known from Sonora, Mexico. The acuna cactus population on BLM lands seemed secure, with many adults flowering (site visit in 2002). Threats to acuna cactus are illegal collection, habitat degradation from undocumented alien traffic and Border Patrol activities, mining, and development. The continued protection of populations on BLM lands is important for the conservation of this species because threats on non-Federal lands are high with little or no section 7 protection for these populations.

FICKEISEN PLAINS CACTUS *(Pediocactus peeblesianus* var. *fickeiseniae*)

Fickeisen plains cactus is a very small (up to 3 inches), unbranched cactus that shrinks into gravely soils after flowering and fruiting, especially during dry periods. The stems are covered with tubercles; each tubercle has 3-7 radial spines and one central spine. The central spine is approximately 0.375 inches long, whitish, and curved upward. The flowers are cream-yellow or yellowish-green, about 1 inches in diameter, and produced on the apex of the stem. The plants flower in April. It is endemic to soils derived from exposed layers of Kaibab limestone. Fickeisen plains cacti are known from BLM, Forest Service, Navajo Nation, NPS, Arizona State, and private lands. The BLM has been monitoring Fickeisen plains cactus populations since 1986. The populations seem stable, but seem to have low reproduction.

Conservation Recommendations for Acuna cactus and Fickeisen plains cactus

We recommend that the BLM:

1. Monitor the effects of suppression activities on all populations of listed plants within the action area.

2. Monitor the effects of fire suppression activities on the spread of non-native species within the action area.

3. Actively participate in the recovery of, and any revision of the recovery plan for, listed plant species on BLM lands.

4. Fund, aid, or establish research or study projects regarding fire ecology and conservation listed plant species on BLM lands.

5. Educate employees and your public users about listed plant species.

6. Map the known locations of these plant populations and avoid them during fire suppression efforts. Both of these species occur in plant communities that are fire-adapted. These populations are located in remote areas with little to no development so fire suppression should not be a high priority near Acuna cactus and Fickeisen plains cactus plant populations.

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APPENDIX B (CONSERVATION MEASURES)

The following section is an excerpt from the BLM Arizona State Office Biological Evaluation for the Proposed Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management, Finding of No Significant Impact and Environmental Assessment, March 2004, pages 205 to 224, as modified during this consultation.

7.0 CONSERVATION MEASURES

For all fire management activities (wildfire suppression, wildland fire use, prescribed fire, and mechanical, chemical, and biological vegetation treatments), the following Conservation Measures will be implemented as part of the proposed action. These Conservation Measures are intended to provide Statewide consistency in reducing the effects of fire management actions on Federally threatened, endangered, proposed, and candidate ("Federally protected") species. Conservation Measures noted as "Recommended" are discretionary for implementation, but are recommended to help minimize effects to Federally protected species. Procedures within the Interagency Standards for Fire and Fire Aviation Operations 2003, including future updates, relevant to fire operations that may affect Federally protected species or their habitat are incorporated here by reference.[4]

Firefighter and public safety is the first priority in every fire management activity. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources must be based on the values to be protected, human health and safety, and costs of protection (2001 Federal Wildland Fire Management Policy). However, implementing the following Conservation Measures during fire suppression to the extent possible, and during the proposed fire management activities as required, would minimize or eliminate the effects to Federally protected species and habitats.

During fire suppression actions, Resource Advisors will be designated to coordinate concerns regarding Federally protected species, and to serve as a liaison between the Field Office Manager and the Incident Commander/Incident Management Team. They will also serve as a field contact representative (FCR) responsible for coordination with the USFWS. The Resource Advisors will have the necessary information on Federally protected species and habitats in the area and the available Conservation Measures for the species. They will be briefed on the intended suppression actions for the fire, and will provide input on which Conservation Measures are appropriate, within the standard constraints of safety and operational procedures. The Incident Commander has the final decision-making authority on implementation of Conservation Measures during fire suppression operations.

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[4] BLM, NPS, USFWS, USFS. 2003. *Interagency Standards for Fire and Fire Aviation Operations 2003*. Department of the Interior, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service; Department of Agriculture, U.S. Forest Service. These standards can be found at: http://www.fire.blm.gov/Standards/redbook.htm (*Note:* This document is updated annually. For BLM, this document is Handbook 9213-1).

Because of the number of species located within the action area for the proposed Statewide LUP Amendment, combined with a variety of fire suppression and proposed fire management activities, conflicts may occur in attempting to implement all Conservation Measures for every species potentially affected by a particular activity. Implementing these Conservation Measures effectively would depend on the number of Federally protected species and their individual life history or habitat requirements within a particular location that is being affected by either fire suppression or a proposed fire management activity. This would be particularly true for timing restrictions on fuels treatment activities, if the ranges of several species with differing restrictions overlap, making effective implementation of the activity unachievable. Resource Advisors (in coordination with the USFWS), Fire Management Officers or Incident Commanders, and other resource specialists would need to coordinate to determine which Conservation Measures would be implemented during a particular activity. If Conservation Measures for a species cannot be implemented, BLM would be required to initiate Section 7 consultation with the USFWS for that particular activity.

BLM will update their local Fire Management Plans and prepare implementation level plans to include site-specific actions for managing wildfire and fuels in accordance with the new Federal fire policies, based on guidance provided in the Decision Records for this Statewide LUP Amendment. These plans will be coordinated with the USFWS and the Arizona Game and Fish Department (AGFD) to address site-specific concerns for Federally protected species. The Fire Management Plans and implementation level plans will incorporate the Conservation Measures included in this Statewide LUP Amendment for Federally protected species occurring within each Fire Management Zone. Consultation with the USFWS will occur on implementationlevel plans, as necessary.

7.1 Conservation Measures for Fire Management Activities

7.1.1 Wildland Fire Suppression (FS)

The following Conservation Measures will be implemented during fire suppression operations, unless firefighter or public safety, or the protection of property, improvements, or natural resources, render them infeasible during a particular operation. Each Conservation Measure has been given an alphanumerical designation for organizational purposes (*e.g.*, FS-1). Necessary modifications of the Conservation Measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the Resource Advisor, and coordinated with the USFWS.

FS-1 Protect known locations of habitat occupied by Federally listed species. Minimum Impact Suppression Tactics (M.I.S.T.) will be followed in all areas with known Federally protected species or habitat [Appendix U, *Interagency Standards for Fire and Aviation Operations 2003*, or updates].

FS-2 Resource Advisors will be designated to coordinate natural resource concerns, including Federally protected species. They will also serve as a field contact representative (FCR) responsible for coordination with the USFWS. Duties will include identifying protective measures endorsed by the Field Office Manager, and delivering these measures to the Incident Commander; surveying prospective campsites, aircraft landing and fueling sites; and performing other duties necessary to ensure adverse effects to Federally protected

species and their habitats are minimized. On-the-ground monitors will be designated and used when fire suppression activities occur within identified occupied or suitable habitat for Federally protected species.

FS-3 All personnel on the fire (firefighters and support personnel) will be briefed and educated by Resource Advisors or designated supervisors about listed species and the importance of minimizing impacts to individuals and their habitats. All personnel will be informed of the conservation measures designed to minimize or eliminate take of the species present. This information is best identified in the incident objectives.

FS-4 Permanent road construction will not be permitted during fire suppression activities in habitat occupied by Federally protected species. Construction of temporary roads is approved only if necessary for safety or the protection of property or resources, including Federally protected species habitat. Temporary road construction should be coordinated with the USFWS, through the Resource Advisor.

FS-5 Crew camps, equipment staging areas, and aircraft landing and fueling areas should be located outside of listed species habitats, and preferably in locations that are disturbed. If camps must be located in listed species habitat, the Resource Advisor will be consulted to ensure habitat damage and other effects to listed species are minimized and documented. The Resource Advisor should also consider the potential for indirect effects to listed species or their habitat from the siting of camps and staging areas (*e.g.,* if an area is within the water flow pattern, there may be indirect effects to aquatic habitat or species located off-site).

FS-6 All fire management protocols to protect Federally protected species will be coordinated with local fire suppression agencies that conduct fire suppression on BLM-administered lands to ensure that the agency knows how to minimize impacts to Federally protected species in the area.

FS-7 The effectiveness of fire suppression activities and Conservation Measures for Federally protected species should be evaluated after a fire, when practical, and the results shared with the USFWS and AGFD. Revise future fire suppression plans and tactical applications as needed and as practical.

7.1.2 Fuels Treatments (prescribed burning and other fuels management) (FT)

The following Conservation Measures **are mandatory** when implementing wildland fire use, prescribed fires, and the proposed vegetation treatments (mechanical, chemical, biological):

FT-1 Biologists will be involved in the development of prescribed burn plans and vegetation treatment plans to minimize effects to Federally protected species and their habitats within, adjacent to, and downstream from proposed project sites. Biologists will consider the protection of seasonal and spatial needs of Federally protected species (*e.g.*, avoiding or protecting important use areas or structures and maintaining adequate patches of key habitat components) during project planning and implementation.

FT-2 M.I.S.T. will be followed in all areas with known Federally protected species or habitats.

FT-3 Pre-project surveys and clearances (biological evaluations/assessments) for Federally protected species will be required for each project site before implementation. All applicable Conservation Measures will be applied to areas with unsurveyed suitable habitat for Federally protected species, until a survey has been conducted by qualified personnel to clear the area for the treatment activity.

FT-4 Use of motorized vehicles during prescribed burns or other fuels treatment activities in suitable or occupied habitat will be restricted, to the extent feasible, to existing roads, trails, washes, and temporary fuelbreaks or site-access routes. If off-road travel is deemed necessary, any cross-country travel paths will be surveyed prior to use and will be closed and rehabilitated after the prescribed burn or fuels treatment project is completed.

FT-5 As part of the mandatory fire briefing held prior to prescribed burning, all personnel (firefighters and support personnel) will be briefed and educated by Resource Advisors or designated supervisors about listed species and the importance of minimizing impacts to individuals and their habitats. All personnel will be informed of the Conservation Measures designed to minimize or eliminate take of the species present.

7.1.3 Rehabilitation and Restoration (RR)

RR-1 When rehabilitating important areas for Federally listed species that have been damaged by fire or other fuels treatments, the biologist will give careful consideration to minimizing short-term and long-term impacts. Someone who is familiar with fire impacts and the needs of the affected species will contribute to rehabilitation plan development. Appropriate timing of rehabilitation and spatial needs of Federally listed species will be addressed in rehabilitation plans.

RR-2 Seed from regionally native or sterile alien (non-native) species of grasses and herbaceous vegetation will be used in areas where reseeding is necessary following ground disturbance to stabilize soils and prevent erosion by both wind and water.

RR-3 Sediment traps or other erosion control methods will be used to reduce or eliminate influx of ash and sediment into aquatic systems.

RR-4 Use of motorized vehicles during rehabilitation or restoration activities in suitable or occupied habitat will be restricted, to the extent feasible, to existing roads, trails, or washes, and to temporary access roads or fuelbreaks created to enable the fire suppression, prescribed burn, or fuels treatment activities to occur. If off-road travel is deemed necessary, any cross-country travel paths will be surveyed prior to use and will be closed and rehabilitated after rehabilitation or restoration activities are completed.

RR-5 All temporary roads, vehicle tracks, skid trails, and off-road vehicle (ORV) trails resulting from fire suppression and the proposed fire management activities will be rehabilitated (water bars, etc.), and will be closed or made impassible for future use.

RR-6 Burned area emergency rehabilitation (BAER) activities and long-term restoration activities should be monitored, and the results provided to the USFWS and AGFD. Section 7 consultation for BAER activities will be conducted independently, if necessary.

7.2 Conservation Measures For Fire Management Activities In Riparian and Aquatic Habitats (RA)

7.2.1 Wildland Fire Suppression and Rehabilitation

The following Conservation Measures will be implemented during fire suppression operations in riparian, wetland, or aquatic habitats, unless firefighter or public safety, or the protection of property, improvements, or natural resources, render them infeasible during a particular operation. Necessary modifications of the Conservation Measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the Resource Advisor, and coordinated with the USFWS. The BLM's 1987 policy Statement on riparian area management defines a riparian area as "an area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil."

RA-1 During wildfire suppression, apply M.I.S.T. within riparian areas. Fire suppression actions in riparian areas should be prioritized to minimize damage to stands of native vegetation from wildfire or suppression operations. To the extent possible, retain large, downed woody materials and snags that are not a hazard to firefighters.

RA-2 Fire suppression and rehabilitation in riparian corridors will be coordinated with the Resource Advisor or qualified biologist approved by BLM.

RA-3 Site-specific implementation plans that include project areas with Federally protected aquatic or riparian-obligate species will specify fire management objectives and wildland fire suppression guidance, taking into account the special concerns related to these species.

RA-4 In riparian areas, use natural barriers or openings in riparian vegetation where possible as the easiest, safest method to manage a riparian wildfire. Where possible and practical, use wet firebreaks in sandy overflow channels rather than constructing firelines by hand or with heavy equipment.

RA-5 Construction or development of a crossing for motorized vehicles across a perennial stream will not be permitted, unless an established road already exists or where dry, intermittent sections occur.

RA-6 Avoid the use of fire retardants or chemical foams in riparian habitats or within 300 feet of aquatic habitats, particularly sites occupied by Federally protected species. Apply operational guidelines as Stated in the *Interagency Standards for Fire and Fire Aviation Operations 2003 (or updates),* "Environmental Guidelines for Delivery of Retardant or Foam Near Waterways," Chapter 8 (pp. 8-13 through 8-15).

RA-7 Priority for placement of fire camps, fire staging areas, and aircraft landing or refueling sites will be outside riparian areas or river/stream corridors.

RA-8 When using water from sources supporting Federally protected species, care must be taken to ensure adverse impacts to these species are minimized or prevented. Unused water from fire abatement activities will not be dumped in sites occupied by Federally protected aquatic species to avoid introducing non-native species, diseases, or parasites.

RA-9 If water is drafted from a stock tank or other body of water for fire suppression, it will not be refilled with water from another tank, lakes, or other water sources that may support non-native fishes, bullfrogs, crayfish, or salamanders.

RA-10 Use of containment systems for portable pumps to avoid fuel spills in riparian or aquatic systems will be required.

7.2.2 Fuels Treatments (prescribed fire; mechanical, chemical, and biological treatments)

The following Conservation Measures **are mandatory** when implementing wildland fire use, prescribed fires, and the proposed vegetation treatments (mechanical, chemical, biological) within riparian, wetland, or aquatic habitats.

RA-12 All Conservation Measures for wildland fire suppression (**RA-1 to RA-11, Section 2.1**) also apply to fuels treatment activities (prescribed fire; mechanical, chemical, and biological treatments) in riparian, wetland, and aquatic habitats.

RA-13 Fire management treatments within or adjacent to riparian and aquatic habitats will be designed to provide long-term benefits to aquatic and riparian resources by reducing threats associated with dewatering and surface disturbance, or by improving the condition of the watershed and enhancing watershed function.

RA-14 For priority fire/fuels management areas (*e.g.*, WUIs) with Federally protected species or designated critical habitat downstream, BLM biologists and other resource specialists, as appropriate, in coordination with USFWS and AGFD, will determine:

A) The number of acres and the number of projects or phases of projects to occur within one watershed per year.

B) An appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream.

C) Where livestock grazing occurs in areas that have been burned, specialists will determine when grazing can be resumed. Such deferments from grazing will only occur when necessary to protect streams from increased ash or sediment flow into streams.[5]

If agreement cannot be reached or treatment will not meet fuel reduction objectives, BLM will re-initiate consultation. Our authority to make these types of changes is in the regulations at 43 CFR 4110.3-3(b).

7.3 Species Specific Conservation Measures

In addition to the general Conservation Measures listed in **Sections 1.0** and **2.0**, the following species-specific Conservation Measures will be applied during wildfire suppression to the extent possible, and will be required during fuels treatment activities (wildland fire use, prescribed fire, vegetation treatments). Necessary modifications of the Conservation Measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the Resource Advisor, and coordinated with the USFWS.

7.3.1 Amphibians [Chiricahua leopard frog (FT); Relict leopard frog (FC)]

AM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

AM-2 For fire management sites with habitat for the Chiricahua leopard frog, unsurveyed sites will be considered occupied unless surveyed prior to project implementation.

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[5] The Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook, Exhibit 4-2 ,BLM supplemental guidance, page 5 of 9 (http://fire.r9.fws.gov/ifcc/ESR/handbook/4PolicyGuidance.htm) establishes the following policy for livestock exclusion following burns:

> Exclusion of livestock is critical for the recovery of burned vegetation or establishment and maintenance of new seedings and use of these areas should not be permitted until the vegetation recovers or is established. Both re-vegetated and, burned but not re-vegetated areas, will be closed to livestock grazing for at least two growing seasons following the season in which the wildfire occurred to promote recovery of burned perennial plants and/or facilitate the establishment of seeded species. Livestock permittees must be informed of the closure early during the plan preparation process, and livestock closures will be made a condition or term on the grazing license or permit through the issuance of grazing decision (see 43 CFR 4160). Livestock closures for less than two growing seasons may be justified on a case-by-case basis based on sound resource data and experience. Livestock management following seedling establishment and/ or burned area recovery should maintain both non-native and/or native species to meet land use (including Standards for Rangeland Health and Guidelines for Grazing Management) or activity plan objectives.

AM-3 Install sediment traps, as determined by a Resource Advisor or qualified biologist approved by BLM, upstream of tanks and ponds occupied by Chiricahua leopard frogs in order to minimize the amount of ash and sediment entering the water. Consultation with a qualified biologist during the planning phase will aid in determining sediment trap installation requirements (see Conservation Measures FT-1 and FT-3).

AM-4 All personnel performing fire management activities at any creek crossing will be informed of the potential presence of Chiricahua leopard frogs, their status, and the need to perform their duties to avoid impacts to the frog and its habitat.

AM-5 Except as needed in emergency situations to abate immediate fire threat or loss of life or property, no water will be drafted for fire suppression from bodies of water known to be occupied by the Chiricahua leopard frog.

7.3.2 Birds

7.3.2.1 Cactus ferruginous pygmy-owl (FE, Proposed CH)

FP-1 Treatment of riparian habitat, Sonoran desert/desertscrub, or mesquite-invaded grasslands under 4,000 feet in elevation that may support nesting cactus ferruginous pygmy owls will only occur during the non-nesting season of August 1 to January 31, unless pre-project surveys indicate the area does not support pygmy-owls or mitigation plans approved by the USFWS have alleviated negative consequences.

FP-2 Develop mitigation plans in coordination with the USFWS for fuels treatment projects (prescribed fire; vegetation treatments) that may adversely affect cactus ferruginous pygmy-owls or their habitat. Mitigation plans for prescribed fire shall limit to the extent practicable the possibility that fire would spread to riparian habitats. Mitigation plans will be approved by the USFWS.

FP-3 To the extent possible, maintain habitat features necessary to support breeding populations of the pygmy-owl within their historical range and review ongoing fire management activities for effects on essential habitat features needed by cactus ferruginous pygmy-owls. Modify activities, where necessary, to sustain the overall suitability of the habitat for the owls. Priority will be given to activities in or near occupied or recently (w/in the last 10 years) occupied habitat.

7.3.2.2 California brown pelican (FE)

BP-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

7.3.2.3 California Condor (FE; 10(j) species)

The following Conservation Measures apply to BLM-administered lands within the designated 10(j) area for California condors and outside of the 10(j) area if BLM observes a condor or is informed of a condor in the vicinity of a fire suppression activity.

CC-1 All helicopter dip tanks containing water will be covered when not in use or personnel will be stationed nearby until a cover is in place.

CC-2 Any presence of condors in the project area will be recorded and reported immediately to the Resource Advisor.

CC-3 If condors arrive at any area of human activity associated with fire suppression or fuels treatment projects (wildland fire use, prescribed fire, vegetation treatments), the birds will be avoided. The assigned Resource Advisor or a qualified wildlife biologist approved by BLM will be notified, and only permitted personnel will haze the birds from the area.

CC-4 All camp areas will be kept free from trash.

CC-5 Aircraft use along the Vermilion Cliffs or sites where condors are attempting to breed or roost will be minimized

CC-6 The Resource Advisor will contact the Peregrine Fund daily (at 520-606-5155 or 520-380-4667) to check on locations of condors during fire suppression or fuels treatment activities involving aviation. This information will be communicated to the Incident Commander and aviation personnel.

CC-7 If any fire retardant chemicals must be used in areas where condors are in the vicinity (see **CC-6**), the application area will be surveyed and any contaminated carcasses will be removed as soon as practical to prevent them from becoming condor food sources.

CC-8 Aircraft will remain 400 meters from condors in the air or on the ground unless safety concerns override this restriction. If airborne condors approach aircraft, aircraft will give up airspace to the extent possible, as long as this action does not jeopardize safety.

CC-9 Smoke from wildland fire use and prescribed fire projects will be managed to minimize negative effects to condor breeding. A potential wildland fire use event will not be initiated, or an existing event will be modified or terminated, to prevent or stop significant amounts of smoke, or smoke that will remain in place for an extended period of time, or chronic smoke events, from occurring in area(s) where condors are attempting to breed.

CC-10 BLM will adhere to the air quality standards set by the Arizona Department of Environmental Quality.

7.3.2.4 Northern aplomado falcon (FE)

AF-1 If aplomado falcons are reestablished or are discovered on public lands, and they nest in a fuels management project area, BLM will implement temporary closures to human access and project implementation (wildland fire use, prescribed burning, vegetation treatments) within ½ mile of nest sites during the breeding season. Wildland fire use and prescribed burning will be conducted in a manner to ensure nest sites are more than ½ mile from downwind smoke effects.

7.3.2.5 Southwestern willow flycatcher (FE)

WF-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

WF-2 Except where fires are active in occupied habitat, minimize unnecessary low-level helicopter flights during the breeding season (April 1 – September 30). Approach bucket dip sites at a 90-degree direction to rivers to minimize flight time over the river corridor and occupied riparian habitats. Locate landing sites for helicopters at least ¼ mile from occupied sites to avoid impacts to willow flycatchers and their habitat.

WF-3 Minimize use of chainsaws or bulldozers to construct firelines through occupied or suitable habitat except where necessary to reduce the overall acreage of occupied habitat or other important habitat areas that would otherwise be burned.

WF-4 Implement activities to reduce hazardous fuels or improve riparian habitats (prescribed burning or vegetation treatments) within occupied or unsurveyed suitable habitat for southwestern willow flycatchers only during the non-breeding season (October 1 to March 31).

WF-5 Avoid developing access roads that would result in fragmentation or a reduction in habitat quality. Close and rehabilitate all roads that were necessary for project implementation (see **RR-5**).

WF-6 Prescribed burning will only be allowed within ½ mile of occupied or unsurveyed suitable habitat when weather conditions allow smoke to disperse away from the habitat when birds may be present (breeding season of April 1 – September 30).

WF-7 Vegetation treatment projects adjacent to occupied or unsurveyed suitable habitat will only be conducted when willow flycatchers are not present (October 1 – March 31).

7.3.2.6 Yuma clapper rail (FE)

CR-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

CR-2 Any prescribed fire or vegetation treatment project in occupied or suitable marsh habitat would only occur between September 1 and March 15 to avoid the Yuma clapper rail breeding and molting seasons.

CR-3 Mechanical removal of overstory habitat (*Tamarisk*) could occur as early as August 15, after the breeding season for Yuma clapper rails.

CR-4 Herbicide application would not occur in Yuma clapper rail habitat and drift-inhibiting agents would be used to assure that the herbicide does not enter adjacent marsh areas.

7.3.2.7 Bald eagle (FT)

BE-1 No human activity within ½ mile of known bald eagle nest sites between December 1 and June 30.

BE-2 No tree cutting within ¼ mile of known nest trees.

BE-3 No human activity within ¼ mile of known bald eagle winter roost areas between October 15 and April 15.

BE-4 No tree cutting within the area immediately around winter roost sites as determined by BLM biologists.

BE-5 No helicopter or aircraft activity or aerial retardant application within ½ mile of bald eagle nest sites between December 1 and June 30 or winter roost sites between October 15 and April 15.

BE-6 Conduct prescribed burn activities outside of nesting season in a manner to ensure nest and winter roost sites are more than ½ mile from downwind smoke effects.

BE-7 Provide reasonable protective measures so fire prescription or fuels treatment will not consume dominant, large trees as identified by the Resource Advisor or qualified biologist approved by BLM within ½ mile of known nests and roosts of bald eagles Pre-treatment efforets should provide reasonable protection of identified nesting and roosting trees (see Conservation Measure FT-4).

7.3.2.8 Mexican spotted owl (FT, CH)

SO-1 BLM wildlife biologists will be involved early in the decision-making process for fuels management treatments (wildland fire use, prescribed fires, vegetation treatments) that are planned within suitable habitat or designated critical habitat for Mexican spotted owls (MSO).

SO-2 Suitable habitat and designated critical habitat for MSO will be surveyed prior to implementing prescribed fire or vegetation treatment activities on BLM-administered lands to determine MSO presence and breeding status. These fire management activities will only be implemented within suitable or critical habitat if birds are not present. If a spotted owl is discovered during these surveys, BLM will notify the USFWS to reinitiate consultation and will determine any additional Conservation Measures necessary to minimize or eliminate impacts to the owl.

SO-3 If a MSO is discovered during fire suppression or fuels treatment activities (wildland fire use, prescribed fire, vegetation treatments), the Resource Advisor or a qualified wildlife biologist will document the find and assess potential harm to the owl and advise the Incident Commander or project crew boss of methods to prevent harm. The information will include for each owl the location, date, and time of observation and the general condition of the owl. The Resource Advisor or biologist will contact the appropriate USFWS office, and BLM will reinitiate consultation for the fire suppression or project activities.

SO-4 Within MSO critical habitat designated on BLM-administered lands:

A) To minimize negative effects on the primary constituent elements of critical habitat, wildland fire use and prescribed fires will be managed primarily as low-intensity fires, with only scattered high-intensity patches. The BLM's objective will be to limit mortality of trees greater than 18 inches dbh to less than 5 percent, occasionally up to 10 percent, within critical habitat.

B) If fireline construction is necessary during fire suppression, wildland fire use, or prescribed fires, BLM will minimize the cutting of trees and snags larger than 18 inches dbh, and no trees or snags larger than 24 inches dbh will be cut unless absolutely necessary for safety reasons.

C) For mechanical vegetation treatments within critical habitat, BLM will minimize the cutting of trees and snags larger than 18 inches dbh, and no trees or snags larger than 24 inches dbh will be cut unless absolutely necessary for safety reasons.

D) Critical habitat disturbed during fire suppression or fuels treatment activities, such as fire lines, crew camps, and staging areas, will be rehabilitated to prevent their use by vehicles or hikers. Fire line rehabilitation will include pulling soil, duff, litter, woody debris, and rocks back onto the line to bring it up to grade and to make it blend in with the surrounding area. Such rehabilitation will be inspected one year after the event to ensure effectiveness.

SO-5 The following measures will be followed in suitable habitat (occupied or unoccupied) whenever consistent with objectives to reduce hazardous fuels:

A) Manage mixed-conifer and pine-oak forest types to provide continuous replacement nest habitat over space and time (Table III.B.1 of the Recovery Plan for Mexican Spotted Owl).

B) Incorporate natural variation, such as irregular tree spacing and various stand/patch sizes, into management prescriptions and attempt to mimic natural disturbance patterns.

C) Maintain all species of native vegetation in the landscape, including early seral species. To allow for variation in existing stand structures and provide species diversity, both uneven-aged and even-aged systems may be used as appropriate.

D) Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure.

E) Within pine-oak types, fuels treatment activities should emphasize retaining existing large oaks and promoting the growth of additional large oaks.

F) Retain all trees >24 inches dbh.

G) Retain hardwoods, large down logs, large trees, and snags. Emphasize a mix of size and age classes of trees. The mix should include large mature trees, vertical diversity, and other structural and floristic characteristics that typify natural forest conditions.

SO-6 The effects of fire suppression and fuels treatment activities on MSO and their habitat, and the effectiveness of these Conservation Measures, will be assessed after each fire event or fuels treatment project by the Resource Advisor or local biologist to allow evaluation of these guidelines and to allow the USFWS to track the species environmental baseline. Prescriptions for wildland fire use, prescribed fires, and vegetation treatments will be adjusted, if necessary.

7.3.2.9 Yellow-billed cuckoo (FC)

YC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

7.3.3 Fish

The following Conservation Measure will be implemented for all Federally protected fish species that may be affected by the Proposed Action during fire suppression to the extent possible, and are mandatory for wildland fire use, prescribed fire, and vegetation treatment activities:

FI-1 BLM will cooperate with other agencies to develop emergency protocols to decrease the impacts of fire suppression and fuels treatment activities on Federally listed fish species. Emergency protocols will include appropriate agency contacts, a list of facilities that can hold fish, sources of equipment needed (e.g., sampling gear, trucks) and how to address human health and safety issues.

In addition to implementing **FI-1**, the following species-specific Conservation Measures will also apply:

7.3.3.1 Bonytail chub (FE,CH)

BC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats to eliminate adverse effects from fire management activities to available spawning habitat along shorelines *(i.e.*, occupied reaches and critical habitat).

7.3.3.2 Desert pupfish (FE,CH)

DP-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats for occupied reaches and critical habitat.

DP-2 Conduct prescribed burns such that no more than one-half of the watershed of each desert pupfish site is burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments at greater than two-year intervals.

DP-3 Monitor, where practical, for fish kill immediately following the first runoff event after prescribed fires in watersheds containing desert pupfish.

DP-4 When considering which creek crossings to use for fire management activities, avoid crossings that are known to be occupied by desert pupfish.

7.3.3.3 Gila topminnow (FE)

GT-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

GT-2 Conduct prescribed burns such that no more than one-half of the watershed of each gila topminnow natural or reintroduction site is burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments at greater than two-year intervals.

GT-3 Monitor for fish kill, where practical, immediately following the first runoff event after prescribed fires in the watersheds containing gila topminnows.

GT-4 When considering which creek crossings to use for fire management activities, avoid crossings that are known to be occupied by Gila topminnow, when possible.

GT-5 Develop mitigation plans in coordination with the USFWS for each fuels management project (prescribed fire; vegetation treatments) that may adversely affect the gila topminnow. Mitigation plans for prescribed fire will limit to the extent practicable the possibility that fire would spread to riparian habitats. Mitigation plans will be approved by the USFWS.

GT-6 Cooperate with the USFWS and AGFD to identify site-specific measures, such as prescribed fires in grassland vegetation types to improve watershed conditions (*e.g.*, in the Cienega Creek watershed), to protect populations of gila topminnow from other resource program impacts.

7.3.3.4 Razorback sucker (FE, CH)

RS-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats to minimize adverse effects from fire management activities to available spawning habitat along shorelines (*i.e.,* occupied sites and critical habitat).

RS-2 Project boundaries for fire management activities will avoid or protect sensitive habitats of the razorback sucker.

7.3.3.5 Virgin River chub (FE, CH)

VC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats for the stretch of the Virgin River within Arizona.

7.3.3.6 Woundfin (FE, CH; Future 10(j) populations)

WM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats for the stretch of the Virgin River within Arizona.

7.3.3.7 Little Colorado spinedace (FT, CH)

LS-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats to minimize adverse effects from fire management activities on BLM-lands to occupied reaches and critical habitat on adjacent lands.

7.3.3.8 Loach minnow (FT, CH); Spikedace (FT, CH)

LM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats for occupied reaches and critical habitat.

LM-2 All reasonable efforts shall be made to minimize disturbance within the wetted areas of Aravaipa Creek or tributary channels.

LM-3 No heavy equipment will be used off-road during wildfire suppression and fuels treatment projects within the wetted areas of Aravaipa Creek.

LM-4 All reasonable efforts will be made to ensure that no pollutants, retardants, or chemicals associated with wildfire suppression and fuels treatment projects or activities enter surface waters of reaches occupied by these two fish species.

LM-5 Develop mitigation plans in coordination with the USFWS for each fuels management project (prescribed fire; vegetation treatments) that may adversely affect the loach minnow and spikedace. Mitigation plans for prescribed fire will limit to the extent practicable the possibility that fire would spread to riparian habitats. Mitigation plans will be approved by the USFWS.

LM-6 Cooperate with the USFWS and AGFD to identify site-specific measures, such as prescribed fires in grassland vegetation types to improve watershed conditions (*e.g.*, in the Aravaipa Creek watershed), to protect populations of loach minnow and spikedace from other resource program impacts.

7.3.3.9 Gila chub (PE, Proposed CH)

GC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats for occupied reaches and proposed critical habitat.

GC-2 When considering which creek crossings to use for fire management activities, avoid crossings that are known to be occupied by Gila chub, when possible.

GC-3 Cooperate with the USFWS and AGFD to identify site-specific measures, such as prescribed fires in grassland vegetation types to improve watershed conditions (*e.g.*, in the Cienega Creek watershed), to protect populations of gila chub from other resource program impacts.

7.3.4 Flowering Plants

The following Conservation Measures for known locations and unsurveyed habitat of all Federally protected plant species within the planning area will be implemented during fire suppression to the extent possible, and are mandatory for wildland fire use, prescribed fire, and vegetation treatment activities:

PL-1 Known locations and potential habitat for plant populations will be mapped to facilitate planning for wildland fire use, prescribed fires, and vegetation treatments, and to ensure protection of these populations during fire suppression.

PL-2 BLM will coordinate with FWS to delineate buffer areas around plant populations prior to prescribed fire and vegetation treatment activities. BLM will coordinate with USFWS during any emergency response and wildland fire use activities to ensure protection of plant populations from fire and fire suppression activities.

PL-3 During fire suppression, wildland fire use, and prescribed fire in habitat occupied by Federally protected plant species, no staging of equipment or personnel will be permitted within 100 meters of identified individuals or populations, nor will off-road vehicles be allowed within the 100-meter buffer area, unless necessary for firefighter or public safety or the protection of property, improvements, or other resources (see **FS-7**). One of the primary threats to many of these plant species is trampling/crushing from personnel and vehicles.

PL-4 No prescribed burning will be implemented within 100 meters of identified locations or unsurveyed suitable habitat for Federally protected and sensitive plant populations unless specifically designed to maintain or improve the existing population.

Holmgren milk-vetch (*Astragalus holmgreniorum*), Jones Cycladenia (*Cycladenia humilis* var. *jonesii*), Brady pincushion cactus (*Pediocactus bradyi*), Arizona cliffrose (*Purshia subintegra*), Nichol turk's head (*Echinocactus horizonthalonius* var. *nicholii*), and Peeble's Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*) are six (6) native, vegetative T&E species that are comprised of distinct populations inhabiting specific ecological areas within BLM managed lands in Arizona, with historically low fire frequencies, and a lack of fine fuel (fine herbaceous vegetation) continuity. No known structures exist within the confines of or immediately adjacent to the habitat locations for each species. The primary reasons for decline/vulnerability for these plant species include off-road vehicle traffic, road construction, urban development, mining activities, and overuse by livestock.

PL-5 The BLM is reasonably certain that in the areas where these six species occur, it is extremely unlikely that fire suppression activity will be necessary for the reasons provided above. Consequently, the specific areas where populations of Holmgren milk-vetch, Jones Cycladenia, Brady pincushion cactus, Arizona cliffrose, Nichol turk's head, and Peeble's Navajo cactus occur on BLM managed land, will be identified, delineated, and avoided by BLM fire suppression crews in the unlikely event that fire suppression activities are required in the immediate region.

There are no additional species-specific conservation measures for the following Federally-protected plant species: **Pima Pineapple Cactus** (*Coryphantha scheeri* var. *robustispina*), **Siler Pincushion Cactus** (*Pediocactus sileri*), **Acuña Cactus** (*Echinomastus erectocentrus* var. *acunensis*), **Fickeisen Plains Cactus** (*Pediocactus peeblesianus* var. *fickeiseniae*).

Huachuca Water Umbel (*Lilaeopsis schaffneriana* var. *recurva*) [FE, CH]
In addition to implementing **PL-1** through **PL-4**, the following species-specific Conservation Measures will also apply:

WU-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats.

7.3.4.2 Kearney's Blue Star (*Amsonia kearneyana*) [FE]

In addition to implementing **PL-1** through **PL-4**, the following species-specific Conservation Measures will also apply:

KB-1 No mechanical or chemical vegetation manipulation will be authorized by BLM, and no planting or seeding of nonnative plants will occur in the Brown Canyon watershed within the Baboquivari allotment.

KB-2 Planning and management for wildfire suppression in the watershed of Brown Canyon will be coordinated with the USFWS.

7.3.5 Mammals

7.3.5.1 Black-footed ferret (FE, 10(j) species)

If black-footed ferrets are discovered or re-established on public lands, then the following Conservation Measures will apply:

BF-1 No heavy equipment operation off of existing roads within ¼ mile of prairie dog towns having documented occurrence of black-footed ferrets.

BF-2 No aerial retardant application within 300 feet of prairie dog towns having documented occurrence of black-footed ferrets.

BF-3 No surface disturbance of prairie dog towns having documented occurrence of black-footed ferrets.

BF-4 In Apache and Navajo counties, prairie dog complexes suitable for black-footed ferrets within ¼ mile of proposed project sites will either be surveyed prior to project implementation or will be protected using measures **BF-1** through **BF-3**, as if ferrets were present.

7.3.5.2 Hualapai Mexican vole (FE)

HV-1 All treatment areas will be surveyed for Hualapai Mexican vole occupancy prior to fuels management treatments (prescribed fire, vegetation treatments) in order to determine project modifications and/or avoidance and protection of occupied areas. Until surveyed, all potential vole habitat is considered occupied. Areas not considered suitable (e.g., areas dominated by thick pine needles and duff) will also be surveyed prior to treatment to protect existing snag habitat for potential future use by Mexican spotted owls.

HV-2 Fuels management treatments (prescribed fire or vegetation treatments), construction of fire breaks, and/or staging areas for fire suppression or fuels management treatments will not be located within a vole use area. Occupied vole sites within proposed burn areas will be protected by firebreaks, precision ignition of fire around such sites, or total avoidance of the area. Fire plans will incorporate site-specific features (*e.g.,* rock outcroppings, game trails, etc.), fire behavior, and professional judgment to determine the most appropriate method to protect occupied vole habitat. Additionally, monitoring of fuel moisture and use of the appropriate minimum impact suppression tactics will be used to reach the desired objective at each site.

HV-3 To minimize impacts to Hualapai Mexican voles during the breeding season, prescribed burns and vegetation treatments in occupied or potential vole habitat will be implemented only between September 1 and March 15. Treatment in chaparral habitat will occur during the latter part of this time frame, in winter and/or early spring. These prescribed fires will follow the summer monsoon period to encourage additional herbaceous growth. Post-monsoon burns would help avoid the dry conditions that could result in extremely hot fires that reduce the recruitment of grasses and forbs. Areas not considered suitable for Hualapai Mexican voles (*e.g.,* dominated by thick pine needles and duff) may be burned prior to September 1, if surveyed prior to treatment.

HV-4 Provide a 75- to 100-foot, minimum, unburned vegetation buffer between fuels treatment sites and riparian and dry wash areas to decrease erosion into and sedimentation of the occupied or potentially occupied vole habitat. Within ponderosa pine treatment sites, use of dry washes as a fire line may be appropriate and result in less disturbance than construction of a cup trench above the wash. Under such circumstances, BLM will prepare the wash as a fire line by raking duff and removing by hand dead branches and other debris.

HV-5 The terms and conditions from the Pine Lake Wildland/Urban Interface Biological Opinion (BLM Kingman Field Office; Consultation No. 02-21-01-F-241) continue to apply to the Pine Lake project.

7.3.5.3 Jaguar (FE)

JA-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats to eliminate adverse effects to jaguars that may occur in dense riparian habitats on BLM-administered lands.

JA-2 Maintain dense, low vegetation in major riparian or xero-riparian corridors on BLM-administered lands in identified locations south of InterState 10 and Highway 86. Locations will be identified in site-specific fire management plans.

7.3.5.4 Lesser long-nosed bat (FE)

LB-1 Instruct all crew bosses (wildfire suppression, managed wildfire, prescribed fire, and vegetation treatments) in the identification of agave and columnar cacti and the importance of their protection.

LB-2 Prior to implementing any fuels treatment activities (prescribed fire, vegetation treatments), pre-project surveys will be conducted for paniculate agaves and saguaros that may be directly affected by fuels management activities.

LB-3 Protect long-nosed bat forage plants -- saguaros and high concentrations of agaves -- from wildfire and fire suppression activities, and from modification by fuels treatment activities (prescribed fire, vegetation treatments), to the greatest extent possible. "Agave concentrations" are contiguous stands or concentrations of more than 20 plants per acre. Avoid driving over plants, piling slash on top of plants, and burning on or near plants. Staging areas for fire crews or helicopters will be located in disturbed sites, if possible.

LB-4 No seeding/planting of nonnative plants will occur in any wildfire rehabilitation site or fuels treatment site with paniculate agaves or saguaros.

LB-5 A mitigation plan will be developed by the Bureau in coordination with the USFWS for prescribed fires or fuels management projects (mechanical, chemical, biological treatments) within 0.5 mi of bat roosts or in areas that support paniculate agaves or

saguaros. The mitigation plan will ensure that effects to bat roosts and forage plants are minimized and will include monitoring of effects to forage plants. The plan will be approved by the USFWS.

LB-6 BLM personnel would examine concentrations of agaves (including shindagger – *A. schottii*) within each proposed fuels treatment area, and blackline or otherwise protect from treatments any significant concentrations of agaves that appear to be amidst fuel loads that could result in mortality greater than 20 percent (>50% for *A. schottii).* BLM personnel would determine which significant agave stands are prone to mortality greater than 20 percent (>50% for *A. schottii*) (see Conservation Measures FT-1 and FT-3).

7.3.5.5 Mexican gray wolf (FE; 10(j) species)

If Mexican gray wolves are re-established on public lands, then the following Conservation Measures will apply:

GW-1 No human disturbance associated with fire management activities will be within one mile of a den site from April1 to June 30.

GW-2 No human disturbance associated with fire management activities will be within one mile of known rendezvous sites from April 1 to June 30.

7.3.5.6 Ocelot (FE)

No species-specific Conservation Measures developed.

7.3.5.7 Sonoran pronghorn (FE)

No species-specific Conservation Measures developed.

7.3.5.8 Black-tailed prairie dog (FC)

If black-tailed prairie dogs are re-established on public lands, then the following Conservation Measures will apply:

PD-1 No heavy equipment operation off of existing roads within ¼ mile of black-tailed prairie dog colonies

PD-2 No aerial retardant application within ¼ mile of black-tailed prairie dog colonies.

PD-3 No surface disturbance of black-tailed prairie dog colonies.

7.3.6 Reptiles

7.3.6.1 Desert tortoise, Mojave population (FT)

DT-1 Take appropriate action to suppress all wildfires in desert tortoise habitat, based on preplanned analysis and consistent with land management objectives, including threats to life and property. Full suppression activities will be initiated within key desert tortoise habitat areas identified in site-specific Fire Management Plans.

DT-2 Suppress all wildfires in desert tortoise habitat with minimum surface disturbance, in accordance with the guidelines in Duck *et al.* (1995) and the 1995 programmatic biological opinion on fire suppression on the Arizona Strip (02-21-95-F-379).

DT-3 Pre-position suppression forces in critical areas during periods of high fire dangers.

DT-4 As soon as practical, all personnel involved in wildfire suppression (firefighters and support personnel) will be briefed and educated about desert tortoises and the importance of protecting habitat and minimizing take, particularly due to vehicle use. Fire crews will be briefed on the desert tortoise in accordance with Appendix II of Duck *et al.* (1995).

DT-5 If wildfire or suppression activities cannot avoid disturbing a tortoise, the Resource Advisor or monitor will relocate the tortoise, if safety permits. The tortoise will be moved into the closest suitable habitat within two miles of the collection site that will ensure the animal is reasonably safe from death, injury, or collection associated with the wildfire or suppression activities. The qualified biologist will be allowed some discretion to ensure that survival of each relocated tortoise is likely. If the extent or direction of movement of a fire makes sites within two miles of the collection site unsuitable or hazardous to the tortoise or biologists attempting to access the area, the tortoise may be held until a suitable site can be found or habitat is safe to access and not in immediate danger of burning. The Resource Advisor will contact the USFWS Arizona Ecological Services Field Office (AESFO) as soon as possible concerning disposition of any animals held for future release. Desert tortoises will not be placed on lands outside the administration of the Federal government without the written permission of the landowner. Handling procedures for tortoises, including temporary holding facilities and procedures, will adhere to protocols outlined in Desert Tortoise Council (1994).

DT-6 Upon locating a dead, injured, or sick desert tortoise, initial notification must be made to the appropriate USFWS Law Enforcement Office 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, and any other pertinent information. The notification will be sent to the Law Enforcement Office with a copy to the AESFO

DT-7 Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible State. If possible, the remains of intact desert tortoises will be placed with educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above will be obtained and the carcass left in place. Arrangements regarding proper disposition of potential museum specimens will be made with the institution prior to implementing the action. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should any treated

desert tortoise survive, the USFWS should be contacted regarding final disposition of the animal.

DT-8 The Resource Advisor or monitor(s) will maintain a record of all desert tortoises encountered during fire suppression activities. This information will include for each desert tortoise: 1) locations and dates of observation; 2) general condition and health, including injuries and State of healing, and whether animals voided their bladders; 3) location moved from and to; and 4) diagnostic markings (i.e., identification numbers of marked lateral scutes). No notching of scutes or replacement of fluids with a syringe is authorized.

DT-9 Prior to moving a vehicle, personnel will inspect under the vehicle for tortoises. If a tortoise is found under the vehicle, the tortoise will be allowed to move away from the vehicle on its own accord, if possible. Otherwise an individual will move the tortoise to a safe locality in accordance with **FS-2** and **DT-5**.

DT-10 Off-road vehicle activity will be restricted to the minimum necessary to suppress wildfires. Vehicles will be parked as close to roads as possible, and vehicles will use wide spots in roads or disturbed areas to turn around. Whenever possible, a biologist or crewperson trained to recognize tortoises and their shelter sites will precede any vehicle traveling off-road to direct the driver around tortoises and tortoise burrows. Whenever possible, local fire-fighting units should provide direction and leadership during off-road travel because of their expertise and knowledge of area sensitivities.

DT-11 Fire-related vehicles will drive slow enough to ensure that tortoises on roads can be identified and avoided.

DT-12 Fire crews or rehabilitation crews will, to the extent possible, obliterate off-road vehicle tracks made during fire suppression in tortoise habitat, especially those of tracked vehicles, to reduce future use.

DT-13 To the maximum extent practical, campsites, aircraft landing/fueling sites, and equipment staging areas will be located outside of desert tortoise habitat or in previously disturbed areas. If such facilities are located in desert tortoise habitat, 100 percent of the site will be surveyed for desert tortoises by a qualified biologist approved by BLM, whenever feasible. Any tortoises found will be moved to a safe location in accordance with **FS-2** and **DT-5**. All personnel located at these facilities will avoid disturbing active tortoise shelter sites.

DT-14 Elevated predation by common ravens or other predators attributable to fire suppression activities will be reduced to the maximum extent possible. Work areas, including campsites, landing/fueling sites, staging areas, etc. will be maintained in a sanitary condition at all times. Waste materials at those sites will be contained in a manner that will avoid attracting predators of desert tortoises. Waste materials will be disposed of at an appropriate waste disposal site. “Waste” means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment.

DT-15 Backfiring operations are permitted where necessary in desert tortoise habitat. Burning out patches of identified habitat within or adjacent to burned areas is not permitted as a standard fire suppression measure unless necessary for firefighter or public safety or to protect property, improvements, or natural resources.

DT-16 Use of foam or retardant is authorized within desert tortoise habitat.

DT-17 Rehabilitation of vegetation in tortoise habitat will be considered, including seeding, planting of perennial species, etc.

DT-18 Recovery of vegetation will be monitored, including establishing and monitoring paired plots, inside and outside burned areas in tortoise habitat. Recovery plans will be coordinated with the USFWS and AGFD.

DT-19 The effectiveness of wildfire suppression activities and desert tortoise Conservation Measures will be evaluated after a wildfire. Procedures will be revised as needed.

7.3.6.2 New Mexico ridge-nosed rattlesnake (FT)

RN-1 To the extent possible, minimize surface disturbing activities from fire suppression and fuels treatment activities within New Mexico ridge-nosed rattlesnake habitat on BLM-administered lands in the southern Peloncillo Mountains, particularly during active periods for snakes (July through October).

RN-2 Prior to using wildland fire for resource benefit, cool season (November – March) prescribed fire or other fuel treatments should be used to reduce unnatural fuel loads within suitable habitat to avoid catastrophic fires and loss of canopy cover.

RN-3 All fires that occur outside of prescriptions that will not result in low intensity, low severity burns will be fully suppressed within or near suitable New Mexico ridge-nosed rattlesnake habitat.

APPENDIX C (PROPOSED ACTIONS BY TREATMENT TYPE)

Table C-1. Approximate treatment acres projected within habitats of Federally protected species analyzed in the Biological Evaluation.

Species	N/A	Treatment Type (approximate acres[1])				
		Rx Fire	Mechanical	Chemical	Biological	
Amphibians[2]						
Chiricahua leopard frog		0	0	0	0	
Relict leopard frog		0	0	0	0	
Birds[2]						
Cactus ferruginous pygmy-owl[3]		0	0	0	0	
California brown pelican		0	0	0	0	
California condor[4]		42,000	41,000	50,000	0	
Masked bobwhite quail		0	0	0	0	
Northern aplomado falcon	X					
Southwestern willow flycatcher[5]		1,900	2,200	1,500	0	
Yuma clapper rail[6]		100	0	0	0	
Bald eagle		0	0	0	0	
Mexican spotted owl[7]		26,000	26,000	0	0	
Yellow-billed cuckoo[5]		1,900	2,200	1,500	0	
Fish[8]						
Bonytail chub		100	10	10	0	
Desert pupfish[9]		5,000	0	0	0	
Gila topminnow[9]		5,000	0	0	0	
Razorback sucker		100	10	10	0	
Virgin River chub		1,400	1,400	1,400	0	
Woundfin		1,400	1,400	1,400	0	
Yaqui chub		0	0	0	0	
Yaqui topminnow		0	0	0	0	
Beautiful shiner	X					
Little Colorado spinedace	X					
Loach minnow		0	0	0	0	
Spikedace		0	0	0	0	
Yaqui catfish		0	0	0	0	
Gila chub[9]		5,000	0	0	0	
Flowering Plants[10]						
Arizona cliffrose		0	0	0	0	
Brady pincushion cactus		0	0	0	0	

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Species	N/A	Treatment Type (approximate acres[1])				
		Rx Fire	Mechanical	Chemical	Biological	
Holmgren (Paradox) milk-vetch		0	0	0	0	
Huachuca water umbel[11]		500	0	0	0	
Kearney's blue-star		0	0	0	0	
Nichol Turk's head cactus		0	0	0	0	
Peebles Navajo cactus		0	0	0	0	
Pima pineapple cactus		0	0	0	0	
Jones cycladenia		0	0	0	0	
Siler pincushion cactus[12]		0	0	0	0	
Acuña cactus		0	0	0	0	
Fickeisen plains cactus		0	0	0	0	
Mammals[13]						
Black-footed ferret	X					
Hualapai Mexican vole		1,000	1,000	0	0	
Jaguar		5,000	0	0	0	
Lesser long-nosed bat		10,000	0	0	0	
Mexican gray wolf		5,000	0	0	0	
Ocelot		5,000	0	0	0	
Sonoran pronghorn		0	0	0	0	
Black-tailed prairie dog	X					
Reptiles						
Desert tortoise, Mohave population[14]		0	0	0	0	
New Mexico ridge-nosed rattlesnake[15]		100	0	0	0	

[1]Estimates show total acres projected over the assumed 10-year life of the Land Use Plan, not estimated acres per year. These are rough estimates, which are subject to change based on funding, program priorities, weather, and other factors. Final treatments and acres will be determined during pre-project planning and environmental analyses for site-specific and "batched" project plans.

[2]Acreages represent occupied habitat, including known nesting territories, unless otherwise footnoted.

[3]Acreages for cactus ferruginous pygmy-owls include occupied, suitable, and critical habitat.

[4]Acreages for California condors include treatments throughout 10(j) area.

[5]Acreages include treatments within occupied, suitable, and potential habitats for Southwestern willow flycatchers and yellow-billed cuckoos. Section 7 Consultation has already been completed for 500 acres of prescribed burning (Safford Field Office). The Yuma Field Office

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will be implementing small treatments (i.e., most treatments are small fuel breaks ≤10 acres) in migration habitat (approx. 20 acres prescribed fire, approximately 800 acres mechanical treatments, approximately 75 acres chemical treatments). Approximately 1,400 acres of tamarisk may be treated using a combination of prescribed fire and mechanical and chemical treatments along the Virgin River and adjacent waterways if a proposed project is funded. Those 1,400 acres are included in totals for each treatment type.

[6]Acreages include treatments in potential Yuma clapper rail habitat; typically decadent marshes that are presently unsuitable for Yuma clapper rail breeding until after treatment implementation.

[7]In the Kingman Field Office this includes treating ≤100 acres/year for a total of ≤1,000 acres (approximately 500 acres of Restricted Areas [Mixed Conifer and Ponderosa Pine-Gambel Oak Forest]; 300 acres of Other Forest and Woodland Types; and 200 acres of Steep Slopes Outside of PACs). In the Arizona Strip Field Office this includes treating approximately 2,500 acres/year of Other Forest and Woodland Types (Pure Ponderosa Pine and Pinyon-Juniper Woodlands) for a total of approximately 25,000 acres. Acres are reported for mechanical treatments and prescribed fire because the proportion of each treatment method has not been determined.

[8]Acreages for fish indicate treatments within the watersheds in which these species, and where applicable, their designated critical habitats, occur.

[9]Four to five thousand acres of tobosa grassland may be treated over 10 years in uplands near desert pupfish, Gila topminnow, and Gila chub populations, and within the guidelines of the current BO on pupfish and topminnow reintroductions (Agua Fria National Monument).

[10]Acreages include known locations and potential habitat for plant populations unless otherwise footnoted.

[11]Acreage also includes critical habitat for Huachuca water umbel. Section 7 consultation has already been completed for 500 acres of prescribed burning.

[12]Acreage includes high probability areas for Siler pincushion cactus. These areas will be proposed as ACECs in the new Arizona Strip RMP.

[13]Acreages for mammals include potential habitat for species that occur on BLM-administered lands

[14]Acreages for desert tortoises include suitable, occupied, and designated critical habitat.

[15]Acreages for New Mexico ridge-nosed rattlesnakes include suitable sites ranked 1, 2, 3, or 4 habitat. BLM manages no more than ~7,600 acres, a large majority of which lies below 5,000 ft. elevation.

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Projected treatments in southwestern willow flycatcher habitat, by Recovery and Management Units

Lower Colorado River RU, Parker-Southerly International Boundary MU

Yuma Field Office anticipates treating approximately 900 acres of monotypic salt cedar: 20 acres prescribed burning, 800 acres mechanically, and 75 acres chemically. Some areas have been selected specifically for their suitability for native riparian revegetation; soil conditions and water availability increase the likelihood of successful establishment. Other sites have been selected for fuel load reduction in the WUI. Depending upon location, distance from river channel, and depth to groundwater, salt cedar communities have differing suitability or potential to develop into southwestern willow flycatcher habitat. There are approximately 70,000 acres of mature salt cedar on the Lower Colorado River from Davis Dam to the International Boundary with Mexico (D. Repass, BLM, pers. comm. 2004). Most projects would occur in the Mittry Lake-Imperial Division area. While territories have been detected along the length of the Colorado River in this MU since the mid-1990s, no nests or successful reproduction have been detected. Migrating flycatchers use the Lower Colorado River from mid-May to early June (241 migrating flycatchers were documented in 2004). The BLM will not be treating any salt cedar from March 13 to September 15 to avoid willow flycatchers (conservation measure WF-4).

Areas selected for restoring native riparian vegetation are located where the BLM has the ability to provide irrigation to establish and maintain cottonwood and willow pole plantings. Natural regeneration from flooding is hampered by regulated flows of the Colorado River.

Lower Colorado River RU, Virgin MU

Arizona Strip Field Office anticipates treating salt cedar along the Virgin River and Beaver Dam Wash and will survey for flycatchers prior to any treatments. The earliest treatment will occur in 2006. They do not propose to treat suitable willow flycatcher habitat within the first few years of the project. In mixed native/salt cedar stands, salt cedar will be removed mechanically and chemically. Prescribed fire will only be used in monotypic salt cedar stands (H. Boyd, BLM, pers. comm. 2004). Treatments will occur in unsuitable habitat located from the downstream end of the Virgin River Gorge to the Nevada State line. Most of this salt cedar is located in sites too dry and high above the river channel to support cottonwood and willow or to grow to heights and densities needed to provide southwestern willow flycatcher habitat. The most significant salt cedar stand is 200 to 300 acres and is located below the Mesquite Diversion (M. Herder, BLM, pers. comm. 2004).

BLM proposes chemical treatments to control or remove salt cedar along the Virgin River. Garlon 4 (Triclopyr) and Arsenal (Imazapyr) are the two herbicides proposed for use; these are labeled for salt cedar control and removal and have been approved for use on BLM lands (BLM 1991). All herbicide use will follow guidelines and restrictions described in Appendix D of the BE. Conservation measure WF-7 restricts chemical treatment in occupied habitats to the period when flycatchers are not present (October 1 to March 31).

Gila RU, Middle Gla/San Pedro MU

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San Pedro Project Office does not anticipate conducting any significant salt cedar removal projects. Salt cedar is found only in isolated, small pockets on BLM-administered lands in this area. Small-scale projects are being considered under a separate consultation with the Arizona Ecological Services Office (M. Fredlake, BLM, pers. comm. 2004).

Safford Field Office has identified 80 acres of salt cedar for treatment on the Gila River within the Gila Box National Riparian Management Area (NRMA). To date, only a few migrant southwestern willow flycatchers, but no nesting birds, have been found in the Gila Box NRMA (Heidi Kuska, BLM, pers. comm. 2004).

Tucson Field Office does not anticipate conducting any salt cedar removal projects on the Middle Gila River or the Las Cienegas NCA (Darryl Tersey, BLM, pers. comm. 2004). Occupied or suitable southwestern willow flycatcher habitat on the NCA is located within native riparian vegetation. Flycatchers nested at this site in 2002. One bird was seen in 2003 but was not observed nesting (Karen Simms, BLM, pers. comm. 2004).

Table C-2. Projected treatments in Virgin River chub and woundfin habitat, by watershed, during the life of the LUP amendment (10 years).

	Prescribed Fire	Mechanical	**Chemical**	**Total**
Virgin River HUC	5,500 (8 mi^2)	0	0	5,500(8 mi^2)
Ft. Pierce HUC	14,500 (23 mi^2)	17,000 (26 mi^2)	35,000 (55 mi^2)	66,500 (104 mi^2)
Total	20,000 (31 mi^2)	17,000 (26 mi^2)	35,000 (55 mi^2)	72,000 (113 mi^2)

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APPENDIX D (CHIRICAHUA LEOPARD FROG DRAFT RECOVERY PLAN GUIDANCE)

The Technical and Stakeholder Subgroups of the Chiricahua Leopard Frog Recovery Team are developing a recovery plan for this species. The current draft of the recovery plan contains a "Mitigation Protocol" for projects affecting the frog, including fire projects. The following are excerpts from the Protocol. The Cienega Creek area is recognized as a "recovery focal area" in the draft recovery plan.

The following mitigation measures should be incorporated into all projects that may affect suitable frog habitats, sites selected for habitat restoration or creation, and movement corridors among sites within recovery focal areas. Included are projects located outside of recovery focal areas (e.g. projects in the watershed) that may affect habitats or frog populations within focal areas. The measures may be modified as necessary to conform to the nature of the project or type of disturbance. Project mitigation should also include measures for reducing the likelihood of disease transmission.

Fire suppression and prescribed fire

In regard to fire suppression near or in the watersheds of recovery focal areas, the following measures should be implemented to the degree that they do not compromise human safety or result in loss of homes or other high value property:

1. An objective of fire suppression should be protection of Chiricahua leopard frogs and their habitats.

2. All personnel on the fire should be briefed about protecting the Chiricahua leopard frog and its habitat.

3. On wildfires, Resource Advisors should be designated to coordinate listed species and other resource concerns, and serve as an advisor to the Incident Commander. Resource Advisors should monitor fire suppression activities to ensure that protective measures endorsed by the Incident Commander are implemented. The Resource Advisor should also perform other duties as necessary to ensure adverse effects to the Chiricahua leopard frog and its habitat are minimized. Resource Advisors should be on call 24 hours during the fire season.

4. Off-road vehicle activity should be kept to a minimum. Vehicles should be parked as close to roads as possible, and vehicles should use wide spots in roads to turn around. Whenever possible, local fire-fighting units should go off-road first because of their prior knowledge of the area.

5. To the degree possible, crew camps, equipment staging areas, and aircraft landing and refueling areas should be located away from Chiricahua leopard frog populations and sites selected for habitat restoration or creation. Whenever

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possible, these activities should be located in previously disturbed areas. If such activities are located in Chiricahua leopard frog habitats, measures should be taken to limit habitat disturbance and to locate sites in areas with minimal effects to the frog and its habitat (see measures for surface-disturbing construction projects, below).

6. Use of tracked vehicles should be restricted to activities that, in the judgment of the Incident Commander and in consultation with the Resource Advisor, might save a large area or important resources from fire.

7. Fire crews should, to the extent possible, obliterate vehicle tracks made during the fire where presence of tracks is likely to encourage off-road travel by recreationists.

8. No fire retardants or suppressants toxic to fish or amphibians should be used over habitats occupied by Chiricahua leopard frogs, tributary drainages, or on the watershed where these chemicals are likely to enter occupied frog habitats.

9. Water should not be drafted from stock tanks or other aquatic habitats if Chiricahua leopard frogs are present or likely to be present, of if the site is known to be chytrid-positive. If stock tanks are refilled after a fire, only sources of water known to be free of non-native predators and chytrids (such as well water) should be used as a source. Avoid water drops on Chiricahua leopard frog habitats unless the water is known to be free of non-natives and chytrids.

10. If fire burns in the watershed of an extant population of frogs and in the judgment of the Resource Advisor will result in significant ash or sediment flow into that habitat, measures such as construction of waterbars in firelines, etc. should be implemented to direct flow away from frog habitats. If ash and/or sediment flow is likely to occur despite these measures, frogs and tadpoles should be salvaged and held at a holding facility until toxic conditions abate or habitat can be restored. If possible, at least 20 frogs and/or 100 tadpoles should be salvaged. Salvage can often wait until the fire is controlled in the area of the habitat. Ash and sediment flow will not be a problem until significant rainfall occurs.

11. Rehabilitation of the burned areas should be undertaken, including seeding, planting of native perennial species, etc. Watersheds of occupied habitat and sites selected for habitat restoration/creation should be rested from grazing for the first two summer growing seasons (July, August, and September) following the fire.

12. Recovery of vegetation should be monitored.

13. The effectiveness of suppression activities and these measures should be evaluated after a fire. Procedures should be revised as needed.

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In regard to prescribed fire (including prescribed natural fire), the following measures should be implemented. If a prescribed fire escapes prescription, the measures above for fire suppression should also be implemented.

1. An objective of prescribed fire should be enhancement of Chiricahua leopard frog habitat, with a recognition that some short-term adverse effects may occur prior to habitat enhancement.

2. Measures 2, 4, 5, 7, 11, 12, and 13 from the fire suppression measures above should be implemented.

3. Only light burns should occur in the watersheds of occupied Chiricahua leopard frog habitats and sites selected for habitat restoration/creation. However, if higher intensity burns occur and biologists predict that ash or sediment may flow into frog habitats, measure 10 for fire suppression, above, should be implemented.

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APPENDIX E (CONDUCTING FUTURE CONSULTATIONS FOR SITE-SPECIFIC ACTIONS AND IMPLEMENTATION LEVEL PLANS UNDER THIS BIOLOGICAL OPINION)

This biological opinion analyzes the potential effects of implementing BLM's fire and fuels management program in Arizona. We have anticipated that take of some species from fire suppression activities and/or fire and fuels management treatments could occur. For these species, the maximum extent of incidental take that could occur was developed given the description of the proposed actions, including full implementation of the relevant general and species-specific conservation measures included in Appendix B of this document.

Fire Suppression

If your fire suppression actions are conducted in accordance with the description of the proposed actions, all relevant conservation measures, and the reasonable and prudent measures and terms and conditions identified for each species in this consultation, incidental take is exempted in this biological opinion and emergency consultation following the wildfire event will not be required. Emergency rehabilitation actions following wildfires have not been specifically analyzed in this biological and conference opinion and will be subject to separate, site-specific consultation, if these actions may affect a listed species or critical habitat.

Documentation of any incidental take during wildfire events is an important part of the reporting requirements of this biological opinion. If fire suppression actions resulting in incidental take account for all of the incidental take anticipated by this program-level consultation, you should reinitiate consultation because any future events may result in exceeding the authorized amount or extent of take.

If conservation measures addressing fire suppression actions are not followed during a wildfire event and you determine that a listed species and/or critical habitat may have been affected, you must request emergency consultation. A separate biological evaluation and biological opinion (as appropriate) will be developed during the consultation. Please note that the items listed in this biological opinion under "Reporting Requirements, Fire Suppression", should be included in the biological evaluation that you submit to us.

In addition, if new information reveals effects of fire suppression activities that were not considered in this opinion, reinitiation of consultation is required. New information may also include the discovery of new locations of species and/or habitat.

Fire and Fuels Management Treatments

We have anticipated that take of some species from fire and fuels management treatments could occur as a result of these proposed actions. For these species, we have anticipated the maximum amount or extent of incidental take that could occur, but because we have no specific project details, we do not know with certainty the specific effects that will result or the exact amount or extent of take that could occur. Therefore, we cannot exempt take for these actions in this consultation. The incidental take exemption will be provided in project-level biological opinions

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when you provide the specifics of your proposed actions. However, the extent of take that is anticipated in this consultation will be included at this time in the species' baselines for future consultations.

You will need to enter into additional consultation once site-specific projects are planned. These include programmatic wildland fire use plans and programmatic, batched, or individual prescribed fire and fuels treatment projects that include site-specific information, prescriptions, and treatment methods. The maximum extent of incidental take identified in this consultation functions as an indicator to let you know when the additive effects resulting from individual actions approaches the limits of our effects analysis. As this level of take is approached, you may need to reinitiate consultation on this Statewide program to ensure that projects are not disrupted because of unanticipated levels of impacts.

The applicable program-level reasonable and prudent measures and terms and conditions included in this biological and conference opinion will also be included in project-level incidental take Statements and should be considered during project planning. These program-level conditions are not mandatory until the incidental take is actually exempted in site-specific project consultations. During these future consultations, we may identify circumstances under which these conditions are unnecessary. We may also identify additional conditions that are required to minimize take resulting from these projects. Final reasonable and prudent measures and terms and conditions will be included in biological opinions for the future site-specific projects.