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In reply refer to:

R2/ES-TE
Cons. #2012-F-0004

March 30, 2012

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U.S. Forest Service, Southwestern Region
333 Broadway SE
Albuquerque, New Mexico 87102

Mr. Earl Stewart, Forest Supervisor
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Dear Mr. Newman:

The enclosed biological opinion (BO) responds to your request for reinitiation of formal consultation under section 7(a) of the Endangered Species Act of 1973 (Act), as amended. We received your letter requesting reinitiation along with the Biological Assessment (BA) titled *Biological Assessment for the Reinitiation of Consultation on the Forest Service's Continued Implementation of the Land and Resource Management Plans (LRMPs) for the 11 Southwestern Region National Forests and National Grasslands* on April 9, 2011.

The BA describes the programmatic nature of the LRMPs and analyzes the effects of LRMP implementation within each National Forest (NF) and one National Grassland (NG) in the Forest Service's Southwestern Region. Each NF has a separate chapter within the BA that specifically evaluates the potential effects to threatened and endangered species and their critical habitats resulting from the implementation of the Standards and Guidelines for that particular NF's, LRMP. In response to your BA and request for reinitiation, we have prepared an individual BO for each of the eleven NFs. The enclosed BO addresses the Forest Service's continued implementation of the LRMP for the Coconino NF of the Southwestern Region. This BO will be in place until the Coconino NF revises its LRMP and subsequently completes section 7 consultation.

Mr. Corbin L. Newman, Jr., Regional Forester
Mr. Earl Stewart, Forest Supervisor

Throughout this process, we have been working closely with your staff. We appreciate your willingness to cooperate and assist the Service during the completion of this consultation. If you have questions or comments, please contact me at the Arizona Ecological Services Office (AESO), at (602) 242-0210, (x244).

Sincerely,


 Steven L. Spangle
Field Supervisor

Enclosure

cc: Regional Consultation Coordinator, Fish and Wildlife Service, Albuquerque, NM
Chief, Threatened and Endangered Species, Fish and Wildlife Service, Albuquerque, NM
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BIOLOGICAL AND CONFERENCE OPINION

The Continued Implementation of the Land and Resource Management Plan
for
The Coconino National Forest
of the
Southwestern Region

Regional Office, Region 2
U.S. Fish and Wildlife Service

Cons. #2012-F-0004

March 30, 2012

Executive Summary

The accompanying document transmits the biological and conference opinion (BO/CO) of the U.S. Fish and Wildlife Service (FWS) in response to the U.S. Forest Service's (USFS) request for re-initiation of consultation in accordance with the Endangered Species Act of 1973 (Act or ESA), as amended. This opinion addresses the USFS's continued implementation of the Land and Resource Management Plan (LRMP) for the Coconino National Forest (NF) of the Southwest Region (proposed action), and their effects to 15 federally listed and eight designated or proposed CHs. The consultation approach used to complete this consultation was the same used in the 2004/2005 consultation (Please refer to the executive summary in the 2005 BO). We are hereby incorporating the 2004/2005 Biological Assessment (BA) and BO by reference into this document.

This approach provided the information necessary to determine whether or not a jeopardy determination could be concluded. For those species with designated or proposed CH, our effects' analysis approach identified how the primary constituent elements (PCEs) or biological features essential to the conservation of the species were likely to be affected; thus, how the proposed action affected the function and conservation value of the associated CHU(s).

A consultation agreement (CA) between the FWS and the USFS was signed on December 7, 2010. The CA addressed issues such as timeframes, staffing, and included a dispute resolution process. In addition, as part of the CA, the agencies have agreed to organize the BA and BO/CO differently than the 2005 consultation. This consultation is considered to be a programmatic batched consultation that will be organized by National Forest (NF). Therefore, while the BA describes the programmatic nature of the LRMPs, it specifically analyzes the effects of LRMP implementation to species and their CHs within the action area of each NF. As a result, each NF has a separate chapter within the BA which discusses the effects to the species that occur on that particular NF that are predicted to result from the implementation of the Standards and Guidelines (S&Gs) of that individual NFs LRMP. The resulting BO/COs issued by the FWS will assign incidental take, reasonable and prudent measures, and terms and conditions for each individual NF LRMP. The BO/COs will then be in place until each of the NFs revises their LRMPs.

Using the approach described above, along with careful consideration of the species' status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects; we found that the proposed action would not jeopardize the continued existence of the 15 species identified within the action area of the Coconino NF. Similarly, we determined that the proposed action was not likely to destroy or adversely modify CH for the species with designated or proposed CH.

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INTRODUCTION

This biological and conference opinion (BO/CO) responds to the U.S. Forest Service's (USFS) request for reinitiation of consultation with the U.S. Fish and Wildlife Service (FWS) in accordance with the requirements of the Endangered Species Act of 1973 (ESA or Act), as amended (16 U.S.C. 1531 *et seq.*). We, the FWS, prepared this opinion which addresses the USFS's continued implementation of the Land and Resource Management Plan (LRMP) on the Coconino National Forest (NF) of the Southwestern Region, and its effects to 15 federally-listed species (see below) and eight designated or proposed CHs. On April 17, 2009, the USFS requested re-initiation of the 2005 LRMP BO/CO due to the belief that the incidental take threshold for the Mexican spotted owl (MSO) could soon be approached and/or exceeded and due to issues related to term and condition 3.1 in the 2005 LRMP BO/CO for several species. Again, on May 18, 2010, the USFS requested re-initiation for all species addressed in the 2005 LRMP BO/CO, as well as requesting consultation for the ocelot, a species now considered present in small numbers in Arizona. The FWS acknowledged the request for re-initiation for the MSO on June 22, 2010 and followed up with a clarification letter acknowledging the USFS request to reinitiate consultation for all other species, including the ocelot, on August 9, 2010. On October 18, 2010 the USFS submitted a species list for this re-initiation effort to the FWS for concurrence. On December 7, 2010 a consultation agreement was signed by the two agencies. On January 18, 2011 the USFS received a species list concurrence letter from the FWS. A final Biological Assessment (BA) from the USFS was received by the FWS on April 6, 2011.

The 2005 BO/CO was considered a plan-level or programmatic consultation, using a tiered approach. The tiered approach is a two-stage consultation process: the first stage is a programmatic BO/CO, which evaluates the program level effects of the continued implementation of the USFS's LRMPs that guide how site-specific projects are designed and managed. The second stage consists of the future consultations on site-specific projects proposed by the USFS. USFS site-specific activities affecting listed species have tiered from the 2005 programmatic BO/CO.

A distinct change from the 2004/2005 consultation is that this consultation will be a programmatic batched consultation that will be organized by NF. Therefore, while the USFS's BA describes the programmatic nature of the LRMPs, it specifically analyzes the effects of LRMP implementation to species and their CH within the action area of each NF. As a result, each NF has a separate chapter within the BA discussing the effects to the species that occur on that particular NF predicted to result from the implementation of the S&Gs of that individual NFs LRMP. Therefore, the FWS's resulting BO/COs will issue an incidental take statement, reasonable and prudent measures, and terms and conditions for each NF LRMP. These BO/COs will then be in place until each of the NFs revises its LRMP.

Coconino National Forest

This programmatic consultation examines the effects on 15 species and nine designated or proposed CH from the direction and guidance provided within the Coconino NF LRMP. The following species are included within this biological and conference opinion for which the USFS and FWS agreed would be affected by the proposed action.

Birds

California condor (*Gymnogyps californianus*), Non-essential experimental 10(j) population; Endangered

Mexican spotted owl (*Strix occidentalis lucida*), Threatened with designated critical habitat

Southwestern willow flycatcher (*Empidonax traillii extimus*), Endangered with proposed and designated critical habitat

Yuma clapper rail (*Rallus longirostris yumanensis*), Endangered

Fish

Colorado pikeminnow (*Ptychocheilus lucius*), Experimental non-essential 10(j) population

Gila chub (*Gila intermedia*), Endangered with designated critical habitat

Gila topminnow (*Poeciliopsis occidentalis*), Endangered

Gila trout (*Onchorynchus gilae*), Threatened

Little Colorado spinedace (*Lepidomeda vittata*), Threatened with designated critical habitat

Loach minnow (*Tiaroga cobitis*), Endangered with designated critical habitat

Razorback sucker (*Xyrauchen texanus*), Endangered with designated critical habitat

Spikedace (*Meda fulgida*), Endangered with designated critical habitat

Reptiles/Amphibians

Chiricahua leopard frog (*Rana chiricahuensis*), Threatened with designated critical habitat

Plants

Arizona cliffrose (*Purshia subintegra*), Endangered

San Francisco Peaks ragwort (*Packera franciscana*), Threatened with designated critical habitat

This BO/CO is based on information provided in the USFS's April 6, 2011 BA, subsequent information provided by the USFS to the FWS throughout the consultation, the 11 NF LRMPs, 1996 Regional Amendment and the 2004/2005 BA and BO which are hereby incorporated by reference. In order to obtain current information concerning the above species, we reviewed final listing rules, candidate assessment forms, recovery plans, published literature, unpublished reports and data, species and CH location maps, and other sources of information. In addition, we consulted species experts (e.g., research scientists conducting field surveys, monitoring, or research studies on any of the above species) from state conservation agencies, USFS research stations, and FWS biologists. A complete administrative record of this consultation is on file at the FWS Regional Office, Albuquerque, New Mexico.

CONSULTATION HISTORY

The history of this consultation is complex. A chronology of past consultations associated with the proposed action, agreed-upon time extensions, and important meetings associated with this biological and conference opinion is provided below.

- From 1985 to 1988, each of the 11 NFs in the Southwestern Region developed and approved LRMPs pursuant to the National Forest Management Act (NFMA). The

FWS issued a non-jeopardy/no adverse CH modification opinion on each of the USFS LRMPs for all federally listed species.

- On April 15, 1993, MSO was listed as threatened. On September 6, 1995, the USFS requested initiation of formal consultation on the 11 National Forest Plans for effects on the MSO.
- On May 14, 1996, the FWS issued a BO on the 11 LRMPs, which concluded jeopardy to the MSO and adverse modification for its designated CH (FWS 1996a). The FWS's Reasonable and Prudent Alternative to the existing LRMPs advised the USFS to implement the 1995 Recovery Plan for the Mexican Spotted Owl. This BO was litigated in U.S. District Court because it did not quantify incidental take for the MSO. On November 25, 1996, the FWS issued another final jeopardy BO that included incidental take for the MSO pursuant to a September 17, 1996 Court Order. Also on November 25, 1996, the FWS issued a biological opinion on the USFS's June 1996 Regional Amendment to the LRMPs for the MSO. The 1996 Regional Amendment directs the implementation of the 1995 Recovery Plan, as well as guidelines for the northern goshawk and old-growth management. The FWS concluded non-jeopardy for the MSO and no adverse modification of its designated CH (FWS 1996b).
- On May 15, 1996, the USFS requested formal consultation on the effects to federally listed species on NFs as a result of the continued implementation of the 11 NF LRMPs.
- On December 19, 1997, the FWS issued a biological and conference opinion on the USFS's 1996 Regional Amendment to the LRMPs for all federally listed species other than the MSO (FWS 1997). This biological opinion concluded non-jeopardy for all federally listed or proposed species, and no adverse modification for designated or proposed CHs. This opinion contained conservation measures for seven listed species including the Southwestern willow flycatcher, cactus ferruginous pygmy-owl, Sonora chub, Little Colorado spinedace, loach minnow, spikedace, and Pima pineapple cactus. The conservation measures were a product of a collaborative effort by FWS and USFS and became known as the "seven species direction." The conservation measures implemented by the USFS are discussed in the effects of the action sections for these species.
- On December 24, 2002, Forest Guardians and several other environmental groups sent the USFS a 60-day Notice of Intent to sue for failing to reinstate formal consultation on the 11 NF LRMPs for all federally listed species.
- On January 13, 2003, the FWS finalized a biological opinion on the proposed rate of implementation of the grazing standards and guidelines in the 1996 Regional Amendment and its effect on the MSO. This opinion concluded no jeopardy for the MSO.

- In February 2003, the USFS and FWS began discussions on the relevance of the 1996 and 1997 LRMP and 1996 Regional Amendment consultations. In early April 2003, the agencies agreed that the USFS would reinitiate consultation with the FWS on the USFS's 11 LRMPs and the 1996 Regional Amendment. On June 2, 2003, the USFS and FWS signed a consultation agreement that outlined timelines, responsibilities, and dispute resolution for the 11 NF LRMP consultation.
- In November 2003, the USFS provided the FWS with a draft BA for the consultation.
- On April 5, 2004, the USFS requested reinitiation of formal consultation under section 7 of the ESA on the 1996 Mexican Spotted Owl opinion and the 1997 opinion for all other federally listed species on the 11 NFs. The USFS provided the FWS with the final Biological Assessment for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands (NGs) of the Southwestern Region (USFS 2004).
- On May 26, 2004, the FWS responded to the USFS, acknowledging formal consultation had been initiated.
- On September 14, 2004, the FWS requested a 90-day extension. The USFS responded on November 10, 2004, and extended the timeline further for a draft to be available for USFS review on January 15, 2005.
- On February 2, 2005, the USFS provided the FWS with supplemental information to their April 8, 2004 biological assessment. The supplemental information included the following four documents: (1) conservation measures for the spikedace, Little Colorado spinedace, Chiricahua leopard frog, and Sacramento prickly poppy; (2) replacement of pages 54-66 of the biological assessment regarding the Rangeland Management Program; (3) clarification of grazing management level definitions; and (4) proposed amendment for noxious or invasive plant management for the Coconino, Kaibab, and Prescott, and Coconino NFs, November 2004 Forest Plan Amendment #20. Post biological assessment submissions were also provided to the FWS informally throughout the consultation and are part of the administrative record.
- On April 22, 2005, the FWS provided the USFS with a draft programmatic biological opinion.
- On June 10, 2005 the FWS provided the USFS with a final programmatic LRMP BO/CO.
- On April 17, 2009, the USFS requested re-initiation of the 2005 LRMP BO/CO because the threshold set for incidental take for the MSO could soon be approached and/or exceeded and due to issues related to term and condition 3.1 in the 2005 LRMP BO/CO for several species. Again, on May 18, 2010, the USFS requested re-initiation for all species addressed in the 2005 LRMP BO/CO, including the ocelot, a species now considered present in small numbers in Arizona.

- On June 22, 2010 FWS acknowledged the USFS request for reinitiation on the MSO and followed up with a clarification letter acknowledging FSs request to reinitiate the consultation for all other species, including the ocelot on August 9, 2010.
- A CA between the FWS and USFS was signed on December 7, 2010, that addressed timeframes, staffing, and a dispute resolution process. As part of the CA, the agencies agreed to organize the BA and BO/CO differently than the 2004 BA and 2005 BO/CO. This consultation is considered to be a programmatic batched consultation that will be organized by NF. Therefore, while the BA describes the programmatic nature of the LRMPs, it specifically analyzes the effects of LRMP implementation to species and their CHs within the action area of each NF. The resulting BO/COs will issue an incidental take statement, reasonable and prudent measures, and terms and conditions for each NF LRMP.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action being analyzed in this BO is the implementation of the Coconino NF LRMP in the USFS Southwestern Region (including the 1996 Region-wide Amendment). Also included in this BA is an analysis of those S&Gs that have been added through any amendments to the Coconino NF LRMP since the 2004 LRMP BA (See Appendix 4 in the BA for a complete list of S&Gs analyzed in the 2011 BA).

The LRMP directs how current and future activities will be carried out in the following Programs: Engineering; Fire Management; Forestry/Forest Health; Lands and Minerals; Rangeland Management; Recreation, Heritage and Wilderness; Watershed Management; and Wildlife, Fish, and Rare Plants (WFRP). The S&Gs related to these Programs are discussed by NF, in the **Effects of the Action** section of this BO.

The LRMP and the 1996 Regional LRMP Amendment describe long-range management strategies for the Coconino NF. They provide a programmatic framework for future activities and emphasize the application of certain S&Gs in the undertaking of those activities on the land. The LRMP does not, however, make site-specific decisions about exactly how, when, and where these activities will be carried out. However, all site-specific activities must conform to the programmatic framework set up in the LRMP (S&Gs) and they must meet site-specific National Environmental Policy Act (NEPA) and ESA requirements.

This consultation on the LRMP does not eliminate the requirement for site-specific BAs and the need for site-specific informal or formal ESA § 7 consultation with the FWS for individual projects implemented under the LRMP. Furthermore, it should be noted that amendment (i.e., deleting/changing S&Gs) of a particular NF LRMP for a site specific project is allowed and can and does occur, although rarely. In this situation, the action would be considered outside of the scope of this consultation and would require its own site specific ESA § 7(a)(2) consultation to

address the effects of that particular proposed action which is being implemented under a project specific amendment to the NF LRMP. Furthermore, wildfire and wildland fire use are not discussed in this BO as they will be covered under separate emergency ESA § 7(a)(2) consultation. Implementation of ongoing projects and the issuance of incidental take associated with those projects is covered under this programmatic opinion since it supersedes the 2005 LRMP BO/CO.

As described above, the LRMP does not make site specific decisions, but it provides direction to each NF regarding how current and future activities will be carried out. Incidental take anticipated in this BO would occur during implementation of site-specific projects. In addition, monitoring to determine overall compliance with the incidental take limits set forth in this BO will be required in all future project level BOs. Project specific monitoring will be designed and implemented to determine if and/or when the incidental take limits set forth in this BO have been exceeded.

DESCRIPTION OF THE ACTION AREA

The Action Area for this BO/CO is defined as all lands that the Coconino NF encompass in the Southwestern Region of the USFS, plus adjacent lands that the proposed action may directly or indirectly affect. The Coconino NF is located in north central Arizona and is composed of approximately 1,800,000 acres ranging in elevation from 2,600 to 12,633 ft. The Forest contains deserts, ponderosa pine forests, mesas, alpine tundra and volcanic peaks. Within the NF there are seven wilderness areas: Kachina Peaks, Fossil Springs, West Clear Creek, Wet Beaver, Sycamore Canyon, Red Rock/Secret Mountain, and Munds Mountain. The Forest also contains Fossil Creek and the Verde River which are designated as Wild and Scenic Rivers (WSRs). The Forest is divided into three Ranger Districts (RDs): Flagstaff (formerly Peaks and Mormon Lake), Red Rock, and Mogollon Rim.

CONSULTATION APPROACH

The purpose of this section is to articulate the FWS's approach to this consultation in order to clearly present the chain-of-logic supporting our determinations. During the initial consultation in 2005, the FWS came up with an analytical approach to completing the consultation. At that time, there was a large number of species to be considered, an extensive number of USFS S&Gs analyzed, as well as eight complex Forest programs. The approach is described in the 2005 BO and is hereby incorporated by reference. It included deconstructing of the proposed action, diagnosing the species' status, establishing the species' condition within the action area, analyzing the effects, and finally, putting it back together to make our conclusions.

In this consultation, both agencies relied on the extensive analysis conducted in the 2005 opinion and incorporated all of the information that has remained unchanged since then. We also considered the species status and any changes that have occurred since 2005. Our analysis focuses on the changes in forest management and species status since the 2005 BO. This approach is consistent with the 1998 Consultation Handbook and the implementing regulations at 50 CFR § 402.

As reflected in the 2005 BO, in order to make determinations of effects to listed species, proposed, or candidate species, and proposed or designated CHs, the USFS made two primary assumptions about the implementation of the 11 LRMPs. These assumptions are as follows:

1. The NFs will implement site-specific management actions to move toward land management goals and desired future conditions for various resources, with the caveat that available funding and other LRMP direction will control the actual extent and intensity of these site-specific management actions;
2. The S&Gs in the LRMPs will be followed when selecting, planning, and executing site-specific management actions. In addition, should a site-specific action not follow the S&Gs, the action must be modified or the LRMP must be amended before the action can be allowed. In the situation where a site specific action requires LRMP amendment, the action would be considered outside the scope of this consultation and would require separate site specific ESA § 7(a)(2) consultation to address the effects of that particular proposed action.

The FWS concurred with the two assumptions stated above. However, based on the large amount of uncertainty surrounding how the S&Gs are implemented and exactly which ones are used during project development, it was necessary for the FWS to make additional assumptions regarding this consultation. Our assumptions are as follows:

3. Site-specific projects will conform to the S&Gs, as well as the programmatic framework established in the LRMPs. If not, the action would be considered outside the scope of this consultation and would require separate site specific ESA §7(a)(2) consultation to address the effects of that particular proposed action.
4. Land managers use and/or implement the S&Gs at every level of planning (e.g., forest-wide, management areas, and project level).
5. Due to their broad scope, the S&Gs may be interpreted and applied differently depending upon the forest planner and interdisciplinary teams.
6. Implementation of the S&Gs will have varying degrees of effects on the species analyzed.

Please refer to the exposure/response analysis in the 2005 BO (pages 38-41) for an explanation of how the S&Gs were considered in the consultation.

For listed species with proposed or designated CH, the FWS analyzed the direct and indirect effects of the proposed action, and those actions interrelated and interdependent of the proposed action on proposed or designated CH. The CH analysis identified how the primary constituent elements (PCEs) or biological features essential to the conservation of the species are likely to be affected, and in turn, how that will impact the function and conservation value of the associated CHU(s).

The following contains the jeopardy analysis for each of the 15 listed species arranged in the following order: mammals, birds, amphibians, fish, reptiles, invertebrates and plants. The status of the species, environmental baseline, effects of the action (which includes cumulative effects), conclusion, and incidental take statements are provided for each species henceforth. In the effects of the action section, we evaluated all eight of the USFS programs within the Coconino NF LRMP for each species. The discussions within the effects of the action section address the pertinent S&Gs that had effects (both adverse and beneficial) to species as well as which S&Gs could cause take of listed species. Finally, standard language for the disposition of dead, injured, or sick federally listed species as well as a re-initiation statement and literature cited section are included at the end of this biological opinion.

The following section describes the effects to species of the continued implementation of the Coconino NF LRMP. The USFS made “no effect” determinations for the Desert pupfish and its designated CH. The FWS does not provide concurrence on “no effect” determinations; therefore this species and its CH will not be addressed below. The FWS has concurred with the USFS on “may affect, but is not likely to adversely affect” determinations for the following species and their CHs (if applicable): California condor, Southwestern willow flycatcher, Yuma clapper rail, Razorback sucker, and San Francisco Peaks ragwort. The USFS requested formal consultation on the Gila trout, but the FWS determined that the proposed action is not likely to adversely affect the Gila trout. These concurrences and the justification for the change in effects determination for the Gila trout can be found in Appendix A of this document.

MEXICAN SPOTTED OWL

STATUS OF THE SPECIES

In 1993, the FWS listed the Mexican spotted owl (*Strix occidentalis lucida*) (MSO) as threatened under the Endangered Species Act. The FWS appointed the MSO Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI Fish and Wildlife Service 1995). The FWS released a Draft Revised Recovery Plan for public review during the summer of 2011 (FWS 2011) and intends to finalize the revised recovery plan in 2012. In addition to referencing the 1995 Recovery Plan, we are also using additional information from the Draft Revised Recovery Plan (FWS 2011) in this BO. Additional information included from the Draft Revised Recovery Plan in this BO includes updated science about the biology of the MSO, updated threats information, and updated management recommendations (such as a revised population modeling framework). CH was designated for the MSO in 2004 (USDI Fish and Wildlife Service 2004).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993), in the Recovery Plan (USDI Fish and Wildlife Service 1995), and in the Draft Revised Recovery Plan (FWS 2011). The information provided in those documents is included herein by reference. The MSO

occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico (Gutiérrez et al. 1995). It ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several States of Mexico. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, the MSO occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known MSO locations indicate that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The MSO occupies many habitat types scattered across a diverse landscape. In addition to this natural variability in habitat influencing MSO distribution, human activities also vary across the MSO's range. The combination of natural variability, human influences on MSOs, international boundaries, and logistics of implementation of the Recovery Plan necessitates subdivision of the MSO range into smaller management areas. The 1995 Recovery Plan subdivided the MSO's range into 11 "Recovery Units" (RUs): six in the United States and five in Mexico. In this revision of the Recovery Plan, we renamed RUs as "Ecological Management Units" (EMUs) to be in accord with current FWS guidelines (USDC NMFS and USDI FWS 2010). We divide the MSO range within the United States into five EMUs: Colorado Plateau (CP), Southern Rocky Mountains (SRM), Upper Gila Mountains (UGM), Basin and Range-West (BRW), and Basin and Range-East (BRE) (Figure 1).



Figure 1. Ecological Management Units for the Mexican spotted owl in the United States

There are two types of monitoring that can be conducted for the MSO. The first type of monitoring is a site-specific inventory of MSO habitat conducted using the MSO survey protocol. This method can provide information regarding the presence or absence of MSOs in a specific area (and is used to establish PACs, etc.), but does not provide population level indicators of the species general population trend. We will refer to this type of monitoring as “MSO surveys.” The second type of monitoring is population monitoring. Population monitoring is conducted at a large enough scale (typically range-wide) to provide information regarding population trend (i.e., is the population increasing, decreasing, or stable). Methodologies to conduct this type of monitoring include demographic studies or range-wide occupancy monitoring as described in the 1995 Recovery Plan and the 2011 Draft Revised Recovery Plan (USDI Fish and Wildlife Service 1995, FWS 2011).

MSO surveys since the 1995 Recovery Plan and issuance of the 2005 LRMP BO have increased our knowledge of MSO distribution, but not necessarily of MSO abundance. Population estimates, based upon MSO surveys, recorded 758 MSO sites from 1990 to 1993, and 1,222 MSO sites from 1990 to 2004 in the United States. An MSO site is an area used by a single or a pair of adult or subadult MSOs for nesting, roosting, or foraging. The increase in number of known MSO sites is mainly a product of new MSO surveys being completed within previously unsurveyed areas (e.g., several National Parks within southern Utah, Grand Canyon National Park in Arizona, Guadalupe National Park in West Texas, Guadalupe Mountains in southeastern New Mexico and West Texas, Dinosaur National Monument in Colorado, Cibola NF in New Mexico, and Gila NF in New Mexico). Thus, an increase in abundance in the species range-wide cannot be inferred from these data (FWS 2011). However, we do assume that an increase in the number of areas considered to be occupied to be a positive indicator regarding MSO numbers.

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

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

and wild ungulate grazing is prevalent throughout Region 3 NF lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all forests, especially in meadow and riparian areas. There is anecdotal information and research that indicates that MSOs 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 severe wildland fire, can have short-term adverse effects to MSOs through habitat modification and disturbance. As the human population grows in the southwestern United States, small communities within and adjacent to NF System lands are being developed. This trend may have detrimental effects to MSOs by further fragmenting habitat and increasing disturbance during the breeding season. West Nile Virus also has the potential to adversely impact the MSO. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that MSOs may be highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of MSOs and the lack of intensive monitoring of banded birds, we will most likely not know when MSOs contract the disease or the extent of its impact to the MSO range-wide.

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

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

Critical Habitat

The FWS designated CH for the MSO in 2004, on approximately 8.6 million acres (3.5 million hectares) of Federal lands in Arizona, Colorado, New Mexico, and Utah (FWS 2004). Within the designated boundaries, CH includes only those areas defined as protected habitats (defined as PACs and unoccupied slopes >40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted habitats (defined as unoccupied MSO foraging, dispersal, and future nest/roost habitat) as defined in the 1995 Recovery Plan (USDI Fish and Wildlife Service 1995). The PCEs for MSO CH were determined from studies

of their habitat requirements and information provided in the Recovery Plan (USDI Fish and Wildlife Service 1995). Since MSO habitat can include both canyon and forested areas, PCEs were identified in both areas. The PCEs identified for the MSO within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the MSO's habitat needs for nesting, roosting, foraging, and dispersing are:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 to 45 percent of which are large trees with diameter at breast height ((dbh) 4.5 ft above ground)) of 12 inches or more;
- A shade canopy created by the tree branches covering 40 percent or more of the ground and;
- Large, dead trees (snags) with a dbh of at least 12 inches.
- High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and
- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

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

Summary of Rangewide Status of the Mexican spotted owl and critical habitat

Overall, the status of the MSO and its designated CH has not changed significantly range-wide in the U.S. (which includes Utah, Colorado, Arizona, New Mexico, and extreme southwestern Texas), based upon on the information we have, since issuance of the 2005 LRMP BO. What we mean by this is that the distribution of MSOs continues to cover the same area and CH is continuing to provide for the life history needs of the MSO throughout all of the EMUs located in the U.S. We do not have detailed information regarding the status of the MSO in Mexico, so we cannot make inferences regarding its overall status.

However, this is not to say that significant changes have not occurred within the action area described below. Wildland fire has resulted in the greatest loss of PACs and CH relative to other actions (e.g., such as forest management, livestock grazing, recreation, etc.) throughout the U.S. range of the MSO. These wildland fire impacts have most impacted MSOs within the Upper Gila Mountains EMU (e.g., Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves NF) and Basin and Range West EMU (e.g., Horseshoe 2 Fire on the Coronado NF); but other EMUs have been impacted as well (Southern Rocky Mountains EMU, the Santa Fe NF by the Las

Conchas Fire). However, we do not know the extent of the effects of these wildland fires on actual MSO numbers.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions within the action area. All proposed federal actions within the action area that have undergone formal or early section 7 consultation are included in the environmental baseline discussion. The environmental baseline discussion defines the current status of the MSO, its habitat, and designated CH within the Coconino NF. This discussion serves as a platform to assess the effects of the action to the MSO now under consultation.

Status of the Mexican Spotted Owl and Critical Habitat within the Action Area

The Coconino NF is located entirely within the Upper Gila Mountains (UGM) Ecological Management Unit (EMU). The UGM EMU contains the largest contiguous ponderosa pine forest in North America, an unbroken band of forest 40- to 64- km (25- to 40- mi) wide and approximately 483-km (300-mi) long extending from north-central Arizona to west-central New Mexico (Cooper 1960). The Coconino NF is located on the western end of UGM EMU and contains approximately 17 percent of the known MSO PACs on NF System Lands within the USFS Southwestern Region.

MSOs are widely distributed on the Coconino NF. MSOs are most common in mixed-conifer forests dominated by Douglas-fir and/or white fir and canyons with varying degrees of forest cover. MSOs also occur in ponderosa pine-Gambel oak forest, where they are typically found in stands containing well-developed understories of Gambel oak (Ganey and Dick 1995).

As of 2011, the Coconino NF has identified 186 MSO PACs within the boundaries of the Coconino NF. The USFS estimates that there are 37,921 acres of protected steep-slope habitat outside of PACs and 573,406 acres of restricted habitat on the Coconino NF. Surveys in protected and restricted habitat may reveal the presence of additional PACs.

Critical Habitat

Part or all of six CHUs (UGM-10, UGM-11, UGM-12, UGM-13, UGM-14, and UGM-15) encompass the Coconino NF. These CHUs contain roughly 380,250 acres of designated CH. As stated earlier, only areas identified as protected and restricted habitat pursuant to the Recovery Plan (USDI Fish and Wildlife Service 1995) within these CHUs are considered to be CH. Therefore, the actual amount of MSO habitat within these three units likely covers less area than is indicated by the unit acreage.

Factors Affecting the Mexican Spotted Owl within the Action Area

The factors (i.e., Federal, State, tribal, local, and private) already affecting the MSO and its designated CH within the action area are discussed in this section. Since the action area consists of NFS lands, there are likely very few, if any, State, tribal, or private actions impacting the MSO or its CH. Formal consultations that have occurred from 2005 (the year of the original LRMP BO) to the present are summarized in Table 1.

Consultation #	Date of Final BO	Project	Approximate # of MSOs	# of PACs	Form of Take
2-21-04-M-0383*	7/26/2005	<i>Webber Emergency Fire Suppression</i>	0 (None on Coconino, all on Tonto)	0	n/a
02-21-05-F-0705	2/10/2006	Victorine Wildland Urban Interface Project	0	0	n/a
02-21-02-F-0206	6/1/2006	East Clear Creek Watershed Health Project	0	0	n/a
22410-2006-FE-0552*	12/20/2006	<i>Norris Fire Emergency Suppression</i>	0	0	n/a
22410-2006-F-0371	6/22/2007	Elk Park Fuels Reduction Project	0	0	n/a
22410-2006-F-0364	7/5/2007	Arizona Forests Utility Hazard Tree Removal Project	4-8	4	Harm and Harass
22410-2004-F-0129	8/14/2007	CQ-12 Power Line Clearance	0	0	n/a
22410-2006-F-0365	7/17/2008	Arizona Forests Utility Corridor Mgmt Project	6-12	6	Harm and Harass
22410-2005-F-0569	6/15/2009	Upper Beaver Watershed Fuels Reduction Project	3-6	3	Harm and Harass
22410-2009-F-0213	10/13/2009	Mormon Mountain Communication Site Project	0	0	n/a
22410-2011-F-0175	6/14/2011	Inner Basin Pipeline Reconstruction Project	3-6	3	Harass
22410-2008-F-0149-R001	12/6/2011	<i>Effects to Listed Species from U.S. Usfs Aerial Application of Fire Retardants on NFS Lands</i>	<i>Effects to Listed Species from U.S. Forest Service Aerial Application of Fire Retardants on NFS Lands</i>	<i>Incidental take will be tracked as it occurs per the BO</i>	<i>Harm & Harass</i>
TOTAL			16-32	16	

*Projects in italics are fire suppression activities that are not included in the proposed action for this consultation.

Since 2005, 11 biological opinions have been issued to the Coconino NF addressing adverse effects to MSOs from projects implemented under the LRMP. These projects included four fuels reduction and forest restoration projects, three utility line hazard tree removal actions, two lands projects (infrastructure repair/maintenance), and two emergency fire consultations (see Table 1). These projects involved the Fire Management, Forestry and Forest Health, and Lands and Minerals programs. These programs were all analyzed in the 2005 Biological Opinion. Within the 11 project-specific Biological Opinions, owls associated with 16 PACs were determined to have some form of incidental take associated with four of the projects. We determined that two fire suppression actions did not result in incidental take of MSOs (an action not included in the proposed action). The Coconino NF provided conservation measures that would minimize the impacts to MSOs in all formal consultations. All biological opinions for projects conducted on the Coconino NF were determined to be non-jeopardy for the species and non-adverse modification for CH.

In summary, over the last seven years, we have completed 9 formal consultations for the Coconino NF that were implemented under the LRMP. These actions included a combination of short- and long-term harm and harassment that resulted in the anticipated take of MSOs associated with 16 PACs. We anticipate for the life of this consultation (or until the Coconino NF reinitiates), activities associated with forest and fire management (i.e., fuels reduction, forest restoration, salvage logging) and the lands program (issuance of special use permits which may result in actions that impact MSOs) will likely be the predominant activities occurring within and adjacent to Mexican spotted MSO habitat. Potential effects of these activities can result in disturbance during the breeding season (such as mechanized logging, hauling routes, smoke, construction), habitat modification (short-term reductions in large logs, snags, and other key habitat components), and habitat degradation (such as long-term loss of old-growth, pre-settlement trees to create openings for regeneration).

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or CH, 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.

Background Information regarding the Proposed Action

The proposed action being analyzed in this BO is implementation of the Coconino NF LRMP and its amendments. The most important amendment in regards to MSO management is the June 5, 1996, Amendment of Forest Plans in Arizona and New Mexico, for the Management of the MSO and northern goshawk. This amendment was developed in collaboration with the FWS and incorporated many of the management recommendations from the Recovery Plan (USDI Fish and Wildlife Service 1995) into all eleven NF LRMPs.

An LRMP provides guidance and direction in the context of a broad management framework. These LRMPs define the direction for managing the NFs. Direction in the LRMP is provided in the form of the S&Gs. Because it was unclear what the operational difference is between a “standard” and “guideline,” neither the USFS nor FWS differentiated between the two for our analysis. While the FWS recognizes that much discretion exists on the part of forest managers at the project level, in the implementation of LRMPs through the S&Gs, this discretion also adds to the complexity of this consultation due to the conflicting nature of some S&Gs that exist between the different operating programs within the same Forest. We provide examples of this below by USFS program.

The S&Gs are written to apply Forest-wide or to a specific management area. The Coconino NF has designated “management areas” based on such criteria as vegetation type, principal land use, and special management designations such as wilderness areas. The LRMP contains some S&Gs that apply Forest-wide and some that apply only to specific management areas. During the development of a project, each management program reviews Forest-wide and management area-specific S&Gs that either give direction to, guide or place constraints on, upon management activities (e.g., logging, grazing, recreation, mining, etc.). The S&Gs that provide direction state what will be accomplished to achieve specific resource goals. In many cases, the S&Gs were developed to target management of a specific species (e.g., the 1996 Forest-wide amendment to include S&Gs for the threatened MSO)

This biological opinion is now covering the projects that were covered by prior opinions but have yet to be implemented. These projects include Victorine Wildland Urban Interface, East Clear Creek Watershed Health Project, Elk Park Fuels Reduction, Arizona Forests Utility Corridor Management Phase II, Upper Beaver Watershed Fuels Reduction, Mormon Mountain Communication Site project, and Inner Basin Pipeline Reconstruction project.

The LRMPs direct how current and future activities will be carried out in the following management programs: (1) Engineering, (2) Fire Management, (3) Forestry and Forest Health, (4) Lands and Minerals, (5) Rangeland Management, (6) Recreation, Heritage and Wilderness, (7) Watershed Management, and (8) Wildlife, Fish, and Rare Plants. Each of the USFS’s eight resource programs were discussed in depth within the April 8, 2004, BA, the June 10, 2005, LRMP BO, and the April 6, 2011, BA.

Effects to the MSO were evaluated in the 2005 BO, and are included herein by reference (see FWS 2005). The majority of the S&Gs, which continue to be implemented as the proposed action within the Coconino NF LRMP, were considered positive in the sense that they would maintain habitat for the MSO or provide for recovery. Several S&G moved towards recovery or implemented actions found in recovery plans for listed species. However, potential adverse effects were found to be caused by actions implemented by the following programs, discussed in detail below: Engineering (e.g., disturbances from road construction); Fire Management Program; Forestry and Forest Health; Lands and Minerals (e.g., the potential for using chemical agents); Rangeland Management; Recreation, Heritage and Wilderness; Watershed Management; and Wildlife, Fish, and Rare Plants. The Fire Management Program combines elements of fire prevention, prescribed fire, wildland fire, and fire suppression. However, wildland fire,

including fire suppression and wildland fire use, are not included in the proposed action (and therefore, are not covered under this consultation) and consultation on these actions will continue to be handled under emergency section 7 consultation procedures.

Effects of the Action on the Mexican spotted owl

Effects to the MSO were evaluated in the 2005 biological opinion (see FWS 2005). The majority of the standards and guidelines within the Coconino NF's LRMP were considered positive in the sense that management would maintain habitat for the MSO or provide recovery. We found no standards and guidelines within the Coconino NF's LRMP that would cause a lethal response to the MSO; however, we ranked seven standards and guidelines as having sublethal and five as having negative behavioral responses to MSOs. Several standards and guidelines were ranked as overall positive, but having short-term adverse effects to the MSO. The following is our analyses of the S&Gs for the Coconino NF's LRMP.

Engineering Program - The S&Gs ranked in this program that were overall positive to the MSO but could have some short-term adverse effects related to locating or relocating roads outside of riparian areas. In addition, S&Gs stated to obliterate unnecessary road in riparian areas. As stated previously, the intent of these S&Gs are good, however, the activity of obliterating roads could have short-term adverse effects, such as harassment, of MSOs.

Fire Management Program - All S&Gs ranked for the MSO in the Fire Management Program were given overall positive rankings but with short-term adverse impacts. For instance, S&Gs 410-412 permit the Forest to allow a fire to burn naturally provided that prescribed conditions are met. Fuels reduction and light burning are recommended in the Recovery Plan for the MSO to reduce the threat of large-scale, stand-replacing fires (FWS 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur. With regards to CH, fire has the potential to affect all PCEs. Although short term data on MSO response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as CH.

Forestry and Forest Health Program - Several S&Gs within this program were ranked as having a sublethal effect to the MSO. For instance, S&G 346 guides the Forest to eliminate or reduce dwarf mistletoe infections to manageable levels. This may eliminate future nest sites since MSOs use dwarf mistletoe (also known as "witches brooms"). Standard and Guideline 347 states that pesticides will be used for pest outbreaks. Pesticides could have lethal affects to small rodents, thus reducing the MSOs prey distribution and abundance. Standard and Guideline 446 states that when stands are managed under even-aged systems, that the shelterwood method is the preferred method in accordance with guidelines. The FWS ranked this S&G as sublethal to the MSO because even-aged management removes important habitat features such as nest and roost stands. The FWS realizes however that the 1996 Regional Amendment would most likely supersede this S&G. Standard and Guideline 450, 451, and 452 address prescriptions for Gambel oak such as rotation age and retaining snags. Management within these S&Gs does not appear to be compatible with maintaining nesting habitat for MSOs. MSOs are known to use nest structures in living oak trees either in a broken top or side cavity (Ganey and Dick 1995:25).

The Recovery Plan for the MSO recommends retaining existing large oaks and promoting the growth of additional large oaks (FWS1995:94). Thus, we ranked S&Gs 450, 451, and 452 as having sublethal because removal or manipulation of Gambel oak in occupied MSO habitat could harm MSOs. With regards to CH, S&Gs 346, 446, 450-452 would negatively impact PCE A and PCE B. Management within these S&Gs does not appear to be compatible with maintaining nest/roost habitat for spotted MSOs.

Lands and Minerals Program - All S&Gs within this program were ranked as being too vague or had conflicting management emphasis to determine responses to the species. For example, S&G 386 states to cooperate with Department of Interior in oil and gas leasing operations, including surface reclamation efforts. This S&G was vague and open to interpretation and thus, FWS did not assign an exposure/response ranking. In general, this program allows for certain amounts of oil and gas leasing, however, we did not have enough information to determine how this would affect the MSO and its habitat.

Rangeland Management Program - S&G 339 states that full capacity rangeland in unsatisfactory condition that has potential for improvement is treated through appropriate structural and nonstructural range improvements. The FWS ranked this S&G as overall positive, but having short-term negative effects. While range improvements will improve MSO habitat and habitat for its prey base (i.e., small mammals), adverse impacts from grazing could still be occurring that alter the MSO's prey availability in areas occupied by MSOs. This would negatively affect PCE B. In addition to this particular S&G, the Coconino NF's LRMP guides the Forest to emphasize high quality range forage and to manage grazing generally at level D intensity (i.e., highest level of grazing with a maximum amount of management such as fences), see page 23 of the Coconino NF's LRMP.

Recreation, Heritage, and Wilderness Program - Standard and Guideline 423 allows for camping albeit on permit system. This S&G states that camp areas will be located outside of spotted MSO PACs where possible. The FWS ranked this S&G as having a negative effect to MSOs within the areas due to human presence. Although the S&G has minimization measures built in, there could be disturbance from people camping within the vicinity. Standard and Guideline 515 allows the Forest to increase day-use opportunities that emphasize nature-based activities such as hiking, bird-watching, photography, etc., in the area of Oak Creek Canyon. MSO PACs have been designated in Oak Creek Canyon, thus, while positive for the general public, this S&G could cause some behavioral disturbance to MSOs occupying this area. There are direct costs associated with responding to disturbance, such as energetic demands of avoidance flight and time lost that would be allocated to other activities (Swarthout and Steidl 2001:316). Standard and Guideline 574 and 575 guide the Forest to provide for OHV recreation. Noise at certain noise levels has been shown to cause a flush response (Delaney et al. 1997). The FWS ranked this as -1 because of the possibility of OHV recreation use causing MSOs to flush or abandon their nest site or roost.

Watershed Management Program - Some S&Gs in the Watershed Management Program may have short-term adverse effects to the MSO. For instance, S&G 377 guides the Forest to implement emergency fire rehabilitation measures where necessary to protect soil and water resources from intolerable losses or to prevent unacceptable downstream damage. Implementing

this standard is obviously good management and will be overall positive for MSO habitat. There could however be some disturbance to MSOs if rehabilitation occurs in areas occupied by MSOs especially during the breeding season. The FWS believes this will be minimal and thus, fire rehabilitation should be left to the discretion of forest managers.

Wildlife, Fish, and Rare Plants Program -Standard and Guideline 321 states that habitat management for federally listed species will take precedence over unlisted species and to follow approved recovery plans. Standard and Guideline 324 guides the Forest to inventory, evaluate, and prepare recovery schedules for listed species and to monitor the effects of management on threatened and endangered species. These S&Gs will be wholly beneficial to the MSO.

In summary, the overall assessment of the Coconino NF's LRMP is that it has some S&Gs that we found could negatively affect the owl when implemented at the project level. However, there were over 100 S&Gs that maintain habitat or provide for recovery for the owl. In addition, one S&G stated that threatened and endangered should be monitored and for the Forest to follow recovery plans. If these are implemented, adverse effects to the owl will be minimized. Regarding CH, we found that the programs within the Coconino NF will not appreciably impact the PCEs to the point that CH for the owl is no longer functional.

Effects of the Action on Mexican spotted owl Critical Habitat

In our analysis of the effects of the action on CH, we consider whether or not a proposed action will result in the destruction or adverse modification of CH. In doing so, we must determine if the proposed action will result in effects that appreciably diminish the value of CH for the recovery of a listed species. To determine this, we analyze whether the proposed action will adversely modify any of the PCEs that were the basis for determining the habitat to be critical. To determine if an action results in adverse modification of CH, we must also evaluate the current condition of all designated CHUs, and the PCEs of those units, to determine the overall ability of all designated CH to support recovery. Further, the functional role of each of the CHUs in recovery must also be considered because, collectively, they represent the best available scientific information as to the recovery needs of the species. Below the PCEs related to forest structure and maintenance of adequate prey species and the effects from implementation of the LRMP are described.

Primary Constituent Elements related to forest structure:

PCE: A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with diameter-at-breast height (dbh) of 12 inches or more.

Effect: Actions implemented under the LRMP are expected to retain the range of tree species (i.e., conifers and hardwoods associated with owl habitat) and will not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by MSOs. Some loss of trees, of all types and dbh size classes, will occur from actions such as hazard tree removal, prescribed fire, and forest thinning (as implemented under the Fire Management and Forest and Forest Health Programs). However, actions implemented under the LRMP are expected to maintain a range of tree species and sizes needed to maintain this PCE in PACs and restricted habitat across the NF because the USFS is implementing the Recovery Plan guidelines that strive to retain large trees, canopy cover appropriate for owl habitat, and a diverse range of tree species (such as Gambel

oak in pine-oak forests and several conifer species in mixed conifer forest. Removal of trees and various trees species may also occur as part of the Recreation (development of recreation sites) and Engineering Programs (creation, maintenance of roads); but these effects should be small in extent and intensity. The function and conservation role of this primary constituent element would not be compromised by the proposed action.

PCE: A shade canopy created by the tree branches covering 40 percent or more of the ground. Previous treatments were not expected to reduce the shaded canopy below 40 percent.

Effect: We expect that tree shade canopy will be reduced following hazard tree removal, thinning, and burning treatments implemented under the LRMP in the Fire Management and Forest and Forest Health Programs. However, we do not expect reduction of canopy cover in MSO forested habitat to be reduced below 40 percent because the USFS has adopted the Recovery Plan recommendations which include managing for higher basal area and denser canopy cover in owl habitat versus pure ponderosa pine or other forest and woodland habitats. We would expect that some small reduction in existing canopy cover (5 to 10 percent) may actually aid in increasing understory herbaceous vegetation and forb production, which will benefit owl prey species. The function and conservation role of this primary constituent element would not be compromised by the proposed action.

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

Effect: Large snags would most likely be reduced following proposed prescribed burning and hazard tree removal actions conducted under the Fire Management and Forest and Forest Health Programs. Currently, large snags are rare across the action area, and any loss of this habitat component may be significant in terms of maintaining owl and prey habitat. Some snags will be created through prescribed burning, which could benefit the owl. However, snags currently used by owls for nesting are typically very old, large dbh, highly decayed snags with cavities. These snags are rare and are not typically created through by fire disturbance, but by decay fungi and insects. In individual burning projects, the USFS would attempt to minimize loss of these large snags through conservation measures (such as lining or using lighting techniques to avoid snags). However, it is likely that following burning treatments, approximately 20 percent of these existing snags may be lost within treated (i.e., burned) owl habitat, resulting in short-term adverse effects to this PCE (Randall Parker and Miller 2000). This is why conservation measures that the USFS implements to protect the largest and oldest snags (particularly those with nest cavities) are so important. As such, the function and conservation role of this primary constituent element would not be compromised by the proposed action.

Primary Constituent Elements related to maintenance of adequate prey species:

PCE: High volumes of fallen trees and other woody debris.

Effect: Fallen trees and woody debris would likely be reduced by the proposed burning treatments (broadcast, piling, and maintenance burning) as part of the Fire Management Program. Logs are expected to be reduced by approximately 50 percent following prescribed burning in forested habitat (Randall Parker and Miller 2000). This loss of large logs would result in short-term adverse effects to this primary constituent element and could result in localized impacts to prey species habitat. However, across the Coconino NF, it is likely that hazard tree removal and prescribed burning will also create fallen trees and woody debris as trees are felled (i.e., cut) and left on the ground or are

killed post-burn and fall. The function and conservation role of this primary constituent element would not be compromised by the proposed action.

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

Effect: This PCE will likely be positively affected by the actions taken under the Fire Management and Forest and Forest Health Programs. Plant species richness would likely increase following thinning and/or burning treatments that result in small, localized canopy gaps. Individual projects conducted under the LRMP typically propose conservation measures that focus on retaining Gambel oaks and other hardwoods, but some level of short-term loss could occur at the individual project level. However, the function and conservation role of this primary constituent element would not be compromised by the proposed action.

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

Effect: Short-term decrease in plant cover will result from prescribed burning conducted under the Fire Management Program. We expect long-term increases in residual plant cover because treatments would provide conditions suitable for increased herbaceous plant growth by removing a thick layer of dead plant debris within treated areas. The mosaic effect created by burned and unburned areas and by opening up small patches of forest within protected habitat is also expected to increase herbaceous plant species diversity and, in turn, assist in the production and maintenance of the MSO prey base. The function and conservation role of this primary constituent element would not be compromised by the proposed action. The combination of low-intensity prescribed burns during restoration projects most likely resulted in short-term adverse effects to the owl with regard to modifying prey habitat within treatment areas. There is the potential for the Rangeland Program to have adverse effects on the production of plant cover post-burning. However, typically the USFS includes measures in its allotment (livestock) management plans to maintain healthy levels of forage and the Fire Program recommends removing livestock temporarily following prescribed and wildland fire.

Effects of the Action on the Role of Critical Habitat in Recovery

Adverse effects and associated incidental take from the projects since 2005 (see Table 1 above) are not expected to negatively affect owl recovery and/or further diminish the conservation contribution of CH to the recovery of the MSO. These projects include Victorine Wildland Urban Interface, East Clear Creek Watershed Health Project, Elk Park Fuels Reduction, Arizona Forests Utility Corridor Management Phase II, Upper Beaver Watershed Fuels Reduction, Mormon Mountain Communication Site project, Inner Basin Pipeline Reconstruction project.

The proposed action includes actions that are recommended in the 1995 Recovery Plan and the Draft Revised Mexican spotted owl Recovery Plan. These actions were identified by the Recovery Team as being necessary to recover the owl and the Coconino NF is implementing these actions in designated CH. Designated CH includes all protected (PACs and protected steep-slope habitat) and restricted habitat (unoccupied owl habitat) within CHUs. These actions include the following:

- The Coconino NF has and continues to designate 600 acres surrounding known owl nesting and roosting sites. PACs are established around owl sites and are intended to protect and maintain occupied owl nest/roost habitat. Nesting and roosting habitat is rare across the range of the owl and by identifying these areas for increased protection, the USFS is aiding in recovery.
- The Coconino NF has identified and is managing pine-oak, mixed-conifer, and riparian forests that have potential for becoming replacement owl nest-roost habitat, or is currently providing habitat for owl foraging, dispersal, or wintering habitats. As stated above, nesting and roosting habitat is a limiting factor for the owl throughout its range. By managing CH for future nest/roost habitat, the USFS is aiding in recovery.
- The population monitoring scheme within the 1995 Recovery Plan was proven to be not feasible due to logistics and expense. A new population monitoring protocol was developed within the Draft Revised Recovery Plan based on owl occupancy. The USFS has agreed to meet with the FWS to discuss their future participation in population monitoring with us and other land management agencies.
- The Coconino NF's intent is to implement the Four Forest Restoration Initiative. The USFS intent is to integrate the best available Recovery Plan habitat management objectives, where possible, into forest restoration and/or fuels reduction projects with the overall goal to protect PACs from high-severity wildland fire and conduct actions to improve forest sustainability (e.g., thinning and prescribed burning) in order to ensure MSO habitat continues to exist on the forest.

These actions should increase the sustainability and resiliency of MSO habitat (particularly through fuels management and forest restoration actions). Therefore, continued implementation of the Coconino LRMP is not expected to further diminish the conservation contribution of CH to the recovery of the MSO.

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. Since the land within the action area is almost exclusively managed by the USFS, most activities that could potentially affect listed species are Federal activities and subject to additional section 7 consultations.

CONCLUSIONS

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of CH in 50 CFR 402.02 because of various court cases surrounding the FWS’s jeopardy and adverse modification analyses. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to CH. CH is defined in section 3 of the Act “as the specific areas within the geographical area occupied by the species,

at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.” We have also relied upon the Consultation Handbook which provides guidance on determining adverse modification of CH and jeopardy pursuant to the following: “Adverse effects on individuals of a species or constituent elements or segments of CH generally do not result in jeopardy or adverse modification determinations unless that loss, when added to the environmental baseline, is likely to result in significant adverse effects throughout the species’ range, or appreciably diminish the capability of the CH to satisfy essential requirements of the species” (FWS and National Marine Fisheries Service 1998:4-34).

After reviewing the current status of the MSO and its CH, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, we conclude that continued implementation of the LRMP for the Coconino NF will not likely jeopardize the continued existence of the MSO and is not likely to destroy or adversely modify designated CH. Effects analyses and conclusions in biological opinions from 2005 through 2010 for the Coconino NF also determined that projects implemented under the current LRMP were not likely jeopardize the continued existence of the MSO or destroy/adversely modify designated CH. Projects implemented under the current Coconino NF LRMP since 2005 in which the Service determined caused adverse effects and associated incidental take of MSOs were primarily due to fuels reduction and restoration projects which are consistent with management recommendations pursuant to the Recovery Plan (USDI Fish and Wildlife Service 1995). Further, summary of our reasoning for determining that the continued implementation of the LRMP for the Coconino NF will not jeopardize the MSO and will not adversely modify designated CH for the species is based on the following:

- In 1996, the USFS amended the Coconino NF’s LRMP to incorporate recommendations from the 1995 Recovery Plan (USDI Fish and Wildlife Service 1995) through an EIS pursuant to NEPA. Since then, the USFS has incorporated 1995 Recovery Plan recommendations into individual projects consulted on under the 2005 LRMP BO and provided project implementation monitoring information to the FWS indicating that these projects were implemented as proposed.
- Standards and Guidelines within the Coconino NF’s LRMP have not changed since 2005, the majority of which were found to be beneficial to the MSO. There is currently an ongoing forest restoration effort (the Four Forest Restoration Initiative) that should reduce the risk of wildfire on the Coconino NF. Prior to the Four Forest Restoration Initiative, the USFS planned small fuels reduction projects to protect communities, but did not focus on reducing fuels and restoring fire to the wildlands, where most MSO habitat is located. This project will conduct thinning and burning actions that will allow for restoration of fire-adapted ecosystems at the landscape level (which is the level at which these very destructive fires are occurring).

- Projects implemented under the Coconino NF's LRMP have not lead to a jeopardy determination or adverse modification of MSO CH since 2005. Implementation of fuels reduction and forest restoration projects that follow 1995 Recovery Plan recommendations will have long-term beneficial effects to MSO's survival and ultimately recovery (FWS 2011). We have information that these forest restoration actions are going to proceed (e.g., Four Forest Restoration Initiative) and that they will include protective measures for the MSO. If the USFS did nothing to reduce fuels and reintroduce fire to the landscape, we would continue to see fires of the size and intensity of the Wallow Fire. Existing forest conditions, climate change, and extended droughts will continue to impact forest sustainability without active management.
- The population monitoring scheme within the 1995 Recovery Plan was proven to be not feasible due to logistics and expense. A new population monitoring protocol was developed within the Draft Revised Recovery Plan based on MSO occupancy. The USFS has agreed to meet with the FWS to discuss their future participation in population monitoring with us and other land management agencies.

Across the range of the MSO, the population monitoring described within the 1995 Recovery Plan was never implemented because it was not economically or operationally feasible. A revised population monitoring procedure has been outlined in the Draft Revised Recovery Plan (USFWS 2011) which aims at assessing MSO population trends. Although population trend monitoring has not occurred for the MSO, our records indicate no decline in the MSO population based upon an increase in known PAC numbers since the MSO was listed (see the Status of the Species section). However, some level of range-wide MSO population monitoring is needed in order for us to assess the status of the MSO. In the 2005 LRMP BO, we included a reasonable and prudent measure for occupancy monitoring that was not feasible, but our revised incidental take statement attempts to provide for a level of project-specific implementation monitoring at the individual BO level in order to assess incidental take associated with the site-specific action.

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.

For the purpose of evaluating incidental take of MSOs from the action under consultation, incidental take can be anticipated as either the direct mortality of individual birds, or the alteration of habitat that affects behavior (i.e., breeding or foraging) of birds to such a degree that the birds are considered lost as viable members of the population and thus “taken.” They may fail to breed, fail to successfully rear young, raise less fit young, or desert the area because of disturbance or because habitat no longer meets the MSO’s needs.

We anticipate that the proposed action is reasonably certain to result in incidental take of MSOs. However, it is difficult to quantify the number of individual MSOs taken because: (1) dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; (2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat; and (3) the species is secretive and we rarely have information regarding the number of MSOs occupying a PAC and/or their reproductive status. For these reasons, we will attribute incidental take at the PAC level. This fits well with our current section 7 consultation policy which provides for incidental take if an activity compromises the integrity of an occupied PAC to an extent that we are reasonably certain that incidental take occurred (USFWS Memorandum, February 3, 1997). Actions outside PACs will generally not result in incidental take because we are not reasonably certain the MSOs are nesting and roosting in areas outside of PACs. We may modify this determination in cases when areas that may support MSOs have not been adequately surveyed and we are reasonably certain MSOs may be present.

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

Amount or Extent of Take

Based upon analyses of the effects of USFS projects within previous BOs, we anticipate the majority of incidental take for future projects implemented under the Coconino NF LRMP will be in form of short-term harassment. MSOs experiencing short-term harassment may fail to successfully rear young in one or more breeding seasons, but not likely desert the area because of a short-term disturbance (Delaney et al. 1999). Incidental take in the form of harm is also anticipated albeit at a lesser amount (i.e., the number of MSOs) than take from harassment. Harm would be defined as either the direct mortality of individual birds, or the alteration of habitat that affects behavior (e.g. breeding or foraging) of birds to such a degree that the birds desert the area and would be considered lost as viable members of the population.

There are 186 known MSO PACs on the Coconino NF. Based upon the potential for incidental take to occur as part of implementation of the LRMP, we anticipate the following incidental take for the proposed action, which is in addition to previously authorized take resulting from ongoing projects as identified in the “Background Information regarding the Proposed Action” section above:

- Harassment of MSOs associated with up to nine PACs per year (5 percent) of the 186 PACs due to a single or short-term disturbance. MSOs associated with an individual PAC may not be harassed over the course of more than three breeding seasons.
- Harm and/or harassment of MSOs associated with two PACs due to long-term or chronic disturbance, or habitat degradation or loss over the life of the project. We expect that actions that could result in this type of harm or harassment would be very rare under the existing LRMP due to the protective S&Gs and other conservation measures included in the forest plan for the MSO.

This amount of incidental take is different from that anticipated in the 2005 LRMP BO/CO as it is based upon site-specific information from the Coconino NF and is not a compilation of all Region 3 NFs in the UGM EMU.

Effect of the Take

In this BO/CO, the FWS determines that this level of anticipated take is not likely to result in jeopardy to MSO. We base the numbers of MSO PACs with anticipated take on the potential for a future projects implemented under the current LRMP that could have short-term adverse effects, but long-term benefits to the MSO (such as, but not limited to a fuels reductions project).

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Coconino NF must comply with the following terms and conditions, which implement the reasonable and prudent measures described below and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary. The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of MSOs.

1. Minimize or eliminate take of MSOs on the Coconino NF.
2. Minimize or eliminate adverse effects to MSO habitat on the Coconino NF.
3. Monitor the impacts of site-specific projects implemented on the MSO.

TERMS AND CONDITIONS

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

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Where feasible, the Coconino NF shall avoid activities within 0.25 mile of PACs during the MSO breeding season (March 1 to August 31) that could result in disturbance to MSOs.
- 1.2 On site-specific projects, the USFS will work with FWS staff to identify additional measures, specific to the project, to minimize effects to owls.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Where feasible, vegetation management treatments (which could include activities such as fuels reduction, utility line maintenance, etc.) will maintain important adequate amounts of habitat features for MSOs (such as large trees, large snags, and large logs).
- 2.2 On site-specific projects, the USFS will work with FWS staff to identify additional measures, specific to the project, to minimize effects to owl habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 The Coconino NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site-specific BO (including conservation measures, and best management practices), breeding season(s) over which the project occurred, relevant MSO survey information, and any other pertinent information about the project's effects on the species.
- 3.2 Annual reports, which will include this species, shall be sent to the appropriate local FWS Ecological Services field office by March 1st of each year.

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 CH, to help implement recovery plans, or to develop information.

1. We recommend that the USFS work with the Fish and Wildlife Service to conduct MSO surveys over the next several years to attempt to determine how MSOs modify their territories in response to wildland fires on the Coconino NF. This information will aid us in understanding the short- and long-term impacts of the fire on the MSO, and its

subsequent effect on the status of the species in the UGM EMU. Surveys shall be conducted according to protocol unless other factors (e.g., public health and safety or best available science indicates that surveys are not needed) result in needed modifications. Surveys should be coordinated with the FWS prior to implementation of any project.

2. We recommend that the USFS continue to work with the Fish and Wildlife Service to design forest restoration treatments across the Coconino NF that protects existing nest/roost habitat from high-severity, stand-replacing fire, and enhances existing or potential habitat to aid in sustaining MSO habitat across the landscape. PACs can be afforded substantial protection from wildland fire by emphasizing fuels reduction and forest restoration in surrounding areas outside of PACs and nest/roost habitat.

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

GILA CHUB

STATUS OF THE SPECIES (rangewide)

Description

The Gila chub is small-finned, deep-bodied, chubby, and darkly colored (sometimes lighter on belly; diffuse lateral band(s) are rarely present). Adult males average about 6 in (150 mm) in total length; females can exceed 10 in (250 mm) (Rinne and Minckley 1991). Scales are coarse, large, thick, and broadly overlapped, and radiate out from the base. Lateral-line scales usually number greater than 61 and less than 80. There are usually eight (rarely seven or nine) dorsal and anal fin-rays; pelvic fin-rays typically number eight, but sometimes nine (Rinne 1976, Minckley and DeMarais 2000, Minckley and March 2009).

Taxonomy

The Gila chub is a member of the minnow family Cyprinidae. Baird and Girard (1854) published a description of the Gila chub, as *Gila gibbosa*, based on the type specimen collected in 1851 from the Santa Cruz River, Arizona. For nomenclature reasons, the name was changed by Girard to *Tigoma intermedia* in 1856, working with specimens from the San Pedro River (Girard 1856). Despite that and other name changes, the Gila chub has been recognized as a distinct species since the 1850's, with the exception of a short period in the mid-1900's when it was placed as a subspecies of the roundtail chub (*Gila robusta*) (Miller 1946). For the past 30 years, *Gila intermedia* has been recognized as a full monotypic species, separate from the polytypic species *Gila robusta*, both currently accepted as valid (Nelson et al. 2004). Taxonomically problematic populations nonetheless exist, variously assigned to one or the other taxa and leading to continued confusion. Further complicating matters, Minckley and DeMarais (2000) described a new species, the headwater chub (*Gila nigra*), within the Gila River Basin. It

is of hybrid origin derived from *Gila robusta* and *Gila intermedia*. Its range is similar to that of *Gila intermedia* and is another headwater-type chub, whereas, *Gila robusta* is found in the mainstem of the major rivers within the Gila River Basin. Dowling et al. (2008) reported on the genetics of many of the extant populations of these three Gila River chubs and recommended management units based on this information.

Life History

Gila chub interact with spring and small stream fishes regularly (Meffe 1985), but are usually restricted to deeper waters (Minckley and Marsh 2009). Adults often are found in deep pools and eddies below areas with swift current. Young-of-the-year inhabits shallow water among plants or eddies, while older juveniles use higher velocity stream areas (Minckley 1973). Gila chub feed on both plants and animals. Adults appear to be principally carnivorous, feeding on large and small terrestrial and aquatic insects and sometimes other small fishes. Smaller individuals often feed on organic debris and aquatic plants, especially filamentous (threadlike) algae, and less intensely on diatoms (unicellular or colonial algae) (Griffith and Tiersch 1989, Rinne and Minckley 1991).

Spawning typically occurs from late spring into summer (Minckley 1973, Griffith and Tiersch 1989, Nelson 1993). Breeding males display deep red or orange coloration on ventral surfaces and paired fin bases (Minckley 1973, Rinne 1976). Spawning is likely sporadic over a long reproductive season (Rinne and Minckley 1991), and in constant warm water temperature settings such as springs; and Gila chubs can spawn throughout the year (Minckley 1973, 1985, Griffith and Tiersch 1989). Spawning likely occurs over beds of submerged aquatic vegetation or root wads, with large females being followed by several smaller males (Minckley 1973). Males and females reach sexual maturity in 1 to 3 years at lengths of 3.6-3.8 in (90 to 95 mm) (Griffith and Tiersch 1989). Gila chub spawn at water temperatures warmer than 62 °F (17 °C), with optimal water temperatures of 68 to 75 °F (20 to 24 °C) (Nelson 1993), and optimal temperatures for growth of 75 to 82 °F (24 to 28 °C) (Schultz and Bonar 2007). Gila chub likely live up to 4 years or more (Griffith and Tiersch 1989).

Status and Distribution

The Gila chub was listed as endangered with CH on November 2, 2005 (USFWS 2005a). Historically, Gila chub have been recorded in approximately 43 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, Weedman et al. 1996, USFWS 2005a). The Gila chub now occupies an estimated 10 to 15 percent of its historical range, and is limited to about 30 small, isolated, and fragmented populations throughout the Gila River basin in Arizona and New Mexico (Weedman et al. 1996, USFWS 2005a). Populations occur in tributaries of the Agua Fria, Babocamari, Gila, San Francisco, San Pedro, Santa Cruz, and upper Verde Rivers in Cochise, Coconino, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz, and Yavapai Counties in Arizona; and in Grant County, New Mexico (Weedman et al. 1996, USFWS 2005a). Approximately half of all known Gila chub occupied habitat occurs on NFS lands. Of these populations, ten are estimated to be stable-threatened, meaning the Gila chub are considered

common, but face threats from nonnative species, land-use practices, and lack of recruitment. The remaining known extant populations are considered unstable-threatened, indicating that Gila chub are rare, have a limited distribution, predatory or competitive nonnative species are present, or the habitat is modified or poor land-use practices occur (Weedman et al. 1996, USFWS 2005a).

In the Verde River basin, the Walker Creek, and Spring Creek populations (Yavapai County) are considered stable-threatened, but the status of the Williamson Valley Wash population and Red Tank Draw is unknown. The Santa Cruz River has three tributaries with extant populations of Gila chub: Sabino Canyon (Pima County) and Sheehy Spring (Santa Cruz County) have unstable-threatened populations; and Cienega Creek (Pima and Santa Cruz Counties) has the only known naturally-occurring stable-secure population of Gila chub. The San Pedro River basin has three extant, stable-threatened populations in Redfield Canyon (Graham and Pima Counties), O'Donnell Creek (Santa Cruz County), and Bass Canyon (Graham and Cochise Counties). Gila chub still occupy T4 Spring in the Babocomari River basin (Santa Cruz and Cochise Counties), but it is very rare in this spring. The San Carlos River and the Blue River, (Gila and Graham Counties), tributaries of the Gila River located on the San Carlos Apache Indian Reservation, are currently occupied by Gila chub (Weedman et al. 1996, USFWS 2005a).

The San Francisco River has two tributaries with extant stable-threatened populations, Harden Cienega Creek and Dix Creek (Greenlee County). The Agua Fria River has four tributaries with stable-threatened populations: Larry, Lousy, Silver and Sycamore Creeks (Yavapai County); as well as two unstable-threatened populations in Little Sycamore Creek and Indian Creek (Yavapai County). Two tributaries of the Gila River in Arizona have extant populations of Gila chub: Eagle Creek (Graham and Greenlee Counties), has an unstable-threatened population and Bonita Creek (Graham County), has a stable-threatened population which is now somewhat protected by placement of a fish barrier and chemical renovation of the stream in 2008. Green sunfish have since reinvaded and additional renovation is planned (USFWS 2005a, Marsh and Associates 2009, U.S. Bureau of Reclamation and Bureau of Land Management 2010).

In Mexico, Gila chub occurred in two small spring areas, Cienega los Fresnos and Cienega la Cienegita, adjacent to the Arroyo los Fresnos (tributary to the San Pedro River), within 1 mi (1.6 km) of the Arizona-Mexico border as recently as 1992, but are now thought to be extirpated (Varela-Romero et al. 1992). No Gila chub remain in the Mexican portion of the Santa Cruz River (Weedman et al. 1996).

Reestablishment of Gila chub has been attempted in at least six Arizona sites. Lousy Canyon and Larry Creek, stocked with 200 Gila chub from Silver Creek in July 1995, are extant. Gardner Canyon (Cochise County) was stocked from Turkey Creek (Santa Cruz County) with 150 Gila chub in July 1988. In May 1995, no Gila chub or any other fish were captured during surveys in Turkey Creek. Turkey Creek, a tributary to the Babocomari River, was stocked with a small number of Gila chub in 2005, but is now thought to be extirpated. In 2005, Bear and Romero Canyons in the Santa Rita Mountains were stocked with Gila chub from Sabino Canyon. Gila chub now appear extirpated from Bear Canyon, but are doing well in Romero Canyon, where they can be considered stable-threatened (Ehret and Dickens 2009).

Habitat

Gila chub commonly inhabit pools in smaller streams, springs, and cienegas, and can survive in small artificial impoundments (Miller 1946, Rinne 1975, Weedman et al. 1996, Minckley and March 2009). Gila chub are highly secretive, preferring quiet, deeper waters, especially pools, or remaining near cover including terrestrial vegetation, boulders, and fallen logs (Rinne and Minckley 1991, Carman 2006, Minckley and March 2009). Undercut banks created by overhanging terrestrial vegetation with dense roots growing into pool edges provide ideal cover (Nelson 1993). Gila chub can survive in larger stream habitat such as the San Carlos River and artificial habitats like the Buckeye Canal (Stout et al. 1970, Rinne 1976). Gila chub are also easily cultured in a hatchery setting (Schultz and Bonar 2007). Gila chub interact with spring and small stream fishes regularly (Meffe 1985), but adults are usually restricted to deeper waters (Minckley and March 2009). Native fish found in Gila chub habitat include desert sucker (*Catostomus clarki*), Sonora sucker (*Catostomus insignis*), longfin dace (*Agosia chrysogaster*), and speckled dace (*Rhinichthys osculus*) (USFS 2011a). They are often found in deep pools and eddies below areas with swift current, as in the Gila chub habitats found in Bass Canyon and Hot Springs in the Muleshoe Preserve area along the western slopes of the Galiuro Mountains. Young-of-the-year inhabit shallow water among plants or eddies, while older juveniles use higher velocity stream areas and then retire to pools when adults (Minckley 1973, 1991). In general, key habitat components for Gila chub of all life stages appear to be deep pools with cover in the form of undercut banks, root wads, and in-stream organic debris (Rinne and Minckley 1991, Carman 2006, Minckley and March 2009).

Critical Habitat

CH for Gila chub is designated for approximately 160 mi (258 km) of stream reaches in Arizona and New Mexico that includes cienegas, headwaters, spring-fed streams, perennial streams, and spring-fed ponds. CH includes the area of bankfull width plus 300 ft (91 m) on either side of the banks. The bankfull width is the width of the stream or river at bankfull discharge (e.g., the flow at which water begins to leave the channel and move into the floodplain) (Rosgen 1996, USFWS 2005a). CH is organized into seven areas or river units:

Area 1 - Upper Gila River, Grant County, New Mexico, and Greenlee County, Arizona, includes Turkey Creek (New Mexico), Eagle Creek, Harden Cienega Creek, and Dix Creek;

Area 2 - Middle Gila River, Gila and Pinal Counties Arizona, consists of Mineral Creek;

Area 3 - Babocomari River, Santa Cruz County, Arizona, includes O'Donnell Canyon and Turkey Creek (Arizona);

Area 4 - Lower San Pedro River, Cochise and Graham Counties, Arizona, includes Bass Canyon, Hot Springs Canyon, and Redfield Canyon;

Area 5 - Lower Santa Cruz River, Pima County, Arizona, includes Cienega Creek, Mattie Canyon, Empire Gulch, and Sabino Canyon;

Area 6 - Upper Verde River, Yavapai County, Arizona, includes Walker Creek, Red Tank Draw, Spring Creek, and Williamson Valley Wash; and

Area 7 - Agua Fria River, Yavapai County, Arizona, includes Little Sycamore Creek, Sycamore Creek, Indian Creek, Silver Creek, Lousy Canyon, and Larry Creek (USFWS 2005a).

There are seven PCEs of CH, which include those habitat features required for the physiological, behavioral, and ecological needs of the species:

1. Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies all found in headwaters, springs, and cienegas, generally of smaller tributaries;
2. Water temperatures for spawning ranging from 63 to 75 °F (17 to 24 °C), and seasonally appropriate temperatures for all life stages (varying from about 50 to 86 °F (10 to 30 °C));
3. Water quality with reduced levels of contaminants, including excessive levels of sediments adverse to Gila chub health, and adequate levels of pH (e.g., ranging from 6.5 to 9.5), dissolved oxygen (e.g., ranging from 3.0 to 10.0 ppm) and conductivity (e.g., 100 to 1,000 mmhos);
4. Prey base consisting of invertebrates (e.g., aquatic and terrestrial insects) and aquatic plants (e.g., diatoms and filamentous green algae);
5. Sufficient cover consisting of downed logs in the water channel, submerged aquatic vegetation, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs, a high degree of stream bank stability, and a healthy, intact riparian vegetation community;
6. Habitat devoid of nonnative aquatic species detrimental to Gila chub or habitat in which detrimental nonnative species are kept at a level that allows Gila chub to continue to survive and reproduce; and
7. Streams that maintain a natural flow pattern including periodic flooding.

The FWS is currently in the process of forming a recovery team for Gila chub to develop and implement a recovery plan for the species. Until the recovery plan is completed, there is limited information with which to evaluate the ability of CH to meet the recovery needs of the species, or how an action may alter the ability of CH to meet recovery needs. In lieu of a recovery plan, assessing the functionality of each of the PCEs of a given reach of CH, and how an action might affect the PCEs of that reach, can provide some insight into the effects of an action on the functionality of CH in terms of recovery.

Reasons for Listing

The Gila chub was listed as endangered with CH on November 2, 2005 (USFWS 2005a). The listing stated that the species has been reduced in numbers and distribution in the majority of its historical range (Minckley 1973, Weedman et al 1996). Where it is still present, populations are often small, scattered, and at risk from known and potential threats and from random events.

Threats: Decline of Gila chub is primarily due to habitat loss from various land-use practices and predation and competition from nonnative fish species, and the highly fragmented and disconnected nature of the remaining Gila chub populations increases their vulnerability to these threats (USFWS 2005a). Land uses that have caused past habitat loss and continue to threaten Gila chub habitat include hydrologic modification of rivers, springs, and cienegas for human uses (groundwater pumping, dewatering, diversion of water channels, impoundments, and flow regulation), poorly managed livestock grazing, logging and fuel wood cutting, road construction and use, recreation, mining, and urban and agricultural development (USFWS 2005a). All of these activities have promoted erosion and arroyo formation and the introduction of predaceous and competing nonnative fish species (Miller 1961, Minckley 1985), and at least one or some combination of these activities is occurring in all of the remaining populations. Wildfires and wildfire suppression activities also pose a threat to the remaining populations by causing water quality changes that can kill fish, (Rinne 2004, USFWS 2005a, Rhodes 2007), negatively altering food base for fishes (Earl and Blinn 2003), and resulting in stream and riparian vegetation alteration that negatively affects fish habitat (USFWS 2005a).

Perhaps the most serious threat to Gila chub is predation by and competition with nonnative organisms, including numerous nonnative fish species, bullfrogs (*Lithobates catesbeiana*), and virile crayfish (*Orconectes virilis*). The impacts of nonnative fish species on native fish including Gila chub have been well documented (Hubbs 1955, Miller 1961, Minckley and Deacon 1968, Minckley 1973, Meffe 1985, Minckley 1985, Williams and Sada 1985, Moyle et al. 1986, Minckley and Deacon 1991, Ruppert et al. 1993, Clarkson et al. 2005). Dudley and Matter (2000) correlated green sunfish presence with Gila chub decline, documented green sunfish predation on Gila chub, and found that even small green sunfish readily consume young-of-year Gila chub. Dudley (1995) found that green sunfish appeared to displace both subadult and adult Gila chub from preferred habitats, found that Gila chub utilized similar habitat types to green sunfish indicating competition for food and space was likely occurring, and concluded that predation by and competition with green sunfish virtually eliminated small chub from where the two species co-occurred, indicating recruitment failure. Unmack et al. (2003) similarly found that green sunfish presence was correlated with the absence of young-of-year Gila chub in Silver Creek, Arizona. Nonnative fish parasites, such as Asian tapeworm (*Bothriocephalus acheilognathi*) also may be a threat to Gila chub (USFWS 2005a).

The U.S. Census predicts that Arizona will be the second fastest growing state in the country through 2030, adding an additional 5.6 million people (U.S. Census 2005). During the 2010 Census, Arizona maintained its standing as having the second fastest population growth rate by growing more than 20 percent between 2000 and 2010 (Pollard and Mather 2010). If these predictions hold true, already severe threats to Gila chub and its habitat will worsen, primarily due to increased human demand for surface and ground water and decreased supply. Water demands continue to increase as the population increases. The agriculture population is also increasing and agriculture is Arizona's largest water demand. Most of Arizona's developed

areas' groundwater is pumped out faster than the aquifer can recharge, resulting in more dependence on freshwater sources from nearby rivers (U.S. Environmental Protection Agency 2011).

Climate Change

General climate change effects on federally listed species are described above. Here we describe factors that might affect the Gila chub.

Several climate-related trends have been detected since the 1970s in the southwestern United States including increases in surface temperatures, rainfall intensity, drought, heat waves, extreme high temperatures, and average low temperatures (Overpeck 2008). Annual precipitation amounts in the southwestern United States may decrease by 10 percent by the year 2100 (Overpeck 2008).

Current predictions of drought and/or higher winter low temperatures may also stress ponderosa pine forests in which Gila chub occurs. Ganey and Vojta (2010) studied tree mortality in mixed conifer and ponderosa pine forests in Arizona from 1997-2007, a period of extreme drought. They found the mortality of trees to be severe; the number of trees dying over a five-year period increased by over 200 percent in mixed-conifer forest and by 74 percent in ponderosa pine forest during this time frame (Ganey and Vojta 2010). Ganey and Vojta (2010) attributed drought and subsequent insect (bark beetle) infestation for the die-offs in trees.

Drought stress and a subsequent high degree of tree mortality from bark beetles make high-elevation forests more susceptible to unnaturally intense wildfires. Wildfires are expected to reduce vegetative cover and result in greater soil erosion from increased droplet splash-erosion and reduced infiltration capacity, subsequently resulting in increased sediment flows in streams (Fulé 2010).

For a detailed discussion on climate change, refer to the Climate Change section within the Gila chub Environmental Baseline section in this BO.

Overall, the populations of Gila chub rangewide (Arizona and New Mexico) currently appear to be stable. Gila chub populations remain extant in the Agua Fria, Blue, Gila, San Francisco, Santa Cruz and Verde Rivers. These populations are spread across the drainages, and most are isolated from other populations.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the effects of the action on federally listed species, we are required to take into consideration the environmental baseline. Regulations implementing the ESA(50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone section 7 consultation, and the impacts of state and private actions that are contemporaneous with the consultation in progress. 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. We have defined the action area for the LRMP as the Coconino NF. The Coconino NF has a land base of approximately 1.8 million acres (728,434 ha).

Status of the Species Within the Action Area

It must be noted that the Gila chub is a secretive species (Rinne and Minckley 1991). Most of the known recent and historical locations described above and in the final listing rule continue to lack extensive surveys, at least since the comprehensive status review by Weedman et al. (1996) and USFWS (2005a). The Gila chub may thus 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 the final rule in recent years, these streams may still be occupied.

The Gila chub is currently restricted to small isolated populations scattered throughout its historical range. Approximately half of all known Gila chub occupied habitat occurs on NFS lands. Most populations on NFS lands are considered to be small, isolated and threatened. Specifically, on the Coconino NF in Arizona, there are three populations. A Gila chub population is known to exist in Walker Creek, Red Tank Draw, and Spring Creek tributaries to the Verde River. In 2005, both Spring and Walker Creek populations were considered stable-threatened and the Red Tank Draw population is unknown (USFWS 2005a).

Critical Habitat

There is only one designated CH area on the Coconino NF. This is Area 6 - Upper Verde River, Yavapai County, Arizona, includes Walker Creek, Red Tank Draw, Spring Creek, and Williamson Valley Wash. The following creeks: Walker Creek, Red Tank Draw, and Spring Creek are within designated CH on the Coconino NF. The Coconino NF is comprised of 10.5 mi (16.9 km) of designated CH for Gila chub.

Factors Affecting the Species within the Action Area

On the Coconino NF, past and present federal, state, private, and other human activities that may affect Gila chub and their habitat include road construction and maintenance, timber harvest, prescribed burning, recreation, sportfish stocking, groundwater pumping and stream diversion. We describe activities that have occurred within the Coconino NF to qualify the environmental baseline.

Livestock grazing

Improper livestock grazing has been shown to increase soil compaction, decrease water infiltration rates, increase runoff, change vegetative species composition, decrease riparian vegetation, increase stream sedimentation, increase stream water temperature, decrease fish populations, and change channel form (Meehan and Platts 1978, Kauffman and Kruger 1984, Schulz and Leininger 1990, Platts 1991, Fleischner 1994, Ohmart 1996). Although direct impacts to the riparian zone and stream can be the most obvious adverse effect of livestock grazing, upland watershed condition is also important because of changes in soil compaction, percent cover, and vegetative type can influence the timing and amount of water delivered to stream channels (Platts 1991). These changes, Increased soil compaction, decreased vegetative

cover, and a decrease in grasslands, lead to faster water delivery to stream channels that increases peak flows and lowers fall base flow (Platts 1991, Ohmart 1996, Belsky and Blumenthal 1997). As a consequence, streams are more likely to experience flood events that negatively affect the aquatic and riparian habitats. As a result, they are more likely to become intermittent or dry in the fall (groundwater recharge is less when water runs off quickly) (Platts 1991, Ohmart 1996).

Timber harvest

Logging activities in the early to mid-1900s likely also caused major changes in watershed characteristics and stream morphology (Chamberlin et al. 1991). Early logging efforts were often concentrated along canyon bottoms with perennial streams. Tree removal along perennial streams within the historical range of possibly Gila chub likely altered water temperature regimes, sediment loading, bank stability, and availability of large woody debris (Chamberlin et al. 1991).

Fire

Because Gila chub are now found primarily in isolated, small streams, avoidance of ash flows resulting from fire may be impossible and opportunities for natural recolonization usually do not exist, as documented for Gila trout (Brown et al. 2001). Persistence of Gila chub in streams affected by fire and subsequent ash flows depend on management actions. In some instances, evacuation of Gila chub from streams in watersheds that have burned is deemed necessary and actions are taken, and in other cases populations are lost and must be replaced through stocking.

Nonnative species

Perhaps the most serious threat to Gila chub is predation by and competition with nonnative organisms, including numerous nonnative fish species, bullfrogs, and virile crayfish. The impacts of nonnative fish species on native fish including Gila chub, have been well documented (Hubbs 1955, Miller 1961, Minckley and Deacon 1968, Minckley 1973, Meffe 1985, Minckley 1985, Moyle 1986, Williams and Sada 1985, Minckley and Deacon 1991, Ruppert et al. 1993, Clarkson et al. 2005, Dudley and Matter 2000).

Nonnative fish found in Gila chub habitat include channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), red shiner (*Cyprinella lutrensis*), fathead minnow (*Pimephales promelas*), green sunfish (*Lepomis cyanellus*), western mosquitofish (*Gambusia affinis*), rainbow trout (*Oncorhynchus mykiss*), and common carp (*Cyprinus carpio*) (Marsh et al. 1991, Weedman et al. 1996).

Climate Change

Climate change predicts four major effects on the Gila chub habitat:

1. increased water temperature;
2. decreased streamflow;
3. a change in the hydrograph; and
4. an increased occurrence of extreme events (fire, drought, and floods).

Increased water temperature

Kundzewicz et al. (2007) state that of all ecosystems, freshwater ecosystems will have the highest proportion of species threatened with extinction due to climate change. Species with narrow temperature tolerances will likely experience the greatest effects from climate change and it is anticipated that populations located at the margins of species hydrologic and geographic distributions will be affected first (Meisner 1990). High temperatures suppress appetite and growth, foster disease, can influence behavioral interactions with other fish (Schrank et al. 2003), or be lethal (McCullough 1999). The temperature preferences and tolerances of Gila chub is less than 98.6 °F (37.0 °C). However, increased stress from elevated temperatures could lead to greater susceptibility to disease and reduced reproductive success.

Decreased stream flow

Current models suggest a decrease in precipitation in the Southwest (Kundzewicz et al. 2007, Seager et al. 2007) which would lead to reduced stream flows and a reduced amount of habitat for Gila chub. Stream flow is predicted to decrease in the Southwest even if precipitation were to increase moderately (Nash and Gleick 1993, State of New Mexico 2005, Hoerling and Eischeid 2007). Winter and spring warming causes an increased fraction of precipitation to fall as rain, resulting in a reduced snow pack, an earlier snowmelt, and decreased summer base flow (Christensen et al. 2004, Stewart et al. 2005, Regonda et al. 2005). Earlier snowmelt and warmer air temperatures can lead to a longer dry season. Warmer air temperatures lead to increased evaporation, increased evapotranspiration, and decreased soil moisture. These three factors would lead to decreased stream flow even if precipitation increased moderately.

The effect of decreased stream flow is that streams become smaller, intermittent or dry, and thereby reduce the amount of habitat available for aquatic species. A smaller stream is affected more by air temperature than a larger one, exacerbating the effects of warm and cold air temperatures (Smith and Lavis 1975). In addition, fish isolated in pools may be subject to increased predation from terrestrial predators.

Change in the hydrograph

Another documented effect of climate change is a shift of the timing of spring snowmelt. Stewart et al. (2005) show that timing of spring streamflow in the western U.S. during the last 5 decades has shifted so that the major peak now arrives 1 to 4 weeks earlier, resulting in less flow in the spring and summer. They conclude that almost everywhere in North America, a 10 to 50 percent decrease in spring-summer streamflow fractions will accentuate the seasonal summer dry period with important consequences for warm-season water supplies, ecosystems, and wildfire risks (Stewart et al. 2005). Rauscher et al. (2008) suggest that with air temperature increases from 37 to 41 °F (3 to 5 °C), snowmelt driven runoff in the western U.S. could occur as much as two months earlier than present. Changes in the hydrograph could potentially alter native fish assemblages. Variability in the hydrographs and greater flow volume has been shown to sustain native fishes (e.g., as seen for spikedace and loach minnow) over nonnatives between periodic flood events (Rinne and Miller 2006).

Increased occurrence in extreme events

Extreme events such as drought, fires, and floods are predicted to occur more frequently because of climate change (IPCC 2007). It is anticipated that an increase in extreme events will most likely affect populations living at the edge of their physiological tolerances. The predicted increases in extreme temperature and precipitation events may lead to dramatic changes in the distribution of species or to their extirpation or extinction (Parmesan and Matthews 2006).

Drought

The Southwest United States is currently experiencing drought conditions (University of Nebraska-Lincoln 2010). Portions of New Mexico are also considered abnormally dry, but not in areas currently occupied by Gila chub (University of Nebraska-Lincoln 2010). Although Gila chub evolved in the Southwest and have survived drought in the past, it is anticipated that a prolonged, intense drought would affect many populations, in particular those occupying small headwater streams which are likely to dry or become intermittent. In addition to streams drying, there is a clear association between severe droughts and large fires in the Southwest (Swetnam and Baisan 1996) that can harm fish.

Fire

Since the mid-1980s, wildfire frequency in western forests has nearly quadrupled compared to the average of the period 1970 to 1986. The total area burned is more than six and a half times the previous level (Westerling et al. 2006). In addition, the average length of the fire season during 1987 to 2003 was 78 days longer compared to 1970 to 1986 and the average time between fire discovery and control increased from about 8 to 37 days for the same time frames (Westerling et al. 2006). McKenzie et al. (2004) suggest, based on models, that the length of the fire season will likely increase and fires in the western U.S. will be more frequent and severe. In particular, they found that fire in New Mexico appears to be acutely sensitive to summer climate and temperature changes and may respond dramatically to climate warming (McKenzie et al. 2004).

Severe wildfires capable of extirpating or decimating fish populations are a relatively recent phenomena and result from the cumulative effects of historical or ongoing grazing, which removes the fine fuels needed to carry fire (Madany and West 1983, Savage and Swetnam 1990, Swetnam 1990, Touchan et al. 1995, Swetnam and Baisan 1996, Belsky and Blumenthal 1997, Gresswell 1999). Historical wildfires were primarily cool-burning understory fires with return intervals of 3 to 7 years in ponderosa pine (Swetnam and Dieterich 1985). Cooper (1960) concluded that prior to the 1950s; crown fires were extremely rare or nonexistent in the region.

Effects of fire may be direct and immediate or indirect and sustained over time (Gresswell 1999). The cause of direct fire-related fish mortalities has not been clearly established. Fatalities are most likely during intense fires in small, headwater streams with low flows (less insulation and less water for dilution) (Gresswell 1999). In these situations, water temperatures can become elevated or changes in pH may cause immediate death (Cushing and Olson 1963). Spencer and Hauer (1991) documented 40-fold increases in ammonium concentrations during an intense fire

in Montana. The inadvertent dropping of fire retardant in streams is another source of direct mortality during fires.

Indirect effects of fire include ash and debris flows, increases in water temperature, increased nutrient inputs, and sedimentation (Swanston 1991, Bozek and Young 1994, Gresswell 1999). Ash and debris flows can cause mortality months after fires occur when barren soils are eroded during monsoonal rain storms (Bozek and Young 1994, Brown et al. 2001). Fish can suffocate when their gills are coated with fine particulate matter, they can be physically injured by rocks and debris, or they can be displaced downstream below impassable barriers into habitat occupied by nonnative fish. Ash and debris flows or severe flash flooding can also decimate aquatic invertebrate populations that fish may depend on for food (Molles 1985, Rinne 1996, Lytle 2000). In larger streams, refugia are typically available where fish can withstand the short-term adverse conditions; small headwater streams are usually more confined, concentrating the force of water and debris (Pearsons et al. 1992, Brown et al. 2001).

Floods

Floods that occur after intense wildfires that have denuded the watershed are also a threat. As described above, several streams occupied by Gila trout have had populations extirpated as a result of ash flows from floods after fire (Rinne 1996, Brown et al. 2001). Consequently, an increase in rain or snow events, intense precipitation that is unseasonable or heavy precipitation that occurs after fire, could extirpate affected Gila chub.

The conjunction of climate change with ongoing habitat loss and alteration; and nonnative species competition has caused a general loss of resiliency in the ecosystem that has serious consequences for Gila chub.

EFFECTS OF THE ACTION

The S&Gs listed in the proposed Coconino NF LRMP and the 1996 Regional Amendment provides direction for the development of site-specific actions. The Gila chub designated CH and occupied sites are within or near Management Areas: 001, 003, 004, 006, 007, 008, 009, 010, 011, 012, 017, 022, 023, 025, 027 and 029. Multiple S&Gs within the Coconino NF LRMP are applicable to the Gila chub and its habitat. These S&Gs may result in both indirect and direct effects to the species.

No new significant scientific information or data have become available that would change the 2004 effects analysis for Gila chub. Based on the 2011 BA (USFS 2011b) it was determined that there have been no changes in USFS policy or programs that would change the 2004 BA (USFS 2004) or 2005 BO/CO (USFWS 2005b) effects determination for the species. The current analysis evaluated all S&Gs identified by the USFS 2011 BA as identified in Table 2 below.

The 2005 BO included tables showing the S&Gs considered for each species' analysis and a ranking table summarizing the types of effects (lethal, sublethal, etc.) expected to result from the S&Gs. For the above reasons, we hereby incorporate by reference the ranking tables and effects analysis presented in the 2005 BO and provide a narrative summary below. Three additional

S&Gs were added to the Coconino NF LRMP (2023 and 2024), which are targeted at the control and prevention of noxious or invasive weeds within the Forest Health Program and S&G 2049 which is management of the Verde River as directed in the Verde Wild and Scenic River Comprehensive River Management Plan.

Table 2. Summary of S&Gs considered for the Gila chub – Coconino NF LRMP.

National Forest	Standard and Guidelines Numbers ¹
Coconino LRMP	311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 327, 328, 329, 331, 336, 337, 338, 339, 341, 342, 343, 344, 345, 353, 354, 355, 356, 357, 358, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 393, 394, 395, 398, 399, 400, 401, 402, 404, 406, 407, 408, 411, 413, 414, 415, 416, 417, 433, 434, 458, 459, 460, 461, 462, 464, 466, 469, 472, 473, 479, 481, 483, 484, 485, 486, 487, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 520, 2023, 2024, 2049
1996 Regional Amendment	1425, 1426, 1427, 1428, 1432, 1434, 1437, 1438, 1440, 1441, 1443, 1445, 1449, 1453, 1454, 1455, 1456, 1458, 1459, 1461, 1462, 1463, 1464, 1465, 1468, 1473, 1474, 1476, 1478, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1495, 1496, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515

¹New S&G in Bold

The FWS found only one S&G that could cause a sublethal response within the Coconino NF’s LRMP. The majority of the S&Gs received a positive rating with regards to maintaining habitat or providing recovery. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects. For additional information about the Gila chub effects analysis see 2005 BO/CO (USFWS 2005b).

1996 Regional Amendment

The management direction provided by the 1996 Regional Amendment S&Gs was related to the conservation of MSOs and northern goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and healthy riparian and aquatic systems (USFS 2004). There are no long-term effects to the Gila chub as a result of the implementation of the 1996 Regional Amendment; however, some S&Gs may have short-term adverse effects on the species; these S&Gs are described below.

S&G 1432 allows no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years. Standard and Guideline 1445 allows treatment of fuel accumulations to abate fire risk. S&G 1455 directs the Forests to use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire. S&G 1458 allows prescribed fire where appropriate within Reserved Lands (wilderness, research natural areas, wild and scenic rivers, and congressionally recognized wilderness study areas). S&G 1468 encourages prescribed and prescribed natural fire to reduce hazardous fuel accumulation. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire. S&G 1476 directs the NF to apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with NF plan old growth S&Gs.

Each of the aforementioned S&Gs permits short-term adverse effects on forested environments in order to secure long-term stability and to create conditions more desirable for the northern goshawk and MSO. The range of the Gila chub is generally situated downstream of much of the habitat occupied by (or suitable for) these raptors and thus, the fish can be expected to experience indirect, short-term adverse effects in exchange for long term habitat stability or improvement.

S&G 1508 allows for low intensity ground fires at any time in all forested cover types, but high intensity crown fires are not acceptable in the post-fledgling family area or nest areas. This S&G directs the Forests to avoid burning the entire home range of a goshawk pair in a single year. For fires planned in the occupied nest area, a fire management plan should be prepared. The fire management plan should minimize the risk of goshawk abandonment while low intensity ground fire burns in the nesting area. Prescribed fire within nesting areas should be planned to move with prevailing winds away from the nest tree to minimize smoke and risk of crown fire developing and driving the adults off or consuming the nest tree. Although, protecting one species could possibly impact another like Gila chub, directing a prescribe fire towards occupied or potential Gila chub habitat. As stated the climate change section for Gila chub, both direct and indirect fire are ongoing threats for many fish species.

Collectively, implementation of the MSO and northern goshawk guidelines may affect the following Gila chub CH PCEs: 1) by reducing the availability of perennial pools; increasing areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; 2) by opening up the overstory resulting in increased water temperatures; 3) by increasing sedimentation resulting in contamination of water quality; 4) by reducing the food base including invertebrates, filamentous algae, and insects; 5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, and large rocks and boulders with overhangs; and 6) by altering a streams natural unregulated flow pattern including periodic natural flooding, which can potentially prolong recovery efforts

Standards & Guidelines 1432, 1445, 1455, 1458, 1468, 1476 and 1508 are all related to the fuels treatment for fire suppression. As discussed previously, there are potential short-term effects

from fuels treatments; however, the beneficial effect of reduced catastrophic fire risk far outweighs those short-term adverse effects.

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 BO. 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 ESA.

Activities on residential and commercial inholdings within watersheds containing Gila chub can adversely affect the species through poor land management practices and water withdrawal. These effects have not been quantified within the action area.

CONCLUSION

After reviewing the current status of the Gila chub, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Gila chub. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

This BO does not rely on the regulatory definition of "destruction or adverse modification" of CH in 50 CFR 402.02 because of various court cases surrounding the Service's jeopardy and adverse modification analyses. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to CH. CH is defined in section 3 of the ESA "as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species." We have also relied upon the Consultation Handbook which provides guidance on determining adverse modification of CH and jeopardy pursuant to the following: "Adverse effects on individuals of a species or constituent elements or segments of CH generally do not result in jeopardy or adverse modification determinations unless that loss, when added to the environmental baseline, is likely to result in significant adverse effects throughout the species' range, or appreciably diminish the capability of the CH to satisfy essential requirements of the species" (USFWS and NMFS 1998).

Effects to the Gila chub from the Coconino NF LRMP and the 1996 Regional Amendment were analyzed in the 2005 BO. Potential adverse effects from the implementation of the LRMP and associated S&Gs were found likely to occur on the Coconino NF. In addition, short-term adverse effects were identified for activities associated with S&Gs that have a long-term benefit

to the species. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- S&G 321 within the Coconino NF LRMP supports conservation and recovery of Gila chub, which states that management of sensitive species will take precedence over other species except threatened and endangered. This S&G guides the NF to implement recovery plans, improve habitat for threatened and endangered species by structural and nonstructural means, and to delist threatened and endangered species.
- Across the range of the species, there are other conservation efforts underway, such as a cooperative agreement between the BLM and The Nature Conservancy to manage the Muleshoe Preserve under the Muleshoe Ecosystem Management Plan. The plan addresses management activities for the maintenance and improvement of watershed conditions necessary for Gila chub PCEs (BLM 1998).

Due to the fact that the Gila chub is a hard-to-find, secretive species and because there have been no extensive survey efforts for this species since the comprehensive status review by Weedman et al. (1996), it is possible that Gila chub still persist in areas thought to be extirpated and may occur in localities yet to be discovered. Proactive efforts by the USFS in the past and the continued monitoring of those actions contribute positively to the overall status of the Gila chub. In addition, there are activities being conducted by other land management agencies to enhance habitat for the chub that benefit its status rangewide. All these actions together with the implementation of the beneficial S&Gs outlined above should continue to improve habitat conditions and increase populations of Gila chub on NFS lands in the southwest. For these reasons, we conclude that the proposed action on the Coconino NF is not likely to jeopardize the continued existence of Gila chub.

Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the designated CH PCEs to function properly. As such, Gila chub designated CH will remain functional to serve its intended conservation role for the species. Therefore, we conclude that the proposed action is not likely to destroy or adversely modify Gila chub designated CH.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined in section 3 of the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined at 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 at 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 (50 CFR 402.02). 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 ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

Incidental take of the Gila chub is reasonably certain to occur as a result of the continued implementation of the Coconino NF LRMPs, as well as the 1996 Regional Amendment. On the Coconino NF, incidental take is expected to be in the forms of harm and harassment to the species from the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, Fire Management, Watershed Management, and Wildlife programs.

The FWS anticipates, however, that the aforementioned incidental take will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, it is not possible to provide precise numbers of Gila chub that will be harassed, harmed, or killed as a result of the proposed action. For purposes of this BO, we define incidental take in terms of the number of extant populations. The extant populations of Gila chub within the Coconino NF are Walker Creek, Red Tank Draw, and Spring Creek. The FWS concludes that incidental take of Gila chub will be exceeded if, during a period of 3 consecutive years, any currently extant population of Gila chub are lost due to the implementation of the proposed action (e.g. absent).

Effect of the Take

In the accompanying BO, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Gila chub.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Gila chub:

1. Minimize or eliminate take of Gila chub on the Coconino NF lands due to LRMP activities.
2. Minimize or eliminate adverse effects to Gila chub habitat on the Coconino NF lands during implementation of the LRMP.
3. Monitor the impacts of implementing the proposed action on Gila chub and its habitat and report the findings to the FWS.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the USFS 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 nondiscretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Gila chub populations for conditions to minimize direct and indirect effects to Gila chub and its habitat.
- 1.2 Develop and implement projects in LRMP programs with the goal of minimizing or eliminating adverse effects to Gila chub.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in Gila chub habitat with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the Gila chub and its habitat to contribute to recovery.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 The Coconino NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site-specific BO (including conservation measures and best management practices), breeding season(s) over which the project occurred, relevant Gila chub survey information, and any other pertinent information about the project's effects on the species.
- 3.2 In order to monitor the impacts of incidental take, the USFS will track and report the implementation and effects of the proposed action. Annual reports, which will include this species, shall be sent to the appropriate local FWS Ecological Services field office by March 1st of each year.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The USFS must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA 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 CH, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue to identify factors that limit the recovery of the Gila chub on NF lands and work to correct them.
2. Acquire instream flow water rights to ensure perennial flow in streams with Gila chub.
3. Continue to work with the FWS and AGFD to remove nonnative species and reestablish Gila chub throughout its historical range in Arizona.
4. Continue fish surveys on the NF lands to determine the extent that other chub, such as the headwater chub, may occupy those streams.
5. Continue to work cooperatively with the FWS, and AGFD to establish refugia populations of Gila chub wherever possible.

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

GILA TOPMINNOW

STATUS OF THE SPECIES

Description

Gila topminnow (*Poeciliopsis occidentalis occidentalis*) is a small live-bearing minnow belonging to the family Poeciliidae. The Gila topminnow is a subspecies of *Poeciliopsis occidentalis* that also includes the Yaqui topminnow (*Poeciliopsis occidentalis sonoriensis*) and are collectively known as the Sonoran topminnow. Males are rarely greater than 1 inch in length, while females are larger, reaching 2 inches in length. Both males and females range in coloration from tan to olive bodies, usually with white on the belly. Breeding males are often blackened, with a golden coloration about the midline, and have orange or yellow at the base of their dorsal fin.

General topminnow habitat includes quiet, warm waters with slow current and abundant aquatic vegetation. However, topminnow can survive in swiftly flowing streams with vegetation providing adequate cover.

Legal Status: The Gila topminnow was listed as endangered in 1967 without CH (FWS 1967). The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis*

(Minckley 1969, 1973). Both subspecies are protected under the ESA. Only Gila topminnow populations in the United States, and not in Mexico, are listed under the ESA.

The original Recovery Plan for the Gila and Yaqui topminnows (The Sonoran Topminnow Recovery Plan) was completed on March 15, 1984. 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 reintroduced populations dropped below that required for downlisting, where it has remained.

The Yaqui topminnow is now included within the Yaqui Fishes Recovery Plan (USFWS 1995). A draft revised recovery plan for the Gila topminnow is available (Weedman 1999). The plan's short-term goal is to prevent extirpation of the species from its natural range in the US and reintroduce it into suitable habitat within historical range. Downlisting criteria require a minimum of 82 reestablished populations, some of which have persisted at least 10 years.

Distribution and Abundance (Rangewide)

Historically, the Gila topminnow was abundant in the Gila River drainage in Arizona and was one of the most common fishes of the Colorado River basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). Gila topminnow also were recorded from the Gila River basin in New Mexico. In the last 50 years, this was reduced to only 16 naturally occurring populations. Presently, only 10 of the 16 known natural Gila topminnow populations are considered extant (Table 3) (Weedman and Young 1997, Voeltz and Bettaso 2003). Only eight have no non-native fish present and therefore can be considered secure for the moment from non-native fish threats. There have been at least 200 wild sites stocked with Gila topminnow, however, topminnow persist at only 30 of these localities. Of the 30, one site is outside topminnow historic range and one contains non-native fish (Voeltz and Bettaso 2003). All of these sites except two are in New Mexico. Many of the reestablished sites are very small and may not contain viable populations. In addition, several of the 30 sites have been reestablished in the last few years, and their eventual disposition is unknown.

Table 3. Status of natural Gila topminnow populations in the US.						
Site	Ownership	Extant? ^{1, 8}	Nonnatives?	Mosquitofish?	Habitat Size ²	Threats ³
Bylas Spring ⁵	San Carlos	YES	NO ⁴	NO ⁴	S D	M/ N G
Cienega Creek	BLM	YES	NO	NO	L	M/ R N
Coal Mine Spring	AGFD	YES	NO	NO	S	L/ G
Cocio Wash	BLM	NO 1982	DRY	DRY	S	H/ M
Cottonwood Spring	Private	YES	NO	NO	S	M/ N
Fresno Canyon ⁷	State Parks	YES	NO ⁹	NO ⁴	M	H/ N G U
Middle Spring ⁵	San Carlos	YES	NO ⁴	NO ⁴	S	H/ N G
Monkey Spring	Private	YES	NO	NO	S	L/ W U
Redrock Canyon	USFS	NO 2005	YES	YES	M D	H/ W R G N

Salt Creek ⁵	San Carlos	YES	NO ⁴	NO ⁴	S	M/ N G
San Pedro River	Private	NO 1976	YES	YES	-	H/ W N G R
Santa Cruz River San Rafael Tumacacori	Private, State Parks, TNC	NO ⁶ YES 2003	YES YES ⁴	YES YES	L D	H/ W N R G C U
Sharp Spring	State Parks	NO 2004	YES	YES	M	H/ N G U
Sheehy Spring	TNC	NO 1987	YES	YES	S	H/ N G U
Sonoita Creek	Private, TNC, State Parks	YES	YES	YES	L D	H/ W N G

¹ if no, last year recorded

² L = large M= medium S = small D = disjunct

³ Immediacy H = high M = moderate L = low

Type W = water withdrawal C = contaminants R = recreation N = nonnatives G = grazing M = mining
U = urbanization

⁴ none recently, they have been recorded

⁵ recently renovated

⁶ in Mexico 2006, US in 1993

⁷ includes Sonoita Creek below Patagonia Lake

⁸ Recent records are those less than 10 years old

⁹ Fresno Canyon renovated in 2007 and is free of nonnative- Sonoita Creek has many nonnatives

Habitat

For a detailed description of Gila topminnow habitat please refer to the 2005 BO.

Life History

Gila topminnow is a live-bearing minnow species with females reaching two inches and males one inch. Breeding is primarily from March to August; however pregnant females may be found at any time of year in habitats supported by warm springs. Brood time is 24-28 days, and young Gila topminnow may take a few weeks to a few months to mature. Gila topminnow is short-lived, with an average life span of less than a year. Gila topminnow is an opportunistic feeder on bottom debris, vegetation, amphipods, and insect larvae.

Reasons for Listing

The Gila topminnow was listed as endangered in 1967 without CH (FWS 1967). The listing stated the species was threatened with extinction based on declining populations.

Threats: According to the Recovery Plan, threats to the Gila topminnow include habitat loss and predation by introduced mosquitofish. Habitat destruction and introduction of non-native species are the primary reasons for reductions in Gila topminnow populations, and are the causes for its listing as an endangered species (FWS 1984, Williams et al. 1985, 1989, Simmons et al. 1989).

During the early 20th century, several factors caused widespread habitat changes throughout the Southwest. These events include both biotic and abiotic factors, such as loss of vegetation through improper livestock grazing and timber wood harvesting, periods of flooding and drought, and the construction of water diversions and dams (Minckley 1993). 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. Although historic events occurring in the early 20th century permanently altered much of the aquatic habitat in the southwest, it is current and future activities that threaten the continued existence and reestablishment of this species. Current land use practices such as livestock grazing, mining, timber harvesting, road maintenance and recreation pose major threats to habitat, as well as existing and future populations. Additionally, population growth and development continue to affect potential recovery of the species through increased groundwater pumping and diversions, stream and river channelization, and increased water pollution (Weedman 1999).

The subspecies is highly vulnerable to adverse effects from non-native aquatic species (Johnson and Hubbs 1989), including non-native crayfish (Fernandez and Rosen 1996) and bullfrogs. Predation and competition from these species have resulted in Gila topminnow declines 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). Bullfrogs (*Rana catesbiana*) are widespread and abundant throughout Gila topminnow historic range and are known to prey on fishes (Rosen and Schwalbe 1996). However, Meffe et al. (1983) identify the introduction of the western mosquitofish as causing the most problems for the Gila topminnow because mosquitofish can tolerate similar environmental extremes, and can therefore occupy similar habitats as Gila topminnow. It has been documented that mosquitofish can eliminate a population of topminnow within a year (Minckley and Deacon 1968, Schoenherr 1974). To date, the spread of mosquitofish has continued virtually unchecked since their introduction to Arizona in 1926 (Minckley et al. 1977, Meffe et al. 1983).

Because the native fish fauna of the Gila basin and of the Colorado basin in general was naturally depauperate and contained few piscivorous fish (Carlson and Muth 1989), the Gila topminnow was unable to evolve mechanisms for protection against predation or competition. In the riverine backwater and side-channel habitats that formed the bulk of Gila topminnow natural habitat, predation and competition from other fishes was essentially absent. Therefore, the introduction of large numbers of predatory and competitive non-native fish, frogs, crayfish, and other species, provided conditions within which the 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.

Recovery Actions

A number of potentially viable sites, including Fossil Creek on the Coconino NF, have been identified by federal and state agencies that could support Gila topminnow. These sites have not been stocked, but several have been evaluated.

The Arizona Department of Transportation has completed a Safe Harbor Agreement for the Gila topminnow and the desert pupfish (Arizona Department of Transportation 2000). This agreement covers all properties managed by Arizona Department of Transportation. The Arizona Game and Fish Department is also developing a Safe Harbor Agreement with the FWS, which will allow Gila topminnow and desert pupfish populations to be established on non-federal lands. Implementation of this Safe Harbor Agreement will allow for the establishment of

new populations and maintenance of genetic stocks and refugia populations in natural, semi-natural, or manmade habitats, which will aid in recovery efforts for the two species.

As discussed previously, there have been over 200 sites stocked with Gila topminnow. However, topminnow persist at only 18 of these localities. Thirteen of the 18 sites occur on NF System lands. Additional efforts have identified suitable sites for stocking the topminnow on NF System lands. The draft recovery plan revision has identified numerous sites to establish populations of Gila topminnow.

Since 2007, Gila topminnow have been stocked in Fossil Creek on the Forest. The Forest continues to cooperate with AGFD to establish the species in Fossil Creek and to assess suitability of other areas for introductions. Gila topminnow have been captured during monitoring during 2009, 2010, and 2011.

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 impacts 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.

Status of the Species in the Action Area (Coconino NF)

At the time of the 2004 BA, no Gila topminnow occupied the Coconino NF. During 2007 and 2008 the species was translocated to Fossil Creek. The species was present during surveys in 2009 but was absent in 2010 (Robinson et al. 2011). During 2010, approximately 6,500 topminnow were stocked in the stream (Robinson et al. 2011). Subsequent stockings have occurred and Fossil Creek is currently considered occupied (C. Overby pers. comm. with J. Monzingo, 4 April 2011). The Forest continues to assess other locations for possible topminnow introductions (C. Overby pers. comm. with J. Monzingo 4 April 2011).

EFFECTS OF THE ACTION

Effects Analysis (Species)

Since the 2004 BA for The Continued Implementation of the LRMP for the 11 NFs and NGs, Gila topminnow have been translocated to Fossil Creek on the Forest. Recently the Forest has worked cooperatively with partners to identify locations on the Forest where Gila topminnow introductions may occur in the future. The Coconino NF LRMP was reviewed and analyzed for effects to Gila topminnow. The 2005 BO included tables identifying each of the applicable S&Gs pertaining to the Gila topminnow as well as ranking tables identifying the types of effects (lethal, sub-lethal, etc.) to the species. These S&Gs have not changed since the 2005 BO, and

the effects analysis presented in the 2005 BO is hereby incorporated by reference and supplemented with the discussion below.

Determination of Effects (Species)

Engineering Program

The Coconino NF LRMP guides the Engineering Program: to close or obliterate roads no longer "needed for industry, public, and/or administrative use" (S&G 400); seasonally close roads to protect soils and resources (S&G 402); maintain road densities below 2 mi/mi², S&G 404); maintain fuelwood access roads to the lowest standard to minimize resource impacts, ground disturbance, and provide user safety (S&G 407); locate new roads out of riparian areas (S&G 408); and manage roads to minimize resource and soil impacts (S&G 406). S&G 400 guides the NF to close or obliterate unneeded roads, although few roads fall into this category if you consider the multiple use mandate of the USFS. S&G 404 sets a standard for road densities that far exceeds the accepted level for impacts to aquatic systems (<1 mi/mi²). This limits the amount of potential adverse effects that can be realized through implementation. Although guidance is predominantly positive, S&G 408 allows existing roads in wet meadows to be reconstructed and maintained in accordance with BMPs which seeks only to minimize the impacts. S&G 400 is primarily positive in that it restricts the use of roads during critical times in which damage to soils may occur. Overall, the Coconino NF LRMP seeks to minimize impacts associated with the Engineering Program; however, effects are certain to occur during implementation in the absence of other guidance or analysis at the project-level.

Fire Management Program

The Coconino NF LRMP contains three Forest-wide S&Gs for the Fire Management Program that may affect Gila topminnow. S&G 413 guides the NF to suppress fires that threaten habitat for threatened and endangered species. S&G 411 guides the NF to plan fuel treatments such that the least impact to the site is realized. This may assist in minimizing the effects to the topminnow. S&G 414 guides the NF to limit fuel treatments to areas where fire may be a threat to life, property, adjacent to old-growth, or specifically identified high resource values. This may be interpreted to include areas identified as threatened or endangered species habitat such as that for the Gila topminnow. General guidance Forest-wide should minimize or eliminate the effects to Gila topminnow by Fire Management projects. However, some short-term adverse effects may take place during project implementation under the guidance of the LRMP. The grass and sparse Piñon-juniper (MA10) and unproductive timberland (ponderosa pine, MA 6) vegetation types have a management emphasis for range management, watershed condition, and wildlife habitat. To achieve this emphasis, prescribed fire will be utilized as a tool to help meet the desired objective. Short-term effects to the Gila topminnow could result from this guidance. Long-term effects from implementation under these S&Gs will likely be positive.

Forestry and Forest Health Program

The Coconino NF LRMP restricts the amount of damage that could occur in riparian areas, seeks to manage timber resources on a sustainable level, and seeks to protect watersheds. Direct effects and indirect effects to Gila topminnow can be reduced but not eliminated through guidance provided by the S&Gs.

Lands and Minerals Program

The Coconino NF LRMP provides guidance for utilization of mineral resources but advises to limit impacts through operating plans, permits, withdrawals, retentions, revocations, and modifications (S&G 380, 381). The LRMP emphasizes the avoidance of effects to riparian-dependent resources, channel morphology, and stream bank stability during exploration and suggests planning to repair damage if inevitable (S&G 382). Several S&Gs working together throughout the Coconino NF LRMP effectively limit the effects that could result from surface occupancy, right-of-way corridors, and access roads to private property. However, first priority (S&G 398) is given to the "public interest and NF Needs." It is not clear how listed species factor into this language. S&G 505 allows mineral material excavation in riparian zones after environmental analysis with the stipulation that activities will maintain or improve the riparian condition. Special uses in riparian areas are generally not allowed unless unavoidable. In which case, the projects will be designed to minimize the extent and the degree of the effects (S&G 506). Riparian areas will be sought through land exchange and will be given a high priority (S&G 507). The LRMP also provides guidance to withdraw all Research Natural Areas and other special areas from locatable mineral entry or prohibit special use authorizations that could adversely affect or change the character of the areas (S&Gs 532 and 533, MA17). The Coconino NF LRMP S&Gs limit effects to the Gila topminnow, but does not provide for avoidance of all adverse effects.

Rangeland Management Program

The Coconino NF LRMP provides guidance to maximize livestock grazing potential, provide wildlife habitat, and ensure watershed condition. It is assumed the watershed condition shall be satisfactory or greater. The LRMP provides utilitarian guidance with considerations to wildlife habitat, watershed protection, riparian/sensitive area protection, and sufficient recreational opportunity. Wildlife habitat management is directed toward Management Indicator Species and game species. Some direct and indirect effects to threatened and endangered species may be realized during implementation, resulting from trampling and grazing. Effects to Gila topminnow are likely to take place during the implementation of S&Gs related to Rangeland Management.

Recreation, Heritage, and Wilderness

The Coconino NF LRMP guides the NF to manage program activities such that damage to resources does not occur, and if damage occurs, it should be repaired (e.g., S&G 312-319). Most S&Gs result in protection for resources; however, one S&G (317) recognizes past damage to soils and allows the continued use of a road as an OHV trail. These types of recreational trails do not apply to calculations for USFS system roads although the S&G advises considerations to wildlife habitat. This S&G alone could allow unlimited recreational OHV trails to exist, but the requirements under the Travel Management Rule serve to prevent unlimited motor vehicle use from occurring. The Travel Management Rule requires that the Coconino NF specifically designate roads, trails, and areas open to motor vehicle use by vehicle class and, if appropriate, by time of year. Designated routes and areas will be identified on a Motor Vehicle Use Map to be available, free of charge, to the public; once these maps have been prepared and routes designated, motorized vehicle use in areas outside of the designated system is prohibited, thereby preventing unlimited recreational OHV trails to exist. This change in roads management will serve to protect resources. Protection for aquatic organisms exists in the possibility for the

Coconino NF to pursue instream flow rights for recreation (S&G 311). Although this S&G is tailored to recreational use, positive effects to the Gila topminnow may result. The individual Management Areas (MAs) seek different levels of recreation use. Higher levels of recreational use may affect topminnows due to overuse. S&G 2049 directs the Forest to manage MA-2 using the direction provided in the Verde WSR CRMP, where the emphasis is to maintain the outstandingly remarkable values for scenery, fish, wildlife, and historic and cultural values, while also protecting the river's free flowing character and water quality.

Watershed Program

The Coconino LRMP guides the Watershed Program to: maintain or improve watershed condition (S&G 364, 366, 375); prevent surface or ground water contamination by chemical agents (S&G 369); maintain or improve water quality, quantity, and soil productivity (S&G 376); implement emergency fire rehabilitation measures to prevent watershed damage (S&G 377); obliterate roads causing watershed damage (S&G 378); comply with federal and state water quality protection laws (S&G 353); reduce non-point source pollution (S&G 354); provide filter strips along riparian areas (S&G 356, 357, 504); protect streams from the effects of timber harvest (S&G 358); locate new roads and relocate existing roads out of stream bottoms and swales (S&G 361); provide adequate road drainage and install structures to prevent sedimentation in stream channel (S&G 362, 365); maintain at least 80% of riparian crown cover (S&G 363); ensure that structures are designed to accommodate 100-year flood events (S&G 368); monitor water quality to ensure compliance with standards (S&G 370, 371); take action to legally protect NF uses of needed waters (S&G 372); acquire water rights for instream flows (S&G 373, 374); leave existing woody debris in stream channels (S&G 359); and protect wetlands (S&G 367). The guidance for the Watershed Program on the Coconino NF is overwhelmingly positive with the exception of allowances for removing riparian crown cover vegetation. Nonetheless, the guidance may assist in minimizing or avoiding effects by the Watershed Program, as well as other programs, to Gila topminnows.

Wildlife, Fish, and Rare Plants Program

The Coconino NF LRMP seeks to conserve and recover species and their habitats. S&G guidance suggests that the Forests follow approved Recovery Plans (S&G 321); inventory and prepare recovery schedules (S&Gs 322 and 324); evaluate potential Resource Program impacts and provide appropriate protection or enhancement (S&Gs 325 and 327); utilize improvements to achieve conservation and recovery (S&G 329); protect all riparian areas (S&Gs 323, 475, 489, 490, 491, 492, 494, 495, 496, 497); secure instream flows to protect ecosystems, fish and wildlife (S&G 493); and collaborate with other agencies to accomplish the above (S&G 331). One S&G may conflict with protection of Gila topminnow. S&G 498 in MA12, which refers to areas of open water, guides the NF to "manage lakes and streams to improve fisheries habitat." This S&G does not specify whether the improvements are for native or non-native species or whether this includes only game species or all species. The assumption is made that this standard can apply to non-native and native species of game fish. This would contribute to a threat to Gila topminnow.

1996 Regional LRMP Amendment

The 1996 Regional LRMP Amendment contributed to the protection of imperiled species and their habitats. The amendment addressed several activities in various Resource Programs.

Additional guidance is provided for the Recreation, Heritage, and Wilderness Program in S&G 1438, which allows recreation to continue at the levels that were occurring prior to the listing of the MSO. Site-specific effects may remain as a result of maintenance of levels of recreation, particularly in riparian areas. Fire Management is provided with guidance to treat fuel accumulations to abate fire risk and protect areas important to MSO and northern goshawk (S&G 1445, 1454, 1455, 1468, and 1508). The management of fuels should result in decreased threats or indirect effects to the Gila topminnow.

This guidance may result in only minor influences on indirect effects to Gila topminnow or may result in neutral or no effect. Standard & Guideline 1473 emphasizes maintenance and restoration of healthy riparian ecosystems. This S&G should have beneficial effects to the topminnow. With regard to Rangeland Management, S&Gs 1448, 1474, 1477, 1479, 1489, and 1510 have significant influence on activities that may affect Gila topminnow. The S&Gs provide guidance for managing range in good to excellent condition (S&G 1474), emphasizing maintenance and restoration of riparian habitats (S&G 1477, 1479, 1490), and maintaining satisfactory soil conditions, hydrologic function, and nutrient cycles. Standard and Guideline 1489 provides guidance for forage use by grazing ungulates such that range conditions will not impede the conservation and recovery of a federally listed species. The implementation of S&Gs contained within the amendment should result in mitigation of adverse effects by Fire Management, Rangeland Management, and Forestry activities.

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 ESA.

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.

Additional cumulative effects to Gila topminnow include ongoing activities in watersheds such as improper 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.

CONCLUSION

After reviewing the current status of the Gila topminnow, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the FWS's opinion that the proposed action is not likely to jeopardize the continued existence of the Gila topminnow. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No CH has been designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the Gila topminnow from the implementation of the Coconino NF LRMP, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- Continuing efforts to stock Gila topminnow throughout its range in various wild sites and within NF System lands, including on the Coconino NF, have allowed the status of topminnow populations to remain stable.
- The effects from most programs are minimized greatly by S&Gs in the Watershed Program and the 1996 Regional LRMP Amendment. Generally, the overall guidance of the LRMP S&Gs is to protect resources while maintaining multiple use activities.
- The Coconino NF's LRMP directs the Forest to maintain and/or improve habitat for threatened or endangered species and work toward the eventual recovery and delisting of species through recovery plan implementation.

Therefore, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Gila topminnow.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA 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 by the FWS 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 by the FWS 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 ESA 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 USFS so that they become binding conditions of any grant or permit issued, as appropriate, for the

exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered by this incidental take statement. If the USFS (1) fails to assume and implement the terms and conditions; or (2) fails to require adherence by a permittee to the terms and conditions of the incidental take statement through enforceable terms that are included in the permit or grand document issued by the USFS, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USFS must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Gila topminnow is reasonably certain to occur as a result of the continued implementation of the Coconino NF LRMP. Incidental take may result from implementation of the Engineering, Fire Management, Forestry and Forest Health, Land and Minerals, Rangeland Management, and Recreation programs. Harassment to individual fish may occur from activities conducted within the occupied stream. Harm to the species occurs through activities that alter the suitability of the habitat to support Gila topminnow.

The FWS anticipates incidental take of Gila topminnow will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Although we cannot estimate the number of individual topminnows that will be incidentally taken, the FWS is providing a mechanism to quantify when take would be exceeded at the population level. The FWS has determined that the anticipated level of take was most appropriately quantified in terms of numbers of populations with disturbance or habitat alteration resulting from site-specific projects. Incidental take will be considered to be exceeded if 1 population is extirpated as a result of the proposed action. However, we have still not established that the population of Gila topminnow on the Coconino NF is a sustainable population as of yet because it was only recently reintroduced.

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 the Gila topminnow.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Gila topminnow.

1. Minimize or eliminate take of Gila topminnow on the Coconino NF lands due to LRMP activities.
2. Minimize or eliminate adverse effects to Gila topminnow habitat on the Coconino NF lands during implementation of the LRMP.

3. Monitor the impacts of implementing the proposed action on Gila topminnow and its habitat and report the findings to the USFWS.

TERMS AND CONDITIONS

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

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Gila topminnow populations for conditions to eliminate direct effects and minimize indirect effects to Gila topminnow and its habitat.
- 1.2 Design projects within the Forestry and Forest Health (e.g., pest management), Rangeland Management, Watershed Management, and Wildlife programs with the goal to minimize or eliminate adverse effects to the Gila topminnow and to promote recovery.

The following term and condition will implement reasonable and prudent measure 2:

- 2.1 Design projects in watersheds occupied by Gila topminnow habitat with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the Gila topminnow and its habitat to contribute to recovery.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 The Coconino NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site-specific BO (including conservation measures and best management practices), breeding season(s) over which the project occurred, relevant Gila topminnow survey information, and any other pertinent information about the project's effects on the species.
- 3.1 Annual reports, which will include this species, shall be sent to the appropriate local FWS Ecological Services field office by March 1st of each year.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures provided. The federal action agency must immediately

provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA 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 CH, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Assist with the development of a Gila topminnow monitoring plan that addresses all actions occurring within pertinent watersheds on the Coconino NF.
2. In cooperation with the AGFD and academia, assess habitat dynamics and fish-habitat relationships of the Gila topminnow.
3. Continue to cooperate with state conservation agencies to eliminate presence of non-native fish species within Gila topminnow habitat.

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

LITTLE COLORADO SPINEDACE

STATUS OF THE SPECIES AND CRITICAL HABITAT

Description

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

The spinedace is a small (about 4 inch) minnow native to the Little Colorado River drainage. This fish occurs in disjunct populations throughout much of the Little Colorado River drainage in Apache, Coconino, and Navajo counties. Extensive collections summarized by Miller (1963) indicated that the spinedace had been extirpated from much of the historical range from 1939 to

1960. Although few collections were made of the species prior to 1939, the species is believed to have inhabited the northward flowing tributaries of the Mogollon Rim, including the northern slopes of the White Mountains.

Food habits of spinedace include chironomid and other dipteran larvae, filamentous green algae, and crustaceans (Runck and Blinn 1993, Blinn and Runck 1990). Spinedace are late-spring to early-summer spawners (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 is compiled in the Little Colorado Spinedace Recovery Plan (FWS 1998), and is included herein by reference.

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

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

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 nonnative fishes is much larger and includes species with varying degrees of incompatibility with the spinedace's long-term survival. The presence of nonnatives 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. Nonnative fish may compete with, prey upon, harass, and alter habitat utilized by native fish. In the last 100 years, at least ten nonnative 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 nonnative 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).

The spinedace is assumed to still occupy the streams it is known from historically (Chevelon, Silver, Nutrioso, East Clear Creek, and the Little Colorado River proper). 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. This ephemeral nature makes management of the species difficult since responses of the population to changes within the watershed cannot be measured with certainty. However, all of the known populations have decreased since 1993 and drought conditions continue to put additional strain on all known populations.

The most recent survey and habitat data for each watershed are indicated below:

Chevelon Creek Watershed: Currently, the spinedace occupies a section of Chevelon Creek, several miles upstream of Chevelon Creek's confluence with the Little Colorado River on the privately owned Rock Art Ranch. Chevelon Creek through the Ranch supports robust populations of spinedace, where large schools of fish (40-50 individuals) can be seen swimming in pools downstream of The Steps (the name of the stream section on the Rock Art Ranch), something not seen in any other currently occupied area (Lopez *et al.* 1998).

On July 23, 2007, AGFD stocked 95 spinedace into five pools on West Chevelon Creek on the Apache-Sitgreaves NF. This tributary to middle Chevelon Creek contains only native fish at this time and is expected to provide habitat for spinedace. In July 2008, surveys located spinedace within the perennial pools they were originally stocked and downstream of the area in ephemeral reaches. It is unclear how many fish are still present or if they spawned in 2008. Further surveys and stockings of this area are needed in order to ensure that spinedace persist in this Chevelon Creek tributary if it is to contribute to recovery.

There are nonnative species present throughout the occupied reach of Chevelon Creek, but green sunfish (*Lepomis cyanellus*) and crayfish, both predators of spinedace, were found to be uncommon in areas where spinedace numbers were highest (Lopez *et al.* 1998). However, AGFD has reported that largemouth bass (*Micropterus salmoides*) appear to be increasing in abundance above The Steps. At this time, the distribution and abundance of largemouth bass in this reach and how that may be impacting spinedace populations in the area is unknown. In addition, Willow Springs Lake, a reservoir located at the head of Chevelon Creek, contains a thriving population of smallmouth bass (*Micropterus dolomieu*). Though the smallmouth bass are currently located many miles upstream of known spinedace locations in Chevelon Creek, their occurrence and potential to move downstream are a threat to spinedace and other native fish in the drainage. The presence of these predatory, nonnative fishes may adversely impact the future abundance and persistence of spinedace in Chevelon Creek. In cooperation with AGFD, we plan to conduct surveys in Chevelon Creek in 2012.

East Clear Creek Watershed: Spinedace currently occupy small, perennial pool habitats in West Leonard Canyon, Leonard Canyon (including Dines Tank), Bear Canyon, Dane Canyon, and Yeager Canyon. The populations and available habitat are all relatively small throughout the watershed, but West Leonard and Leonard Canyons continue to be the most dependable locations to find spinedace in the entire watershed. The Bear, Dane, and Yeager Canyon populations are sustained by stocking spinedace from West Leonard Canyon and Dines Tank (Leonard Canyon) to these areas.

In October 2007, nonnative green sunfish (multiple size classes), largemouth bass, and yellow bullhead (*Ameiurus natalis*) were detected near the boat ramp and in the Bear Canyon arm of the C.C. Cragin (Blue Ridge) Reservoir. These nonnative species had not been located here prior to this time and if they were to access the above drainages, these predatory fishes could completely derail recovery efforts in the watershed. High-flow events during the winter 2007-2008 could have allowed these fish to spread up- and downstream of these locations. Surveys conducted to date in 2010 have not located these nonnative fishes upstream of the reservoir; however, in spring 2010 and spring 2011, AGFD found green sunfish below the dam. Currently Bear Canyon is the only occupied habitat located upstream of C.C. Cragin Reservoir. Efforts will be made to stock spinedace in Miller and Kehl Canyons in 2012, which are also located upstream of the reservoir.

Silver Creek: As stated above, spinedace were thought to be extirpated from Silver Creek until a small number of fish were discovered in lower Silver Creek in July 1997 (Lopez *et al.* 1999). However, numerous surveys since then have failed to find spinedace, including an extensive survey in 2004 funded by a cooperative agreement with the Bureau of Land Management (BLM) (McKell and Lopez 2005). It is believed that changes to the habitat since 1997 have likely increased habitat for nonnative fishes and negatively affected our ability to capture spinedace during surveys. If spinedace are still present in Silver Creek, it may be that they exist at such low numbers that our current sampling techniques are insufficient to detect them in this altered habitat.

In 1997, the habitat in Silver Creek consisted primarily of shallow riffle/run habitat with occasional relatively small pools. Starting in 1999 and continuing to the present, the same areas now consist of almost exclusively deep, wide pool habitat due to extensive beaver dams. In addition, the extensive pool habitat, which extends for miles, has created prime habitat for nonnative fish and crayfish. This change in habitat has made sampling the area extremely difficult. At this time, both the FWS and AGFD are hopeful that spinedace still exist in lower Silver Creek. However, the prognosis for spinedace recovery in Silver Creek is bleak at this time. The habitat is conducive to promoting nonnative fish and crayfish and there are fewer and fewer native fish found within Silver Creek.

In addition to the above in-stream populations of spinedace, there are currently two functioning refugial populations of spinedace. We have a refugial population of Little Colorado spinedace (>400 fish) at AGFD's Grasslands Property and we have approximately 200 spinedace from East Clear Creek in captivity that we are caring for until construction of the refuge pond at AGFD's Raymond Ranch can be completed (the expected date of completion is spring 2012). We currently do not have a refugial population for the Chevelon Creek genetic sub-group, although we expect to have a captive population established at Winslow High School for the Chevelon Creek genetic sub-group in late 2012. For many years we had a refugial population of East Clear Creek spinedace at the Flagstaff Arboretum, but this site is no longer functional.

Our information indicates 37 formal consultations have been completed or are underway for actions affecting Little Colorado spinedace rangewide, but only 3 consultations have been completed for this species on the Coconino NF (Table 4). Adverse effects to Little Colorado spinedace have occurred due to all 37 formal consultations and many of these consultations have required reasonable and prudent measures to minimize effects of incidental take on Little Colorado spinedace. However, as is the case with many aquatic species, it is difficult, if not impossible, to quantify the actual incidental take of spinedace to date. The continued invasion of nonnative aquatic species into spinedace habitat and the on-going reductions in surface water (due to both drought and groundwater pumping) are two of the greatest threats to the species and are contributing factors to the spinedace's overall decline.

Table 4: Formal consultations for Coconino NF actions affecting the Little Colorado spinedace

	Consultation #	Date	Name	Anticipated Incidental Take
1	02-21-02-F-0206	June 1, 2006	East Clear Creek Watershed Health Project	None anticipated
2	22410-2008-F-0332	October 22, 2008	Little Colorado River and Nutrioso Creek Riparian Enhancement Project	None anticipated
3	22410-2008-F-0149-R001	December 6, 2011	<i>Effects to Listed Species from U.S. Forest Service Aerial Application of Fire Retardants on NFS Lands</i>	<p><i>Take described in terms of stream miles potentially affected, rather than number of fish.</i></p> <ul style="list-style-type: none"> • <i>One drop in occupied habitat affecting 7.32 miles of occupied habitat on the Coconino NF.</i> • <i>One drop in occupied habitat affecting 9.11 miles on Apache-Sitgreaves NF.</i>

ENVIRONMENTAL BASELINE

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

Description of the Action Area

The Action Area includes all streams occupied by Little Colorado spinedace that may be directly or indirectly affected by actions occurring on Coconino NF.

On the Coconino NF, the Action Area includes the East Clear Creek watershed. The drainages within this watershed include Leonard canyon (which includes Dines Tank), as well as West Leonard, Bear, Dane, Yeager, Miller, and Kehl canyons in the East Clear Creek watershed.

EFFECTS OF THE PROPOSED ACTION

The Little Colorado spinedace occurs on the Coconino NF and the Apache-Sitgreaves NFs. Relevant S&Gs were identified and analyzed for the Apache-Sitgreaves and Coconino NF LRMPs, and for the 1996 Regional Amendment. The 2005 BO included tables showing the S&Gs considered for each species' analysis and a ranking table summarizing the types of effects (lethal, sublethal, etc.) expected to result from the S&Gs. Because no new significant scientific information has become available on the Little Colorado spinedace and there have been no changes in Forest policy or programs that would change the 2004 BA (USFS) and 2005 BO/CO

(FWS) effects determination for this species, we hereby incorporate by reference the ranking tables and effects analysis presented in the 2005 BO and provide a narrative summary below.

The proposed action's effects on Little Colorado spinedace CH will be analyzed based on the respective S&G's impact on the primary constituent elements (PCEs) within each CHU (CHU) identified in the final rule. The PCEs for Little Colorado spinedace CH include: (1) aquatic systems with perennial flow; (2) free of nonnative fishes; (3) natural hydrographs; and (4) good water quality, free of pollutants. Since these PCEs relate directly to the life history requirements of the species itself, the effects section will seek primarily to identify which PCEs are being affected by each S&G that has received an adverse numeric effects rating. A summary section will analyze the proposed action's effects to the Little Colorado spinedace and to the species' CH in terms of ensuring that recovery is not precluded.

The FWS found one S&G within the Coconino NF LRMP to be sublethal to the spinedace. The majority of the S&Gs maintained habitat and provided recovery for the species. Additionally, there were several S&Gs that were beneficial in the long-term but had the potential for some short-term adverse effects.

Engineering Program

Five S&Gs within the Coconino NF Engineering Program were ranked as causing short-term adverse effects in order to achieve long-term positive effects; a net beneficial effect. S&G 400, for example, provides for road removal. While it is advantageous to reduce road density, the work associated with "putting roads to bed" may have short-term impacts on water quality in adjacent streams inhabited by Little Colorado spinedace (see above for discussion on the effects of sediment in streams). The remaining S&Gs (404, 408, 460, and 534) also allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status. Implementation of this S&G 400 may affect Little Colorado spinedace CH PCEs: (3) by altering the natural hydrograph and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Forestry and Forest Health Program

Standard and Guideline 461 guides the Coconino NF to avoid or designate stream course crossings for skid trails and limit the trails to the minimum needed. The Forest is also directed to choose crossings with stable conditions or stable bed and bank material such as cobble or rock. While skidding of timber is likely to cause short-term, adverse effects on water quality, we recognize that mechanical removal of logs is likely to be implemented to reduce fire hazard and/or improve overall forest health. The FWS is particularly amenable to forest health projects (outside of riparian areas) that allows for increased herbaceous ground cover to become established in the uplands. Increased ground cover can be expected to reduce downstream sedimentation.

Wildlife, Fish and Rare Plants Program

Three S&Gs within the Coconino LRMP are considered to have an overall beneficial effect but with short-term adverse effects. Standards and Guidelines 475 and 496 guide the NF to protect meadow communities, riparian areas, or other sensitive areas in Management Areas 9 and 12,

respectively, from the effects of spring development by piping water to water developments in adjacent, less sensitive areas (USFS 2004:159) (in our experience the piping of the water protected the habitat and did not result in dewatering the habitat). Again, the long-term goal of reduced wildlife and stock water use in habitats which may contain Little Colorado spinedace is beneficial, but some fish will be taken from occupied sites during development and minimal numbers may also be taken during subsequent operations and maintenance of the sites.

Standard and Guideline 490 guides the NF to meet the following riparian standards in the Regional Guide for 80 percent of riparian areas above the Rim and 90 percent below the Rim by the year 2030; maintain at least 80 percent of the potential over-story crown coverage; maintain at least three age classes of woody riparian species, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings; maintain at least 80 percent of the potential stream shading from June to September along perennial cold and cool water streams; maintain at least 80 percent of the potential shrub cover in high elevation areas; maintain at least 80 percent of the potential emergent vegetation cover from May 1 to July 15 in key wetlands; maintain at least 80 percent of the spawning gravel surface free of inorganic sediment; maintain at least 80 percent of streambank total linear distance in stable condition; retain snags in riparian areas that are not a safety hazard. Overutilization of vegetation, including riparian vegetation, can cause changes to plant root structures, and alter plant species composition and overall biomass (Martin 1975, Menke 1988, Vallentine 1990, Popolizio *et al.* 1994). These conditions may increase sediment delivery into the stream (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994), change the way in which flood flows interact with the stream channel, and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation.

Implementation of these S&Gs may affect Little Colorado spinedace CH PCEs: (1) by altering perennial flows of streams; (2) by increasing the opportunities for nonnative fishes; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Lands and Minerals Program

Two Coconino NF S&Gs were determined to be capable of adversely affecting Little Colorado spinedace in the short-term. Standard & Guideline 393, applied forest-wide, guides the NF to evaluate requests for transmission corridors based on public need, economics, and environmental impacts of the alternatives and to use existing corridors to capacity with compatible utilities where additions are environmentally and visually acceptable before evaluating new routes. This S&G has short-term adverse effects (such as sedimentation, etc.), indicating that while long-term adherence to its conditions could lessen impacts on the spinedace habitats, short-term effects could harm individuals of the species.

Standard and Guideline 505 was determined to be capable of creating a sublethal response (harm) to Little Colorado spinedace, as it permits the NF to consider material excavation within riparian zones. Though the stated goal of the S&G is that such activities would maintain or improve riparian conditions, the S&G does not specify that water quality or quantity would be maintained, or that sediments loads would not increase or, conversely, that moderately-fine bed materials required by Little Colorado spinedace would not be removed.

Implementation of these S&Gs may affect Little Colorado spinedace CH PCEs: (1) by altering perennial flows of streams; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Fire Management Program

Standard and Guideline 411 guides the NF to plan fuels treatments that have the least impact on the site, meet resource management needs, are cost effective, and meet fuel treatment objectives. The FWS expects reduced fuel loading to reduce the risk of high-severity wildland fire. Given the potential severity of post-fire effects on aquatic systems (Dunham *et al.* 2003, Rinne 1996, Bozek and Young 1994), this S&G can be expected to reduce adverse effects on Little Colorado spinedace over the long-term. Fuel treatments, however, can result in short-term degradation of water quality and direct mortality. In addition, S&G 414 directs the Coconino NF to limit the treatment of natural fuels to areas where fuel buildups are a threat to life, property, adjacent to old-growth areas, or specifically identified high resource values. Fuel treatments could include prescribed fire and physical, chemical, or biological treatment of vegetation.

Prescribed fire is an activity that could be managed somewhat effectively to minimize effects to the spinedace. Nonetheless, prescribed fire can directly affect fishes. 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.

Implementation of these S&Gs may affect Little Colorado spinedace CH PCEs: (1) by altering perennial flows of streams; (2) by increasing the opportunities for non-native fishes; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

1996 Regional Amendment

None of the S&Gs within the 1996 Regional Amendment had solely adverse effects to the spinedace; however, several S&Gs have the potential for short-term effects in an overall beneficial action. Also, we found that the guidelines used by the USFS for the northern goshawk do not appreciably affect this species.

The following S&Gs within the 1996 LRMP Amendment could have potential short-term adverse effects to the Little Colorado spinedace:

Standard and Guideline 1432 allows no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years. Standard and Guideline 1445 guides the Forests to treat fuel accumulations to abate fire risk. Standard and Guideline 1455 guides the Forests to use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire in MSO protected areas. Standard and Guideline 1458 permits NFs to allow

prescribed fire within Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally-recognized Wilderness Study Areas). Standard and Guideline 1468 encourages the Forest to utilize prescribed and prescribed natural fire to reduce hazardous fuel accumulation and further states that thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire. Standard and Guideline 1476 allows the NF to apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old growth standards and guidelines. Standard and Guideline 1508 permits the NF to pursue low-intensity ground fires at any time in all forested cover types inhabited by northern goshawks, but high intensity crown fires are not acceptable in the post-fledgling family area or nest areas and further guides the NF to avoid burning the entire home range of a goshawk pair in a single year. For fires planned in the occupied nest area, a fire management plan should be prepared. The fire management plan should minimize the risk of goshawk abandonment while low intensity ground fire burns in the nesting area. Prescribed fire within nesting areas should be planned to move with prevailing winds away from the nest tree to minimize smoke and risk of crown fire developing and driving the adults off or consuming the nest tree.

Each of the aforementioned S&Gs permits short-term adverse effects on forested environments in order to secure long-term stability and/or to create conditions more desirable for the northern goshawk and/or MSO. The range of the Little Colorado spinedace coincides with or is downstream of much of the habitat occupied by (or suitable for) these raptors and thus, the fish can be expected to experience short-term adverse effects in exchange for long-term habitat stability or improvement.

Implementation of these S&Gs may affect Little Colorado spinedace CH PCEs: (1) by altering perennial flows of streams; (2) by increasing habitat conditions preferred by nonnative fishes; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Effects to Recovery

In our analysis of the effects of the action on CH, we consider whether or not a proposed action will result in the destruction or adverse modification of CH. In doing so, we must determine if the proposed action will result in effects that appreciably diminish the value of CH for the recovery of a listed species. To determine this, we analyze whether the proposed action will adversely modify any of the PCEs that were the basis for determining the habitat to be critical. To determine if an action results in adverse modification of CH, we must also evaluate the current condition of all designated CHUs, and the PCEs of those units, to determine the overall ability of all designated CH to support recovery. Further, the functional role of each of the CHUs in recovery must also be considered because, collectively, they represent the best available scientific information as to the recovery needs of the species.

The objective of the Little Colorado Spinedace Recovery Plan (FWS 1997) is to delist the species. The recovery criteria developed to implement this objective are: (1) to secure and maintain all extant populations; and (2) to establish refugia in the most natural, identifiable

habitats within the probable historical range. Reintroduced populations will not be considered established until they have persisted for a minimum of five years. In our 5-Year Review of the status of the Little Colorado spinedace (FWS 2008), we determined that the Recovery Plan did not address the five factors (or threats) that resulted in the species' listing nor were the delisting criteria objective and measurable. Although the FWS acknowledges that the AGFD, USFS, and others have made significant efforts to conserve Little Colorado spinedace, we also recommended in the 5-Year Review that the species be uplisted from threatened to endangered due to extensive threats from invasion of nonnative fishes, groundwater pumping, and lack of available habitat for recovery (due to fragmentation, long-term drought, etc.).

The Coconino and Apache-Sitgreaves NFs, AGFD, and FWS are implementing the 1999 *East Clear Creek Watershed Recovery Strategy for the Little Colorado spinedace and other Riparian Species*. This document identified current and ongoing impacts to the watershed, the need for reducing these impacts, and recommended potential projects and actions to reduce and/or eliminate those impacts. The East Clear Creek Watershed Health Improvement Project (see list of Biological Opinions for past and ongoing projects, above) includes the proposed implementation of many of those recommendations.

In the analyses in the Effects of the Proposed Action section, above, the applicable S&Gs from the Coconino NF, including the S&Gs from the 1996 Plan Amendment, were analyzed individually to determine their effects to the species and its CH. The S&Gs were also assigned numeric values based on their effects to the species and/or PCEs of CH, and these amalgamated values are useful for a qualitative analysis of the proposed action's effect to recovery.

Of the 137 applicable S&Gs affecting the species on the Coconino NF, 0.7% could be causing a sublethal response, 66.4% are maintaining habitat and providing recovery value, and 1.5% are implementing the Recovery Plan. Of the 51 S&Gs associated with the 1996 Regional Plan Amendment, which includes both NFs, 58.8 percent are maintaining habitat and providing recovery. In summary, across the Coconino NF, an appreciably greater proportion of S&Gs are associated with recovery of Little Colorado spinedace than with harm and mortality of the species. We also reiterate that both the Apache-Sitgreaves and the Coconino NFs are implementing the *East Clear Creek Watershed Recovery Strategy for the Little Colorado spinedace and other Riparian Species*, which is guided by the S&Gs and has resulted in the implementation of projects that assist in recovering the species.

Again, while the Coconino NF is making progress towards the recovery of the Little Colorado spinedace, we do not feel the species should be delisted and, in fact, we feel uplisting may be necessary due to worsening threats such as the continued invasion of nonnative aquatic species into spinedace habitat and the on-going and future reductions in surface water (due to both drought and surface and groundwater pumping) (FWS 2008). We note, however, that the primary impediments to securing and maintaining all extant populations of the species and establishing refuge sites within its historical range are the increasing threats posed by small- and large-scale habitat fragmentation caused by water development and long-term drought; the effects of the unlawful introduction of competitive and/or predatory nonnative fishes; and the effects of climate change (FWS 2008). These threatening factors' combined, long-term effect

may be to preclude the species' recovery, but none are the result of implementation of S&Gs on the Coconino NF.

For this analysis, we have focused instead on the ability for the S&Gs, if fully implemented through specific projects, to protect the primary constituent elements of the Little Colorado spinedace's habitat, including CH, so that the species' natural ecological resilience can continue to ensure its survival and recovery in the wild. Watershed protection initiatives such as the East Clear Creek Watershed Health Project and others (see consultations in Table 4, above) are likely to have short-term adverse effects such as sedimentation while increasing herbaceous ground cover and reducing wildfire risk over the long term. Consultation on USFS grazing allotments focuses on protecting watersheds from excessive impacts. We thus conclude that implementation of the proposed action will not preclude the recovery of the species.

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 ESA.

A large proportion of the range of the Little Colorado spinedace exists on federal lands. Future projects undertaken by the respective federal agencies managing those lands would thus be subject to interagency consultation under section 7 of the ESA. Further, it is expected that a portion of the projects occurring on non-federal lands would nonetheless be considered federal action by nature of their funding (e.g., Federal Highway Administration road projects, Natural Resource Conservation Service restoration actions). The effects of any remaining actions occurring within the range of the Little Colorado spinedace but lacking discretionary involvement by a federal agency would thus be considered cumulative. Future actions within the action area that are reasonably certain to occur include increased water use, development, road maintenance, private fuels-reduction treatments, ungulate grazing on pastures adjacent to streams, and other associated actions. It is currently unknown whether state or private lands in the project area will be subject to future state or private projects; however, large-scale development of the area is not reasonably certain to occur in the near future because of the rural nature and economy of much of the area.

These cumulative actions, though potentially limited in extent, have the potential to reduce the quality of habitat for the Little Colorado spinedace and contribute as cumulative effects to the proposed action. 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 ESA, the 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 cumulative increases in status of the species but instead may simply mitigate cumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the Little Colorado spinedace, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Little Colorado spinedace, is not likely to destroy or adversely modify designated CH, and will not preclude recovery of the species. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS anticipates adverse effects to the Little Colorado spinedace from the implementation of the Coconino NF LRMP, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- Actions implemented by the USFS for the conservation of Little Colorado spinedace include land management actions designed to improve or protect habitat and the protection of some habitats from threats associated with land-use practices such as livestock grazing.
- In 1997, Region 3 of the USFS funded the implementation of several actions intended to address "short-term" needs for the conservation of Little Colorado spinedace as part of the "Seven Species Effort". These actions included fencing to preclude livestock from a portion of East Clear Creek (Coconino NF), and revising several allotment management plans (Coconino NF).
- There are several S&Gs within the Coconino LRMP that support conservation and recovery of Little Colorado spinedace. These are S&Gs 321 and 324 within the Coconino LRMP. These S&Gs guide the Forest to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to recover threatened and endangered species.
- The *East Clear Creek Watershed Recovery Strategy for the Little Colorado Spinedace and Other Riparian Species* (USFS 1999), identified activities to assist in the recovery of the spinedace and its habitat within the East Clear Creek Watershed on both the Coconino and Apache-Sitgreaves NFs. Projects implemented by the USFS under this strategy include improved livestock management within the watershed and increased protection for headwater meadows and occupied spinedace habitats from detrimental land management activities.

Additionally AGFD has been very proactive in recovery efforts for Little Colorado spinedace. Their efforts include cost-share projects with the USFS; funding survey and inventory efforts, as well as assisting in those efforts; leading emergency salvage efforts; purchased property on the Buck Springs Allotment with occupied habitat; and, are currently working with FWS to build a refugium for the East Clear Creek subgroup of spinedace at the AGFD owned Raymond Wildlife Area. In addition, through consultation with FWS on the Wildlife and Sport Fish Restoration Funding of AGFD's stocking program, AGFD has altered stocking rates for rainbow trout at

three reservoirs to limit the migration of the trout downstream to occupied spinedace habitat and will soon employ triploid (sterile) rainbow trout to further limit persistence.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined in section 3 of the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined at 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 at 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 ESA 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 USFS so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered by this incidental take statement. If the USFS (1) fails to assume and implement the terms and conditions; or (2) fails to require the permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are included in the permit or grant document issued by the USFS, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USFS must report the progress of the action and its impact on the species to us as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Little Colorado spinedace is reasonably certain to occur as a result of the continued implementation of the Coconino NF LRMP, as well as the 1996 Regional Amendment. This incidental take is expected to be in the forms of harm (e.g. mortality) and harassment of Little Colorado spinedace from projects implemented under Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, and Wildlife programs.

However, the FWS believes that the aforementioned incidental take will be difficult to detect for the following reasons: finding a dead or impaired specimen (adult, young-of-year, or egg) is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, it is not possible to provide precise numbers of Little Colorado spinedace that will be harassed, harmed, or killed during projects implemented under the plan amendment.

Although we cannot estimate the number of individual spinedace that will be taken as a result of the proposed action, the FWS is providing a mechanism for when take would be considered exceeded at the population level. The FWS concludes that incidental take of Little Colorado spinedace will be exceeded if there is a loss of one population in the current number of spinedace populations on the Coconino NF as a result of the proposed action, without being offset by newly established populations. This surrogate is reasonable to use to measure when take is exceeded for the following reasons:

- 1) As stated above, spinedace populations naturally fluctuate. Some years we find only a few individual fish and in other years we find more individuals, but the number of individual fish (i.e., adults, young-of-year, eggs) in a particular system is not static; therefore, we cannot use a single number of individuals to identify if take has occurred or not.
- 2) Because individual populations of spinedace within single drainages are discrete from other populations on the Coconino NF, we may infer the absence of spinedace from a particular drainage if none are found during surveys. As stated above, numbers naturally fluctuate, but if numbers are so low we are not detecting spinedace, it is likely that the population cannot recover without management assistance.

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 the Little Colorado spinedace.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Little Colorado spinedace.

1. Minimize or eliminate take of Little Colorado spinedace on the Coconino NF.
2. Minimize or eliminate adverse effects to Little Colorado spinedace habitat on Coconino NF.
3. Monitor the impacts of site-specific projects implemented on the Little Colorado spinedace.

TERMS AND CONDITIONS

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

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of spinedace populations for potential natural vegetation conditions to eliminate direct effects and minimize indirect effects to spinedace.
- 1.2 Design projects to minimize or eliminate adverse effects to the Little Colorado spinedace.
- 1.3 When designing fish habitat improvement projects, give consideration to native fish species.

The following term and condition will implement reasonable and prudent measure 2:

- 2.1 Design projects to reduce negative effects (direct and indirect) with the goal of implementing projects that have beneficial, insignificant, or discountable effects within occupied spinedace habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 The Coconino NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site-specific BO (including conservation measures and best management practices), breeding season(s) over which the project occurred, relevant Gila chub survey information, and any other pertinent information about the project's effects on the species.
- 3.2 In order to monitor the impacts of incidental take, the USFS will track and report the effects of the proposed action on Little Colorado spinedace, pursuant to 50 CRF 402.14(i)(3). Annual reports, which will include this species, shall be sent to the appropriate local FWS Ecological Services field office by March 1st of each year.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures provided. The federal action agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA 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 CH, to help implement recovery plans, or to develop information. The FWS recommends that the USFS:

1. Continue working with FWS, AGFD, and our other partners to implement the *East Clear Creek Watershed Recovery Strategy for the Little Colorado spinedace and other Riparian Species* (FS1999).
2. Continue working with the Arizona Elk Society, AGFD, and us to remove livestock fencing and improve habitat on the Buck Springs Allotment.
3. Continue to identify factors that limit the recovery potential of the spinedace and work to correct them.
4. Acquire instream flow water rights to ensure perennial flow in streams with Little Colorado spinedace habitat.
5. Assist the FWS and AGFD to reestablish Little Colorado spinedace throughout its historical range.
6. Work with the FWS and AGFD to eliminate nonnative aquatics within occupied habitat of the spinedace on NFS lands.

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

LOACH MINNOW

STATUS OF THE SPECIES RANGEWIDE

Loach minnow was listed as a threatened species on October 28, 1986 (USFWS 1986). However, we determined in 1994 that reclassifying loach minnow to endangered status was warranted but precluded (59 FR 35303, July 11, 1994), and restated this conclusion on January 8, 2001 (66 FR 1295). We reanalyzed the determination each year in our Candidate Notice of Review, and determined that reclassification to endangered is warranted, in the Candidate Notice of Review published on November 9, 2009 (74 FR 57804). In 2010, we published a proposed rule to reclassify loach minnow to endangered status (75 FR 66482). During the preparation of this BO, the proposed rule changing the loach minnow's status from threatened to endangered was finalized on February 23, 2012 (77 FR 10810).

CH for the loach minnow was originally designated on March 21, 2007 (USFWS 2007). The 2007 designation included as CH portions of the East Fork Black River, North Fork East Fork Black River, Coyote Creek, and Boneyard Creek; Aravaipa Creek and its tributaries Deer and Turkey creeks; the San Francisco River and its tributary Whitewater Creek; Eagle Creek, the Blue River and its tributaries, Campbell Blue Creek, Little Blue Creek, Dry Blue Creek, Pace

Creek, and Frieborn Creek; the Tularosa River and its tributary, Negrito Creek; ; the Gila River, and its tributaries West, Middle, and East Forks. Following a legal challenge to that designation, we filed a motion for voluntary remand in 2009 and began re-evaluating CH. Those areas originally designated as CH in the 2007 rule remained in place until the new designation was finalized. As mentioned above, USFWS published the final rule reclassifying the species as endangered and revising the loach minnow's designated CH on February 23, 2012 (77 FR 10810). The final rule became effective on March 26, 2012. While there are some differences between the 2007 designation and the 2012 revised designation, much of the geographic area included for loach minnow CH is the same in both proposals. Specific details regarding the areas included as designated or proposed CH can be found in these rules. Key features, or Primary Constituent Elements (PCEs) for loach minnow are: 1) Habitat to support all egg, larval, juvenile, and adult loach minnow; (2) An abundant aquatic insect food base; (3) Streams with no or no more than low levels of pollutants; (4) Perennial flows, or interrupted stream courses that are periodically dewatered but that serve as connective corridors when wetted; (5) No or low levels of nonnative aquatic species that allow for persistence of loach minnow; and (6) Streams with a natural, unregulated flow regime that allows for periodic flooding or, if regulated, that allows for adequate river functions. Additional detail on each of these PCEs are found in the CH rule.

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

The limited taxonomic and genetic data available for loach minnow indicate there are substantial differences in morphology and genetic makeup between remnant loach minnow populations. Tibbets (1993) concluded that results from mitochondrial DNA (mtDNA) and allozyme surveys indicate variation for loach minnow follows drainage patterns, suggesting little gene flow among rivers. The levels of divergence present in the data set indicate that populations within rivers are unique, and represent evolutionarily independent lineages. The main difference between the mtDNA and allozyme data was that mtDNA suggest that the San Francisco/Blue and Gila groups of loach minnow are separate, while the allozyme data places the Gila group within the San Francisco/Blue group. Tibbets (1993) concluded that the level of divergence in both allozyme and mtDNA data indicated that all three main populations (Aravaipa Creek, Blue/San Francisco Rivers, and Gila River) were historically isolated and represent evolutionarily distinct lineages. No genetic information is currently available for loach minnow in the White River system.

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst et al. 1988; Propst and Bestgen 1991; Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and

Minckley 1966). Loach minnow feeds exclusively on aquatic insects (Schrieber 1978, Abarca 1987). Loach minnow live two to three years with reproduction occurring primarily in the second summer of life (Minckley 1973, Sublette et al. 1990). Spawning occurs March through May (Britt 1982, Propst et al. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst et al. 1988, Vives and Minckley 1990). Additional details on habitat preferences are provided in the 2007 CH designation (72 FR 13356), the proposed rule for CH designation from 2010 (75 FR 66482), and the recently-published final rule for CH designation (77 FR 10810).

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

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

The status of loach minnow is declining rangewide. Although it was originally listed as threatened, the FWS determined in 1994 that a petition to uplist the species to endangered status was warranted (USFWS 1994). The FWS confirmed this decision in 2008 (USFWS 2008). As noted above, we published a proposed rule to for redesignation of CH as well as reclassification of loach minnow to endangered status in October 2010, and the final rule was published on February 23, 2012, and becomes effective on March 26, 2012.

Recovery Actions Rangelwide

The Loach Minnow Recovery Plan (FWS 1991) was completed in 1991. Recovery goals include protection of existing populations, restoration of populations in portions of historic habitat, and eventual delisting, if possible. The Recovery Plan is currently being revised by a new recovery team, which was convened in 2011 and began meeting in 2012. We anticipate that a new recovery plan will be released within approximately two years.

The following recovery efforts for the loach minnow have been conducted by NFs in Region 3 (USFS 2004). Many of these recovery efforts were implemented as part of the “seven species direction” (USFS 1997). Riparian areas on NF System lands have been excluded from livestock grazing to protect habitat along the Gila, Mangas Creek, Bear Creek, San Francisco, Tularosa River, Negrito Creek, Verde, Blue, North Fork East Fork Black Rivers, and Campbell Blue and Eagle Creeks. Forest Road 586 on the Apache-Sitgreaves NF was obliterated to reduce sediment input to Boneyard Creek which is a tributary to occupied habitat in the North Fork East Fork Black River. A fish barrier is under construction on the Blue River, which completion anticipated for late Spring 2012. The barrier will help to prevent the upstream movement of non-native predators and competitors. Off-highway vehicles can cause significant damage. Areas to focus efforts to control and enforce existing regulations on the Prescott NF have been identified.

ENVIRONMENTAL BASELINE (Coconino NF)

Status of the Species within the Action Area

During 2007, 2008, and 2010, loach minnow were stocked in Fossil Creek on the Forest (AGFD 2009). Monitoring during 2009 determined that loach minnow persisted in Fossil Creek. One loach minnow was detected in 2011 (C. Crowder, AGFD, pers. comm. 2011).

CH was designated for the loach minnow in 2007. The FWS published a proposed rule to modify the CH designation in 2010 (October 28, 2010, 75 FR 66482), and a final rule was published on February 23, 2012, and became effective on March 26, 2012. Although the original 2007 designation did not include any streams on the Coconino NF, the 2012 designation includes portions of Oak Creek, Beaver and Wet Beaver Creeks, Fossil Creek, and a reach of the Verde River for loach minnow.

Factors Affecting the Species within the Action Area

Loach minnow and its designated CH may be affected on NF s by groundwater pumping, watershed conditions, stormwater runoff, non-native fish species, livestock grazing, timber harvest, wildfire, recreational activities, and other habitat alterations.

EFFECTS OF THE ACTION

The following effects analysis for this Forest is consistent with the 2011 BA.

The S&Gs listed in the NF LRMPs and the 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the loach minnow and its habitat. These S&Gs may result in both indirect and direct effects to the species. For a list of S&GS considered for the loach minnow, see the 2005 BO/CO.

The 2004 BA did not address the effects of continued implementation of the Coconino NF LRMP S&Gs on the loach minnow because the species did not occur on the Forest at that time. Since the 2004 BA loach minnow has been stocked in Fossil Creek on the Coconino NF in an attempt to re-establish the species. Recovery actions have allowed the species to persist but have limited ability to recover the species at this time due to the presence of nonnative species (USFWS 2012).

Table 5. Summary of S&G rankings for the loach minnow on the Coconino NF.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing a lethal response	0	0%
-2	S&G is causing a sub-lethal response	0	0%
-1	S&G is causing a behavioral response	13	10%
0	S&G could be interpreted in many ways that could cause a negative or a positive response by the species	71	54%
+1	S&G is maintaining habitat & providing recovery	31	23%
+2	S&G is moving species toward recovery	9	7%
+3	S&G is implementing species recovery plan	6	5%
Y	S&G has no application to the species	1	1%
Z	S&G is in compliance with existing law, implementation is none discretionary	0	0%
X	S&G is only a heading	0	0%
Total		131	100%

Activities that affect water quality, such as removal of riparian cover, sedimentation, or control of water levels, can adversely affect loach minnow habitat quality. Dams and reservoirs appear to eliminate loach minnow for many miles upstream and downstream. Spread of non-native predators, especially flathead catfish and channel catfish can also directly reduce loach minnow populations.

The S&Gs analyzed for direct or indirect effects to the loach minnow include those for the Coconino NF as well as the 1996 Regional LRMP Amendment, and the 2004 Verde CRMP which has been incorporated into the LRMP as S&G 2049.

Engineering Program

The Coconino NF LRMP guides the Engineering Program to: close or obliterate roads no longer "needed for industry, public, and/or administrative use" (S&G 400); seasonally close roads to protect soils and resources (S&G 402); maintain road densities below 1.24 km/km² ([2 mi/mi²], S&G 404); maintain fuelwood access roads to the lowest standard to minimize resource impacts, ground disturbance, and provide user safety (S&G 407); locate new roads out of riparian areas (S&G 408); and manage roads to minimize resource and soil impacts (S&G 406). S&G 400 guides the NF to close obliterate unneeded roads, although few roads fall into this category if you consider the multiple use mandate of the USFS. S&G 404 sets a standard for road densities that far exceeds the accepted level for impacts to aquatic systems (1 mi/mi²). This limits the amount of potential adverse effects that can be realized through implementation. Although guidance is predominantly positive, S&G 408 allows existing roads in wet meadows to be reconstructed and maintained in accordance with Best Management Practices which seeks only

to minimize the impacts. S&G 400 is primarily positive in that it restricts the use of roads during critical times in which damage to soils may occur. Overall, the Coconino NF LRMP seeks to minimize impacts associated with the Engineering Program; however, effects are certain to occur during implementation in the absence of other guidance or analysis at the project-level to prevent adverse effects.

Fire Management Program

The Coconino NF LRMP contains three Forest-wide S&Gs for the Fire Management Program that may affect loach minnow. S&G 413 guides the NF to suppress fires that threaten habitat for threatened and endangered species. S&G 411 guides the NF to plan fuel treatments such that the least impact to the site is realized. This may assist in minimizing the effects to the loach minnow. S&G 414 guides the NF to limit fuel treatments to areas where fire may be a threat to life, property, adjacent to old-growth, or specifically identified high resource values. This may be interpreted to include areas identified as threatened or endangered species habitat such as that for the loach minnow. General guidance Forest-wide should minimize or eliminate the effects to loach minnow by Fire Management projects. However, some short-term adverse effects may take place during project implementation under the guidance of the LRMP. Short-term effects to the loach minnow could result from this guidance. Long-term effects from implementation under these S&Gs will likely be positive.

Forestry and Forest Health Program

The Coconino NF LRMP restricts the amount of damage that could occur in riparian areas, seeks to manage timber resources on a sustainable level, and seeks to protect watersheds. Direct effects and indirect effects to loach minnow can be reduced, but not eliminated, through guidance provided by the S&Gs.

Lands and Minerals Program

The Coconino NF LRMP provides guidance for utilization of mineral resources but advises to limit impacts through operating plans, permits, withdrawals, retentions, revocations, and modifications (S&G 380, 381). The LRMP emphasizes the avoidance of effects to riparian-dependent resources, channel morphology, and stream bank stability during exploration and suggests planning to repair damage if inevitable (S&G 382). Several S&Gs working together throughout the Coconino NF LRMP effectively limit the amount of effects that could result from surface occupancy, right-of-way corridors, and access roads to private property. However, first priority (S&G 398) is given to the "public interest and NF needs". It is not clear how listed species or CH factor into this language. S&G 505 allows mineral material excavation in riparian zones after environmental analysis with the stipulation that activities will maintain or improve the riparian condition. Special uses in riparian areas are generally not allowed unless unavoidable in which case the projects will be designed to minimize the extent and the degree of the effects (S&G 506). Riparian areas will be sought through land exchange and will be given a high priority (S&G 507). The LRMP also provides guidance to withdraw all RNAs and other special areas from locatable mineral entry or prohibit special use authorizations that could adversely affect or change the character of the areas (S&Gs 532 and 533, MA17). The Coconino NF LRMP S&Gs limit effects to the loach minnow, but do not eliminate all adverse effects.

Rangeland Management Program

The Coconino NF LRMP provides guidance to maximize livestock grazing potential, provide wildlife habitat, and ensure watershed condition. It is assumed the watershed condition shall be satisfactory or greater. The LRMP provides utilitarian guidance with considerations to wildlife habitat, watershed protection, riparian/sensitive area protection, and sufficient recreational opportunity. Some indirect effects to threatened and endangered species may occur during implementation. Effects to loach minnow are likely to take place during the implementation of S&Gs related to Rangeland Management.

Recreation, Heritage, and Wilderness Program

The Coconino NF LRMP guides the NF to manage program activities such that damage to resources does not occur, and if damage occurs, it should be repaired (e.g., S&G 312-319). Most S&Gs result in protection for resources; however, one S&G (317) recognizes past damage to soils and allows the continued use of a road as an OHV trail. This may allow unlimited recreational OHV trails to exist, but the S&G also advises considerations for wildlife habitat. Protection for aquatic organisms exists in the possibility for the Coconino NF to pursue instream flow rights for recreation (S&G 311). Although this S&G is tailored to recreational use, positive effects to the loach minnow may result. Higher levels of recreational use may affect loach minnow due to overuse. S&G 2049 directs the Forest to manage MA-2 using the direction provided in the Verde WSRCMP, where the emphasis is to maintain the outstandingly remarkable values for scenic, fish, wildlife, and historic and cultural values, while also protecting the river's free flowing character and water quality.

Watershed Program

The Coconino LRMP guides the Watershed Program to: maintain or improve watershed condition (S&G 364, 366, 375); prevent surface or ground water contamination by chemical agents (S&G 369); maintain or improve water quality, quantity, and soil productivity (S&G 376); implement emergency fire rehabilitation measures to prevent watershed damage (S&G 377); obliterate roads causing watershed damage (S&G 378); comply with federal and state water quality protection laws (S&G 353); reduce non-point source pollution (S&G 354); provide filter strips along riparian areas (S&G 356, 357, 504); protect streams from the effects of timber harvest (S&G 358); locate new roads and relocate existing roads out of stream bottoms and swales (S&G 361); provide adequate road drainage and install structures to prevent sedimentation in stream channel (S&G 362, 365); maintain 80% of riparian crown cover (S&G 363); ensure that structures are designed to accommodate 100-year flood events (S&G 368); monitor water quality to ensure compliance with standards (S&G 370, 371); take action to legally protect NF uses of needed waters (S&G 372); acquire water rights for instream flows (S&G 373, 374); leave existing woody debris in stream channels (S&G 359); and protect wetlands (S&G 367). The guidance for the Watershed Program on the Coconino NF is overwhelmingly positive with the exception of allowances for removing riparian crown cover vegetation. Nonetheless, the guidance may assist in minimizing or avoiding effects by the Watershed Program, as well as other programs, to loach minnow.

Wildlife, Fish, and Rare Plants Program

The Coconino NF LRMP seeks to conserve and recover species and their habitats. S&G guidance suggests: following approved Recovery Plans (S&G 321); inventory and prepare

recovery schedules (S&Gs 322 and 324); evaluate potential Resource Program impacts and provide appropriate protection or enhancement (S&Gs 325 and 327); utilize improvements to achieve conservation and recovery (S&G 329); protect all riparian areas (S&Gs 323, 475, 489, 490, 491, 492, 494, 495, 496, 497); secure in-stream flows to protect ecosystems, fish, and wildlife (S&G 493); and collaboration with other agencies to accomplish the above (S&G 331). One S&G may conflict with protection of loach minnow. S&G 498 in MA12, which refers to areas of open water, guides the NF to "manage lakes and streams to improve fisheries habitat." This S&G does not specify whether the improvements are for native or non-native species or whether this includes only game species or all species. The assumption is made that this standard can apply to non-native and native species of game fish. This would contribute to a threat to loach minnow.

1996 Regional Amendment

Short-term adverse effects to the loach minnow may occur from the implementation of the 1996 Regional Amendment, as reflected in the ranking of the S&Gs. However, the majority of the S&Gs within the 1996 Regional Amendment maintain habitat and provide for recovery of the species. Also, we found that the guidelines used by the USFS for the northern goshawk do not appreciably affect this species.

The following S&Gs under the 1996 Amendment are those that will ultimately result in a long-term beneficial effect; however there may be some potential short-term adverse effects. They are S&Gs 1432, 1445, 1448, 1455, 1458, 1468, 1476, and 1508. All these S&Gs direct the Forests to use prescribed fire as a tool for fire risk abatement, as well as thinning and other fuels management activities. Potential short-term effects include those associated with ground disturbance (e.g., sedimentation), as well as those from the fire itself. See previous discussion under the Fire Management Program for discussion of those effects.

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 ESA.

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.

CRITICAL HABITAT EFFECTS ANALYSIS

At the time of the 2011 BA, no designated CH was located on or downstream of the Coconino NF. For this reason, the USFS determined that the continued implementation of the Coconino NF LRMP would have No Effect on designated CH for the loach minnow. Alternatively, USFWS had proposed CH for the loach minnow in portions of Oak Creek, Beaver and Wet Beaver Creeks, Fossil Creek, and a reach of the Verde River for loach minnow. Since the 2011 BA, a final rule designating loach minnow CH was published on February 23, 2012, and became effective on March 26, 2012.

The continued implementation of the Coconino NF LRMP may affect and is likely to adversely affect designated CH for the loach minnow. The Coconino NF LRMP lacks S&Gs which provide guidance to avoid all adverse effects to the PCEs from several Programs with S&Gs applicable to the proposed CH for loach minnow. Some conflicts will arise with effects to the proposed CH occurring due to the lack of adequate review necessary to prevent adverse influence on the PCEs. The 2004 BA (USFS 2004) for The Continued Implementation of the LRMP for the 11 NFs and NGs provides an in depth analysis for CH on the Forest.

After reviewing the current status of loach minnow CH, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our opinion that the continued implementation of the LRMP will not destroy or adversely modify CH for loach minnow. The LRMPs contain guidance that seeks to minimize the magnitude of the effects; however, there is still a potential to implement the LRMPs while causing adverse affects to CH. Although the Service anticipates some adverse effects to loach minnow CH from the implementation of the Coconino NF's LRMP, as well as the 1996 Regional Amendment, we do not believe the impacts of the proposed action will result in adverse modification to loach minnow CH.

The PCEs for loach minnow include habitat to support all life stages of the fish, including perennial flows, appropriate stream habitats and microhabitats, low levels of pollutants, an appropriate prey base, no or low levels of nonnative aquatic species, and a natural, unregulated flow regime that allows for periodic flooding (77 FR 10810). The various USFS programs may include activities such as road development or eradication, vegetation removal, and grazing which could impact these PCEs by removing vegetation, disturbing soils, or other activities. Consultation on site-specific projects under these programs will be conducted to more adequately address specific impacts to the PCEs.

It is possible that loach minnow still persist in areas thought to be extirpated and may occur in localities yet to be discovered. Proactive efforts by the USFS in the past and the continued monitoring of their management actions contribute positively to the overall status of the loach minnow and its CH. These actions together with the implementation of the beneficial S&Gs

outlined above should continue to improve habitat conditions on NF lands in the southwest. For these reasons, as well as the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the loach minnow designated CH PCEs to function properly. As such, CH for the loach minnow will remain functional to serve its intended conservation role for the species (i.e. survival and recovery). Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify proposed CH for the loach minnow.

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 ESA.

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 loach minnow CH 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. Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use on 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.

Drought and climate change could eventually exacerbate existing threats to streams in the Southwestern U.S. Increased and prolonged drought associated with changing climatic patterns could adversely affect streams by reducing water availability, and altering food availability and predation rates. Drying or warming of streams is of particular concern because loach minnow depend on permanent flowing water of appropriate water quality for survival. Long term climate change could exacerbate the effects of drought. Therefore we conclude that drought is negatively affecting the species now, and is likely to continue into the foreseeable future

CONCLUSION

After reviewing the current status of the loach minnow, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action will not jeopardize the continued existence of the loach minnow. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS anticipates adverse effects to the loach minnow from the implementation of the Coconino NF LRMP, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- The conservation measures within the proposed action for the spikedace will also improve the status for the loach minnow.
- There are several S&Gs within the Coconino NF LRMP that support conservation and recovery of the loach minnow (see Table 5). All of these S&Gs guide the Forests to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species

With the benefits from the USFS's conservation measures for the spikedace (i.e., as part of the proposed action), loach minnow habitat is expected to improve. These conservation measures direct the USFS to implement projects that will improve spikedace habitat. Since both species occupy mid-elevation stream habitats within the Gila River Basin, and in several instances are sympatric, several populations of loach minnow will benefit significantly from conservation measures applied to spikedace populations. Improved habitat for loach minnow due to implementation of the conservation measures, continued exclusion of livestock grazing in all occupied habitats on NF lands, consideration given to recovery of the loach minnow within the proposed action, in combination with the relative widespread distribution of populations (of which the majority are substantial in numbers of individuals) within the Gila River Basin, ensure that the proposed action will not reduce appreciably the likelihood of both survival and recovery of the loach minnow. Although some take is reasonably certain to occur through time, incidental take of individuals during site-specific project activities is not expected to be appreciable. For these reasons, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of loach minnow.

Critical Habitat

After reviewing the current status of loach minnow CH, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our opinion that the continued implementation of the Coconino LRMP is not likely to destroy or adversely modify CH for loach minnow. The Service bases this conclusion on the following reasons:

- Consultation on site-specific projects under these programs will be conducted to more adequately address specific impacts to the PCEs.
- Proactive efforts by the USFS in the past and the continued monitoring of their management actions contribute positively to the overall status of the loach minnow and its CH.
- CH for the loach minnow will remain functional to serve its intended conservation role for the species (i.e. survival and recovery).

It is possible that loach minnow still persist in areas thought to be extirpated and may occur in localities yet to be discovered. Proactive efforts by the USFS in the past and the continued monitoring of their management actions contribute positively to the overall status of the loach

minnow and its CH. Activities such as closing roads, removal of non-native fish, establishing a captive breeding program, and the exclusion of cattle from riparian areas continue to contribute toward the improvement of loach minnow habitat. In addition, there are also activities being conducted by other land management agencies to enhance habitat for the loach minnow that benefit its CH rangewide. All these actions together with the implementation of the beneficial S&Gs outlined above should continue to improve habitat conditions on NF lands in the southwest. For these reasons, as well as the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the loach minnow designated CH PCEs to function properly. As such, CH for the loach minnow will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify CH for the loach minnow.

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of CH in 50 CFR 402.02 because of various court cases surrounding the Service's jeopardy and adverse modification analyses. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to CH. CH is defined in section 3 of the Act "as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species." We have also relied upon the Consultation Handbook which provides guidance on determining adverse modification of CH and jeopardy pursuant to the following: "Adverse effects on individuals of a species or constituent elements or segments of CH generally do not result in jeopardy or adverse modification determinations unless that loss, when added to the environmental baseline, is likely to result in significant adverse effects throughout the species' range, or appreciably diminish the capability of the CH to satisfy essential requirements of the species" (FWS and National Marine Fisheries Service 1998:4-34).

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA 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 by the FWS 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 by the FWS 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 ESA

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

Amount or Extent of Take Anticipated

Incidental take of loach minnow is not reasonably certain to occur as a result of the continued implementation of the Coconino NF LRMP because recent reintroductions of loach minnow at Fossil Creek have yet to show successful establishment of a self-sustaining population.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA 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 CH, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. In cooperation with AGFD, NMDGF, and FWS, remove all non-native species affecting the loach minnow and take measures to prevent reoccurrence of non-native species into loach minnow habitat.
2. Manage streams to create additional habitat for loach minnow.
3. Cooperate with state conservation agencies, FWS, and universities to conduct field studies and in-stream experiments to qualitatively and quantitatively describe indirect interactions among loach minnow and non-native fishes.

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

SPIKEDACE

STATUS OF THE SPECIES RANGEWIDE

Spikedace (*Meda fulgida*) was listed as a threatened species on July 1, 1986 (51 FR 23769). However, we determined in 1994 that reclassifying loach minnow to endangered status was warranted but precluded (59 FR 35303, July 11, 1994), and restated this conclusion on January 8, 2001 (66 FR 1295). We reanalyzed the determination each year in our Candidate Notice of Review, and determined that reclassification to endangered is warranted, in the Candidate Notice of Review published on November 9, 2009 (74 FR 57804). In 2010, we published a proposed rule to reclassify loach minnow to endangered status (75 FR 66482). During the preparation of this BO, the proposed rule changing the status of the spikedace from threatened to endangered was finalized on February 23, 2012 (77 FR 10810).

CH was originally designated on March 21, 2007 (72 FR 13356), and included portions of the Verde, middle Gila, lower San Pedro, and upper Gila rivers, and Aravaipa Creek, as well as several tributaries of those streams. Following a legal challenge to that designation, we filed a motion for voluntary remand in 2009 and began re-evaluating CH. Those areas originally designated as CH in the 2007 rule remained in place until the new designation was finalized. As mentioned above, USFWS published the final rule reclassifying the species as endangered and revising the loach minnow's designated CH on February 23, 2012 (77 FR 10810). The final rule became effective on March 26, 2012. While there are some differences between the 2007 designation and the 2012 revised designation, much of the geographic area included for spikedace CH is the same in both proposals. Specific details regarding the areas included as designated or proposed CH can be found in the two rules. Key features, or Primary Constituent Elements (PCEs) for spikedace are: 1) Habitat to support all egg, larval, juvenile, and adult spikedace; (2) An abundant aquatic insect food base; (3) Streams with no or no more than low levels of pollutants; (4) Perennial flows, or interrupted stream courses that are periodically dewatered but that serve as connective corridors when wetted; (5) No or low levels of nonnative aquatic species that allow for persistence of spikedace; and (6) Streams with a natural, unregulated flow regime that allows for periodic flooding or, if regulated, that allows for adequate river functions. Additional detail on each of these PCEs are found in the CH rule.

Spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the middle, and upper Gila River and Aravaipa Creek. The species also occurs in the upper Verde River and Eagle Creek, 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 have not been detected in Eagle Creek since 1989 (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh et al. 1990, Sublette et al. 1990, Jakle 1992, Knowles 1994, Rinne 1999). 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).

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).

Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst et al. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst et al. 1986). Spikedace spawns from March through May with some yearly and geographic variation (Barber et al. 1970, Anderson 1978, Propst et al. 1986). Actual spawning has not been observed in the wild, but spawning behavior and captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace lives about two years with reproduction occurring primarily in one-year old fish (Barber et al. 1970, Anderson 1978, Propst et al. 1986). It feeds primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh et al. 1989). Additional details on habitat preferences are provided in the 2007 CH designation (72 FR 13356), the proposed rule for CH designation from 2010 (75 FR 66482), and the recently-published final rule for CH designation (77 FR 10810).

The spikedace was once common throughout much of the Gila River basin, including the mainstem Gila River upstream of Phoenix, and the Verde, Agua Fria, Salt, San Pedro, and San Francisco subbasins. Habitat destruction and competition and predation by nonnative aquatic species reduced its range and abundance (Miller 1961; Lachner et al. 1970; Ono et al. 1983; Moyle 1986; Moyle et al. 1986; Propst et al. 1986). Spikedace are now restricted to portions of the upper Gila River (Grant, Catron, and Hidalgo Counties, New Mexico); Aravaipa Creek (Graham and Pinal Counties, Arizona); Eagle Creek (Graham and Greenlee Counties, Arizona); and the Verde River (Yavapai County, Arizona) (Marsh et al. 1990; M. Brouder, FWS (Service), pers. comm. 2002; Stefferud and Reinthal 2005; Paroz et al. 2006; Propst 2007).

In 2007, spikedace were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a; T. Robinson, Arizona Game and Fish Department (AGFD), pers. comm. 2008b; D. Orabutt, AGFD, pers. comm. 2009; Robinson 2009a; Robinson et al. 2010a; Robinson et al. 2010b). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Spikedace were also translocated into Fossil Creek, a tributary to the Verde River in Gila County, Arizona, in 2007, and were subsequently augmented in 2008 (Carter 2007; Carter 2008; Robinson 2009b; Boyarski et al. 2010). In 2008, spikedace were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (H. Blasius, U.S. Bureau of Land Management (BLM), pers. comm. 2008; D. Orabutt, AGFD, pers. comm. 2009; Robinson et al. 2009), and were repatriated to the upper San Francisco River in Catron County, New Mexico (D. Propst, New Mexico Department of Game and Fish (NMDGF), pers. comm. 2010).

Augmentations with additional fish will occur for the next several years at all sites, if adequate numbers of fish are available. Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will ultimately be successful and result in establishment of new populations of loach minnow in these locations.

Spikedace is now common only in Aravaipa Creek in Arizona (Arizona State University (ASU) 2002; P. Reinthal, University of Arizona, pers. comm. 2008, Reinthal 2009) and one section of the Gila River south of Cliff, New Mexico (NMDGF 2008; Propst et al. 2009). The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey (M. Brouder, Service, pers. comm. 2002; AGFD 2004). Spikedace from the Eagle Creek population have not been seen for over a decade (Marsh 1996), although they are still thought to exist in numbers too low for the sampling efforts to detect (Carter et al. 2007; see Minckley and Marsh 2009). The Middle Fork Gila River population is thought to be very small and has not been seen since 1995. Planning among several State and Federal agencies is underway for restoration of native fish species, including spikedace, in the Blue River following construction of a barrier that will exclude nonnative fish from moving upstream from the lower San Francisco River, and allow for translocation of spikedace. Barrier construction is underway with completion anticipated in late Spring 2012. Federal land ownership throughout the majority of this proposed CHU would facilitate management for the species. While the Blue River and its tributaries were not included in the 2007 designation, the proposed rule in 2010 includes these areas for spikedace, and contains details on areas considered as proposed CH.

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

The status of spikedace is declining rangewide. It is now restricted to approximately 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 (FWS 2000). Although it was listed as threatened at the time of the 2011 BA, we published the final rule to redesignate CH and to reclassify spikedace to threatened status on February 23, 2012, and the rule becomes effective on March 26, 2012.

Drought and climate change could eventually exacerbate existing threats to streams in the Southwestern U.S. Increased and prolonged drought associated with changing climatic patterns could adversely affect streams by reducing water availability, and altering food availability and predation rates. Drying or warming of streams is of particular concern because spikedace depend on permanent flowing water of appropriate water quality for survival. Long term climate change could exacerbate the effects of drought. Therefore we conclude that drought is negatively affecting the species now, and is likely to continue into the foreseeable future.

ENVIRONMENTAL BASELINE

Status of the Species within the Action Area

The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey.

On the Coconino NF, spikedace were stocked in Fossil Creek as recently as 2011, and spikedace were detected in 2011 monitoring (prior to the 2011 stocking). Spikedace are believed to still be present in the Verde River, although the species has not been detected in recent stream surveys.

During 2005, 26 mi of the upper Verde River were surveyed with no spikedace being detected. Planning for the Fossil Creek project was ongoing during this period. The Forest cooperates with partners to monitor the fish community in Fossil Creek. Spikedace are estimated to be present in six to seven mi of Fossil Creek. Surveys in 2011 found 69 spikedace.

CH was originally designated for the spikedace in 2007 and modification to the 2007 designation became final on February 23, 2012. The 2007 designation included a small portion of the Verde River on the Coconino NF. The 2012 revisions designate as spikedace CH the entire Verde River on the Forest, and Oak Creek, Beaver Creek, Wet Beaver Creek, West Clear Creek, and Fossil Creek.

Factors Affecting the Species within the Action Area

Spikedace and its designated and proposed CH may be affected on NFs by groundwater pumping, watershed conditions, stormwater runoff, non-native fish species, livestock grazing, timber harvest, wildfire, recreational activities, and other habitat alterations.

CONSERVATION MEASURES

The USFS has agreed to implement the following CMs for the spikedace:

Conservation Measure #1: Design projects in occupied spikedace habitat on NFS lands which address the appropriate components of the spikedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to spikedace.

Conservation Measure #2: Cooperate with state game and fish agencies, other federal agencies, USFS research stations, FWS, and others (universities, etc.) to assess and prioritize habitat of stream and river segments for potential spikedace reintroduction. Report results of these efforts to the FWS in LMRP annual reports.

- a. Determine necessary habitat and watershed improvements in occupied watersheds and watersheds identified as high priority reintroduction sites, and implement projects needed to contribute to recovery.

Conservation Measure #3: Participate in ongoing efforts initiated in 2003 involving state agencies, other federal agencies, universities, USFS research facilities, and FWS to document the current state of knowledge regarding the spikedace.

- a. Identify existing populations in imminent need of protection and develop and implement, to the extent possible by the USFS, a strategy for protecting the population and reducing threats to the population.

Conservation Measure #4: With state agencies and other researchers (e.g., academic and USFS), who are currently monitoring spikedace populations, participate in the development of a consistent monitoring methodology for spikedace, their associated habitat, and co-occurring aquatic species. Report results of these efforts to the FWS in the LRMP annual reports.

Conservation Measure #5: To the extent feasible within the mission and capabilities of the USFS, assist the FWS, AGFD, and the NMDGF with any spikedace reintroduction efforts.

Conservation Measure #6: Within the mission and capabilities of the USFS, continue to assist the FWS, other federal agencies, state agencies, universities, and others in the continuation of a captive spikedace propagation program designed to augment wild populations.

Conservation Measure #7: The long-term benefits directly attributable to wildland fire use for resource benefits is the reduction of catastrophic fire. This is very significant to long-term land management goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and intensity outside historic ranges of variability which are highly detrimental to aquatic systems. That said, the USFS agrees to the following:

- a. Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in Geographical Information System (GIS) layers on each NF in the Southwestern Region. These GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition, as well as surrounding watersheds. Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as delay, direct check, and/or suppress.
- b. A USFS biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, implement spawning season restrictions to protect breeding activities, establish appropriate buffers to filter ash and sediment, avoid mechanical and chemical measures within the riparian corridor, etc. During development and implementation of operational management plans, identify potential threats to listed species and designated CH and develop mitigation actions to eliminate threats.
- c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

EFFECTS OF THE ACTION

The 2005 BO included tables showing the S&Gs considered for each species' analysis and a ranking table summarizing the types of effects (lethal, sublethal, etc.) expected to result from the S&Gs. Because no new significant scientific information has become available on the spikedace (other than 69 fish in Fossil Creek) and there have been no changes in Forest policy or programs that would change the 2004 BA (USFS) and 2005 BO/CO (FWS) effects determination for this species, we hereby incorporate by reference the ranking tables and effects analysis presented in the 2005 BO and provide a narrative summary below.

This section includes analyses of the direct and indirect effects of the proposed action on the spikedace for the Coconino NF LRMP.

The spikedace is considered to occur on the Coconino NF in the Verde River and Fossil Creek. In 1994, approximately 425 individual spikedace were caught in the Verde River. This number declined precipitously to approximately 75 in 1995, with a brief peak near 150 individuals in 1996, before declining to 0 in 1997 (Rinne 1999). Spikedace in the Verde River have reached an all-time low in numbers, such that the last fish observed was in 1999 (Brouder 2002). Although spikedace have not been detected in the Verde River in several years it is still considered to be occupied because the very small population size and elusive nature of the species inhibits the effectiveness (and/or the confidence) of spikedace presence/absence survey techniques. The population of spikedace in the Verde River is thought to be the most taxonomically distinct population (U.S. Fish and Wildlife Service 2004).

Only two S&Gs (424 and 505) within the Coconino NF LRMP, if implemented, could potentially result in sublethal effects to the spikedace. The majority of the S&Gs maintain habitat and provide for recovery of the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

The S&Gs from the Verde Wild & Scenic River CRMP are incorporated by reference and can be found at <http://azmemory.lib.az.us/cgi-bin/showfile.exe?CISOROOT=/feddocs&CISOPTR=1579&filename=1581.pdf>. The management direction in the CRMP amends previous direction from the Verde Wild & Scenic River portions of the MA-1 and MA-2 land allocations on the Coconino NF. The Wild & Scenic River Act requires that designated Wild & Scenic Rivers first be administered in such a manner as to protect and enhance the river's values, and second to allow other uses that do not interfere with public use and enjoyment of those river values; therefore, protection and enhancement of the specific outstandingly remarkable values and water quality within the Verde Wild & Scenic River provides the foundations upon which all management actions and authorizations of uses are based (USFS 2004). The S&Gs that resulted from the Verde Wild & Scenic River CRMP were previously informally consulted upon and FWS concurred with USFS' findings. The S&Gs outlined in the CRMP are expected to be beneficial to the spikedace due to the overall direction to protect and enhance water quality and outstandingly remarkable values, and to protect the free-flowing character of this segment of the Verde River. This consultation is hereby incorporated by reference.

Engineering Program

Within the Engineering Program, S&G 400 allows the Forest to operate and maintain roads to meet objectives and to obliterate roads not needed for industry, public, and/or administrative use. Obliteration includes restoring the original land contour to the degree practical, scarifying, providing proper drainage, and re-vegetating with appropriate species.

Standard and Guideline 404 allows for management of road densities to achieve an average of 1.1 mile of open road per section in the woodland zone, such as pinyon-juniper, desert, and grassland vegetation types, and an average of 2 miles of open road per section in the ponderosa pine/mixed conifer zone.

Standard and Guideline 408 and 460 guide the Forest to locate new roads out of riparian areas and water collecting features such as swales and to obliterate unnecessary roads in riparian areas. Standard and Guideline 547 provides guidance for eliminating unneeded roads and the redesign or relocation of poorly located roads and trails to lessen impacts on such resources as cultural sites, soil, water and wildlife. This S&G also guides the Forest to reduce user conflicts and restore areas heavily damaged by vehicle or foot traffic using such methods as obliteration, barriers, closures, and visitor information.

All of these S&Gs are intended to address potential negative effects of roads within the Forest and reduce the impacts of roads on the landscape. The long-term implementation of these S&Gs would benefit the watershed; however, there is the potential for short-term effects from construction activities involved in relocating or obliterating a road. Such impacts may include heavy machinery in the stream potentially resulting in increased turbidity, as well as the actual crushing of fish. In addition, there may be an increase in sediment due to ground disturbing activities adjacent to or upstream of spikede habitat.

Fire Management Program

Standards and Guidelines 411 and 414 allow the Forest to plan and implement fuels treatment projects that have the least impact on the site, meet resource management needs, are cost effective, and meet fuel treatment objectives while reducing the threat to life, property, adjacent old-growth areas, or other areas of high resource value. Effects of fuels treatment projects include effects of the actual fire, including a reduction of the vegetative cover contributing to the possibility of ash and sediment entering the stream channel. Other effects include the effect of fireline construction, and the potential for damage from machinery within or immediately adjacent to the stream channel. These effects are all localized and short-term and are far outweighed by the benefit in the reduction of the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standards and Guidelines 458 and 461 provide guidance to minimize resource damage due to management activities such as timber sales, and also direct the use of Knutson-Vandenburg Act (KV) funds to correct resource damage caused by timber sale activities. Once again, these S&Gs are beneficial in the long-term but could potentially result in some short-term effects to the spikede habitat from surface disturbing activities.

Lands and Minerals Program

Standard and Guideline 505 allows for mineral material excavation within the riparian zone after the completion of an environmental analysis as long as those mineral activities maintain or improve riparian conditions. Mineral material excavation within the riparian zone may involve excavation within the stream channel or immediately adjacent to the channel. This could result in potential direct effects to spikedece from crushing by people or machinery in the stream. In addition, there may be some potential sedimentation into the stream resulting from work that would occur on the stream bank. Other effects could include the potential for heavy metals (e.g., the by-products of the ore extraction process) to leech into the stream, thereby causing harm to the spikedece.

Standards & Guidelines 391 and 393 address minimizing the impacts of non-discretionary special use projects (e.g., mining and transmission corridors) across the Forest. Although they are implemented to reduce or eliminate long-term resource damage, to improve areas in unsatisfactory condition, and to maintain those in satisfactory or better condition, they could potentially result in short-term adverse effects to the spikedece. These effects could result from construction activities including relocating or obliterating roads. These effects are short-term and are outweighed by the benefit of minimizing long-term impacts to the landscape.

Rangeland Management Program

Standard and Guideline 424 directs grazing management within designated wilderness areas. Designated wilderness areas adjacent to the Verde River include Munds Mountain and Sycamore Canyon Wilderness areas, and Mazatzal Wilderness near Fossil Creek. According to the Coconino NF LRMP, there is grazing in the wilderness (U.S. Fish and Wildlife 1994:110). In addition, the LRMP also states that any adjustments in the numbers of livestock permitted to graze in wilderness will be made as a result of revision in the normal grazing and land management policy, giving consideration to legal mandates, range condition, and protection of the range resource from deterioration.

Spikedece are adversely affected by activities which contribute to the alteration of the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, regardless of season, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). Some effects to spikedece and their habitat may be restricted within a small area, other effects extend downstream. The effects of the livestock grazing and the magnitude of those effects on the watershed are dependent on local site conditions.

Standards & Guidelines 338, 339, 341, and 483 all provide positive direction to the Forest for managing the impacts of grazing and improving grazing conditions. Although the intent is beneficial, they could have some short-term negative effects from the presence of livestock in the channel, manipulation of riparian vegetation, or from heavy machinery disturbing the soil, as well as effects from prescribed fire. All of these negative effects are short-term and localized and are outweighed by the benefit of improved range conditions in the long-term.

Watershed Management Program

There is a potential for adverse short-term effects from the implementation of S&Gs 361, 363, 377, and 378. They all provide direction for resource improvements such as locating/relocating roads out of stream courses and maintaining riparian vegetation, as well as doing emergency fire rehabilitation where needed to protect soil and water resources. Some of the effects include short-term ground disturbance activities that may temporarily increase sedimentation into the stream channel. These effects would be temporary and would eventually contribute to overall watershed health.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 490 provides guidance for management of riparian resources. The FWS recognizes that the intent of this S&G is positive; however, due to the current status of the spinedace across its range, it is imperative that all habitat that is currently occupied, or is capable of supporting spinedace, be maintained in optimal conditions. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable condition. Less than stable conditions could result in the streambank collapsing into the stream, increasing sedimentation, widening of the stream, and leading to increased summer water temperatures. In addition, the loss of riparian vegetation could impair the filtering capacity of the riparian buffer, leading to an increase in nutrients and contaminants into the creek. Loss of riparian vegetation also leads to increased summer water temperatures and lower winter water temperatures. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

1996 Regional Amendment

Short-term adverse effects to the spinedace may occur from the implementation of the S&Gs within the 1996 Regional Amendment, as reflected in the rankings of the S&Gs. Yet, we found that the guidelines used by the USFS for the northern goshawk do not appreciably affect this species.

The S&Gs under the 1996 amendment that will ultimately have a long-term beneficial effect to the spinedace are S&Gs 1432, 1445, 1448, 1455, 1458, 1468, 1476, and 1508. All of these S&Gs allow the Forests to use prescribed fire, thinning, and other fuels management activities as a tool for fire risk abatement. Potential short-term effects include those associated with ground disturbance (e.g. sedimentation) as well as those from the fire itself. See previous discussions under the Fire Management Program for discussion of those effects. Although the implementation of these S&Gs will have short-term effects from using prescribed fire, there will be a long-term beneficial effect in the reduced risk of catastrophic wildfire.

CRITICAL HABITAT EFFECTS ANALYSIS

Designated CH occurs on lands within the boundaries of the Coconino NF. Therefore, direct and indirect effects on CH and the primary constituent elements will be considered for this NF.

Table 6. Direction from the Coconino NF's LRMP and the 1996 Regional LRMP Amendment for the Spinedace Critical Habitat.

National Forest	Standards and Guidelines Considered
Coconino	312, 313, 315-319, 321-325, 327, 328, 331, 336-339, 341, 343-345, 353-358, 361-367, 369, 372, 375-378, 381-390, 393-395, 398-402, 404, 406-408, 411, 413, 414, 415, 417, 424-426, 428, 430-434, 458-462, 479-481, 483-487, 490-511, 513, 515-519, 545, 547, 548, 551, 552, 561-567, 570-576
1996 Regional LRMP Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1448, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1479, 1486-1492, 1495, 1499-1501, 1504-1515

Engineering Program

The Engineering Program on the NFs with designated spikedeace CH manages roads, facilities, and structures. Degradation and destruction of spikedeace CH may take place directly or indirectly as the result of road, facility, or structure construction or maintenance. In general, S&Gs do not exist in the LRMPs for facility or structure construction or maintenance. The lack of guidance for facility and structure maintenance to prevent effects to the spikedeace CH may best be addressed at the project-level of analysis due to the varying nature of such projects. Region-wide, the administration of the variety of roads on USFS lands has the most direct link between management activities and species effects. Although some NFs lack S&Gs directly related to the Engineering Program, S&Gs do exist for other programs (e.g., Watershed) that are directly related to activities administered by the Engineering Program, primarily roads.

Within the Coconino NF LRMP, S&Gs 400 and 402 provide direction to the Engineering Program to close or obliterate roads no longer "needed for industry, public, and/or administrative use" and to seasonally close roads to protect soils and resources. In addition, S&Gs 404 and 408 guide the Forest to: maintain road densities below 1.24 km/km² (2 mi/mi²); maintain fuelwood access roads to the lowest standard to minimize resource impacts, ground disturbance, provide user safety; and locate new roads out of riparian areas. S&G 404 sets a standard for road densities that is below the accepted level for impacts to aquatic systems (< 0.62 km/km² or 1 mi/mi²). This reduces the potential adverse effects that can be realized by obliterating roads. Additionally, S&G 406 guides the Forest to manage roads to minimize resource and soil impacts. Although guidance is predominantly positive, S&G 408 allows existing roads in wet meadows to be reconstructed and maintained in accordance with Best Management Practices which seek only to minimize the impacts. S&G 402 is primarily positive in that it restricts the use of roads during critical times in which damage to soils may occur. Overall, the Coconino LRMP seeks to minimize impacts associated with the Engineering Program. A significant amount of direction is contained within the LRMP for avoiding effects to CH from roads; however, some short-term adverse effects may be realized during project implementation.

Fire Management Program

Fire management may potentially result in beneficial effects to the spikedace CH in the long-term. However, the use of fire, as well as fire suppression activities, may result in direct and indirect effects to spikedace CH and its primary constituent elements in the short-term.

The Coconino NF LRMP contains three Forest-wide S&Gs for the Fire Management Program that may affect spikedace CH. S&G 413 guides the NF to suppress fires that threaten habitat for threatened and endangered species and S&G 411 guides the Forest to plan fuel treatments such that the least impact to the site is realized. This may result in a minimization of effects to CH. S&G 414 guides the Forest to limit fuel treatments to areas where fire may be a threat to life, property, adjacent to old-growth, or specifically identified high resource values. This may be interpreted to include areas identified as threatened or endangered species habitat such as that for the spikedace. General Forest-wide guidance should minimize or eliminate the adverse effects to spikedace CH within the Fire Management Program. However, there may be some short-term adverse effects during project implementation under the guidance of the LRMP. While this may be beneficial in stabilizing primary constituent elements for spikedace CH in the long-term, short-term effects to the spikedace CH could result from this guidance.

Forestry and Forest Health Program

The Coconino NF LRMP restricts the amount of damage that could occur in riparian areas, seeks to manage timber resources on a sustainable level, and seeks to protect watersheds. Direct effects and most indirect effects to spikedace CH may be avoided by implementation of the guidance provided in the S&Gs.

Lands and Minerals Program

The Coconino NF LRMP S&Gs 380 and 381 allow for the utilization of mineral resources but provide guidance to limit impacts through operating plans, permits, withdrawals, retentions, revocations, and modifications. S&G 382 guides the Forest to avoid adverse effects to riparian-dependent resources, channel morphology, and stream bank stability during exploration and suggests planning to repair damage if needed. Although there are several S&Gs working together throughout the Coconino LRMP that may effectively limit the amount of effects to CH resulting from surface occupancy, right-of-way corridors, and access roads to private property, S&G 398 guides the Forest consider the "public interest and Forest needs." It is not clear how listed species or CH plays into this language. S&G 505 allows mineral material excavation in riparian zones after environmental analysis with the stipulation that activities will maintain or improve the riparian condition. In general, special uses in riparian areas are generally not allowed unless unavoidable. If it is unavoidable, S&G 506 guides the Forest to design the project to minimize the extent and the degree of the effects to CH. S&G 507 directs the Forest to make searching for and acquisition of riparian areas through land exchange a high priority. In addition, S&Gs 532 and 533, and in MA17 direct the Forest to withdraw all Research Natural Areas and other special areas from locatable mineral entry or prohibit special use authorizations that could adversely affect or change the character of the areas. Although some of the S&Gs with the Coconino LRMP minimize some of the effects of this program on spikedace CH, they do not eliminate all of the potential for adverse effects.

Rangeland Management Program

The Coconino NF LRMP provides direction for maximizing livestock grazing potential, providing wildlife habitat, and ensuring watershed condition. It is aimed at achieving a watershed condition that is in satisfactory condition or better. The LRMP also provides guidance to the Forest to protect wildlife habitat and provide watershed protection and riparian/sensitive area protection, while offering sufficient recreational opportunities. Wildlife habitat management is directed toward Management Indicator Species and game species not T&E species. There is the potential that indirect effects to T&E species may be realized during implementation of these S&Gs. Therefore, adverse effects to spokedace CH are likely to occur during the implementation of S&Gs related to the Rangeland Management Program on the Coconino NF.

Recreation, Heritage, and Wilderness Program

Standards & Guidelines 312-319 within the Coconino NF LRMP guide the Forest to manage program activities in a way that would avoid damage to resources, and if damage occurs, it directs the Forest to repair it. In general most of the S&Gs direct the protection for resources; however, S&G 317 recognizes past damage to soils and allows the continued use of a road as an OHV trail. This may allow unlimited recreational OHV trails to exist, but the S&G also advises considerations to wildlife habitat. Protection for aquatic organisms on the Coconino exists in the possibility for the NF to pursue instream flow rights for recreation (S&G 311). Although this S&G is tailored to recreational use, positive effects to the spokedace CH may result. The individual MAs seek different levels of recreation use. Higher levels of recreational use may adversely affect spokedace CH due to overuse resulting in habitat destruction.

Watershed Program

The Watershed Programs for all of the NFs seek to maintain or improve watershed conditions and maintain good water quality. It is cross-program in orientation in that it seeks to mitigate impacts from other program activities. The guidance for the Watershed Program should be used to minimize effects from other programs with inadequate guidance to minimize adverse effects to the spokedace CH.

The Coconino LRMP guides the Watershed Program to: maintain or improve watershed condition (S&G 364, 366, 375); prevent surface or ground water contamination by chemical agents (S&G 369); maintain or improve water quality, quantity, and soil productivity (S&G 376); implement emergency fire rehabilitation measures to prevent watershed damage (S&G 377); obliterate roads causing watershed damage (S&G 378); comply with federal and state water quality protection laws (S&G 353); reduce non-point source pollution (S&G 354); provide filter strips along riparian areas for protection (S&G 356, 357, 504); protect streams from the effects of timber harvest (S&G 358); locate new roads and relocate existing roads out of stream bottoms and swales (S&G 361); provide adequate road drainage and install structures to prevent sedimentation in stream channels (S&G 362, 365); maintain 80% of riparian crown cover (S&G 363); ensure that structures are designed to accommodate 100-year flood events (S&G 368); monitor water quality to ensure compliance with standards (S&Gs 370, 371); take action to legally protect NF uses of needed waters (S&G 372); acquire water rights for instream flows (S&G 373, 374); leave existing woody debris in stream channels (S&G 359); and protect wetlands (S&G 367). The guidance for the Watershed Program on the Coconino NF is overwhelmingly positive with the exception of allowances for removing partial riparian crown

cover vegetation and the retention of 80% bank stability. Nonetheless, the guidance may assist in minimizing or avoiding effects by the Watershed Program, as well as other programs, to spikedace CH.

Wildlife, Fish, and Rare Plants Program

The intent of LRMPs and S&Gs applicable to the Wildlife, Fish, and Rare Plants Program is to maintain or improve conditions for wildlife habitat Region-wide. The implementation of S&Gs for this program is often cross-program in nature, therefore, some S&Gs seek to restrict or encourage activities in other programs in consideration of wildlife, fish, or rare plants. Other S&Gs allow water diversions (e.g., S&G 475), facilitate the introduction of predators (S&Gs 498, and 885), or allow the use of chemical substances (S&G 698).

There are many S&Gs within the Coconino NF LRMP that direct the Forest to conserve and recover species and their habitats. S&G guidance suggests: following approved Recovery Plans (S&G 321); preparing recovery schedules (S&Gs 322 and 324); evaluating potential Resource Program impacts and providing appropriate protection or enhancement (S&Gs 325 and 327). In addition, other S&Gs direct the Forest to: utilize improvements to achieve conservation and recovery (S&G 329); protect all riparian areas (S&Gs 323, 475, 489, 490, 491, 492, 494, 495, 496, 497); secure instream flows to protect ecosystems, fish, and wildlife (S&G 493); and collaborate with other agencies to accomplish the above (S&G 331). There is one S&G that may conflict with protection of spikedace CH. S&G 498 in MA12, which refers to areas of open water, guides the NF to "manage lakes and streams to improve fisheries habitat." This S&G does not specify whether the improvements are for native or non-native species or whether this includes only game species or all species. Nonetheless, some fish are considered predators. The assumption is made that this standard can apply to non-native and native species of game fish. This could be a threat to the primary constituent elements for spikedace CH that requires habitat devoid of non-native aquatic species.

1996 Regional LRMP Amendment

Although the 1996 Regional LRMP Amendment focuses on effects to the MSO, there are some S&Gs that may contribute to the protection of imperiled species and their habitats. The amendment addressed several activities in various Resource Programs. One S&G provides guidance for the Engineering Program and the Recreation, Heritage, and Wilderness Program. S&G 1437 suggests avoidance of roads or trails in MSO PACs. This restricts the location of road and trail placement that could have varying effects to the spikedace CH depending on location specifics. Additional guidance is provided for the Recreation, Heritage, and Wilderness Program in S&G 1438, which allows recreation to continue at the levels that were occurring prior to the listing of the MSO. Site-specific effects may continue to occur as a result of maintaining those levels of recreation, particularly in riparian areas. S&Gs within the Fire Management Program provide guidance for treating fuel accumulations to abate fire risk and protect areas important to MSO and northern goshawk (S&G 1445, 1454, 1455, 1468, and 1508). The management of fuels should result in decreased threats or indirect effects to the spikedace CH. The Forestry and Forest Health Program has S&Gs that provide guidance primarily targeting timberland in areas that may affect the MSO and the northern goshawk. This guidance may result in only minor influences on indirect effects to spikedace CH or may result in neutral

or no effect. Guidance provided for riparian areas has a greater influence on effects to spikedace CH. Standard & Guideline 1473 emphasizes maintenance and restoration of healthy riparian ecosystems. This S&G should have beneficial effects to the spikedace.

With regard to Rangeland Management, S&Gs 1448, 1474, 1477, 1479, 1489, and 1510 have significant influence on activities that may affect spikedace CH. The S&Gs provide guidance for managing range in good to excellent condition (S&G 1474), emphasizing maintenance and restoration of riparian habitats (S&G 1477, 1479, 1490), and maintaining satisfactory soil conditions, hydrologic function, and nutrient cycles. S&G 1489 directs allowable forage use by grazing ungulates such that range conditions will not impede the conservation and recovery of federally listed species. The implementation of S&Gs contained within the amendment should result in some minimization of potential adverse effects by Fire Management, Rangeland Management and Forestry activities on spikedace CH.

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 ESA.

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 improper 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, residential, or commercial use of the non-federal lands near the riparian areas would likely result in 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.

CONCLUSION

After reviewing the current status of the spikedace, the environmental baseline for the action area, the effects of the proposed action which include the various conservation measures voluntarily brought forward by the USFS, and the cumulative effects, it is the FWS's biological opinion that the proposed action will not jeopardize the continued existence of the spikedace nor destroy or adversely modify proposed CH. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or

indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of CH in 50 CFR 402.02 because of various court cases surrounding the Service’s jeopardy and adverse modification analyses. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to CH. CH is defined in section 3 of the Act “as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.” We have also relied upon the Consultation Handbook which provides guidance on determining adverse modification of CH and jeopardy pursuant to the following: “Adverse effects on individuals of a species or constituent elements or segments of CH generally do not result in jeopardy or adverse modification determinations unless that loss, when added to the environmental baseline, is likely to result in significant adverse effects throughout the species’ range, or appreciably diminish the capability of the CH to satisfy essential requirements of the species” (FWS and National Marine Fisheries Service 1998:4-34).

The FWS anticipates adverse effects to the spokedace from the implementation of the Coconino NF LRMP, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species for the following reasons:

- Several S&Gs within this NF LRMP support conservation and recovery of spokedace. These S&Gs guide the Forests to implement recovery plans, improve habitat for threatened and endangered species by structural and nonstructural means, and to delist threatened and endangered species.
- Verde Comprehensive River Management Plan S&G.

In addition, the USFS will implement (i.e., as part of the proposed action) several additional conservation measures specifically for the spokedace. These conservation measures include the following:

- Designing projects in occupied spokedace habitat on NFS lands that address the appropriate components of the spokedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to spokedace.
- Cooperating with state conservation agencies, other federal agencies, USFS research stations, FWS, and others (universities) to assess and prioritize habitat of stream and river segments for potential spokedace reintroduction. In addition, determine necessary habitat and watershed improvements in occupied watersheds and watersheds identified as high priority reintroduction sites and implement projects needed to contribute to recovery.
- Participating in ongoing efforts initiated in 2003 involving state agencies, other federal agencies, universities/colleges, USFS research facilities, and FWS to document the current state of knowledge regarding the spokedace. Further, develop a conservation

assessment and strategy for the spikedace with a target completion of this effort within 1.5 years.

- Identifying existing populations in imminent need of protection and develop and implement, to the extent possible, a strategy for protecting the population and reducing threats to the population.
- With state conservation agencies and other researchers (e.g., academia and USFS), who are currently monitoring spikedace populations, participating in the development of a consistent monitoring methodology for spikedace, their associated habitat, and co-occurring aquatic species. The USFS will cooperatively document the results in an annual report to the FWS.
- The USFS will assist the FWS, AGFD, and the NMDGF with any spikedace reintroduction effort to the extent feasible within the mission and capabilities.
- The USFS will, within the mission and capabilities, assist the FWS, other federal agencies, state agencies, universities/colleges, and others in the continuation of a captive spikedace propagation program designed to augment wild populations.

The USFS has also agreed to implement the following conservation measures with regards to wildland fire use:

- Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in Geographical Information System (GIS) layers on each NF in the Southwestern Region and provide them to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition, as well as surrounding watersheds.
- Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as delay, direct check, and/or suppress.
- A USFS biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, implement spawning season restrictions to protect breeding activities, establish appropriate buffers to filter ash and sediment, avoid mechanical and chemical measures within the riparian corridor, etc.
- During development and implementation of operational management plans, identify potential threats to listed species and designated CH and develop mitigation actions to eliminate threats.
- Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities/colleges, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

The USFS has committed to the implementation of these conservation measures. Therefore, implementation of these conservation measures along with the management direction provided by the beneficial S&Gs within the NF LRMPs should not result in a further decline in population numbers or habitat conditions of spikedace on NFS lands in the southwest. Habitat for the spikedace is expected to improve. Specifically, the conservation measures direct actions at eliminating threats and augmenting populations. These efforts, in combination with actions already ongoing for the conservation benefit of the species, will provide sufficient protection for

the spikedace. Therefore, we conclude that the continued implementation of the Coconino NF's LRMP is not likely to jeopardize the continued existence of the spikedace.

After reviewing the current status of the spikedace CH, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our opinion that the proposed action is not likely to destroy or adversely modify CH.

Effects to the spikedace from the Coconino NF LRMP and the 1996 Regional Amendment were analyzed. We found that potential adverse effects from the implementation of this LRMP and associated S&Gs were likely to occur. In addition, short-term adverse effects were identified for activities associated with S&Gs that have a long-term benefit to the species. However, the FWS does not believe the impacts of the proposed action will result in the alteration of the abilities of the PCEs to function properly. The FWS bases this conclusion on the following reasons:

- There are several S&Gs within the Coconino NF LRMP that support conservation and recovery of spikedace. The 1996 Regional LRMP Amendment essentially reduces the effects caused by the Forestry and Forest Health and Rangeland Management Programs for all NFs.
- Standard and Guideline 321 within the Coconino LRMP states that management of sensitive species will take precedence over other species except threatened and endangered species.
- The USFS has taken proactive measures in an attempt to reduce the decline of the spikedace. For example, the USFS and FWS jointly developed a set of Conservation Measures for the spikedace which became part of the proposed action under the 2004/2005 consultation. According to the October 2008, Final Annual Report, the Forests have implemented those conservation measures into their project designs as appropriate.
- The Southwestern Region of the USFS, in implementation of one of the RPMs described in the 2005 BO, has hosted the Spikedace Conservation Coordination Meetings to identify priority sites for reintroducing spikedace. During these meetings, the team has identified existing populations of spikedace in imminent need of protection due to natural occurrences, as well as management activities. Since then, the USFS has developed and implemented a strategy for protecting and reducing threats to the populations.
- The USFS has been involved with others in discussions on the development of a captive spikedace propagation program designed to augment wild populations. The Bureau of Reclamation is funding the establishment of a captive facility for spikedace and loach minnow at the Bubbling Springs Hatchery operated by the AGFD. Applicable Forests have cooperated with others to provide access to wild populations to serve as sources for the captive stock.
- In compliance with an RPM described in the 2005 BO, the USFS agreed to maintain current distributions of spikedace in Geographical Information System (GIS) layers on

each NF in the Southwestern Region and provide them to the Line Officer, Fire Management staff and/or incident commander. In addition, they have identified watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. This information is used to guide fire use mitigation measures such as delay, direct check, and/or suppress.

After reviewing the current status of loach minnow CH, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our opinion that the continued implementation of the LRMP will not destroy or adversely modify CH for loach minnow. The LRMPs contain guidance that seeks to minimize the magnitude of the effects; however, there is still a potential to implement the LRMPs while causing adverse effects to CH. Although the Service anticipates some adverse effects to loach minnow CH from the implementation of the Coconino NF's LRMP, as well as the 1996 Regional Amendment, we do not believe the impacts of the proposed action will result in adverse modification to loach minnow CH.

The PCEs for loach minnow include habitat to support all life stages of the fish, including perennial flows, appropriate stream habitats and microhabitats, low levels of pollutants, an appropriate prey base, no or low levels of nonnative aquatic species, and a natural, unregulated flow regime that allows for periodic flooding (77 FR 10810). The various USFS programs may include activities such as road development or eradication, vegetation removal, and grazing which could impact these PCEs by removing vegetation, disturbing soils, or other activities. Consultation on site-specific projects under these programs will be conducted to more adequately address specific impacts to the PCEs.

It is possible that spinedace still persist in areas thought to be extirpated and may occur in localities yet to be discovered. Proactive efforts by the USFS in the past and the continued monitoring of those areas contribute positively to the overall status of the spinedace and its CH. Activities such as closing roads, removal of non-native fish, establishing a captive breeding program, and the exclusion of cattle from riparian areas continue to contribute toward the improvement of loach minnow habitat. In addition, there are activities being conducted by other land management agencies to enhance habitat for the spinedace that benefit its CH rangewide. All of these actions, together with the implementation of the beneficial S&Gs outlined above, should continue to improve habitat conditions on NFS lands in the Southwest. For these reasons, as well as the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, CH for the spinedace will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify proposed CH for the spinedace.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA 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 by the Service 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 by the Service 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 ESA 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 USFS so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered by this incidental take statement. If the USFS (1) fails to assume and implement the terms and conditions; or (2) fails to require adherence by a permittee to the terms and conditions of the incidental take statement through enforceable terms that are included in the permit or grand document issued by the USFS, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USFS 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 section 402.14(i)(3)]

Amount or Extent of Take Anticipated

Given the limited information available at this time, the FWS is unable to conclude that incidental take of spikedace is reasonably certain to occur within the Coconino NF during the lifetime of the proposed action. We find this for the following reasons: the most significant factor is the very small population size and elusive nature of the species which inhibits the effectiveness (and/or confidence) of spikedace presence/absence survey techniques. Secondly, if the species is present but not detected, uncertainties on their location and abundance precludes our ability to estimate the method, timing, or location of adverse effects incurred either directly or indirectly from the proposed action. Also, spikedace occur in low numbers in the Verde River, and are not yet considered as an established population in Fossil Creek.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA 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 CH, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Design and implement projects on NFS lands and within the range of spikedace consistent with the recovery plan. That is, the focus shall be on projects designed specifically for spikedace recovery and not on incidental take minimization within other projects

2. Manage streams to create additional habitat for spikedace.
3. Cooperate with state conservation agencies, FWS, and universities to determine range of natural variation in absolute abundance and age-class structure pursuant to Recovery Task 2.4.
4. In cooperation with FWS, state conservation agencies, and universities, conduct field studies and in-stream experiments to qualitatively and quantitatively describe indirect interactions among spikedace and non-native fishes.
5. Work to secure funding for studies and habitat improvement projects.

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

CHIRICAHUA LEOPARD FROG

STATUS OF THE SPECIES

The Chiricahua leopard frog (*Lithobates [=Rana] chiricahuensis*) was listed as a threatened species without CH in a Federal Register notice dated June 13, 2002. Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. CH was proposed in 2011 (FWS 2011a, 2011b) and includes 43 CHUs in Arizona and New Mexico. The Chiricahua Leopard Frog Final Recovery Plan (Recovery Plan) was finalized in April 2007 (FWS 2007).

The frog is distinguished from other members of the *Lithobates pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Platz and Mecham 1979, Davidson 1996). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Platz and Mecham 1979, Stebbins 2003). The Ramsey Canyon leopard frog (*Lithobates "subaquavocalis"*), found on the eastern slopes of the Huachuca Mountains, Cochise County, Arizona, has recently been subsumed into *Lithobates chiricahuensis* (Crother 2008) and recognized by the FWS as part of the listed entity (FWS 2009).

The range of the Chiricahua leopard frog includes central and southeastern Arizona; west-central and southwestern New Mexico; and, in Mexico, northeastern Sonora, the Sierra Madre Occidental of northwestern and west-central Chihuahua, and possibly as far south as northern Durango (Platz and Mecham 1984, Degenhardt et al. 1996, Lemos-Espinal and Smith 2007, Rorabaugh 2008) (Figure 2). Reports of the species from the State of Aguascalientes (Diaz and

Diaz 1997) are questionable. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali*) in the southern part of the range of the Chiricahua leopard frog (see further discussion below).

The Chiricahua leopard frog is an inhabitant of montane and river valley cienegas, springs, pools, cattle (stock) tanks, lakes, reservoirs, streams, and rivers. The species requires permanent or semi-permanent pools for breeding and water characterized by low levels of contaminants and moderate pH, and may be excluded or exhibit periodic die-offs where *Batrachochytrium dendrobatidis* (*Bd*), a pathogenic chytridiomycete fungus, is present (see further discussion of this in the threats section below and in FWS 2011). The diet of the Chiricahua leopard frog includes primarily invertebrates such as beetles, true bugs, and flies, but fish and snails are also eaten (Christman and Cummer 2006).

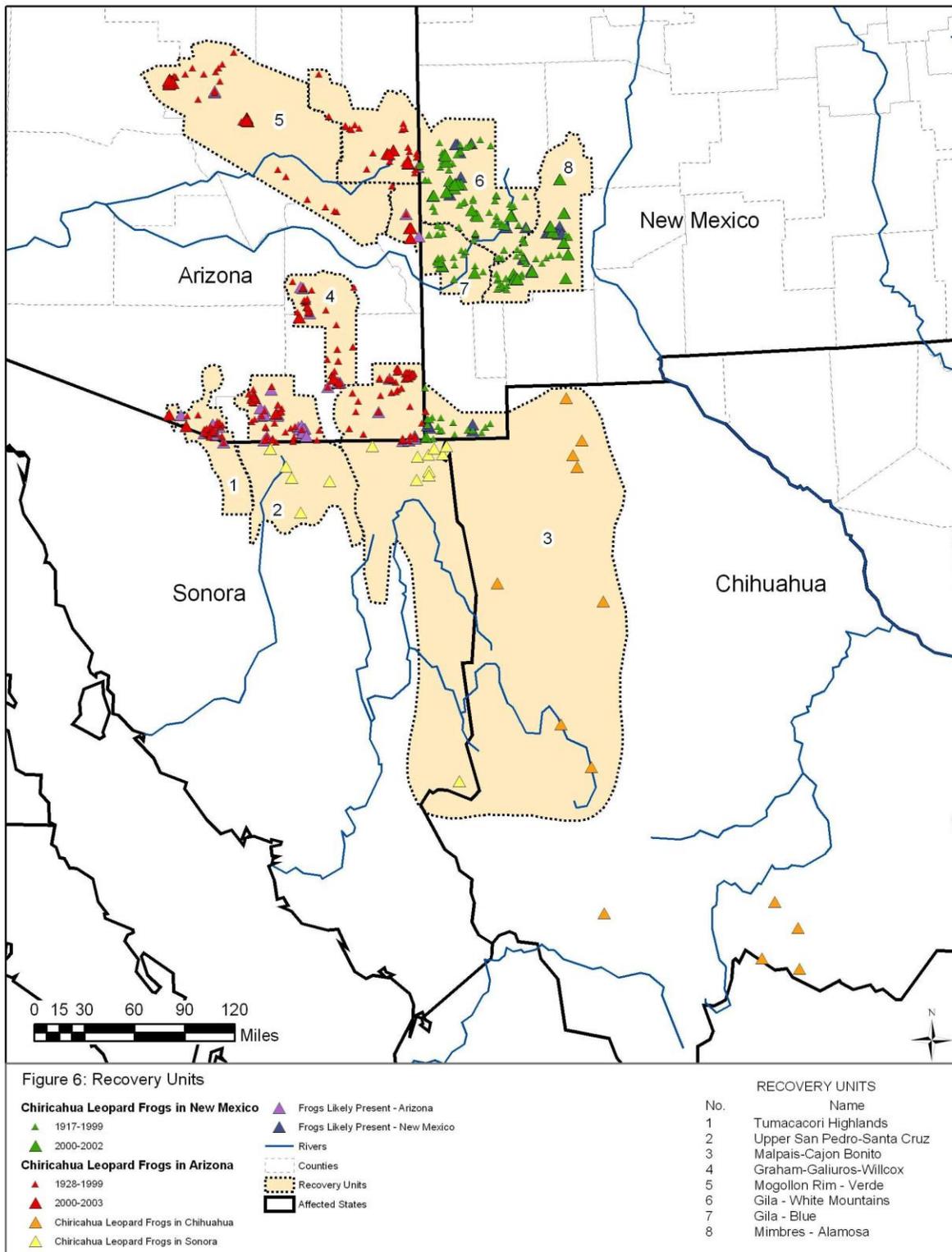


Figure 2. Map of the known range of the Chiricahua leopard frog as of 2007. The map covers areas in Arizona, New Mexico, and Mexico. All eight recovery units (RUs) are delineated by number.

Prior to the invasion of perennial waters by predatory, non-native species (American bullfrog, crayfish, fish species), the frog was historically found in a variety of aquatic habitat types. Today, leopard frogs in the Southwest are so strongly impacted by harmful nonnative species, which are most prevalent in perennial waters, that their occupied niche is increasingly restricted to the uncommon environments that do not contain these nonnative predators, and these now tend to be ephemeral and unpredictable. This increasingly narrow realized niche is a primary reason for the threatened status of the Chiricahua leopard frog.

The life history of the Chiricahua leopard frog can be characterized as a complex life cycle, consisting of eggs and larvae that are entirely aquatic and adults that are primarily aquatic, making the species a habitat specialist (FWS 2007). The species has a distinctive call and males can be temporarily territorial (FWS 2007). Amplexus is axillary and the male fertilizes the eggs as the female attaches a spherical mass to submerged vegetation. Eggs are laid from February into October, with most masses found in the warmer months (FWS 2007). Numbers of eggs in a mass range from 300 to 1,485 (Jennings and Scott 1991) and may be correlated with female body size. The hatching time of egg masses in the wild ranges between 8-14 days, depending on water temperature (FWS 2007). Upon hatching, tadpoles are mainly herbivorous and remain in the water, where they feed and grow, with growth rates faster in warmer conditions. Tadpoles have a long larval period, from three to nine months, and may overwinter. After metamorphosis, Chiricahua leopard frogs eat an array of invertebrates and small vertebrates and are generally inactive between November and February (FWS 2007). Males reach sexual maturity at 2.1-2.2 in (5.3-5.6 cm), a size they can attain in less than a year (Sredl and Jennings 2005). Under ideal conditions, Chiricahua leopard frogs may live as long as 10 years in the wild (Platz et al. 1997, p. 553).

Chiricahua leopard frogs can be found active both day and night, but adults tend to be active more at night than juveniles (Sredl and Jennings 2005). Chiricahua leopard frogs presumably experience very high mortality (greater than 90 percent) in the egg and early tadpole stages, high mortality when the tadpole turns into a juvenile frog, and then relatively low mortality when the frogs are adults (Zug et al. 2001, FWS 2007). Adult and juvenile Chiricahua leopard frogs avoid predation by hopping to water (Frost and Bagnara 1977). They also possess an unusual ability among members of the *Rana pipiens* complex; they can also darken their ventral skin under conditions of low reflectance and low temperature (Fernandez and Bagnara 1991; Fernandez and Bagnara 1993), a trait believed to enhance camouflage and escape predation (FWS 2007).

Males have larger home range sizes than females, with the largest home range for a male documented at 251,769 ft² (7,674 by 32 ft, or 23,390.2 m² [2,339 by 9.8 m]) (FWS 2007). The maximum distance moved by a radio-telemetered Chiricahua leopard frog in New Mexico was 2.2 miles (3.5 km) in one direction (preliminary findings of telemetry study by R. Jennings and C. Painter, Technical Subgroup, 2004). In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (*Lithobates blairi*) leopard frogs for five miles or more along West 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 stock tank located 3.4 miles away. Although amphibians are known to have limited dispersal and colonization abilities due to physiological constraints, limited movements,

and high site fidelity (Blaustein et al. 1994), Chiricahua leopard frogs can disperse to avoid competition, predation, or unfavorable conditions (Stebbins and Cohen 1995). Dispersal most likely occurs within favorable habitat, making the maintenance of corridors that connect disjunct populations possibly critical to preserve populations of frogs. Active or passive dispersal (while carried along stream courses) of juveniles or adults to discrete aquatic habitats facilitates the creation and maintenance of metapopulations (FWS 2007), an important option for a water-dependent frog in an unpredictable environment like the arid Southwest.

For far more detailed information on this species, please refer to the Recovery Plan (FWS 2007), which is the baseline in regard to the current status, biology, and threats to the Chiricahua leopard frog.

Population Status in Arizona, New Mexico, and Mexico

Evidence indicates that since the time of listing, the species has probably made at least modest population gains in Arizona, but is apparently declining in New Mexico. Overall in the U.S., the status of the Chiricahua leopard frog is either static or, more likely, improving, with much of the increase attributable to an aggressive recovery program that is showing considerable results on the ground through the reestablishment of populations (mainly in Arizona), captive rearing programs, creation of refugial populations, and enhancement and development of habitat have helped stabilize or improve the status of the species in some areas (FWS 2011). In Arizona and New Mexico, there are currently two main captive breeding facilities – the Phoenix Zoo and the Ladder Ranch. In Arizona, a captive breeding program was established with the Phoenix Zoo in 2005 and the Ladder Ranch (a private 155,553 acre ranch in Sierra County, New Mexico) began captive propagation-headstarting-release in 2011. These programs, in concert with habitat restoration activities occurring across both states, are contributing to range-wide recovery of the frog. Population status and trends in Mexico are unknown.

Arizona

In Arizona, the frog still occurs in seven of eight major drainages of historical occurrence (Salt, Verde, Coronado, San Pedro, Santa Cruz, Yaqui/Bavispe, and Magdalena river drainages), but appears to be extirpated from the Little Colorado River drainage on the northern edge of the species' range. Within the drainages where the species occurs, it was not found recently in some major tributaries and/or in river mainstems. For instance, the species has not been reported since 1995 from the following drainages or river mainstems where it historically occurred: White River, West Clear Creek, Tonto Creek, Verde River mainstem, 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 areas: Pinaleno Mountains, Peloncillo Mountains, and Sulphur Springs Valley. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. Large valley bottom cienega complexes may have once supported the largest populations in southeastern Arizona, but non-native predators are now so abundant that the cienegas do not presently support the frog in viable numbers (FWS 2002).

A review of the status of the species in Arizona from 2002, when the species was listed, to 2009

was conducted by Rorabaugh (2010). A comparison of survey results during 2005-2009 versus 1999-2002 revealed increasing numbers of sites occupied by Chiricahua leopard frogs from 2002-2008. The total number of occupied sites increased from 49 in 2002 to 80 in 2008 and 90 in 2009, while the number of robust breeding populations increased from 5 in 2002 to 13 in 2008, and then declined slightly to 11 in 2009. The total number of breeding populations increased from 26 in 2002 to 34 in 2008 and then declined by 1 for a total of 33 sites in 2009. These trends were also generally reflected at the Recovery Unit (RU) level of analysis. Exceptions included a reduction in number of breeding populations in RU 3 from three to two and in RU 6 from three to zero. Recovery Unit 5 also exhibited a reduction in the number of robust breeding populations from two to zero. Overall, the data suggest that there has been an increase in the number of occupied sites from 2002-2009. However, the increase in sites may only represent a positive response to temporarily favorable environmental conditions (i.e., such as adequate summer rains in rare years that allow for limited dispersal, rather than an intrinsic improvement that will endure over time due to factors such as long-term drought) and/or it could be a result of our underestimating the number of sites in 2002 due to lack of surveys in areas the frog actually occurred in at that time.

The above data suggest substantial gains in the number of known locations of Chiricahua leopard frogs since the time of listing. However, basing status and trends on differences in numbers of occupied sites from 2002-2009 can be problematic for several reasons. First, if increasing trends are accurate, they may represent population response to temporarily favorable environmental conditions, such as adequate summer rains that allow dispersal, rather than an intrinsic improvement that will endure over time. Second, there are sources of bias that affect the conclusions. For instance, both data sets likely underestimate the number of occupied sites existing at the time, because some sites were unknown or surveys had not been conducted within the last three years to categorize all sites as occupied or unoccupied. But there is further bias in the survey data in that the 2009 data set benefits from recent discoveries of populations that could have existed in 2002, but we did not know of them at the time.

The latter type of bias can be eliminated by adding to the 2002 total all of the occupied sites that were discovered after 2002, except for those for which we are reasonably certain were unoccupied in 2002. If analyzed in this way, the total number of occupied sites, in 2002, increases from 49 to 83. This is roughly the same number of occupied sites as in 2008 (85). Based on this, the total number of occupied sites was fairly stable or increasing slightly in Arizona from 2002 (83) to 2008 (85) and 2009 (92). However, this correction inserts yet another type of bias into the sample – analyzed in this way, the 2002 total is based not only on what was found during 1999 to 2002, but also surveys during period 2003 to 2009. Yet the 2008 and 2009 totals are only based on surveys during 2005-2008 and 2006-2009 respectively. The number of occupied sites in 2009 would no doubt increase if we could add in new sites during the equivalent future period (through 2016). Though we cannot provide an exact number of expected new sites that may be established by 2016, each RU stakeholder group has identified locations for potential new sites, so we potentially could work towards establishing four to eight new sites per year (though not all of these sites are guaranteed to be successful).

As a result, concluding there were 83 extant sites in 2002, 85 in 2008, and 92 in 2009, is likely the worst case scenario, in that this analysis is most likely to show any declines, if they occurred

from 2002-2009. The actual trend is probably somewhere between that (roughly stable) to what was concluded in the previous analysis (substantial increases). In conclusion, there is no evidence of decline in Arizona; rather, the data suggest at least modest increases.

New Mexico

In New Mexico, the frog historically occurs in west-central and southwestern New Mexico in Catron, Grant, Hidalgo, Luna, Socorro, and Sierra Counties and has been collected or observed at 182 localities over time (Painter 2000). In 1995, Jennings reported that frogs still occurred at only eleven sites in New Mexico. Based on additional work, Painter (2000) listed forty-one localities at which frogs were found from 1994-1999. Thirty-three of these are north of Interstate 10 and eight are in the southwestern corner of the state. Thirty-one of the 41 populations were verified extant during 1998-1999 (Painter 2000). However, during May-August 2000, the frog was found at only eight of 34 sites (FWS 2002). Three populations east of Hurley in Grant County declined or were extirpated during 1999 to 2000, and preliminary data indicate another population on the Mimbres River, also in Grant County, has experienced a significant die-off (FWS 2002). Survey results from the 2004 field season indicate that there are 31 locations where the frog can be considered as likely to occur in New Mexico (R. Williams, FWS, 2004, unpubl. data; R. Jennings, Western New Mexico University, 2005, unpubl. data).

A similar analysis as was done for Arizona populations (see above) was not possible in New Mexico because all sites have not been monitored annually and much of the reported survey information is reported as presence or absence. Due to the evolving nature of Chiricahua leopard frog monitoring since the early 1990s and the ability of frogs to move up to 5 miles (8 km), survey information has resulted in different definitions of “sites” and “populations” over time. Often site boundaries are indistinct making some connected areas a single site, and other connected areas several sites. Thus it is difficult to assess the frog’s status by enumerating sites and often comparisons among sites are not equivalent. However, based upon the data available, we can conclude that the frog has continued to decline annually in New Mexico since listing.

As background, the final rule listing the species indicated the frog had been found at 41 sites from 1994-1999, and 31 of these 41 sites were verified as extant during 1998-1999. The rule explains that frogs were found at only 8 of 34 surveyed sites (of the original 41 sites) in 2000. The Recovery Plan indicated that 30-35 populations of Chiricahua leopard frogs were likely extant in New Mexico at the time of writing (2006-7). The tally of these 30-35 populations included dispersal sites, which indicates that not all of these populations were robust, breeding sites. Starting with the 41 sites from 1994-1999, 27 of those sites are now extirpated, four of them are considered unstable with low population numbers or are possibly extirpated, two are considered dispersal observations with no reproduction, one has an unknown status due to inaccessibility, and seven sites support reproduction and no significant die-off or population loss has been observed.

Based on the above data, collected from 2002 to 2010, 27 of the 41 sites are considered extirpated, representing a 66 percent drop in the known Chiricahua leopard frog sites in New Mexico during this 5-year period (FWS 2011). Since listing in 2002, an additional 30 new sites have been identified. To date, of these 30 new sites, 15 have become extirpated, six are unstable

with low population numbers or are possibly extirpated, four are considered dispersal observations with no reproduction, one site is on private property with an unknown population status, and at four sites reproduction is occurring and no significant die-off or population loss has been observed. New sites have been found due to increased surveying efforts in remote areas and growing access to private lands through partnership activities. Although undiscovered occupied sites may still exist, the rate and likelihood of finding new sites will diminish, as the area of unsurveyed habitat is reduced each year. Furthermore, while the frog has a large capacity for dispersal, because of the many of the new observations were not near known occupied sites, we assume that most of the new observations were existing locations and not newly colonized locations. Thus in the past eight years, these newer sites have reflected a similar trend of decline, with half of the sites no longer occupied.

Disease, particularly infection caused by Bd, has accounted for the majority of Chiricahua leopard frog declines. This disease seems to present more of a threat the frog in New Mexico than it does in Arizona, perhaps due to the higher elevations and cooler conditions found at sites in New Mexico. However, non-native species (bullfrogs, crayfish, and non-native fish) also continue to significantly impact extant populations and threaten the frog in New Mexico. All remaining frog populations in New Mexico are extremely vulnerable to extirpation from disease, non-native species, small population sizes, habitat drying, and lack of connectivity between other suitable habitats or populations.

In recent years, New Mexico Chiricahua leopard frog partners have gained momentum in conservation actions. In an effort to stave off permanent genetic losses, much of the recovery activities in New Mexico have been focused on creating off-site refugia populations. This entails collecting wild eggs, tadpoles, or metamorphs and bringing them into captivity for rearing and disease testing and treatment if needed, and releasing them into confined steel rim tanks. Currently, the New Mexico Ecological Services Field Office and the Bureau of Land Management have the capacity to rear, hold, and treat animals; the USFS has set up a quarantine holding facility (for first use in Spring 2011); and the Ladder Ranch has outdoor holding pens for adult frogs (for captive reproduction). For the Chiricahua leopard frog in New Mexico, our hope is that not only will the refugia sites serve as a back-up if there is a die-off at the source population, but that with time, they will also serve as a source for additional repatriation efforts. The facilities that are contributing to these efforts will also serve to produce animals for repatriation projects once extant populations have been boosted. As of 2010, we have attempted to establish eight refugia populations.

Mexico: Sonora and Chihuahua

Based on published and unpublished reports and perusal of Sonora, Mexico collection data from 23 museums, the Chiricahua leopard frog is known from about 26 localities in Chihuahua, Mexico and 19 localities in Sonora (Lemos-Espinal and Smith 2007). *Lithobates* [*Rana*] *chiricahuensis* have been reported as far south as the Mexican state of Aguascalientes, but frogs south of central Chihuahua are of questionable identification (FWS 2007). Based on limited surveys, populations of leopard frogs, gartersnakes, and other native aquatic herpetofauna are generally more intact and non-native predators are much less widely distributed in Sonora and at least parts of Chihuahua (Rosen and Melendez 2010, Lemos-Espinal and Smith 2007, Rorabaugh

2008). However, specifically for the Chiricahua leopard frog, data are insufficient to determine status or trends in Mexico. None of the Chiricahua leopard frog localities in Sonora have been revisited recently, with the exception of one in the Sierra Los Ajos. No frogs were found at that site (L. Portillo, pers. comm. 2009). Chiricahua leopard frogs have been observed recently at several sites in Chihuahua (R. Jennings, pers. comm. 2007), but not enough is known to assess status or trends.

Summary of Population Status

In conclusion, the data suggest the status of the Chiricahua leopard frog is at least stable and probably improving in Arizona, declining in New Mexico, and unknown in Mexico. In pooled data for the U.S., a worst case analysis shows essentially no change in the number of occupied sites from 2002 to 2009 (133 versus 131, respectively); however, as discussed above, this likely underestimates the status of the species in Arizona, overestimates the status of the species in New Mexico, and includes data that are not standardized to be truly comparable. The actual situation is probably that the status of the species is stable in the U.S overall, but the different conditions between Arizona and New Mexico indicate that improvement is occurring only in Arizona at this time, while in New Mexico, frog numbers continue to decline. Continued and new aggressive recovery actions are needed to address threats to the species rangewide, to maintain positive trends in Arizona, to stabilize population losses in New Mexico, and to assist partners in Mexico with their conservation efforts. If on-going recovery actions are interrupted, drought worsens, or other threats intensify, the status of the species across its range could easily deteriorate.

Threats

The primary threats to this species are predation by nonnative organisms and die-offs caused by a fungal skin disease – chytridiomycosis. The chytridiomycete skin fungus, (*Bd* is the organism that causes chytridiomycosis) is responsible for global declines of frogs, toads, and salamanders (Berger et al. 1998, Longcore et al. 1999, Speare and Berger 2000, Hale 2001). Additional threats include: drought, floods, degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes, mining, development, and other human activities; disruption of metapopulation dynamics, resulting from an increased chance of extirpation or extinction resulting from small numbers of populations and individuals, and environmental contamination (FWS 2007). 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). Witte et al. (2008) analyzed risk factors associated with disappearances of ranid frogs in Arizona and found that population loss was more common at higher elevations and in areas where other ranid population disappearances occurred. Disappearances were also more likely where introduced crayfish occur, but were less likely in areas close to a source population of frogs.

The goal of the Recovery Plan (FWS 2007) is to improve the status of the species to the point that it no longer needs the protection of the Endangered Species Act. The recovery strategy calls for reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long term; translocation of frogs to establish, reestablish, or augment

populations; building support for the recovery effort through outreach and education; monitoring; conducting research needed to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Recovery actions are recommended in each of eight recovery units throughout the range of the species. Management areas are also identified within recovery units where the potential for successful recovery actions is greatest.

The Recovery Plan identifies eight RUs in Arizona and New Mexico (Figure 2, Table 7). Focus areas, referred to as management areas (MAs), are identified within each RU. Management areas are areas with the greatest potential for successful recovery actions and threat alleviation. Hydrologic units and mountain ranges are used as MA boundaries. Within MAs, sites where metapopulations and robust, isolated populations occur or will be established are referred to herein as “recovery sites.” MAs have been delineated to include all habitats of known extant Chiricahua leopard frog populations as well as other sites with the highest potential for recovery, including sites where habitat restoration or creation, and establishment or re-establishment of Chiricahua leopard frog populations will likely occur or has already occurred. We include all known extant populations within MA boundaries because of the high value of those populations for recovery.

For the Chiricahua leopard frog to be recovered, conservation must occur in each RU (Table 7). Successful conservation is not necessary in every MA and recovery does not depend upon an even distribution of recovery efforts across an RU. Rather, we anticipate that recovery efforts will be focused in those MAs and portions of RUs in which opportunities are best. Recovery criteria to delist the Chiricahua leopard frog includes: 1) at least two metapopulations located in different drainages, plus at least one isolated and robust population in each RU, 2) protection of these populations and metapopulations, 3) connectivity and dispersal habitat protection, and 4) reduction or elimination of threats and long-term protection. As noted in the FWS’s 1998 Consultation Handbook, RUs are population units that have been documented as necessary to both the survival and recovery of the species. Avoiding loss of populations or other serious adverse effects in a RU will ensure continued contribution of that RU to the recovery of the species.

Existing populations and suitable habitat in MAs will be protected through management. Management will include maintaining or improving watershed conditions both upstream and downstream of Chiricahua leopard frog habitats to reduce physical threats to aquatic sites and allow for Chiricahua leopard frog dispersal, reducing or eliminating non-native species, preventing and managing disease, and other actions. Suitable or potentially suitable unoccupied habitat with high potential for supporting Chiricahua leopard frog populations or metapopulations (referred to here as recovery sites) will be protected, and restored or created as needed, within MAs. These habitats will include aquatic breeding habitats and uplands or ephemeral aquatic sites needed for movement among local populations in a metapopulation. Activities to achieve this include habitat management, removal of non-native species (e.g. American bullfrogs, non-native fishes, and crayfish), enhancing water quality conditions, and reducing sedimentation. Populations of Chiricahua leopard frogs will be established or reestablished in these MAs.

Table 7. The eight RUs as identified in the Recovery Plan and the current status of the delisting criteria for the Chiricahua leopard frog in each RU.

Recovery Unit	RU#	Recovery Criteria 1	Recovery Criteria 2	Recovery Criteria 3	Recovery Criteria 4
Tumacacori-Atascosa-Pajarito Mountains, Arizona and Mexico	1	Met	Not met	Not met	Not met
Santa Rita-Huachuca-Ajos Bavispe, Arizona and Mexico	2	Not met	Not met	Not met	Not met
Chiricahua Mountains-Malpai Borderlands-Sierra Madre, Arizona, New Mexico, and Mexico	3	Not met	Not met	Not met	Not met
Pinaleno-Galiuro-Dragoon Mountains, Arizona	4	Not met	Not met	Not met	Not met
Mogollon Rim-Verde River, Arizona	5	Not met	Not met	Not met	Not met
White Mountains-Upper Gila, Arizona and New Mexico	6	Not met	Not met	Not met	Not met
Upper Gila-Blue River, Arizona and New Mexico	7	Not met	Not met	Not met	Not met
Black-Mimbres-Rio Grande, New Mexico	8	Not met	Not met	Not met	Not met

Proposed Critical Habitat

The 2011 proposed CH rule includes 43 CHUs across the range of the species in Arizona and New Mexico (FWS 2011a, 2011b). When CH was proposed, the FWS determined the physical and biological features (PBFs) for Chiricahua leopard frog. The PBFs include those habitat features required for the physiological, behavioral, and ecological needs of the species. These PBFs were later amended and published in the Notice of Availability on September 21, 2011 (U.S. Fish and Wildlife 2011a).

Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, we have proposed that the PBFs essential to the conservation of the Chiricahua leopard frog are:

1. Aquatic breeding habitat and immediately adjacent uplands exhibiting the following characteristics:
 - a. Standing bodies of fresh water (with salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present), including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or rarely dry for more than a month. During periods of drought, or less than average rainfall, these breeding sites may not hold water

- long enough for individuals to complete metamorphosis, but they would still be considered essential breeding habitat in non-drought years.
- b. Emergent and or submerged vegetation, root masses, undercut banks, fractured rock substrates, or some combination thereof, but emergent vegetation does not completely cover the surface of water bodies.
 - c. Nonnative predators (e.g., crayfish (*Orconectes virilis*), American bullfrogs (*Lithobates catesbeiana*), nonnative predatory fishes) absent or occurring at levels that do not preclude presence of the Chiricahua leopard frog.
 - d. Absence of chytridiomycosis, or if present, then environmental, physiological, and genetic conditions are such that allow persistence of Chiricahua leopard frogs.
 - e. Upland areas that provide opportunities for foraging and basking that are immediately adjacent to or surrounding breeding aquatic and riparian habitat.
2. Dispersal and non-breeding habitat, consisting of areas with ephemeral (present for only a short time), intermittent, or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provides corridors (overland movement or along wetted drainages) for frogs among breeding sites in a metapopulation with the following characteristics:
- a. Are not more than 1.0 mile (1.6 kilometers) overland, 3.0 miles (4.8 kilometers) along ephemeral or intermittent drainages, 5.0 miles (8.0 kilometers) along perennial drainages, or some combination thereof not to exceed 5.0 miles (8.0 kilometers).
 - b. In overland and non-wetted corridors, provides some vegetation cover or structural features (e.g., boulders, rocks, organic debris such as downed trees or logs, small mammal burrows, or leaf litter) for shelter, forage, and protection from predators; in wetted corridors, provides some ephemeral, intermittent, or perennial aquatic habitat.
 - c. Are free of barriers that block movement by Chiricahua leopard frogs, including, but not limited to, urban, industrial, or agricultural development; reservoirs that are 50 acres (20 hectares) or more in size and contain predatory nonnative fishes, bullfrogs, or crayfish; highways that do not include frog fencing and culverts; and walls, major dams, or other structures that physically block movement.

With the exception of impoundments, livestock tanks, and other constructed waters, CH does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries.

The purpose of the proposed designation of CH is to conserve the PBFs essential to the conservation of the species through the identification of the appropriate quantity and spatial arrangement of the PBFs sufficient to support the life-history functions of the species. Because not all life-history functions require both PBFs, not all areas proposed as CH contain both PBFs. Each of the areas proposed for CH have been determined to contain sufficient PBFs, or with reasonable effort, PBFs can be restored to provide for one or more of the life-history functions of the Chiricahua leopard frog.

All areas proposed for designation as CH will require some level of management to address the current and future threats to the Chiricahua leopard frog and to maintain or restore the PBFs. Special management in aquatic breeding sites will be needed to ensure that these sites provide water quantity, quality, and permanence or near permanence; cover; and absence of extraordinary predation and disease that can affect population persistence. In dispersal habitat, special management will be needed to ensure frogs can move through those sites with reasonable success.

Approximately 29 percent of all proposed CH for the Chiricahua leopard frog is located on five NFs in Region 3 (the Coronado, Gila, Tonto, Coconino, and Apache-Sitgreaves NFs). In total, approximately 3,272 acres of proposed CH occurs on these five NFs and the majority of these CHUs are represented by populations occupying cattle tanks. The Coconino NF, which is the subject of this BO, includes seven percent (232 acres) of the proposed CH on NFS lands.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions within the action area. All proposed federal actions within the action area that have undergone formal or early section 7 consultation are included in the environmental baseline discussion. The environmental baseline discussion defines the current status of the frog, its habitat, and designated CH within the Coconino NF. This discussion serves as a platform to assess the effects of the action to the Chiricahua leopard frog now under consultation.

Description of the Action Area

The Action Area includes all occupied and potential habitat for Chiricahua leopard frogs within RU 5 that fall within the administrative boundaries of the Coconino NF (see FWS 2007). On the Coconino NF, the Action Area includes portions of the Fossil Creek, East Clear Creek, and West Clear Creek Watersheds.

Status of the Chiricahua leopard frog and its proposed critical habitat within the Action Area

Currently occupied, previously occupied, and suitable habitat for the Chiricahua leopard frog on the Coconino NF is located within RU 5. Recovery Unit 5 lies along the Mogollon Rim (Rim) in Arizona, including mostly forested lands both above and below the Rim. The Coconino NF occurs within the northwest portion of the RU. Historically, Chiricahua leopard frogs were widely-distributed both above and below the Rim in RU 5, including records from the Fossil Creek, West Clear Creek, and East Clear Creek watersheds on the Coconino NF.

Today, Chiricahua leopard frog occupied habitat on the Coconino NF consists entirely of cattle (stock) tanks. The area of occupied habitat is referred to as the Buckskin Hills Conservation Management Area for Chiricahua leopard frogs (or simply the Buckskin Hills). This area is located east of Camp Verde, Arizona and south of Highway 260 and consists of cattle tanks in the uplands of the Fossil Creek Watershed (but not areas within Fossil Creek itself). Fossil Creek is occupied by lowland leopard frogs (*Lithobates yavapaiensis*) and we have no historical

data to indicate that Chiricahua leopard frogs ever occupied Fossil Creek. The Chiricahua leopard frogs likely occupy the cattle tanks because they are the only source of perennial pools of sufficient size for breeding habitat in the area. There are multiple ephemeral drainages in the Buckskin Hills (such as Boulder Canyon, Sycamore Canyon, Mud Tanks Draw), but these drainages either dry during the breeding season (e.g., Boulder and Sycamore Canyons) or contain crayfish (e.g., Mud Tanks Draw) are not habitat for Chiricahua leopard frogs. Up until 2002, the Buckskin Hills appeared to contain a functioning metapopulation (as defined in FWS 2007, p. K-3) of Chiricahua leopard frogs in cattle tanks. Following the 2002 drought, many occupied sites (i.e., cattle tanks) “died out” as the waters dried and frogs became extremely susceptible to other fatality factors (e.g., predation, possibly disease, etc.). From 2002-2006, the FWS and Arizona Game and Fish Department (AGFD) monitored the decline of Chiricahua leopard frogs in the Buckskin Hills and in 2005, the FWS removed frogs from the population to start a captive breeding program with The Phoenix Zoo. In October 2005, one female and three male frogs were collected from Sycamore Basin Tank. These were the last remaining frogs that could be located on the Coconino NF. These animals, and Chiricahua leopard frogs collected from Gentry Creek, Tonto NF, produced the frogs that FWS and AGFD released into Middle Tank on April 10, 2008 (26 subadult, pure Buckskin Hills CLF released) and October 15, 2008 (18 subadults and 48 tadpoles of Buckskin Hills/Gentry Creek mixed lineage, 1 adult frog originally from Sycamore Basin Tank released). Since this time, we have conducted additional augmentation of frogs to Middle Tank and have conducted reintroductions at Walt’s Tank, Black Tank, and Buckskin Tank. Since reintroductions began in 2008 (and have continued through the present) we have confirmation of breeding Chiricahua leopard frogs at Middle, Walt’s, and Black Tanks. We only recently (summer 2011) stocked frogs at Buckskin Tank, so we will determine breeding status of these frogs in 2012. The FWS and AGFD, in cooperation with the permittee and the Coconino NF, intend to continue stocking frogs into these sites, and possibly others, in order to improve the status of the species within the action area. In addition to reintroducing frogs to historically known locations, the FWS, AGFD, and USFS have worked to improve habitat at sites prior to restoring frogs by removing nonnative fishes, removing sediment from tanks, fencing portions of the tanks to deny livestock access, and installing erosion socks on hillsides adjacent to tanks to reduce sediment inputs into the tanks.

Since our issuance of the 2005 LRMP BO, the status of the Chiricahua leopard frog within the action area has changed significantly. In 2005, we were faced with local extirpation of the frog on the Coconino NF, but since this time efforts made by the FWS, AGFD, and USFS have resulted in the establishment of four occupied tanks, three of which are confirmed breeding sites.

Status of Proposed Critical Habitat within the Action Area

The FWS proposed CH for the Coconino NF in the Buckskin Hills, CHU (CHU) 23 (FWS 2011a, b). This CHU includes 232 ac (94 ha) of Coconino NF lands in Yavapai County, Arizona. This unit is proposed as CH because it was occupied at the time of listing and currently contains sufficient PBFs (PBFs 1 and 2) to support life-history functions essential for the conservation of the species. Included in this proposed CHU are six tanks occupied at the time of listing (Sycamore Basin, Middle, Walt’s, Partnership, Black, and Buckskin Tanks) that could function as a metapopulation. Frogs currently occur at Middle, Black, Walt’s, and Buckskin Tanks as a result of the frog reintroductions noted above. Also included in the CH proposal are

two tanks occupied in 2001 that probably dried out during the 2002 drought: Doren's Defeat and Needed Tanks. The former holds water well and is about 0.5 mi (0.8 km) from Partnership Tank and 0.67 mi (1.07 km) from Walt's Tank. Needed Tank may not hold water long enough for breeding, but it provides an important stopover site for dispersing frogs. This proposed CH also includes drainages and uplands likely used as dispersal corridors among these tanks, including: (1) from Middle Tank downstream in Boulder Canyon to its confluence with an unnamed drainage that comes in from the northwest, to include Black Tank, then upstream in that unnamed drainage to a saddle, to include Needed Tank, downstream from the saddle in an unnamed drainage to its confluence with another unnamed drainage, downstream in that drainage to the confluence with an unnamed drainage, to include Walt's Tank, and upstream in that unnamed drainage to Partnership Tank; (2) from Doren's Defeat Tank upstream in an unnamed drainage to Partnership Tank; (3) from the confluence of an unnamed drainage with Boulder Canyon west to a point where the drainage turns southwest, then directly overland to the top of Sycamore Canyon, and then downstream in Sycamore Canyon to Sycamore Basin Tank; and (4) from Buckskin Tank upstream in an unnamed drainage to the top of that drainage, then directly overland to an unnamed drainage that contains Walt's Tank.

Since our issuance of the 2005 LRMP BO, much recovery work has been accomplished in the proposed CHU 23, including the reintroduction of frogs, the elimination of nonnative predatory fishes, the installation of erosion control structures and removal of sediment from tanks, and fencing tanks to exclude livestock from portions of proposed CH.

Factors Affecting the Chiricahua leopard frog and Proposed Critical Habitat within the Action Area

The factors affecting the Chiricahua leopard frog and its proposed CH within the action area, the Coconino NF, are discussed in this section. Projects associated with formal consultations that evaluated adverse effects to the frog that occurred from 2005 (i.e., the year of the original LRMP BO) to the present are summarized in Table 8.

Table 8. Formal consultations and incidental take anticipated for the Chiricahua leopard frog on the Coconino NF from 2005 to 2011.					
Consultation #	Date of Final BO	Project	Anticipated Take	Locations	Form of Take
02-21-04-F-0103	8/4/2005	Historic Mail Trail Project	None Anticipated	n/a	n/a
22410-2007-F-0198	4/6/2009	Hackberry and Pivot Rock Range Allotment Management Plans	Unspecified number of frogs due to lack of occupied sites currently; however, over life of project we are reasonably certain that	Hackberry and Pivot Rock Allotments	Direct mortality, Harm and Harass

			frogs will occur on the allotment		
22410-2007-F-0197	2/9/2010	Fossil Creek Range Allotment Management Plan	See below (This BO was found to be legally insufficient [No. CV 10-330 TUC AWT])		
22410-2007-F-0197	2/26/2010	Fossil Creek Range Allotment Management Plan - Clarification	Unspecified number of frogs, but cannot go below baseline of two populations on Coconino NF	Fossil Creek Grazing Allotment	Direct mortality, Harm and Harass
<i>22410-2008-F-0149-R001</i>	<i>12/6/2011</i>	<i>Effects to Listed Species from U.S. Forest Service Aerial Application of Fire Retardants on NFS Lands</i>	<i>One retardant drop on the affecting 6.2 stream miles or 0.25 acres of non-fluvial, standing water</i>	<i>Coconino NF</i>	<i>Direct mortality, Harm and Harass</i>
22410-2007-F-0197-R001	In progress	Reinitiation of Fossil Creek Range Allotment Management Plan	In progress (BO will replace BO identified above)	In progress	In progress

*Projects in italics are fire suppression activities that are not included in the proposed action for this consultation.

Since 2005, four site-specific BOs covering three projects have been issued to the Coconino NF addressing adverse effects to Chiricahua leopard frogs from projects implemented under the LRMP and one BO addressing fire suppression activities (an action not included in the proposed action). These projects included two range allotment management plans (one of which is currently being re-written as a result of litigation), a recreation project, and a fire retardant project (see Table 8). These projects involved the Range, Recreation, and Fire Management Programs. These programs were all analyzed in the 2005 Biological Opinion. Within the four project-specific biological opinions, some form of incidental take was issued for all but the Historic Mail Trail Project (recreation). The Coconino NF provided conservation measures that would minimize the impacts to frogs in all formal consultations. All biological opinions for projects conducted on the Coconino NF were determined to be non-jeopardy for the species. Incidental take of Chiricahua leopard frogs associated with wildland fire suppression activities is not part of the action under consultation in this biological opinion, but is part of the environmental baseline for this consultation.

The greatest threats to Chiricahua leopard frogs on the Coconino NF are nonnative species, drought, and disease. Divide Tank, which is adjacent to Highway 260 and up-drainage of

occupied stock tanks, currently has crayfish and has supported nonnative fishes in the past (it has likely been used by locals to stock nonnative bait fishes due to its easy access from the highway). If re-established there, nonnative fishes could spread to currently occupied tanks and tanks proposed as CH. In addition, all of the cattle tanks are filled by runoff; hence, they are vulnerable to drying during drought. Chytridiomycosis has not been found in any wild frogs in the Buckskin Hills; however, the disease occurs in Arizona treefrogs (*Hyla wrightorum*) and western chorus frogs (*Pseudacris triseriata*) less than 10 mi (16 km) to the east, and frogs collected from Walt's Tank (2002) subsequently tested positive for the disease in captivity. It is unknown whether they contracted the disease in the wild or while captive.

Current predictions of drought and/or higher winter low temperatures may also stress ponderosa pine forests in which the Chiricahua leopard frog occurs. Ganey and Vojta (2010) studied tree mortality in mixed conifer and ponderosa pine forests in Arizona from 1997-2007, a period of extreme drought. They found the mortality of trees to be severe; the number of trees dying over a five-year period increased by over 200 percent in mixed-conifer forest and by 74 percent in ponderosa pine forest during this time frame (Ganey and Vojta 2010). Ganey and Vojta (2010) attributed drought and subsequent insect (bark beetle) infestation for the die-offs in trees. Drought stress and a subsequent high degree of tree mortality from bark beetles make high elevation forests more susceptible to unnaturally intense wildfires. Climate is a top-down factor which synchronizes with fuel loads which is a bottom-up factor; combined, these factors correlate to supporting larger, more frequent, and more severe wildfires in the southwestern United States, influenced by a predicted reduction in snowpack and an earlier snowmelt (Fulé 2010). Wildland fires are expected to reduce vegetative cover and result in greater soil erosion from increased droplet splash-erosion and reduced infiltration capacity, subsequently resulting in increased sediment flows in streams (Fulé 2010). Increases in the number and severity of wildland fires on the landscape is likely to translate into more suppression activities and therefore more use of retardants, which could potentially impact Chiricahua leopard frogs (FWS 2011, AESO Consultation #22410-2008-F-0149-R001).

Since the 2005 LRMP BO was issued, the environmental baseline for Chiricahua leopard frog within the action area is increasing at this point due to extensive recovery efforts implemented by FWS, AGFD, the USFS, and other partners. The Coconino NF is actively participating in recovery actions that are benefiting the frog (FWS 2011c).

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or CH, 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.

Background Information regarding the Proposed Action

The proposed action being analyzed in this BO is implementation of the Coconino NF LRMP and its amendments. During the 2005 LRMP consultation, the FWS and USFS jointly developed a set of conservation measures for the Chiricahua leopard frog which became part of the proposed action. The five conservation measures are listed below.

- *Conservation Measure #1:* Design projects in occupied Chiricahua leopard frog habitat on NFNFS lands which address the appropriate components of the Recovery Plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to Chiricahua leopard frog.
- *Conservation Measure #2:* Over the next five years, cooperate with Chiricahua leopard frog recovery partners to assess and prioritize habitat for potential Chiricahua leopard frog re-introduction. Cooperatively document the result in an annual report to the FWS and to the extent feasible within the mission and capabilities of the USFS, assist with any Chiricahua leopard frog re-introduction efforts.
- *Conservation Measure #3:* Implement, as appropriate, actions to minimize the effects of stock pond management and maintenance identified in the Recovery Plan for the Chiricahua leopard frog.
- *Conservation Measure #4:* Continue to implement the standardized interagency monitoring protocol for Chiricahua leopard frogs, particularly in areas where dispersal could occur from extant populations or where survey data are insufficient to determine accurate population status.
- *Conservation Measure #5:* With regard to wildland fire use, the USFS shall maintain current distributions of listed species; identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires; and preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

An LRMP provides guidance and direction in the context of a broad management framework. These LRMPs define the direction for managing the NFs. Direction in the LRMP is provided in the form of the Standards & Guidelines (S&Gs). Because it was unclear what the operational difference is between a “standard” and “guideline,” we did not differentiate between the two for our analysis. While the FWS recognizes that much discretion exists on the part of forest managers at the project level, in the implementation of LRMPs through the S&Gs, this discretion also adds to the complexity of this consultation due to the conflicting nature of some S&Gs that exist between the different operating programs within the same Forest. We provide examples of this below by USFS program.

The S&Gs are written to apply Forest-wide or to a specific management area. The Coconino NF has designated “management areas” based on such criteria as vegetation type, principal land use, and special management designations such as wilderness areas. The LRMP contains some S&Gs that apply Forest-wide and some that apply only to specific management areas. During the development of a project, each management program reviews Forest-wide and management area-

specific S&Gs that either give direction to, or place constraints on, management activities (e.g., logging, grazing, recreation, mining, etc.). The S&Gs that provide direction state what will be accomplished to achieve specific resource goals.

The LRMPs direct how current and future activities will be carried out in the following management programs: (1) Engineering, (2) Fire Management, (3) Forestry and Forest Health, (4) Lands and Minerals, (5) Rangeland Management, (6) Recreation, Heritage and Wilderness, (7) Watershed Management, and (8) Wildlife, Fish, and Rare Plants. Each of the USFS's eight resource programs were discussed in depth within the April 8, 2004, BA, the June 10, 2005, LRMP BO, and the April 6, 2011, BA.

Effects to the Chiricahua leopard frog were evaluated in the 2005 BO, and are included herein by reference (see FWS 2005). The majority of the S&Gs, which continue to be implemented as the proposed action within the Coconino NF LRMP, were considered positive in the sense that they would maintain habitat for the frog or provide for recovery. However, potential adverse effects were found in all of the management programs. The Fire Management Program combines elements of fire prevention, prescribed fire, wildland fire, and fire suppression. However, wildland fire, including fire suppression and wildland fire use, are not included in the proposed action and consultation on these actions will continue to be handled under emergency Section 7 consultation procedures.

Effects of the Action on the Chiricahua leopard frog

Engineering Program: No applicable S&Gs in the Engineering Program are likely to result in direct negative effects to the frog. A handful of S&Gs do result in some short-term adverse effects. Standards and Guidelines 400, 404, 460, and 534 allow for roads to be closed and obliterated. This activity should result in improved watershed conditions, reducing the impact of degraded watersheds on frog populations; however, the act of obliterating roads could result in adverse effects to frogs. Frogs, particularly dispersing frogs, could be killed by tools and machinery used to obliterate roads. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Standard and Guideline 408 has multiple impacts. The first part of this S&G allows for roads in riparian areas to be relocated. Movement of these roads would reduce habitat degradation, but would also have short-term effects associated with obliterating roads, as discussed above. The second part allows for roads to cross the riparian area, but directs that they cross perpendicular to the stream course. This impact is somewhat self-minimizing in that it reduces habitat destruction and watershed degradation by having roads run perpendicular rather than parallel to the stream course, but any construction of roads in the riparian area could result in fatality of individuals associated with occupied riparian areas or dispersal corridors. However, no frogs are currently known to occur in stream or riverine habitats on the Coconino NF, so at present, these impacts are unlikely to occur.

There may also be negative effects from the Engineering Program not captured in the applicable S&Gs. The Engineering Program includes activities such as construction, maintenance, and operation of roads. Construction and use of roads in general may have negative effects on frogs

in that, at any road density, improperly placed roads may disrupt metapopulation dynamics (such as dispersal) due to habitat fragmentation if these roads serve as barriers to movement (deMaynadier 2000).

These effects would likely result in reduced feeding and breeding success due to degraded habitat and increased difficulty in dispersion and reproduction. Although not documented for Chiricahua leopard frogs, fatality of other species of leopard frogs by vehicle traffic on roadways can be considerable (Carr and Fahrig 2001). Chiricahua leopard frogs, although rarely, are sometimes found on roads (J. Rorabaugh, FWS, 2005, unpubl. data) where they could be killed.

Fire Management Program: Standards and Guidelines 411 and 414 allow for the use of fuel treatments, which include prescribed fire and mechanical thinning. These S&Gs provide benefits to the frog by reducing the risk of landscape scale, high-severity wildland fire, which given the limited populations in existence, could have serious impacts the species. However, the fuels treatment projects could result in fatality of individuals as a result of operations occurring in frog habitat. There also could be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success.

Forestry and Forest Health Program: No applicable S&Gs within the Forestry and Forest Health Program are likely to result in direct negative effects to the frog. However, S&G 458 could result in adverse effects through short-term project level impacts. This S&G addressed the use of Knutson-Vandenberg (K-V) funds, which the FWS is aware is not currently in use; however, there is nothing in the Coconino NF LRMP preventing their use in the future, thus impacts from the use of K-V funds must be addressed in future consultations. Like many other S&Gs addressed thus far, there is potential for harm and/or harassment of individuals during the course of habitat improvement projects. Frogs of multiple life stages could be impacted by humans or killed by tools and machinery.

Standard and Guideline 461 is also a somewhat self-limiting S&G. Similar to S&G 408, this S&G allows skid trails to cross the riparian area, but requires them to cross in stable areas thus reducing the potential for watershed degradation. In areas where skidding does occur in or near occupied riparian habitats, there is potential for lethal take of individuals associated with tools and machinery.

Land and Minerals Program: No applicable S&Gs in the Lands and Minerals Program are likely to result in direct negative effects to the frog. However, some S&Gs could result in adverse effects through short-term project level impacts. Standard and Guideline 391 allows for reclamation of mined areas. This is beneficial in that it provides improved watershed conditions and could recreate lost frog habitat; however, frogs of multiple life stages could be impacted by humans or killed by tools and machinery in the course of reclamation projects.

Standard and Guideline 393 guides projects to use existing transmission corridors to the greatest extent possible by utilizing overbuilding and underbuilding strategies. This protects other undisturbed areas from habitat destruction, but there could be project level impacts associated with the overbuilding and underbuilding if dispersing frogs are present in the area. Adverse

effects could occur if machinery used to implement the project impacted dispersing frogs by either killing them or disrupting a travel corridor.

Rangeland Management Program: Livestock grazing has been identified as having adverse effects to frogs, in general. The specific and direct effects of livestock grazing on leopard frog population trends are not well-studied; however the literature is robust in its treatment of livestock grazing on aquatic and riparian habitat. Livestock are known to spend a disproportionate amount of their time in riparian zones and thus can adversely affect these systems in a number of ways (FWS 2007:32). Livestock grazing is nearly ubiquitous within the historical range of the frog. In Arizona, stock tanks have become important habitats for the Chiricahua leopard frog. Adverse effects to the species and its habitat may occur under certain circumstances as a result of livestock grazing activities; particularly in drought conditions or in instances where numerous stressors on frog populations act in concert.

Actual trampling of metamorphosed frogs or toads from livestock using occupied habitat has been reported in rare instances. In extreme drought conditions, the likelihood of adult or larval frogs being trampled may increase due to the decrease of standing water and increase in livestock use. However, we believe the most significant adverse effect of livestock accessing breeding habitat of the frog is the high likelihood of trampling egg masses. Egg masses may contain over 1,000 individual eggs and with even a one percent survival rate, constitute the simultaneous mortality of 10 or more reproductive individuals. Egg masses are also particularly important for use in head-starting, specifically in circumstances with limited access to egg masses within particular genetic strains. Indirect effects from livestock grazing may include deterioration of watersheds, erosion, scouring, and/or siltation of stream courses, elimination of off-channel pools that provide breeding habitat and undercut banks that provide cover for frogs, and possibly the spread of disease (i.e., Bd) (FWS 2007:33).

The S&Gs in this program result in a variety of effects to the frog. Standard and Guideline 424 allows grazing to occur in wilderness areas. In those areas where grazing overlaps occupied frog habitat, there are likely to be negative impacts that result in reduced feeding and breeding success. In addition, there are likely to be impacts to individual frogs under any grazing regime, in the form of fatality via trampling, spread of Bd, livestock water maintenance, and spread of nonnative predators via livestock waters. On the other hand, livestock waters in non-Wilderness areas currently provide the only habitat for frogs on the Coconino NF, thus though there may be adverse effects and even incidental take from implementation of this program, there will also be positive impacts from the continued management of stock tanks to supply perennial water. Standards and Guidelines 338 and 339 call for range management to result in improved rangeland condition. This could, in the long-term, provide increased watershed health and improved habitat for the frog, as well as the negative impacts described above.

Standards and Guidelines 341 and 499 call for salting to generally occur outside of riparian areas. This S&G should aid in reducing trampling, disturbance, and watershed degradation impacts to frogs from cattle in riparian areas. However, these S&Gs also allow for providing salt for livestock in riparian areas in order to improve habitat conditions. Where salting is used in the riparian area, it could result in the trampling of frogs.

Standard and Guideline 342 calls for the USFS to conduct maintenance of range improvement structures, as needed. These actions are generally good for frogs as they help lessen the impact of livestock. However, there are likely short-term impacts to individual frogs killed by humans, tools, and machinery during the project. Additionally, this S&G could include stock tank maintenance (i.e., draining and/or sediment removal) which is likely to result in mortality of frogs.

Standard and Guideline 483 allows for the maintenance of pinyon-juniper vegetation type. There may be short-term project impacts due to mechanical manipulation, chemical use, and prescribed fire. The impacts from these projects could include simple disturbance, reduced feeding and breeding due to chemical use, avoidance of burned areas resulting in reduced breeding success, and mortality due to fire, tools, and machinery.

Recreation, Heritage, and Wilderness Program: The LRMP allows for dispersed recreation in areas that are likely to be occupied by frogs. Any dispersed recreation such as camping, hiking, fishing, or boating could result in take of individual frogs in the form of disturbance, avoidance of impacted recreation areas, and even mortality from direct contact with humans and vehicles. Additionally, as these recreational users move through the environment, they might contribute to the spread of chytrids, especially water users of boats and other equipment that is not thoroughly dried or sterilized between sites, and some will likely spread non-native predators. Such predators in the form of sport fishes have been illegally introduced by the public to former frog habitats in the Buckskin Hills. Standard and Guideline 318 may minimize the effects of other recreation-related LRMP S&Gs by allowing closures and restrictions in damaged areas or T&E species habitats.

Watershed Management Program: There are a number of S&Gs in this program which could affect the frog. First, S&G 369 allows for the use of chemical agents as long as surface and ground waters do not become contaminated. Frogs in the water should not be affected by this S&G, but as adult frogs are not restricted entirely to the aquatic environment, some may be found on land and are likely to be affected by chemical use that reduces upland cover plant species and prey (insects). However, application of chemicals is not likely to occur during precipitation events or the wet season, when frogs are most likely to be dispersing overland (R. Maes, USFS, 2005, unpubl data).

Standard and Guideline 356 provides for general protection of frog habitats, but it does allow for some skidding of trees within riparian areas as long as the ability of the area to function as a filter strip is not compromised. It is likely that some individual frogs foraging or dispersing overland may be killed through the operation of this heavy machinery, even while the filter strip is functioning properly to protect the stream course habitat.

Standard and Guideline 359 provides for general maintenance or improvement of riparian conditions which benefit the frog. However, the action of removing debris from the waterway is likely to result in disturbance and lethal take of individual frogs associated with human foot traffic or use of tools and machinery. Additionally, removal of debris from the water (logs, etc.) could adversely affect frogs by removing cover and egg deposition sites.

Standards and Guidelines 361 and 378 allow for roads to be obliterated. These activities should result in improved watershed conditions reducing the impact on frogs and the likelihood of frogs being killed on roads; however, the act of obliterating roads is likely to result in the loss of individuals as frogs, of various life stages, through the use of tools and machinery. There is also likely to be some temporary avoidance of the project areas, which could result in reduced breeding success if projects occur during the breeding period.

Standard and Guideline 377 addresses rehabilitation projects that occur after fires. This could be an extremely important S&G to deal with sedimentation, erosion, or ash flow contamination that is likely to occur after large fires. There is potential that these activities could result in some lethal take of individuals, at the project level, if the area to be rehabilitated was not completely scorched or degraded allowing some frogs to persist.

Wildlife, Fish, and Rare Plants Program: No applicable S&Gs in Wildlife Program are likely to result in direct negative effects on the frog. Standards and Guideline 475 guides the NF to protect meadow communities, riparian areas, or other sensitive areas in Management Areas 9 from the effects of spring development by piping water to water developments in adjacent, less sensitive areas (USFS 2004:159) (in the FWS's experience, the use of this S&G to pipe water away from the spring or meadow was used to protect the habitat and did not result in dewatering the habitat). The long-term goal of reduced wildlife and stock water use in habitats which may contain Chiricahua leopard frog habitat is beneficial, but some frogs could be taken during pipeline development and minimal numbers may also be taken during subsequent operations and maintenance of the sites. This incidental take could occur as a loss of individuals as frogs, of various life stages, killed by tools and machinery.

A number of S&Gs in the Wildlife Program potentially provide substantial benefits to the frog. Standards and Guidelines 321 and 328 would help to alleviate some effects from all of the analyzed programs by establishing listed species habitat as higher priority for protection than that of other species. Standard and Guideline 321 also directs the Coconino NF to follow approved recovery plans, allowing for some recovery actions and potential mitigation of impacts. These S&Gs should help the NF to minimize the effects of other projects, prioritize its projects such that negative impacts resulting from other forest uses could occur largely outside of important frog habitat, and may also result in increased population numbers and sizes.

In summary, the applicable S&Gs within the Coconino NF LRMP allow for a variety of effects to the frog. To a large extent, activities conducted under the positive S&Gs should benefit the frog and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not eliminate the possibility of small, short-term adverse effects, and in some cases the potential for low levels of incidental take.

Effects of the Action on Chiricahua leopard frog Proposed Critical Habitat

In our analysis of the effects of the action on proposed CH, we consider whether or not a proposed action will result in the destruction or adverse modification of proposed CH. In doing so, we must determine if the proposed action will result in effects that appreciably diminish the value of proposed CH for the recovery of a listed species. To determine this, we analyze

whether the proposed action will adversely modify any of the PBFs that are the basis for proposing CH. To determine if an action results in adverse modification of proposed CH, we must also evaluate the current condition of all proposed CHUs, and the PBFs of those proposed CHUs, to determine the overall ability of all proposed CH to support recovery. Further, the functional role of each of the CHUs in recovery must also be considered because, collectively, they represent the best available scientific information as to the recovery needs of the species.

The FWS only proposed CH in 2011. Therefore, we have not yet analyzed the effects of site-specific projects on proposed CH. Based upon actions we have consulted on within this action area, continued implementation of the Coconino NF LRMP may result in projects with adverse effects to proposed CH. Below the PBFs related to Chiricahua leopard frog aquatic breeding habitat (including immediately adjacent uplands) and dispersal habitat and the potential effects from implementation of the LRMP are described.

1. Aquatic breeding habitat and immediately adjacent uplands exhibiting the following characteristics:

PBF 1a: Standing bodies of fresh water, including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or rarely dry for more than a month. During periods of drought, or less than average rainfall, these breeding sites may not hold water long enough for individuals to complete metamorphosis, but they would still be considered essential breeding habitat in non-drought years.

Effect: Actions implemented under the LRMP are expected to retain and recover this PBF for frogs. There are S&Gs in place to ensure that areas supporting listed species are not dewatered or impaired to the point that they cannot support frogs. Cleaning (i.e., draining and or removal of sediment) of stock tanks or piping of water from pools (spring-fed or perennial) that provide habitat for Chiricahua leopard frogs could result in the loss and/or reduction (reduced depth) of this PBF. However, occasional drying for short periods (less than one month) may be beneficial in that the frogs can survive, but nonnative predators, particularly fish, and in some cases, American bullfrogs and populations of aquatic forms of tiger salamanders, will be eliminated during the dry period (FWS 2007).

PBF 1b: Emergent and or submerged vegetation, root masses, undercut banks, fractured rock substrates, or some combination thereof, but emergent vegetation does not completely cover the surface of water bodies.

Effect: The Rangeland Management Program is expected to result in adverse effects to this PBF. Livestock will eat and/or modify emergent and submerged vegetation at sites they occupy resulting in loss of cover for frogs. However, because we have worked with the Coconino NF to fence off portions of stock tanks occupied by Chiricahua leopard frogs and proposed these locations as CH, the expected effect is that vegetation inside the protective fences will be protected and will maintain sufficient vegetation at these stock tanks to support breeding frogs (e.g., vegetation to attach egg masses, provide cover and food to tadpoles, etc.).

PBF 1c: Nonnative predators absent or occurring at levels that do not preclude presence of the Chiricahua leopard frog.

Effect: The Coconino NF is implementing conservation measures to ensure that actions implemented under the LRMP, particularly movement of water under the Fire Management and Range Management Programs does not result in the incidental movement of nonnative species into proposed CH. These measures include mandatory notification of USFS biologists and the FWS 60-days prior to cleaning any stock tank located within Chiricahua leopard frog areas. Efforts are also made to ensure that USFS employees are aware of what stock tanks contain frogs and nonnative species so that the potential for inadvertent transfers of nonnative species to occupied habitat is reduced.

PBF 1d: Absence of chytridiomycosis (Bd), or, if present, then environmental, physiological, and genetic conditions are such that allow persistence of Chiricahua leopard frogs.

Effect: There is the potential that actions carried out under the LRMP, such as the cleaning/sediment removal of stock tanks and moving machinery between stock tanks could result in the movement of Bd, or other diseases, to proposed CH. However, the Coconino NF provides preventative measures to all of its livestock allotment permittees, field personnel, and others working in/near proposed CH that require equipment be disinfected between sites. Pathogens, such as Bd, can easily be transferred between habitats on equipment and footwear. Disinfecting equipment between sites should significantly reduce the potential for Bd to be transmitted to proposed CH.

PBF 1e: Upland areas that provide opportunities for foraging and basking that are immediately adjacent to or surrounding breeding aquatic and riparian habitat.

Effect: Rangeland management actions may result in reduced vegetative habitat immediately around and surrounding proposed CH. However, fencing at occupied habitat will leave some areas adjacent and immediately surrounding the stock tanks vegetated by denying livestock access. Livestock will be able to eat, trample, and/or otherwise modify vegetation outside the fenced area. This may result in some beneficial effects by providing basking habitat (e.g., open areas) for frogs.

2. Dispersal and non-breeding habitat, consisting of areas with ephemeral (present for only a short time), intermittent, or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provide corridors (overland movement or along wetted drainages) for frogs to move among breeding sites in a metapopulation. The dispersal and non-breeding habitat need to have the following characteristics:

PBF 2a: Are not more than 1.0 mile overland, 3.0 miles along ephemeral or intermittent drainages, 5.0 miles along perennial drainages, or some combination thereof not to exceed 5.0 miles.

Effect: Actions implemented under the LRMP should not result in the loss of stock tanks within proposed CH that would change the movement distance between stock tanks. Therefore, dispersal and non-breeding habitat should remain intact.

PBF 2b: In overland and non-wetted corridors, provides some vegetation cover or structural features (e.g., boulders, rocks, organic debris such as downed trees or logs, small mammal burrows, or leaf litter) for shelter, forage, and protection from predators; in wetted corridors, provides some ephemeral, intermittent, or perennial aquatic habitat.

Effect: Actions implemented under the LRMP should not significantly reduce or modify this PBF within proposed CH. Though actions may result in small reductions in organic debris as a result of prescribed fire, road maintenance, or livestock grazing, these impacts are not likely to significantly modify this PBF.

PBF 2c: Are free of barriers that block movement by Chiricahua leopard frogs, including, but not limited to, urban, industrial, or agricultural development; reservoirs that are 50 acres or more in size and contain predatory nonnative fishes, bullfrogs, or crayfish; highways that do not include frog fencing and culverts; and walls, major dams, or other structures that physically block movement.

Effect: Actions implemented under the LMRP would not result in the creation of barriers to movement within proposed CH.

Effects of the Action on the Role of Proposed Critical Habitat in Recovery

The proposed action includes actions that are recommended in the Recovery Plan. These actions were identified as being necessary to recover the Chiricahua leopard frog and the Coconino NF is either implementing or assisting with implementation of these actions in proposed CH. Proposed CH includes all occupied sites within CHUs. These actions include the following:

- The Coconino NF has and continues to design projects in occupied Chiricahua leopard frog habitat which address the appropriate components of the Recovery Plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to Chiricahua leopard frog.
- The Coconino NF has and continues to implement actions to minimize the effects of stock pond management and maintenance as identified in the Recovery Plan. As recommended by the Recovery Plan, occupied stock tanks have been partially fenced and stock-pond management guidelines are being followed according to the USFS.
- The Coconino NF, working with FWS and AGFD, has been monitoring potential habitat following the standardized interagency monitoring protocol for the Chiricahua leopard frog.
- The Coconino NF maintains GIS layers for the current distribution of Chiricahua leopard frogs on the forest and this information is used to guide fire management and mitigation

to avoid or minimize the effect of wildland fires on the species. Fire use operational plans on each district are reviewed and updated prior to each fire season and are followed during a fire use event. USFS and FWS biologist are consulted prior to determining if a natural fire ignition may be allowed to burn in listed species habitat.

- The USFS Threatened and Endangered species Program (i.e., the USFS's Southwestern Regional Office) has taken the lead in organizing and hosting Chiricahua leopard frog conservation coordination meetings. The team of agency personnel and other interested parties established several workgroups to address various aspects of protecting populations, identifying information needs, information access, seeking funding and resources, establishing partnerships, and other tasks. The Regional Office has financially supported reintroduction projects, survey training workshops, and frog propagation efforts during the reporting period. In addition, the biologists on the Coconino NF are active members of the Chiricahua leopard frog multi-organization conservation team. Further, the Coconino NF biologists have also helped with habitat improvements and re-introduction of populations.

These actions should increase the sustainability and resiliency of Chiricahua leopard frog habitat. Therefore, continued implementation of the Coconino NF's LRMP is not expected to diminish the conservation contribution of proposed CH to the recovery of the Chiricahua leopard frog.

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 BO. 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. Since the entire project area is within the Coconino NFs, all legal actions likely to occur are considered Federal actions.

Unregulated activities on Federal and non-Federal lands, such as trespass livestock, inappropriate use of off-highway vehicles, and illegal introduction of nonindigenous aquatic species are cumulative effects and can adversely affect the species through a variety of avenues. Illegal introductions of nonindigenous fishes and other aquatic invasive species are routinely made by the public (e.g., topminnow, red shiner, and guppies).

Cumulative effects to native aquatic animals 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, and recreation without a Federal nexus. 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 aquatic animals. Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-Federal lands near riparian areas and earthen stock tanks would likely result in increased cumulative adverse effects to occupied, as well as potentially occupied native aquatic animal habitat through increased water use, increased pollution, and increased alteration of the stream banks through riparian vegetation suppression, bank trampling, changing flow regimes, and erosion.

Cumulative effects from climate change are expected. That southeastern Arizona and much of the American southwest have experienced serious drought recently is well known. What is known with far less certainty is the frequency and duration of future droughts.

CONCLUSIONS

This BO does not rely on the regulatory definition of “destruction or adverse modification” of CH in 50 CFR 402.02 because of various court cases surrounding the FWS’s jeopardy and adverse modification analyses. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to proposed CH. CH is defined in section 3 of the Act “as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.” We have also relied upon the Consultation Handbook which provides guidance on determining adverse modification of CH and jeopardy pursuant to the following: “Adverse effects on individuals of a species or constituent elements or segments of CH generally do not result in jeopardy or adverse modification determinations unless that loss, when added to the environmental baseline, is likely to result in significant adverse effects throughout the species’ range, or appreciably diminish the capability of the CH to satisfy essential requirements of the species” (FWS and National Marine Fisheries Service 1998:4-34).

After reviewing the current status of the Chiricahua leopard frog and its proposed CH, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, we conclude that continued implementation of the LRMP for the Coconino NF will not jeopardize the continued existence of the frog and will not destroy or adversely modify proposed CH. Effects analyses and conclusions in biological opinions from 2005 through 2010 for the Coconino NF also determined that projects implemented under the current LRMP were not likely to jeopardize the continued existence of the Chiricahua leopard frog. Further, summary of our reasoning for determining that the continued implementation of the LRMP for the Coconino NF will not jeopardize the frog and will not adversely modify proposed CH for the species is based on the following:

- During the 2005 LRMP consultation, the FWS and USFS jointly developed a set of conservation measures for the Chiricahua leopard frog which became part of the proposed action. Since then, the USFS has incorporated these recommendations into individual projects consulted on under the 2005 LRMP BO and provided project implementation monitoring information to the FWS indicating that these projects were implemented as proposed.
- Standards and Guidelines within the Coconino NF’s LRMP have not changed since 2005, the majority of which were found to be beneficial to the Chiricahua leopard frog. The frog’s environmental baseline has improved on the Coconino NF as a result of conservation actions implemented by FWS, AGFD, and the USFS. These actions, such

as habitat improvements and reintroductions, have resulted in an increase in the number of stock tanks occupied since 2005 and protection of proposed CH (e.g., fencing at occupied tanks to prevent livestock access to portions of the tank).

- Projects implemented under the Coconino NF's LRMP have not lead to a jeopardy determination.

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

Amount of Take

Incidental take of the Chiricahua leopard frog is reasonably certain to occur as a result of the continued implementation of the Coconino NF LRMP. This incidental take is expected to be in the forms of harm (including direct mortality) and harassment resulting from site-specific projects implemented under the LRMP. However, it is difficult to quantify the number of individual frogs taken because: (1) dead or impaired individuals are difficult to find (and are readily consumed by predators) and losses may be masked by seasonal fluctuations in environmental conditions; (2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat; and (3) the species is small-bodied, well camouflaged, and occurs under water of varying clarity.

The standard Visual Encounter Surveys (VES) method is the survey protocol used to conduct Chiricahua leopard frog surveys (FWS 2007, Appendix E). The VES method will generate presence/absence data if used independently and generate information from which inferences about frog abundance and trends can be made at a specific site. However, we do not have a means of counting all individual frogs at a site. As noted above, we believe that we cannot measure the number of frogs taken as a result of this action because these frogs are difficult to find, particularly if they are dead or impaired, and the frog is difficult to see due to its size, cryptic coloring, and complex habitat. In addition, egg masses and tadpoles are frequently hidden in submerged vegetation and cannot be counted precisely. Therefore, though we can generate counts of frogs seen by surveyors, results from these surveys do not provide an accurate estimate of the number of frogs present at the site. If we are unable to know the number of frogs at a site, it follows logically that we would be unable to count the number of frogs potentially incidentally taken as a result of the proposed action.

Since we cannot estimate the number of individual frogs that will be incidentally taken for the reasons listed above, the FWS is providing a mechanism to quantify when take would be considered to be exceeded as a result of the implementing the Coconino NF LRMP within the Buckskin Hills (i.e., we will use the existing number of occupied sites on the Coconino NF to determine when take is exceeded). We conclude that the incidental take of Chiricahua leopard frogs will be considered exceeded if there is a net loss of any one of the currently occupied stock tanks for one year (there are currently 4 known stock tanks occupied by Chiricahua leopard frogs – Middle Tank, Black Tank, Walt’s Tank, and Buckskin Tank), as a result of the implementation of the Coconino NF LRMP. In other words, we have identified actions that may result in the incidental take of individual frogs (due to actions implemented under the Management Programs discussed in the Effects section above); however, we do not anticipate the complete loss of an entire occupied stock tank as a result of any action authorized under the LRMP. The actions analyzed under the LRMP could take several (though we are unable to count the exact number) individual frogs of various life stages (frogs, tadpoles, and eggs) through direct mortality or harm from trampling (human, animal, or machine), and harm and/or harassment through habitat modification (e.g., as a result of roads, livestock, piping of water, and/or the movement of disease or nonnative predators through cleaning of stock tanks, or other action resulting in take authorized under the LRMP). If the loss of a currently occupied site occurs, in coordination with the Coconino NF, we will determine whether it was the result of the proposed action or if environmental conditions (such as drought) caused the loss (as occurred in 2002, see Environmental Baseline). This amount of incidental take will not prevent the population from recovering to pre-take levels because the existing occupied stock tanks are all within frog dispersal distance of one another (frogs can move up to 5 miles, see Status of the Species) and connected via proposed CH. Therefore, if frogs cease to be present at one site, the frogs will be able to recolonize the site on their own, or we can assist them as we have done in the past. We expect the Coconino NF to continue to work with the FWS and AGFD to continue to implement actions such as captive breeding, habitat protection (e.g., fencing, silt fences, etc.) that will result in an increase in the number and resiliency of occupied stock tanks or other suitable habitats on the NF.

Effect of the Take

In this BO, the FWS determines that this level of anticipated take is not likely to result in jeopardy to Chiricahua leopard frogs. While the proposed action, implementation of S&Gs under the seven Management Programs described in the Effects Section, may adversely affect the frog in the short-term through the loss of individual frogs of various life stages through any of the forms of incidental take described above, none of these actions as described in the BA should result in the loss of all frogs at a given stock tank.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Chiricahua leopard frogs.

1. Minimize or eliminate take of Chiricahua leopard frogs on the Coconino NF.
2. Minimize or eliminate adverse effects to Chiricahua leopard frog habitat on the Coconino NF.
3. Monitor the impacts of site-specific projects implemented on the Chiricahua leopard frog.

TERMS AND CONDITIONS

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

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 The Coconino NF shall attempt to protect occupied breeding sites during implementation of projects, which may include fencing of stock tanks to exclude livestock or wild ungulates if necessary.
- 1.2 Where feasible, all equipment that comes into contact with aquatic habitats will be cleaned and disinfected or allowed to dry completely before visiting a different aquatic site by removing all soil, mud, and debris to ensure that Bd or other diseases are not spread between sites.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be moved among earthen stock tanks or other aquatic sites by Coconino USFS employees or permittees unless approved by the FWS.

- 2.2 Where new or existing sites occupied by Chiricahua leopard frogs occur, water shall not be exchanged between sites that support leopard frogs, bullfrogs, crayfish, or fish by Coconino NF employees, permittees, or anyone operating under USFS authorization.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 The Coconino NF shall monitor incidental take resulting from the proposed action and report their findings to the FWS. Incidental take (implementation) monitoring shall include information such as when or if the project was implemented, whether the project was implemented as analyzed in the site-specific BO (including conservation measures, and best management practices), breeding season(s) over which the project occurred, relevant frog survey information, and any other pertinent information as described in the site specific BO about the project's effects on the species.
- 3.2 Annual reports, which will include this species, shall be sent to the appropriate local FWS Ecological Services field office by March 1st of each year.

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 the AESO. Care must be taken in handling sick or injured animals to ensure effective treatment and in handling dead specimens to preserve the biological material in the best possible state. If possible, the remains of intact species shall be provided to the AESO. If the remains of the species are not intact or are not collected, the information noted above shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should the treated species survive, contact our office regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the 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 CH, to help implement recovery plans, or to develop information.

1. We recommend that the Coconino NF implement Forest-specific actions within the Recovery Plan (FWS 2007).

2. We recommend that the Coconino NF work with us and AGFD to reintroduce the CLF to suitable habitats identified through habitat assessment and surveys conducted throughout the range of the frog on the Coconino NF.
3. We recommend the Coconino NF work with us and the AGFD to begin an aggressive program to control non-native aquatic organisms on the Forest, particularly bullfrogs, non-native fish, and crayfish.
4. We recommend that the Coconino NF work with us to develop a programmatic environmental assessment and BO to cover tank renovation and maintenance on the Coconino NF.
5. We recommend that the Coconino NF continue to identify factors that limit the recovery potential of Chiricahua leopard frogs on lands under their jurisdiction and work to correct them.

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.

ARIZONA CLIFFROSE

STATUS OF THE SPECIES

Description

The Arizona cliffrose (*Purshia subintegra*) is a long-lived evergreen shrub that is a member of the rose family (Rosaceae), reaching 5 to 6 feet (1.5-1.8 meters) in height. Its bark is pale gray with young twigs covered with dense, soft, glandless, white hairs. Leaves are also glandless and simple, usually no lobes (but occasionally one or two lobes), with smooth and revolute leaf margins. Flowers contain white or yellow petals about 0.4 inches (1 centimeter) long.

Arizona cliffrose is a rare Arizona edaphic endemic, restricted to nutrient deficient calcareous soils (Anderson 1986, 1993). The species grows on gentle to steep slopes, open basins, and limestone ledges and outcrops. As stated in the June 2000 General Species Information worksheet available on the Arizona Ecological Services Field Office website, all four localities of this species are in central Arizona below the Mogollon Rim. These known sites include the Burro Creek drainage (Mohave County), Horseshoe Lake (Maricopa County), Verde Valley (Yavapai County), and the San Carlos Indian Reservation near Bylas (Graham County).

Legal Status: On May 29, 1984, the Arizona cliffrose was listed as an endangered species under the Endangered Species Act, without CH (USFWS 1984). The Arizona Native Plant Law (A.R.S Chapter 7, Article 1) also protects the Arizona cliffrose. The provisions of the Arizona Native Plant Law significantly strengthen the protections offered by section 9 of the ESA because a

violation of the Arizona Native Plant Law is also a violation of the ESA. Additionally, the Lacey Act, as amended in 1982, provides some protection for the Arizona cliffrose. Under this law, it is prohibited to import, export, sell, receive, acquire, purchase, or engage in the interstate or foreign commerce of this plant. The Arizona cliffrose Recovery Plan was completed in 1995.

Distribution and Abundance

This species has narrow habitat requirements and occurs in four widely separated areas in central Arizona as stated above. These four known populations are spread across a 200-mile zone of central Arizona within an elevation range of 2,100-3,600 feet (650-1,100 meters). Each of the four populations of Arizona cliffrose is genetically variable, having distinct biological, ecological, and morphological characteristics (Mount and Logan 1992). Certain morphological characteristics, especially the frequency and degree of leaf lobing, and the density of leaf and flower stipitate glands, differ among the populations (Reichenbacher 1992).

The largest known populations of Arizona cliffrose occur in the Verde Valley and near the Burro Creek population, the latter occurring on lands administered by the Bureau of Land Management (BLM). The 1,113-acre Clay Hills Area of Environmental Concern (ACEC) contains the largest subpopulation of Arizona cliffrose in the Burro Creek area (T. 14 N., R. 11 W., Secs. 1, 2, 11, and 12). BLM also has recently discovered two smaller subpopulations (BLM 1990).

Little is known of the Arizona cliffrose population near Bylas on the San Carlos Apache Indian Reservation. However, based on the presumed extent of appropriate habitat, this population may be rather large. The Horseshoe Lake population includes several subpopulations and is found on the Tonto NF. The Verde Valley population is the largest, covering over 1,000 acres (USFWS 1995). A portion of the Verde Valley population is found on the Coconino NF (as discussed below); and the remaining habitat is management by Yavapai County (formerly Arizona State Land Department), Dead Horse Ranch State Park, and private individuals. A graduate student, Greg D. Goodwin, from Northern Arizona University recently completed a survey and census of the *Purshia subintegra* plants in the area west of U.S. Highway 89 which includes the Verde Valley Botanical Area, adjacent USFS lands, Dead Horse Ranch State Park and Yavapai county lands. Additionally, he documented data from the Arboretum at Flagstaff, who have several demography sites in the area. As a result, the population is estimated at approximately 9,000 plants. These data are on file at the Coconino NF. Mr. Goodwin anticipates completion of this project in February 2012.

Habitat

As stated in the June 2000 General Species Information worksheet available on the Arizona Ecological Services Field Office website, the species grows only on tertiary limestone lakebed deposits. The distinctive white soil color of these deposits can be seen from a distance. Each of the sites where the four populations occur 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, and contain a locally unique vegetative community (Anderson 1993).

Life History

The Arizona cliffrose appears to be a long-lived shrub, capable of a large reproductive output, but recruitment rates vary among populations. For a detailed discussion of Arizona cliffrose life history, please refer to the 2005 BO.

Reasons for Listing

The FWS listed the Arizona cliffrose as an endangered species under the Endangered Species Act on May 29, 1984. The following information is reiterated from the 2005 BO. Major reasons for listing the Arizona cliffrose as endangered include urbanization, recreation, road and utility line construction, mineral exploration, mining, and livestock and wildlife browsing. The Cottonwood population occurs in a developing urban/suburban area, where the most serious impacts stem from land development, road construction, and recreational activities. Soils supporting Arizona cliffrose populations contain high quality bentonite, a type of clay with numerous commercial uses. Mining and mineral exploration has impacted the Burro Creek and Horseshoe Lake populations. Additionally, many Arizona cliffrose populations are subject to impacts from livestock and/or wildlife grazing.

Threats: Threats to the species include livestock and burro grazing, mineral exploration and development, construction and maintenance of roads and utility rights-of-way, recreation, off-road vehicle use, urbanization, pesticides, poor reproduction (e.g., recruitment) and hybridization. The relative importance of these threats varies from population to population.

Climate Change

The 2011 BA states that no research has been initiated related to the specific effects of climate change on this species but that there are no expectations of measurable changes in climate within the temporal bounds of the proposed action. However, Maschinski et al. (2006) state that global warming conditions are likely to reduce the carrying capacity of many rare species' habitats; their models also suggest that the Arizona cliffrose population in the Verde Valley is slowly declining and will be at greater risk of extinction with global warming. With decreasing population size, the risks of genetic erosion and extinction increase, and these risks become even higher when habitat is fragmented (Young & Clarke 2000 *in* Maschinski et al. 2006). Additional studies will be necessary in order to better understand how climate change will affect the Arizona cliffrose.

Despite the current limits of climate change effects analysis, the 2011 BA also states that the USFS Southwestern Region has developed guidance for addressing climate change in NF LRMP revisions, which are broad and general in scope and which rely on adaptive management as climate change science evolves. Therefore, as we build a better understanding of the potential effects resulting from climate change on Arizona cliffrose distribution, FWS expects that this increased knowledge will be incorporated into the revisions of the Coconino NF LRMP.

Recovery Actions

The following information regarding cliffrose conservation actions occurring on the Coconino NF is reiterated from your 2011 BA. Jenkins in 1991, Lutz in 1994-1995, Hanneman in 1995, and Baker and Wright in 1995 conducted surveys in the vicinity of Cottonwood in the Verde Valley and confirmed the distribution of the previously known population, but did not extend the known range (Phillips *et al.* 1995).

The USFS has closed and rehabilitated an unofficial target shooting range, which destroyed an unknown number of plants and acres of habitat. Construction of fences, parking areas, and signs has eliminated much of the impact from OHV users who drove through the population, ignoring signs or cutting fences to gain access to prohibited areas.

Numerous meetings have been held since June 1995 regarding the impacts from existing and proposed trails, types of recreation uses, and proposed development in the vicinity of Dead Horse Ranch State Park. These meetings have included the participation of personnel from the USFS, State Park, FWS, and others. Surveys on the NF have been conducted for Arizona cliffrose, other sensitive plant species, and archeological and historical resources. There has been ongoing informal consultation with USFWS on this issue.

The USFS is working with State and local planners, and other entities such as Dead Horse Ranch State Park, ADOT, and private landowners to develop more comprehensive and ecosystem-based plans for the Verde Valley. These efforts should result in establishing management which will lessen the human impacts on this fragile ecosystem (Phillips *et al.* 1995).

The Coconino NF revised the Windmill Allotment Management Plan in 1992 to better accommodate Arizona cliffrose recovery needs. This included excluding livestock from the Rocking Chair and Cornville pastures of that allotment (USFWS 1995). Managing livestock in the Windmill Allotment using the LRMP standards and guidelines is providing increased protection for plants and habitat through use of fences, monitoring, and grazing regimes.

In 1995, a 10-year permit was issued for the Windmill Allotment under the Rescission Bill (Burns Amendment). This permit included some interim mitigation measures including fencing the Verde Valley Botanical Area, no grazing of Duff Flat and Gyberg pastures from 4/1-7/31, restrict holding pasture use to 10 days or less, sweep the Mooney Trail of cattle after two days of trailing cattle up or down the Mogollon Rim and monitor MSO and Arizona cliffrose habitat. As a result of this analysis, the boundary of the Verde Valley Botanical Area was fenced and is no longer utilized in the allotment. A monitoring plan was also established to monitor utilization of Arizona cliffrose by cattle. After several attempts to monitor the plants, the forest decided to fence the southern portion of the Gyberg pasture to exclude cattle from the population. As a result, that area is no longer utilized as part of the allotment. Only occasional intrusions by cattle occur in these areas, generally through gates that are occasionally left open but recreationists and others. These cattle are generally removed from the areas mentioned above by the permittee as soon as they are detected. These changes have mostly occurred through modification of the Annual Operating Plan but will be evaluated during an upcoming NEPA analysis currently planned for fiscal year 2012.

The Coconino LRMP designated the 1,140 ac (470 ha) Verde Valley Botanical Area for the protection of the unique plant community, which includes Arizona cliffrose. The management of the Botanical Area has been considered in all other actions. In addition, Forest personnel were involved in discussions regarding the Dead Horse Ranch State Park Phase 3 Roadway Improvements (Phillips 1993), as was the FWS. These discussions and field meetings resulted in modifications to the development plans with increased protection for Arizona cliffrose and its habitat, both within the Botanical Area and adjacent to it in the State Park.

Areas known to contain an important part of the Cottonwood population were considered for inclusion in the Bar-T-Bar land exchange. In 1991, additional surveys documented the presence of Arizona cliffrose and several USFS sensitive species in the land exchange area (Jenkins 1991). These lands were withdrawn from the exchange. The Coconino NF has indicated that no lands containing endangered species will be exchanged out of federal ownership (USFWS 1995).

In 1996, a five-year research program on Arizona cliffrose was conducted through the Arboretum at Flagstaff research facility. Research was funded by ADOT as mitigation for the U.S. Highway 89A expansion project and the Mingus Avenue bypass project in the Verde Valley. As mitigation for these road expansions, the Arboretum at Flagstaff cultivated Arizona cliffrose plants for return to sites along the roadway. However, several sites were unsuitable due to steep road cuts. The Arboretum at Flagstaff and the USFS found suitable locations for some of these plants on NFS lands adjacent to Dead Horse State Park in Cottonwood. In April 2003, personnel from the Arboretum, USFS, and numerous volunteers planted Arizona cliffrose and some associated USFS Sensitive plants on the parcel. These plants will be cared for and irrigated through a cooperative effort between the Arboretum, USFS, Dead Horse State Park, and volunteers (B. Phillips, Coconino NF, e-mail pers. comm. with C. McDonald 5 September 2003).

The Arboretum at Flagstaff established 30 demographic plots at four sites in the Verde Valley in 1996 and monitored them yearly until 2001. Results of these plots and other studies on *Purshia subintegra* can be found in the yearly reports prepared by the Arboretum that are on file at the Coconino NF. Some of these studies include genetics, cultivation requirements, and perceived threats (B. Phillips, Coconino NF, e-mail pers. comm. with C. McDonald 5 September 2003).

The Coconino NF, Red Rock RD has initiated several actions since 1996 that benefit Arizona cliffrose habitat. These actions include trail re-routing and rock placement to protect Arizona cliffrose along several trails in the area of Dead Horse State Park, photo monitoring along trails, and maintenance of fences to exclude cattle and OHVs from the Verde Valley Botanical Area. Other beneficial actions include maintenance and enhancement of vehicle closures along Rocking Chair Road and emergency consultation on illegally placed signs. District biologists initiated the emergency consultation, then coordinated placement of the signs to eliminate damage to Arizona cliffrose (B. Phillips, Coconino NF, e-mail pers. comm. with C. McDonald 5 September 2003).

The Red Rock Ranger District monitored trail use on the Lime Kiln Trail in 2010 using a series of photo points established in 1999. As a result of this monitoring, the district trail crew and volunteers performed maintenance on the trail, narrowing it back to its established tread, especially in areas containing Arizona cliffrose.

Coconino NF signed a decision notice implementing the Travel Management Rule in October 2011. As a result, cross-country vehicle travel is no longer allowable on most of the forest including the areas on the forest containing Arizona cliffrose. This eliminates impacts of motorized vehicles.

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 impacts 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.

Status of the Species in the Action Area

As you state in the 2011 BA, the Coconino NF has management responsibility for much of the Cottonwood population. Recruitment rates to maintain viable populations of Arizona cliffrose are not well documented or known; the Cottonwood population is shown to support a relatively large number of established seedlings (USFS 2004). The Cottonwood population has been the subject of several biological opinions as described in the 2005 BO. Among these, one was issued on July 8, 1996, for the State Route 89A Cottonwood to Sedona Construction Segment 2 project. Another was issued on March 9, 2001, for the Mingus Avenue Extension Project.

Factors Affecting the Species within the Action Area

The following factors affecting the species on the Coconino NF are reiterated from both the 2005 BO and the 2011 BA. Impacts on the Coconino NF near Cottonwood are typical of public lands near an urban fringe. There are informal roads and trails, unofficial sites for target shooting, and off-highway vehicle activity. Roads and highways passing through NFS lands require maintenance and upgrades to accommodate increasing traffic. Much of this activity is in Arizona cliffrose habitat with both direct and indirect effects to the population.

The Cottonwood population is in the Gyberg, Rocking Chair, and Cornville pastures of the Windmill Grazing Allotment. Fencing has excluded livestock from the Rocking Chair and Cornville pastures since 1992. The Allotment Management Plan allows up to 750 head of cattle in the Gyberg Pasture for 20-30 days every other year during the fall-spring grazing period. The use level set on forage species is 25 percent, which is below the level of 30 percent designated in the LRMP for areas of "Defer 2 years in 3 in Fair Range Condition." Monitoring has documented use levels below 25 percent and results have been reported to the FWS in those years when cattle have been in the area (D. Ward, Sedona Ranger District, Coconino NF, pers. Comm. 1996).

EFFECTS OF THE ACTION

The S&Gs listed in the Coconino NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs are related to the Arizona cliffrose and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species.

The 2005 BO included tables showing the S&Gs considered for each species' analysis and a ranking table summarizing the types of effects (lethal, sublethal, etc.) expected to result from the S&Gs. Because no new significant scientific information has become available on the Arizona cliffrose and there have been no changes in Forest policy or programs that would change the 2004 BA (USFS) and 2005 BO/CO (FWS) effects determination for this species, we hereby

incorporate by reference the ranking tables and effects analysis presented in the 2005 BO and provide a narrative summary below.

On the Coconino NF, Arizona cliffrose populations occur in management areas (MAs) 11 and 17. The management emphasis for MA11 is watershed condition, range management, wildlife habitat for upland game birds, and dispersed recreation. In MA 17 (which includes the Verde Valley Botanical Area), the emphasis is to maintain existing conditions and natural processes for public enjoyment, demonstration, and study.

Less than 23 percent of the S&Gs could cause mortality of Arizona cliffrose plants, while 34 percent of the S&Gs have positive effects for this species. The remaining 44 percent of the S&Gs have no effect on Arizona cliffrose or the S&Gs are too vague to analyze.

The majority of the S&Gs in the Engineering Program are beneficial to the Arizona cliffrose as they apply Forest-wide and concern road maintenance, road densities, and road closures to minimize or prevent resource damage and habitat intrusion. Similarly, the S&Gs in the Recreation, Heritage, and Wilderness Program benefit the Arizona cliffrose as well by minimizing resource damage due to trail and off-road vehicle use while also maintaining habitat by allowing for dispersed recreation. The S&Gs in the Watershed Management Program will provide benefits to cliffrose populations by maintaining healthy ecosystems as damaged watersheds are repaired and roads contributing to watershed degradation are obliterated.

Overall, the S&Gs pertaining to the Lands and Minerals Program do not provide enough detail to allow for adequate analysis. Specific S&Gs, however, dealing with utility corridors and urban development do not have enough protections in place for listed species' habitat and can lead to the destruction of plants and habitat. Thus, six S&Gs from this program area were found to have negative consequences for the cliffrose. In addition, the continued implementation of two S&Gs within the Rangeland Management Program will have negative effects on the cliffrose as plants are palatable and grazing is authorized in cliffrose habitat. These S&Gs allow for the use of seeding and prescribed burns to increase forage which can also lead to habitat modification and possible mortality of plants. Four additional S&Gs related to the Rangeland Management Program also direct grazing actions to maximize full range capacity and to use salt to redirect livestock away from riparian areas, but potentially into upland areas that support cliffrose populations. These four S&Gs can degrade habitat and cause plant mortality, and, thus, were rated as lethal to the Arizona cliffrose. Lastly, three S&Gs pertaining to the Wildlife, Fish, and Rare Plants Program were found to have negative consequences for the cliffrose as they direct the Forest to use seeding and prescribed burns to improve forage; these actions may degrade cliffrose habitat and cause direct mortality to the plant.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of MSOs and northern goshawks. The S&Gs: promote healthy forest ecosystems; properly functioning watersheds; and riparian and aquatic systems (USFS 2004). There is only one S&G (1510) that applies to the Arizona cliffrose. In addition, we found that the guidelines used by the USFS for the northern goshawk do not appreciably affect this species.

The one S&G from the 1996 Regional Amendment that applies to Arizona cliffrose states that forage use by grazing ungulates will be maintained at or above a condition which assures the recovery and continued existence of listed species. The implementation of this S&G, which is applicable to the Rangeland Management Program, should preserve and protect, at a minimum, the known locations of Arizona cliffrose on the Coconino NF.

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 ESA.

As stated in the 2005 Biological Opinion, Arizona cliffrose populations are not restricted to the Coconino NF, but also occur on adjacent state trust lands and lands managed by a state park. The Cottonwood population has already been affected by urban development and road maintenance and construction. These activities are likely to continue in the future as the Verde Valley continues to grow. The Bylas population is on the San Carlos Indian Reservation. That population will most likely be affected by development and infrastructure demands on the reservation. Livestock grazing on the reservation may be affecting the Bylas population. There would be no cumulative effects to the Tonto NF because the Arizona cliffrose locations within that forest are restricted to federal ownership.

CONCLUSION

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 the FWS's biological opinion that the Coconino NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Arizona cliffrose. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. CH for this species has not been designated; thus none will be affected.

Arizona cliffrose 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). These four known populations are spread across a 200-mile zone of central Arizona. The population near Burro Creek is on BLM land and is within a protected area. The Horseshoe Lake population is on the Tonto NF and a portion of the Verde Valley population is on the Coconino NF, with the remaining portions on lands managed by the Arizona State Land Department. The Bylas population is on the San Carlos Apache Reservation. The BLM and Coconino NF populations have the highest level of protection and are monitored on a regular basis. These populations seem to be stable, whereas the status of the other two populations is unknown.

Cumulative effects considered in our analysis include the impacts of urban development, road maintenance, and road construction on the Cottonwood population located on state lands. These activities are likely to continue in the future as the Verde Valley continues to grow. The Bylas population on the San Carlos Indian Reservation will most likely be affected by development and infrastructure demands of the reservation. Livestock grazing on the reservation may also be affecting the Bylas population.

As discussed above, the FWS anticipates that adverse effects to the Arizona cliffrose (including habitat modification and mortality) are reasonably certain to occur under direction of the Coconino NF LRMP and 1996 Regional Amendment. However, the FWS does not believe that such activities will rise to the level of jeopardy for the following reasons:

- The Coconino NF has conducted many activities to conserve and protect Arizona cliffrose. These include, but are not limited to, numerous surveys, support of research on this species on USFS lands, and the creation of a botanical area with management prescriptions designed to protect this species and the fragile habitat on which it occurs.
- Standard and guideline 324 permits Arizona cliffrose habitat to be surveyed and evaluated. This S&G also allows for the reintroduction of threatened and endangered species in accordance with approved recovery plans.
- According to S&G 384, surface occupancy is prohibited where listed species exist.
- In accordance with S&Gs for Management Area 17 (Verde Valley Botanical Area), off-road driving, timber harvest, and fuelwood cutting are prohibited.
- Under S&G 1510, the habitat needs of listed species will be taken into consideration and forage use will not preclude recovery or the continued existence of listed species.

Therefore, with the implementation of these beneficial S&Gs within the Coconino NF LRMPs and the conservation efforts conducted by the Forest, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Arizona cliffrose.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA 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 CH, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Develop a monitoring plan for populations of Arizona cliffrose on the Coconino NF.
2. Implement the recommendations in the 1995 Arizona Cliffrose Recovery Plan.

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

DISPOSITION OF DEAD OR INJURED LISTED SPECIES

Upon locating a dead, injured, or sick listed species initial notification must be made to the Fish and Wildlife Service'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.

REINITIATION NOTICE

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 CH 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 CH not considered in this opinion; or (4) a new species is listed or CH 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.

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Arizona cliffrose

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Appendix A: Not Likely to Adversely Affect Determinations

Appendix A documents our concurrence with your determination of “may affect, is not likely to adversely affect” for the species and CH listed below. In addition, the FWS has provided a brief reasoning for these concurrences.

California condor (*Gymnogyps californianus*) Non-essential, Experimental §10(j) Population; Endangered

The FWS concurs with your determination that the continued implementation of the S&Gs within the Coconino NF LRMP is not likely to jeopardize the experimental, non-essential population of California condors and not likely to adversely affect the fully listed species for the following reasons:

1. The USFS contributed funding to the Peregrine Fund to help increase the tracking efforts of the released condors. Past tracking efforts have shown that condors have been found near the San Francisco Peaks outside of Flagstaff on the Coconino NF. The California condor is not closely associated with any particular vegetation or aquatic community on the Coconino NF, but uses suitable cliff faces and trees for roosting. There are no known nest sites on the Coconino NF. Ingestion of lead shot is the main threat to the condor, but hunting is managed by the AGFD rather than the Coconino NF.
2. The Coconino NF LRMP includes S&Gs related to enhancing populations of game animals which is viewed as positive for the condor because this would likely increase populations of wild ungulates and increased food for the condor.
3. Many of the resource activities undertaken by the Coconino NF in conformance to LRMP guidance are beneficial to the condor (specifically, those S&Gs related to Rangeland Management; Wildlife, Fish, and Rare Plants; and Forestry & Forest Health).
4. Another threat to the California condor is collisions with power lines. The Coconino NF LRMP includes S&G 396 that requires power lines and towers to be built (construction or reconstruction) to specifications compatible with raptor use. We believe that implementation of this S&G will avoid adverse impacts from new power lines.
5. By definition, an experimental, non-essential population is not essential to the continued existence of the species; therefore, no proposed action impacting the experimental, nonessential population so designated under the ESA §10(j) could lead to a jeopardy determination for the entire species.

Southwestern willow flycatcher (*Empidonax traillii extimus*), Endangered with designated and proposed critical habitat

The FWS concurs that, at the plan level, activities within the Coconino NF’s LRMP programs have insignificant effects to the species and thus, are not likely to adversely affect the flycatcher. In addition, although a small section of proposed critical habitat exists on the Coconino NF, we concur with your determination that the continued implementation of the S&Gs within the LRMP is not likely to destroy or adversely modify flycatcher designated and proposed CH.

1. Riparian areas on the Forest have been surveyed for flycatcher occupancy, and detections have been sporadic (a male flycatcher in 1993 and 2007 at Dry Beaver Creek, a male flycatcher in 1998 at Sheepshead; a male in 1993 at Wet Beaver Creek; and a male in 1997 at West Clear Creek). Sites are monitored almost annually since 1994 because flycatcher habitat exists at the Sheepshead and Stagesop at Dry Beaver Creek; however, no nesting has been documented on the Coconino NF.
2. Many of these riparian areas mentioned above are excluded from livestock grazing according to the USFS.
3. Standards and Guidelines within the Coconino NF LRMP were found to be positive for conservation of riparian systems from Program activities.

Yuma clapper rail (*Rallus longirostris yumanensis*), Endangered

The FWS concurs with your determination that the continued implementation of the S&Gs within the Coconino NF LRMP, may affect, but is not likely to adversely affect the Yuma clapper rail for the following reasons:

1. The Yuma clapper rail is not known to occur on the Coconino NF, although it has been observed wintering adjacent to the Forest on the Tavasci Marsh.
2. There are specific S&Gs for the Coconino NF LRMP that provide for protection of riparian and wetland areas and threatened and endangered species habitat.

Colorado pikeminnow (*Ptychocheilus lucius*) Non-essential, Experimental §10(j) Population

The FWS concurs with your determination that the continued implementation of the S&Gs within the Coconino NF LRMP is not likely to jeopardize the experimental, non-essential population of Colorado pikeminnow for the following reasons:

1. The main limiting factors for this species in the lower Colorado River basin include loss of habitat due to non-USFS impoundments leading to alterations in flow regimes and historical stocking of non-native fish by state agencies and private landowners. These factors are unrelated to USFS management.
2. While USFS management can have effects to water quality and quantity, the impacts are insignificant given the implementation of established S&Gs, ongoing conservation measures, and the full range of the species in the Colorado River Basin.
3. The USFS has made efforts to acquire water rights to improve the flow regime on the Verde River as well as monitor non-native fish populations (in partnership with University of Arizona, ADGF and Rocky Mountain Research Station) in relation to the Colorado pikeminnow. These monitoring activities are being used to further guide management in the future to improve habitat conditions that will benefit Colorado pikeminnow.
4. By definition, an experimental, non-essential population is not essential to the continued existence of the species; therefore, no proposed action impacting the experimental, nonessential population so designated under the ESA_§ 10(j) could lead to a jeopardy determination for the entire species.

Gila trout (*Onchorynchus gilae*), Threatened

The FWS has determined that the continued implementation of the S&Gs within the Coconino NF LRMP may affect, but is not likely to adversely affect the Gila trout for the following reasons:

1. Currently, no Gila trout exist on the Coconino NF. When the BA for the implementation of the Coconino NF LRMP was prepared, the USFS was in the process of proceeding with the West Fork Oak Creek project planning which proposed to remove existing non-native fish, build a fish barrier, and re-introduce Gila trout. In anticipation of this project, the USFS evaluated the effects of the Coconino NF S&Gs on this species and proposed in the BA that the continued implementation of the LRMP may affect and is likely to adversely affect the Gila trout, once it is reintroduced. However, the proposed reintroduction project has been delayed for an unforeseen amount of time due to being present within a Wilderness and Wild and Scenic Rivers area, due to restriction and analyses required by these Acts to renovate streams for Gila trout. According to discussions between USFS and the FWS, it is highly unlikely that the proposed reintroduction project will be implemented during the life of the LRMP (R. Maes, personal communication, 9 December 2011). Therefore, the FWS concludes that the proposed action is not likely to adversely affect the Gila trout.

Razorback sucker (*Xyrauchen texanus*), Endangered

The FWS concurs with your determination that the continued implementation of the S&Gs within the Coconino NF LRMP may affect, but is not likely to adversely affect the razorback sucker for the following reasons:

1. The most recent supplement to the razorback sucker recovery plan states that the primary threats to the species are: (1) streamflow regulation; (2) habitat modification; (3) predation by non-native fish species; and, (4) pesticides and pollutants (USFWS 2002). Sediment has not been identified as a threat to the species. For example, the species evolved in riverine systems with high sediment loads. The Colorado River was named by early Spanish explorers as *Río Colorado* for the red colored silt the river carried from the mountains. Issues concerning sediment associated with livestock grazing have been stated as potentially having adverse effects to razorback suckers (see USFWS 2010). Razorback suckers however, evolved with extreme seasonal variation in levels of sediment in the Colorado River and its associated tributaries (USFWS 2010). Thus, the difficulty lies in the ability to meaningfully measure, detect, or evaluate sediment having impacts to razorback suckers from livestock grazing or other USFS activities that could cause increased sediment in riverine systems occupied by razorback suckers. At the plan level, activities within the Coconino NF's LRMP programs have insignificant effects to the species and thus, are not likely to adversely affect the razorback sucker. Insignificant effects relate to the size of the impact which correlates to the ability to meaningfully measure or detect such effects (USFWS and NMFS 1998b:3-12). How standards and guidelines within a Forest's LRMP are interpreted and ultimately implemented on the ground however will govern whether impacts to the razorback sucker will occur.

2. We recommend that the USFS utilize their 7(a)(1) responsibilities and improve the status of the razorback sucker.
3. Established S&Gs and on-going recovery actions minimize effects from USFS management that may affect water quality and quantity.
4. The primary limiting factor throughout the razorback sucker's range is due to the impoundments that lead to alterations in flow regimes, as well as historical stocking of non-native predators and competitors by state agencies and private landowners; these activities are unrelated to USFS management and are outside the scope of the proposed action.
5. The recent LRMP amendment related to the Verde River WSR CRMP (S&G 2050 MA-9) has strengthened the Forest's management objectives for activities along the river.

Razorback sucker designated Critical Habitat

The FWS concurs with your determination that the LRMP for the Coconino NF will not destroy or adversely modify critical habitat of the razorback sucker for the following reasons:

1. Established S&Gs and on-going recovery actions minimize effects from USFS management that may affect water quality and quantity.
2. Effects to the primary constituent elements of CH for the razorback sucker are insignificant and discountable because the S&Gs for most of the programs is sufficient to avoid activities that may adversely affect razorback sucker habitat.
3. The primary limiting factor through the razorback sucker's range is due to the impoundments that lead to alterations in flow regimes, as well as historical stocking of non-native predators and competitors by state agencies and private landowners; these activities are unrelated to USFS management and are outside the scope of the proposed action.
4. The recent LRMP amendment related to the Verde River WSR CRMP (S&G 2051 MA-1C, 1D, and 4D) has strengthened the Forest's management objectives for activities along the river.

San Francisco Peaks ragwort (*Packera franciscana*), Threatened

The FWS concurs with your determination that the continued implementation of the S&Gs within the Coconino NF LRMP, may affect, but is not likely to adversely affect the San Francisco Peaks ragwort for the following reasons:

1. Conservation measures for the plant are addressed in the Alpine Tundra Management Plan, which was incorporated into the Coconino NF LRMP.
2. Due to heavy trail use, the alpine area was closed to any off-trail traffic in 1984 and the alpine tundra on Agassiz Peak was closed to trail hiking in 1985. Also, there is no livestock grazing in the alpine tundra.
3. There are specific management directions (S&Gs 326, 418, and 423) for the protection of this species and critical habitat in the Coconino NF LRMP.

San Francisco Peaks ragwort designated Critical Habitat

The FWS concurs with your determination that the LRMP for the Coconino NF will not destroy or adversely modify critical habitat of the San Francisco Peaks ragwort for the following reasons:

1. There are specific management directions (S&Gs 326, 418, and 423) for the protection of critical habitat for this plant in the Coconino NF LRMP.
2. The alpine tundra within critical habitat on Agassiz Peak is closed to trail hiking.
3. Per the Coconino NF LRMP, the tundra and upper mixed conifer/spruce-fir slopes within the Kachina Peaks Wilderness are closed to grazing.
4. The tundra and upper mixed conifer/spruce-fir slopes within the Kachina Peaks Wilderness are closed to grazing and are not part of any grazing allotment.

Appendix B: Abbreviations and Acronyms

ADOT – Arizona Department of Transportation

AGFD – Arizona Game and Fish Department

AZ - Arizona

BA – Biological Assessment

BLM – Bureau of Land Management

BMPs – Best Management Practices

BO – Biological Opinion

BO/CO – Biological/Conference Opinion

CA – Consultation Agreement

CH - Critical Habitat

CHU – Critical Habitat Unit

CLF – Chiricahua leopard frog

CMs – Conservation Measures

CMP – Cooperative Management Plan

CO – Conference Opinion

CRMP – Comprehensive River Management Plan

EMU – Ecological Management Unit

ESA – Endangered Species Act

ft. - feet

FWS – U.S. Fish and Wildlife Service

GIS – Geographical Information Systems

LAA – May Affect, Likely to Adversely Affect

LCR – Little Colorado River

LRMP – Land and Resource Management Plans (Forest Plans)

MA – Management Area

mi. – miles

MIS – Management Indicator Species

MSO – Mexican spotted owl

NA – Not Applicable

NE – No Effect

NF – National Forests

NEPA – National Environmental Policy Act

NFMA – National Forest Management Act of 1976

NFS – National Forest System

NG – National Grasslands

NLAA – May Affect, Not Likely to Adversely Affect

NLDAM – Not Likely to Destroy or Adversely Modify

NLJ – Not Likely to Jeopardize

NM – New Mexico

NMGFD – New Mexico Game and Fish Department

OHV – Off Highway Vehicle

PAC – Protected Activity Center

PCE – Primary Constituent Element

RD – Ranger District

RNA – Research Natural Area

S&Gs – Standards and Guidelines

Sq - square

TNC – The Nature Conservancy

UGM – Upper Gila Mountains Recovery Unit

U.S. – United States

U.S.D.A. – U.S. Department of Agriculture

USFS – U.S. Forest Service

WFRP – Wildlife, Fish, and Rare Plants Program

WSR – Wild and Scenic River