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In reply refer to:

R2/ES-TE
Cons. #2012-F-0009

March 30, 2012

Mr. Corbin L. Newman, Jr., Regional Forester
U.S. Forest Service, Southwestern Region
333 Broadway SE
Albuquerque, New Mexico 87102

Ms. Betty Mathews, Forest Supervisor
344 South Cortez Street
Prescott, Arizona 86303-4398

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 Prescott NF of the Southwestern Region. This BO will be in place until the Prescott NF revises its LRMP and subsequently completes section 7 consultation.

Mr. Corbin L. Newman, Jr., Regional Forester
Ms. Betty Mathews, 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,

Jean A Calhoun

for 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
Assistant Field Supervisor, Fish and Wildlife Service, Flagstaff, AZ

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BIOLOGICAL AND CONFERENCE OPINION

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

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

Cons. #2012-F-0009

March 30, 2012

Executive Summary

The accompanying document transmits the biological (BO) and conference opinion (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, as amended (ESA or Act). This opinion addresses the USFS's continued implementation of the Land and Resource Management Plan (LRMP) for the Prescott National Forest (NF) of the Southwestern Region (proposed action), and their effects to seven federally-listed species and five designated or proposed Critical Habitats (CHs). The consultation approach used to complete this consultation was to the same as that used in the 2004/2005 consultation (please refer to the executive summary in the 2005 BO/CO). We are hereby incorporating the 2004/2005 Biological Assessment (BA) and BO/CO 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 critical habitat units (CHUs).

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 in the 2005 consultation. 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. 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 NF LRMP. The resulting BO/CO issued by the FWS will assign incidental take, reasonable and prudent measures, and terms and conditions for each individual NF LRMP. This BO/CO will then be in place until the Prescott NF revises its LRMP.

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 seven species addressed in this BO/CO that are within the action area of the Prescott 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 opinion and conference opinion (BO/CO) responds to the U.S. Forest Service's (USFS) request for re-initiation 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 BO/CO which addresses the USFS's continued implementation of the Land and Resource Management Plan (LRMP) for the Prescott National Forest (NF) of the Southwestern Region, and its effects to seven federally-listed species and five designated or proposed critical habitats (CH). On April 17, 2009, the USFS requested re-initiation of the 2005 LRMP BO/CO due to the belief that incidental take for the MSO (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, and also requested consultation for the ocelot, a species now considered present in small numbers in Arizona. The FWS acknowledged the requests 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 reinitiation 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 NF LRMP. Therefore, the FWS's resulting BO/CO will issue an incidental take statement, reasonable and prudent measures, and terms and conditions for each individual NF LRMP. This BO/CO will then be in place until each of the NFs revises their LRMPs.

<u>Prescott National Forest</u>
This programmatic consultation examines the effects on seven species and five designated or proposed CH from the direction and guidance provided within the Prescott NF LRMP. The following species are included within this BO/CO for which the USFS and FWS agreed would be affected by the proposed action.

Birds
Mexican spotted owl (*Strix occidentalis lucida*) Threatened with designated critical habitat
Southwestern willow flycatcher (*Empidonax traillii extimus*) Endangered with designated and proposed critical habitat

Fish
Colorado Pikeminnow (*Ptychocheilus lucius*) 10(j) non-essential experimental
Gila chub (*Gila intermedia*) Endangered with designated critical habitat
Gila trout (*Oncorhynchus gilae*) Threatened
Razorback sucker (*Xyrauchen texanus*) Endangered with designated critical habitat
Spikedace (*Meda fulgida*) Endangered 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/CO 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, the MSO was listed as threatened. On September 6, 1995, the USFS requested initiation of formal consultation on the 11 NF 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 (U.S. Fish and Wildlife Service 1996a). The FWS's Reasonable and Prudent Alternative to the existing LRMPs advised the USFS to implement the 1995 Recovery Plan for the MSO. This opinion was litigated in US 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 BO on the USFS's June 1996 Regional Amendment to the LRMPs for the MSO. The 1996 Regional Amendment directs the implementation of the Recovery Plan for the MSO, 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 (U.S. Fish and Wildlife Service 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 BO/CO on the USFS's 1996 Regional Amendment to the LRMPs for all federally listed species other than the MSO (U.S. Fish and Wildlife Service 1997). This BO 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 reinitiate formal consultation on the 11 NF LRMPs for all federally listed species.

- On January 13, 2003, the FWS finalized a BO 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 for 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 MSO opinion and the 1997 opinion for all other federally listed species on the 11 NFs. The USFS provided the FWS with the final BA for the Continued Implementation of the LRMPs for the Eleven NFs and National Grasslands (NGs) of the Southwestern Region (U.S. Forest Service 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 BA. 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 BA 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-BA 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 BO.

- On June 10, 2005 the FWS provided the USFS with a final programmatic BO.

- 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 re-initiation on the MSO and followed up with a clarification letter acknowledging FS request to reinitiate consultation for all other species, including the ocelot on August 9, 2010.

- A CA between the USFWS 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/CO is the implementation of the Prescott 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 individual NF LRMPs since the 2004 LRMP BA (See Appendix 4 for a complete list of S&Gs analyzed in the 2011 BA). This consultation will be in place until the Prescott NF completes a revised LRMP at which time they will re-consult with the FWS.

The LRMPs direct 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/CO.

The LRMPs and the 1996 Regional LRMP Amendment described long-range management strategies for the NFs and National Grasslands (NG) in the USFS Southwestern Region. 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 LRMPs do 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 LRMPs (S&Gs) and they must meet site-specific National Environmental Policy Act (NEPA) and ESA requirements.

This consultation on the LRMPs 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 LRMPs. 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/CO 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/CO 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/CO 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/CO have been exceeded.

DESCRIPTION OF THE ACTION AREA

The Action Area for this BO/CO is defined as all lands that the Prescott NF encompasses in the Southwestern Region of the USFS, plus adjacent lands that the proposed action may directly or indirectly affect. The Prescott NF covers approximately 1.25 million acres (ac) around the city of Prescott, Arizona. Elevations range from 3,000 to 8,000 feet (ft). At the lowest elevation, the primary vegetation is of the Sonoran Desert type. As the elevation rises, chaparral becomes common, followed by piñon pine and juniper. Above that, Ponderosa pine dominates the landscape. There are eight designated wilderness areas: Apache Creek, Castle Creek, Cedar Bench, Juniper Mesa, Pine Mountain, Sycamore Canyon, and Woodchute. The Forest also has the Verde River designated as a Wild and Scenic River (WSR). The Forest is divided into three ranger districts: Bradshaw, Chino Valley, and Verde.

Climate Change

According to the Intergovernmental Panel on Climate Change (IPCC 2007) "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." Average Northern Hemisphere temperatures during the second half of the 20th century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1300 years (IPCC 2007). It is very likely that over the past 50 years cold days, cold nights and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent (IPCC 2007). Data suggest that heat waves are occurring more often over most land areas, and the frequency of heavy precipitation events has increased over most areas (IPCC 2007).

The IPCC (2007) predicts that changes in the global climate system during the 21st century are very likely to be larger than those observed during the 20th century. For the next two decades a warming of about 0.2°C (0.4°F) per decade is projected (IPCC 2007). Afterwards, temperature projections increasingly depend on specific emission scenarios (IPCC 2007). Various emissions scenarios suggest that by the end of the 21st century, average global temperatures are expected to increase 0.6°C to 4.0°C (1.1°F to 7.2°F) with the greatest warming expected over land (IPCC 2007).

Localized projections suggest the southwest may experience the greatest temperature increase of any area in the lower 48 States (IPCC 2007), with warming in southwestern states greatest in the summer (IPCC 2007b). The IPCC also predicts hot extremes, heat waves, and heavy precipitation will increase in frequency (IPCC 2007). There is also high confidence that many semi-arid areas like the western United States will suffer a decrease in water resources due to climate change (IPCC 2007), as a result of less annual mean precipitation and reduced length of snow season and snow depth (IPCC 2007b). Milly et al. (2005) project a 10–30 percent decrease in precipitation in mid-latitude western North America by the year 2050 based on an ensemble of 12 climate models.

The increase in global temperature is already putting pressure on ecosystems and the plants and animals that co-exist in those systems. Warmer temperatures during the second half of the 20th century have begun to shift the growing season in many parts of North America by increasing it

as much as two weeks (Regonda et al. 2005). In addition, Spring is coming earlier. This change in the growing season affects the broader ecosystem. Migrating animals have to start seeking food sources earlier. The shift in seasons may already be causing the lifecycles of pollinators, like bees, to be out of synch with flowering plants and trees. This mismatch can limit the ability of both pollinators and plants to survive and reproduce, which would reduce food availability throughout the food chain.

An extended growing season also means that plants need more water to keep growing throughout the season or they will dry out, increasing the risk of wildfire. Once the growing season ends, the shorter, milder winters fail to kill dormant insects, increasing the risk of large-scale insect infestations in subsequent seasons (Seager et al. 2007).

In some ecosystems, maximum daily temperatures might climb beyond the tolerance of indigenous plant or animal. To survive the extreme temperatures, both marine and land-based plants and animals have started to migrate towards the poles. Those species, and in some cases, entire ecosystems, that cannot quickly migrate or adapt, may ultimately face extinction.

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/CO 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/CO. This approach is consistent with the 1998 Consultation Handbook and the implementing regulations at 50 CFR § 402.

As reflected in the 2005 BO/CO, 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 EDA § 7(a)(2) consultation to address the effects of that particular 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 is considered outside of the scope of this consultation and would require separate site specific ESA § 7(a)(2) consultation to address the effects of that particular action.

4. Land managers use and/or implement the S&Gs at every level of planning (i.e., 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/CO 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 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 four 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 Prescott 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 reintiation statement and literature cited section is contained at the end of this BO/CO.

The following section describes the effects to species of the continued implementation of the Prescott NF LRMP. The FWS has concurred with the USFS on "may affect, but is not likely to adversely affect" determinations for the Southwestern willow flycatcher and razorback sucker, "not like to adversely modify" Southwestern willow flycatcher and razorback sucker CH, and "not likely to jeopardize" the 10(j) population of Colorado Pikeminnow. Concurrences 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 MSO (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 (U.S. Fish and Wildlife Service 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 (U.S. Fish and Wildlife Service 2011) in this BO/CO. Additional information included from the Draft Revised Recovery Plan in this BO/CO includes updated science about the biology of the MSO, updated threats information, and updated management recommendations (such as a revised population modeling framework). Critical habitat 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 (U.S. Fish and Wildlife Service 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).

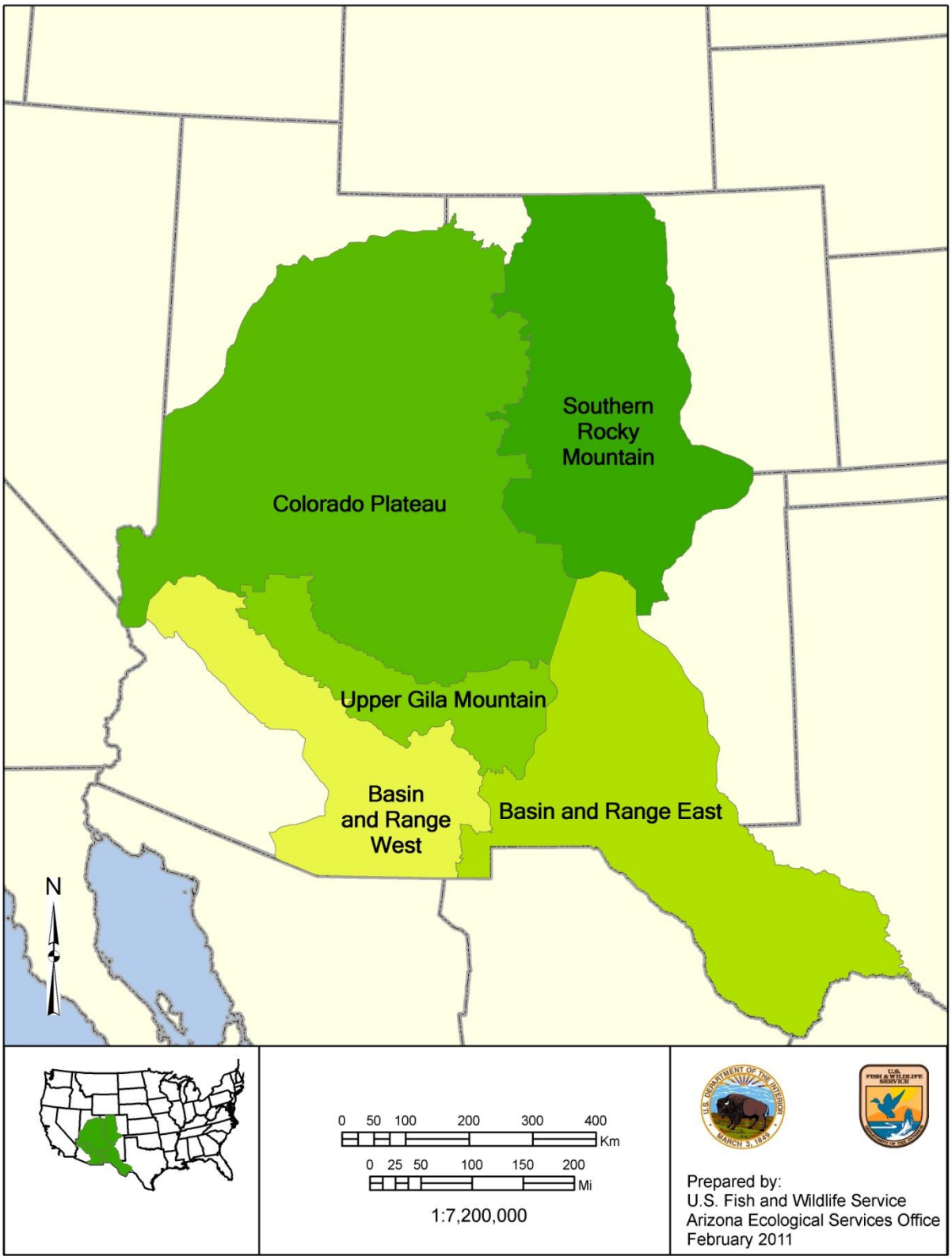

Figure 1. Ecological Management Units for the MSO in the United States

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 a large enough scale (typically range-wide) to provide information regarding population trend (i.e., is the species increasing, decreasing, or stable). Methodologies to conduct this type of monitoring include demographic studies or range-wide occupancy monitoring as described in the 1995 Recovery Plan and the 2011 Draft Revised Recovery Plan (USDI Fish and Wildlife Service 1995, U.S. Fish and Wildlife Service 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 (U.S. Fish and Wildlife Service 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 LRMPs. 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 National Forest System (NFS) lands are being developed. This trend may have detrimental effects to MSOs by further fragmenting habitat and increasing disturbance during the breeding season. West Nile Virus also has the potential to adversely impact the MSO. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that MSOs may be highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of MSOs and the lack of intensive monitoring of banded birds, we will most likely not know when MSOs contract the disease or the extent of its impact to the MSO range-wide.

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

Global climate variability may also be a threat to the MSO and synergistically result in increased effects to habitat from fire, 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 (U.S. Fish and Wildlife Service 2004). Within the designated boundaries, CH includes only those areas defined as protected habitats (defined as PACs and unoccupied slopes >40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted habitats (defined as unoccupied 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 MSO 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 Prescott NF. This discussion serves as a platform to assess the effects of the action to the MSO now under consultation.

Status of the MSO and Critical Habitat within the Action Area

The Prescott NF is located within the Basin and Range West (BRW) Ecological Management Units (EMU) with a small portion of the forest occurring in the Upper Gila Mountain (UGM) EMU. As of 2011, 15 MSO PACs have been designated within the boundaries of the Prescott NF. All MSO PACs on the Forest occur within the BRW RU.

Critical Habitat

Three CH units (BRW-2, BRW-3, and UGM-10) occur on the Prescott NF. The UGM-10 unit is large and 11,794 acres of this unit occur on the Prescott NF. The BRW-2 unit encompasses approximately 55,210 acres including Maverick and Lookout Mountains. Due to the exclusion of the Boundary WUI Project area from designation as CH (FWS 2004), 22,182 of the remaining acres are considered for CH status of which 2,993 acres are protected (PAC) habitat and 5,313 acres are restricted habitat. The BRW-3 unit encompasses 15,580 acres and is located in the Bradshaw Mountains. Due to the exclusion of the Crown King/Ash Creek WUI Project areas from designation as CH (FWS 2004), 10,838 of the remaining acres are considered for CH status of which 1,065 acres are protected (PAC) habitat and 918 acres are restricted habitat. As stated earlier, only areas identified as protected and restricted habitat pursuant to the Recovery Plan (USDI Fish and Wildlife Service 1995) within these CH units are considered to be CH. Therefore, within designated CH on the Prescott NF, the total area of protected habitat is 4,058 acres, and the total area of restricted habitat is 6,231 acres.

Factors Affecting the MSO and its Critical Habitat 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.

Table 1. Formal consultations on the Prescott NF from 2005 to 2011.*

Consultation #	**Date of Final BO**	**Project**	**Approximate # of Owls Anticipated Taken**	**# of PACs Anticipated Taken**	**Form of Take**
22410-2006-F-	7/5/2007	Arizona Forests	4-8 adults	4	Harass

0364		Utility Hazard Tree Removal Phase I			
22410-2006-F-0365	7/17/2008	Phase II Utility Maintenance in Utility Corridors on Arizona Forests	4-8 adults	4	Harm & Harass
22410-2008-F-0223	5/13/2008	August Fire Suppression Rehabilitation Project	1-2 owls	1	Harm & Harass
22410-2006-FE-0318	*12/5/2008*	*Emergency Hazard Vegetation Treatment in Utility Corridors in Arizona*	*0*	*0*	*n/a*
22410-2008-F-0149-R001	*12/2/2011*	*National Fire Retardant Consultation*	*0*	*Incidental take will be tracked as it occurs per the BO*	*Harm & Harass*
		TOTAL		9 PACs	

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

The majority of the projects that involved harm and/or harassment of MSOs included utility hazard tree removals and wildland fire suppression and rehabilitation activities on the Prescott NF. Two projects also anticipated harm to MSOs from projects that removed key nesting, roosting, and foraging habitat components from vegetation removal activities. Overall, from 2005 to present, incidental take in the form of harm or harassment was anticipated for MSOs associated with 9 PACs on the Prescott NF.

Critical Habitat

The utility corridor projects listed in Table 1 have impacted MSO CH. Approximately 1,543 acres of MSO CH occurred within the action area of the utility corridor projects. This acreage total includes both protected and restricted habitat composed of forested mixed conifer and pine-oak habitat. It was unknown how many large, live conifers (pines and firs) greater than 18 inches dbh, large snags, conifers less than 18 inches dbh, and Gambel oak (or other hardwood tree species) were removed as a result of the action. The removal of hazard vegetation would have resulted in impacts to the size and species structure of MSO CH along utility corridors. This impact to tree species diversity and loss of certain sized trees would result in a short-term adverse effect to this PCE. Large, live trees are an important element of MSO habitat, and MSO use is often correlated with a medium-to-large tree component. Large trees and snags take many years to develop and are very difficult to replace, even over the long-term. Canopy closure was not expected to fall below 40 percent. Large snags most likely were reduced following hazard tree removal. The reduction of this habitat component may affect MSO and prey habitat. However, since snags were likely identified as hazard vegetation along utility corridors, it is likely that following hazard tree removal within the project area, this habitat component was lost within treated MSO habitat, resulting in adverse effects to this PCE.

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/CO is implementation of the Prescott NF LRMP and its amendments. The most important amendment in regards to MSO management is the June 5, 1996, Amendment of LRMPs 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 USFS site-specific actions.

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 the FWS differentiated between the two for the analyses in the BA or the BO. The FWS recognizes that some differences in interpretation may exist on the part of forest managers at the project level in the implementation of LRMPs through the S&Gs. These differences in interpretation also add to the complexity of this consultation.

The S&Gs are written to apply Forest-wide or to a specific management area. The Prescott 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. 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 BO/CO is now covering the projects that were covered by prior opinions but have yet to be implemented. These projects include Arizona Forests Utility Maintenance Phase II and August Fire Suppression Rehabilitation 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/CO, and are included herein by reference (see U.S. Fish and Wildlife Service 2005). The majority of the S&Gs within the Prescott NF's LRMP were considered positive in the sense that management would maintain habitat for the MSO or provide for recovery. However, over the life of this consultation there is the potential for adverse effects to occur to the MSO or its CH as the Prescott NF implements actions to meet multiple resource objectives. It is possible that implementation of the Fire Management Program and Forestry and Forest Health programs, in particular, could result in future adverse effects even though the Prescott NF strives to have actions result in insignificant and discountable effects to the MSO and its CH. 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. As stated in the 2005BO/CO, the overall assessment of the Prescott NF's LRMP was overall positive for the MSO.

Effects of the Action on the MSO

Fire Management Program: Implementation of a fire program is good management and will be overall positive for MSO habitat. Fuels reduction and light burning are recommended in the Recovery Plan for the MSO to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). The 1996 Regional Amendment guides NFs in S&G 1455 to use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire, in order to reduce the threat of stand-replacing fires. Also within the 1996 Regional Amendment, S&G 1446 guides that NFs should select for treatment 10 percent of the PACs where nest sites are known in each recovery unit having high fire risk conditions and to select another 10 percent to serve as control areas. This is expected to be beneficial for the MSO in the long-term, but short-term behavioral responses such as flushing or nest/roost abandonment could occur. With regards to CH, prescribed 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.

Lands and Minerals Program: Standard and Guideline 1169 states that roads needed for private land access, special uses or mineral activities will be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and revegetated after use. The intent of this S&G is overall positive because it implies that roads will be minimal (i.e., 2-tracks that may restrict use) and that they will be closed and revegetated. Roads increase vehicle traffic and thus, can cause disturbance to MSOs. However, if implemented, disturbance will be minimal to the MSO.

Rangeland Management Program: Standard and Guideline 1154 allows the Forest to manage to bring all grazing allotments to satisfactory management by the end of the first decade. Satisfactory management occurs on allotments where management actions are proceeding

according to a schedule (Allotment Management Plan), which lead to fair or better range condition with upward trend. Acres of satisfactory management are the total full capacity acres for a complete allotment within a management area being operated satisfactorily. Acres of unsatisfactory managed range are the total full capacity acres for complete allotments within a management area being operated unsatisfactorily. The FWS ranked this S&G as potentially having some adverse effects. Unsatisfactory range conditions could affect the MSO's reproduction by impacting its prey distribution and abundance. This would negatively affect PCE B which relates to maintenance of adequate prey species. Although the overall intent of the S&G is positive, the length of time to obtain satisfactory range conditions through existing management could be adversely affecting the MSO.

Wildlife, Fish, and Rare Plants Program: Many S&Gs within this program directed the Forest to manage threatened and endangered species to meet the goals and intent of the ESA. For instance, S&G 1119, states 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. Because Recovery Plans are considered "road-maps" for recovering listed species, accomplishing recovery tasks and goals are important means to achieving delisting.

In summary, the S&Gs provided to us by the USFS were positive for the MSO for the Prescott NF. Further, the overall assessment of the Prescott NF's LRMP was that this plan has a considerable amount of positive guidance for listed species. Incidental take of MSOs will occur through implementation of S&Gs within the following programs: Lands and Minerals and Rangeland Management. However, based on our analyses of the S&Gs, we found that the programs within the Prescott NF will not appreciably impact the PCEs to the point that CH for the MSO is no longer functional.

Since 2005, 4 BOs have been issued to the Prescott NF addressing adverse effects to MSOs from projects implemented under the LRMP. These projects included utility hazard tree removals and rehabilitation activities associated with wildland fire suppression. These actions included a combination of short- and long-term harassment and harm that resulted in the anticipated take of MSOs associated with five PACs. The Prescott NF provided conservation measures that would minimize the impacts to MSOs in all formal consultations. All BOs for projects conducted on the Prescott NF were determined to be non-jeopardy for the species and non-adverse modification for CH.

Effects of the Action on MSO 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 CH units 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 MSO 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 MSO 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 PCE 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 MSO 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 MSO prey species. The function and conservation role of this PCE 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 MSO and prey habitat. Some snags will be created through prescribed burning, which could benefit the MSO. However, snags currently

used by MSOs for nesting are typically very old, large dbh, highly decayed snags with cavities. 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) MSO 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 PCE 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 MSO habitat (Randall Parker and Miller 2000). This loss of large logs would result in short-term adverse effects to this PCE and could result in localized impacts to prey species habitat. However, across the Prescott 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 PCE 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 PCE 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 PCE 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 MSO 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 MSO recovery and/or further diminish the conservation contribution of CH to the recovery of the MSO. These projects include Arizona Forests Utility Hazard Tree Removal Phase I, Phase II Utility Maintenance in Utility Corridors on Arizona Forests, and August Fire Suppression Rehabilitation project, and Emergency Hazard Vegetation Treatment in Utility Corridors in Arizona.

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

- The Prescott NF has and continues to designate 600 acres surrounding known MSO nesting and roosting sites. PACs are established around MSO sites and are intended to protect and maintain occupied MSO nest/roost habitat. Nesting and roosting habitat is rare across the range of the MSO and by identifying these areas for increased protection, the USFS is aiding in recovery.

- The Prescott NF has identified and is managing pine-oak, mixed-conifer, and riparian forests that have potential for becoming replacement MSO nest-roost habitat, or is currently providing habitat for MSO foraging, dispersal, or wintering habitats. As stated above, nesting and roosting habitat is a limiting factor for the MSO 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 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.

These actions should increase the sustainability and resiliency of MSO habitat (particularly through fuels management and forest restoration actions). Therefore, continued implementation of the Prescott 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 BO/CO. 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.

CONCLUSION

This BO/CO 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' 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. Critical habitat 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" (U.S. Fish and Wildlife Service 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 Prescott 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 BOs from 2005 through 2010 for the Prescott 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 Prescott NF LRMP since 2005 in which the FWS determined caused adverse effects and associated incidental take of MSOs were primarily due to utility corridor maintenance consultations and rehabilitation projects which are consistent with management recommendation 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 Prescott 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 all 11 LRMPs to incorporate recommendations from the Recovery Plan (USDI Fish and Wildlife Service 1995) through an Environmental Impact Statement pursuant to the National Environmental Policy Act. 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 Prescott NF's LRMP have not changed since 2005, the majority of which were found to be beneficial to the MSO. The USFS continues to implement many of the 1995 Recovery Plan recommendations to protect the MSO (e.g., minimize noise disturbance and habitat altering actions within PACs during the breeding season) and its CH (e.g., manage for PCEs such as large trees, high canopy cover, snags, and logs in designated CH).

- Projects implemented under the Prescott 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 (U.S. Fish and Wildlife Service 2011). Existing forest conditions, climate change, and extended droughts will continue to impact forest sustainability without active management.

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 (e.g., breeding or foraging) of birds only temporarily, or to such a degree that the birds are considered lost as viable members of the population and thus "taken." Birds experiencing only temporary or short-term effects may fail to breed, fail to successfully rear young, or raise less fit young; longer-term disturbance may result in MSOs deserting the area because of chronic 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 reasonable and prudent 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 FWS as specified in the incidental take statement (see 50 CFR §402.14(i)(3)).

Amount 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 Prescott NF LRMP will be in form of short-term harassment. Mexican spotted owls 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. The number of MSO PACs on the Prescott NF is currently 15. Based upon the potential for incidental take to occur as part of implementation of the LRMP, we anticipate the following incidental take due to 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 owls associated with up to two PACs per year (5 percent) of the 15 PACs due to a single or short-term disturbance. Owls associated with an individual PAC may not be harassed over the course of more than three breeding seasons.

- Harm and/or harassment of owls associated with one PAC 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 harm would be very rare under the existing LRMP due to the protective Standards and Guidelines 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 Prescott NF and not a compilation of all Region 3 NFs in the BRW 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 or adverse modification to designated CH. While the proposed action may adversely affect MSO in the short-term, the long-term ramifications of the project are expected to be beneficial through reducing the potential for high-severity, stand replacing fire in MSO protected and restricted habitat, and designated CH. Yearly reports will allow the FWS to evaluate whether projects under the LRMP were implemented as proposed and that the effects were equal to or less than we analyzed in our project-level BO(s).

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Prescott 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 Prescott NF.
2. Minimize or eliminate adverse effects to MSO habitat on the Prescott 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 Prescott 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 Prescott 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 owls.

1.2 On site-specific project, the FS 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 adequate amounts of important habitat features for owls (such as large trees, large snags, and large logs).

2.2 On site-specific project, the FS 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 Prescott 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 FWS to design forest restoration treatments across the Prescott 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.

2. We recommend that the USFS work with the FWS to conduct MSO surveys over the next several years to attempt to determine how MSOs modify their territories in response to wildland fires. This information will aid us in understanding the short- and long-term impacts of fire on the MSO, and its subsequent effect on the status of the species. 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. Surveys should focus on potential habitat within the fire perimeter.

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.

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 inches (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 main stem 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 March 2009). Adults are often 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 occur of 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–uses 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, Red Tank Draw, and Spring Creek populations (Yavapai County) are considered stable-threatened, but the status of the Williamson Valley Wash population 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 (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 (2 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. 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 are 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*), Sonoran 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 at all life stage appear to be in deep pools with cover in the form of undercut banks, root wad and instream organic debris (Rinne and Minckley 1991, Carman 2006, Minckley and March 2009).

Critical Habitat

Critical habitat 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. Critical habitat includes the area of bankfull width plus 300 feet (91 m) on either side of the banks. The bankfull width is the width of the stream or river at bankfull discharge (i.e., the flow at which water begins to leave the channel and move into the floodplain) (Rosgen 1996, USFWS 2005a). Critical habitat 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 (i.e., 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. 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 earlier. 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 near streams where 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. 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). 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/CO.

Overall, the populations of Gila chub rangewide (Arizona and New Mexico) currently appear to be stable. The current distribution Gila chub populations remain extant to 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 Prescott NF. The Prescott NF has a land base of approximately 1.68 million acres (679,871 ha). This land base is drained by several major drainages with considerable occupied or potential habitat within the historical range of Gila chub.

Status of the species within the action area

It must be noted that the Gila chub is a secretive species (Rinne and Minckley 1991). The Gila chub may persist in some of the locations now considered extirpated, and may occur in localities as yet undiscovered. Although Gila chub have not been found in some of the localities listed in 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 occur of NFS lands. Most populations on NFS lands are considered to be small, isolated and threatened. Specifically, on the Prescott NF in Arizona, there are three populations. A Gila chub population is known to exist in Sycamore, Little Sycamore and Indian Creeks which are tributaries to the Agua Fria River. In 2005 Sycamore and Indian Creeks was considered unstable-threatened and Little Sycamore Creek was considered stable-threatened (USFWS 2005a).

Critical Habitat

There is only one designated CH area on the Prescott NF. This is 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). Sycamore Creek, Little Sycamore Creek and Indian Creek are all located within the Prescott NF and comprised of 13.1 mi (21.0 km) of designated CH for Gila chub in Area 7. Since our issuance of the 2005 LRMP BO, the status of CH has been most impacted by the Cave Creek Complex fire in 2005. The impacts consisted of ash flow and debris making some of the habitat unsuitable, but the Gila chub population still resides in this area in low numbers.

Factors affecting the species environment within the action area

On the Prescott NF, past and present Federal, State, private, and other human activities that may affect Gila chub and their habitat include: improper livestock grazing, wildfires and other habitat alterations. We describe activities that have occurred within the Prescott NF to qualify the environmental baseline. We also include information from the Gila NF, which provide anecdotal information concerning activities that may impact Gila chub on Prescott NF.

Livestock grazing

Historically, improper livestock grazing likely contributed to habitat modifications noted by Miller (1950). The historical occurrence of intensive grazing and resulting effects on the land are indicated in published reports dating back to the early 1900s (Rixon 1905, Rich 1911, Duce 1918, Leopold 1921, Leopold 1924).

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 sign 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). 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 Gila chub likely altered water temperature regimes, sediment loading, bank stability, and availability of large woody debris (Chamberlin et al. 1991).

Fire

The Cave Creek Complex Fire in 2005 burned in portions of watersheds on the Prescott NF with occupied habitat for Gila chub. Populations and habitat were reduced in Sycamore Creek, Little Sycamore Creek, and Indian Creek due to flooding and high sediment input occurring with rain events following the fire.

Because Gila chub are now found primarily in isolated, small streams, avoidance of ash flows 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).

Nonnative fish found in Gila chub habitat on the Prescott NF include fathead minnow (*Pimephales promelas*), green sunfish (*Lepomis cyanellus*), western mosquitofish (*Gambusia affinis*), and rainbow trout (*Oncorhynchus mykiss* (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).

<u>Increased water temperature</u>

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.

<u>Decreased streamflow</u>

Current models suggest a decrease in precipitation in the Southwest (Kundzewicz et al. 2007, Seager et al. 2007) which would lead to reduced streamflows and a reduced amount of habitat for Gila chub. Streamflow 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 streamflow even if precipitation increased moderately.

The effect of decreased streamflow 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 United States 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 United States could occur as much as 2 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 with 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 United States 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 and fire suppression (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

Gila Chub

The S&Gs listed in the proposed Prescott 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: 2, 3, 5, and 6G. Multiple S&Gs within the Prescott 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. The 2005 BO/CO 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 Gila chub 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/CO and provide a narrative summary below.

The current analysis evaluated all S&Gs applicable to Gila chub and its CH identified by the USFS 2011 BA. Although, two additional S&Gs were added to the Prescott NF LRMP (2031 and 2032), that are targeted at the control and prevention of noxious or invasive weeds within the Forestry and Forest Health Program and S&G 2050 which is management of the Verde River as directed in the Verde Wild and Scenic River Comprehensive River Management Plan.

The FWS found two S&Gs with potential lethal effects and one that could cause a sublethal response within the Prescott NF 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 MSO and northern goshawks. The S&Gs promote healthy forest ecosystems; function watersheds; and 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. Yet, some S&Gs may have short-term adverse effects on the species.

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. S&G 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 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. 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; 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 prolong recovery efforts.

Standards and 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.

Effects to Critical Habitat

The effects from LRMP implementation on designated CH PCEs are described below.

PCE 1: Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies

Effect: Maintaining roads at minimum standards may adversely affect the Gila chub by increasing sedimentation into pool habitat (S&G 1169). Providing water away from sensitive areas to maintain riparian communities does not eliminate the effects of livestock on those areas (S&G 1151). Livestock may continue to seek shade in the riparian areas, upland conditions may remain compromised, or the water development may reduce streamflows affecting pools and shallow water areas. Bringing all grazing allotments to satisfactory management condition deferred until a later time may have short-term adverse effects to the species through increased sedimentation (S&G 1154). Minimization of impacts to the soil and water resources during all ground disturbing activities does not eliminate all such impacts, and may have short-term adverse effects through increased sedimentation (S&G 1166). Collectively, implementation of the MSO and northern goshawk guidelines may affect this PCE by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies, and by increasing sedimentation into pool habitat.

PCE 2: Water temperatures for spawning and seasonally appropriate temperatures for all life stages

Effect: Maintaining roads at minimum standards may adversely affect the Gila chub by opening up the overstory resulting in increased water temperatures (S&G 1169). Providing water away from sensitive areas to maintain riparian communities does not eliminate impacts to riparian areas that may open up the overstory resulting in increased water temperatures (S&G 1151). Bringing all grazing allotments to satisfactory management condition deferred until a later time may have short-term adverse effects to the species by opening up the overstory resulting in increased water temperatures (S&G 1154). Minimization of impacts to the soil and water resources during all ground disturbing activities does not eliminate all such impacts, and may have short-term adverse effects by opening up the overstory resulting in increased water temperatures (S&G 1166). Collectively, implementation of the MSO and northern goshawk guidelines may affect this PCE by opening up the overstory resulting in increased water temperatures.

PCE 3: Water quality with reduced levels of contaminants, including excessive levels of sediments adverse to Gila chub health, and adequate levels of pH, dissolved oxygen and conductivity

Effect: Maintaining roads at minimum standards may adversely affect the Gila chub by increasing sedimentation resulting in contamination of water quality (S&G 1169). Providing water away from sensitive areas to maintain riparian communities does not eliminate impacts to riparian areas that may increase sedimentation resulting in contamination of water quality (S&G 1151). Bringing all grazing allotments to satisfactory management condition deferred until a later time may have short-term adverse effects to the species by increasing sedimentation resulting in contamination of water quality (S&G 1154). Minimization of impacts to the soil and water resources during all ground disturbing activities does not eliminate all such impacts, and

may have short-term adverse effects by increasing sedimentation resulting in contamination of water quality (S&G 1166). During pesticide use some residual runoff may enter streams degrading water quality (S&G 1162). Collectively, implementation of the MSO and northern goshawk guidelines may affect this PCE by increasing sedimentation resulting in contamination of water quality.

PCE 4: Prey base consisting of invertebrates and aquatic plants

Effect: Maintaining roads at minimum standards may adversely affect the Gila chub by reducing the food base including invertebrates; filamentous algae; and insects (S&G 1169). Providing water away from sensitive areas to maintain riparian communities does not eliminate impacts to riparian areas that may reduce the food base including invertebrates; filamentous algae; and insects (S&G 1151). Bringing all grazing allotments to satisfactory management condition deferred until a later time may have short-term adverse effects to the species by reducing the food base including invertebrates; filamentous algae; and insects (S&G 1154). Minimization of impacts to the soil and water resources during all ground disturbing activities does not eliminate all such impacts, and may have short-term adverse effects by reducing the food base including invertebrates; filamentous algae; and insects (S&G 1166). Collectively, implementation of the MSO and northern goshawk guidelines may affect this PCE by reducing the food base including invertebrates; filamentous algae; and insects.

PCE 5: Sufficient in-stream cover, a high degree of stream bank stability, and a healthy, intact riparian vegetation community

Effect: Maintaining roads at minimum standards may adversely affect the Gila chub 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 (S&G 1169). Providing water away from sensitive areas to maintain riparian communities does not eliminate impacts to riparian areas that may reduce 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 (S&G 1151). Bringing all grazing allotments to satisfactory management condition deferred until a later time may have short-term adverse effects to the species 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 (S&G 1154). Minimization of impacts to the soil and water resources during all ground disturbing activities does not eliminate all such impacts, and may have short-term adverse effects 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 (S&G 1166). Collectively, implementation of the MSO and northern goshawk guidelines may affect this PCE 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.

PCE 6: Habitat devoid of nonnative aquatic species detrimental to Gila chub

*Effec*t: Promoting fish stocking to meet State agencies fisheries goals, may introduce nonnative fishes in habitat occupied by Gila chub or habitat where it may be reestablished (S&G 1149).

PCE 7: Streams that maintain a natural flow pattern including periodic flooding

Effect: Maintaining roads at minimum standards may adversely affect the Gila chub by altering a stream's natural unregulated flow pattern including periodic natural flooding (S&G 1169). Providing water away from sensitive areas to maintain riparian communities does not eliminate impacts to riparian areas that may alter a stream's natural unregulated flow pattern including periodic natural flooding (S&G 1151). Bringing all grazing allotments to satisfactory management condition deferred until a later time may have short-term adverse effects to the species by altering a stream's natural unregulated flow pattern including periodic natural flooding (S&G 1154). Minimization of impacts to the soil and water resources during all ground disturbing activities does not eliminate all such impacts and may have short-term adverse effects by altering a stream's natural unregulated flow pattern including periodic natural flooding (S&G 1166). Collectively, implementation of the MSO and northern goshawk guidelines may affect this PCE by altering a stream's natural unregulated flow pattern including periodic natural flooding, which can prolong recovery efforts.

Only one BO has been issued for Gila chub in the Prescott NF since 2005 (USFWS 2010). This action included livestock grazing on riparian herbaceous and woody species stream crossing, and installation of a well on private land between Reach 1 and Reach 2 of Sycamore Creek. We concluded that this action would not impede the ability of the PCEs to contribute to the conservation and recovery of the Gila chub, or affect the function and conservation role of this designated CH area (Area 7) (USFWS 2010).

In summary, over the last seven years, we have conducted one formal consultation for action implemented on the Prescott NF, which can be tied to actions implemented under the LRMP. These actions included a combination of short- and long-term effects to designated CH. Primarily, these activities should be beneficial to Gila chub CH, because the proposed includes actions that should increase the sustainability and resiliency of Gila chub habitat. Continued implementation of the Prescott NF LRMP is not expected to further diminish the conservation contribution to the recovery of the Gila chub.

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/CO. 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.

Cumulative effects that could adversely affect the species include residential development on lands within watersheds containing threatened and endangered native fishes. Additional cumulative effects to Gila chub include ongoing activities in watersheds 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 or residential 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 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 will not 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/CO 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. Critical habitat 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" (USFWS and National Marine Fisheries Service 1998).

Effects to the Gila chub from the Prescott NF LRMP and the 1996 Regional Amendment were analyzed in the 2005 BO/CO. Potential adverse effects from the implementation of these LRMPs and associated S&Gs were found likely to occur on the Prescott NF LRMPs. 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 1119 within the Prescott NF LRMP that support 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 guide the NFs to implement

recovery plans, improve habitat for threatened and endangered species by structural and nonstructural means, and to delist threatened and endangered species.

- Prior to the Gila chub being federally listed, the USFS has taken proactive measures in an attempt to reduce the decline of the species. For example, occupied habitat in Indian Creek was fenced to exclude livestock grazing. Monitoring of all three populations and habitat on the forest occurs regularly to document their status.

- Across the range of the Gila chub, 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).

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 will not jeopardize the continued existence of Gila chub.

Based on the above analyses, it is the FWS's BO/CO that the proposed action will not alter the ability of the 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. Per the ESA, "take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined (50 CFR 402.02) 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.

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 Prescott NF LRMPs, as well as the 1996 Regional Amendment. On the Prescott NF, incidental take due to the proposed action is expected to be in the form of harm or harassment of Gila chub from the Lands and Minerals, Recreation, Rangeland 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. The extant populations of Gila chub within the Prescott NF are Sycamore, Little Sycamore and Indian Creek. The FWS concludes that incidental take of Gila chub will be considered to be exceeded if, during a period of 3 consecutive years, any currently extant population is lost (e.g. absent) as a result of the proposed action. This level of incidental take is in addition to any previously authorized take resulting from ongoing projects or projects that have been consulted on but are yet to be implemented.

Effect of the Take

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

REASONABLE AND PRUDENT MEASURES

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

1. Minimize or eliminate take of Gila chub on the Prescott NF lands due to LRMP activities.

2. Minimize or eliminate adverse effects to Gila chub habitat on the Prescott NF lands due to LRMP activities.

3. Monitor the impacts of site-specific projects implemented on the Gila chub.

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 within the Prescott NF with the goal of minimizing or eliminating adverse effects to the Gila chub.

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

2.1 Develop and implement projects (i.e., watershed or riparian restoration) in occupied Gila chub habitat with the goal of minimizing or eliminating adverse effects to Gila chub habitat.

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

3.1 The Prescott 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 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 to what extent other chub, such as the headwater chub may occupy those streams.

5. Continue to work cooperatively with the FWS, BLM, NMDGF, and AGFD to establish refugia populations of Gila chub wherever possible.

6. Cooperate with AZGFD to eliminate the introduction and the continued presence of non-native species within Gila chub habitat.

7. Identify and map suitable habitat, especially pools, by reach for the Gila chub within the Prescott NF.

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 TROUT

STATUS OF THE SPECIES

Description

The Gila trout is a member of the salmon and trout family (Salmonidae). Gila trout is a moderate-sized salmonid that typically attains lengths of 8-10 in (200-250 mm); older individuals can exceed 14 in (355 mm) in total length. Gila trout were formally described by Miller (1950) using trout collected from Main Diamond Creek, Sierra County, New Mexico in 1939. Gila trout is closely related to Apache trout (*O. apache*), which is endemic to the upper Salt and Little Colorado drainages in east-central Arizona. Gila trout and Apache trout are more closely related to rainbow trout (*O. mykiss*) than to cutthroat trout (*O. clarki*) suggesting that Gila and Apache trout were derived from an ancestral form that also gave rise to rainbow trout (Behnke 1992, Dowling and Childs 1992, Utter and Allendorf 1994, Nielsen et al. 1998, Riddle et al. 1998).

The Gila trout is readily identified by its iridescent gold sides that blend to a darker shade of copper on the operculum (gill covers). Spots on the body are small and profuse, generally occurring above the lateral line and extending onto the head, dorsal (back, top) fin, and caudal (tail) fin. Spots are irregularly shaped on the sides and increase in size on the back. On the dorsal surface of the body, spots may be as large as the pupil of the fish eye and are rounded. A few scattered spots are sometimes present on the anal fin, and the adipose fin (fleshy fin located behind dorsal fin) is typically large and well-spotted. Dorsal, pelvic, and anal fins have a white

to yellowish tip that may extend along the leading edge of the pelvic fins. A faint, salmon-pink band is present on adults, particularly during spawning season when the normally white belly may be streaked yellow or reddish orange. A yellow cutthroat mark is present on most mature specimens. Parr marks (diffuse splotches on the sides of body, usually seen on young trout) are commonly retained by adults, although they may be faint or absent (Miller 1950, David 1976). The golden coloration of the body, parr marks, and fine profuse spots above the lateral line distinguish Gila trout from other co-occurring nonnative trout species in the field (USFWS 2003).

Legal Status: The Gila trout was designated as an endangered species under the Federal Endangered Species Preservation Act of 1966 (USFWS 1967), and subsequent designation of the species as endangered continued under the ESA (1973). Reasons for listing included hybridization, competition, and predation by nonnative rainbow trout (*O. mykiss*), cutthroat trout (*O. clarkii*), and brown trout (*Salmo trutta*), and habitat degradation. No CH was designated at the time of listing.

In 1987, the FWS proposed to reclassify the Gila trout as threatened (USFWS 1987). The FWS withdrew the 1987 proposal for reclassification on September 12, 1991 (USFWS 1991) because: 1) severe flooding in 1988 reduced the Gila trout populations in McKnight Creek by about 80 percent; 2) wildfires in 1989 eliminated Gila trout from Main Diamond Creek and all of the South Diamond drainage except Burnt Canyon, a small headwater stream; 3) propagation activities at hatcheries had not proceeded as planned, and fish were not available to replenish wild stocks; and 4) brown trout, a known predator, were found present in Iron Creek, which at the time was thought to harbor a relict population of Gila trout.

Gila trout was listed as endangered by the New Mexico Department of Game and Fish (NMDGF) in 1975 under the Wildlife Conservation Act and was downlisted to threatened in 1988. Gila trout are considered a Species of Concern by the AGFD in 1966.

On May 11, 2005, the FWS proposed to reclassify Gila trout from endangered to threatened (USFWS 2005) with a special 4(d) rule to allow recreational angling to occur according to regulations implemented by the NMDGF and AGFD. The final rule for the reclassification became effective on August 17, 2006 (USFWS 2006a). The reclassification was justified on the basis of replication of the relict trout populations, the viability and security of the population replicates, documented increases in trout numbers, and the creation and use of appropriate management plans (i.e., broodstock management, evacuation plan, updated Recovery Plan, etc.).

Distribution and Abundance

The historical distribution of Gila trout is not known with certainty (Behnke 2002). Although, Gila trout were believed to occupy the upper Gila in New Mexico and parts of the San Francisco systems of Arizona and New Mexico (Behnke 2002). The Arizona populations were believed to be extirpated around the turn of the 20th century (USFWS 2003). A native trout identified as Gila trout in spotting, but as Apache trout from other characteristics once occurred in the Verde and Agua Fria drainages in Arizona (Behnke and Zarn 1976, Behnke 2002). Trout collected in Oak Creek (1888-89), a tributary of the Verde River, were originally identified as Gila trout.

Trout collected in Sycamore Creek (1975), a tributary of the Agua Fria, were reported to be Gila hybrids (Behnke and Zarn 1976, USFWS 2003). Distribution of both Gila and Apache trout is not known for certain in the Verde River during the last glacial period to hybridize and produce a form intermediate to the two still existing trout.

It is known to be native to higher elevation streams in portions of the Gila River drainage, New Mexico. According to anecdotal reports, in 1896 Gila trout was found in the Gila River drainage, New Mexico, from the headwaters downstream to a box canyon, about 7 mi (11.3 km) northeast of Cliff, New Mexico (Miller 1950). By 1915, the downstream distribution of Gila trout in the Gila River had receded upstream to Sapillo Creek, a distance of approximately 15 mi (25 km) (Miller 1950). By 1950, water temperature in the Gila River at Sapillo Creek was considered too warm to support any trout species (Miller 1950). The earliest documented collections of Gila trout in the upper Gila River drainage were in 1939, from Main Diamond Creek (Miller 1950). New populations were sporadically found until 1992, when Gila trout was discovered in Whiskey Creek, a tributary to the upper West Fork Gila River (USFWS 2003).

When the Gila trout was listed as endangered, it was thought that its range had been reduced to five streams within the Gila NF, New Mexico: Iron, McKenna, Spruce, Main Diamond, and South Diamond Creeks. Main Diamond Creek was the largest of the five populations which has been attributed to numerous pools formed by log dams built by the Civilian Conservation Corps in the 1930s (Behnke 2002). Beginning in 1970, Gila trout from each of the five relict populations were translocated into other streams. In 1992, a relict population in Whiskey Creek was discovered (Leary and Allendorf 1998). It was later determined that the McKenna and Iron Creek populations were hybridized with rainbow trout and therefore, did not contribute to the recovery of the species because they were not genetically pure (Leary and Allendorf 1998, USFWS 2003). Consequently, there are four confirmed relict populations known today. All four original pure populations (Main Diamond, South Diamond, Spruce, and Whiskey Creeks) are replicated at least once (Table 2).

Surveys on most of the 18 existing populations indicate that the recovery efforts to remove nonnative fish and prevent their return to the renovated areas have been successful (USFWS 2003, USFWS 2011b) (Table 2). Replicated populations in New Mexico are successfully reproducing, indicating that suitable spawning and rearing habitats are available. Replication efforts in Arizona have not been as successful. Young of the year Gila trout were planted in Dude Creek in 1999 (not included in Table 2); however, the stream is presently fishless and has been determined unsuitable of Gila trout (AGFD 2010, USFWS 2010). Raspberry Creek was originally stocked with Spruce Creek lineage in 2000 (113 age-0 fish). In May 2004, Gila trout were evacuated from Raspberry Creek due to the threat of ash flow from the KP Fire. In November 2004, 14 fish were restocked into the uppermost portions. Few individuals have been observed between 2008 and 2010, but are currently in good condition and reproduction is taking place. Given the low number of individuals augmentation may be needed to maintain this population (AGFD 2010, USFWS 2010).

Table 2. Summary of streams rangewide inhabited by Gila trout in 2011 (sorted by state). Relict lineages in bold.

State	County	Stream Name	Drainage	Length of stream inhabited (km (mi))
NM	Sierra	**Main Diamond Creek**	East Fork Gila	6.1 (3.8)
NM	Grant	McKnight Creek	Mimbres River	8.5 (5.3)
NM	Grant	Black Canyon	East Fork Gila	18.2 (11.3)
NM	Catron	Lower Little Creek	West Fork Gila	6.0 (3.7)
NM	Catron	Upper White Creek	West Fork Gila	8.8 (5.5)
NM	Sierra	**South Diamond Creek**[1]	East Fork Gila	6.7 (4.2)
NM	Catron/Grant	Mogollon Creek[2]	Gila River	28.8 (17.9)
NM	Catron/Grant	Sheep Corral	Gila River	1.6 (1.0)
NM	Catron	**Spruce Creek**	San Francisco	3.7 (2.3)
NM	Catron	Big Dry Creek	San Francisco	1.9 (1.2)
NM	Catron	**Whiskey Creek**	San Francisco	2.6 (1.6)
NM	Catron	Langstroth Canyon	West Fork Gila	5.4 (3.3)
NM	Catron	Rawmeat Canyon	West Fork Gila	0.8 (0.5)
NM	Catron	Cub Creek	West Fork Gila	6.9 (4.3)
NM	Catron	Mainstem West Fork Gila	West Fork Gila	18.6 (11.6)
AZ	Greenlee	Raspberry Creek	Blue River	6.0 (3.7)
AZ	Graham	Frye Creek	San Francisco	8.0 (5.0)
AZ	Yavapai	Grapevine Creek	San Francisco	3.2 (2.0)

[1]includes Burnt Canyon.
[2]includes Trail Canyon, Woodrow Canyon, Corral Canyon, and South Fork Mogollon Creek.

Habitat

Gila trout are a typical cold-water species requiring well-oxygenated water; coarse sand, gravel and cobble substrate; stable stream back conditions; and abundant overhanging banks, pools and cover for optimal habitat. They are found in moderate to high gradient (from 1 to over 14 percent gradient) perennial streams above 5,400 ft (1,600 m) to over 9,200 ft (2,838 m) in elevation (McHenry 1986, Propst and Stefferud 1997). The species requires water temperatures below 77 ºF (25 ºC), adequate stream flow to maintain survivable conditions, and clean gravel substrates for spawning (USFWS 2003). Gila trout use substrates of fine gravel and coarse sand (0.07-1.50 in; 0.31-1.50 in [1.8-38.1 mm; 8.0-38 mm]) during spawning (Rinne 1980). Spawning habitat of Gila trout in Main Diamond, South Diamond, and McKnight creeks average substrate composition consisted of 6.6 percent silts, clays, and very fine to coarse sands (<0.04 in [1mm] diameter), 14.4 percent very coarse sand (0.04-0.08 in [1 to 2 mm]); 27.4 percent very fine to medium gravels (0.08-0.35 in [2 to 9 mm]); 6.9 percent to very coarse gravels (1.50-2.48 in [38 to 63 mm]), and 6.7 percent cobbles (2.52-10.08 in [64 to 256 mm]) (Rinne 1980, Rosgen 1998).

Nursery and rearing habitats are areas used by larval and juvenile Gila trout. Although no studies have focused on habitat use by these life stages of Gila trout, generalizations can be made based on characteristics of related trout species. Suitable nursery habitat for trout includes areas with slow current velocity such as stream margins, seeps, shallow bars, and side channels (Behnke 1992). Low flows during emergence from the egg and early growth of larval trout may result in strong year classes (young fish are not displaced downstream) (Behnke 1992), as may constant, elevated flows during summer (improved water quality) (USFWS 2003). Absence of predation by or competition with nonnative trout, particularly brown trout, is another essential element of nursery and rearing habitat.

Subadult and adult habitats are defined as areas suitable for spawning, breeding, feeding, survival or growth to maturity of various life stages. Subadults are sexually immature individuals, generally less than 6 in (150 mm) total length and adults are sexually mature individuals typically greater than 6 in (150 mm) total length (Propst and Stefferud 1997). Subadult Gila trout occur primarily in riffles (shallow water flowing over cobbles), riffle-runs, and runs, while adults are found mainly in pools (Rinne 1978). Cover (large woody debris, undercut banks, boulders, deep water, and overhanging woody and herbaceous vegetation) is an important component of subadult and adult habitat (Stefferud 1994).

The quantity and quality of adult habitat typically limits the population (Behnke 1992). Essential elements of subadult and adult habitat relate principally to channel dimensions, cover, and hydrologic variability. Absence of predation by and competition with nonnative trout (brown and rainbow) for foraging habitat is also an essential element of subadult and adult habitat.

Variation in stream flow is a major factor affecting subadult and adult population size (McHenry 1986, Turner 1989, Propst and Stefferud 1997). In particular, high flow events may cause marked decrease in population size. These events result in short-term, radical changes in habitat conditions, primarily in flow velocity. Because most streams occupied by Gila trout have relatively narrow floodplains, the forces associated with high flow events are concentrated in and immediately adjacent to the bankfull channel. High stream flow velocities can cause channel scouring and displacement of fish downstream, often into unsuitable habitats (Rinne 1982).

Overwintering habitat is defined as areas that afford shelter during periods of low water temperature, generally from November through February. Rinne (1981) and Propst and Stefferud (1997) indicated the importance of pool habitat for overwinter survival of Gila trout. Essential elements of overwintering habitat are deep water with low current velocity and protective cover (Behnke 1992). These elements are important because small streams can freeze, but deep pools provide areas that do not freeze. Trout are coldwater species and therefore are typically more sluggish in the winter and cover is important to protect them from predators. Barriers to fish movement (e.g., waterfalls, dry stream bed) that prevent fish from accessing overwintering habitat may benefit populations of Gila trout. Gila trout are now restricted to small, headwater streams that typically have fewer deep pools and suitable overwintering habitat than do larger streams (Harig and Fausch 2002).

Life History

Spawning occurs mainly in April (Rinne 1980) when temperatures are 43 to 46 °F (6 to 8 °C); however, day length may also be an important cue. Stream flow is apparently of secondary importance in triggering spawning activity (Rinne 1980). Young fish less than 1 in (25 mm) emerge from gravel nests 56 to 70 days after egg deposition (Rinne 1980). By the end of the first summer, young attain a total length of 2.7 to 3.5 in (70 to 90 mm) at lower elevation streams and 1.6 to 2.0 in (40 to 50 mm) at higher elevation sites (Rinne 1980, Turner 1986). Growth rates are variable, but Gila trout generally reach 7.1 to 8.7 in (180 to 220 mm) total length by the end of the third growing season in all but higher elevation streams. Mean survival rates for life history stages of Gila trout from 0.128 to 0.497, where survival rate is defined as the proportion of individuals of age x that survive to age $x + 1$ (Ricklefs 1990, Brown et al. 2001). On average, approximately half of every 100 eggs will survive to the juvenile life stage. Of the surviving fish, only approximately six will make it to the subadult stage, and of those six subadults, only two will survive to the adult life stage. The average life expectancy of an adult Gila trout is 5 years (Turner 1986), with a maximum age of nine reported by Nankervis (1988). As a result of these survival rates, the majority of the adult female Gila trout will only spawn twice before dying, while males will spawn three to four times before dying (USFWS 2003). Normally a single fish or a pair of fish occupied a spawning redd, but occupancy by three to four fish can be common (Rinne 1980).

Aquatic insects are the primary food of Gila trout. Regan (1966) reported that adult flies (diptera), caddisfly larvae (trichoptera), mayfly nymphs (ephemeroptera), and aquatic beetles (coleoptera) were the most abundant food items in stomachs of Gila trout in Main Diamond Creek. There was little variation in food habits over the range of size classes sampled (1.8 to 6.6 in [47 to 168 mm] total length). Gila trout diet shifted seasonally as the relative abundance of various prey changed. Insect taxa consumed by Gila trout were also common in stomach contents of nonnative trout species in the Gila River drainage, indicating the potential for interspecific competition. Hanson (1971) noted that Gila trout established a feeding hierarchy in pools during a low flow period in Main Diamond Creek. Larger fish aggressively guarded their feeding stations and chased away smaller fish. Large Gila trout occasionally consume speckled dace and may also cannibalize smaller Gila trout (Van Eimeren 1988, Propst and Stefferud 1997).

Adult Gila trout are typically sedentary and movement is influenced by population density and territoriality (Rinne 1982). Although individual fish may move considerable distances (e.g., over 0.9 mi [1.5 km]), Rinne (1982) found that after 8 months, 75 percent of tagged fish were less than 100 m (328 ft) from their release sites in Main Diamond, South Diamond, and McKnight Creeks. Gila trout showed a tendency to move upstream in South Diamond Creek, possibly to perennial reaches with suitable pool habitat in response to low summer discharge. Downstream movement in Main Diamond and McKnight Creeks involved primarily smaller fish and probably occurred because of nocturnal migrations or displacement downstream during flooding (Rinne 1982). High density of log structures in Main Diamond Creek appeared to reduce mobility of Gila trout in that stream (Rinne 1982).

Population dynamics

Factors affecting population size and dynamics of Gila trout are not well understood. Inferences about factors that control population size have been made from analysis of time-series data (Turner and McHenry 1985, Turner 1989, Propst and Stefferud 1997). Hydrologic variability appears to be most important in regulating population size of Gila trout in many of the streams occupied by the species (e.g., Regan 1966, Mello and Turner 1980, McHenry 1986, Turner 1989, Brown et al. 2001). Gila trout populations typically have high densities during relatively stable flow periods (Platts and McHenry 1988). The overall importance of environmental factors, specifically quantity and variability of stream discharge, in determining persistence of Gila trout populations is evidenced by the effects of fire, flood, and low flow on population size and density of this species. Examples of the effects of severe wildfires and subsequent floods and ash flows are the elimination of the Gila trout populations from Main Diamond Creek (1989) and South Diamond Creek (1995).

Reasons for Listing

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

Threats: Major threats to this species include habitat alterations, competition, hybridization and predation by nonindigenous fish (USFWS 1987).

The decline in Gila trout populations and available habitat is due to a multitude of factors: 1) habitat degradation, including the impacts of grazing and logging; 2) uncontrolled angling; 3) predation from and competition with nonnative trout, especially piscivory of brown trout; 4) inadequacy of legal protections up to 1967 when Federal listing occurred; and 5) introgressive hybridization with nonnative rainbow trout (USFWS 2003).

Climate Change

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

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, 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 to 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). 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 trout Environmental Baseline section in this BO/CO.

Recovery Actions

The initial Recovery Plan for Gila trout was released in 1979, and was revised in 1984, 1993, and 2003. Initial efforts to conserve Gila trout began in the 1920's with attempts to propagate Gila trout in hatchery settings (USFWS 2003). By the late 1940's the hatchery efforts were abandoned and NMDGF implemented a policy of not stocking nonnative trout into known Gila trout streams. In the 1960's study of Gila trout ecology began (Regan 1966). In the 1970's taxonomic analyses (David 1976, Beamish and Miller 1977) and population and habitat evaluations were conducted (Rinne 1978), and comprehensive distribution assessments (Mello and Turner 1980). In the 1980's the focus was on stream renovation and barrier construction, along with the establishment of new populations by direct transfer from both wild and hatchery populations. Further studies on ecology and systematics were also conducted (Lee and Rinne 1980, Rinne 1980, Rinne 1981, Rinne 1982, Loudenslager et al. 1986, Pittenger 1986, Medina and Martin 1988, Nankervis 1988, Van Eimeren 1988).

The range of the Gila trout was expanded in the 1990's, although controversy around the use of antimycin A stalled expansion efforts from 1994 to 1997 (USFWS 2003). Broodstock kept at Mescalero National Fish Hatchery, were transferred to Mora National Fish Hatchery and Technology Center (MNFHTC) in the late 1990's. The MNFHTC facility continues to play a critical role in maintaining Gila trout for broodstock, as well as holding populations rescued from

wildfire impacts. The MNFHTC facility is currently investigating enhancement of rearing to mimic more natural conditions, which is hoped to better maintain the wild characteristics of Gila trout held in a hatchery environment (USFS 2004, USFWS 2011a).

In 1999, Gila trout were stocked into Dude Creek and in 2000 they were stocked into lower Little Creek, upper Little Creek, and Raspberry Creek. However, the upper Little Creek population was lost in 2003 due to ash flow from a wildfire. The remaining populations are currently being monitored for survival and impacts on the populations due to drought and overall stream condition.

The Gila NF, in cooperation with the NMDGF and the FWS recently completed the West Fork Gila Environmental Assessment which will add five populations and approximately 34.3 km (21.3 mi) of occupied streams in the Gila Recovery Unit (Blue Earth Ecological Consultants 2002). The 2003 Recovery Plan proposes 23 new populations for re-introduction. Nearly half (11) are proposed on the Gila NF (including the 21.3 mi [34.3 km] above), which would result in occupancy of about an additional 53.7 mi (83.3 km) (USFWS 2003).

Recovery efforts have included waters in Arizona where Gila trout had been extirpated until 1999. An expansive proposed effort includes reestablishing viable populations in 12 different stream segments in Arizona. These 12 segments are on three NFs. The Apache-Sitgreaves NF has seven population segments proposed which would occupy streams in the Blue, Campbell Blue and Eagle drainages, totaling 31.9 mi (51.4 km). The Coronado NF has three population segments proposed which would occupy streams in the Gila and Aravaipa drainages, totaling 10.0 km (6.2 mi). The Coconino NF has two population segments proposed which would occupy streams in the Verde drainage, totaling 33.0 mi (53.1 km) (USFWS 2003). Current efforts are focused on the Apache-Sitgreaves NF, which has begun to cooperate with AGFD to analyze introduction into Chitty Creek, and the Coconino NF in cooperation with AGFD and the Federation of Fly Fishers has begun to analyze introduction into the West Fork of Oak Creek.

Overall, the status of Gila trout rangewide, both in Arizona and New Mexico, currently appears to be stable and increasing. The New Mexico populations represent the majority of Gila trout numbers within its range. Arizona on the other hand has experienced several impediments to recovery due to several wildfires that have impacted both repatriated and renovation streams for recovery. In addition, renovation efforts have been set back due to new regulations which placed a moratorium on the use of piscicides in the State of Arizona. Given these setbacks, the Recovery Team has worked hard to renovate and add new populations of Gila trout in both Arizona and New Mexico. When Gila trout was downlisted in 2005, there were only 13 populations of Gila trout range wide. Currently, there are 18 populations of Gila trout within is range with plans for repatriating other streams in the new future.

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 FR 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 Prescott NF. The Prescott NF has a land base of approximately 1.25 million acres (500,857 ha). This land base is drained by several major drainages with considerable occupied or potential habitat within the historical range of Gila trout.

Status of the species within the action area

Although the historical distribution of Gila trout is not known with certainty (Behnke 2002), based on the location of remnant populations, the Gila River drainage represents the core of the historical distribution.

According to the Gila trout recovery plan (USFWS 2003), at least eight potential streams have been identified for the San Francisco River Recovery Unit lineages and San Francisco-Gila River mixed lineages. Grapevine Creek was not identified in the Recovery Plan as a stream for restoration for any of the Recovery Unit lineages. Grapevine Creek is the only pure population of Gila trout from the South Diamond lineage that currently exists within the historical range of Yavapia County on lands administered by Prescott NF (Table 2).

Grapevine Creek was stocked with South Diamond lineage in 2009 (150 fish). The population in Grapevine, once established, will partially fulfill recovery criteria identified for the San Francisco-Gila River mixed lineage assemblage (AGFD 2011, USFWS 2010). The reach of creek stocked with Gila trout is located within the Grapevine Botanical Area and livestock grazing has been excluded from the area since 2004.

Factors affecting the species environment within the action area

On the Prescott NF, past and present Federal, State, private, and other human activities that may affect Gila trout and their habitat include: livestock grazing, timber harvest, wildfire, recreational activities, and any other habitat alterations. In addition, the stocking of nonnative trout by AGFD and private citizens in the early to mid-1900s is also included in the environmental baseline. We describe activities that have occurred within the Prescott NF to qualify the environmental baseline. We also include information from the Gila NF, which provide anecdotal information concerning activities that may impact Gila trout on Prescott NF. We use information from the Gila NF because we don’t have information regarding Prescott NF land and resource management impacts on Gila trout due to many of the population in Arizona are newly introduced, therefore we use the Gila NF as a surrogate of information due to similar management practices.

Recreational activities

It is likely that early settlers or indigenous people harvested Gila trout for food. The extent to which either group depended on Gila trout for subsistence is unknown. In 2005, the FWS published a 4(d) rule states that you may take Gila trout in accordance with applicable State fish and wildlife conservation laws and regulations to protect this species in the States of New Mexico or Arizona.

Livestock grazing

Historically, improper livestock grazing likely contributed to habitat modifications noted by Miller (1950). The historical occurrence of intensive grazing and resulting effects on the land are indicated in published reports dating back to the early 1900s (Rixon 1905, Rich 1911, Duce 1918, Leopold 1921, Leopold 1924).

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 sign 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 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).

Improper livestock grazing practices can degrade riparian and aquatic habitats, resulting in decreased production of trout (Platts 1991). Livestock affect riparian vegetation directly by eating grasses, shrubs, and trees, by trampling the vegetation, and by compacting soil. Riparian vegetation benefits streams and trout by providing insulation (cooler summer water temperatures, warmer winter water temperatures), by filtering sediments so that they do not enter the stream (sediment clogs spawning gravel voids and reduces the survival of salmonid eggs), by providing a source of nutrients to the stream from leaf litter (increases stream prey productivity), and by providing root wads, large woody debris, small woody debris to the stream (provides cover for the fish) (Kauffman and Krueger 1984, Platts 1991, Ohmart 1996). Livestock grazing increases sedimentation through trampling of the steam banks (loss of vegetative cover), by removal of riparian vegetation (filters sediment), and through soil compaction (decreases infiltration rates, increases runoff, causes increased erosion). Sediment is detrimental to trout because it decreases the survival of their eggs (Bjornn and Reiser 1991), and because of its negative impact on aquatic invertebrates, a food source for trout (Wiederholm 1984).

In the late 1800s and early 1900s, livestock grazing was uncontrolled and unmanaged over many of the watersheds that contained Gila trout and much of the landscape was denuded of vegetation

(Rixon 1905, Duce 1918, Leopold 1921, Leopold 1924, Ohmart 1996). Livestock grazing is more carefully managed now, which has resulted in less impact to streams occupied by Gila trout. Improved management grazing practices (e.g., fencing) have reduced livestock access and impacts to streams. Grapevine Creek is found within one grazing allotments Big Bug allotment. The reach of creek stocked with Gila trout is located within the Grapevine Botanical Area and livestock grazing has been excluded from the area since 2004.

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 Gila trout likely altered water temperature regimes, sediment loading, bank stability, and availability of large woody debris (Chamberlin et al. 1991). Timber harvest is not currently allowed in wilderness or primitive areas.

Fire

High-severity wildfires and subsequent floods and ash flows caused the extirpation of seven populations of Gila trout since 1989 including in: Main Diamond Creek (1989), South Diamond Creek (1995), Burnt Canyon (1995), Trail Canyon (1996), Woodrow Canyon (1996), Sacaton Creek (1996), and Upper Little Creek (2003) (Propst et al. 1992, Brown et al. 2001, USFWS 2002). The largest fire near Grapevine Creek was the Bug Fire occurred in 1976, which burned 28,389 acres (11,489 ha) of land. This watershed has not experienced many devastating fire, but only a few lightning strikes that burned less than 100 acres (40 ha) (USFS 2011a).

Because Gila trout are now found primarily in isolated, small streams, avoidance of ash flows may be impossible and opportunities for natural recolonization usually do not exist (Brown et al. 2001). Persistence of Gila trout in streams affected by fire and subsequent ash flows depend on management actions. In some instances, evacuation of Gila trout 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 (USFWS 2006b).

Nonnative species

Perhaps the most serious threat to Gila trout is predation, competition and hybridization with nonnative salmonids (i.e., brown and rainbow trout). The impacts of nonnative trout species on native fish including Gila trout or other trout species have been well documented ((Miller 1950, Behnke and Zarn 1976, Sublette et al. 1990, Propst et al. 1992, Turner 1996). Grapevine Creek within the Grapevine Botanical Area was a fishless stream before the introduction of Gila trout in 2009 and predation/competition with nonnative fish is not a serious threat to the population.

Climate change

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

1. increased water temperature;

2. decreased streamflow;
3. change in the hydrograph; and
4. 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 (Kundzewicz et al. 2007). 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). Water temperature influences the survival of salmonids at all stages of their life cycle. Alterations in the temperature regime from natural background conditions negatively affect population viability, when considered at the scale of the watershed or individual stream (McCullough 1999). Salmonids are classified as coldwater fish with thermal preferences centered on 59 °F (15 °C) (Shuter and Meisner 1992). High temperatures suppress appetite and growth, foster disease, can influence behavioral interactions with other fish (Schrank et al. 2003), or be lethal (McCullough 1999). Salmonids inhabiting warm stream segments have higher probabilities of dying from stress (McCullough 1999). The temperature preferences and tolerances of Gila trout have not yet been determined. However, increased stress from elevated temperatures could lead to greater susceptibility to disease and reduced reproductive success.

Gila trout are found within small ranges with limited dispersal capabilities and narrow physiological tolerance (i.e. temperature) making them susceptible to extinction as the climate changes (Kennedy et al. 2009). Because Gila trout occur in the upper reaches of the watershed there is no suitable habitat to move to with increasing temperature. Based on the documented loss of occupied habitat, downstream temperatures may already be marginally suitable and in the future, they may become too warm to be suitable for Gila trout (Miller 1950). For example, by 1950, water temperature in the Gila River at Sapillo Creek was considered too warm to support any trout species (Miller 1950). Kennedy et al. (2009) determined that warm season habitat for Gila trout will be reduced by 70 percent, due to warmer temperature in combination with decrease precipitation in the summer, leading to increase in intensity and frequency of wildfires.

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 trout. 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. The life history of salmonids is tied to the timing of runoff (Fausch et al. 2001). A change in timing or magnitude of floods can scour the streambed destroying eggs, or displace recently emerged fry downstream (Erman et al. 1988, Montgomery et al. 1999, Fausch et al. 2001).

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 U.S. is currently experiencing drought conditions (University of Nebraska-Lincoln 2010). Although Gila trout 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 stream drying, there is a clear association between severe droughts and large fires in the Southwest (Swetnam and Baisan 1996).

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 and fire suppression (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 trout. Ash and debris flows or severe flash flooding can also decimate aquatic invertebrate populations that trout 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).

Increases in water temperature occur when the riparian canopy is eliminated by fire and the stream is directly exposed to the sun. After fires in Yellowstone National Park, Minshall et al. (1997) reported that maximum water temperatures were significantly greater in headwater streams affected by fire than in reference (unburned) streams and subsequent water temperatures often surpassed tolerance levels of salmonids. Warm water is stressful for salmonids and can lead to increases in disease and lowered reproductive potential (Bjornn and Reiser 1991).

Salmonids need clean, loose gravel for spawning sites (Bjornn and Reiser 1991). Ash and fine particulate matter created by fire can fill the interstitial spaces between gravel particles eliminating spawning habitat or, depending on the timing, suffocating eggs that are in the gravel. Increases in water temperature and sedimentation can also impact aquatic invertebrates changing

species composition and reducing population numbers (Minshall 1984, Wiederholm 1984, Roy et al. 2003), consequently affecting the food supply of trout.

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 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 trout.

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 trout.

EFFECTS OF THE ACTION

The S&Gs listed in the proposed Prescott NF LRMP and the 1996 Regional Amendment provides direction for the development of site-specific actions. The Gila trout occurs in Management Areas: 3 and 4. Multiple S&Gs within the Prescott NF LRMP are applicable to the Gila trout and its habitat. These S&Gs may result in both indirect and direct effects to the species. Gila trout on the Prescott NF was not evaluated during the last consultation because Gila trout were not present on the NF at that time. Gila trout were recently introduced on Prescott NF in Grapevine Creek in 2009. This analysis evaluated all S&Gs identified by the 2011 BA (as shown in Table 3 below).

Table 3. Summary of S&Gs considered for the Gila trout – Prescott NF LRMP.

National Forest	**Standard and Guidelines Numbers[1]**
Prescott LRMP	1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158. 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1169, 1170, 1171, 1172, 1173, 1174, 1175. 1176, 1177, 1178, 1179, 1180, 1181, 1182, **2031, 2032, 2050**
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

[1]New S&G in Bold

Each of the S&Gs was evaluated using the ranking scale method from the 2005 BO. Table 4 below provides a summary of the S&Gs' effects on Gila trout in the Prescott NF. As you can see, 77.3 percent of the S&Gs are anticipated to assist in providing recovery for the species. Thus, the majority of the S&Gs are beneficial for the Gila trout. Only three S&Gs were found to cause a lethal or sublethal response in Gila trout. These S&Gs causing lethal and sublethal responses are discussed in detail below and are the result of activities in the Watershed Management; Wildlife, Fish, and Rare Plants; and Rangeland Management Program.

Table 4. Summary of the S&Gs effects on the Gila Trout in the Prescott NF.

Ranking	**Explanation of Ranking**	**Total**	**Percentage**
-3	S&G is causing lethal response	2	3.0
-2	S&G is causing sublethal response	1	1.5
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is open to interpretation	4	6.1
1	S&G is maintaining habitat & providing recovery	51	77.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	3.0
Y	S&G has no application to the species	1	2.0
Z	S&G implementation is nondiscretionary	3	4.5
X	S&G is a heading	1	1.5
Total		66	100

Watershed Management Program
S&G 1147 guides the NF to meet the following riparian standards in the Regional Guide for 80 percent of riparian areas by 2030: maintain at least 80 percent to the potential overstory crown closure of obligate riparian species. Manage resources to create or 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 where site potential exists. Maintain at least 80 percent of the potential stream shading along perennial cold-water streams. Maintain adequate emergent vegetation to ensure compliance with the goals of the strategic plan. Maintain 80 percent of spawning gravel surface free of occlusive inorganic sediment. Maintain at least 80 percent of stream bank linear distance in stable condition. Retain snags in riparian areas that are not a safety hazard. Implementation of this S&G (1147) may result in lethal effects on Gila trout because 80 percent potential stream shading may not be adequate to maintain the optimal stream temperatures required by this species. Once again, partial attainment of habitat conditions is interpreted to result in some level of adverse effects to the Gila trout.

Wildlife, Fish, and Rare Plants Program
S&G 1149 allows the NF to cooperate with AGFD on population control of aquatic plants and undesirable fish species. This S&G directs the NF to permit fish stocking to meet state fisheries goals. The effects of nonnative fish on native fishes, including Gila trout, are almost entirely deleterious and have been documented in numerous publications (Propst et al. 1992, Brown et al. 2001, Clarkson et al. 2005). The FWS considers the introduction or maintenance of nonnative fishes in habitats occupied by Gila trout, or habitats into which the species may be reestablished, to be highly adverse. Implementation of S&G 1149 may affect Recovery Effort identified in the Gila Trout Recovery Plan; by not providing a habitat devoid of nonnative aquatic species detrimental to Gila trout or its habitat.

Rangeland Management Program
S&G 1162 states that when using pesticides, avoid direct application to water, and to not mix or load chemicals near streams or wet areas. This S&G is not protective enough to prevent the intrusion of pesticides into streams nor does it specify what pest species are to be targeted or what effects their removal will have on Gila trout. Thus, this S&G may result in a sublethal response by the trout.

The majority of the S&Gs maintain habitat and provide for recovery of this species. Additionally, there are several S&Gs that are beneficial in the long-term but have some short-term adverse effects.

<u>1996 Regional Amendment</u>

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

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. S&G 1445 allows treatment of fuel accumulations to abate fire risk. S&G 1455 directs the NF to use combinations of thinning trees less than 23 cm (9 in) 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 trout 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 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.

S&Gs 1432, 1445, 1455, 1458, 1468, 1476 and 1508 are all related to the fuels treatment for fire risk abatement. 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/CO. 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. Grapevine Creek within the Big Bug Creek HUC6 subwatershed, where suitable for Gila trout, is wholly within the Prescott NF. As such, no cumulative effects were identified.

CONCLUSION

After reviewing the current status of the Gila trout, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's BO that the proposed action will not jeopardize the continued existence of the Gila trout or its recovery. 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. No CH has been designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the Gila trout from the implementation of the Prescott NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will jeopardize the continued existence of the species or its recovery. The FWS bases this conclusion on the following reasons:

- The status of the Gila trout has been downlisted because three of the four original pure population lineages are currently protected and replicated in 67 mi (109 km) of stream; each replicate is geographically separate from its remnant population.

- An Emergency Plan (Plan) has been developed and implemented. This Plan addresses wildfire-related impacts and nonnative salmonid invasion (USFWS 2006b).

- The Prescott NF, in cooperation with the AGFD and FWS, established a new Gila trout population.

- There are S&Gs that support conservation and recovery of Gila trout. These S&Gs guide the USFS to implement recovery plans, improve habitat for threatened and endangered species, and to delist threatened and endangered species.

Proactive efforts by the USFS in the past and the continued monitoring of those actions have contributed positively to the overall status of the Gila trout such that the trout was downlisted from endangered to threatened in 2005 (USFWS 2005). Although several S&Gs may cause lethal or sublethal responses to the Gila trout and result in take of individuals, implementation of these S&Gs would not cause jeopardy to the species because all the actions described above, together with, the implementation of the beneficial S&Gs outlined above should not result in a decline in population numbers or habitat conditions of Gila trout on NFS lands in the southwest. For these reasons, the FWS concludes that the proposed action will not jeopardize the continued existence of Gila trout or its recovery.

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. Per the Act, "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 (50 CFR 402.02) 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 nondiscretionary, 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 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 Gila trout is reasonably certain to occur as a result of the continued implementation of the Prescott NF LRMP. On the Prescott NF, take in the form of harm and harass of Gila trout is expected from the Watershed Management and Wildlife Programs. Harassment to individual fish may occur from activities conducted within occupied streams. Harm to the species occurs through activities that alter the suitability of the habitat to support Gila trout and activities that improve habitat to support nonnative trout species, which may predate on Gila trout.

The FWS anticipates incidental take of Gila trout will be difficult to detect because 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 trout that will be incidentally taken, we are providing a mechanism to quantify when take would be considered to be exceeded at the population level. For purposes of this BO/CO, we define incidental take in terms of the number of extant populations. The only extant population within Prescott NF is Grapevine Creek. The FWS concludes that incidental take of Gila trout will be considered to be exceeded if, during a period of 3 consecutive years, there is a loss of any currently extant population of Gila trout on Prescott NF lands as a result of the proposed action. If a loss of an extant population of Gila trout is identified, it must be verified to be lost the next year. This level of incidental take is in addition to any previously authorized take resulting from ongoing projects or projects that have been consulted on but are yet to be implemented.

Effect of the Take

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

REASONABLE AND PRUDENT MEASURES

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

1. Minimize or eliminate take of Gila trout on the Prescott NF lands due to LRMP activities.

2. Minimize or eliminate adverse effects to Gila trout habitat on the Prescott NF lands due to LRMP activities.

3. Monitor the impacts of site-specific projects implemented on the Gila trout.

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 trout populations in order to minimize direct and indirect effects to Gila trout and its habitat.

1.2 Develop and implement projects in LRMP programs within the Prescott NF with the goal of minimizing or eliminating adverse effects to the Gila trout.

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

2.1 Develop and implement projects in occupied Gila trout habitat with the goal of minimizing or eliminating adverse effects to Gila trout habitat.

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

3.1 The Prescott 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 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. In cooperation with AGFD and the FWS, remove all nonnative species affecting the Gila trout and take measures to prevent reoccurrence of nonnative species from identified recovery stream segments.

2. In cooperation with AGFD and the FWS to secure, renovate, and maintain streams in order to provide additional habitat for Gila trout. Populations of Gila trout should continue to be replicated into streams that are geographically separate to increase the range of the species and streams that are within watersheds of currently occupied habitat to ensure that natural or human-induced disasters do not extirpate the populations.

3. Implement recovery actions identified in the Gila Trout Recovery plan, and emphasize efforts in replicating Spruce Creek and Gila-San Francisco lineages

In order 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 in the annual report.

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 and spikedace 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 spikedace to endangered status (75 FR 66482). During the preparation of this BO, the proposed rule changing the spikedace's status from threatened to endangered was finalized on February 23, 2012 (77 FR 10810).

Critical habitat 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 spikedace'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 can be 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), 2010 proposed rule for CH designation (75 FR 66482), and the 2012 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, U.S. Fish and Wildlife Service (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 spikedace 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 CHU would facilitate management for the species. While the Blue River and its tributaries were not included in the 2007 designation, the 2012 final rule 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 (U.S. Fish and Wildlife Service 2000). Although it was listed as threatened at the time of the 2011 BA, we published a proposed rule in October 2010 to redesignate CH and to reclassify spikedace to endangered status. The final rule was published on February 23, 2012, and became effective on March 26, 2012.

ENVIRONMENTAL BASELINE

Status of the Species within the Action Area

On the Prescott NF spikedace are believed to still be present in the Verde River. Although the species has not been detected in stream surveys since 1999, the river is still considered to be occupied, albeit at low numbers. The Forest continues to cooperate with partners to determine the status of spikedace in the upper Verde River. The Forest continued with monitoring of seven sites along the upper Verde River to document fish community structure and habitat conditions. The AGFD completed species specific surveys for portions of the upper Verde River in 2008, 2009, and 2011. During 2006- 2011 the Forest and partners removed nonnative fish

along three mi of the upper Verde River. The Prescott NF, along with AGFD and the BOR, completed site feasibility visits in 2006 along the upper Verde River for potential fish barrier locations and BOR completed an appraisal of findings in 2010. Livestock grazing allotment management on the Prescott continues to restrict livestock grazing use along the upper Verde River. The Prescott NF continues to have road closures in place for the upper Verde River. Barrier and sign maintenance were completed at river access points in 2008 and 2011 to prevent illegal vehicle access to the upper Verde River. The Forest completed about five mi of road decommissioning/closures within watersheds of the upper Verde River in 2009. The Forest continued with noxious plant treatment and retreatment along 12-mi of the upper Verde River to improve riparian conditions from 2007 – 2009 with retreatments scheduled in 2012.

Critical habitat was designated for the spikedace in 2007 and modification to the original designation was recently finalized by the FWS (finalized February 23, 2012; effective March 26, 2012). The 2010 proposal and 2012 final rule included a reach of the Verde River on the Forest.

Factors Affecting the Species within the Action Area
Spikedace and its designated CH may be affected on NFs by groundwater pumping, watershed conditions, stormwater runoff, nonnative fish species, livestock grazing, timber harvest, wildfire, recreational activities, and other habitat alterations.

CONSERVATION MEASURES

The USFS has agreed to implement the following Conservation Measures (CM) 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 (i.e. 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 development of a captive spikedace propagation program designed to augment wild populations.

Conservation Measure #7: The long-term benefit 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 and 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 wells 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, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding 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 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 Prescott NF.

As stated above, we assume this species to be present within the Verde River on the Prescott NF. There are four S&Gs within the Prescott NF LRMP that if implemented could potentially result in lethal and non-lethal effects to the spikedace. These are S&Gs 1149 and 1162. The majority of the S&Gs provide for maintaining habitat recovery of the spikedace. Additionally, there were several S&Gs that were beneficial in the long-term but had some short term adverse effects.

Lands and Minerals Program
Standard and Guideline 1169 allows the Forest to permit roads needed for private land access, special uses or mineral activities to be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and revegetated after use. This S&G could potentially cause short-term adverse effects (i.e., increased sedimentation into the stream channel) in the process of implementing an activity that will provide an overall beneficial effect to the landscape in the long-term. The effects of closing roads are discussed under the Engineering Program for the Coronado NF.

Rangeland Management Program
Standards and Guidelines 1151 and 1154 are positive management activities to manage livestock grazing and reduce adverse effects to the landscape in the long-term; however, there may be short-term adverse effects associated with this management. See the discussion under the Gila NF, Rangeland Management Program.

Included among the formal consultations in Arizona with adverse effects to the spikedace is 2-21-95-F-0440-R1 on the Prescott NF. This is a batched consultation of several allotments within the upper portion of the Verde River. Because the presence of the species within the Verde River during that time was uncertain, the BO had no take associated with it.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1162 states that when using pesticides, the Forest should avoid direct application to water and directs the Forest to avoid mixing or loading chemicals near streams or wet areas. Pesticides (insecticides and fungicides) and herbicides are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application. In the case of S&G 697, these pesticides and herbicides could potentially be introduced into aquatic systems to kill undesirable pests such as weeds and algae in order to enhance fishing opportunities.

A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e. non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995). Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can suppress an already small population as is typical of endangered or threatened species (Pattee *et a*l. 2003).

Standard and Guideline 1136 allows trail access but restricts it to non-motorized use except where indicated on the Forest visitor maps or signing on the ground. Where discrepancies occur, S&G 1136 directs on the ground signing. This S&G is an attempt to minimize the effect of roads and trails to the watershed in the long-term. This action could mean a potential for some short term adverse effects from ground disturbing activities that may increase sedimentation into streams.

Watershed Management Program

Standard and Guideline 1147 provides guidance for management of the riparian resources. The FWS recognizes that the intent of this S&G is positive; however, due to the current status of the spikedace across its range, it is imperative that all habitat that is currently occupied, or is capable of supporting spikedace, 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.

Wildlife, Fish and Rare Plants Program

Standard &Guideline 1149 provides guidance for permitting stocking of fish to meet AGFDs fisheries goals. For the purposes of this analysis, the FWS assumes that “fisheries” could include native as well as non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of spikedace (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968, Minckley 1973). The red shiner is a very competitive species that out-competes spikedace for food items and habitat and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and

Hill 1977). In addition, largemouth bass, smallmouth bass, green sunfish, and introduced trout may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

1996 Regional Amendment

Short-term adverse effects to the spikedace may occur from the implementation of the S&Gs within the 1996 Regional Amendment. Yet, 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 have a long-term beneficial effect to the spikedace. They are 1432, 1445, 1448, 1455, 1458, 1468, 1476, and 1508. All 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 (i.e. sedimentation) as well as those from the fire itself. See previous discussions under the Fire Management Program, Coconino NF for discussion of those effects. Although the implementation of all 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 boundary of the Prescott NF. Therefore, direct and indirect effects on CH and the PCEs will be considered for this NF.

Engineering Program
The Engineering Programs on the NFs with designated spikedace CH manage roads, facilities and structures. Degradation and destruction of spikedace 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 spikedace 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.

The Prescott NF LRMP contains two Forest-wide S&Gs that may affect spikedace CH. S&G 1173 guides the Program to relocate roads out of canyon bottoms during construction and reconstruction. S&G 1174 guides the NF to prohibit road construction on unstable soils and slopes greater than 40% incline if it cannot be done in a manner that maintains or enhances water quality and quantity objectives. These two S&Gs provide guidance that may prevent potential adverse effects to spikedace CH.

Fire Management Program

There is very little guidance in the LRMP's S&Gs that addresses conflicts between fire management and spikedace CH. For example, the Prescott LRMP does not have S&Gs specific to the Fire Management Program that may have effects on CH. Fire is often used to meet management objectives such as improving wildlife habitat, livestock forage, reducing fuel hazards, and improving watershed condition. Only S&G 413 considers the effects of fire on listed species. 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.

Forestry and Forest Health Program
The Prescott NF LRMP does not contain S&Gs that may restrict activities in the Forestry and Forest Health Program, which would cause effects to federally-listed species. As a result, there may be potential adverse effects to spikedace CH.

Lands and Minerals Program
There are four S&Gs within the Prescott NF LRMP that direct the Forest to protect and conserve listed species and their habitats. S&Gs 1169 and 1170 guide the Forest to limit the amount of disturbance created by multiple roads to private land inholdings in the same proximity by allowing only one access road. In addition, S&Gs 1171 and 1172 direct the Forest to acquire inholdings that "contain vital threatened and endangered species habitat or vital wildlife habitat", as well as wetlands, riparian areas, and other water-oriented lands. Although these S&Gs exist, there is still the potential that some activities are not substantially restricted as to preclude effects to spikedace CH within the Prescott NF.

Rangeland Management Program
The S&Gs applicable to the Rangeland Management Program on the Prescott NF provide guidance for protecting riparian areas, watersheds, soils, water quality, wildlife habitat, and listed species. S&G 1161 guides the Forest to meet "T&E species requirements in all range or grazing activities." This S&G may minimize effects and could potentially contribute toward the recovery of spikedace CH.

Recreation, Heritage, and Wilderness Program
Standards and Guidelines 1135 – 1138 within the Prescott NF Recreation, Heritage, and Wilderness Program provide guidance for the protection of resources. This guidance can potentially protect spikedace CH from adverse effects caused by off road driving.
These S&Gs recommend access restrictions for roads, trails, or cross country travel that may be yearlong or temporary to reduce erosion potential, protect roads, to protect cultural sites, and to provide for recreation settings without vehicle disturbance.

Watershed Program
The Watershed Programs for this Forest seeks 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 spikedace CH.

Standard and Guideline 1122 within the Prescott NF LRMP guides the program to restore all lands to satisfactory watershed condition. In addition, other S&Gs exist that guide the Forest to give preference to riparian-dependent resources over all other resources (S&G 1123, 1144), improve and maintain all riparian areas in satisfactory condition (S&G 1124, 1145-1147), and protect soil, water, vegetation, wildlife and fish resources (S&G 1143, 1165-1167). The S&Gs for the Watershed program are very protective of riparian resources and if implemented, may minimize or avoid adverse effects to spikedace CH.

Wildlife, Fish, and Rare Plants Program
The intent of LRMPs and S&Gs applicable to the Fish, Wildlife 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.

The Prescott NF LRMP provides direction to the Wildlife, Fish, and Rare Plants Program to "manage for a diverse, well distributed pattern of habitats for wildlife populations and fish species" (S&G 1118), and "maintain and/or improve habitat" for listed species (S&G 1119). All structure and non-structural construction and maintenance priority will be given to listed species. S&G 1149 guides the Forest to cooperate with the AZGFD to control aquatic plants and undesirable fish species and permit the State agency to stock fish to meet the agency fisheries goals. This may not be compatible with maintaining or recovering listed species and the primary constituent element related to non-native species. If preference is not given to those S&Gs that provide protection for CH, the result may be adverse effects to spikedace CH.

1996 Regional LRMP Amendment
Although the 1996 Regional LRMP Amendment focuses on effects to MSO, there are some S&Gs that may contribute to the protection of imperiled species and their habitats. The amendment addressed several activities in several Resource Programs. One S&G provides guidance for the Engineering and Recreation, Heritage and Wilderness Programs. 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 BO/CO. 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.

Cumulative effects to spikedace CH include ongoing activities on non-federal lands within watersheds with designated CH such as livestock grazing and associated activities outside of the allotments addressed herein, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization, and recreation. Some of these activities are declining and are not expected to contribute substantially to cumulative long-term adverse effects.

Other activities, such as recreation are increasing. Increasing recreational, residential, or commercial use of the private lands near the riparian areas will likely result in increased cumulative adverse effects to loach minnow and spikedace CH 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 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

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. 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.

The FWS anticipates adverse effects to the spikedace from the implementation of the Prescott 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 spikedace. These S&Gs guide the Forest to implement recovery plans, improve habitat for threatened and endangered species by structural and nonstructural means, and to delist threatened and endangered species.
- The USFS has fenced hundreds of miles of streams within NFS lands for the protection of spikedace habitat.

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

- Designing projects in occupied spikedace habitat on NFS lands that address the appropriate components of the spikedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to spikedace.
- 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 spikedace reintroduction. In addition, determining 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 spikedace. Further, developing 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 (i.e., 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 development 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 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 wells 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, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding 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 measure direct actions at eliminating threats and augmenting populations. These efforts, in combination with actions

already on-going for the conservation benefit of the species, will provide sufficient protection for the spikedace. Therefore, we conclude that the continued implementation of the Prescott NF's LRMP is not likely to jeopardize the continued existence of the spikedace.

Critical Habitat

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 will not destroy or adversely modify CH.

This BO/CO 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' 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. Critical habitat 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" (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998:4-34).

Effects to the spikedace from the Prescott NF LRMP and the 1996 Regional Amendment were analyzed. Potential adverse effects from the implementation of this LRMP and associated S&Gs were found 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 Prescott 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 1119 within the Prescott LRMP gives preference to threatened and endangered species and their habitats. In addition, there are S&Gs that 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 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 projects designs as appropriate. The Prescott NF has incorporated native fish restoration objectives in its Forest Plan Revision.

- 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 AZGFD. Applicable Forests have cooperated with others to provide access to wild populations to serve as sources for the captive stock.

- Since June 2007, the Gila NF, in cooperation with NMDGF, AZGFD, and FWS Phoenix ES Office, have captured spikedace at the Gila River Bird Area to establish a captive breeding program at Bubbling Springs Hatchery in Arizona.

- In compliance with an RPM described in the 2005 BO, the USFS agreed to maintain current distributions of threatened, endangered, proposed, and candidate species in Geographical Information System (GIS) layers on each NF in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed that the ignition occurs, as well as, surrounding watersheds. 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. The Prescott NF, through annual pre-ignition planning and appropriate suppression response discussions, addresses the potential effects to threatened, endangered, and proposed species and if potential adverse effects to the spikedace and its CH cannot be avoided or minimized the Line Officer is responsible for determining the appropriate suppression response.

- The Prescott NF has implemented some non-native fish removal on three miles of stream along the upper Verde River from 2006 to 2011 in cooperation with the Rocky Mountain Research Station, Flagstaff.

The PCEs for spikedace 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 spikedace 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 spikedace and its CH, promoting survival and recovery. 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 spikedace habitat. In addition, there are activities being conducted by other land management agencies to enhance habitat for the spikedace 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 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 spikedace 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 designated CH for the spikedace.

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. Per the Act, "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 (50 CFR 402.02) 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 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 action area of the Prescott 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.

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.

DISPOSITION OF DEAD OR INJURED LISTED SPECIES

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS 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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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 listed below. In addition, the FWS has provided a brief reasoning for these concurrences.

Southwestern willow flycatcher (*Empidonax traillii extimus*) and designated and proposed Critical Habitat

The FWS concurs that at the LRMP level, activities within the Prescott NF 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 designated and proposed CH exists on the Prescott NF, we concur with your determination that the continued implementation of the S&Gs within the Prescott NF LRMP is not likely to destroy or adversely modify flycatcher CH.

1. The USFS has not detected nesting Southwestern willow flycatchers on the Prescott NF, however, migrants and/or floaters may exist on the Forest because nesting is known to occur along a segment of the Verde River which is in close proximity to the Prescott boundary.
2. Little to no riparian areas that could be considered flycatcher habitat exists on the Forest primarily due to the lack of perennial water.
3. Standards and Guidelines within the Prescott NF LRMP were found to be positive for conservation of riparian systems from Program activities.
4. Many riparian areas are excluded from livestock grazing.

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

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

1. The Prescott NF LRMP includes S&Gs that generally restrict the activities of Resource Programs to reduce impacts to the Colorado pikeminnow.
2. The Forest manages the river, flood plain, and the watersheds that feed the occupied habitat in a manner that is beneficial to the species.
3. The Colorado pikeminnow's main limiting factors, such as 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, are unrelated to USFS management and out of the scope of this project.
4. While USFS management can have effects to water quality and quantity, the impacts are negligible given the established S&Gs, on-going conservation measures, and the full range of the species in the Colorado River Basin.

Razorback sucker (*Xyrauchen texanus*) Endangered

The FWS concurs with your determination that the continued implementation of the S&Gs within the Prescott 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 nonnative 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 Prescott NF 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 conservation measures minimize effects from USFS management that may affect water quality and quantity.
4. 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.
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.

<u>Razorback sucker designated Critical Habitat</u>
The FWS concurs with your determination that the LRMP for the Prescott NF <u>is not likely to destroy or adversely modify</u> critical habitat of the razorback sucker for the following reasons:

1. Established S&Gs and on-going conservation measures minimize effects from USFS management that may affect water quality and quantity.
2. Effects to the PCEs 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 2050 MA-9) has strengthened the Forest's management objectives for activities along the river.

Appendix B: Abbreviations and Acronyms

AGFD – Arizona Game and Fish Department

AZ - Arizona

BA – Biological Assessment

BLM – Bureau of Land Management

BO – Biological Opinion

BO/CO – Biological/Conference Opinion

BOR – Bureau of Reclamation

BRW – Basin and Range West Recovery Unit

CA – Consultation Agreement

CH - Critical Habitat

CLF – Chiricahua leopard frog

CMs – Conservation Measures

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

LRMP – Land and Resource Management Plans (Forest Plans)

MA – Management Area

mi. – miles

MSO – MSO

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 Road Vehicle

PAC – Protected Activity Center

PCE – Primary Constituent Element

RU – Recovery Unit

S&Gs – Standards and Guidelines

Sq - square

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