United States Department of the Interior

FISH AND WILDLIFE SERVICE

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September 14, 2022

Cons: # 02ENNM00-2017-F-0527

Camille Howes
U.S. Forest Service, Gila National Forest
3005 East Camino Del Bosque
Silver City, NM 88061

Dear Ms. Howes:

Thank you for the June 22, 2021, letter requesting formal consultation with the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act of 1973 (16 USC 1531-1544), as amended (ESA), for the U.S. Forest Service's Gila National Forest Land Management Plan Revision (LMP or proposed action). Your letter included a biological assessment (BA) dated June 22, 2021, and hereby incorporated by reference, which analyzed the effects of the proposed action on the following federally listed species: Mexican wolf (*Canis lupus baileyi*), New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) and its critical habitat (CH), Mexican spotted owl (*Strix occidentalis lucida*) and its CH, Southwestern willow flycatcher (*Empidonax traillii extimus*) and its CH, Western yellow billed cuckoo (*Coccyzus americanus occidentalis*) and its CH, Chihuahua chub (*Gila nigrescens*), Gila chub (*Gila intermedia*) and its CH, Gila trout (*Onorhynchus gilae*), loach minnow (*Tiaroga cobitis*) and its CH, spikedace (*Meda fulgida*) and its CH, Chiricahua leopard frog (*Lithobates chiriahuensis*) and its CH, narrow-headed gartersnake (*Thamnophis rufipunctatus*) and its CH, and Northern Mexican gartersnake (*Thamnophis eques megalops*).

The Forest Service made a determination that the proposed project "may affect, is likely to adversely affect" for the following species and/or their CH: Mexican spotted owl and CH, New Mexico meadow jumping mouse, Southwestern willow flycatcher and CH, Western yellow-billed cuckoo and CH, Chihuahua chub, Gila chub and CH, Gila trout, loach minnow and CH, spikedace and CH, Chiricahua leopard frog and CH, narrow-headed gartersnake and CH, and Northern Mexican gartersnake. No critical habitat exists for the New Mexico meadow jumping

mouse or the Northern Mexican gartersnake within the Gila National Forest boundaries; therefore, CH will not be affected for these species. Critical habitat has not been designated for the Gila trout or the Chihuahua chub.

The Forest also made a determination of "may affect, not likely to jeopardize the continued existence of" for the Mexican wolf. The Mexican wolf has been established in New Mexico as an experimental, non-essential population under section 10(j) of the ESA. For section 7 consultation purposes, any experimental, non-essential population located outside of a National Park or National Wildlife Refuge System is treated as a proposed species. As such, the Forest determined that the proposed action "is not likely to jeopardize" the continued existence of the wolf. The USFWS concurs with your determination of "may affect, is not likely to jeopardize" the continued existence of the wolf because during project implementation wolves can avoid areas of activity and the plan will eventually benefit the wolf by improving habitat conditions.

Additionally, the June 2021 BA included determinations of "no effect" for 19 species and associated CH. Although the ESA does not require Federal agencies to consult with the USFWS if the action agency determines their action will have "no effect" on threatened or endangered species or designated critical habitat (50 CFR 402.12), we appreciate your consideration for the conservation of these species and notification of your "no effect" determinations.

The attached biological opinion is based on the review of the proposed action and its effects on federally listed species and designated critical habitat in accordance with section 7 of the ESA. The biological opinion is based on information provided in the BA, correspondence with your staff, data in our files, a literature review, and other sources of information, including the final rules to list the previously mentioned species as threatened or endangered and designate critical habitat. The literature cited in the attached biological opinion is not a complete bibliography of all literature available on the species of concern, the project, and its effects, or other subjects considered in this opinion.

We appreciate your efforts to identify and minimize effects to listed species from the U.S. Forest Service's Gila National Forest Land Management Plan Revision. For further information, please contact Elizabeth Bainbridge of my staff at elizabeth_bainbridge@fws.gov. Please refer to consultation number 02ENNM00-2017-F-0527 in future correspondence concerning this project.

Sincerely,

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Date: 2022.09.14 13:34:19 -06'00'

Shawn Sartorius
Field Supervisor

cc (electronic):

Forest Biologist, Gila National Forest, Silver City, New Mexico
Species Lead Biologists (Gila trout, Mexican wolf, New Mexico meadow jumping mouse), U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico
Species Lead Biologists (Chiricahua leopard frog, Chihuahua chub, Gila chub, loach minnow, Mexican spotted owl, narrow-headed gartersnake, Northern Mexican gartersnake, Southwestern willow flycatcher, spikedace, Western yellow-billed cuckoo), U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Biological Opinion for the Gila National Forest

Land Management Plan Revision

02ENNM00-2017-F-0527

September 2022

SHAWN

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Shawn Sartorius — Date
Field Supervisor
New Mexico Ecological Services Field Office

Contents

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (USFWS) biological opinion concerning the effects of the U.S. Forest Service's (USFS) Gila National Forest (GNF, Forest, or NF) Land Management Plan (LMP) revision, in accordance with section 7 of the Endangered Species Act of 1973 (16 USC 1531-1544), as amended (ESA).

A biological opinion (opinion) is a document that states the opinion of the USFWS as to whether a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. "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 the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02). "Destruction or adverse modification" is defined as a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR § 402.02; 84 FR 44976-45018). Please note that primary constituent elements (PCEs) of critical habitat are now referred to as physical and biological features (PBFs) based on the final rule implementing changes to regulations for designating critical habitat (81 FR 7414-7440). However, to maintain consistency with the final rules designating critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*), Southwestern willow flycatcher (*Empidonax traillii extimus*), Western yellow billed cuckoo (*Coccyzus americanus occidentalis*), Gila chub (*Gila intermedia*), loach minnow (*Tiaroga cobitis*), spikedace (*Meda fulgida*), Chiricahua leopard frog (*Lithobates chiriahuensis*), and narrow-headed gartersnake (*Thamnophis rufipunctatus*), this opinion will use the term PCEs.

The USFWS received your request for formal consultation and associated Biological Assessment (BA) for the U.S. Forest Service's Gila National Forest LMP Revision (proposed action) on June 22, 2021. The Forest determined that the proposed project "may affect, is likely to adversely affect" the following species and/or their critical habitat (CH): Mexican spotted owl (owl or MSO) and CH, New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), Southwestern willow flycatcher (flycatcher or SWWF) and CH, Western yellow-billed cuckoo (cuckoo or WYBC) CH, Chihuahua chub (*Gila nigrescens*), Gila chub and CH, Gila trout (*Onorhynchus gilae*), loach minnow (minnow) and CH, spikedace and CH, Chiricahua leopard frog (CLF or frog) and CH, narrow-headed gartersnake (NHG) and CH, and Northern Mexican gartersnake (*Thamnophis eques megalops*).

We base this opinion on the proposed action and its effects on the listed species in accordance with section 7 of the ESA. Our analysis includes information provided in the submitted BA, correspondence with your office, data in our files, a literature review, and other sources of information, including the final rules to list the species as threatened or endangered and designate critical habitat. Literature cited in this opinion is not a complete bibliography of all literature on the species of concern, the project and its effects, or other subjects considered. A complete administrative record of this consultation is on file at the New Mexico Ecological Services Field Office (NMESFO).

CONSULTATION HISTORY

The consultation history relevant for this opinion includes region-wide consultations as well as consultations conducted only for the Gila National Forest. Since 1986, there have been six formal ESA § 7(a)(2) consultations in the Southwestern Region of the Forest Service covering each of the 11 LMPs and their amendments. The Southwestern Region developed and approved LMPs pursuant to the National Forest Management Act of 1976 (NFMA).

The Gila National Forest finalized the first LMP in 1986, and the forest prepared a Biological Evaluation (BE) for its LMP. The USFWS conducted a consultation for all "may affect" determinations for the species and critical habitats that were federally listed or proposed when the GNF developed the. The USFWS issued a no-jeopardy/no adverse modification opinion on the LMP.

On April 15, 1993, the USFWS listed the MSO as threatened under the ESA (58 FR:14248-14271). The USFS began consulting on site-specific projects for the MSO. The USFWS later approved the Final Recovery Plan for the MSO on October 16, 1995. Critical habitat for the MSO was proposed on December 7, 1994, and designated on June 6, 1995 (60 FR 29913).

The USFS initiated informal consultation on the MSO and critical habitat for its existing LMPs on September 6, 1995, but did not submit a BA at that time. After submitting the BA on September 22, 1995, the USFS and USFWS met several times to discuss additional information needs. The USFS submitted additional information and formal consultation was initiated on November 9, 1995. On September 6, 1995, the USFS requested formal consultation on the 11 LMPs for effects on the MSO. A jeopardy and adverse critical habitat modification biological opinion (BO) for the existing LMPs was issued on November 25, 1997, but a no-jeopardy/no adverse modification BO was issued the same day for the amended LMPs which rendered the jeopardy consultation moot.

On July 14, 1995, the USFS submitted a BA and requested formal consultation on an Amendment of LMPs. The USFWS issued a no-jeopardy/no adverse modification BO on the Region-wide amendment on November 25, 1997.

In January 1996, the USFS and USFWS signed an agreement on procedures for consultation on the Southwestern Region's 11 LMPs for all listed and proposed species and critical habitats (except the MSO and its critical habitat, which were covered in two separate BOs described above).

The USFS requested initiation of formal consultation/conferencing for the 11 LMPs on May 15, 1996. The USFWS acknowledged the request on May 24, 1996, and requested the BAs for the Tonto, Cibola, and Carson NFs, which had not been submitted. Those BAs were sent to the USFWS on May 31, 1996.

On June 10, 1997, the USFS submitted supplements to the BAs, which addressed additional management direction for seven species of particular concern to USFWS. The USFS provided

additional information on Chihuahua chub on July 28, 1997. The USFWS sent a draft BO to the USFS on September 18, 1997, and issued a final no-jeopardy/no adverse modification BO on December 19, 1997.

On August 30, 2000, the Bureau of Land Management, Forest Service, National Marine Fisheries Service, and Fish and Wildlife Service developed a Memorandum of Agreement in order to improve the efficiency and effectiveness of plan and programmatic level section 7 consultation processes under the Endangered Species Act and enhance conservation of imperiled species while delivering appropriate goods and services provided by lands and resources managed by the signatory agencies.

In February 2003, the USFS and USFWS began discussions about the continued relevance of the existing LMP consultations. In early April 2003, it was decided that the USFS would reinitiate consultation on the 11 LMPs and the 1996 Region-wide LMP amendment. On June 2, 2003, the USFS and USFWS completed a Consultation Agreement (CA) for the 2003 Regional Programmatic LMP Consultation. On June 4, 2003, the USFWS concurred with the list of species to be considered in the consultation. The USFS requested formal consultation on April 15, 2004, and submitted a final BA. The USFWS issued a final BO for the continued implementation of all 11 LMPs in the Southwestern Region on June 10, 2005.

Since the issuance of the 2005 BO, the USFS has submitted three reports in fulfillment of the reporting requirements established by the USFWS. In these reports, several issues and concerns were identified that had become apparent during the implementation of the BO. As a result, the USFWS and USFS met numerous times to discuss these issues and developed draft solutions that would be addressed during re-initiation.

On April 17, 2009, the USFS requested re-initiation of the 2005 LMP BO due to the belief that incidental take for the Mexican spotted owl could soon be approached and/or exceeded and due to the inability to fully implement the monitoring requirements associated with the Reasonable and Prudent Measures in the 2005 LMP BO for several species. Again, on May 18, 2010, the USFS requested re-initiation for all species addressed in the 2005 LMP BO, as well as requested consultation for the ocelot (*Leopardus pardalis*), a species now considered present in small numbers in Arizona. The USFWS 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 re-initiation effort to the USFWS for concurrence. A consultation agreement between the USFWS and USFS was signed on December 7, 2010. The consultation agreement addressed timeframes, staffing, and a dispute resolution process. The USFWS and USFS agreed to complete consultation/conferencing on all Federally listed and proposed species, all designated and proposed critical habitats, and a select number of candidate species that occur within the Action Area of the national forests and grasslands in the USFS Southwestern Region. As part of the consultation agreement, the agencies agreed to organize the BA and BO differently than was done in the 2004 BA and 2005 BO. This consultation was a programmatic batched consultation that would be organized by National Forest. Therefore, the BA described the programmatic nature of the LMPs and it specifically analyzed the effects of LMP implementation to species and their critical habitats

within the action area of each forest. The resulting eleven BOs, one for each Forest, were produced by the USFWS issued incidental take, reasonable and prudent measures, and terms and conditions for each NF LMP. The resulting BOs were to be in place until each of the national forests revised their LMPs.

On May 2, 2017, the USFWS Information for Planning and Consultation (IPaC) website was used to formally request and receive an official species list for the Gila National Forest administrative boundary area.

On December 12, 2017, the Gila National Forest Supervisor submitted a cooperatively developed consultation agreement to revise the Gila National Forest LMP. The NMESFO Supervisor reviewed and agreed to the timeframes, personnel, and procedures for completing consultation pursuant to section 7(a)(2) of the ESA, with a process for resolving disputes, should they arise. The Forest Supervisor signed the agreement on December 11, 2017. The NMESFO Supervisor also signed and returned the agreement on January 17, 2018.

On August 22, 2019, USFWS and the Cibola, Santa Fe, Carson, and Gila NFs attended a joint meeting at the NMESFO in Albuquerque to discuss the process and timeline for all New Mexico NF LMPs.

On November 19, 2019, the Gila NF reinitiated and consulted on the MSO for the LMP. The USFWS issued a biological opinion without an incidental take statement on December 16, 2019.

On February 19, 2020, the Gila NF used the USFWS Information for Planning and Consultation (IPaC) website to obtain an updated official species list for the Gila NF administrative boundary area.

On June 22, 2021, the Gila NF submitted a letter requesting formal consultation with the USFWS for the Forest's LMP Revision and included a final BA (Cons. #02ENNM00-2017-F-00527).

On October 22, 2021, the USFWS sent a draft BO to the Gila NF requesting review for the LMP. The USFS sent back the draft document on January 6, 2022, with minor comments and edits.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Background

The proposed action is the implementation of the revised Land Management Plan, which provides programmatic guidance and constraints for integrated resource management on the Gila NF. The planning period for the proposed LMP is 10-15 years following LMP approval or until the LMP is revised. The LMP identifies plan components, including desired conditions, goals, objectives standards, guidelines, general land use purposes or the suitability, and management approaches that establish the management framework for all activities conducted and authorized on the Forest.

The proposed LMP is part of the land management planning process. It provides forest-level direction to meet the Forest Service's mission for the management of activities on the Forest. LMPs are developed, amended, and revised over time consistent with the National Forest Management Act and must comply with the National Environmental Policy Act (NEPA) and the ESA. The effects to listed species and designated critical habitat of future actions that are subsequently authorized, funded, or carried out under this program will be addressed in subsequent section 7 consultations, as appropriate.

Plan Components

Plan components were developed collaboratively with input from various external and internal stakeholders with broad interdisciplinary representation. The proposed LMP also provides direction for addressing threats such as invasive species, excessive fuel loading, and climate change within the authority of the Forest Service. An interdisciplinary team refined the final form and organization of the plan to make it as understandable, useable, and integrated as possible. The proposed LMP includes the following types of components:

Desired conditions (DC) – outline the desired social, economic, and ecological characteristics for managing resources on the Gila NF. They are described in specific terms to allow progress toward their achievement, without specific completion dates. They attempt to paint a picture of what the public and the Forest Service desire the Forest to look like or the goods and services that the Forest should provide. These conditions are aspirational and not commitments or final decisions that approve projects or activities, and they may only be achievable over an extended timeframe (e.g., several hundred years). In some cases, the desired condition matches the current condition, so the goal is to maintain the current condition. Desired conditions are the focus of this LMP. They are the basis for the other plan components and describe the framework and sideboards for future projects and activities.

Objectives (O) – are concise, time-specific statements of measurable, anticipated results that help achieve or move towards desired conditions over the life of the plan. Activities specified in objectives intend to help progress toward achieving desired conditions and represent some of the outcomes or actions expected to accomplish movement toward desired conditions. Objectives might be exceeded or not fully achieved based on changes in environmental conditions, budgets, and other factors.

Standards (STDs) – are technical design constraints that need to be followed when steps are taken toward desired conditions. A standard is an absolute requirement to be met in the design of projects and activities. Standards differ from guidelines in that standards do not allow for any deviation without a plan amendment.

Guidelines (GL) – are technical design criteria or constraints on project and activity decision-making that help progress toward desired conditions. A guideline allows for departure from its terms if it is possible to meet the intent of the guideline. Deviation from a guideline must be specified in the decision document with the supporting rationale. When deviation from a guideline does not meet the original intent, a plan amendment is required.

Area-Specific Direction – is for spatially delineated areas with a standard set of plan components that differ from the general Forest. The LMP divides area-specific direction into two categories: management areas and special areas. The Forest defines management areas by the desired settings and types of uses within them under the LMP. Special areas are designated by Congress or as an administrative action at a regional or local level. The Forest considers pecial areas because of their unique or special characteristics. Examples include wilderness, natural areas, geological and botanical areas, national trails, and national and state scenic roads.

Suitability – describes the appropriateness of applying certain resource management practices to a particular land area based on the desired conditions applicable to those lands. Identifying an area suitable for various uses is guidance for project and activity decision-making. It is not a resource commitment or final decision approving or restricting projects and activities. Final decisions on resource commitments are made at the project level. The Gila NF only conducted a suitability analysis for timber.

This plan's "***other content***" includes background and contextual information, monitoring, management approaches, and appendices. These sections are meant to provide information and assist in understanding the larger management context. These sections are not mandatory directions.

Monitoring – is part of the adaptive management strategy used to determine how on-the-ground management maintains or makes progress toward desired conditions. The monitoring plan includes questions and performance measures designed to evaluate implementation and effectiveness and inform adaptive management. It helps ensure that the LMP remains adaptive in that new knowledge and information can be analyzed and changed accordingly.

Management approaches – include information and guidance for projects and activity decision-making to help achieve desired conditions and objectives.

Appendices – provide additional information to the LMP and include maps, an overview of the proposed and probable management practices, a crosswalk of common and scientific species names, a list of other sources of information, and an index of documents supporting the LMP.

Analysis, Process, and Assumptions

All desired conditions, objectives, standards, and guidelines were reviewed to determine potential effects to listed or proposed species and their designated or proposed critical habitats from adoption of the plan direction. To make determinations of effects for the species and critical habitats in the Forest's BA, several assumptions were made as follows:

- The Gila NF will implement site-specific management actions to move toward these desired future conditions. Funding, priorities, capacity, and other constraints will influence the actual timing, location, extent, and intensity of site-specific management actions, but this cannot be predicted in a program-level analysis.
- Objectives represent a minimum level of activities that may be implemented to move towards or maintain DCs during the 10- to 15-year life of the LMP. Although many other activities, actions, and projects are expected to be implemented over the life of the

LMP, these objectives provide a reasonable expectation of the focus for plan implementation.

- Standards and guidelines in the LMP will be followed when selecting, planning, and executing site-specific management actions. If a site-specific action does not follow the standards and at least the intent of the guidelines, the action must either be modified or the LMP must be amended (either project specific or full LMP amendment) before the action can be authorized. In the situation where a site-specific action requires LMP amendment, the action would be considered outside the scope of this consultation and would require its own separate site-specific ESA consultation to address the effects of that proposed action.
- The LMP provides a programmatic framework for future site-specific actions, however it does not authorize or mandate any site-specific projects or activities.
- LMPs do not affect species but site-specific projects implemented consistent with the programmatic framework may result in effects to species and critical habitats. The consequences of these site-specific actions will be analyzed through future site- or project-specific consultations.
- Future site-specific management actions that implement the LMP will be subject to individual NEPA and ESA requirements. Each site-specific project/activity implemented under the revised LMP that may affect a listed species or critical habitat will undergo a separate ESA consultation.
- Law, policy, regulations, and applicable best management practices (BMPs) will be followed when planning or implementing site-specific projects and activities.
- Monitoring will occur as described in the monitoring section of the LMP. Based on results, the LMP may be amended, as needed, in the future.

Ecological Response Units

Plant and animal species are highly dependent on the function of ecosystems with specific conditions, such as local soil, air, water, aspect, elevation, and precipitation, which create areas favorable for species. Vegetation is one of the primary factors influencing species diversity and abundance and is one of the more obvious habitat components influenced by management, land use, and natural disturbance. Species presence and absence on the Forest is, in many cases, directly tied to availability of resources, current ecological condition, and key ecosystem characteristics of Ecological Response Units (ERUs).

Terrestrial Habitat

Associating ERUs with specific species is critical for assessing future management needs. However, some species utilize landscape features that may not correspond to ERUs, such as caves, mines, cliffs, or talus slopes. Many species on the Gila NF use these features and will be analyzed as specific features needed and not necessarily characteristics associated with specific ERUs. The Gila NF contains 13 different upland ERUs that make up approximately 98 percent of the forest. Five forest ERUs make up 1,601,785 acres (approx. 46% of the Gila NF), five woodland ERUs make up 1,282,507 acres (approx. 41%), the only shrubland ERU comprises 138,105 acres (approx. 5%), and the three grassland ERUs make up 258,790 acres (approx. 6%). Ten ERUs are moderately departed, three are highly departed, and one is low departure from

reference conditions. All ERUs are modeled to be relatively stable with slight increases and decreases in departure while remaining in the same departure state for all but one ERU: Juniper grassland (JUG). JUG is modeled to go from low departure to moderate departure over the 100-year modeling period. Objectives for terrestrial ERUs are summarized below (note that some ERUs, such as woodland and shrubland ERUs, do not currently have management objectives under the LMP):

Forested Ecological Response Units and Corresponding Objectives

1) Ponderosa Pine Forest (PPF)
    - Treat at least 6,320 and no more than 600,300 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
2) Mixed Conifer-Frequent Fire Forest (MCD)
    - Treat at least 6,875 and no more than 282,400 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
3) Ponderosa Pine-Evergreen Oak Forest (PPE)
    - Treat at least 1,000 and no more than 540,000 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
4) Mixed Conifer with Aspen Forest (MCW)
    - Treat at least 300 and no more than 73,934 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
5) Spruce-Fir Forest
    - Treat at least 250 and no more than 23,779 acres per decade using a combination of naturally ignited wildfire and prescribed fire methods to maintain or move toward desired conditions.

Woodland Ecological Response Units and Corresponding Objectives

6) Pinon-Juniper Woodlands (PJO)
7) Pinon-Juniper Grass Woodland (PJG)
    - In Pinon-Juniper Grass, treat at least 4,000 and no more than 145,800 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
    - In Juniper Grass, treat at least 4,000 and no more than 88,000 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
8) Juniper-Grass Woodland (JUG)
    - Treat at least 4,000 and no more than 88,000 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
9) Madrean Pinon-Oak Woodland (MPO)
10) Pinon-Juniper/Evergreen Shrub Woodland (PJC)

Shrublands

11) Mountain Mahogany Mixed Shrubland

Grassland Ecological Response Units and Corresponding Objectives

12) Montane/Subalpine Grasslands (MSG)
    - Treat at least 4,600 and no more than 94,800 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
13) Colorado Plateau-Great Basin Grassland (CPGB)
    - Treat at least 2,000 and no more than 59,500 acres per decade using a combination of naturally ignited wildfire, prescribed wildfire, and mechanical methods to maintain or move toward desired conditions.
14) Semidesert Grassland (SDG)
    - Treat at least 800 and no more than 88,900 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired condition.

Riparian and Aquatic Habitat

There are 11 riparian ERUs in the Gila NF that comprise approximately two percent of the Forest:

1) Fremont Cottonwood/Oak (FCO)
2) Fremont Cottonwood/Shrub (FCS)
3) Narrowleaf Cottonwood/Shrub (NCS)
4) Sycamore-Fremont Cottonwood (SFC)
5) Desert Willow (DW)
6) Arizona Alder-Willow (AAW)
7) Upper Montane/Conifer-willow (UMCW)
8) Willow-Thinleaf Alter (WTA)
9) Ponderosa Pine/Willow (PPW)
10) Herbaceous/Wetland Riparian (HWR)
11) Arizona Walnut (AW)

Wetlands occur in association with some but not all streamside riparian areas (riverine wetlands) and the uplands (non-riverine wetlands). The LMP identified 2,694 acres of riverine wetlands, 2,534 acres of non-riverine wetlands, 918 spring/seeps, 957 perennial stream miles, and 546 intermittent stream miles. There are three main objectives within two subcategories for the riparian ERUs, which are summarized below:

Watersheds

- Improve condition class in at least five 6th level watersheds within the planning period.
- Aside from unavoidable consequences that may result from naturally ignited wildfire, maintain condition class in those 6th level watersheds currently in proper functioning condition over the planning period.

Riparian and Wetland Ecosystem

- Implement at least one riparian improvement project annually, above and beyond any noxious or invasive weed treatments.

Special Habitat Features

Other features important to wildlife and plants include coarse woody debris (e.g., downed logs), rocky riparian areas with deciduous leaf litter, and soil parent material specific to certain plant species. Coarse woody debris provides shelter, food, and moisture retention, and standing snags of sufficient size provide for roosting, nesting, or foraging habitat. These features could impact species if they are departed from reference conditions. These characteristics are somewhat more transient on the landscape and as snags fall and eventually decay, standing live trees die becoming new snags. If the seral stage proportions of most vegetation communities trend towards smaller diameter trees, future trees may not be large enough to provide the ecological conditions required by species that depend on large diameter snags.

Caves, Cliffs, Talus Slopes, and Mines

Caves, cliffs, talus slopes, scree, rock features, and mines are widespread microsites within all vegetation ERUs. These ecological conditions are inherently stable for long periods of time because they are changed primarily by geologic forces. There are a few caves on the Gila NF including one that is managed through access control via a gated entrance and key sign-out procedures. The Gila NF has seen an extensive amount of historic mining with several historic mining districts located within and adjacent to the Forest boundary. As such, there are extensive mines and associated mining features (i.e., adits, shafts, etc.) located within the Forest boundary as well as lands adjacent. Examples of key ecosystem characteristics include cliffs used for nesting by many bird species, cave-like structures and crevices used for roosting and hibernating by many bat species, and rock outcrops or boulder and talus accumulations used by several land snails and plants for all life functions, as well as mammals for hibernation, shelter from the weather, or to escape from predators.

Other Objectives

Objectives outlined within the LMP that could affect listed species are summarized below:

Wildlife, Fish, and Plants

1) Assess and maintain, reconstruct, or decommission based on the assessment 10 percent of upland water features constructed for wildlife per year.
    - Examples might include controlled burns or habitat restoration.
2) Assess and maintain, reconstruct, or decommission based on the assessment 10 percent of constructed aquatic barriers per year.
    - Examples include removing artificial dams and building in-stream structures to improve habitat.
3) Implement at least 20 activities that contribute to the recovery of federally listed species of each 10-year period.

- Examples include removing non-native fish species, habitat restoration, and fish stocking.

4) Restore or enhance at least 100 miles of stream habitat over each 10-year period.
5) Implement at least 20 projects that maintain or enhance upland habitat connectivity over each 10-year period.
    - This includes many of the same examples as mentioned above but aimed specifically at increasing connectivity between habitat features.

Non-native Invasive species

1) Contain, control, or eradicate at least 100 acres of noxious weed species annually.
2) Inventory up to 2,000 acres annually.
3) Reduce non-native fish and other aquatic species within native aquatic populations in at least four to six stream reaches during each 10-year period.
4) Eradicate non-native fish populations from at least one stream reach containing a natural or constructed barrier in compliance with recovery plans during each 10-year period.

Livestock Grazing

1) Implement at least one action per year to improve poor or very poor range conditions (or equivalent condition class), other than mechanical treatments targeting wood invaders.
    - Examples might include range management techniques such as rotational grazing, controlling undesirable plants, or reducing water runoff.
2) In cooperation with every permit holder, evaluate consistency with annual operating instructions and document pasture rotation, utilization compliance, and improvement maintenance annually.

Lands

1) Annually, post an average of 2-5 miles of unposted property boundary.
2) Annually, maintain an average of 2-5 miles of previously posted property boundary.
3) Annually, resolve an average of two existing encroachment/trespass cattle cases.

Roads

1) Decommission 50 miles of roads within 10 years of plan approval.

Soils

1) Implement at least one action per year to improve an area of "impaired" or "unsatisfactory" soil condition.
2) Implement at least 10 projects per decade to address active headcuts or gully erosion.
    - Examples of projects meeting the intent of this objective include construction or maintenance of watershed structures, or road maintenance and improvement of drainage features associated with active headcuts or gullies. Examples of projects not meeting the intent of this objective include prescribed fire and mechanical vegetation treatments.

Sustainable Recreation

1) Implement at least 75 percent of the specific action items within the Forest's Sustainable Recreation Action Plan within 5 years following the action plan implementation.

Dispersed Recreation

1) In addition to areas already identified, within 5 years of implementation of the forest plan, identify at least three additional dispersed recreation concentrated use areas for preapproved recreation events, non-commercial group use, weddings, etc.
2) Annually, implement at least one small-scale recreation project that enhances visitor access for dispersed uses, including but not limited to providing improved trailhead parking, access, and functionality, and improve access and functionality for dispersed camping opportunities.

Trails

1) Annually, the Gila NF will fully restore to standard at least 1 mile of trails that have been degraded from desired conditions by past wildfires or post-fire events such as flooding or fallen trees.
2) Annually, the Gila NF will restore or improve at least 5 miles of NFS trails to standard. This includes realignment, reconstruction, or deferred maintenance beyond that which would be considered routine annual maintenance by handbook direction.
3) Within 5 years of implementing the forest plan, identify at least 20 miles of trails for either being reclassified to Trail Class 1 or for full decommissioning and removal from the national forest trail system.

Wilderness

1) Annually, rehabilitate at least five wilderness trail segments, campsites, or other areas that have been impacted by fire or other management to restore wilderness character.
2) Within five years of implementation of the forest plan, all congressionally designated wilderness areas should be managed to at least a minimum standard as defined by the current wilderness performance reporting measures.

Continental Divide National Scenic Trail

1) Restore or relocate 5 miles or more of the trail by 2025, to better align with law, regulation, and policy; improve access to safe water sources; improve scenic viewing opportunities; and provide for better quality non-motorized recreation experiences.

Wildland-Urban Interface

1) Treat between 16,480 and 249,000 acres per decade using any combination of mechanical and prescribed fire methods.

Description of Action Area

The action area is defined as all areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). In delineating the action area, we evaluated the farthest-reaching physical, chemical, and biotic effects of the action on the environment. The action area is typically more extensive than the area directly affected by the action. In this context, the action area for this consultation will include the entire Gila National Forest (Figure 1).

The Gila NF administers approximately 3.3 million acres, making it the sixth-largest National Forest in the continental United States. The Forest is in portions of four counties – Catron, Grant, Hidalgo, and Sierra counties (Figure 1). Twenty-four percent of the Forest area comprises the Gila, Aldo Leopold, and Blue Range Wildernesses. The Forest is delineated into six ranger districts: Black Range, Glenwood, Quemado, Reserve, Silver City, and Wilderness.

The Forest has twelve mountain ranges and an elevational range between 4,160 to 10,770 feet. Annual precipitation ranges from 11 inches (28 cm) in the northern end of the Forest near Quemado to over 35 inches (89 cm) in the higher elevations of the Black Range and the Mogollon Mountains. The Forest includes semi-desert grasslands, shrublands, woodlands, ponderosa pine, mixed conifer, and spruce life zones. Major streams include the Mimbres River, the Gila River and its tributaries and the San Francisco River, which all have many riparian- and wetland-associated habitats.

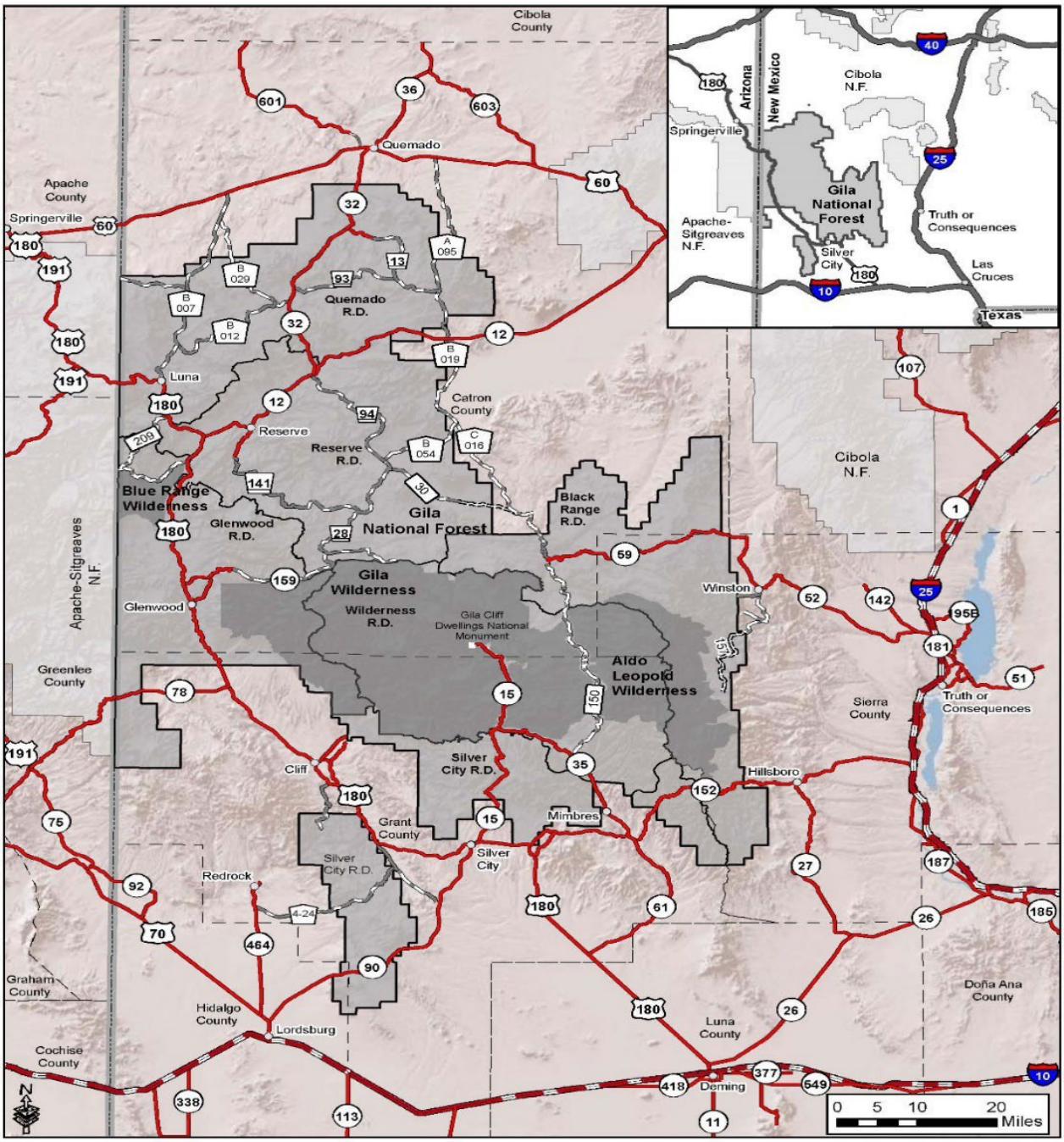

Figure 1. The Gila National Forest. This map shows county boundaries and major highways, with the various ranger districts and wilderness areas delineated. The inset depicts the location of the Forest in Southwestern New Mexico.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

"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 the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02). Per policy and regulation, the jeopardy analysis in this biological opinion relies on four components in our evaluation for each species:

1. *The Status of the Species* - evaluates the species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs;
2. *The Environmental Baseline* – evaluates the condition of the species in the action area, the factors which are responsible for that condition, and the relationship of the action area to the survival and recovery of the species;
3. *The Effects of the Action* - determines the consequences of the proposed Federal action on the species that are reasonably certain to occur as a result of the proposed action; and,
4. *Cumulative Effects* - evaluates the effects of future, non-Federal activities in the action area on the species.

The jeopardy determination is made by evaluating the effects of the Federal action in the context of the species' status. This analysis considers any cumulative effects to determine if the implementation of the action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis places emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Destruction or Adverse Modification Determination

"Destruction or adverse modification" is defined as a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR § 402.02; 84 FR 44976-45018). Per policy and regulation, the adverse modification analysis in this biological opinion relies on four components:

1. *The Status of Designated Critical Habitat* – evaluates the range-wide condition of designated critical habitat for the species in terms of physical and biological features (PCEs), the factors responsible for that condition, and the intended recovery function of the designated critical habitat overall;
2. *The Environmental Baseline* - evaluates the condition of the designated critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area;
3. *The Effects of the Action* - determines the consequences of the proposed Federal action on the PCEs that are reasonably certain to occur as a result of the proposed action and how

they will influence the recovery role of affected designated critical habitat units; and,

4. *Cumulative Effects* - evaluates the effects of future, non-Federal activities in the action area on the PCEs, and how they will influence the recovery role of affected designated critical habitat units.

When making an adverse modification determination, the Service evaluates the effects of the proposed Federal action on the designated critical habitat in the context of the condition of the designated critical habitat unit. This analysis includes the cumulative effects of the proposed Federal action. By adding these effects into our analysis, we can determine if the critical habitat unit would remain ecologically functional (or would retain the ability for the PCEs to continue functioning in areas of suitable habitat) to serve its intended recovery role for the species.

STATUS OF SPECIES AND CRITICAL HABITAT

New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*)

On June 10, 2014, the USFWS listed the New Mexico meadow jumping mouse ("mouse" or "NMMJM") endangered (USFWS, 2014a). The USFWS later designated the final critical habitat on March 16, 2016 (USFWS, 2016). In addition to the summary information provided below, we completed a species status assessment report (SSA), and a revised SSA for the mouse in May 2014 and January 2020 respectively (USFWS, 2014b; USFWS, 2020a). A Recovery Outline was also completed concurrently with the final rule listing the species as endangered (USFWS, 2014c). The SSA provides a thorough assessment of mouse biology and natural history. It assesses demographic risks (small population sizes), threats, and limiting factors in determining viability and risk of extinction for the species. We also compiled biological data in the SSA Reports and described the mouse's past, present, and likely future threats.

Description and life history

The mouse is a small mammal that measures approximately 7.4 to 10 inches (187 to 255 millimeters (mm)) in total length (VanPelt, 1993). The coloration is typically grayish brown on the back, yellowish-brown on the sides, and white underneath. The species has large, five-toed hind feet, smaller front feet with four toes, a long tail, and the ability to make long leaps. The tail of the mouse is longer than its body (Miller, 1911). Adult mice are known to make jumps of up to three feet but more commonly jump approximately one foot. The New Mexico meadow mouse is semi-aquatic, and its large feet may assist it with swimming (Hoffmeister, 1986).

The mouse is primarily nocturnal, occasionally foraging during daylight hours. It is active only during the growing season of the grasses and forbs on which it depends. Preparation for hibernation (weight gain, nest building) seems to be triggered by day length. The mouse hibernates about nine months out of the year and is only active for three or four months during the summer (Morrison, 1990; VanPelt, 1993). The species only live up to three years and has one litter annually, with an average of five young. Due to this low reproductive ability, if resources are not available in a single season, populations become significantly stressed and can decline.

Experts consider the mouse a k-selected species because it is long-lived for a rodent species, and females produce few offspring. Although this strategy is successful in stable and predictable environments, k-selected species are at a higher risk of extinction because they recover more slowly from reductions in population size and are subject to genetic and demographic stochasticity.

Distribution and Status

The New Mexico meadow jumping mouse occurs within eight geographic management areas defined by current critical habitat units (USFWS, 2020b). These geographic management areas are throughout the mouse's historical range. They adequately represent genetic diversity among populations and ecological diversity across the subspecies' range (USFWS, 2020a). Even though the New Mexico meadow jumping mouse has experienced recent declines in the overall number of populations, Malaney et al. (2012) found that the current populations still retain distinctive genetic signatures and might still contain genetic diversity of the species across the range.

Habitat loss has occurred across the historical range of the mouse, which has likely resulted in mice not being detected at many locations (Frey and Malaney, 2009; Morrison, 1991). However, since the original SSA was completed (USFWS, 2014), jumping mice have been documented at 39 new locations. Out of these new locations, 32 were in areas outside of the designated critical habitat. Jumping mice naturally occur at low population densities and are rarely and unpredictably encountered where they do occur. NMMJM are hard to detect during surveys (Morrison, 1991; Hafner et al., 1998; Frey, 2012). These natural attributes of jumping mice make it difficult to precisely determine their distribution within the current range or trends in range expansion or contraction that may have occurred in the past.

Based on historical (the 1980s and 1990s) and current (from 2005 to 2020) data, the mouse's distribution and abundance have declined significantly range-wide. Most extirpations have occurred before the mid-1990s; about 70 formerly occupied locations are extirpated. Since 2005, there have been 77 documented remaining populations (18 in Colorado, 22 in New Mexico, and 37 in Arizona) spread across the eight geographic management areas (USFWS, 2020a). Nearly all the current populations are isolated and widely separated. Most of the populations detected since 2005 have patches of suitable habitat that are too small to support resilient populations of jumping mice. In addition, at least 11 populations documented since 2005 have been substantially compromised since 2011, due to water shortages, grazing, or wildfire and post-fire flooding. These populations could already be extirpated (USFWS, 2014).

Threats

Due to the life history (short active period, short life span, low fecundity, low dispersal ability) and renders the mouse sensitive to habitat loss and degradation. Research shows there has been a significant reduction in occupied habitat due to these factors. The past and current habitat loss has caused local extirpations. Ongoing and future habitat loss is expected to result in the loss of more populations.

The primary sources of past and future habitat losses are from grazing pressure (which removes the needed vegetation) and water management and use (which causes vegetation loss from mowing and drying of soils), lack of water due to drought (exacerbated by climate change), and wildfires (also exacerbated by climate change). Additional sources of habitat loss are likely to occur from scouring floods, loss of beaver ponds, highway reconstruction, residential and commercial development, coalbed methane development, and unregulated recreation.

Mexican Spotted Owl (*Strix occidentalis lucida*)

The USFWS listed the Mexican spotted owl as a threatened species on March 16, 1993 (USFWS, 1993). The USFWS later produced the Recovery Plan for the owl in 1995 (USFWS, 1995a). On August 31, 2004, the USFWS designated critical habitat for the owl (USFWS, 2004). The USFWS released the final Mexican spotted owl Recovery Plan, First Revision (RP), in December 2012 (USFWS, 2012).

Description and Life History

The MSO is a medium-sized bird and does not have ear tufts. These birds are mainly brown and have mottled feathers with irregular white spots on their abdomen, back, and head. Mexican spotted owls nest in caves, in stick nests built by other birds, on debris platforms in trees, and in tree cavities. Spotted owls have distinct, annual breeding periods, with courtship beginning in March. Eggs are laid in late March or early April, and hatch approximately 30 days later. Nestling MSOs generally fledge early to mid-June and usually disperse from the nest area by late August or early September. A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO can be found in the Final Rule listing the MSO as a threatened species (USFWS, 1993), the original Recovery Plan (USFWS, 1995a), and in the revised Recovery Plan (USFWS, 2012).

Distribution and Status

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

Human activities vary across the owl's range. The combination of natural habitat variability, human influences on owls, international boundaries, and logistics of implementation of the Recovery Plan necessitates subdivision of the owl's range into smaller management areas. The 1995 Recovery Plan subdivided the owl's range into 11 Recovery Units (RUs): six in the United States and five in Mexico. In the first revision of the Recovery Plan, the RUs were renamed Ecological Management Units (EMUs) to be in accord with current USFWS guidelines. The Mexican spotted owl's range within the United States is divided 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). Within Mexico, the Revised Recovery Plan delineated five EMUs: Sierra Madre Occidental Norte, Sierra Madre Occidental Sur, Sierra Madre Oriental Norte, Sierra Madre Oriental Sur, and Eje Neovolcanico.

Mexican spotted owl surveys since the 1995 Recovery Plan have increased our knowledge of owl distribution, but not necessarily of owl abundance. Surveys show owl population estimates at approximately 758 sites from 1990 to 1993 and 1,222 owl sites from 1990 to 2004 in the United States. The revised Recovery Plan (USFWS, 2012) lists 1,324 known owl sites in the United States. An owl site is an area used by a single owl or a pair of adults or subadult owls for nesting, roosting, or foraging. The increase in the number of known owl sites is mainly a product of new owl surveys within previously unsurveyed areas (e.g., several National Parks within southern Utah, Grand Canyon National Park in Arizona, Guadalupe National Park in West Texas, the Guadalupe Mountains in southeastern New Mexico and West Texas, Dinosaur National Monument in Colorado, Cibola National Forest in New Mexico, and Gila National Forest in New Mexico). An increase in abundance in the species range-wide cannot be inferred from these data (USFWS, 2012). However, we assume that an increase in the number of occupied areas is a positive indicator regarding owl abundance.

The MSO Recovery Plan divides the range of the MSO into six Recovery Units (RU)s; the Colorado Plateau (Utah, northern Arizona, northwest New Mexico, southwest Colorado), the Southern Rocky Mountains-Colorado (Colorado), the Southern Rocky Mountains-New Mexico (New Mexico), the Upper Gila Mountains (Arizona, New Mexico), Basin and Range-West (Arizona, New Mexico), and Basin and Range-East (New Mexico). The Mexican spotted owls potentially affected by the project occur within the Upper Gila Mountains RU. The Basin and Range-West RU crosses onto the Forest in the Burro Mountains.

The Upper Gila Mountains RU is a relatively narrow band bounded on the north by the Colorado Plateau RU and to the south by the Basin and Range-West RU. The southern boundary includes the drainages below the Mogollon Rim in central and eastern Arizona. The eastern boundary extends to the Black, Mimbres, San Mateo, and Magdalena Mountain ranges of New Mexico. The northern and western boundaries extend to the San Francisco Peaks and Bill Williams Mountain north and west of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep forested drainages. This RU is an important interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces.

Most of the mature trees on the gentle slopes surrounding the canyons had been partially or completely harvested prior to the species' listing as threatened in 1993, however, MSO nesting habitat remains in steeper areas. Mexican spotted owls are widely distributed and use a variety of habitats within this RU (USFWS, 2005).

This RU contains the largest known population of MSO with approximately 63% of known MSO PACs in FS Southwestern Region (USFWS, 2004). Because of its central location and its large and relatively continuous MSO population, the Recovery Team believes that this RU is critically important to the overall stability and persistence of the MSO in the United States. Specifically, this RU may be considered a source population, providing immigrants to smaller, isolated

populations in other RUs. Although there are few data on dispersal patterns or movements between RUs, the Recovery Plan recommends maintaining the MSO population at current levels and at least the current level of connectivity within the RU.

Protected Activity Centers (PACs) have been established at all MSO sites located during surveys and around all management territories since 1989. These PACs are 600 acres or more in size and have been digitized using mapped vegetation polygons that are centered around nest sites, roost sites, quality nesting habitat and appropriate topographic features. MSO PACs and habitat throughout the Upper Gila Recovery Unit, the Action Area contains approximately 36% of the MSO PACs, 35% of the PAC acres, and 41% of the total habitat (inside and/or outside of PACs) according to figures assembled for continued implementation of the Forest Plans (USFS, 2004). These figures give a general portrayal that the Gila NF plays a particularly important role in overall MSO recovery.

The MSO occurs in varied habitat consisting of mature montane forest and woodland, shady wooded canyons, and steep canyons. In forested habitat, uneven-aged stands with a high canopy closure, high tree density, and a sloped terrain are key habitat components. Generally, nests are in older forests of mixed conifer (MCW or MCD) or ponderosa pine/Gambel oak (PPF). Nests are found in live trees in natural platforms such as dwarf mistletoe brooms, snags, and on canyon walls. Elevation ranges from 1,249 to 2,743 m (4,100 to 9,000 ft).

Threats

There are two primary reasons that the Service listed the MSO in 1993:

1. the historical alteration of its habitat as the result of timber management practices; and,
2. the threat of these practices continuing.

In 1993, the Service considered stand-replacing wildland fires as a future, increasing threat to the species. Since the publication of the original Recovery Plan (USFWS, 1995a), we have acquired new information on the biology, threats, and habitat needs of the MSO. Threats to its population in the US (but likely not in Mexico) have transitioned from commercial-based timber harvest to the risk of stand-replacing wildland fire (USFWS, 2012).

Southwestern forests have experienced more significant and more severe wildland fires from 1995 to the present than before 1995. Climate variability combined with unhealthy forest conditions might synergistically result in increased adverse effects on habitat conditions related to wildland fires. Changing climate conditions may interact with fire, management actions, and other factors discussed above, to increase impacts to MSO habitat. Climate change intensifies natural drought cycles and causes heat stress in high-elevation montane habitats (Cook et al., 2004, Breshears et al., 2005, Mueller et al., 2005). The intensification of natural drought cycles and the ensuing stress placed upon overstocked forested habitats could result in more massive and more severe wildfires in the MSO habitat. Fuel's reduction treatments can have short-term, adverse effects on MSOs through habitat modification and disturbance. Livestock and wild ungulate grazing are prevalent throughout the MSO's range. Grass-cover increases prey abundance, and if overgrazing reduces this resource, prey species can decline.

High-severity, stand-replacing fires are influencing Ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic wildland fire is probably the greatest threat to the MSO within the action area. Although MSOs forage in burned areas and, at times, nest and successfully fledge, the long-term effects of roosting and nesting habitat by stand-replacing wildfire are unknown.

Mexican Spotted Owl Critical Habitat

The Service designated critical habitat for the MSO in 2004 on approximately 3.5 million hectares (ha) (8.6 million acres (ac)) of Federal lands in Arizona, Colorado, New Mexico, and Utah (USFWS, 2004). The Service chose the PCEs for MSO critical habitat from studies of the species habitat requirements and information provided in the 1995 Recovery Plan (USFWS, 1995a). Mexican spotted owl habitat can include both canyon and forested areas (USFWS, 2004; 2012); therefore, there are PCEs in both types of habitat. 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:

PCE I: 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) (1.4 meters (m) or 4.5 feet (ft) above ground) of 30.5 centimeters (cm) (12 inches (in)) or more;

PCE II: A shade canopy created by the tree branches covering 40 percent or more of the ground;

PCE III: Large, dead trees (snags) with a dbh of at least 30.5 cm (12 in);

PCE VI: High volumes of fallen trees and other woody debris;

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

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

The PCEs listed above usually are present with increasing forest age. However, their occurrence can vary by location, past forest management practices, 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 can persist.

Steep-walled rocky canyonlands can also provide habitat for MSO. Mexican spotted owls use canyon habitat for nesting, roosting, and foraging and include landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to two kilometers (1.2 miles) in width (from rim to rim), with canyons often reaches two kilometers or greater and with colder north-facing aspects. The PCEs related to canyon habitat include one or more of the following:

PCE I: Presence of water (often providing colder and often higher humidity than the surrounding areas);

PCE II: Clumps or stringers of mixed-conifer, pine-oak, piñon-juniper, and riparian vegetation;

PCE III: Canyon walls containing crevices, ledges, or caves; and,

PCE IV: A high percentage of ground litter and woody debris.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The USFWS listed the Southwestern Willow Flycatcher (SWWF) as an endangered species on February 27, 1995 (USFWS, 1995b). On July 22, 1997, the USFWS designated critical habitat for the SWWF (USFWS, 1997). The USFWS has since revised designated critical habitat for the Flycatcher in 2013 (USFWS, 2013a). The USFWS finalized the Recovery Plan for the Flycatcher in August of 2002 (USFWS, 2002a).

Description and Life History

The USFWS listed the Southwestern Willow Flycatcher (SWWF) as an endangered species in February of 1995 (USFWS, 1995b). In July of 1997, the USFWS designated critical habitat for the SWWF (USFWS, 1997). The USFWS has since revised designated critical habitat for the Flycatcher on January 3, 2013 (USFWS, 2013a). The USFWS finalized the Recovery Plan for the Flycatcher in August of 2002 (USFWS, 2002).

The Southwestern Willow Flycatcher is a neo-tropical migrant that breeds in the southwestern United States and winters in Mexico, Central America, and South America. Flycatchers arrive on breeding grounds in Arizona and New Mexico in late April and early May. Nesting begins in May and early June. The average clutch size is three to four eggs. The time from egg-laying to fledging is short (28 days), and parental care of fledglings can last 15 days and possibly much longer. It is uncommon for flycatchers to re-nest if the first nesting attempt is successful; however, the birds will re-nest if the first clutch is lost or abandoned (USFWS, 2002).

The SWWF breeds in riparian habitat near or adjacent to surface water or underlain with saturated soil in parts of six southwestern states from near sea level to over 2,000 m (6,100 ft) in elevation. Flycatcher nesting habitat is composed of specific plant species that provide structure. Common tree and shrub species used for nesting include willows (*Salix* spp), buttonbush (*Cephalanthus* spp), box elder (*Acer negundo*), tamarisk (*Tamarix pentandra*), Russian olive (*Elaeagnus angustiofolis*), and sometimes with a scattered overstory of cottonwood (*Populus* spp). Flycatcher nest sites are composed of some form of dense foliage. The birds build nests that are open cup structures within the fork of a branch. Typically, nests are relatively low, 1.9 to 7.0 m (6.5 to 23 ft) above ground (USFWS, 2002).

The SWWF is an insectivore and feeds on small to medium-sized insects. They employ “sit-and-wait” foraging, with long periods of perching interspersed with foraging bouts (USFWS, 2002).

Distribution and Status

The current distribution of the SWWF represents a fraction of its former historically occupied range. There have been declines in breeding territories and the number of locations where SWWFs nest (USFWS, 2002).

There are 288 identified SWWF breeding sites and territories in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all reported detections from 1993 to 2007 with territorial SWWF), holding an estimated 1,299 territories (Durst et al., 2008). Numbers have increased since the bird was listed under the ESA. Some habitat remains unsurveyed; after nearly a decade of intense surveys, the existing numbers only slightly higher than Unitt's (1987) population estimate of 20 years ago (500 to 1,000 pairs).

Within the USFS Southwest Region, the SWWF is currently found nesting on several National Forests. Research has shown that migrant SWWF uses major southwestern river drainages as habitat. Migrant birds have been detected in riparian habitats suitable and unsuitable for nesting and may occur in non-riparian areas. Such migration stopover areas may be critically essential resources affecting productivity and survival (USFWS, 2002).

The abundance and distribution of nesting SWWFs on NFs in New Mexico are dynamic (USFWS, 2002). Habitat is changing conditions throughout the NFs where SWWFs are detected. Because riparian vegetation typically occurs in flood plain areas prone to periodic natural disturbance, suitable habitats are ephemeral, and the species distribution is dynamic. Indeed, many sites will cycle through a stage of being suitable but unoccupied before they become occupied. In a dynamic riparian system, all suitable habitat starts as potential habitat (USFWS, 2002).

Threats

Riparian habitat loss was the main threat which triggers the USFWS to list the SWWF under the ESA. Recovery of the SWWF requires a watershed approach and consideration of all interrelated factors that influence riparian habitat conditions (USFWS, 2002). Over the past decade, drought has reduced water levels, increased the potential for fire in suitable habitats, and exacerbated existing stressors created from water management, groundwater pumping, surface water diversion, livestock grazing, and watershed degradation.

Additional threats include non-native plants species and brown-headed cowbirds (USFWS, 2002.) Tamarisk (a non-native tree) provides significant amounts of suitable SWWF nesting habitat, resulting in some of the densest and most successful nesting populations in the sub-species range (USFWS, 2002). However, there are concerns about the overall recovery value of tamarisk because, unlike native plants, it can facilitate periodic fire regimes detrimental to adjacent native riparian plants and bird communities (USFWS, 2002). Brood parasitism by brown-headed cowbirds can reduce SWWF reproductive performance; this can be especially significant in small populations, geographically distant from other source populations (USFWS, 2002).

Because of the small population size and the degree of fragmentation between breeding populations, SWWFs are susceptible to demographic stochasticity and reduced genetic variation.

While not specifically a threat but rather a consequence of the poor status of the species, these factors may influence the potential to recover the species (USFWS, 2002).

Southwestern Willow Flycatcher Critical Habitat

Revised critical habitat for the Southwestern Willow Flycatcher was designated by the USFWS on January 3, 2013 (USFWS, 2013a). Within the action area, the critical habitat is limited to areas that contain PCEs described in the final rule designating critical habitat (USFWS 2013a). The SWWF habitat needs for nesting, roosting, foraging, and dispersing are:

PCE I: Riparian habitat in a dynamic successional riverine environment (for nesting, foraging, migration, dispersal, and shelter). This includes:

- **a.** Trees and shrubs of a variety of species, including willows, as documented in the finale rule;
- **b.** Dense riparian vegetation a with thickets of trees and shrubs;
- **c.** Dense riparian foliage from the ground level up to approximately 4 m (13 ft);
- **d.** Sites for nesting (a tree or shrub canopy with densities ranging from fifty to one hundred percent.; and,
- **e.** Dense patches of riparian forests that are interspersed with small openings of open water or marsh as little as 0.25 acres or as large as 175 acres.;

PCE II: A variety of insect prey populations found within or adjacent to riparian floodplains.

All the PCEs for the SWWF are found in the riparian ecosystem within the 100-year floodplain or flood prone areas. Because riparian vegetation is prone to disturbance regimes, flycatcher habitat is ephemeral by nature, and its distribution dynamic (USFWS, 2002). Flycatchers commonly return to the general area, or site, where they were previously bred or hatched. Areas of critical habitat will require some level of both management or protection to address the current and future threats to the SWWF and maintain PCEs in order to ensure overall conservation of the species (USFWS, 2013a).

Western Yellow-Billed Cuckoo (*Coccyzus americanus*)

The yellow-billed cuckoo was listed as threatened in the western United States on October 3, 2014 (USFWS, 2014d). This area is a Distinct Population Segment (DPS) of the more extensive, yellow-billed cuckoo range. The DPS is appropriate because the population segment has a geographical distribution that is biologically meaningful. The USFWS proposed Critical habitat for the western yellow-billed cuckoo ("WYBC" or "cuckoo") DPS on August 15, 2014 (USFWS, 2014e). The agency later revised the proposed rule on February 27, 2020 (USFWS, 2020a). The USFWS designated the final critical habitat for the cuckoo on April 21, 2021 (USFWS, 2021). The habitat areas used by the species for nesting stretch from southern British Columbia, Canada, to southern Sinaloa, Mexico, and may occur from sea level to 7,000 feet (ft) (2,154 meters (m)) in elevation (or slightly higher in western Colorado, Utah, and Wyoming). The USFWS has not developed a recovery plan for the WYBC.

Description and Life History

Adult, yellow-billed cuckoos have a stout, down-curved bill; a slender, elongated body with a long, spotted tail; and a narrow yellow ring of colored, bare skin around the eye (USFWS, 2013b). The plumage is loose and grayish brown above and white below, with reddish primary flight feathers. The species is a medium-sized; about 12 inches (in) (30 centimeters (cm)) in length, and about 2 ounces (oz) (60 grams (g)) in weight. The bill is dark with yellow on the basal half of the lower mandible.

The WYBC is a neotropical migrant that winters in South America and breeds in North America. Yellow-billed cuckoos spend the winter on the plains of central South America, including portions of Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (AOU, 1998; Johnson et al., 2008). Cuckoos often forage in open areas such as woodlands, orchards, ponds, marshes, fields, savannas, and meadows (Rosenberg et al., 1991). On average, cuckoos can travel around half a mile from nesting sites to find food (Sechrist et al., 2009).

The cuckoo breeds from late May through September. Nesting occurs where temperatures are cool and humid, generally in large tracts of riparian forests (Gaines and Laymon, 1984; Laymon, 1998; Corman and Magill, 2000). A dense understory canopy appears to be essential for the cuckoo nest site section. The WYBC are known to nest in various habitats across the DPS where conditions are suitable and are not limited to riparian zones. The species nests commonly in cottonwoods (*Populus* spp.) and willows (*Salix* spp.) in habitats with complex vegetative structures (Gaines, 1974b; Gaines and Laymon, 1984; Groschupf, 1987; Laymon and Halterman, 1989; Corman and Magill, 2000; Dettling and Howell, 2011). Territories vary in size depending on available resources (Sechrist et al., 2009; McNeil et al., 2013). Local conditions in riparian areas are dynamic and variable based on winter snowpack and seasonal rainfall, primarily driven by the North American Monsoon rainfall patterns (Wallace et al., 2013).

The WYBC has a rapid hatch-to-fledge time, and adults need abundant food sources to rear the young successfully (Laymon, 1980). Cuckoos feed on large insects (such as cicadas, caterpillars, grasshoppers, crickets, beetles, and dragonflies) and small vertebrates (frogs and lizards). Food availability and foraging distance can vary significantly within and between years, drainages, and geographic area and is mainly rainfall related. During years of high insect abundance, cuckoos in the Southwestern United States lay larger clutches and more juvenile birds successfully fledged. Under these conditions, adults can also breed multiple times in one year (Laymon et al. 1997).

The WYBC breeding habitat occurs primarily along perennial, intermittent, and ephemeral drainages in the arid Southwestern United States and Northern Mexico. These areas are isolated and sparsely distributed, being surrounded by arid landscapes. Breeding habitat is generally below 6,000 ft elevation (1,829 m). Habitat for the cuckoo in much of its range is associated mainly with perennial rivers and streams that support the expanse of vegetation characteristics needed by breeding cuckoos. The range and variation of streamflow frequency, magnitude, duration, and timing that establish and maintain riparian habitat can occur in different types of regulated and unregulated flows depending on the interaction of the water and the physical

characteristics of the landscape (Poff et al., 1997; USFWS, 2021). Hydrologic conditions at cuckoo breeding sites can vary widely between years and during low rainfall years; if vegetation and prey are insufficient, cuckoos may move on to more favorable sites.

Distribution and Status

The boundary of the listed DPS includes cuckoos west of the Continental Divide and the Rio Grande River drainages, excluding the Pecos River Drainage, including the Sangre de Cristo Mountains (USFWS 2020a). The population of the WYBC has declined over the past 100 years (USFWS 2020a). Historically, the WYBC was found from southern British Columbia and all states west of the Rocky Mountains. The species was once extremely common in the Central Valley of California. The species is now rare or absent throughout most of its former range, including California. The cuckoo is now most common in Arizona, New Mexico, and Mexico.

Within New Mexico, WYBC historically existed in riparian areas along the Rio Grande, Gila, San Francisco, and San Juan Rivers in western New Mexico (Bailey, 1928; Hubbard, 1978). Woodward et al. (2003) found eighty-nine WYBC within the Gila and Mimbres River drainages in 2002. The WYBC on the Rio Grande likely supports the largest population in the western DPS (USFWS, 2020a).

Threats

The USFWS has identified the primary threat to the species as the loss and degradation of riparian habitat, including habitat fragmentation across the landscape (USFWS, 2014d). Additional threats to the species include climate change, pesticides, wildfire, building strikes (USFWS, 2013b).

Western Yellow-Billed Cuckoo Critical Habitat

The Service designated critical habitat for the WYBC in 2021 on approximately 298 thousand acres (120 thousand hectares) of land in Arizona, California, Colorado, Idaho, New Mexico, Texas, and Utah (USFWS, 2021). The physical or biological features essential to the conservation of WYBC are described below:

PCE I: Riparian woodlands (including mesquite bosques), desert scrub and desert grassland drainages with a tree component, and Madrean evergreen woodland (oak and other tree species) drainages. This physical or biological feature includes breeding habitat found throughout the DPS range and additional breeding habitat characteristics unique to the Southwest;

a. *Range-wide breeding habitat (including areas in the Southwest).* Range-wide breeding habitat is composed of woodlands within floodplains or in upland areas or terraces often greater than 325 ft (100 m) in width and 200 ac (81 ha) or more in extent with an overstory and understory vegetation component in contiguous or nearly contiguous patches adjacent to intermittent or perennial watercourses. The slope of the watercourses is generally less than three percent but may be greater in some instances. Nesting sites within the habitat have an above-average canopy

closure (greater than 70 percent), and have a cooler, more humid environment than the surrounding riparian and upland habitats; and,

b. *Southwestern breeding habitat.* Southwestern breeding habitat comprises more arid riparian woodlands (including mesquite bosques), desert scrub and desert grassland drainages with a tree component, and Madrean evergreen woodlands (oak and other tree species), in perennial, intermittent, and ephemeral drainages. These more arid riparian woodland drainages also bisect other habitat types, including Madrean evergreen woodland, native and nonnative desert grassland, and desert scrub. More than one habitat type within and adjacent to the drainage may contribute toward nesting habitat. Southwestern breeding habitat is more water-limited, contains a greater proportion of xeroriparian and non-riparian plant species, and is often narrower, more open, patchier, or sparser than elsewhere in the DPS and may persist only as narrow bands or scattered patches along the bankline or as small in-channel islands. The habitat contains a tree or large-shrub component with a variable overstory canopy and understory component that is sometimes less than 200 ac (81 ha). Riparian trees (including xeroriparian) in these ecosystems may even be more sparsely distributed and less prevalent than non-riparian trees. Adjacent habitat may include managed (mowed) nonnative vegetation or terraces of mesquite or other drought-tolerant species within the floodplain. In narrow or arid ephemeral drainages, breeding habitat commonly contains a mix of non-riparian vegetation found in the base habitat as well as riparian (including xeroriparian) trees.

PCE II: Adequate prey base. Presence of prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies, moth larvae, spiders), lizards, and frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas;

PCE III: Hydrologic processes, in natural or altered systems, that provide for maintaining and regenerating breeding habitat. This physical or biological feature includes hydrologic processes found in range wide breeding habitat as well as additional hydrologic processes unique to the Southwest in southwestern breeding habitat;

a. Range wide breeding habitat hydrologic processes (including the Southwest): Hydrologic processes (either natural or managed) in river and reservoir systems that encourage sediment movement and deposits and promote riparian tree seedling germination and plant growth, maintenance, health, and vigor (e.g., lower-gradient streams and broad floodplains, elevated subsurface groundwater table, and perennial rivers and streams). In some areas where habitat is being restored, such as on terraced slopes above the floodplain, this may include managed irrigated systems that may not naturally flood due to their elevation above the floodplain; and,

b. Southwestern breeding habitat hydrologic processes: In southwestern breeding habitat, elevated summer humidity and runoff resulting from seasonal water management practices or weather patterns and precipitation (typically from North American Monsoon or other tropical weather events) provide suitable conditions

for prey species production and vegetation regeneration and growth. Elevated humidity is especially important in southeastern Arizona, where cuckoos breed in intermittent and ephemeral drainages.

The physical or biological features essential to the conservation of the western, yellow-billed cuckoo are present in the areas designated, but the specific quality of habitat for nesting, migration, and foraging will vary in condition and location over time due to plant succession and the dynamic environment in which they exist. As a result, the areas that are designated may not contain at any one time all the physical and biological features that have been identified, but all areas contain at least PBF 1.

Chihuahua Chub (*Gila nigrescens*)

On October 11, 1983, the USFWS listed the chub as threatened under the ESA, without critical habitat (USFWS, 1983). The Republic of Mexico also considers the species to be threatened (Propst, 1999). This species declined substantially in abundance and range (Miller and Chernoff, 1979; Propst and Stefferud, 1994). The USFWS has recommended that the species should be up listed to endangered (USFWS, 2010a).

Populations range-wide appear to be decreasing, particularly in Mexico (Propst, 1991). However, only a fraction of potentially occupied habitat in Chihuahua, Mexico, has been surveyed. There have not been any surveys since 1990; therefore, current knowledge regarding the distribution and status in Mexico is limited (USFWS, 2010a).

Description and Life History

The Chihuahua chub is a medium-sized fish in the minnow family (Cyprinidae), averaging between five to six inches in length. Adults are a dark green or grey dorsally and cream to white ventrally. Reproductive adults are reddish-orange around the base of paired fins, and around the mouth, and ventrally. The males have brighter colors and contain numerous small nuptial tubercles on the head (Propst, 1999). The species is an opportunistic carnivore in its feeding behavior, taking terrestrial insects, aquatic invertebrates, and some fish and vegetation (Sublette et al., 1990).

The adult Chihuahua chub is a habitat specialist and is found primarily in lateral scour pools, beneath undercut banks, or under other solid objects (e.g., logs, boulders). Occupied pools are typically 3 to 7 ft. (1 to 2 m) deep with a small-grained substrate (USFWS, 2010a). Adults select habitats adjacent to moderate to fast-flowing water in small to medium-sized streams (Miller and Chernoff, 1979; Propst and Stefferud, 1994). Backwater pools with large woody debris are also important habitats. Juveniles prefer more shallow water with or without cover (Miller and Chernoff, 1979). All suitable habitat for this species contains cover composed of organic debris and roots of large trees.

Propst and Stefferud (1994) suggest that the spawning season could extend from early spring through autumn across the Chihuahua chubs' range. In New Mexico, spawning probably occurs from spring to summer, eggs are probably scattered randomly over sandy or silt substrates, and

young most likely occupy quiet backwaters (New Mexico Department of Game and Fish, 1988). Chihuahua chubs in captivity mature at age two or three (Propst, 1999). Wild fish probably do not live more than four or five years.

Distribution and Status

The historical habitat for the Chihuahua chub has been dramatically reduced and degraded (USFWS, 2010a). Historically, Chihuahua chub probably occupied all the warm water reaches of the Mimbres River drainage within or downstream of the Gila NF (Propst, 1999). Experts believed the Chihuahua chub was extirpated in New Mexico until its rediscovery in 1975 (Koster, 1957; Rogers, 1975). In New Mexico, the population of Chihuahua chub in the Mimbres River is probably stable. However, its status remains precarious due to the population's dependence on stocking and ongoing threats (USFWS, 2010a).

The Mimbres River populations are located primarily on lands managed by The Nature Conservancy (TNC), New Mexico Department of Game and Fish (NMDGF), and private landowners; the Mimbres River at Cooney Canyon and the McKnight Creek populations were on Gila NF lands. However, the population stocked in McKnight Creek is presumed absent following surveys in 2014. Chihuahua chubs were again, recently, stocked in McKnight Creek, above a fish passage barrier. The status of this repatriated population is unknown. A small population continues to persist on the Gila NF in the Mimbres River.

Threats

Habitat loss and modification is the primary threat to the chub in the Mimbres River. Historically, the Mimbres River was a relatively deep (2.5 ft. (0.8 m)), slow-moving river with a series of pools or lagoons at its terminus, bordered with thickets of native willows (*Salix* spp.) (Antisell, 1856). Presently, river conditions have been drastically altered through numerous diversions and stream modifications, reducing both the quantity of water in the river and the quality of its adjacent riparian habitat. Ash flows resulting from wildfires reduce water quality and increases sedimentation (Propst, 1999). These impacts decrease habitat suitability for the chub and probably caused local extirpations of the species. The presence of the parasitic yellow grub (*Clinostomum complanatum*) is a threat due to the possibility of reduced survival caused by excessively infected fish (Propst, 1999). The species might now be more highly imperiled in Mexico than when it was last surveyed in 1990 due to increasing threats from exotic species, water extraction, groundwater pumping, and stream drying (USFWS, 2010a).

Gila Chub (*Gila intermedia*)

The USFS identified the Gila chub as an endangered species and designated critical habitat on November 2, 2005 (USFWS, 2005a). The Gila chub was formerly considered a separate taxonomic entity but is now recognized with the headwater chub and the roundtail chub as a single, taxonomic species, *Gila robusta* (USFWS, 2017). The USFWS is currently evaluating the status of this taxon. Until there is a final rule to delist the Gila chub, it legally retains its status as an endangered species. This *draft* opinion reflects this status. The USFWS approved a recovery plan for the Gila chub in 2015 (USFWS, 2015).

Description and Life History

The Gila chub is a deep-bodied, darkly colored cyprinid that can reach 7.8 inches (200 mm) in length. Females are slightly Females are slightly larger than males (Minckley, 1973; Propst, 1999). Breeding begins when the water warms to between 68 to 80°F (20 to 26.5°C). Studies show that the Gila chub is omnivorous (Griffiths and Tiersch, 1989). They probably feed on invertebrates and small fishes (Rinne and Minckley, 1991). Griffiths and Tiersch (1989) found that Gila chubs consume speckled dace, dobsonfly nymphs, and terrestrial insects (ants, caterpillars, and beetles); a high presence of algae and small gravel, which indicates bottom-feeding, was also found in their diet.

Gila chub commonly inhabit pools with smaller streams, springs, and cienegas. Generally, Gila chub is associated with cover, including terrestrial vegetation, boulders, fallen logs (Rinne and Minckley, 1991), and undercut banks created by over-hanging terrestrial vegetation (Nelson 1993). Habitat selection is life stage specific, with adults commonly found in deep pools with eddies below areas with swift currents (Minckley, 1973). Young-of-the-year inhabit shallow water among plants or eddies, and other juveniles use high-velocity stream areas such as riffles (Minckley, 1973). Dudley (1995) observed temporal variation in habitat selection in Sabino canyon whereby Gila chub occupied dark interstitial spaces during winter. Sub-adults were observed farther from cover and frequently in shallow or higher current areas with warm summer water.

Distribution and Status

The Gila chub recovery plan (USFWS, 2015) lists 22 extant, wild populations throughout the species range. There are an additional seven populations that have not been detected for the past 20 years. One population (Bear Canyon) was assumed extinct by experts but was detected again in 2018. In 2019, Gila chub were stocked into Rarick Canyon. Three, new refuge populations were established n Horseshoe Ranch Pond, Spring Water Wetland Pond, and Clyne Pond. Gila chub populations remain extant in tributaries to the Agua Fria, Blue, Gila, San Francisco, Santa Cruz, and Verde rivers in Arizona and New Mexico. The Gila chub populations are spread across drainages, and most are isolated from one another.

Threats

The primary threat to the Gila chub is habitat loss. Activities that can degrade habitat, including groundwater pumping, damming, diversions, and stream channelization, can lead to stream dewaters and altered channel morphology. In southeast Arizona, poor watershed conditions due to overgrazing, mining, timber harvesting, and fire suppression are habitat threats (Bahre, 1991; Humphrey, 1958; Martin, 1975).

The U.S. Bureau of Land Management (BLM, 1998) suggested recreation (e.g., all-terrain vehicles, hiking, wading, and swimming) might negatively affect habitat through increased sediment disturbance, fish displacement, and trampling bank vegetation. Destruction of stream habitat and dewatering leads to fragmentation of habitat and populations, which restricts movement and reduces the ability for populations to colonize areas, and for gene flow among populations.

Another severe threat to the Gila chub is predation and competition with nonnative species, such as fishes, bullfrogs, and crayfish. The impacts of nonnative fish species on native fish, including Gila chub, are well documented (Miller, 1961; Minckley and Deacon, 1968; Minckley, 1973; Meffe, 1985; Moyle, 1986; Minckley and Deacon, 1991; Ruppert et al., 1993; Clarkson et al., 2005). Additionally, large-scale wildfires have negatively impacted the Gila chub populations and their habitats (USFWS, 2015).

Gila Chub Critical Habitat

The USFWS designated critical habitat for the Gila chub in 2005. The PCEs for the species are summarized below:

PCE I: Perennial pools found in headwaters, springs, and cienegas, generally of smaller tributaries;

PCE II: Water temperatures for spawning ranging from 17 to 24°C;

PCE III: Water quality with reduced levels of contaminants, including excessive levels of sediments;

PCE IV: Food base consisting of invertebrates and aquatic plants;

PCE V: Sufficient cover consisting of downed logs, undercut banks with overhanging vegetation, large rocks, boulders, and healthy intact riparian vegetation community;

PCE VI: Habitat nearly devoid of nonnative aquatic species detrimental to the Gila chub; and

PCE VII: Streams that maintain a natural flow patterns including periodic flooding.

Gila Trout (*Oncorhynchus gilae*)

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. In 2006, the Gila trout was reclassified from an endangered to threatened under the ESA. The Gila trout was under the ESA before the USFWS developed a critical habitat policy, therefore there is no critical habitat for this species (USFWS, 2006).

Description and Life History

The Gila trout is a salmonid that is usually between 8 and 10 inches (200-250 millimeters(mm)) long. The species has iridescent gold sides that blend to a darker shade of copper in the operculum (gill cover). This golden coloration distinguishes Gila trout from other co-occurring nonnative trout species. There are many small spots on the body, generally occurring above the lateral line and extending onto the head, back and tail. These fish have a light underside. Breeding adults have a faint pink band around the stomach (USFWS, 2003). The Gila Trout Recovery Plan was completed in 1979.

Distribution and Status

Historically, the Gila trout occurred in the upper Gila River basin in New Mexico and parts of the San Francisco systems of Arizona and New Mexico (Behnke, 2002). The Arizona populations were probably extirpated around the turn of the 20th century (USFWS, 2003). The Gila trout is native to higher elevation streams in portions of the Gila River drainage, New Mexico. By 1915, the downstream distribution of Gila trout in the Gila River had already declined (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, experts thought its range had been reduced to five streams within the Forest: Iron, McKenna, Spruce, Main Diamond, and South Diamond Creeks. Main Diamond Creek was the largest of the five populations (Behnke, 2002). Beginning in 1970, Gila trout from each of the five relict populations were relocated into other streams. Currently, there are four confirmed relict populations known today, Main Diamond, South Diamond, Spruce, and Whiskey Creeks.

Conservation efforts for the Gila trout began in the 1920s (USFWS, 2003). In the 1970s, taxonomic analyses (Beamish and Miller, 1977) and population and habitat evaluations were conducted (Rinne, 1978), along with comprehensive distribution assessments (Mello and Turner, 1980). In the 1980s, 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 (Rinne, 1980; Loudenslager et al., 1986; Pittenger, 1986; Nankervis, 1988; Van Eimeren, 1988).

Between the 1990s and 2017, there have been several Gila trout translocation efforts with varying success in Arizona and New Mexico. Stockings have occurred on the Prescott, Apache-Sitgreaves, Tonto, and Coconino National Forests in Arizona, and the Gila National Forest in New Mexico. Currently, there are 23 Gila trout populations; seven in Arizona and 16 in New Mexico.

The Recovery Plan was most recently revised in 2003 (USFWS 2003). In 2001, the Gila Trout Recovery Team recommended to the USFWS that the Gila trout be down-listed from endangered to threatened, based in part on successful reestablishments of the species in New Mexico and Arizona. By 2003, Gila trout were reported to be found in 14 populations in the wild (USFWS 2003). The species was down-listed to threatened status in 2006 (USFWS, 2005; 2006). The Recovery Plan is currently going through review for its fourth revision.

Threats

Reasons for listing included hybridization, competition, and predation by nonnative rainbow trout, cutthroat trout (*O. clarkii*), and brown trout, and habitat degradation.

Wildfire has emerged as an increasing threat to the Gila trout. In 2012, the Whitewater-Baldy Fire in the Gila Mountains of New Mexico burned over 290,000 acres in Gila trout-occupied habitat. Seven of the 14 occupied Gila trout recovery streams were severely impacted. In

response to the Whitewater-Baldy Fire in the Gila Mountains, Gila trout from Whiskey, Langstroth, and Spruce creeks were salvaged. Trout were transported to the Mora National Fish Hatchery or the New Mexico Fish and Wildlife Conservation Office. Trout from Spruce Creek were also taken to Ash Creek in Arizona. Later in 2012, 3,000 Gila trout were returned to the West Fork of the Gila River in New Mexico.

In 2013, the Silver Fire burned 139,000 acres in the Black Range in southwestern New Mexico. The Gila trout in McKnight Creek were eliminated; trout in Black Canyon were greatly reduced.

Loach Minnow (*Tiaroga cobitis*)

The USFWS listed the loach minnow as a threatened species on October 28, 1986 (USFWS, 1986a). On February 23, 2012, the USFWS reclassified the loach minnow as endangered (USFWS, 2012b). The state of New Mexico lists the species threatened (recommended to be uplisted to endangered) (NMDGF, 2006). The USFWS published the Loach Minnow Recovery Plan in 1991 (USFWS, 1991). The USFWS designated revised critical habitat in 2012 (USFWS, 2012b).

Description and Life History

The loach minnow is a small, slender, elongate fish of the family Cyprinidae that can reach up to 60 mm (2.4 in) in length (Minckley, 1973). The loach minnow has upward-directed eyes and a terminal mouth with no barbels. Loach minnows have an olive color that is blotched with darker pigment. Whitish spots are present at the origin and insertion of the dorsal fin and the dorsal and ventral portions of the caudal fin base. Breeding males develop bright red-orange coloration at the bases of the paired fins, on adjacent fins, on the base of the caudal opening, and often on the abdomen. Breeding females become yellowish on their fins and lower body (Minckley, 1973).

Loach minnow is found in turbulent, rocky riffles of streams up to about 2,200 m (7,200 ft) in altitude. The loach minnow is a bottom-dwelling inhabitant of shallow, swift waters flowing over gravel, cobble, and rubble substrates in mainstream rivers and tributaries (Rinne, 1989; Propst and Bestgen, 1991).

The loach minnow deposits eggs on the downstream side of rocks using sicky adhesive eggs. These areas form a cavity in the substrate, providing some protection for the eggs. Rocks used for spawning are flattened and slightly elevated from the stream bottom on the downstream side and are nearly always fine-grained, basalt-type material with smooth surfaces (Propst and Bestgen, 1991). Loach minnow females can attach up to 260 eggs to a single rock (Propst and Bestgen, 1991; Britt, 1982). The fecundity of females ranges from about 150 to 250 mature ova and generally increases with increasing size (USFWS, 1991). Eggs incubated at 18 to 20 °C (64.4 to 68 °F) hatched in 5 to 6 days (Propst et al., 1988).

Individual loach minnows grow quickly during their first summer and are nearly as large as adults within a few months. Longevity is typically 15 months to 2 years, although loach minnow can live up to 3 years (Britt, 1982; Propst et al., 1988; Propst and Bestgen, 1991). The first spawn generally occurs in the spring of their section year (March – May)(Britt, 1982; Propst et al., 1988). The species is also known to spawn in the autumn (Vives and Minckley, 1990).

Miller (1998) reports that loach minnow males in New Mexico were in breeding coloration in late June. The loach minnow has low population density, short life expectancy, and low fecundity. Even in optimal habitat, loach minnow populations are not abundant (Propst and Bestgen 1991).

Loach minnows feed exclusively on aquatic insects (Britt, 1982; Abarca, 1987). Loach minnow is opportunistic benthic insectivores, feeding primarily on larval mayflies, black flies, and chironomids. They actively seek their food among bottom substrates.

Distribution and Status

The loach minnow is endemic to the Gila River basin of Arizona and New Mexico, and Sonora, Mexico During the last century, loss of habitat, competition, and predation by nonnative aquatic species have reduced the historical range of the loach minnow by about 85 percent (Miller 1961; Hendrickson and Minckley 1984; Williams et al. 1985; USFWS 1986a; Marsh et al. 1989; USFWS 1994a). Present populations are geographically isolated and inhabit upstream areas of their historical range, including the Verde, Salt, San Pedro, San Francisco, and Gila Rivers (Minckley 1973; Sublette et al. 1990).

In Arizona, the loach minnow once occupied as many as 2,250 km (1,400 mi) of streams, but it is now found in less than ten percent of that range and is considered uncommon (Propst et al., 1988). The species is probably extinct in Mexico.

Before European settlement in New Mexico, the loach minnow lived in warm water reaches of the San Francisco and Gila Rivers and their significant tributaries. The species has become rare in New Mexico and now occupies only fragmented reaches of the San Francisco and Gila drainages (Propst et al., 1988). The loach minnow is the most abundant 10 km (6.2 mi) of the Tularosa and San Francisco Rivers (NMDGF, 2010). In the lower reaches of the West Fork Gila River, a small population persists (NMDGF, 2009), and the population in the Gila-Cliff Valley has declined considerably during the past 15 years (Paroz et al., 2006; NMDGF, 2010).

Biochemical investigations on this species indicate that there are substantial differences in genetic makeup between the remnant loach minnow populations that occupy isolated fragments of the Gila River basin, indicating a geographic component to the population structure of the species (Tibbets and Dowling, 1996). Therefore, protection of isolated loach minnow populations are essential to preserving genetic variation.

Past changes in the range and population density of the loach minnow undoubtedly occurred in response to natural spatial and temporal variations in the environment. However, its declining status is the result of human activities (USFWS 2010). Much of the habitat in the Gila River basin is degraded with poor riparian habitats, incised channels, poor bank stability, and high streambed embeddedness due to water diversion and pumping, livestock grazing, and road construction (USFWS, 2010).

Threats

When the loach minnow was listed, the main threats identified were range reduction and population decline due to habitat destruction and competition with nonnative fish species

(USFWS, 1986a). During the last century, the loach minnow distribution and abundance have been greatly reduced throughout the species' range (Propst et al., 1988). Competition and predation by non-native fish and habitat destruction have reduced the historical range of the loach minnow by about 85% (USFWS, 1986a). Suitable habitat for the loach minnow is vulnerable to the harmful effects of sedimentation. These factors make the loach minnow very sensitive to environmental changes and disturbances. Loach minnow uses the spaces between and the lee of larger substrates for resting, sheltering, feeding, and spawning (Propst et al., 1988; Rinne, 1989). The species is rare or absent from habitats where fine sediments fill interstitial spaces (Propst and Bestgen, 1991).

Current threats to the loach minnow that can exacerbate sedimentation include livestock grazing, mining, agriculture, timber harvest, wildfire, recreation, development, or impoundments (Hendrickson and Minckley, 1984; Belsky et al., 1999). Land and water use practices have impaired perennial flows and natural hydrographs (Minckley and Meffe, 1987). These activities can degrade loach minnow habitats by altering flow regimes, increasing watershed and channel erosion, contributing to increased sedimentation, and adding contaminants to streams and rivers (Belsky et al., 1999; Donahue, 2000). Alteration of the natural flooding characteristic of desert streams has degraded habitat and increased competition from introduced nonnative species (Minckley and Meffe, 1987). As a result, these activities may affect the loach minnow through direct mortality, interference with reproduction and predator avoidance, and reduction of invertebrate food supplies.

Nonnative aquatic species (fishes, bullfrogs, and crayfish) are a threat to the loach minnow. Red shiners compete with the loach minnow for food and habitat and tolerate the extreme conditions found in desert streams (Matthews and Hill, 1977). Nonnative fish such as channel catfish and flathead catfish frequent riffles occupied by loach minnow, especially at night when catfish move onto riffles to feed and may prey on loach minnow (Propst, 1999). In addition, largemouth bass, smallmouth bass, green sunfish, introduced trout, and bullfrogs may prey on the loach minnow.

Loach Minnow Critical Habitat

Critical habitat was designated (USFWS, 2012), and the PCEs for loach minnow were developed; they are summarized below:

PCE I: Habitat to support all egg, larval, juvenile, and adult loach minnow. This habitat includes perennial flows with a stream depth generally less than 1m (3.3ft) and with slow to swift flow velocities between 0 and 80 mm per second (0.0 and 31.5 in. per second). Appropriate stream microhabitat types include glides, runs, riffles, the margins of pools and eddy, and backwater components over sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Appropriate habitat must have a low gradient of less than approximately 2.5 percent, at elevations below 2,500 m (8,202 ft). Water temperatures should be in the general range of 8 to 25 degrees Celsius (46.4 to 77.0 °F);

PCE II: An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies;

PCE III: Streams with no or no more than low levels of pollutants;

PCE IV: Perennial flow, or interrupted stream courses that are occasionally dry but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted;

PCE V: No nonnative aquatic species or levels of nonnative aquatic species that are sufficiently low as to allow persistence of loach minnow; and

PCE VI: Streams with a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flow capable transporting sediments.

Spikedace (*Meda fulgida*)

The spikedace was listed as threatened under the ESA on October 28, 1986 (USFWS, 1986b). The agency later reclassified the spikedace as endangered on February 23, 2012 (USFWS, 2012). The USFWS published a recovery plan for the spikedace in 1991 (USFWS, 1991b). Critical habitat was designated for the spikedace on February 23, 2012 (USFWS, 2012).

Description and Life History

The spikedace is a member of the minnow family Cyprinidae. Adult spikedace are 63-75 mm (2.5-2.9 in) in length (Sublette et al., 1990). The spikedace has large eyes, a pointed snout, and a slightly subterminal mouth with no barbels present. The species is slender and slightly compressed laterally. Scales are present only as small, deeply embedded plates. The first spinous ray of the dorsal fin is the strongest and most sharply pointed. The spikedace is olive-gray to light brown above, with bright silver sides, black specks, and blotches on the back and upper sides. Breeding males have brassy-yellow heads and fin bases (Minckley, 1973).

Spikedace occupy midwater habitats, usually less than 30 mm (12 in) deep, with slow to moderate water velocities over sand, gravel, and cobble substrates (Sublette et al., 1990). Adults often aggregate in shear zones along gravel-sand bars where rapid water borders slower flow, quiet eddies on the downstream edges of riffles, and broad, shallow areas above gravel sand bars (Propst et al., 1986). The preferred habitat of spikedace varies, shifting both seasonally and with maturation (Propst et al., 1986). The species shows geographic variation in microhabitat use, with populations in the forks area of the Gila drainage occupying deeper, slower velocities than more downstream populations. Likewise, researchers have noted seasonal shifts in microhabitat in the upper Gila drainage, with populations seeking shallower habitats in the winter and deeper water during warmer months (Sublette et al., 1990). In winter, the species congregates along stream margins with cobble substrates.

The erratic flow patterns of southwestern streams that include periodic flash floods and recurrent floods are essential to the feeding and reproduction of spikedace by scouring the sands and keeping gravels clean (Propst et al., 1986). The spikedace larvae and juveniles tend to occupy shallow, peripheral portions of streams that have slow currents and sand or delicate gravel substrates, as well as backwater habitats. The spikedace lives approximately 2 years, with

reproduction occurring primarily in 1-year-old fish (Barber et al., 1970; Anderson, 1978; Propst et al., 1986). Spawning extends from mid-March into June and occurs in shallow gravel-sand substrates with the moderate flow (Barber et al., 1970; Anderson, 1978; Propst et al., 1986). By mid-May, most spawning has occurred, although spawning may continue into early June (Propst et al., 1986). Younger females spawn once per year and older females twice.

The spikedace begin to reproduce when stream discharge starts to decline and water temperatures increase. Males move about the spawning riffles without exhibiting aggression, awaiting females ready to spawn (Barber et al., 1970). Females enter spawning sites from adjacent pools, slow velocity areas, or from downstream and are met by two or more patrolling males and herded toward the bottom where spawning occurs. After spawning, the males return to patrol the area while the females move downstream. Gametes are presumably expelled into the water column. The eggs are heavy, sink, and adhere to the substrate. The fecundity of individual females ranges from 90 to 250 ova, with larger, older females producing more eggs (USFWS, 1991b). The young grow rapidly, attaining a length of 35 to 40 mm (1.4 to 1.6 in) by late fall.

Spikedace feeds primarily on aquatic and terrestrial insects (Barber and Minckley, 1983; Propst et al., 1986; Marsh et al., 1989). In addition, Barber et al. (1970) report that they feed on items in the drift, including some fish fry. Habitat type and time of year determine diet composition (Minckley, 1973). Propst et al. (1986) report that spikedace from the Gila-Cliff Valley feed on mayflies, true flies, and caddisflies. The general lack of terrestrial invertebrates in spikedace stomachs indicated that the species depends on aquatic insects for sustenance.

Recent taxonomic and genetic work on spikedace indicates substantial differences in morphology and genetic makeup among drainage basins. Anderson and Hendrickson (1994) found that spikedace from the Verde River are morphologically distinguishable from all other spikedace populations, being the most distinct from spikedace in Aravaipa Creek. In contrast, spikedace from the upper Gila River and Eagle Creek populations have intermediate levels of variation. Mitochondrial DNA and allozyme analyses have revealed similar patterns of geographic variation within the species (Tibbets and Dowling, 1996). Protection of isolated spikedace populations is vital to preserving genetic variation.

Distribution and Status

Since the 1800s, spikedace have declined markedly in distribution and abundance throughout their range (Propst et al., 1986; USFWS, 1986b). Historically, spikedace occurred in the Agua Fria, Verde, Salt, San Pedro, San Francisco, and Gila drainages in Arizona and throughout the Gila River and its tributaries (e.g., San Francisco River, West, East, and Middle Forks Gila River) in New Mexico. By 2000, spikedace had been eliminated from over 90 percent of its historical range (Paroz et al., 2006). By 2004, there were only two remaining stronghold reaches for the species, 21 km (13 mi) of Aravaipa Creek in Arizona and an 11 km (7 mi) segment of the Gila River at the Gila Bird Area (Paroz and Propst, 2007).

Spikedace exists in low numbers in other locations of the Gila River, but its numbers have been declining since 2000 (Paroz et al., 2006; Paroz and Propst, 2007). The species is now absent from the San Francisco and Tularosa Rivers in New Mexico.

Threats

During the last century, habitat destruction, competition, and predation by nonnative aquatic species have reduced the range of the spikedace from the species historical extent (Miller, 1961; Hendrickson and Minckley, 1984; Williams et al., 1985; USFWS, 1986b; Marsh et al., 1989; USFWS, 1994b).

Human influences, including livestock grazing, mining, agriculture, timber harvesting, wildfire, human recreation, and development, have changed the landscapes surrounding spikedace habitats. (Hendrickson and Minckley, 1984; Belsky et al., 1999). These landscape changes have impaired perennial flows and natural hydrographs (Minckley and Meffe, 1987), degrading spikedace habitats by altering flow regimes, increasing watershed, and channel erosion, contributing to increased sedimentation contaminants in streams and rivers (Belsky et al., 1999; Donahue, 2000). As a result, these activities might affect spikedace through direct mortality, interference with reproduction and predator avoidance, fragmentation of populations, and reduction of invertebrate food supplies.

Nonnative aquatic species (fishes, bullfrogs, and crayfish) are a threat to spikedace as they are for most native aquatic fishes. Researchers have identified the red shiner *(Cyprinella lutrensis)* as a cause of Spikedace decline (Minckley and Deacon, 1968; Minckley, 1973). Red shiner outcompetes spikedace for food and habitat and is very tolerant of the extreme conditions found in desert streams (Matthews and Hill, 1977). Nonnative fish such as channel catfish *(Ictalurus punctatus)* and flathead catfish *(Pylodictis olivaris)* frequent riffles occupied by spikedace, especially at night when they move onto riffles to feed and might prey on spikedace (Propst, 1999). In addition, largemouth bass *(Micropterus salmoides),* smallmouth bass *(Micropterus dolomieu),* green sunfish *(Lepomis cyanellus),* introduced trout, and bullfrogs may prey on spikedace.

Spikedace Critical Habitat

The designated critical habitat for spikedace includes five complexes, which were based specific areas within the geographical area occupied by the species, at the time it was listed in accordance with the Act, on which are found those physical and biological features sufficient (PCEs) include the Verde River Subbasin, Salt River Subbasin, San Pedro River Subbasin,
Bonita Creek Subbasin, The PCEs of critical habitat designated for spikedace are as follows (USFWS, 2012):

PCE I: Habitat to support all egg, larval, juvenile, and adult spikedace. This habitat includes perennial flows with a stream depth generally less than 1m (3.3ft) and with slow to swift flow velocities between 5 and 80 mm per second (1.9 and 31.5 in. per second). Appropriate stream microhabitat types include glides, runs, riffles, the margins of pools and eddy, and backwater components over sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Appropriate habitat must have a low gradient of less than approximately 1.0 percent, at elevations below 2,100 m (6,890 ft). Water temperatures should be in the general range of 8.0 to 28.0 degrees Celsius (46.4 to 82.4 °F);

PCE II: An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies

PCE III: Streams with no or no more than low levels of pollutants.

PCE IV: Perennial flow, or interrupted stream courses that are occasionally dry but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

PCE V: No nonnative aquatic species or levels of nonnative aquatic species that are sufficiently low as to allow persistence of Spikedace. and

PCE VI: Streams with a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flow capable transporting sediments.

There is approximately 1,010 km (628 mi) of designated critical habitat within the spikedace range.

Chiricahua Leopard Frog (*Lithobates [Rana] chiricahuensis*)

The USFWS listed the Chiricahua leopard frog (CLF or frog) as a threatened species under the ESA with the scientific taxonomic name *Rana chiricahuensis* on June 13, 2002 (USFWS, 2002b). The taxon has since moved into the *Lithopates* genus. The USFWS summarized the taxonomy of the species in the most recent 5-year review for the Chiricahua leopard frog (USFWS, 2011). The USFWS published a final rule on March 30, 2012 (USFWS, 2012c), including a reassessment of threats, taxonomic name change, and critical habitat designation. The USFWS finalized a recovery plan for the Frog in 2007 (USFWS, 2007).

Description and Life History

The Chiricahua leopard frog is distinguished from other species of leopard frog by a combination of characteristics. The species has a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles (wart-like projections) on a dark background, folds on the back and sides that, towards the rear, are interrupted and deflected towards the middle of the body. The frog has a stocky body with relatively rough skin on the back and side. The eyes of this species are positioned relatively high on the head, and often green coloration on the head and back (Platz and Mecham, 1979; Degenhardt et al., 1996). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Platz and Mecham, 1979; Davidson, 1996). Overall body lengths of adults range from approximately 2.1 inches (in) (5.3 centimeters (cm)) to 5.4 in (13.7 cm) (Platz and Mecham, 1979).

The Chiricahua leopard frog has a complex life cycle typical of amphibians, consisting of eggs and larvae that are entirely aquatic and adults who are primarily aquatic but may be terrestrial at times. Females attach spherical masses of fertilized eggs to submerged vegetation, ranging from 300 to 1,485 eggs (Sredl and Jennings, 2005). Researchers have reported egg masses of the frog in all months. However, reports of egg-laying in June and November through January are uncommon (Zweifel, 1968; Frost and Bagnara, 1977; Frost and Platz, 1983; Scott and Jennings,

1985; Sredl and Jennings, 2005). Frost and Platz (1983) divided egg-laying activity into two distinct periods concerning elevation. Populations at elevations below 5,900 feet (ft) (1,798 meters (m)) tend to lay eggs from spring through late summer, with most activity taking place before June. Populations above 5,900 ft (1,798 m) breed in June, July, and August. Scott and Jennings (1985) found a similar seasonal pattern of reproductive activity in New Mexico (February through September), as did Frost and Platz (1983), although they did not note elevational differences. Chiricahua leopard frogs at warm springs may lay eggs year-round due to elevated water temperatures than most breeding habitats (Scott and Jennings, 1985).

Eggs hatch in approximately 8 to 14 days, depending on temperature. After hatching, tadpoles remain in the water, where they feed and grow. Tadpoles turn into juvenile frogs in 3 to 9 months. In overall body length, juvenile frogs are typically 1.4 to 1.6 in (35 to 40 millimeters (mm)). Males reach sexual maturity at 2.1 to 2.2 in (5.3 to 5.6 cm), a size they can attain in less than a year (Sredl and Jennings, 2005).

The diet of the CLF includes invertebrates such as beetles, true bugs, and flies primarily, but fish and snails are also taken (Christman and Cummer, 2006). Chiricahua leopard frogs are active both day and night, but adults tend to be active more at night than juveniles (Sredl and Jennings, 2005). Chiricahua leopard frogs presumably experience very high mortality (greater than 90 percent) in the egg and early tadpole stages, high mortality when the tadpole turns into a juvenile frog, and relatively low mortality when the frogs are adults (USFWS, 2007).

The Chiricahua leopard frog occupies cienegas (mid-elevation wetland communities often surrounded by arid environments), pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations from 3,281 to 8,890 feet (994 to 2,694 meters) in Arizona, New Mexico, and Mexico. Shallow waters with emergent and perimeter vegetation provide tadpole and adult basking habitats, while deeper water, root masses, and undercut banks provide refuge from predators and potential sites for hibernation (Sredl and Jennings, 2005). Most perennial waters supporting Chiricahua leopard frogs possess fractured rock substrate, emergent or aquatic vegetation, deep water, root masses, undercut banks, or some combination of these features that frogs may use as refugia from predators and climatic conditions. Chiricahua leopard frogs may over-winter at or near breeding sites, although no studies exist for these microsites. Other leopard frog species typically over-winter at the bottom of well-oxygenated ponds and may bury themselves in the mud (Nussbaum et al., 1983; Harding, 1997).

Distribution and Status

The range of the Chiricahua leopard frog in the United States includes central and southeastern Arizona and west-central and southwestern New Mexico. In Mexico, it includes northeastern Sonora, the Sierra Madre Occidental of northwestern and west-central Chihuahua, and possibly as far south as northern Durango (Platz and Mecham, 1984; Degenhardt et al., 1996; Sredl and Jennings, 2005; Brennan and Holycross, 2006; Lemos-Espinal and Smith, 2007; Rorabaugh, 2008). The distribution of the species in Mexico is unclear due to limited survey work and closely related taxa in the southern part of the CLF range (Figure 2).

Based on 2010 data, the species still occurs in most significant drainages in Arizona and New Mexico, where it occurred historically; the exception is the Little Colorado River drainage in

Arizona (USFWS, 2011). In Arizona and New Mexico, the species likely occurs within about 14 percent and 16 to 19 percent of its historical localities, respectively (USFWS, 2007).

The most recent 5-year status review (USFWS, 2011) estimates that 90, 29, and 45 Chiricahua leopard frog occupied sites in central and southeastern Arizona, New Mexico, and northern Mexico, respectively. Occupied sites range from one individual Chiricahua leopard frog (i.e., egg mass, tadpole, metamorph, or adult) to a robust breeding population. The occupied sites have increased in Arizona and New Mexico, but to a lesser extent in New Mexico than in Arizona. The increase in occupied sites is primarily the result of active management, habitat creation and enhancement, and reintroduction of Chiricahua leopard frogs.

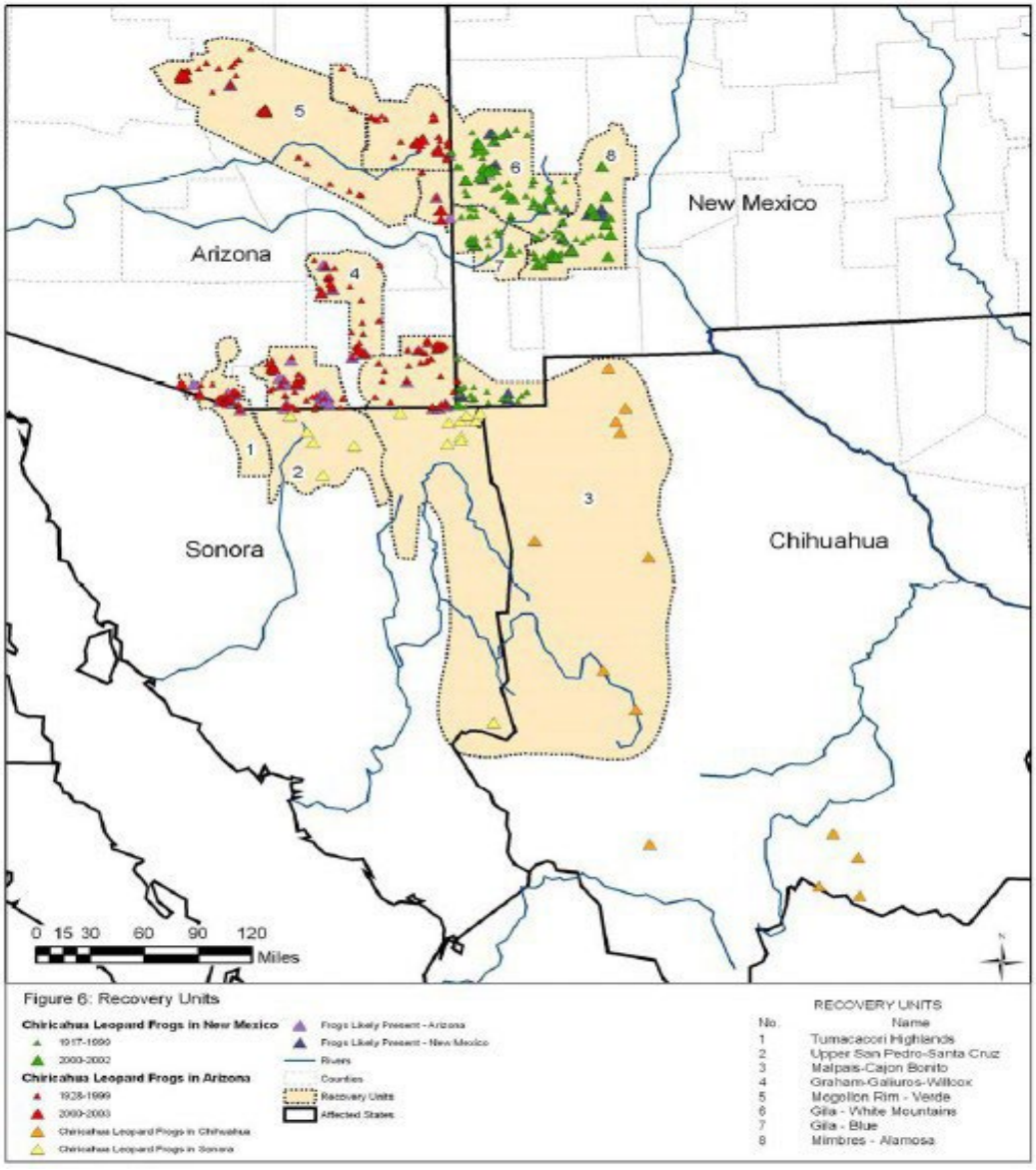

Figure 2. Chiricahua Leopard Frog Recovery Units in Arizona, New Mexico, and Mexico (USFWS, 2007).

Threats

Range-wide, the most severe threat to the Chiricahua leopard frog includes predation by non-native organisms, especially American bullfrogs, spiny-rayed fishes (*Micropterus spp.; Lepomis spp.*), and non-native crayfish (*Orconectes spp.*). The introduced crayfish (*Orconectes spp*.) has harmful effects on native populations of leopard frogs in North America (Kats and Ferrer, 2003) and likely has negative effects on CLF in Arizona and New Mexico since bullfrogs are significant predators of native frogs. Recent bullfrog eradication efforts in southern Arizona (Atascosa Mountains and Cienega Valley) appear to have established conditions favorable to the reestablishment of the Chiricahua leopard frog. Efforts are underway to expand bullfrog eradication in New Mexico.

Other significant threats to the Chiricahua leopard frog include a fungal skin disease (chytridiomycosis or chytrid) globally, killing frogs and toads. This disease is caused by the chytrid fungus *Batrachochytrium dendrobatidis* (Bd), a globally occurring pathogen. Habitat loss, degradation, and fragmentation from water diversion, pollution, groundwater pumping, drought, floods, wildfires, improper grazing practices, and disruption of metapopulation dynamics (relationships among populations of frogs), also adversely affect the species and limit its recovery. Climate change and increased ultraviolet radiation could indirectly impact this species in the future through increased temperatures and more prolonged and severe droughts.

Chiricahua Leopard Frog Critical Habitat

The 2012 final critical habitat rule for the Chiricahua leopard frog designated 39 critical habitat units totaling approximately 10,346 acres (4,187 ha) in eight recovery units within the range of the species in Arizona and New Mexico (USFWS 2012). The purpose of designating critical habitat is to conserve physical or biological features essential to the conservation of the species and may require special management consideration or protection. Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, we determined that the PCEs specific to the Chiricahua leopard frog are:

PCE I: Aquatic breeding habitat and immediately adjacent uplands exhibiting the following characteristics:

- **a.** Standing bodies of fresh water (with salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present). This includes natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or rarely go dry for more than a month. During periods of drought or less than average rainfall, these breeding sites may not hold water long enough for individuals to complete metamorphosis. However, they would still be considered essential breeding habitats in non-drought years;

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

c. Non-native predators (e.g., crayfish, American bullfrogs, non-native predatory fishes) are absent or occurring at levels that do not preclude the presence of the Chiricahua leopard frog;

d. Absence of chytridiomycosis or if present, then environmental, physiological, and genetic conditions are such to allow persistence of Chiricahua leopard frogs; and

e. Upland, terrestrial habitats provide opportunities for foraging and basking immediately adjacent to or surrounding breeding aquatic and riparian habitat.

PCE II: Dispersal and non-breeding habitat, consisting of areas with ephemeral (present for only a short time), intermittent or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provides corridors (overland movement or along wetted drainages) for Chiricahua leopard frogs among breeding sites in a metapopulation with the following characteristics:

a. Are not more than 1.0 mile (1.6 kilometers) overland, 3.0 miles (4.8 kilometers) along ephemeral or intermittent drainages, 5.0 miles (8.0 kilometers) along perennial drainages, or some combination thereof not to exceed 5.0 miles (8.0 kilometers);

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

c. Are free of barriers that block movement by Chiricahua leopard frogs including but not limited to, urban, industrial, or agricultural development; reservoirs 50 acres (20 hectares) or more in size and contain nonnative predatory fish, bullfrogs, or crayfish; highways that do not include frog fencing and culverts; and walls, major dams, or other structures that physically block movement.

All areas designated as critical habitats will require some management to address the current and future threats to the Chiricahua leopard frog and maintain or restore the PCEs. Except for impoundments, livestock tanks, and other constructed waters, critical habitat does not include manufactured structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries. Aquatic breeding sites will need unique management to ensure that these sites provide water of sufficient quantity, quality, and permanence or near permanence, cover, and absence of predation and disease that can affect population persistence. Dispersal habitat will also need special management to ensure Chiricahua leopard frogs can move through those sites with reasonable success.

Approximately 36 percent of all designated critical habitat for the Chiricahua leopard frog are located on five National Forests in Arizona and New Mexico (the Coronado, Gila, Tonto, Coconino, and Apache- Sitgreaves National Forests). Approximately 3,762 acres (1,524 hectares) of Chiricahua leopard frog critical habitat occurs on these five National Forests, and most of these critical habitat units support populations occupying livestock tanks.

Narrow-headed Gartersnake (*Thamnophis rufipunctatus)*

The USFWS listed the narrow-headed gartersnake (NHGS) as threatened under the ESA on July 8, 2014 (USFWS, 2014e). Critical habitat was proposed on July 10, 2013 (USFWS, 2013c) and later revised and re-proposed on April 28, 2020 (USFWS, 2020) but is not yet designated.

Description and Life History

The NHGS is a small to medium-sized gartersnake with a maximum length of 44 in (112 cm) (Painter and Hibbitts, 1996). Its eyes are set high on its unusually elongated head, which narrows to the snout, and it lacks striping on the dorsum (top) and sides, which distinguishes its appearance from other gartersnake species with which it could co-occur (Rosen and Schwalbe, 1988). The base color is usually tan or grey, brown with conspicuous brown, black, or reddish spots that become indistinct towards the tail (Rosen and Schwalbe, 1988; Boundy, 1994). The scales are keeled.

Due to its fish diet, the species is probably one of the most aquatic gartersnakes (Drummond and Marcias-Garcia, 1983; Rossman et al., 1996). This species is strongly associated with clear, rocky, often perennial streams, using predominantly pool and riffle habitat including cobbles and boulders (Rosen and Schwalbe, 1988; Degenhardt et al., 1996; Rossman et al., 1996; Nowak and Santana-Bendix, 2002; Ernst and Ernst, 2003). According to a multi-year telemetry study in New Mexico, despite the reputation of being highly aquatic, narrow-headed gartersnakes found in water represented less than 10 percent of total observations (Jennings and Christman, 2012). These data suggest that this species might spend a relatively small percentage of its time in the water, but compared to other native gartersnakes, it is still the most aquatic.

Narrow-headed gartersnakes also use terrestrial, upland habitat for cover and thermoregulatory needs, such as shelter during periods of cold-season dormancy, basking, the gestation of young, facilitating digestion, avoiding flood events. Nowak (2006) found that narrow-headed gartersnakes used an upland habitat 328 feet (100 m) away from the stream during early fall and spring months and may strongly associate with boulders in the floodplain during summer months. During cold-season dormancy periods, narrow-headed gartersnakes may use upland habitat up to 656 feet (200 m) or farther out of the floodplain (Nowak, 2006). The farthest distance from water that narrow-headed gartersnakes were found at three study sites in New Mexico was 285 ft, from 467 discreet samples; on average, snakes were found farther from water during the monsoon than during the spring and early summer months (Jennings and Christman 2012).

Narrow-headed gartersnakes occur at elevations from approximately 2,300 to 8,000 ft (701 to 2,430 m), inhabiting Petran Montane Conifer Forest, Great Basin Conifer Woodland, Interior Chaparral, and Arizona Upland Sonoran Desertscrub communities (Rosen and Schwalbe, 1988; Brennan and Holycross, 2006).

Distribution and Status

Historically, the species existed in headwater streams of the Gila River subbasin that drain the Mogollon Rim and the White Mountains in Arizona and the Gila Wilderness in New Mexico.

Major subbasins in its historical distribution included the Salt and Verde River subbasins in Arizona and the San Francisco and Gila River subbasins in New Mexico (Holycross et al. 2006). Holycross et al. (2006) suspect the species was likely not historically present in the lowest reaches of the Salt, Verde, and Gila Rivers, even where perennial flow persisted.

In 2011, the only remaining narrow-headed gartersnake populations where the species could reliably be found were located at: (1) Whitewater Creek (NM), (2) Tularosa River (NM), (3) Diamond Creek (NM), (4) Middle Fork Gila River (NM), and (5) Oak Creek Canyon (AZ). However, in 2012, New Mexico's largest wildfire in state history occurred, the Whitewater-Baldy Complex Fire. Narrow-headed gartersnake populations in Whitewater Creek and the Middle Fork Gila River were significantly affected by ash and sediment flows and the resultant fish kills, which reduced the gartersnake's prey base. The narrow-headed gartersnake population in the Middle Fork Gila River appears to be stabilizing with the return of native fish (Christman, 2016). From a combination of post-fire effects and a fish removal project (NMDGF, 2017), the Whitewater Creek population is probably now extirpated. Based on the most recent capture rates and survey results from Diamond Creek, New Mexico (GCWG, 2016), the crayfish population has reached a high density, and the narrow-headed gartersnake population may be in a potentially sharp decline. Survey data from the Tularosa River from 2019 found crayfish densities to be significantly rising, which is a cause for concern for the viability of that population soon (Jennings et al., 2019).

Threats

Some species of predatory nonnative species such as bass (*Micropterus* spp.), flathead catfish (*Pylodictis* sp.), channel catfish (*Ictalurus* spp.), bullheads (*Ameiurus* spp.), sunfish (*Lepomis* spp.), crappie (*Pomoxis* spp.), brown trout (*Salmo trutta*), American bullfrogs (*Lithobates catesbeiana*), and crayfish (*Orconectes virilis*) and red swamp crayfish (*Procambarus clarkii*) are the most significant threat to narrow-headed gartersnakes and their prey base. Predatory nonnative fish and bullfrogs affect gartersnake populations via direct and indirect community interactions. In contrast, crayfish also affect gartersnakes via effects to their physical habitat in addition to via adverse community interactions (Gonçalves-Loureiro et al., 2015).

In the Southwestern United States, projected climate change includes increasing temperatures, decreasing precipitation, decreasing snowpack, decreasing runoff and streamflow (Cayan et al., 2013). Increasing temperature increases the evaporation and transpiration of surface water, further reducing the amount of water for gartersnake prey species.

Since 2002, over 1.5 million acres have burned due to high-intensity wildfires within the range of the NHGS (Jones et al., 2014). High-intensity wildfires lead to excessive sedimentation and ash flows which can, in turn, result in fish kills. The past decade has seen two of the largest fires in the region, which coincided with declines in native fish and NHGS population numbers (Christman 2016). Declines in population numbers increase the risk of detrimental effects to the species due to genetic drift (Wood et al., 2018). Other threats include human recreation, road maintenance, environmental contaminants, and mortality from entanglement (USFWS, 2013).

Narrow-headed Gartersnake Critical Habitat

The USFWS designated critical habitat for the narrow-headed gartersnake on October 10, 2021. There are eight units in portions of Arizona and New Mexico, totaling 23,782 acres. Within these areas, the physical and biological features essential to narrow-headed gartersnake conservation are:

PCE I: Perennial streams or spatially intermittent streams that provide both aquatic and terrestrial habitat that allows for immigration, emigration, and maintenance of population connectivity of narrow-headed gartersnakes and contain;

- **a.** Pools, riffles, cobble, and boulder substrate, with a low fine sediment and substrate embeddedness;
- **b.** Organic and natural inorganic structural features (e.g., cobble bars, rock piles, large boulders, logs or stumps, aquatic and wetland vegetation, logs, and debris jams) in the stream channel for basking, thermoregulation, shelter, prey base maintenance, and protection from predators;
- **c.** Water quality that is absent of pollutants or, if pollutants are present, at levels low enough such that recruitment of narrow-headed gartersnakes is not inhibited; and
- **d.** Terrestrial habitat within 89 ft (27 m) of the active stream channel that includes boulder fields, rocks, and rock structures containing cracks and crevices, small mammal burrows, downed woody debris, and vegetation for thermoregulation, shelter sites, and protection from predators.

PCE II: Hydrologic processes that maintain aquatic and riparian habitat through;

- **a.** A natural flow regime that allows for periodic flooding, or if flows are modified or regulated, a flow regime that allows for the movement of water, sediment, nutrients, and debris through the stream network, as well as maintenance of native fish populations; and
- **b.** Physical hydrologic and geomorphic connection between the active stream channel and its adjacent terrestrial areas.

PCE III: Prey base of native fishes, or soft-rayed, nonnative fish species;

PCE IV: An absence of nonnative predators, such as fish species of the families Centrarchidae and Ictaluridae, bullfrogs, and crayfish, or occurrence of nonnative predators at low enough densities such that recruitment of narrow-headed gartersnakes is not inhibited and maintenance of viable prey populations is still occurring; and

PCE V: Elevations of 2,300 to 8,200 ft (700 to 2,500 m).

Northern Mexican Gartersnake

The USFWS listed the northern Mexican gartersnake (NMGS) under the ESA on July 8, 2014 (USFWS, 2014). The USFWS proposed critical habitat on July 10, 2013 (USFWS, 2013c) and

later revised and re-proposed on April 28, 2020 (USFWS, 2020c). The USFWS finalized critical habitat for the northern Mexican gartersnake on April 28, 2021 (USFWS, 2021b).

Description and Life History

The northern Mexican gartersnake, which reaches up to 44 inches total length (112 cm), ranges in color from olive to olive-brown or olive-gray with three lighter-colored stripes that run the length of the body, the middle of which darkens towards the tail. It may occur with other native gartersnake species and can be difficult to identify because of its similarity of appearance to other native gartersnake species. The position of the lateral stripe in the anterior portion of the body is a key diagnostic feature. If this stripe invades the fourth scale row, it is conclusive as a northern Mexican gartersnake.

Aquatic habitat is used for prey acquisition and can be either lentic (such as stock tanks, ponds, or cienegas) or lotic (low-gradient streams). In the lotic habitat, Emmons and Nowak (2013) found this subspecies most commonly in protected backwaters, braided side channels and beaver ponds, isolated pools near the river mainstem, and edges of dense emergent vegetation that offered cover and foraging opportunities. Dense vegetation likely plays a crucial role in protecting northern Mexican gartersnakes when in the presence of predatory nonnative species (Boyarski et al., 2015) but is likely not critical in wholly native aquatic communities. These snakes were documented using artificial, human-created objects as surface cover (Boyarski et al., 2015).

Sexual maturity in northern Mexican gartersnakes occurs at two years of age in males and two to three years in females (Rosen and Schwalbe, 1988). Northern Mexican gartersnakes are viviparous. Researchers have observed mating in April, and May followed by the live birth of between 7 and 38 newborns from June through September (Rosen and Schwalbe, 1988; Degenhardt et al., 1996; Nowak and Boyarski, 2012). A staggered or biennial reproductive strategy is used by northern Mexican gartersnakes (Rosen and Schwalbe, 1988; Boyarski et al., 2019).

The northern Mexican gartersnake is often found in riparian habitats and may spend time in a terrestrial habitat removed from water (Emmons and Nowak, 2016). Examples include grasslands up to a mile away from surface water, several hundred yards from mainstem rivers, or even in highly disturbed, open, developed areas devoid of vegetation or associated lengthy, dry reaches along intermittent streams (Cobbold, 2018). Species records suggest it may possess a more terrestrial ecology than previously considered (Jones, 2017; Cobbold, 2018), presumably forging on lizards, small mammals, and invertebrates, possibly through periods of long-distance dispersal. Terrestrial habitat serves three primary functions for northern Mexican gartersnakes: 1) thermoregulatory purposes; 2) as protective cover while surface-active; and 3) for maintaining adequate terrestrial prey populations of small rodents, lizards, or invertebrates.

Distribution and Status

Historically, the northern Mexican gartersnake occurred within nearly every major watershed in Arizona (except for the Little Colorado River watershed) and southwestern New Mexico, including the Colorado, Verde, Salt, San Pedro, and Gila watersheds, extending south along the

Mexican Plateau to near Mexico City. Throughout its range-wide distribution, the northern Mexican gartersnake occurs at elevations from 140 to 8,497 ft (Rossman et al., 1996) within a wide variety of biotic communities, including Sonoran Desertscrub through Semidesert Grassland, Interior Chaparral, Madrean Evergreen Woodland, into the lower reaches of Petran Montane Conifer Forest (Brennan and Holycross, 2006).

Within Mexico, northern Mexican gartersnakes historically occurred within the Sierra Madre Occidental and the Mexican Plateau in the Mexican states of Sonora, Chihuahua, Durango, Coahuila, Zacatecas, Guanajuato, Nayarit, Hidalgo, Jalisco, San Luis Potosí, Aguascalientes, Tlaxacala, Puebla, México, Veracruz, and Querétaro, comprising approximately 85 percent of the total range-wide distribution of the subspecies.

In Arizona, the species might occur in the Bill Williams River, Agua Fria River, the Upper Salt River subbasin, Tonto Creek, the Verde River subbasin, the Upper Santa Cruz River subbasin, Redrock Canyon, the Buenos Aires National Wildlife Refuge, the Cienega Creek subbasin, the San Pedro River subbasin, the Babocomari River subbasin, and the San Bernardino National Wildlife Refuge. The species' current distribution in Mexico is uncertain.

Threats

The presence of harmful nonnative species constitutes the most significant threat to the NMGS. Harmful nonnative species also compete with NMGS prey species and modify habitat for both the NMGS and their prey. Landscape-level effects from the continued expansion of harmful nonnative species have changed the spatial orientation, created greater isolation between populations (USFWS, 2014e).

Amphibians are a principal prey item for the northern Mexican gartersnake, and documented declines in amphibian population densities and distributions have significantly contributed to the decline in NMGS (USFWS, 2014e). Direct predation by, and competition with, bullfrogs is a severe threat to NMGS throughout their range. Bullfrogs also negatively impact NMGS populations through direct predation of juveniles and sub-adults. Crayfish are another nonnative species in Arizona and New Mexico that threaten northern Mexican gartersnakes through competition by consuming similar prey species and direct predation on juvenile NMGS themselves (Voeltz, 2002; USFWS, 2007).

Activities that reduce flows or dewater habitat, such as dams, diversions, flood-control projects, and groundwater pumping, seriously threaten the physical habitat of the gartersnake because both fish and amphibians must have water to survive and reproduce. Without this prey base, gartersnakes cannot persist (USFWS, 2014e).

High-intensity wildfires lead to excessive sedimentation and ash flows in streams, which can, in turn, result in sharp declines, and even complete elimination, in fish communities downstream.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the effects of the action on federally listed species, the USFWS is 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 projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in progress. The environmental baseline defines the 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. The environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (84 FR 44976-45018).

Terrestrial Habitat

Plant and animal species are highly dependent on the function of ecosystems with specific conditions, such as local soil, air, water, aspect, elevation, precipitation, which create areas favorable for species. Vegetation is one of the primary factors influencing species diversity and abundance and is one of the more obvious habitat components influenced by management, land use, and natural disturbance. Species presence and absence on the Forest is, in many cases, directly tied to availability, current ecological condition, and crucial ecosystem characteristics of Ecological Response Units (ERUs).

The analysis of the proposed action utilizes the ERU vegetation classification system. ERUs are map unit constructs that combine themes of site potential, historical disturbance regimes, and natural succession. Site potential is a term used to describe the characteristic ecological conditions resulting from climate, soil, and vegetation interactions at late development.

Riparian and Aquatic Habitat

Riparian areas are affected by surface and subsurface, perennial or intermittent, flowing or standing bodies of water. Riparian habitats are composed of distinctively different vegetative species than adjacent terrestrial areas where water is limited. In these systems, terrestrial and aquatic ecological processes are integrated within watersheds.

Aquatic habitat consists of streams classified as perennial, intermittent, or ephemeral by seasonal variations of flow. Ephemeral streams experience relatively short duration flow only in direct response to surface runoff from precipitation or snowmelt. Perennial streams typically flow year-round as they receive contributions from both surface runoff and groundwater. Intermittent streams fall between perennial and ephemeral types as groundwater contributions are seasonal. Streams, mainly perennial and intermittent streams, are important water sources that support terrestrial, riparian, and aquatic ecosystems and human uses.

Status of the New Mexico Meadow Jumping Mouses within the Action Area

NMMJM has only recently (summer 2018) been found on the Gila NF in a portion of Dry Blue Creek adjacent to the Arizona border. Researchers will conduct more surveys near the Dry Blue Creek area. The Gila NF is currently not within any of the NM geographic management areas

for this species, but it is adjacent to Arizona's White Mountains management area (USFWS 2014).

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

The action area is within the Upper Gila Mountains RU for the MSO. The most current information indicates that 94% of the owl PACs in the Southwest are occupied by breeding adults. Approximately 10% of the PACs are within Wilderness areas. There are 309 MSO PACs delineated within the boundary of the Gila NF (Figure 3). The Gila NF has the most known PACs within a Wilderness, with 106 PACs either wholly or partially within wilderness boundaries.

According to the Gila NF GIS database there are approximately 1,125,958 acres of designated critical habitat within the Gila National Forest boundary with approximately 517,811 acres located within wilderness areas.

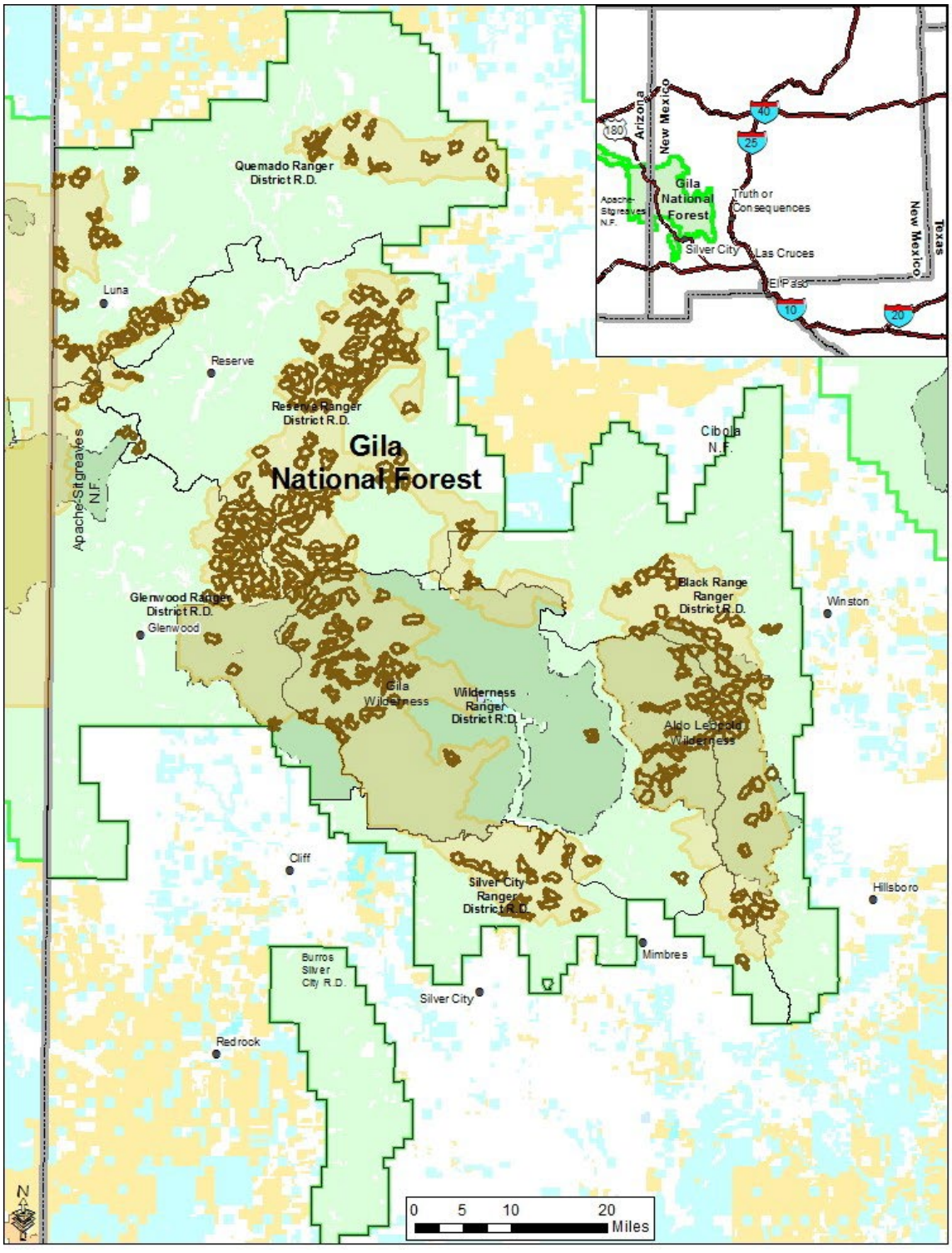

Figure 3. Mexican spotted owl critical habitat and PACs on the Gila National Forest.

Status of the Southwestern Willow Flycatcher and Critical Habitat Within the Action Area

Approximately 3,250 acres of designated flycatcher critical habitat exist on the Gila NF. Designated critical habitat on the Gila River intersects National Forest in two areas. They include the Gila Bird Management Area (GBMA) on the north end of the Burro Mountains on the Silver City Ranger District and the Fort West Ditch area on the northwest portion of the Silver City Ranger District. Both areas currently have habitat with PCEs and recent breeding territories (Table 1). Critical habitat designated along the San Francisco River occurs from the Arizona State line through Luna and from Deep Creek extending south of Glenwood.

Table 1. Recent History of Southwestern Willow Flycatcher Territories on the Gila National Forest.

YEAR	SAN FRANCISCO MGMT UNIT	YEAR	UPPER GILA MGMT UNIT
2005	NA	2014	7
2006	NA	2015	7
2007	3	2016	11
2008	3	2017	12
2009	3	2018	10
2010	NA	2019	7

There are two sites within the Cliff-Gila Valley in the Upper Gila Management Unit, where the species has persisted for over 25 years along the Gila River: the GBMA and the Fort West ditch site. In 2019, surveyors found 14 adults comprising 7 pairs and 7 territories at these sites. The U Bar Ranch, found in the Cliff/Gila Valley on private land, is located nearby and is one of the largest sites known throughout the subspecies range (Figure 4; Shook, 2019).

In the San Francisco Management Unit, a breeding site was discovered in 2007 on National Forest. Known as the Keller Canyon (WS Dam) site, it is located along the San Francisco River between Deep Creek and Alma Highway 180. Three flycatcher territories were verified there in 2007, 2008, and 2009.

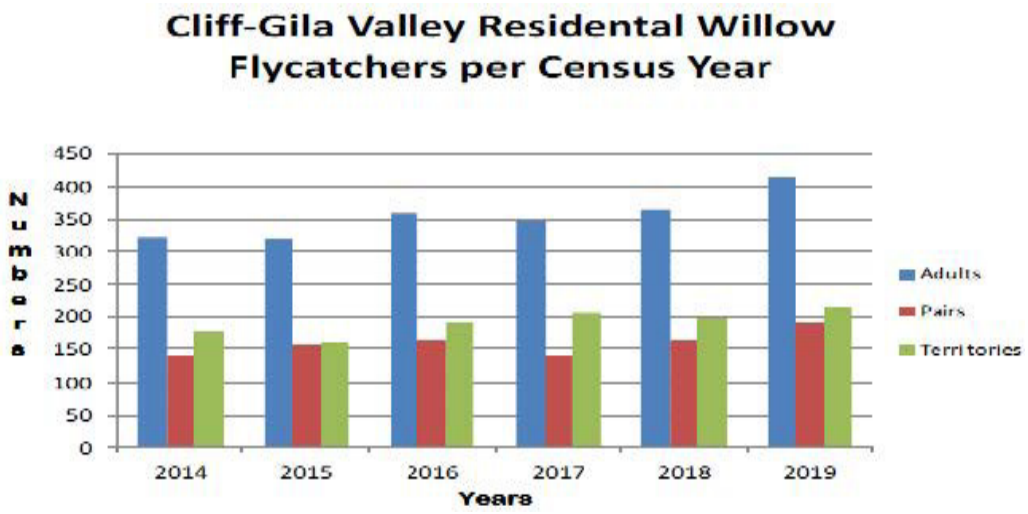

Figure 4. The number of resident adults, pairs, and territories detected at the Cliff-Gila Valley plotted by survey year.

Critical habitat along the Gila River overlaps the Gila NF in two areas: the Gila Bird Management Area on the Burro Mountains' north end and the Fort West Ditch area, both on the Silver City Ranger District. These areas currently have PCEs and records of recent breeding territories. Critical habitat along the San Francisco River occurs from the state border with Arizona through Luna, and then continues from Deep Creek extending south of Glenwood (Figure 5).

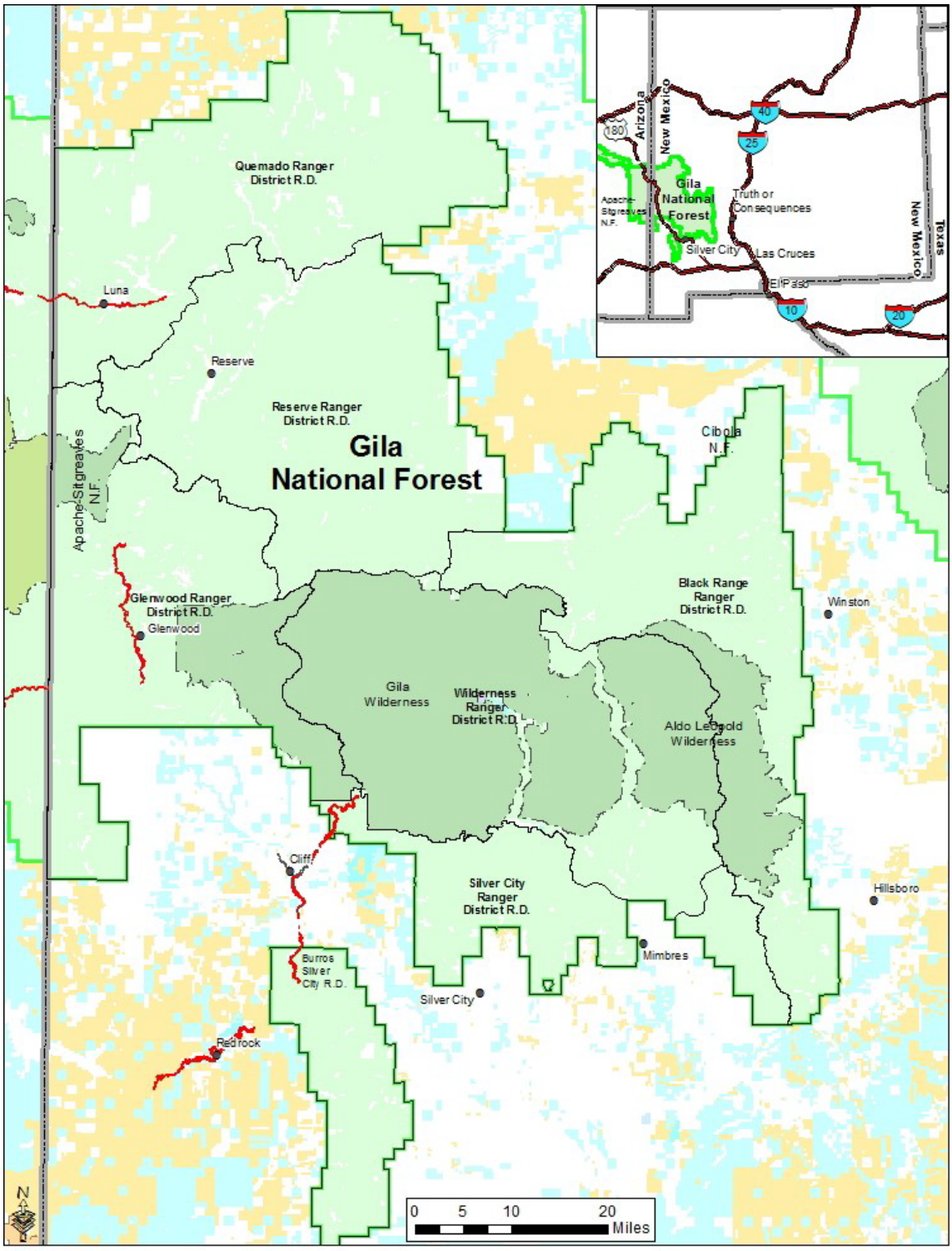

Figure 5. Location of Southwestern willow flycatcher critical habitat on the Gila National Forest.

Status of the Western Yellow-Billed Cuckoo and Critical Habitat Within the Action Area

Within the Gila NF, WYBC occurs along the Gila and San Francisco rivers. Recent surveys have detected individuals in the Gila River Bird Area and other NFS lands in the Cliff-Gila Valley. There are fewer birds along the San Francisco River, which might be due to a lower survey effort.

From 2014-2019 surveys were conducted on both private and Gila NF lands in the Cliff-Gila Valley (Shook, 2019b). Private lands consisted of those parcels managed by TNC and a few adjacent private properties, referred to as TNC property. Field crews surveyed these properties along the Gila River.

Public property, managed by the USFWS, consisted of the area around the confluence of Mogollon Creek and the Gila River located above Cliff, the Fort West Ditch site located approximately 8 km upstream from Cliff, and the Gila Bird Area. The results of those surveys are displayed in the table below (Table 1).

Table 2. Western Yellow Billed Cuckoo detections from 2014-2019 on Gila National Forest Lands.

LOCATION	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***
MOGOLLON CREEK	48	48	40	51	51	48
FORT WEST DITCH	20	17	21	15	21	17
GILA BIRD AREA	62	62	72	60	77	72
TOTAL	130	127	133	126	149	137

Based on an analysis of 23 years of breeding bird population data from the Gila Bird Area, cuckoo detections in the Middle Gila Valley show a significant increase since 1997. Limited data from cuckoo surveys in 2014 through 2019 indicate the Yellow-billed Cuckoo is a common summer resident of the Middle Gila Valley of New Mexico, and their populations appear stable (Shook, 2019).

Critical habitat on the Gila National Forest falls into two units, NM 1 San Francisco River (approx. 2,039 ac) and NM 2 Gila River (approx. 1,421 ac). The total critical habitat acreage of these two units on the Gila NF is approximately 3,459 acres, or 0.7 percent of all critical habitat for WYBC (Figure 6).

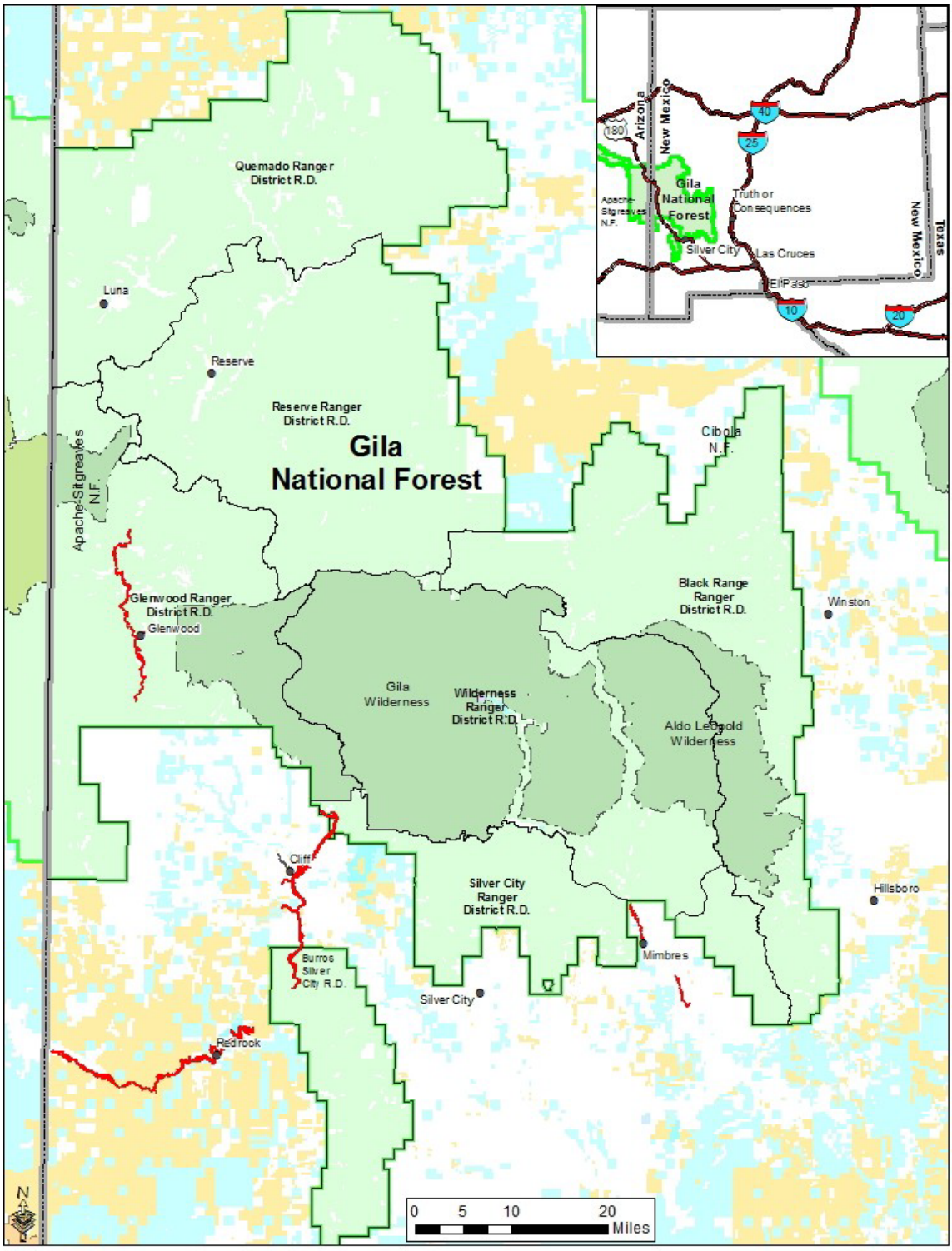

Figure 6. Yellow-billed Cuckoo Critical Habitat on the Gila National Forest.

Status of the Chihuahua Chub within the Action Area

The NMDGF stocked the Chihuahua chub population on TNC properties along the Mimbres River. NMDGF conducts annual monitoring of the Mimbres River in the fall, and recent surveys indicate an increase in the density of Chihuahua chub and evidence of natural recruitment. As a result, the population status of Chihuahua chub in the Mimbres is currently stable (USFWS 2010a).

Status of the Gila Chub and Critical Habitat within the Action Area

The Gila chub has approximately 764 acres of designated critical habitat on the Gila NF (Figure 7). The species occurs in Turkey Creek and Mule Creek on the Gila National Forest. The population in Turkey Creek is robust and stable. Stocking of the Gila Chub occurred in Mule Creek in 2012; the population is now self-sustaining, but small. The species also persists in Harden Cienega Creek in Arizona on the Apache-Sitgreaves National Forest. The Gila NF administers the Harden Cienega population due to a grazing allotment that crosses state lines. Approximately 85-90 percent of the Gila chubs' habitat has been degraded or destroyed (USFWS, 2015).

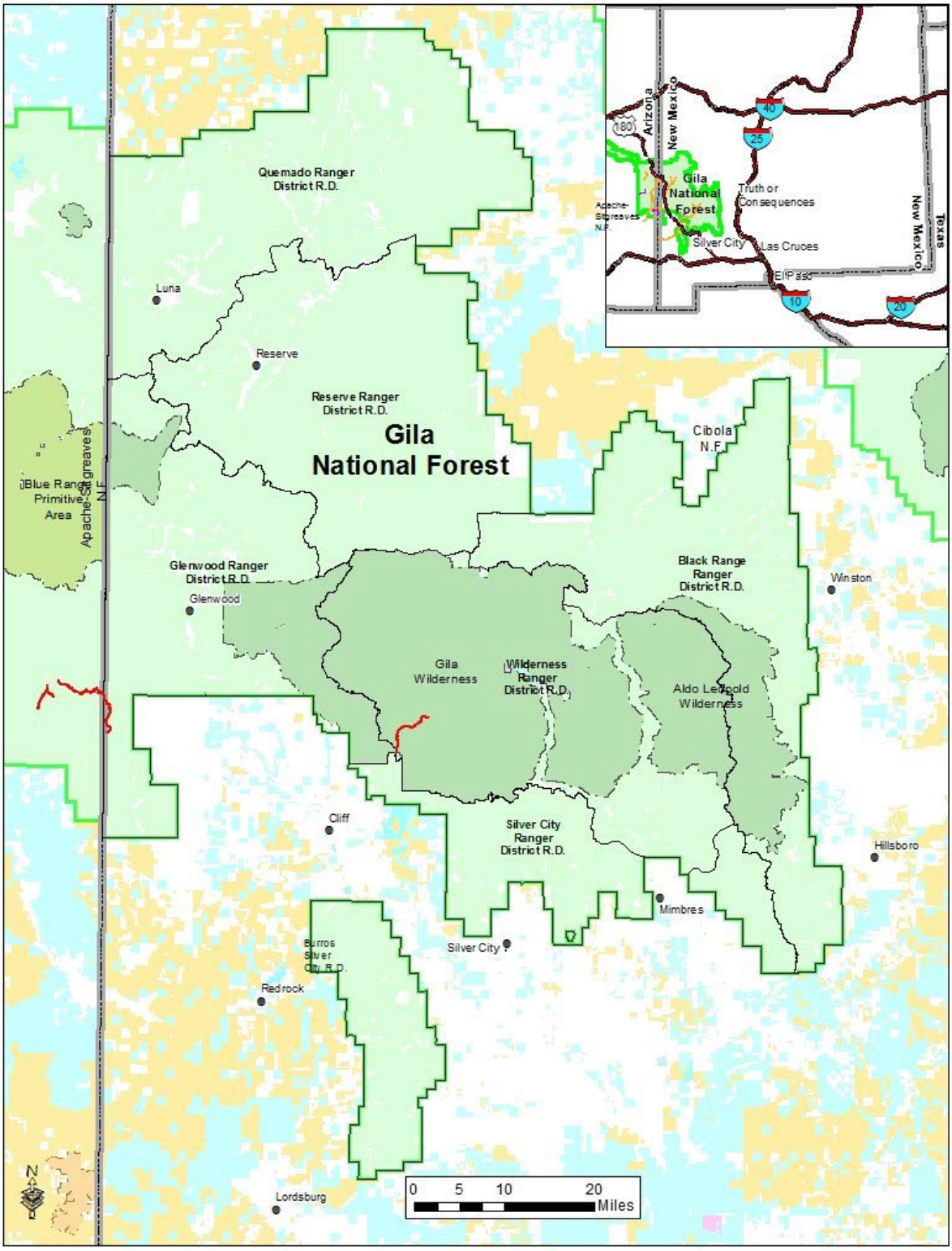

Figure 7. Gila chub critical habitat on the Gila National Forest.

Status of the Gila Trout Within the Action Area

As of April 2022, there were 23 populations of Gila trout in the wild (USFWS 2022). There are currently five known genetic lineages of the species – Main Diamond Creek, South Diamond Creek, Whiskey Creek, Iron Creek, and Spruce Creek – all of which are represented by at least three wild populations. Within the Gila NF, there were fourteen stream reaches with extant populations in the spring of 2022 (Figure 8). It is noteworthy that there were significant wildfires in the species' range during the summers of 2021 and 2022 and the number of populations is suspected to have declined on the Gila NF (Baumler pers. comm. 2022)

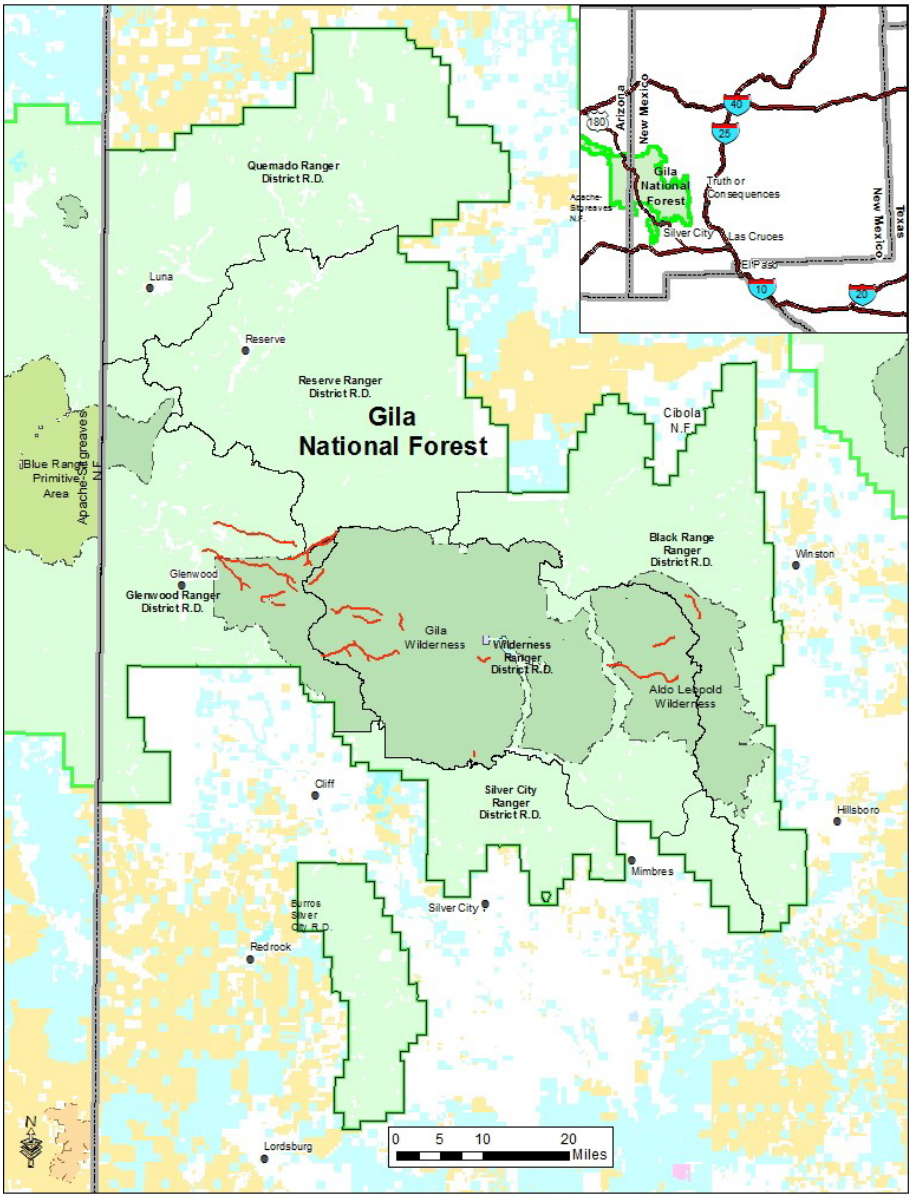

Figure 8. Gila Trout distribution on the Gila National Forest.

Status of the Loach Minnow and Critical Habitat within the action Area

There are approximately 11,673 acres of designated critical habitat on the Gila NF (Figure 9). The species is extant in the upper Gila River, including the East, Middle, and West Forks of the Gila River, the San Francisco and Tularosa Rivers, and Dry Blue Creek. All occupied habitat in the action area is within the designated critical habitat.

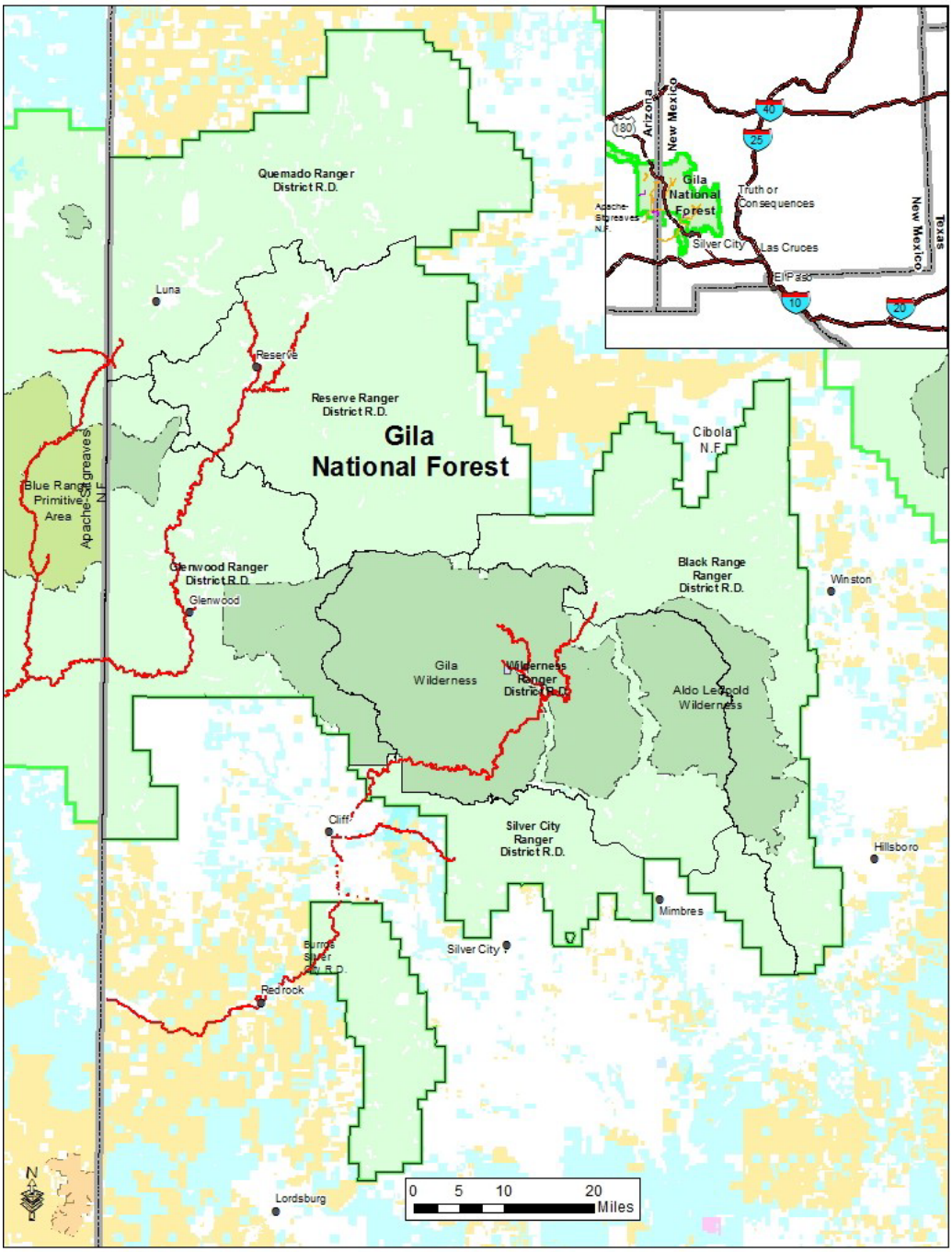

Figure 9. Loach Minnow Critical Habitat on the Gila National Forest.

Status of the Spikedace and Critical Habitat within the Action Area

Spikedace is federally listed as endangered, with approximately 9,968 acres of designated critical habitat on the Gila NF. Since the 1800s, the spikedace has declined markedly in distribution and abundance throughout its range, including on the Gila NF (Propst et al., 1986; USFWS, 1986b). By 1996, the spikedace was absent from over 85% of its historical range (NMDGF, 1996). Recent taxonomic and genetic work on spikedace indicates substantial differences in morphology and genetic composition among remnant spikedace populations.

Within the Gila NF, spikedace have been restocked within portions of the San Fancisco River. Populations were self-sustaining during the most recent survey efforts in 2020 (Freeport-McMorRan, Inc. 2022).

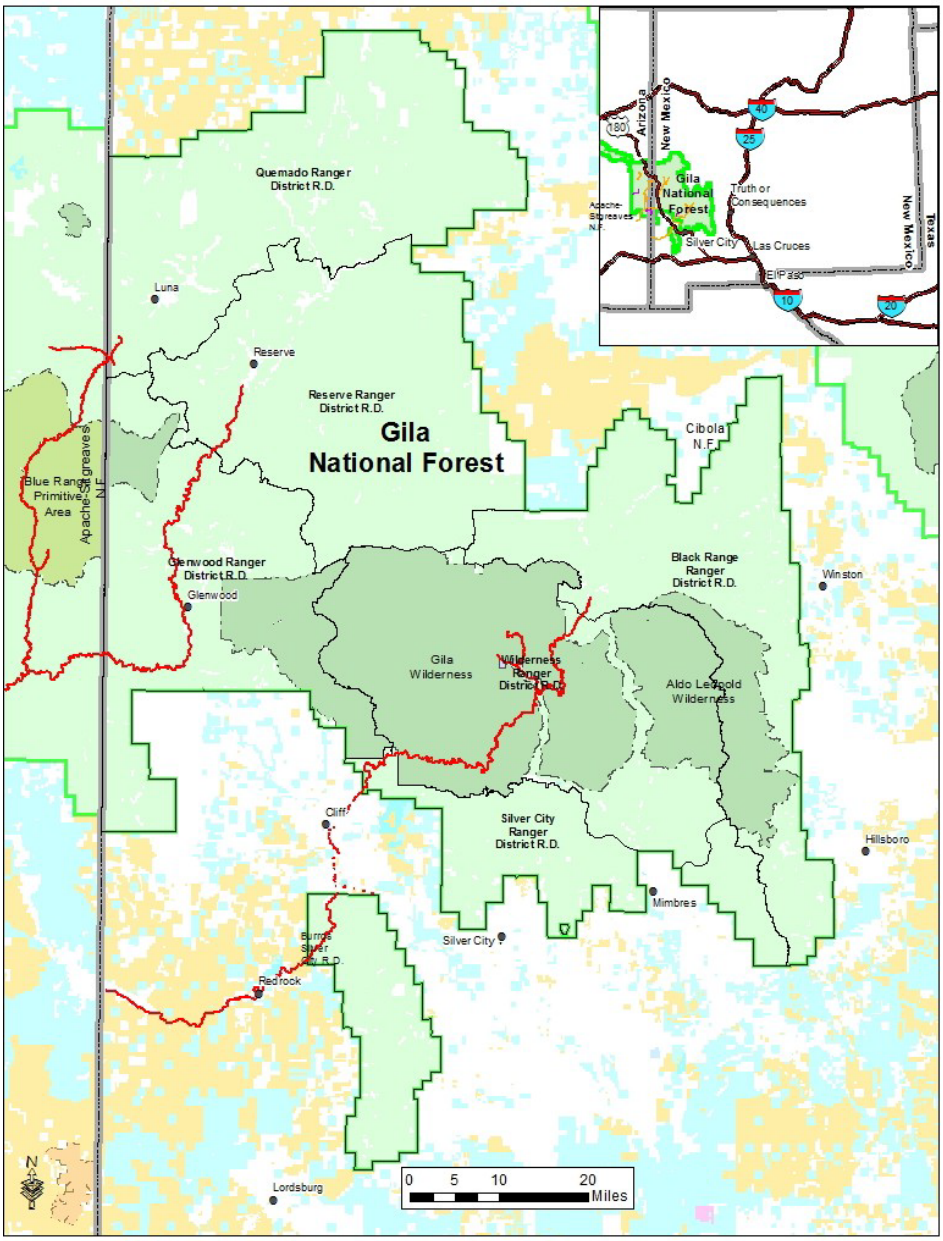

Figure 10. Spikedace critical habitat on the Gila National Forest.

Status of the Chiricahua Leopard Frog and Critical Habitat within the Action Area

The Gila National Forest has completed an extensive amount of survey work for this species since 2000. Over this time, the Forest has observed the number of CLF populations on the Gila decline due to Chytridiomycosis. These extant sites are the only known or expected remaining occupied sites within the action area and can be categorized into the local populations.

The Gila NF occurs in three recovery units identified in the CLF Recovery Plan, including recovery unit 6, recovery unit 7, and recovery unit 8. Gila NF manages the higher country in the

Burro Mountains and west and south of Mule Creek. In RU-8, large continuous tracts of land are managed by the Gila NF in the Black, Pinos Altos, and Mimbres mountains and the Cibola NF in the San Mateo Mountains. One extant population (North Seco Creek) is known on the Forest within Recovery Unit 8 (Figure 11).

Chiricahua leopard frogs have been found on the Tularosa River from Tularosa Spring downstream to the entrance to the canyon below Hell Hole. Frogs were observed in this reach in 2002 at the time of listing and continue to persist in small numbers. This population is isolated from other populations but is an extensive system capable of supporting a robust population. In 2009, researchers found a small number of frogs at two sites in the river. The frogs may occur throughout this reach of the river, but breeding is likely limited to isolated localities where nonnative predators are rare or absent.

Another population inhabits one livestock tank in the Deep Creek Divide area and connects North and South Fork of Negrito Creek above their confluence. CLF was last detected in South Fork of Negrito Creek in 2006 and at Burro Tank in 2002. CLF in North Fork Negrito tested positive for chytrid in 2019; low numbers of frogs have been consistently found within the North Fork Negrito livestock exclosure. On the Wilderness RD, Diamond Creek supports a small population of CLF. CLF also persists at a stock tank in Diamond Creek, and CLF was released in Black Canyon during 2019, and small numbers persist there. Another population is known to occur along an approximate 5.59-mile portion of Beaver Creek, beginning at a warm spring and running downstream to its confluence with Taylor Creek. Below that confluence, the stream is known as the East Fork of the Gila River. On the Glenwood Ranger District, a tiny population persists at Chimney Rock Spring, and Saliz Creek supports a robust population along approximately one mile of a perennial stream. The last known population is at The North Fork of Seco Creek from Sawmill Well downstream to the confluence with South Fork of Seco Creek.

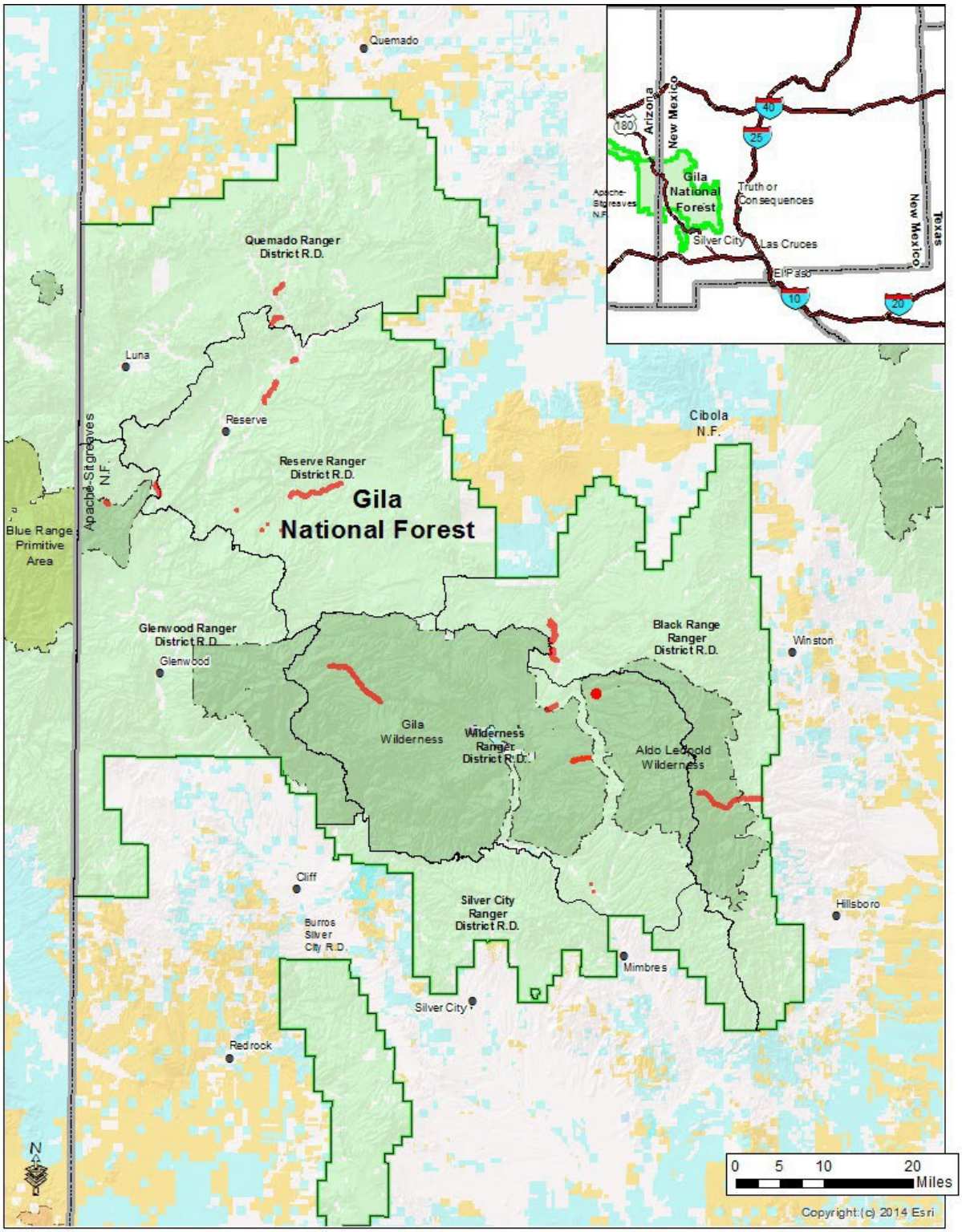

Figure 11. Chiricahua leopard frog occupied sites on the Gila National Forest.

Status of the Narrow-Headed Gartersnake and Critical Habitat in the Action Area

Population status information suggests that the narrow-headed gartersnake has experienced significant declines in population density and distribution along streams and rivers. It was formerly well-documented and reliably detected (USFWS, 2014e).

The NMDGF has translocated narrow-headed gartersnakes in Saliz creek, an area which now supports a successful population of the species. Recent surveys have documented the species in Diamond Creek, Negrito Creek, the Tularosa River and Turkey Creek. The population of narrow-headed gartersnakes in Whitewater Creek appears to have been extirpated after the 2013 Baldy-Whitewater Complex Fire (Jennings et al. 2021).

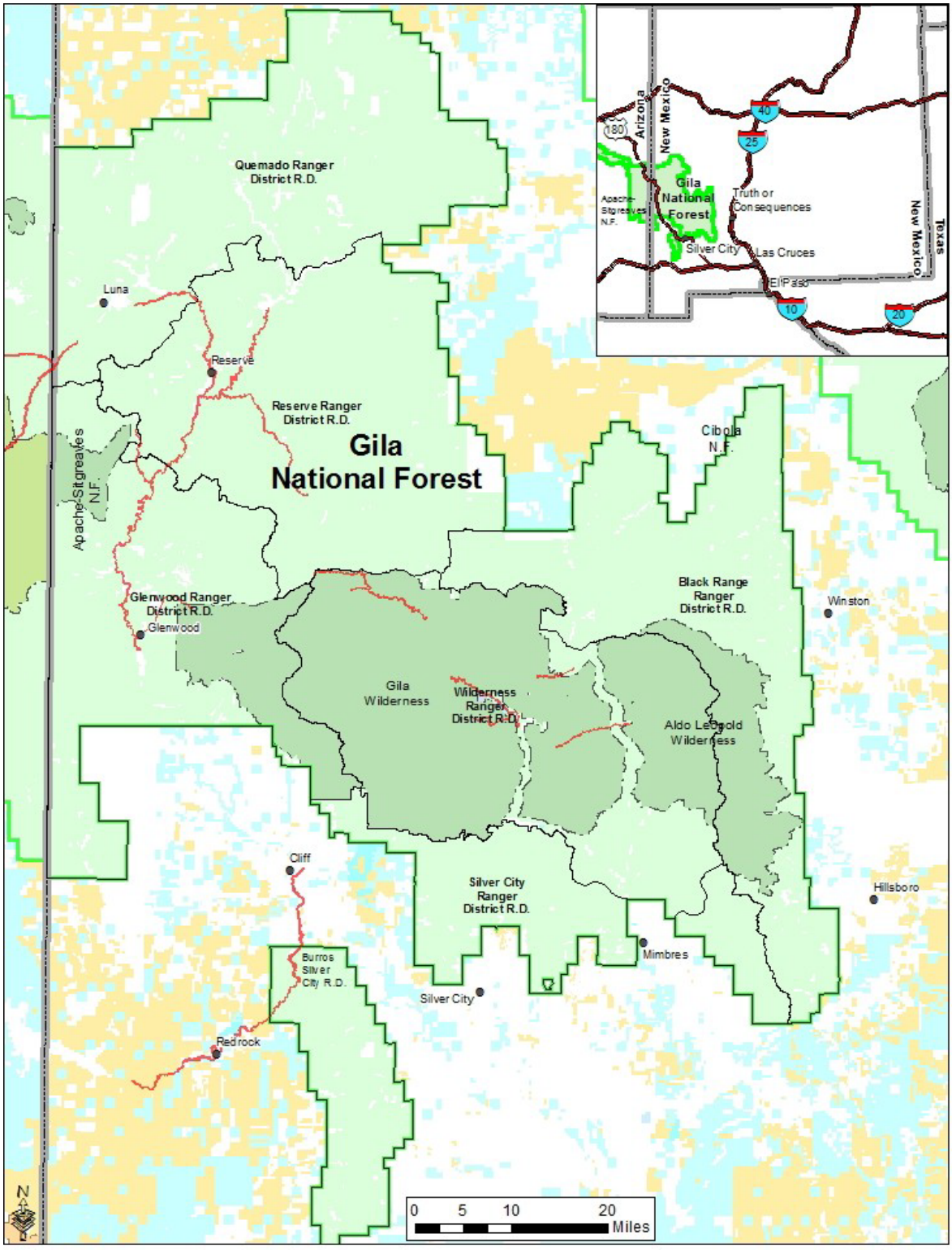

Figure 12. Narrow-headed gartersnake critical habitat on the Gila National Forest.

Status of the Northern Mexican Gartersnake within the Action Area

The NMGS might still occur in Gila River in New Mexico. Northern Mexican gartersnakes have been found in the Gila River near the Highway 180 crossing in 2002, 2013, and 2015, and just outside of Duck Creek near its' confluence with the Gila River in 2018. The species is probably no longer occurring on the Gila National Forest. In 2020 there were no areas designated as critical habitat for northern Mexican gartersnake on the Gila NF.

EFFECTS OF THE ACTION

Effects of the action refer to the consequences to listed species or critical habitat caused by the proposed action, including the consequences of other activities that are caused by the proposed action. The proposed action causes a consequence if it would not occur, but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (84 FR 44976-45018). The USFS 2021 BA includes effects or impacts on species or critical habitat; this *draft* opinion will refer to effects or impacts as consequences.

Because this is a programmatic consultation and many site-specific actions have not yet been planned, we will only discuss consequences regarding the general effects we anticipate will occur to each species and its critical habitat. In general, the opinion will discuss the relevant plan components and the most likely effects discussed in the BA. The LMP components provide direction to protect, limit, or mitigate effects on species or critical habitats. All individual plan components, including objectives, standards, and guidelines, can be found in the Forest's LMP (USFS, 2019). Individual plan components that might result in or have the potential for adverse effects to listed species are in Appendix A. The Forest's BA (USFS, 2021) and LMP (USFS, 2019) do not authorize site-specific actions, nor do they typically prescribe specific land management activities' timing or exact location. Hence, the USFS will develop detailed site-specific projects consistent with the framework of the LMP, and these projects will be consulted on separately, as required. Specifically, each site-specific project or activity implemented under the revised LMP that may affect a listed species or critical habitat will undergo a separate ESA section 7(a)(2) consultation.

Environmental Effects Common to Federally Listed Species for Proposed Action

The proposed action includes managing upland ERUs, and riparian/water resources to improve the ecological condition, abundance, and distribution for species that depend on those ecosystems. These activities might modify the habitat and create temporary disturbance for listed species. However, the Forest will develop these activities to improved desired conditions. The LMP seeks to improve the resilience of habitat for listed species and improve viability on the Forest. Research shows that forest fuel-reduction treatments can benefit resiliency in fire-adapted ecosystems such as the Gila NF (Stephens et al., 2012).

The LMP also provides a framework to implement recovery based on ESA documents. Some species' listed threats are "unmanaged grazing," which is the same as unauthorized grazing and is not legal on the Gila NF. There are no plan components to address illegal activities in the

Forest. There are plan components that address grazing and ensuring it is in balance and compatible with other forest uses.

The proposed action includes both mechanical vegetation treatment and wildfire to varying degrees to manage all upland ERUs. Mechanical vegetation treatment in upland areas can also improve the structure of riparian/water resources (e.g., aquatics, riparian ERUs) and improve the ecological condition, abundance, and distribution for species that depend on those vegetation communities by reducing runoff and erosion into riparian habitats. These activities can modify the habitat and create a temporary disturbance for listed upland species, such as the Mexican spotted owl, but might enhance ecological conditions closer to desired conditions. These activities would improve the ecological conditions for listed species increasing the resilience of ERUs to uncharacteristic disturbances and improving the likelihood of long-term persistence and viability. Current science demonstrates the positive benefits of forest fuel-reduction treatments in improving resiliency in frequent fire-adapted systems of the west/southwest (Stephens et al., 2012). Table 5 summarizes the habitats and ERUs included in the plan that are occupied by listed species.

Table 3. Federally listed species currently known to occur in the plan area and associated ecological response unit types, riparian/aquatic habitats, and features that the species occupy.

Common Name	SDG	MSG	CPGB	MMS	PJG	PJO	MPO	JUG	PPE	PPF	MCD	MCW	SFF	Riparian/ Aquatic	Feature
Mammals															
New Mexican Meadow Jumping Mouse														X	
Amphibians and Reptiles															
Chiricahua Leopard Frog														X	
Narrow Headed Gartersnake														X	
Northern Mexican Gartersnake														X	
Birds															

Mexican Spotted Owl									X	X	X	X	X	X	X
Southwestern Willow Flycatcher														X	
Western Yellow-Billed Cuckoo														X	
Fish															
Chihuahua Chub														X	
Gila Chub														X	
Gila Trout														X	
Loach Minnow														X	
Spikedace														X	

Adaptive management will be essential to effectively manage the effects of climate change on habitats and associated impacts from disturbance events and invasive species in changing and uncertain conditions. The proposed action includes a monitoring plan designed to better inform the Gila NF of effects and the effectiveness of management and progress towards desired conditions through implementation of the LMP. The plan might also help the FS address the harmful effects of non-native invasive species and disease on ecosystem integrity and biological diversity. The proposed action recognizes and includes plan components to help address climate change and reduce the risk of removing ecological conditions necessary for federally listed species.

The primary needs for threatened and endangered species are addressed through law, regulation, and policy (recovery plans and conservation agreements). The forest plan provides the framework for implementing the recommendations from these higher-level laws, regulations, policies, plans, and agreements for these species, with little additional direction.

Federally listed species on the Gila NF typically use forests ERUs, riparian ERUs, and aquatic systems. The primary contemporary threat is loss of habitat related to large stand-replacing fire, associated runoff and sedimentation that could affect riparian habitat, and altered in-stream flow. The proposed action would move the habitat for these species toward the desired conditions for each ERU. There could be some localized adverse impacts to these species during application of

the framework, but overall, conservation would be maintained with progress towards species recovery goals. Objectives to treat acres in these ERUs would move them toward a vegetative or aquatic state that species have adapted to within the natural range of variability by increasing the amount of habitat in the desired seral states or properly functioning conditions for breeding and foraging.

Direction for invasive species was updated and expanded to recognize the threats to ecosystem resilience from all non-native invasive aquatic and terrestrial plants and animals likely to cause harm to ecosystems. Finally, climate change may push rare and endemic species to the limits of their range and evolutionary capacity. The warming trend could be especially significant in the Southwest, an area already affected by long-term drought. The proposed action recognizes and includes plan components to help address that threat and reduce the risk of removing ecological conditions necessary for federally listed species.

The amount of wilderness recommended for management is listed in the proposed action is 110,402 acres. Recommended wilderness could potentially benefit federally listed species through its management to protect or improve wilderness character, which minimizes human disturbance to environmental conditions and directly to federally listed species. Larger areas of land without barriers associated with human development and disturbance provides habitat connectivity. However, the Gila NF would also be more limited in treating these areas through mechanical cutting or prescribed fire and would rely on naturally-ignited fire as its primary restoration tool. Limiting the ability to treat these areas may leave these areas vulnerable to large, contiguous extents of high severity fire and cause these areas to become more departed in the future. More departed ecological conditions in the future may negatively affect federally listed species dependent on this habitat.

There are three proposed botanical management areas under the proposed forest plan. These areas are identified as necessary for rare and endemic plant species. There are currently no threatened or endangered plant species on the Gila NF; however, plant management would raise awareness of rare plants and hopefully stimulate efforts to proactively manage them to avoid the need for listing in the future. Also, plan components would benefit threatened or endangered species within the proposed botanical management areas. Table 4 lists the names of each proposed botanical management area and the acreage proposed.

Table 4. Proposed Botanical Management Areas.

Alternative	Mogollon Mountains	Pinos Altos Range	Emory Pass
Alt. B (Preferred)	45,029 ac.	6,198 ac.	16,944 ac.

Plan components that support resilient and resistant ecosystems and watersheds would protect species from the harmful effects of climate change and allowing wildlife species the benefit of or the potential for adapting to changing conditions. These plan components should positively influence all federally listed species when implemented through site-specific projects across the forest. A comprehensive list of plan components that benefit wildlife species has been put

together in a crosswalk list (Appendix A). We direct the reader to this appendix to see specific examples, so they will not all be presented in this section.

The proposed action references the most current recovery plans for listed species, which would allow them to adapt to changing ideas and thinking as new science emerges and the recovery plans are updated over time.

Effects Analysis for the Mexican Spotted Owl

The framework for analysis focuses on any potential impacts from implementing the plan on habitat made up of mixed-conifer (MCW and MCD) and ponderosa pine/Gambel oak (PPF) and protected habitat that supports the MSO.

Projects and program activities implemented under the Gila NF LMP may occur near or within MSO PACs. The LMP references and plan components align with the most current MSO recovery plan. Fuels reduction along wildland urban interfaces, watershed management projects, travel management, and livestock grazing, may be implemented within the constraints of the Gila LMP and can result in adverse effects to the MSO. Activities could occur which may affect individual MSO in the short term. These activities will likely occur in the foreseeable future and will be analyzed, consulted on, and discussed separately at the project level.

Upland vegetation ERUs (PPF, MCD, MCW) used by MSO are moderate to highly departed from the historic range of variability but trending toward reference conditions. At the same time, the riparian recovery habitat ERUs are depart little from reference conditions and are stable. The selected alternatives would increase the current rate of treatment through a combination of mechanical and fire treatments during each 10-year period in upland ERUs. In MCW the Forest would treat between 300 - 73,934 acres per 10 year period using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods; in MCD the Forest would treat between 6,875 - 282,400 acres per 10-year period using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods; and in PPF the Forest would treat between 6,320 – 600,300 acres per 10 year period using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods.

The number of acres to be treated over the 10-year period is based on an average of mechanical treatment acres over the past 10 years using allocated dollars. The maximum is unlikely to be achieved. The exact size of areas to be treated and the effects on listed will be evaluated in future consultations.

After 10 years, desired conditions for MCW and MCD would remain moderately departed. However, they would move closer to the desired conditions, changing from 40% to 35% in MCW and 55% to 52% in MCD. PPF would remain highly departed but still moving closer to desired conditions, changing from 79% to 75%.

The Gila NF conducts mechanical and prescribed fire treatments following MSO Recovery Plan recommendations. This will continue to occur within the MSO habitat in consultation with USFWS at the project level. Most of the fuel reductions in the following descriptions are because of the amount of naturally ignited wildland fire managed under the new forest plan. The changes in the acreage of nest/roost habitat are due to the wildland fire changing the ecological

states of each ERU, rendering previously suitable habitat unsuitable. This is not to say that it would make habitat unusable in the future as forest succession is dynamic and ever-changing across the landscape.

The Forest tries to suppress or mitigate any high severity fire in mixed conifer with aspen to keep as much as possible in large, closed-canopy state and get to desired condition acreages for this ERU. In contrast, the MCD ERU can have high severity even in more open stands that would change the state to one that nest/roost conditions are removed.

Several ERUs that contain habitat for MSO are likely to see decreases in nest/roost habitat under climate change conditions. Models show that the amount of Ponderosa Pine Forest with Gambel oak, mixed conifer with frequent fire, mixed conifer with aspen will all see decreases in available for nesting and roosting might decrease over the next 10-15 years. For the first two ERUs described above, these declines are not expected to be serious enough to decrease nest/roost habitat below Desired Conditions outlined in this plan or decrease recovery potential of these habitats as outlined in the recovery plan (Service 2012). For the mixed conifer with aspen ERU, there might be decreases below Desired conditions. However, this ERU represents a small portion of suitable habitat for the owl. Overall, there would be an abundance of nest/roost habitat across the forest between all ERUs used for nesting/roosting. The Forest will also use mechanical treatments in owl habitat to ensure that the ERUs discussed above would maintain characteristics required for MSO nesting/roosting. Those characteristics would not be reduced below the recommended habitat abundance needed for recovery, as is outlined in the most recent recovery plan.

Effects on Mexican Spotted Owl Critical Habitat

Here we consider whether the implementation of the proposed plan will affect the PCEs within MSO CH. We consider whether the proposed plan affects the PCEs within mixed conifer (MCW and MCD) and ponderosa pine/Gambel oak forest that provides for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing. Actions implemented consistent with the LMP that might affect CH includes actions such as forest restoration, fuels reductions, thinning and other vegetation management or altering activities that reduce any features of designated CH using tools such as mechanical thinning and fire (naturally-ignited and prescribed fire). However, projects would be designed to protect or restore vegetation structure and composition that would sustain or improve the PCEs within the critical habitat. In the process of moving the ERUs in designated CH toward the Desired Conditions, some adverse effects to PCEs might occur during project implementation. However, these impacts are likely temporary and will not compromise the ability of the designated CH to contribute to the conservation of the MSO.

High-severity fires resulting in the loss of dense mature forest, large snags, and downed logs effectively remove preferred nesting and roosting habitat and can take centuries to regrow. The proposed plan seeks to move existing vegetation conditions to a more desired state and decrease the risk of habitat loss from high severity wildfire. The proposed plan also directs managers to review and adhere to guidance outlined in species recovery plans. Projects would be designed to minimize effects on PCEs of designated critical habitat but effects at the project scale are still likely and may not be possible to avoid for every project or resource area. Analysis for critical

habitat will be done at the project level to make those determinations and assess if consultation with USFWS or a change in project design is required.

The entirety of the Proposed Forest Plan provides for the ecological conditions needed for the MSO on the Gila NF and promotes the conservation and recovery of MSO on the Forest. Plant components provide the primary needs for MSO and critical habitat in ERUs, specifically the Desired Conditions for MCW, MCD, and PPF, wildfire, fuels, and the livestock grazing program areas. A complete list of plan components that would benefit the MSO are listed in Appendix A, attached to this document.

Effects Analysis species in Riparian Habitats within the Action Area: New Mexico Meadow Jumping Mouse, Southwestern Willow Flycatcher, Western Yellow-Billed Cuckoo, Chiricahua Leopard Frog, Narrow-Headed Gartersnake, and Northern Mexican Gartersnake.

The LMP outlines direction for using best management practices by following the standards and guidelines to improve riparian and aquatic areas' condition, function, and resiliency. Riparian habitat includes wetlands and forested riparian (such as willow, cottonwood, and sycamore) areas surrounding seeps/springs, perennial streams, lakes, and other water features. Still, there may be effects to ESA listed species resulting from management activities related to site-specific actions that could temporarily cause negative impacts to species and their habitats. Effects could be related to vegetation management, fuel reductions, riparian restoration, road maintenance, and livestock grazing and might impact suitable habitats for ESA-listed species in riparian areas. However, the proposed Gila NF LMP includes many plan components to address the effects of these activities. Over the long term, habitat management techniques will benefit the species, their habitats, and the overall function of the riparian and aquatic areas on which these species depend. Appendix A contains a list of plan components beneficial to each listed species in this opinion.

Riparian habitat occupies approximately two percent of the Forest. Conditions in riparian habitats on the Gila NF range from low to moderate departure from desired conditions. Because of the importance of water resources and the number of rare species which use these habitats, treatment is given priority for restoring riparian habitats under the plan (Riparian and Aquatic Ecosystems GL 6).

Treatments done under the management plan in upland areas could increase soil erosion and sedimentation into riparian and aquatic areas. The proposed framework for improvements to the watershed fire regime condition class (FRCC) would increase prescribed fire and mechanical treatments. Sedimentation can negatively affect riparian habitats by reducing the water flow needed for vegetation establishment. However, desired conditions, standards, and guidelines (e.g., Timber, Forest, and Botanical Products DC 1, STD 1 and 5, GL 3, 6, and 7) should minimize these potential impacts and prevent large-scale movement of sediments. Moreover, desired conditions, standards, and guidelines should reduce the probability of sedimentation that could occur due to stochastic events such as large wildfires, drought, wind, insect infestations, disease epidemics, and habitat fragmentation.

Objectives under the plan outline activities to restore the structure and function of at least one riparian project annually, in addition to noxious and invasive weed treatments (Riparian and

Aquatic Ecosystems OB-1). Twenty activities and projects that contribute to the recovery of federally listed species, including habitat enhancement and connectivity, will be completed over each 10-year period (Wildlife, Fish, and Plants OB-3 & 5). At least 100 stream miles of riparian habitat will be restored, enhanced, or maintained under the objectives in the LMP (Wildlife, Fish, and Plants OB-4). Within riparian areas, naturalized roads (informal roads created by human recreation) will be closed to reroute traffic from sensitive habitats (Roads resource area DC-5) to reduce impacts on ecological resources (that is, watersheds, wildlife, and fish habitat, and soil erosion). No new construction or realignment of roads and motorized routes, recreation sites, or other infrastructure should be done within the 100-year floodplain or within 300 feet of a Riparian Management Zone. These plan components are designed to move riparian ecological conditions across the forest closer to the desired state. Doing so would ultimately benefit threatened and endangered species that depend on riparian habitats.

The needs for the mouse, flycatcher, cuckoo, Chiricahua leopard frog, narrow-headed gartersnake, and northern Mexican gartersnake will be met through plan components under riparian and aquatic ecosystems, soils, watersheds, fish, wildlife, plants, nonnative invasive species, and water uses, and livestock grazing program areas within the plan. Moving towards desired conditions would improve the ecological conditions necessary for the Mouse, flycatcher, cuckoo, CLF, NHGS, and NMG by decreasing soil erosion and sedimentation risks, repairing disconnected floodplains, improving water quality, maintaining water on the landscape, improving aquatic vegetation, improving hydrologic flows, and providing for prey and dispersal habitat. These conditions should benefit all species and increase the probability that they will persist within the action area.

Effects Analysis for on Critical Habitat in Riparian Areas: Southwestern Willow Flycatcher, Western Yellow-Billed Cuckoo, Chiricahua Leopard Frog, and Narrow-headed Gartersnake

Here we consider the effects of the action on critical habitat in riparian areas. We considered whether the implementation of the proposed plan would result in altering the PCEs of CH for all affected species: flycatcher, cuckoo, frog and NHGS. To determine this, we analyze whether the proposed plan describes a reduction in PCEs within the riparian habitat that provides for one or more of the habitats needs for all life functions necessary for the species mentioned above.

The proposed plan generally seeks to move existing vegetation conditions to a more desired state and decrease the risk of habitat loss from stand-replacing wildfire. Non-native invasive plant species, particularly tamarisk, is a concern throughout the southwestern riparian areas. There are not large areas within the Gila NF that have tamarisk, but there are areas that have and will be treated in the future. Although tamarisk can provide habitat for flycatcher and cuckoo, it likely has lower recovery value than native species because of periodic fire regimes that are detrimental to the habitat and can increase fragmentation and inhibit the re-establishment of native vegetation.

The LMP provides for the ecological conditions needed for the for all critical habitat within the plan area. While management actions are being implemented, there could be temporary, negative impacts to habitat. However, over time, the PCEs will move closer to desired conditions and the characteristics described within the PCEs. A complete list of plan components that would benefit each species and corresponding critical habitat are listed in

Appendix A. We do not expect that any PCEs will be permanently altered as a result of the plan components proposed under the LMP.

Effects Analysis for species in Aquatic habitats within the action area: Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow and Spikedace

Aquatic habitats used by Chihuahua chub, Gila chub, Gila trout, loach minnow, and spikedace would be affected primarily by the same plan components that impact riparian habitat under the LMP. Most potential effects on these species come from sedimentation into streams caused by erosion or wildfire. While management actions proposed in this plan could cause sedimentation, plan components address and mitigate against this outcome. All fish species would benefit from plan components that maintain or improve riparian and aquatic ecosystems toward desired conditions.

Aquatic habitat occupies less than one percent of the action area, and riparian conditions range from low to moderate departure. Maintaining the low departure riparian systems while improving the moderately departed riparian systems would likely improve ecological conditions for all listed aquatic species. Additionally, plan components that improve upland conditions would benefit aquatic habitats by reducing the amount of sedimentation after disturbances and maintaining or improving hydrologic flows. The proposed plan will maintain Riparian Management Zones at or make progress toward proper functioning conditions (or equivalent condition class).

Desired conditions and standards within the Timber, Forest, and Botanical Products (DC1, STDs 1, 3, 5) plan components would protect the ecological integrity of watershed conditions by minimizing potentially adverse effects that could cause soil erosion and sedimentation during timber harvest operations. Plan components for Livestock Grazing (DC 3 & 4, STDs 1 & 3, GL 1, 2, 4, & 5), Riparian and Aquatic Ecosystems (Watershed Scale DC1 & 3, Fine Scale DC1 &2, STDs 1 &2), Water Uses (DC1), and Roads (DC 4 & 5, GL 1, 3, & 4) would ensure associated management activities are compatible with ecological function, including in wetland and riparian management zones. Many of these same plan components also would protect riparian areas from streambed and flood plain alteration. They would minimize disturbance (e.g., water flow, sedimentation) from the construction of roads and energy corridors by including mitigations to limit disturbance during project level design.

Several plan components would help move these systems toward proper functioning conditions (e.g., Riparian and Aquatic Ecosystems Watershed Scale DC3, Fine Scale DC1) while balancing multiple uses with ecological integrity (Livestock Grazing GL1) to avoid excessive grazing impacts. Livestock Grazing guidelines 1 and 3 prevent the construction of new structures in riparian management zones and minimize potential adverse effects that such structures may have on soils and the hydrologic function of streams. These components would help minimize water diversions and improve hydrologic function while maintaining systems resilient to climate change and associated disturbances, such as fire (Livestock Grazing GL4).

There are also standards and guidelines within several sections (e.g., Watershed STD1, Livestock Grazing STD1) that ensure that every site-specific project will improve watershed conditions by reducing effects due to wildfires, erosion, and flooding. No new construction or realignment of

roads and motorized routes, recreation sites, or other infrastructure should be within the 100-year floodplain or 300 feet of a Riparian Management Zone. Several standards and guidelines would mitigate road construction or reconstruction (Roads DC4, GL1-4), which can cause sedimentation. They would also rehabilitate in-stream structures (Wildlife, Fish, and Plants DC9), improving hydrologic function.

Plan components seek to remove and reduce the number of nonnative fish and aquatic species in 4-6 stream reaches. The Forest will remove nonnative fish populations from at least one stream containing a natural or constructed barrier in compliance with recovery plans every 10-year period (Nonnative Invasive Species OB-4 & 5, respectively).

The proposed plan generally seeks to move existing vegetation conditions to a more desired state and decrease the risk of habitat loss from the erosion and sedimentation potential following stand-replacing wildfire. Plan components have been developed to implement 20 activities and projects that contribute to the recovery of federally listed species and maintain or enhance upland habitat connectivity over each 10-year period (Wildlife, Fish, and Plants OB-3 & 5). The LMP also outlines objectives to restore, enhance, or maintain 100 stream miles (Wildlife, Fish, and Plants OB-4).

While the Forest is executing management actions under the LMP, there could be temporary, negative impacts to ESA-listed aquatic species. However, after the Forest has implemented plan components, habitat conditions will become more suitable for each species. These components would provide the key ecological conditions needed for the species life functions. The plan provides for the primary needs for the Chihuahua chub, Gila chub, Gila trout, loach minnow, and spikedace through plan components, including: Watershed, Water Quality, Riparian and Aquatic Ecosystems, All Upland ERUs, Non-native Invasive Species, and Wildlife, Fish, and Plants, Dispersed and Developed Recreation, and Facilities plan sections of the proposed plan. Additional plan components, which balance multiple uses with wildlife needs, can be found under the Wildland Fire and Fuels Management, Water Uses, Livestock Grazing, Timber, Forest, Botanical Products, Roads, Minerals, and Dispersed Recreation sections. Appendix A is a complete list of plan components that would benefit all threatened and endangered fish species.

Effects Analysis for Critical Habitat in Aquatic Areas: Gila chub, loach minnow, and spikedace

Here we consider the effects of the action on critical habitat in aquatic areas. For this analysis we considered whether the implementation of the proposed plan will result in the structure and function of PCEs within critical habitat. To determine this, we analyze whether the proposed plan describes a reduction in PCEs within aquatic habitat that provide for one or more of the habitat needs for necessary life functions of the Gila chub, loach minnow and spikedace.

Plan components seek to maintain adequate streamflow within all water bodies, but water rights are highly contentious and managed through the State Engineers Office. As such, constant streamflow cannot be guaranteed through this plan. Another threat to aquatic PCEs are high-severity fires that results in the loss of dense riparian habitat effectively remove shading from streams that could cause temperatures to rise. This could also add sediments to the stream from

the uplands. The proposed plan generally seeks to move existing vegetation conditions to a more desired state and would decrease the risk of habitat loss from stand replacing wildfire.

The LMP provides for the ecological conditions needed for the for all critical habitat within the plan area. While management actions are being implemented, there could be temporary, negative impacts to habitat. However, over time, the PCEs will move closer to desired conditions and the characteristics described within the PCEs. A complete list of plan components that would benefit each species and corresponding critical habitat are listed in Appendix A. We do not expect that any PCEs will be permanently altered as a result of the plan components proposed under the LMP.

CONCLUSION

New Mexico Meadow Jumping Mouse

After reviewing the current status of the New Mexico meadow jumping mouse, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that implementation of the Forest's revised LMP will not jeopardize the continued existence of the mouse. We base our conclusion on the following:

- The forest plan provides a programmatic framework for future site-specific projects and actions but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate or minimize impacts to NMMJM. All future project level activities that may affect this species will require project-specific assessments and consultation under Section 7 of the Endangered Species Act.
- Watershed Resources improvement projects are anticipated to maintain or improve the ecological condition of riparian habitat during the 10- to 15-year life of the LMP. These projects are likely to aid in improving hydrologic conditions within the watershed and maintain or improve these habitats in the long-term.
- Restoring desired vegetation species composition and structure in Aquatic and Riparian ERUs, returning riparian areas toward desired conditions, and contributing to more natural hydrologic cycles and functions should benefit mouse habitat and provide for the species' needs.
- Plan components will reduce the risk of population and habitat loss due to high severity wildfires.

While some short-term consequences may occur as part of implementing the management direction within the revised LMP, the components will help to minimize them and over the long-term, forest health and resiliency are expected to improve, benefitting the mouse.

Mexican spotted owl and designated critical habitat

After reviewing the current status of the owl and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that implementation of the Forest's revised LMP will not jeopardize the

continued existence of the owl and will not destroy or adversely modify its designated critical habitat. We base our conclusion on the following:

- The forest plan provides a programmatic framework for future site-specific projects and actions but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate or minimize impacts to Mexican spotted owl. All future project level activities that may affect this species will require project-specific assessments and consultation under Section 7 of the Endangered Species Act.
- A combination of ecosystem level plan components and species-specific plan components for spotted owl provide for the ecological conditions that would contribute to the conservation and recovery of the species.
- The forest plan includes direction to avoid, mitigate or minimize the loss of key habitat features such as large trees and snags during forest restoration activities but cannot eliminate the risk entirely. Actions under this plan would still benefit and maintain PCEs within MSO critical habitat.
- The forest plan includes direction to minimize the risk of habitat loss from uncharacteristic stand replacing wildfire which should benefit the species.
- Critical Habitat might benefit by restoring the ecological role of fire.

While some short-term consequences may occur as part of implementation, the plan components will minimize consequences or adverse effects over the long-term, increasing forest resiliency and benefiting owl habitat.

Southwestern Willow Flycatcher and Critical Habitat and Western Yellow-Billed Cuckoo and Critical Habitat

After reviewing the current status of the flycatcher and its designated critical habitat, as well as the western yellow-billed cuckoo's and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action on each species, and the cumulative effects, it is our biological opinion that implementation of the Forest's revised LMP will not jeopardize the continued existence of the flycatcher and will not destroy or adversely modify flycatcher or cuckoo designated critical habitat. We base our conclusion on the following:

- The forest plan provides a programmatic framework for future site-specific projects and actions but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate or minimize impacts to the flycatcher and cuckoo. All future project level activities that may affect this species will require project-specific assessments and consultation under Section 7 of the ESA.
- Treatments on the Forest would reduce the potential for undesirable effects from uncharacteristic fire, drought, wind by managing terrestrial and aquatic resources, benefiting flycatcher and cuckoo critical habitat.
- Plan components for Livestock Grazing and Riparian and Aquatic Ecosystem sections provide for moving both resource areas toward desired conditions which would benefit both species and their critical habitats.

- There are objectives to restore structure and function of at least one riparian project annually, over each 10-year period which would benefit the habitat for the flycatcher and the cuckoo and their critical habitats.

While some short-term consequences may occur as part of implementation, the plan components will minimize consequences or adverse effects over the long-term, increasing forest resiliency and benefiting flycatcher and cuckoo habitat.

Chihuahua Chub, Gila Chub and Critical Habitat, Gila Trout, Loach Minnow and Critical Habitat, and Spikedace and Critical Habitat

After reviewing the current status of the Chihuahua chub, Gila chub and its designated critical habitat, Gila trout, loach minnow and its designated critical habitat, and spikedace and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that implementation of the Forest's revised LMP will not jeopardize the continued existence of any of the above fish species, nor will any of their respective critical habitats be destroyed or adversely modified. We base our conclusion on the following:

- The forest plan provides a programmatic framework for future site-specific projects and actions but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate or minimize impacts to the Chihuahua chub, Gila chub, Gila trout, loach minnow, and spikedace. All future project level activities that may affect this species will require project-specific assessments and consultation under Section 7 of the ESA.
- The long-term effect of watershed improvement and forest restoration actions will maintain or improve the ecological condition of aquatic fish habitat during the 10- to 15-year life of the LMP. These projects will aid in improving hydrologic conditions within the watershed and maintain or improve the PCEs of critical habitats for Gila chub, loach minnow, and spikedace over the long-term.
- Watershed Resources improvement projects are anticipated to maintain or improve the ecological condition of water resource features (such as riparian areas, springs, and streams) during the 10- to 15-year life of the LMP. These projects are likely to reduce sediment, improve stream shade streambank conditions, and improve other habitat conditions such as cover for all listed fish species.

While some short-term consequences may occur as part of implementation, the plan components will minimize consequences or adverse effects over the long-term, increasing forest resiliency and benefit the Chihuahua chub, Gila chub, Gila trout, loach minnow, and spikedace, and their respective critical habitats.

Chiricahua Leopard Frog and Critical Habitat

After reviewing the current status of the Chiricahua leopard frog and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that implementation of the Forest's revised LMP

will not jeopardize the continued existence of the frog and will not destroy or adversely modify its designated critical habitat. We base our conclusion on the following:

- The forest plan provides a programmatic framework for future site-specific projects and actions but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate or minimize impacts to the frog. All future project level activities that may affect this species will require project-specific assessments and consultation under Section 7 of the ESA.
- The long-term effect of watershed improvement and forest restoration actions will maintain or improve the ecological condition of frog habitat during the 10- to 15-year life of the LMP. These projects will aid in improving hydrologic conditions within the watershed and maintain or improve the PCEs of frog critical habitat over the long-term.
- Plan components for Livestock Grazing and Riparian and Aquatic Ecosystem sections provide for moving both resource areas toward desired conditions while maintaining grazing standards on the Forest.

While some short-term consequences may occur as part of implementation, the plan components will minimize consequences or adverse effects over the long-term, increasing forest resiliency and benefiting frog habitat.

Narrow-Headed Gartersnake and Critical Habitat and Northern Mexican Gartersnake

After reviewing the current status of the narrow-headed gartersnake and its designated critical habitat and the northern Mexican gartersnake, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that implementation of the Forest's revised LMP will not jeopardize the continued existence of either snake species and will not destroy or adversely modify narrow-headed gartersnake designated critical habitat. We base our conclusion on the following:

- The forest plan provides a programmatic framework for future site-specific projects and actions but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate, or minimize impacts to the narrow-headed gartersnake and its critical habitat, as well as the northern Mexican gartersnake. All future project level activities that may affect this species will require project-specific assessments and consultation under Section 7 of the ESA.
- The effect of watershed improvement and forest restoration actions will maintain or improve the ecological condition of frog habitat during the 10- to 15-year life of the LMP. These projects will aid in improving hydrologic conditions within the watershed and maintain or improve the PCEs of narrow-headed gartersnake critical habitat over the long-term.
- Watershed Resources improvement projects are anticipated to maintain or improve the ecological condition of water resource features (such as riparian areas, springs, and streams) during the 10- to 15-year life of the LMP. These projects are likely to reduce sediment, improve stream shade streambank conditions, and improve other habitat conditions such as cover.

- The plan provides a programmatic framework for future site-specific projects and actions. All future project level activities that may affect this species will require separate consultation under Section 7 of the Endangered Species Act.

INCIDENTAL TAKE STATEMENT

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

Programmatic Consultations

The proposed action described above is a "framework programmatic action" as defined in 50 CFR 402.02. In accordance with 50 CFR 402.14(i)(6), an incidental take statement is not required at the programmatic level for a framework that does not authorize future actions; incidental take resulting from any action subsequently authorized, funded, or carried out under the program will be addressed in subsequent section 7 consultation, as appropriate. This biological opinion provides a broad-scale examination of the proposed action's potential impacts on the New Mexico meadow jumping mouse, Mexican spotted owl, Southwestern willow flycatcher, Western yellow-billed cuckoo, Chihuahua chub, Gila chub, Gila trout, loach minnow, spikedace, Chiricahua leopard frog, narrow-headed gartersnake and Northern Mexican gartersnake, but we lack reasonable certainty of where, when, and how much incidental take may occur for these species. Therefore, we have not quantified the amount and extent of incidental take that may result from the proposed action and have not exempted such take in this biological opinion for those species.

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. The term "conservation recommendations" has been defined as USFWS suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility. In order for the USFWS to be kept informed of activities that either minimize or avoid adverse effects or that

benefit listed species or their habitats, the USFWS requests notification of the implementation of the conservation recommendations. These recommendations include:

New Mexico Meadow Jumping Mouse

1. We recommend the Forest continue to conduct surveys to confirm presence of NMMJM populations.
2. We recommend the Forest work with USFWS, NMDGF, and other partners to develop and improve riparian habitat during the 10- to 15-year life of the LMP.

Mexican Spotted Owl

1. We recommend the Forest continue to work with USFWS to implement actions to protect PACs from high-severity fire and improve the resiliency of fire-adapted forested habitats.
2. We recommend the Forest continue to work with the USFWS to conduct owl surveys over the next several years to attempt to determine how owls modify their territories in response to fuels treatments, forest restoration, and wildland fire. This information will aid in understanding the short- and long-term impacts of these actions on the owl, and their subsequent effect on the status of the species.
3. We recommend the Forest continue to work with the USFWS to design forest restoration treatments across the Forest that protect existing nest/roost replacement habitat from high severity, stand-replacing fire and enhance existing or potential habitat to aid in sustaining owl habitat across the landscape. Owl 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 replacement recovery habitat.
3. We recommend the Forest continue to conduct surveys to confirm presence of MSO populations.
4. We recommend the Forest work with USFWS, NMDGF, and other partners to develop and improve riparian habitat during the 10- to 15-year life of the LMP.

Southwestern Willow Flycatcher and Western Yellow-Billed Cuckoo

1. We recommend the Forest continue to implement surveys for both bird species on the Gila NF and document the number of nesting pairs in riparian areas.
2. We recommend the Forest continue to work with the USFWS to manage riparian habitats to provide suitable nesting and foraging areas for both bird species.
3. We recommend the Forest continue to manage riparian vegetation treatments to reduce tamarisk encroachment on the Forest.
4. Where habitat for these species exists on the Gila NF, we recommend the Forest managed the habitat to provide the highest number of birds possible.
5. We recommend the Forest continue to work with the USFWS to excluded livestock and maintain fences in grazing areas to protect large portions of the San Francisco and Gila Rivers and improve riparian function.
6. We recommend the Forest continue to restrict OHV access in areas used by sensitive bird species.
7. We recommend the Forest work with USFWS, NMDGF, and other partners to develop and improve riparian habitat during the 10- to 15-year life of the LMP.

8. We recommend the Forest should continue to work with the USFWS in coordination efforts for flycatcher and cuckoo recovery.

Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow and Spikedace

1. We recommend the Forest conducts annual monitoring with appropriate partner agencies at occupied sites for all fish species.
2. We recommend the Forest continue to work with USFWS on each specific project to minimize instream sediment during upland habitat management activities.
3. We recommend the Forest should manage upland habitat to reduce the likelihood of large wildland fire to reduce the risk of ash flows in aquatic habitat.
4. We recommend the Forest work with partner agencies to assist with supplemental stocking for fish species as appropriate.
5. We recommend the Forest implement grazing plans that exclude livestock from areas occupied by listed fish species.
6. We recommend the Forest work with partner agencies to manage water resources to maintain instream flows are year-round.
7. We recommend the Forest should work with the USFWS and other agencies to aggressively control non-native aquatic organisms on the Forest, particularly bullfrogs, non-native fish, and crayfish.
8. We recommend the Forest should continue to work with the USFWS in coordination efforts for listed fish recovery.

Chiricahua Leopard Frog

1. We recommend the Forest should take preventive measures to minimize the transmission of chytrid fungus within and between allotments. These measures should include not moving livestock from other allotments known to be chytrid-positive and decontaminating equipment before use in allotments that contain Chiricahua leopard frogs. The Forest should use biosecurity protocols as described on this Service website: (https://www.fws.gov/southwest/es/newmexico/ES_Protocols.cfm).
2. We recommend the Forest should work with the USFWS and other agencies to aggressively control non-native aquatic organisms on the Forest, particularly bullfrogs, non-native fish, and crayfish.
3. We recommend the Forest should investigate the feasibility of providing alternative watering sources at springs with potential/suitable Chiricahua leopard frog habitat. Installation of spring boxes and troughs would protect spring wetland vegetation and provide fresh water to livestock.
4. We recommend the Forest should continue to work with the USFWS in annual coordination efforts for Chiricahua leopard frog recovery.

Narrow-Headed Gartersnake and Northern Mexican Gartersnake

1. We recommend the Forest should continue to work with the USFWS in coordination efforts for gartersnake recovery.

2. We recommend the Forest should work with the USFWS and other agencies to aggressively control non-native aquatic organisms on the Forest, particularly bullfrogs, non-native fish, and crayfish.
3. We recommend the Forest conducts annual monitoring with appropriate partner agencies at occupied sites for both gartersnake species.

Disposition of Dead of Injured Listed Species

Upon locating a dead, injured, or sick listed species, initial notification must be made to the USFWS's Law Enforcement Office (4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to the New Mexico Ecological Services Field Office (see contact information on Biological Opinion cover letter). 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

This concludes formal consultation on the effects of the U.S. Forest Service's Gila National Forest Land Management Plan Revision. 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 maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (applicable to future tiered consultations); (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending consultation with the USFWS.

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APPENDIX A. DOCUMENTATION OF THE ANALYSES OF AT-RISK SPECIES

Crosswalk between Listed Species, Habitat Characteristics/Ecological Conditions, Potential Stressors, and Plan Components

This analysis focuses on federally recognized threatened, endangered, proposed, and candidate species. Table 6 is a crosswalk used to show plan components that meet listed species habitat needs and provide for species ability to persist. Detailed information on individual species can be found in Chapter 8 and Appendix G of the Gila NF Final Assessment Report (link). The Gila NF federally listed species are as follows:

Amphibians: Chiricahua leopard frog

Reptiles: Narrowheaded gartersnake, Northern Mexican gartersnake

Birds: Mexican spotted owl, Southwestern willow flycatcher, Western Yellow-billed cuckoo

Fish: Chihuahua chub, Gila chub, Gila trout, Loach minnow, Spikedace

Mammals: Mexican gray wolf, New Mexican meadow jumping mouse

Plan components in the last column of Table 6 relate to Chapter 2 of the Draft Forest Plan. As a footnote of the table there are codes for vegetation types. Additionally, coding for plan components in the final column are DC = Desired Condition, and the number following DC, Standard, or Guideline relates to the number of the plan component from the Draft Forest Plan. For example, Soils – DC 1a the reader would go to the Draft Forest Plan, Chapter 2, Soils section, and scroll down to Desired Condition 1a to see the related plan component.

Table 5. Crosswalk used to show plan components that meet listed species habitat needs and provide for species ability to persist.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Tree dependent: Mexican Spotted Owl	Large trees and snags, cavities, downed logs,	Logging, large-scale wildfire, forest treatments (prescribed fire, thinning), fuelwood collection, and pile burning	**All Upland ERUs**[1] – all DC's and Guidelines. **SFF ERU** – Landscape Scale DCs 1-5, Mid-scale DCs 2-4, Fine-scale DC 1. **MCW ERU** – Landscape Scale DCs 1-5, Mid-scale DCs 2-4, & 6, Fine-scale DC 1. **MCD ERU** – Landscape Scale DCs 1-5, Mid-scale DCs 2-5, & 7, Fine-scale DC 1. **PPE ERU** – Landscape Scale DCs 1, & 3-6, Mid-scale DCs 2-5, & 7, Fine-scale DC 1.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
			MPO ERU – Landscape Scale DCs 1 & 2, Mid-scale DCs 4-7, Fine-scale DCs 1-3. **PJO ERU** – Landscape Scale DCs 1-3, Mid-scale DCs 1-3 **PJG & JUG ERUs** – Landscape Scale DCs 1 & 2, Mid-scale DCs 1 & 2, Fine-scale DC 1. **MMS ERU** – Landscape Scale DCs 1 & 2, Mid-scale DC 1. **Soils** – DCs 1a-c & 1e, All Standards, All Guidelines. **Watersheds** – DC 1c, All Standards, All Guidelines. **Riparian and Aquatic Ecosystems** – Watershed Scale DCs 3c & 3e, Fine-scale DCs 1c-e, Standards 1 & 3, Guidelines 3-5. **Wildlife, Fish and Plants** – DCs 5 & 6, Guideline 1c, 3, & 6. **Rare and Endemic Pland and Animal Species and Habitats –** DC 2. **Wildland Fire and Fuels Management** – DCs 5a-c, Guidelines 1 & 3. **Livestock Grazing** – DC 3. **Timber, Forest, and Botanical Products** – DCs 1a-c, 2c-g, Standards 6a-c, 7-9, Guidelines 3, 6a, & 7. **Facilities** – DC 2, Guideline 3. **Locatable Minerals** – DC 1, Guideline 2.
Interlocking canopy and old growth: Mexican Spotted Owl, Southwestern Willow Flycatcher, Yellow-billed Cuckoo	Interlocking canopy, old growth, and denser stands	Logging, large-scale wildfire, forest treatments (prescribed fire, thinning), fuelwood	**All Upland ERUs** – DCs 1-3b, 7, & 8, Guideline 1. **SFF ERU** – Landscape Scale DCs 1-5, Mid-scale DCs 2 & 4, Fine-scale DC 1. **MCW ERU** – Landscape Scale DCs 1-5, Mid-scale DCs 2-4, & 6, Fine-scale DC 1. **MCD ERU** – Landscape Scale DCs 1-4, Mid-scale DCs 2, 4, 5, & 7, Fine-scale DC 1.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
			PPF ERU – Landscape Scale DCs 1-5, Mid-scale DCs 2, 4, 5, & 7, Fine-scale DC 1. **PPE ERU** – Landscape Scale DCs 1-5, Mid-scale DCs 2-5, & 7, Fine-scale DC 1. **MPO ERU** – Landscape Scale DCs 1 & 2, Mid-scale DCs 2, 4, &5, Fine-scale DCs 1 & 3. **PJO ERU** – Landscape Scale DCs 1-3, Mid-scale DCs 1 & 2. **PJG & JUG ERUs** – Landscape Scale DC 2, Mid-scale DC 1, Fine-scale DC 1. **MMS ERU** – Landscape Scale DC 1. **Riparian and Aquatic Ecosystems** – Watershed Scale DCs 1, 3a, 3b, 3e & 3f, Fine-scale DCs 1b, 1c, & 1f, Standard 1, Guideline 5. **Wildlife, Fish and Plants** – DCs 1, 3-7, & 9, Guideline 1c, 3, 6, & 9. **Nonnative Invasive Species** – DC 1, Standard 10 & 15. **Wildland Fire and Fuels Management** – DCs 5a-c. **Livestock Grazing** – DC 3 & 4, Standards 2 & 4, Guidelines 1 & 4. **Timber, Forest, and Botanical Products** – DCs 1a & 1c, 2c, 2d, & 2f, Standards 6a & 6b, Guidelines 2, 3, & 6a. **Roads** – DC 4, Guideline 1, 3, & 4. **Facilities** – DC 2, Guideline 3. **Locatable Minerals** – DC 1, Guideline 2. **Dispersed Recreation** – DC 1. **Motorized Trails** – Guidelines 2, 3, & 7.
Riparian dependent: Chiricahua Leopard Frog, Narrow-headed Gartersnake,	Permanent open water, dense thickets of shrubby vegetation, structural heterogeneity, full	Dewatering or channelization, increased sedimentation	**Soils** – All DCs, Standards and Guidelines. **Water Quality** – DC 1. **Watersheds** – All DCs, Standards, and Guidelines.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Northern Mexican Gartersnake, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, New Mexican meadow jumping mouse	complement of tree age size classes, snags, streamside vegetation, connected floodplains		**Riparian and Aquatic Ecosystems** – All watershed scale DCs, Fine-scale DCs 1 & 2, All standards and guidelines. **Fish, Wildlife, and Plants** – DCs 1-7, 9, & 11, Objectives 3 & 5, Standard 1, Guidelines 2-6, & 9. **Rare and Endemic Plant and Animal Species and Habitats** – All DCs. **Nonnative Invasive Species –** DC 1, Objectives 1-4, Standards 1-4, 6-10, & 12, Guidelines 1, 2, & 5-7. **Wildland Fire and Fuels Management –** DC 5a-c & 6, Standards 4-6, and all Guidelines. **Water Uses –** DCs 1-4. **Livestock Grazing –** DCs 3 & 4, Standards 2-4, Guidelines 1-4. **Timber, Forest, and Botanical Products –** DCs 1a-c & 2e-g, Standards 1, 3, 4, & 9, Guidelines 1-3, 6a, & 7. **Locatable Minerals** – DC 1, Guidelines 2, 3, 5-7, & 10. **Salable/Mineral Materials** – DCs 2 & 3, Standard 1, Guidelines 4 & 9. **Roads** – DCs 4 & 5, Guidelines 1-4. **Facilities** – DC 2, Guideline 2. **Developed Recreation** – Guideline 1. **Dispersed Recreation –** DC 1, Guideline 3. **Trails –** DC 4-7, Guideline 5c & 7. **Motorized Trails –** DC 2 & 5, Standard 4, Guidelines 2-5, 7, & 8. **Non-Motorized Trails –** Guideline 2.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Riparian dependent: Chiricahua Leopard Frog, Narrow-headed Gartersnake, Northern Mexican Gartersnake, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo	Permanent open water, dense thickets of shrubby vegetation, structural heterogeneity, full complement of tree age size classes, snags, streamside vegetation, connected floodplains	Invasion by non- native species	**Soils** – All DCs, Standards and Guidelines. **Water Quality** – DC 1. **Watersheds** – All DCs, Standards, and Guidelines. **Riparian and Aquatic Ecosystems** – All watershed scale DCs, Fine-scale DCs 1 & 2, All standards and guidelines. **Fish, Wildlife, and Plants** – DCs 1-7, 9, & 11, Objectives 3 & 5, Standard 1, Guidelines 2-6, & 9. **Rare and Endemic Plant and Animal Species and Habitats** – All DCs. **Nonnative Invasive Species –** DC 1, Objectives 1-4, Standards 1-4, 6-10, & 12, Guidelines 1, 2, & 5-7. **Wildland Fire and Fuels Management –** DC 5a-c & 6, Standards 4-6, and all Guidelines. **Water Uses –** DCs 1-4. **Livestock Grazing –** DCs 3 & 4, Standards 2-4, Guidelines 1-4. **Timber, Forest, and Botanical Products –** DCs 1a-c & 2e-g, Standards 1, 3, 4, & 9, Guidelines 1-3, 6a, & 7. **Locatable Minerals** – DC 1, Guidelines 2, 3, 5-7, & 10. **Salable/Mineral Materials** – DCs 2 & 3, Standard 1, Guidelines 4 & 9. **Roads** – DCs 4 & 5, Guidelines 1-4. **Facilities** – DC 2, Guideline 2. **Developed Recreation** – Guideline 1. **Dispersed Recreation –** DC 1, Guideline 3. **Trails –** DC 4-7, Guideline 5c & 7. **Motorized Trails –** DC 2 & 5, Standard 4, Guidelines 2-5, 7, & 8. **Non-Motorized Trails –** Guideline 2.
Riparian dependent: Chiricahua	Permanent open water, dense thickets of shrubby	Wildfire, climate change	**All Upland ERUs** – DCs 1, 2, & 6.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Leopard Frog, Narrow-headed Gartersnake, Northern Mexican Gartersnake, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, New Mexican meadow jumping mouse	vegetation, structural heterogeneity, full complement of tree age size classes, snags, streamside vegetation, connected floodplains		**SFF ERU** – Landscape scale DCs 1 & 6, Mid-scale DC 1. **MCW ERU** – Landscape scale DCs 1, & 6, Mid-scale DC 1. **MCD ERU** – Landscape scale DC 6, Mid-scale DCs 1, 3, & 6. **PPF ERU** – Landscape scale DC 7, Mid-scale DCs 1 & 3. **PPE ERU** – Landscape scale DC 7, Mid-scale DC 1 & 2. **MPO ERU** – Landscape scale DCs 2 & 3, Mid-scale DC 1, 3, & 7, Fine-scale DC 1. **PJO ERU** – Landscape scale DCs 2 & 4, Mid-scale DC 2. **PJG & JUG ERUs** – Landscape scale DCs 2 & 3, Fine-scale DC 1. **MMS ERU** – Landscape scale DC 3, Mid-scale DC 1. **Grassland ERUs** – Landscape scale DCs 1, & 2, Mid-scale DC 1. **Soils** –DC 1e, Standards 1 & 2. **Watersheds** – DC 1b, & ci. **Riparian and Aquatic Ecosystems** – Watershed scale DCs 3a, 3c, Fine-scale DC 1d. **Wildlife, Fish and Plants** – DC 4. **Rare and Endemic Plant and Animal Species and Habitats** – DC 2. **Wildland Fire and Fuels Management** – DCs 2 & 5a-c, Guidelines 1 & 2. **Livestock Grazing** – DC 2, Guidelines 4-7. **Timber, Forest, and Botanical Products** – DC 1a, 1c, & 2e.
Riparian dependent: Chiricahua Leopard Frog, Narrow-headed Gartersnake, Northern	Permanent open water, dense thickets of shrubby vegetation, structural heterogeneity, full complement of tree	Trampling from ungulate grazing	**Soils** – All DCs, Standards, and Guidelines. **Watersheds** – All DCs, Standards, and Guidelines. **Riparian and Aquatic Ecosystems** – Watershed scale DCs 1, 3a, c-e, & 4,

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Mexican Gartersnake, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, New Mexican meadow jumping mouse	age size classes, snags, streamside vegetation, connected floodplains		Fine-scale DCs 1a-c & 2, Standards 1, 3, & 6, Guidelines 1, 3, & 5. **Wildlife, Fish and Plants** – DCs 7 & 8, Guideline 9. **Water Uses** – DCs 1 & 3. **Livestock Grazing** – DC 3 & 4, Standards 1, 2, & 4, and Guidelines 1-6.
Aquatic dependent (e.g. seeps, springs, streams): Chiricahua Leopard Frog, Narrow-headed Gartersnake, Northern Mexican Gartersnake, Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow, Spikedace, New Mexican meadow jumping mouse.	Permanent open water, edge vegetation, water quality, connected floodplains	Dewatering or channelization, wetland drainage, altered flow regimes, increased sedimentation, drought, spring development, flood scouring, drought, climate change	**Soils –** DC 1c & 1d, Objective 2, Standards 1 & 2, Guidelines 2 & 3. **Water Quality –** DC 1. **Watersheds –** All DCs, Objectives, Standards, and Guidelines. **Riparian and Aquatic Ecosystems –** All watershed scale DCs, Fine-scale DCs 1 & 2, Objective 1, All Standards, All Guidelines. **Wildlife, Fish, and Plants –** DCs 1-5, 7-10, Objectives 1 & 3-5, Guidelines 3-6, & 9. **Rare and Endemic Plant and Animal Species and Habitats** – All DCs. **Nonnative Invasive Species** – DC 1, Objectives 4 & 5, Standards 1-3, 5-10, 12, 14, 15, & 17, Guidelines 1, 2, & 4-8. **Wildland Fire and Fuels Management –** DC 5b & 6, Standards 2 & 4-6, Guideline 2. **Water Uses –** DCs 1 & 2. **Livestock Grazing –** DCs 3 & 4, Standards 2-4, Guidelines 1-4. **Timber, Forest, and Botanical Products –** DCs 1a-c, 2f, & 2g, Standards 1, 3, & 4, Guidelines 1-3 & 6a. **Special Uses (Lands) –** DC 4. **Locatable Minerals –** DC 1, Guidelines 2, 3, & 5-7. **Salable/Mineral Materials** – DCs 2 & 3, Standard 1, Guidelines 4.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
			Roads – DCs 4 & 5, Guidelines 1-4. **Facilities** – DC 2, Guideline 2. **Sustainable Recreation** – Standard 4, Guideline 3. **Developed Recreation** – Standard 1 & 2, Guideline 1. **Dispersed Recreation** – DC 1, Guideline 3. **Special Uses (Recreation)** – DC 2, Standards 1 & 2. **Trails** – DCs 4-7, Guidelines 4, 5c, & 7. **Motorized Trails –** DC 2 & 5, Standard 4, Guidelines 2-5, 7, & 8. **Non-motorized Trails –** Guideline 2.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Aquatic dependent (e.g. seeps, springs, streams): Chiricahua Leopard Frog, Narrow-headed Gartersnake, Northern Mexican Gartersnake, Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow, Spikedace.	Permanent open water, edge vegetation, water quality, connected floodplains	Invasion of non-native species	**Soils –** DC 1c & 1d, Objective 2, Standards 1 & 2, Guidelines 2 & 3. **Water Quality –** DC 1. **Watersheds –** All DCs, Objectives, Standards, and Guidelines. **Riparian and Aquatic Ecosystems –** All watershed scale DCs, Fine-scale DCs 1 & 2, Objective 1, All Standards, All Guidelines. **Wildlife, Fish, and Plants –** DCs 1-5, 7-10, Objectives 1 & 3-5, Guidelines 3-6, & 9. **Rare and Endemic Plant and Animal Species and Habitats** – All DCs. **Nonnative Invasive Species** – DC 1, Objectives 4 & 5, Standards 1-3, 5-10, 12, 14, 15, & 17, Guidelines 1, 2, & 4-8. **Wildland Fire and Fuels Management –** DC 5b & 6, Standards 2 & 4-6, Guideline 2. **Water Uses –** DCs 1 & 2. **Livestock Grazing –** DCs 3 & 4, Standards 2-4, Guidelines 1-4. **Timber, Forest, and Botanical Products –** DCs 1a-c, 2f, & 2g, Standards 1, 3, & 4, Guidelines 1-3 & 6a. **Special Uses (Lands) –** DC 4. **Locatable Minerals –** DC 1, Guidelines 2, 3, & 5-7. **Salable/Mineral Materials** – DCs 2 & 3, Standard 1, Guidelines 4. **Roads –** DCs 4 & 5, Guidelines 1-4. **Facilities** – DC 2, Guideline 2. **Sustainable Recreation** – Standard 4, Guideline 3. **Developed Recreation** – Standard 1 & 2, Guideline 1. **Dispersed Recreation** – DC 1, Guideline 3.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
			Special Uses (Recreation) – DC 2, Standards 1 & 2. **Trails** – DCs 4-7, Guidelines 4, 5c, & 7. **Motorized Trails –** DC 2 & 5, Standard 4, Guidelines 2-5, 7, & 8. **Non-motorized Trails –** Guideline 2.
Aquatic dependent (e.g. seeps, springs, streams): Chiricahua Leopard Frog, Narrow-headed Gartersnake, Northern Mexican Gartersnake,	Permanent open water, edge vegetation, water quality, connected floodplains	Trampling from ungulate grazing	**Soils** – All DCs, Standards, and Guidelines. **Watersheds** – All DCs, Standards, and Guidelines. **Riparian and Aquatic Ecosystems** – Watershed scale DCs 1, 3a, c-e, & 4, Fine-scale DCs 1a-c & 2, Standards 1, 3, & 6, Guidelines 1, 3, & 5. **Wildlife, Fish and Plants** – DCs 7 & 8, Guideline 9.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow, Spikedace, New Mexican meadow jumping mouse			**Water Uses** – DCs 1 & 3. **Livestock Grazing** – DC 3 & 4, Standards 1, 2, & 4, and Guidelines 1-6.
Species affected by sediments in natural waters: Chiricahua Leopard Frog, Narrow-headed Gartersnake, Northern Mexican Gartersnake, Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow, Spikedace, New Mexican meadow jumping mouse	Permanent open water, water quality	Erosion above background levels, trampling from ungulate grazing, wildfire, roads	**All Upland ERUs** – Landscape scale DCs 1, 2, & 5, Standards 2-4. **SFF ERU** – Objective 1. **MCW ERU** – Objective 1. **MCD ERU** – Landscape scale DC 6, Objective 1. **PPF ERU** – Landscape scale DC 7, Objective 1. **PPE ERU** – Landscape scale DC 7, Objective 1. **PJG & JUG ERUs** – Landscape scale DC 3, Objectives 1 & 2. **All Grassland ERUs** – Landscape scale DC 2, All Objectives. **Soils –** DC 1a, 1c, & 1d, All Objectives, All Standards, Guidelines 2 & 3. **Water Quality –** DC 1. **Watersheds –** All DCs, Objectives, Standards, & Guidelines. **Riparian and Aquatic Ecosystems –** All Watershed scale DCs, Fine-scale DCs 1b-d & 2, Standards 2, 3, & 6, Guidelines 1-3, 5, & 6. **Caves and Abandoned Mine Lands –** DC 1. **Wildlife, Fish, and Plants –** DC 4, 5, & 7-10, Objectives 3 & 5, Standard 1, Guidelines 3-5, & 9. **Rare and Endemic Plant and Animal Species and Habitats** – DC 2. **Nonnative Invasive Species** – DC 1, Objectives 4 & 5, Standards 10 & 12, Guidelines 4, 5, & 7.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
			Wildland Fire and Fuels Management – DC 5, Standards 4-6, Guideline 2. **Water Uses** – DC 1 & 2. **Livestock Grazing** – DCs 1-4, Standards 1-4, Guidelines 1, 3, & 4. **Timber, Forest, and Botanical Products –** DC 1, Standards 1 & 4, Guidelines 3, 6a, & 7. **Locatable Minerals –** DC 1, Guidelines 2, 3, & 7. **Salable/Mineral Materials –** DC 2 & 3, Standard 1, Guideline 4. **Roads –** DCs 4 & 5, Guidelines 1-4. **Facilities –** Guideline 2 & 3. **Developed Recreation –** Standards 1 & 2, Guideline 1. **Dispersed Recreation –** DC 1, Guideline 3. **Trails –** DCs 4 & 6, Guidelines 4, 5c, & 7. **Motorized Trails –** DC 2, Standard 4, Guidelines 2-5, 7 & 8. **Non-Motorized Trails** – Guideline 2.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Rocky Features and Cave/Cliff/Mine dependent: Mexican Spotted Owl	Rocks (canyons, caves, mines, ledges, talus slopes, and cliffs), man-made habitat (buildings, bridges)	Rock collection, cliff blasting, road construction, mining/mineral activities.	**Cliffs and Rocky Features** – Guidelines 1, 2, & 6. **Caves and Abandoned Mine Lands** – DC 3, Standard 2, & Guidelines 1, 2, 4, & 5. **Wildlife, Fish and Plants** – DCs 5 & 6, Guideline 6. **Rare and Endemic Plant and Animal Species and Habitats** – DC 2. **Community Relationships –** DCs 2 & 3. **Tribal Importance and Use –** DCs 2 & 4. **Livestock Grazing** – Standard 2. **Locatable Minerals** – All DCs, All Standards, All Guidelines. **Salable/Mineral Materials** – All DCs, All Standards, All Guidelines. **Roads** – DCs 2, 4, & 5, Guidelines 1 & 3. **Trails –** DCs 5, 6 & 7, Guidelines 1, 4, & 5c. **Motorized Trails –** Guidelines 2 & 8.
Rocky Features and Cave/Cliff/Mine dependent: Mexican Spotted Owl	Rocks (canyons, caves, mines, ledges, talus slopes, and cliffs), man-made habitat (buildings, bridges)	Recreational rock climbing/mine adit exploring	**Cliffs and Rocky Features** –Guidelines 3, 4, & 6. **Caves and Abandoned Mine Lands** – DC 3, Standard 2, & Guidelines 1, 2, 4, & 5. **Wildlife, Fish and Plants** – DCs 5 & 6, Guideline 6. **Rare and Endemic Plant and Animal Species and Habitats** – DC 2. **Livestock Grazing** – Standard 2. **Locatable Minerals** – DCs 1 & 3, Standard 1, Guidelines 2, 3, 4, & 10. **Salable/Mineral Materials** –Guideline 3.

Listed Species	Key ecosystem characteristic or ecological conditions	Potential Stressors/Threats	Coarse and Fine Filter Plan Components, which address Key Ecosystem Characteristic, Ecological Condition, or Potential Stressors
Riparian dependent: Chiricahua Leopard Frog **Aquatic dependent (e.g. seeps, springs, streams):** Chiricahua Leopard Frog, Chihuahua Chub, Gila Chub, Gila Trout, Loach Minnow, Spikedace.		Disease transmission	**Riparian and Aquatic Ecosystems** – Standard 2. **Caves and Abandoned Mine Lands** – DC 2, Guideline 3. **Fish, Wildlife, and Plants** –Guidelines 6, & 10. **Nonnative Invasive Species** –Standard 1, Guideline 5. **Wildland Fire and Fuels Management** – DC 6. **Livestock Grazing** –Standard 5. **Locatable Minerals** –Guideline 10. **Trails** –DC 4. **Research Natural Areas** – DC 3.

From:	Leonard, Ariel -FS
To:	Monzingo, Jerry -FS; Rasmussen, Jenny- FS; Mizuno, Lisa- FS
Subject:	FW: Gila NF Land Management Plan Biological Opinion
Date:	Wednesday, September 14, 2022 4:25:15 PM
Attachments:	20220914_Gila NF LMP Revision_final.pdf

FYI.

From: Bainbridge, Elizabeth (Betsy) <elizabeth_bainbridge@fws.gov>
Sent: Wednesday, September 14, 2022 3:21 PM
To: Maes, Ronnie- FS <Ronald.Maes@usda.gov>; Leonard, Ariel -FS <ariel.leonard@usda.gov>
Cc: Mamuscia, Jodie <jodie_mamuscia@fws.gov>; Colcord, Jasper - FS <jasper.colcord@usda.gov>
Subject: FW: Gila NF Land Management Plan Biological Opinion

Hi Ronnie and Ariel,

The Biological Opinion for the Gila NF LMP revision was finalized today. Here it is for your reference.

Take care,

Elizabeth "Betsy" Bainbridge
Fish and Wildlife Biologist, U.S. Fish and Wildlife Service
New Mexico Ecological Services Field Office
Aquatic and Terrestrial Conservation Branch
2105 Osuna Rd NE,
Albuquerque NM 87113
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elizabeth_bainbridge@fws.gov
"One individual cannot possibly make a difference, alone. It is individual efforts, collectively, that makes a noticeable difference—all the difference in the world!"
— Dr. Jane Goodall

From: Smith, Marita M <marita_smith@fws.gov>
Sent: Wednesday, September 14, 2022 3:13 PM
To: camille.howes@usda.gov
Cc: jeffrey.shearer@usda.gov; jerry.monzingo@usda.gov; Matthew.wunder@state.nm.us; Susan.torres@state.nm.us; Horner, Mark W <mark_horner@fws.gov>; Baumler, Chad E <chad_baumler@fws.gov>; Smith, Clinton P <clinton_smith@fws.gov>; Davis, Jennifer L <jennifer_l_davis@fws.gov>; Brennan, Mark <mark_brennan@fws.gov>; Alleman, Janelle C <janelle_alleman@fws.gov>; Franssen, Nathan R <nathan_franssen@fws.gov>; Crawford, Cat <cat_crawford@fws.gov>; Gordon, Ryan <ryan_gordon@fws.gov>; Richardson, Mary <mary_richardson@fws.gov>; Hedwall, Shaula <shaula_hedwall@fws.gov>; Servoss, Jeff <jeff_servoss@fws.gov>; Beatty, Greg <greg_beatty@fws.gov>; Bainbridge, Elizabeth (Betsy) <elizabeth_bainbridge@fws.gov>; Mamuscia, Jodie <Jodie_Mamuscia@fws.gov>
Subject: Gila NF Land Management Plan Biological Opinion

Marita M. Smith
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