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In reply refer to:
AESO/SE
2022-0001651

February 1, 2022

Mr. Neil Bosworth, Forest Supervisor
Tonto National Forest
2324 East McDowell Road
Phoenix, Arizona 85006

RE: Tonto National Forest Land and Resource Management Plan Revision

Dear Mr. Bosworth

Thank you for your May 18, 2021, letter and accompanying biological assessment (BA) requesting formal section 7 consultation under the Endangered Species Act (16 U.S.C. 1531-1544), as amended, which we (U.S. Fish and Wildlife Service, hereafter we, USFWS or the Service) received the same day. This document transmits our biological opinion (BO) based on a review of the effects of the proposed Tonto National Forest (Tonto NF) Revised Land and Resource Management Plan (LRMP) in Coconino, Gila, Maricopa, Pinal, and Yavapai counties, Arizona.

You concluded that Tonto NF LRMP implementation "may affect" the endangered Arizona cliffrose (*Purshia subintegra: cliffrose*), Arizona hedgehog cactus (*Echinocereus arizonicus* subsp. *Arizonicus: cactus*), ocelot (*Leopardus pardalis*), desert pupfish (*Cyprindon macularius*), Gila chub (*Gila intermedia*: chub) and critical habitat, Gila topminnow (*Poeciliopsis occidentalis*), razorback sucker (*Xyrauchen texanus*: sucker) and critical habitat, loach minnow (*Tiaroga cobitis*) and critical habitat, spikedace (*Meda fulgida*) and critical habitat, southwestern willow flycatcher (*Empidonax traillii extimus*: flycatcher) and critical habitat, and Yuma Ridgway's rail (*Rallus obsoletus yumanensis*: rail); and the threatened Mexican spotted owl (*Strix occidentalis lucida*: spotted owl, owl) and critical habitat, Chiricahua leopard frog (*Lithobates chiricahuensis*: leopard frog, frog) and critical habitat, narrow-headed gartersnake (*Thamnophis rufipunctatus*: gartersnake) and critical habitat, northern Mexican gartersnake (*Thamnophis eques megalops*: gartersnake) and critical habitat, Gila trout (*Oncorhynchus gilae*: trout), and western yellow-billed cuckoo (*Coccyzus americanus*: cuckoo) and critical habitat.

Additionally, you determined LRMP implementation would not jeopardize the Mexican wolf (*Canis lupus baileyi*) or Colorado pikeminnow (*Ptychocheilus lucius*) non-essential experimental 10(j) populations.

We based this BO on information provided in your May 18, 2021, BA, conversations with the Forest Biologists, email exchanges, field investigations, and other sources of information. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern, nor of effects from the subjects considered in this opinion. A complete record of this consultation is on file at the Arizona Ecological Services Office.

BIOLOGICAL OPINION
CONFERENCE OPINION

For the

Tonto National Forest
Land and Resource
Management Plan

Coconino, Gila, Maricopa, Pinal and Yavapai Counties, Arizona
Southwestern Region U.S.D.A. Forest Service

Arizona Ecological Services Field Office, Interior Region 8
U.S. Fish and Wildlife Service

Contents

CONSULTATION HISTORY

- May 18, 2021: We received a final BA from you and initiated formal consultation.
- August 31, 2021: We requested a 60-day extension on the BO.
- September 10, 2021: We received your response accepting the extension.
- December 17, 2021: We sent a draft BO to you.
- January 12, 2022: We received comments on the draft BO from you.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Regulations implementing the Act (50 CFR 402.02) define "action" as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies of the United States or upon the high seas."

The following is a summary of the proposed action. Your May 18, 2021, Biological Assessment (BA) contains a detailed description of the proposed action. In addition, we used information your staff transmitted via email to clarify the proposed action. Commonly used acronyms and abbreviations can be found in Appendix A, Table A-1.

The proposed action being analyzed is the implementation of the Tonto NF revised Land and Resource Management Plan (hereafter LRMP). The National Forest Management Act of 1976 requires each national forest to develop a land management plan and amend or revise the plan every 10 to 15 years. The Tonto NF is consulting on the LRMP's program direction and guidance (effects of recreation, roads and facilities, livestock grazing, fire management, etc.), as well as "plan Components" (desired conditions, objectives, standards, guidelines, and suitability of lands; these are discussed in greater detail below). Most of the actions being consulted on are program management direction and guidance, including standards and guidelines, which tend to minimize effects of the actions and function as conservation measures.

Once finalized, the LRMP will replace the 1985 Tonto NF LRMP and its amendments, and this programmatic biological and conference opinion (PBO/PCO) will replace previous LRMP BOs/COs. Our most recent BO on the Tonto NF LRMP (December 17, 2019) replaced the 2012 analysis for Mexican spotted owl.

The LRMP provides broad, program-level planning direction for future management of National Forest System (NFS) lands and resources on the Tonto NF. The LRMP outlines desired conditions for Tonto NF resources and provides direction for how projects will address future risks to the Tonto NF's sustainability of resources, goods, and services. Although the LRMP does not commit to selecting any specific project, future projects will be based on guidance in the LRMP. The LRMP:

- Applies to only those lands within the Tonto NF
- Uses the best available scientific, local, and native knowledge to inform the planning process
- Provides a framework for integrated resource management and for guiding project and activity decision making
- Does not authorize projects or activities, commit the Forest Service to implement actions, or regulate uses by the public (in other words, no site-specific decisions are made in a LRMP), and
- Should not repeat laws, regulations, or program management policies, practices, and procedures that are in the Forest Service directive system.

A LRMP consists of Components and other content. Plan Components guide future project and activity decision-making, are required in the forest plan, and are the main substance of the document. They include desired conditions, objectives, standards, guidelines, suitability of lands, and goals. Each of these is discussed in further detail below.

LRMP Components

Desired conditions are specific social, economic, and ecological conditions of the Tonto NF's planning area, or a portion of the area, that are described in terms specific enough to allow for progress toward their achievement. All project-level management activities should be aimed at the achievement of the desired conditions for those resources in the area where the project is located. Desired conditions can be thought of as vision statements that help define a collective vision for the National Forest in the future.

Objectives are concise, measurable, and time-specific statements of a desired rate of progress toward desired conditions and should be based on reasonably foreseeable budgets. Objectives, along with the strategies (from management approaches or Forest Service handbook direction) used to accomplish them, can be thought of as the tools used to prioritize project activities to reach desired conditions.

Standards are mandatory constraints on project and activity decision-making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements. A deviation from a standard within a project requires a LRMP amendment for that deviation.

Guidelines describe constraints on project and activity decision-making that allow for departure from its terms, so long as the intent of the guidelines is met. In other words, guidelines are mandatory with some flexibility on how they are implemented in meeting the intent of the existing guideline. Any deviation from the intent of a guideline requires a LRMP amendment.

Suitability of lands is identified in a LRMP as specific lands within the planning area that are suitable for various uses or activities based on the desired conditions applicable to those lands. The LRMP also identifies lands within the LRMP area as not suitable for uses that are not compatible with desired conditions for those lands. The suitability of lands need not be identified for every use or activity; however, every LRMP must identify those lands that are not suitable for timber production (required by the National Forest Management Act).

Other LRMP Content

Every LRMP must have management areas, geographic areas or both. The LRMP may identify designated or recommended areas as management areas or geographic areas. Geographic areas were not utilized in the LRMP.

The LRMP also contains "other required plan content," including identification of priority watersheds, identification of the roles and contributions of the LRMP area, a LRMP monitoring program, and proposed and possible future actions. Other content are not LRMP Components.

In addition to the required content, a LRMP may also include "optional plan content", such as

background information, explanatory narratives, general management principles, potential management approaches, management challenges, performance history, performance risks, contextual information, or referenced material. Optional content is not labeled or worded in a way that suggests it is a LRMP component and does not imply or constitute management direction but may help clarify LRMP direction and how it may be applied.

A change to "other required plan content" or "optional content" does not require a LRMP amendment; instead, such changes may be made using an administrative correction process.

Description of the Proposed Action by LRMP Section

The following are the resource areas presented in the LRMP. Management direction and associated content contained here are summaries and are only those that are relevant to the recovery of federally listed species and their critical habitats. The full suite of Components is readily available in the LRMP.

Partnerships and Volunteers (PV)
Desired conditions direct the Tonto NF to strive for strong relationships with partners and volunteer groups to increase capacity for managing forest resources and improve the quality and efficacy of future projects. Because this program is largely administrative in nature, effects to listed species or critical habitat are not anticipated. Projects that may result from PV efforts will be covered by effects analyses in other sections and will be subject to future section 7 consultation. Therefore, this program is not discussed further.

Recreation (REC)
The overarching goal for the Tonto NF's recreation program is to provide sustainable recreation opportunities for its approximate 3 million visitors (USFS 2016). Sustainable recreation is defined as the set of recreation settings and opportunities on the NFS that are ecologically, economically, and socially sustainable for present and future generations.

The LRMP contains overarching direction for recreation as well as for specific topics including developed recreation, dispersed recreation, motorized recreation, non-motorized recreation, water-based recreation, recreational shooting, and wildlife-related recreation. Desired conditions describe a program that provides a wide range of recreational opportunities to diverse user groups, while maintaining order and protecting the natural landscape.

REC desired conditions include:

- Providing recreation opportunities while conserving water quality, fish and wildlife habitat, and landscapes (REC-DC-1).
- Recreation sites free of trash dumping (REC-DC-8).
- Dispersed recreation (on water and land) with minimal impacts to natural resources (e.g., riparian areas, streams, lakes, and wetlands) (REC-DIS-DC-1).
- Damage due to recreation use (e.g., soil compaction or lack of vegetation) is minimal and infrequent (REC-DIS-DC-4).
- Unauthorized user-created trails are not evident on the landscape (REC-DIS-DC-6).
- Damage due to motorized trails is minimal (REC-DIS-MO-DC-3).

- Largely undisturbed riparian areas (REC-DIS-WB-DC-3).
- Recreational shooting does not cause environmental impacts or resource damage (REC-DIS-RS-DC-1, 4 and 5).

REC objectives:

- During each 10-year period of the LRMP, rehabilitate 5 to 7 areas on the Tonto where dispersed recreation is causing erosion, sanitation issues, or other adverse effects on natural resources (REC-O-1).
- Within 10 years of LRMP approval, develop or modify 1 to 4 systems of sustainable designated motorized (e.g., motorcycle, jeep, and all-terrain vehicle trails) and 1 to 4 systems of designated non-motorized trails (e.g., mountain biking and equestrian trails) to adequately provide for these user groups and reduce user conflicts (REC-O-3 and 4).
- Every 5 years take appropriate action (e.g., close, decommission, or convert) on at least 10 miles of motorized and/or non-motorized trails that may not offer recreational value (e.g., unsustainable, low-use, or have no remarkable destination value) or are not needed for administrative use (REC-O-5).
- Within one year of LRMP approval, complete an occupancy and use order to establish quiet hours within developed campgrounds between 10pm and 6am (REC-DEV-O-1).

REC standards and guidelines direct the Tonto NF to:

- Plan, design, and manage activities to minimize resource damage (e.g., soil erosion and vegetation trampling) (REC-G-3).
- Ensure that newly developed and dispersed recreation sites, facilities, and authorized activities do not degrade resources or prevent wildlife access to water (REC-G-4).
- Promote land-use ethics (e.g., Leave No Trace and pack-it-in pack-it-out) (REC-G-7).
- Minimize conflict between forest users and wildlife (REC-G-9).
- Close sites or mitigate conflicts where damage is occurring to natural resources (e.g., riparian areas) (REC-DIS-G-1c).
- Minimize adverse effects from motorized and non-motorized trails (REC-DIS-G-2) and use sustainable design practices for new trails (REC-DIS-MO-S-2).
- Avoid locating motorized or non-motorized trails in or crossing the riparian management zone (which includes riparian areas, meadows, wetlands, seeps, springs, streams, and connected floodplains supporting riparian vegetation) or meadows (REC-DIS-G-3).
- Use barriers or signage to control unauthorized motorized recreation (REC-DIS-MO-G-1).
- Decommission unsustainable motorized trails (REC-DIS-MO-G-3).
- Work to prevent and/or minimize the spread of invasive species (REC-DIS-WB-G-1).
- Minimize adverse trail effects to springs (REC-DIS-NMO-G-2).
- Post an approved list of target types and target shooting restrictions online and at entrances for areas that are frequently used for shooting (REC-DIS-RS-G-1).

Though this program seeks to provide opportunities for numerous forms of recreation, the LRMP does not authorize or explicitly promote specific recreation activities.

<u>Special Uses (SU)</u>
The Tonto NF authorizes recreation SU when activities support its mission, meet public needs,

and are consistent with the desired conditions for the use area. The most common activities include recreation events, noncommercial group uses, marinas, resorts, organization camps, recreation residences, and outfitting and guiding, and specialized activities such as commercial filming, apiaries, fishing competitions, and research and monitoring.

The Tonto NF also authorizes land SU for infrastructure such as communication sites, utilities (e.g., electrical, communication, and internet lines), pipelines (e.g., natural gas, water), road access, sanitation, and alternative energy development that cannot be reasonably accommodated on private lands. Requests for communication and electronic sites have increased and will likely continue. The Tonto NF expects more demand for utility lines, renewable energy sources, community infrastructure, and private land access.

Desired conditions for SU are to provide for a range of special use activities while reducing effects to ecological resources (SU-DC-1).

SU standards and guidelines include requirements that:

- Authorizations for utilities must incorporate conservation measures for road construction, reconstructions, reclamation, and maintenance (e.g., dust abatement, preventing the spread of invasive weeds) to minimize resource damage (SU-S-3).
- Utilities should utilize existing facilities, roads, sites, and corridors unless new sites can provide better social and/or ecological resource benefits (SU-G-1).
- Organized recreation events and noncommercial group uses authorized under special use permit will be limited to designated NFS trails and roads, suitable developed sites and group sites, and pre-disturbed areas, while promoting responsible land use (e.g., Leave No Trace ethics and pack-it-in pack-it-out) (SU-G-2).
- Special use permits should not authorize camping in sensitive species areas (SU-G-4).
- Proposals for special uses (e.g., apiaries) that may negatively impact public safety, native fish, wildlife, and plant species (especially at-risk species) should include design elements to mitigate such risks prior to authorization or not be authorized (SU-G-8).

There are no objectives in the SU section of the LRMP.

Energy Production and Delivery (EG)

The Tonto NF may host or facilitate the development of multiple renewable energy sources including solar, wind, geothermal and biomass, yet trends suggest the Tonto NF is not a primary target for some energy sources. The U.S. Department of Energy's National Renewable Energy Laboratory (2010) concluded most wind development potential in Arizona lies outside the Tonto NF. Similarly, the potential for geothermal development is low due to lack of utility-scale features.

While there are no current biomass plants on the Tonto NF, biomass generation has the highest potential for future energy development. The most recently approved Four Forest Restoration Initiative could provide more fuel for biomass-generated electricity.

Hydroelectric power generation is the oldest and largest source of renewable energy in Arizona and the Tonto NF has a long history of hydroelectric production beginning with the Salt River

Project (SRP) and the Childs/Irving Power Plants in the early 1900's. Current hydroelectric infrastructure includes five hydroelectric plants, three steam plants (two with separate combustion-turbine installations), and a combined-cycle plant (Bureau of Reclamation 2014). The likelihood for future development of large-scale hydroelectric projects is low. More likely are smaller, localized projects such as within local water districts for flood control and irrigation (EmPower Arizona 2013).

In 2009 The *Record of Decision to Amend Forest Service Land Management Plans Designating Section 368 Energy Corridors on National Forest System Lands* was signed by the Secretary of Agriculture directing the Tonto NF to amend its 1985 LRMP to designate one energy corridor, number 62-211, approximately 53.5 miles long, as a Section 368 Energy Corridor (USFS 2009). The corridor initiates in Navajo County, runs through the southeast portion of Coconino County, then travels southwest through Payson-Starr Valley, terminating northeast of Scottsdale. Although the corridor has been designated, no major transmission line projects are currently proposed.

EG desired conditions state:

- Exploration, development, production, and transmission of renewable energy resources are conducted in a manner that minimizes adverse long-term impacts to resources and uses, ecosystem health, and watershed conditions (EG-DC-2).
- Energy rights-of-way allow for the operation and maintenance of facilities and infrastructure as well as desired vegetative conditions and land uses (EG-DC-3).

EG guidelines include:

- Co-locate with existing infrastructure sites to minimize disturbance (EG-G-1, EG-G-2).
- Energy facilities and corridors should avoid locations in areas identified as having a demonstrated high risk to wildlife, including riparian areas (EG-G-3, EG-G-4).

No new authorizations for energy production and delivery are proposed as part of the LRMP, and there are no objectives calling for related projects or activities.

Rangelands, Forage, and Grazing (GRZ)

Rangelands are grasslands, shrublands, forests and woodlands, wetlands, and deserts that can be grazed by domestic livestock or wild animals. Congress has designated grazing as an important use of NFS lands through various legislative acts (Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976).

Ranchers are issued permits to graze a specific number of livestock in designated areas called allotments. Allotments are further subdivided into pastures, and most allotments follow a rotational grazing system where livestock are moved through different pastures as the year progresses. Nearly the entire Tonto NF is divided into grazing allotments; however, a few allotments are considered vacant (no current permittee) or closed (no longer authorized for permitted livestock grazing).

The LRMP provides generalized, forestwide guidance for livestock grazing on the Tonto NF.

Specific plans for grazing allotments are provided in annual operating instructions which outline site-specific direction for grazing operations, such as number and category of livestock permitted, pasture rotation schedules, utilization standards, maintenance procedures, etc. In general, LRMP Components serve to minimize detrimental effects to ecosystems.

GRZ desired conditions are:

- Rangelands are resilient to disturbances, fluctuations, and extremes in the natural environment (e.g., fire, flooding, drought, climate variability) (GRZ-DC-2).
- Livestock grazing allows for healthy rangelands, plant communities, soil conditions, and riparian habitats (GRZ-DC-3).
- Livestock management and range improvements sustain or improve other resources (GRZ-DC-4).

GRZ objectives are:

- At least two water troughs or open storage tanks per ranger district will be fitted with wildlife escape ramps each year until all troughs and tanks have ramps (GRZ-O-1).
- At least one vacant allotment will be evaluated for one of the following options every two years, until there are no vacant allotments. If additional allotments become vacant (waived without preference) they will be evaluated for one or a combination of the following options within two years (GRZ-O-2):
    - Convert to forage reserves to improve resource management flexibility
    - Grant to current or new permitted livestock producer, or close to permitted grazing, in whole or in part.

GRZ standards and guidelines include:

- Livestock use in and around riparian areas will be evaluated on an allotment-specific basis. Design elements (e.g., deferment, herding, and fencing) will be implemented where needed (GRZ-S-1).
- Salt or mineral supplements should not be placed near riparian, wetland, karst features, or other areas where livestock concentrations are undesired (GRZ-G-2).
- Grazing management is directed to emphasize drought preparedness and consider other shifts in climate and range conditions (GRZ-G-3).
- Guidelines direct range managers to avoid overuse through rotational grazing, removing unauthorized livestock, and dispersing livestock with diversionary tactics (GRZ-G-4, GRZ-G-8).
- Allotments and other areas closed to permitted livestock grazing should remain closed (GRZ-G-7).
- Use a stock and monitor approach incorporating best available science should be used when evaluating stocking rates in grazing decisions (GRZ-G-9).

Cultural and Historic Resources (CUH)

The Tonto NF contains cultural and historic resources that document almost continuous human presence for at least the past 12,000 years. Many cultural resources are considered traditionally significant to tribes associated with Tonto NF managed land. Numerous cultural sites on the Tonto NF are significant social and economic contributors to their local areas, region, and the nation. They provide opportunities for cultural tourism, education, research, and traditional

cultural practices.

The LRMP provides guidance and constraints to protect and preserve cultural and historic resources. Other LRMP Components call for mitigation measures and cooperation with other programs to achieve desired conditions. Implementation of these Components is unlikely to result in activities that have any direct, indirect, or cumulative effects on species or critical habitat.

Tribal Relations and Areas of Tribal Importance (TRB)
LRMP direction guides the Tonto NF to honor and protect tribal rights and interests during project design, decisions, implementation, and monitoring; however, Components do not call for on-the-ground actions or authorize specific activities.

Forestry and Forest Products (FP)
NFS lands were reserved with the intent of providing goods, including production of a sustainable supply of forest products and services, to satisfy public needs over the long term. This program supplies forest products including wood (timber, biomass, fuelwood) and special forest products, including but not limited to Christmas trees and boughs, decorative tree or shrub limbs, manzanita, wildlings (e.g., transplanted trees, shrubs, or herbaceous plants), dry cones, mistletoe, agave and yucca stalks, post, poles, stays, novelty wood, burls, and ceremonial products).

A key objective in this program is creating sustainable landscape-scale ecosystems that maintain desired conditions over time. The Tonto NF seeks to integrate a timber and forest products program that supports industry and the public, while managing for ecosystem health, restoring watersheds, improving wildlife habitats, and reducing hazardous fuels at a landscape scale.

FP desired conditions include:

- Personal and commercial timber harvest contributes to watershed health, function, and resilience, enhances wildlife habitat, and supplements other restoration and maintenance treatments to achieve landscape scale desired conditions (FP-DC-1, FP-DC-2).
- Harvest of dead and dying trees balances economic value with the needs of wildlife habitat, soil productivity, and ecosystem functions (FP-DC-5).

The FP objective is:

- Provide at least 34,000 hundred cubic feet (CCF) or 15,400 thousand board feet (MBF) of timber every 10 years to contribute to forest product industry (FP-O-1).[1]

Implementation of this objective may result in projects that include timber harvest, fuel reduction thinning, pre-commercial thinning, selection cutting, shelterwood harvesting, and clear-cutting. Selection cutting includes mainly commercial thinning treatments, as well as individual tree selection, group selection cutting, and in more recent years, sanitation/salvage cutting. Shelterwood cutting includes shelterwood seed cuts and removal cuts. Clear cutting in

[1] There is not one single conversion when converting CCF to MBF as local conditions and merchantability influence the conversion. The conversion of 34,000 CCF to 15,400 MBF was based on conditions specific to the Tonto NF and/or past timber sale data.

Southwestern Region national forests has historically been limited to aspen regeneration or in forested stands severely infected with mistletoe. Timber sales and harvest projects also include the construction and decommissioning of temporary roads. Treatments for mistletoe include tree felling, tree pruning, and killing (i.e., basal burning) large trees infected with mistletoe to create snags.

FP standards and guidelines include:

- Timber harvest and vegetation manipulation shall only occur where soil, slope, and watersheds will not be irreversibly damaged, and protection must be provided for streams, streambanks, riparian, shorelines, lakes, wetlands, other waterbodies, fish, and wildlife (FP-S-1).
- Even-aged timber harvest methods shall only be used where a completed interdisciplinary team review (and environmental analysis) and project-specific conditions determine them to be appropriate, and clearcutting will only be used where it is determined to be the optimum method to manage towards desired conditions over the long term with maximum size openings created in one harvest limited to 40 acres or less (FP-S-5, FP-S-7).
- Even-aged regeneration cuts will be shaped and blended with the natural terrain and provide for the protection of soil, watershed, fish, and wildlife (FP-S-6).
- Forest treatments should focus on uneven-aged management consistent with desired conditions for ecological response units (FP-G-3).
- Log landing areas should be located outside of sensitive environments (e.g., riparian areas, wetlands and natural meadows, archeological sites, karst formations, and sensitive species areas). When landings must be in these areas, effects to the sensitive resource should be mitigated (FP-G-6).

Scenery (SC)

Scenery Components direct the Tonto NF to consider the natural, scenic character of the forest when designing and implementing projects. Primarily, direction serves to modify other projects, activities, and uses and does not call for any projects or activities specific to scenery.

Mining, Minerals, and Abandoned Mines (MMAM)

Minerals of economic interest are classified as leasable, salable, or locatable. Coal, oil shale, oil and gas, phosphate, potash, sodium, geothermal resources, and all other minerals that may be acquired under the Mineral Leasing Act of 1920 (30 U.S.C. 181), as amended, are referred to as leasable minerals. Common varieties of sand, stone, gravel, pumicite, and clay that may be acquired under the Materials Act of 1947 (30 U.S.C. 601-604) are considered salable minerals or mineral materials. Minerals that are not salable or leasable (e.g., gold, silver, copper, tungsten, uranium, et al.) are referred to as locatable minerals. Locatable mineral deposits include most metallic mineral deposits and certain nonmetallic and industrial minerals. Locatable minerals are subject to the Mining Law of 1872 (30 U.S.C. 22, et seq), as amended. Locatable minerals can be claimed, explored, and mined on public lands under the Mining Law of 1872.

No leasable mineral authorizations or applications are currently located within the Tonto NF. The potential for development of fluid minerals is low because the geologic depositional environment is not conducive to hydrocarbon generation.

Salable materials found on the Tonto NF include sand and gravel, decomposed granite, and building stone. The Tonto NF provides opportunities for local communities to extract these materials at the discretion of the authorizing officer (Forest Supervisor or District Ranger, as appropriate). Currently, the Arizona Department of Transportation and other local government agencies have permits to use mineral materials from NFS lands. There are provisions in the regulations that allow public access to small quantities of mineral materials for personal use at the discretion of the authorizing officer. Regulation allows for commercial sales of mineral material; however, the Tonto NF does not currently have active commercial mineral material sites.

The Forest Service follows regulations under 36 CFR 228, Subpart A for locatable minerals, to minimize adverse effects on NFS surface resources. It is Forest Service policy to administer responsible, environmentally sound energy and mineral development and reclamation on the Tonto NF. Locatable mineral resources occur on all ranger districts with several active locatable mines on the Globe Ranger District.

MMAM desired conditions include:

- The program complies with law, regulation, and policy in the development of minerals, while minimizing adverse environmental effects, including those to wildlife and wildlife habitat (MMAM-DC-1).
- Mineral materials are available to the public and to local, State, and Federal government agencies where reasonable protection of, or mitigation of effects on, other resources is assured, and where removal is not prohibited (MMAM-DC-3).
- Reclaimed mining and mineral sites provide for protection of forest resources (MMAM-DC-2), and abandoned mines do not pose health, safety, or environmental hazards (MMAM-DC-5).

The MMAM objective is:

- Implement closures of at least ten abandoned mines over the life of the LRMP (MMAM-O-1).

MMAM standards and guidelines:

- Require operation plans or design plans that comply with state and Federal requirements for mineral operations that will likely cause significant disturbance of resources (MMAM-S-1), reclamation activities (MMAM-S-2, MMAM-G-4, MMAM-G-5), abandonment of drill holes (MMAM-S-3), and closure of abandoned mine features (MMAM-G-6).
- State that mineral materials (e.g., sand and gravel) should not be removed from the riparian management zone without adequate engineering controls to protect surface waters (MMAM-G-1), and placer mining (i.e., streambed mining) should avoid damaging riparian vegetation, degrading water quality, and negatively effecting channel stability (MMAM-G-3).

The issuance of permits, easements, rights-of way, and approval of mineral extraction plans of operation may have numerous effects to federally listed species and their habitats where such projects are approved; however, the LRMP does not include or explicitly promote any such

authorizations.

Roads (RD)
There are approximately 4,200 miles of roads on the Tonto NF. These roads have various maintenance levels, from closed to all motorized uses to those that offer a high level of comfort and are open for all users. The construction and maintenance of the road system includes the roadbed, roadsides and surfaces, bridges, culverts, drainages, signage, and clearing of brush and overgrowth. Roads are maintained to provide access for land management needs, protect natural resources, and to best serve the public.

RD desired conditions include:

- The Forest's transportation system and infrastructure accommodate needs for public access, land management, resource protection, and user safety (RD-DC-1).
- Roads have minimal adverse environmental effects to soil, riparian areas, watercourses, native vegetation, and at-risk species (RD-DC-4, RD-DC-6).
- Unauthorized routes and unnecessary forest system roads or trails are not present on the landscape (RD-DC-5).

RD objectives are:

- Decommission 100 to 600 miles of a combination of unauthorized routes and NFS roads identified through the travel management process every ten years (RD-O-1).
- Grade surfaces and clean culverts and ditches on at least 500 miles of open NFS roads annually (RD-O-2).

RD standards and guidelines:

- Limit motor vehicle use by the public as designated in the motor vehicle use map, except as authorized (RD-S-1).
- Require road maintenance from commercial users to prevent resource damage (RD-S-2).
- Use Best Management Practices (BMPs) in road construction and maintenance (RD-S-3).
- Decommission temporary roads as part of the same project (RD-S-4).
- Prohibit new roads in primitive areas and avoid them in semi-primitive areas as designated in the Recreation Opportunity Spectrum (ROS) (RD-G-1, RD-G-2).
- Return decommissioned roads to their natural condition (RD-G-3).
- Design and maintain bridges to reduce wildlife mortality, maintain habitat, and provide connectivity (RD-G-4).
- Locate new or reconstructed roads outside of the riparian management zone, or other important water resources (e.g., meadows, wetlands, seeps, and springs), to prevent resource damage. If road construction in riparian areas is unavoidable, it should be designed and implemented to minimize effects to natural waterflow, aquatic species, channel morphology, water quality, and native riparian vegetation. The number of stream crossings should be minimized to reduce negative impacts to natural resources (RD-G-5).
- Develop new or redesigned stream crossings (e.g., bridges and culverts) that are wide enough to pass the bankfull without obstructing or confining the flow (RD-G-6).
- Design and locate new or reconstructed roads, culverts, and other water crossing infrastructure to allow for passage of aquatic species and the naturally occurring sediment and debris transported by the stream (RD-G-7).

- Designate any necessary stream crossings for temporary roads to mitigate sedimentation and gradient changes and impacts to channel stability. These crossings should be designated by the appropriate resource specialists and installed and removed while protecting existing adjacent features (RD-G-9).

The USFS published the Travel Management Rule (TMR) in 2005 (USFS 2005b) which addressed use of motor vehicles on national forests. In accordance with the 2005 rule, the Tonto NF issued a Final Record of Decision (ROD) in October 2021. The Tonto NF TMR ROD designates a managed system of motorized roads, trails, and areas on the Tonto NF that will better protect natural and cultural resources, address use conflicts, and secure sustainable opportunities for public enjoyment on the Tonto NF. The ROD designated roads, trails, and areas open to motor vehicle use by vehicle class and, if appropriate, by time of year. Designated routes and areas are identified on a motor vehicle use map (MVUM). The ROD prohibits use of motorized cross-country travel (off the MVUM) for most activities (big game retrieval and personal firewood collecting are authorized) across all Ranger Districts. Effects of the Tonto NF TMR ROD on listed, proposed, or candidate species were subject to a separate Section 7 consultation completed in 2016 (02EAAZ00-2014-F-0463).

Facilities (FC)

The Tonto NF manages a variety of buildings and infrastructure for an array of purposes. These include administrative facilities (e.g., offices, warehouses, employee housing, and fire facilities) and public recreational facilities (e.g., visitor centers, campground or picnic area restrooms, and storage buildings), associated water and wastewater treatment systems, dams, and electronic and communication towers.

FC desired conditions:

- Facilities have minimal impacts to the environment (FC-DC-2) and do not damage ecologically sensitive areas (FC-DC-6).

FC guidelines include:

- Construction of new facilities in sensitive environments (e.g., floodplains, wetlands) should be avoided or area of disturbance minimized, where practicable (FC-G-2).
- Facility design and construction should consider measures to minimize negative impacts to wildlife, fish, and rare plants (e.g., no reflective surfaces that would cause confusion and collusion by birds or accommodate appropriate movement for fish and other aquatic organisms) (FC-G-3).

There are no objectives in the FC section of the LRMP nor does it authorize or call for construction of new facilities.

Lands and Access (LA)

Land status is defined as the ownership record of title to lands, including withdrawals, rights, and privileges affecting or influencing the use and management of NFS lands and provides general guidance and policy for the management of a defined geographic area. This guidance can include restrictions (such as withdrawals or dedication) and encumbrances (such as rights-of-way acquired or granted, reservations, outstanding rights, partial interests, or easements).

Land use is the current use of land, such as residential, commercial, industrial, or agricultural. Access is provided through a system of non-motorized and motorized roads and trails, including pedestrian access from properties adjacent to the Tonto NF. Gaining access to the Tonto NF is important so the public can continue their traditional uses. Additionally, administrative access supports the ability of the Tonto NF to implement project work and promote forest health.

LA desired conditions describe land ownership adjustments (e.g., purchase, donation, exchange, or other authority) which improve management activities, with examples specifically citing the retention or acquisition of lands for wildlife and fish, reducing wildlife-human conflicts, and providing for wildlife connectivity (LA-DC-1, LA-DC-2).

One LA standard directs access authorizations for private property to a single road (LA-S-1).

No land ownership adjustments (e.g., purchases, donations, exchanges, etc.) or access roads are authorized in the LRMP. Future actions under this program will require evaluation under the National Environmental Policy Act and additional section 7 consultation if listed species are affected.

Vegetation and Ecological Response Units (ERU)
The Tonto NF stretches across a range of altitudes and geology giving rise to diverse vegetative communities from lower Sonoran deserts to pine-forested mountains (Appendix F, Table F-1).

Management direction is described for vegetation communities and ecosystems using ecological response units. ERUs are mapped ecosystem types based off biophysical themes that represent the range of conditions (e.g., dominant species, vegetation associations, soils, landscape features, and climate) that prevail under natural disturbance regimes (e.g., fire, insects, and disease). Each ERU has specific seral stages that describe smaller units of vegetation conditions and succession (e.g., dominance of post-disturbance species, closed canopy conditions) that are influenced by both natural processes and management.

ERU desired conditions are presented at three spatial scales: landscape scale, mid-scale, and fine scale. For woodland and forest ERUs, the landscape scale is 1,000–10,000 acres or larger, the mid-scale is 10–1,000 acres, and the fine scale is less than 10 acres. For shrublands (semi-desert grassland, and desert ERUs), the landscape scale is 1,000–10,000 acres or larger, the mid-scale is 100–1,000’s acres, and the fine-scale is less than 100 acres. Vegetation descriptions at these scales provide adequate detail and guidance for project design and activities that will help achieve desired conditions over time. In some cases, not enough science is available to provide descriptions at multiple scales.

Each ERU describes a range of conditions (e.g., cacti and grass ranges from 10–25% on average) for desired conditions. No one individual project is expected to reach these targets (not every acre will be representative of these ranges), but individual projects should be designed in a manner that helps to drive the ecosystem towards desired conditions and the culmination of projects and average conditions across the forest, over time.

Woodland ERUs, primarily pinyon-juniper, are the most abundant, representing a combined 34%

of the Tonto NF. Of the forested ERUs, ponderosa pine evergreen oak ERU is most common, while ponderosa pine forest and mixed-conifer ERUs are the least common. Desert ERUs make up 29% of the Tonto NF, while semi-desert grassland ERU makes up 12%.

The following LRMP Components apply to all upland (not including riparian) ERUs. Refer to the twelve individual ERU sections as well as Forestry and Forest Products, Fire and Fuels, and Invasive and Noxious Species sections in the LRMP for additional direction.

ERU desired conditions include:

- At the landscape scale, a mosaic of different vegetation conditions and landscape features promote resiliency and ecosystem function which also create natural fire breaks (ERU-DC-1). A diversity of seral states is also present (ERU-DC-2).
- Old growth, including old trees, dead trees, and downed wood, within woodland and forested ecological response units occurs throughout the landscape (ERU-DC-3).
- Terrestrial ecological response units are functioning properly and are resilient to the frequency, extent, intensity, and severity of disturbances (e.g., insects, diseases, and fire) (ERU-DC-5).
- Fire frequency and severity are within, or trending towards, characteristic ranges (ERU-DC-6). Fire interacts with other disturbances to create spatial and temporal patterns that maintain an ecosystem within a characteristic range of conditions (ERU-DC-7).
- Ecosystem function is supported by native plant communities and have little or no invasive species (ERU-DC-10).
- Upland vegetation and riparian zones are ecologically connected based on natural patterns that are consistent with landforms and topography and provide for upland and aquatic species movements and genetic exchange (ERU-DC-11).
- Vegetative cover and litter are distributed across the soil surface in adequate amounts to limit erosion and contribute to soil deposition and development (ERU-DC-13).
- Ecological conditions for habitat quality, distribution, and abundance contribute to self-sustaining populations of native terrestrial and aquatic plants and animals (ERU-DC-14).
- Based off site potential, native plants provide nectar, floral diversity, and pollen throughout the seasons that pollinator species are active (ERU-DC-15).

LRMP objectives include:

- In frequent-fire, forested ERUs (ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire), emphasize treatments within the ponderosa pine-evergreen oak ecological response unit by treating:
  - 50,000 to 122,000 acres over a 10-year period with both mechanical treatments and fire. About 22% would be treated with prescribed fire, with the expectation that the rest would be treated with wildfire.
  - 105,000 to 325,000 acres over a 10-year period with only fire (no mechanical treatment). About 22% of these acres would be treated with prescribed fire, with the expectation that the rest would be treated with wildfire (ERU-O-1).
- In woodland ERUs, emphasize treatments within the frequent-fire woodlands (pinyon-juniper grass and juniper grass and Madrean pinyon oak) as follows:

  - 400 to 2,000 acres over a 10-year period with both mechanical treatments and fire. About 22% would be treated with prescribed fire, with the expectation that the rest would be treated wildfire.
  - 20,000 to 200,000 acres with only fire (no mechanical treatments) over a 10-year period. About 22% would be treated with prescribed fire, with the expectation that the rest would be treated wildfire (ERU-O-2).
- Restore at least 500 acres of semi-desert grasslands, over a 10-year period (ERU-O-3).
- Reduce the impact of invasive species (e.g., buffelgrass, fountain grass, and red brome) by surveying, inventorying, and treating 10,000 to 15,000 acres in desert ecological response units (Sonoran Desert plant communities and Sonora-Mojave mixed-salt desert scrub) over a 10-year period (ERU-O-4).

ERU standards and guidelines include:
- Naturally ignited fires should be allowed to function in their natural ecological role in fire-adapted ecological response units (ERU-G-1).
- When seeding is desirable for restoration, seeding with native species should be prioritized. (ERU-G-2).
- Ground-disturbing activities that increase the risk of invasion by exotic and invasive plant species should include measures to eradicate or limit the spread of these species (ERU-G-3).
- In areas within woodland and forest ecological response units where there is little understory and mechanical treatments are proposed, slash treatments should be used to move towards desired conditions (ERU-G-4). Hand piles should be retained for several years in areas where coarse woody debris is deficient to provide nesting habitat and cover for birds, small mammals, reptiles, and invertebrates (ERU-G-6).
- In forest and woodland ecological response units, the development of old-growth conditions should be encouraged where it is lacking. Uneven-aged vegetation treatments should be designed to assure continuous representation of old-growth characteristics across the landscape over time (ERU-G-5).
- Even-aged silvicultural practices may be used as a strategy for achieving desired conditions over the long term. Treatments for mitigating adverse impacts should not eliminate mistletoe but, rather, they should typically be aimed at reducing infection levels across the stand and increasing host vigor (ERU-G-8).
- Vegetation management activities should retain old trees, snags, and downed logs in and near stream channels and riparian areas to provide for wildlife habitat and recruitment of large woody material (ERU-G-9).
- In forested and woodland ecological response units, strategies developed for re-establishing desired conditions should include snags, downed logs, and other woody components that collect drifting seeds, provide shade, cooler temperatures, moisture retention, and protection from ungulate herbivory (ERU-G-12).

<u>Riparian Ecological Response Units (RERU)</u>
Riparian ERUs are mapped riparian areas that describe dominant riparian plant communities. Mapping methods, ecosystem typing, and classification may change based on best available scientific information, however LRMP direction will still apply to any new system of riparian ecosystem typing because the direction is broadly described for riparian plant communities.

The following riparian ERUs are present on the Tonto NF: Arizona alder-willow, Arizona walnut, desert willow, Fremont cottonwood-conifer, Fremont cottonwood-oak, Fremont cottonwood/shrub, herbaceous, narrowleaf cottonwood/shrub, ponderosa pine/willow, and sycamore-Fremont cottonwood. The Regional Riparian Mapping Project report (Triepke 2013) has a detailed description of each riparian ERU. When using riparian ERUs, or other riparian mapping data, it should be noted that these classifications represent potential plant associations. Riparian areas are dynamic and can undergo dramatic changes in plant composition and structure, specifically at reach scales, based on short and long-term disturbances (e.g., periodic flood pulses, 100-year floods, drying conditions).

RERU desired conditions aspire to:

- Have riparian plant communities that consist of mostly native species (RERU-DC-1), a plant composition which largely reflects site potential (RERU-DC-2), contains adequate ground cover (RERU-DC-3), and shows a diversity of seral states (RERU-DC-4).
- Provide for functional soil and water resources (RERU-DC-7) and have infrequent fires (RERU-DC-11, RERU-DC-12).
- Not have invasive species (e.g., tamarisk, Russian olive, exotic forbs, and grasses) degrading ecological conditions (RERU-DC-8).

RERU guidelines include:

- Vegetation management (e.g., timber harvest, invasive species, and prescribed fire) should not result in long-term degradation to riparian ecological response units (RERU-G-1).
- Livestock management practices should allow riparian vegetation to recover. Plant development or recovery sufficient to sustain healthy riparian areas should occur following each livestock use period (RERU-G-2).
- Projects and activities should be designed and implemented to promote a diversity of age classes and natural succession of native riparian and wetland obligate species (e.g., cottonwood, willow, sycamore, ash, alder, sedges, grasses, and other wetland plants) (RERU-G-3).
- Large mature Freemont and narrowleaf cottonwood and Arizona sycamore trees should be protected from management activities. Projects occurring in these areas should incorporate restoration goals to ensure persistence of cottonwood and sycamore communities/forests (RERU-G-4).

The LRMP does not contain objectives in the riparian ERU section. Thus, the primary effect of implementing LRMP Components is to shape future projects and activities in ways that promote conservation and restoration of riparian areas.

Fire and Fuels (FF)

Fire management includes the planning, strategies, and actions used before, during, and after wildland fire. Management of wildland fires affects the health, resilience, and sustainability of highly valued resources, including natural resources and constructed resources. Wildfire management is based on current and expected fire behavior and effects, resource availability, and values at risk. It is also influenced by social understanding and tolerance, as well as adjoining governmental jurisdictions. Daily management may change as a fire spreads across the landscape, with parts of a fire managed to meet protection objectives (suppression), and other

parts managed to meet resource objectives.

Some of the vegetation on the Tonto NF is adapted to recurrent wildland fires started by lightning during spring and summer thunderstorms. In fire adapted ecosystems, prescribed fire and wildfire are important tools for maintaining and/or restoring vegetative composition and structure. Although wildfires are not covered in this consultation, the Forest Service will work closely with the USFWS on management responses and emergency consultation procedures.

FF desired conditions describe an environment where wildland fire improves or maintains ecosystems and wildlife habitats (FF-DC-4).

FF standards and guidelines include:

- Use wildfires only to meet resource objectives and where they do not threaten lives, property, infrastructure, or resources (FF-S-1) and wildland fire activities should be conducted in a manner that minimizes disturbance to at-risk species (FF-G-3).
- Prescribed fires must be designed to move areas towards natural fire regimes unless this threatens other values (FF-S-4).
- Temporary fire facilities should be placed to minimize effects to cultural sites and sensitive species areas (e.g., designated critical habitat, Protected Activity Centers, at-risk plant sites, and riparian areas) (FF-G-4).
- In advance of wildfire or prescribed fire, or as projects are being implemented, excessive fuel accumulation should be reduced around streams, springs, seeps, wetlands, and riparian areas to protect them from uncharacteristic or damaging fire effects (FF-G-5).
- Ignitions should be located outside riparian management zones (FF-G-7) and slash piles should not be placed within 300 feet of perennial or intermittent streams or within 100 feet of ephemeral streams (FF-G-6).

The Fire and Fuels section does not contain objectives. Direction in this section provides guidance to shape and modify future wildfire and prescribed fire actions.

Watersheds and Water Resources (WAT)

A watershed is a region or land area drained by a single stream, river, or drainage network. Watersheds collect precipitation that flows into streams and rivers, infiltrates into the ground and recharges aquifers, evaporates, or is transpired by vegetation within the watershed. Good watershed management maintains the productive capacity of soils, protects water quality and quantity, sustains native species, provides state designated beneficial water uses, and reduces the threat of flood damage to forest resources and downstream values.

Constructed water features on the Tonto NF include fish barriers, earthen stockponds, wildlife drinkers, and concrete or steel storage tanks, watering troughs fed by developed springs, groundwater wells, or stream diversions.

The Tonto NF is also an important source of groundwater for a variety of uses. Groundwater discharge supports fens, wetlands, seeps, springs, groundwater-fed streams, and lakes, and contributes to the supply of water used by households, industry, power suppliers, and agriculture. LRMP Components for watersheds and water resources help ensure this service for the future.

WAT desired conditions describe watersheds that:

- Support multiple uses with no long-term decline in ecological conditions (WAT-DC-1).
- Provide surface water and groundwater that meet or exceed state standards (WAT-DC-2).
- Function properly and exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition, and be resilient to disturbance (WAT-DC-3, WAT-DC-4).
- Have surface waters that provide habitat for aquatic species and riparian species, contribute to connectivity for wildlife across the landscape, provide for local and urban potable water supplies, agricultural uses (e.g., livestock watering and irrigation), and recreation (WAT-DC-8).

WAT objectives are to:

- Implement at least one project identified in the Watershed Restoration Action Plan for each priority watershed every year (WAT-O-1).
- As defined in the Watershed Condition Framework, improve or maintain watershed condition class of at least one 6th code (HUC12) watershed every 5 years (WAT-O-2).
- Improve Soil and Water condition of at least 10,000 acres annually (WATO-3).
- Complete at least four aquatic habitat restoration projects (e.g., increase pool quantity, provide stream cover, and bank stabilization) every 10 years (WAT-O-4).
- Apply for state-based water rights for instream flow use for at least two streams threatened with dewatering, supporting highly valued resources (e.g., threatened or endangered species, species of conservation concern, river-based recreation) or containing unique qualities (e.g., a perennial stream in the Sonoran Desert) within each ten-year period (WAT-O-5).

WAT standards and guidelines direct the Tonto NF to:

- Use best management practices to control non-point pollution and meet desired conditions (WAT-S-1).
- Only authorize new wells and pipelines that would not adversely impact springs, wetlands, riparian areas, surface flows, and other groundwater dependent systems (WAT-S-2, WAT-G-1, WAT-G-4) and when additional water supplies are necessary, prioritize use of existing infrastructure (WAT-G-2).
- Use decontamination procedures to prevent the spread of parasites, pathogens, and invasive species (WAT-S-4).
- Prohibit new or reconstructed roads and motorized routes, infrastructure, recreation sites, or similar constructed facilities within floodplains or within 300 feet of water resource features (except for necessary stream crossings or resource protection) (WAT-G-6).
- Require that permitted water uses, water diversions, or obstructions in good standing allow sufficient water to pass downstream to preserve minimum levels of water flow that maintain riparian and aquatic desired conditions (WAT-G-7).
- Identify stressors degrading watershed conditions, eliminating or reducing them where feasible, and prioritizing natural recovery where reasonable (WAT-G-11).
- Manage groundwater and surface water as one hydrologically connected system (WAT-G-14).

<u>Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)</u>
Southwestern riparian ecosystems are dynamic habitats that border streams, springs, ponds, and lakes or occupy other wet areas, such as wetlands, cienegas, fens, or bogs. They occur within all

terrestrial vegetation communities and are the interface between the terrestrial uplands and open water. Riparian ecosystems include water dependent plants near the water's edge and often transition to a combination of upland and riparian species as distance from water increases, which adds significantly to their ecosystem diversity. Riparian vegetation may vary widely depending on amount, timing, and source of water, as well as biophysical characteristics (e.g., salinity and gradients in saturated soils). Riparian areas are more productive than other vegetation communities in terms of plant and animal biomass per acre. Additionally, these systems are some of the most important habitats for plants and wildlife on the Tonto NF, providing water, forage, shelter, and habitat for nesting, roosting, and bedding.

LRMP Components in the RMZ section apply to all riparian management zones and associated riparian vegetation (refer to Riparian ERUs). The LRMP establishes riparian management zones within approximately 100 feet of the edges of all lakes, stream ecosystems (perennial and intermittent), springs, seeps, and wetlands; however, riparian management zone width may vary based on ecological or geomorphic factors (such as areas identified to have riparian vegetation) or by type of water body. Riparian management zone widths may be replaced by site-specific delineations during project planning and implementation.

RMZ desired conditions envision riparian areas where:

- Departure from reference conditions is low (RMZ-DC-1) and riparian areas have stable banks and shorelines that resist erosion (RMZ-DC-2, RMZ-DC-3).
- Livestock grazing and other forest uses do not affect the long-term health of riparian vegetation (RMZ-DC-4, RMZ-DC-5).
- Stream flows and sediment movements reflect characteristic variability (RMZ-DC-6), and riparian systems provide habitat connectivity for the movement and dispersal of species (RMZ-DC-7).

RMZ objectives include:

- Complete active and passive restoration projects on at least 125 miles of streams every 10 years to improve the ecological integrity of perennial and intermittent riparian ecosystems rated as nonfunctioning and functioning-at-risk (RMZ-O-1).
- Improve 10 to 15 individual springs during each 10-year period (RMZ-O-2).

RMZ standards and guidelines direct the Tonto NF to:

- Identify and delineate riparian management zones (RMZ-S-1).
- Prohibit toxicants in riparian management zones (except for the Lakes and Rivers Management Area) (RMZ-S-2).
- Establish buffers for projects using herbicides or pesticides in the riparian management zone (RMZ-S-3).
- Design projects in perennial streams to allow for natural instream movement of aquatic species (except where barriers are necessary to preclude the movement of non-native species) (RMZ-G-2).
- Design and implement projects in a way that they maintain or restore long-term natural streambank stability, native vegetation, floodplain, and soil function (RMZ-G-3).
- Where appropriate, leave downed woody material in stream channels to provide habitat for aquatic species (RMZ-G-4).
- Prevent spread of non-native species when drafting or moving water (RMZ-G-6).

Wildlife, Fish, and Plants (WFP)
The Tonto NF provides important habitat for an exceedingly diverse array of wildlife, fish, and rare plants. Under the 2012 planning rule, the Tonto NF is instructed to provide the ecological conditions necessary to maintain the persistence, or contribute to the recovery of, native species within the LRMP area, including at-risk species (FSH 1909.12, Chapter 20, section 21.13). The Tonto NF has identified a total of 70 at-risk species in the LRMP planning area, 19 federally listed and 51 species of conservation concern.

WFP desired conditions:

- Ecological conditions contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, maintain viable populations of species of conservation concern, and sustain both common and uncommon native species (WFP-DC-1).
- Habitats are sufficiently resilient to withstand foreseeable levels of disturbance and redundant enough to maintain species diversity, enabling species to adapt to changing environmental conditions (e.g., climate change) (WFP-DC-2).
- Habitat condition, distribution, and abundance contribute to self-sustaining populations of plant and animal species, including at-risk species, rare, and endemic species (WFP-DC-3).
- A diversity of habitat features, including biotic and abiotic, are available at the appropriate spatial, temporal, compositional, and structural levels to provide adequate opportunity for critical life history needs (e.g., breeding, feeding, and nesting) of species (WFP-DC-4).
- Habitats within and adjacent to the forest are sufficiently interconnected in order to allow for necessary movements and dispersal of native animal and plants, as well as promote species interactions. Habitats are connected at a landscape scale that includes adjacent lands (WFP-DC-5).
- Locations, status, and life histories (e.g., population trend, threats, and habitat requirements) of at-risk, rare, and endemic species are known and better understood (WFP-DC-6).
- Human-wildlife conflicts and human disturbances are minimal, as are adverse impacts to vital life history functions (e.g., breeding, feeding, and rearing young) of wildlife, fish, and rare plants (WFP-DC-7).
- Unique plant communities and landscape features (e.g., limestone cliffs, calcareous soils, margins of seeps and springs, canyons/cliffs, hanging gardens) are present to maintain well-distributed populations of associated native, endemic, and rare plant species (WFP-DC-8).

WFP objectives direct the Tonto NF to conduct projects and activities that specifically address needs of at-risk species, including:

- Implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to the recovery of at-risk species every 10 years (WFP-O-1).
- Complete at least 20 products or activities that educate the public about wildlife, fish, and rare plants every two years (e.g., educational signs and brochures, website pages, species checklists, presentations, and field trips) (WFP-O-2).

The WFP section incorporates (by reference) guidelines from recovery plans and conservation agreements stating:

- Activities occurring within federally listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans (Appendix F, Table F-2) (WFP-G-1).
- Where the Forest Service has entered into a signed conservation agreement (Appendix F, Table F-3) that provides guidance on activities or actions to be carried out by the Forest, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement (WFP-G-2).
- The best available science and/or conservation measures should be used to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain viable populations of species of conservation concern (WFP-G-3).
- Projects and activities that may negatively impact at-risk species, including plants, should consider protections and design elements to address impacts, especially considering the timing and location of vulnerable life history processes (e.g., reproduction, molting, migration, and hibernation). Examples of design elements and protections could include but are not limited to timing restrictions, adaptive percent utilization levels, distance buffers (WFP-G-4, WFP-G-5).

Several other WFP guidelines require projects to:

- Include designs that minimize wildlife mortality (WFP-G-6).
- Avoid uncharacteristic habitat fragmentation during treatments (WFP-G-7).
- Provide for species movement and dispersal (WFP-G-8).

<u>Invasive Species (INS)</u>
Invasive Species are described as alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: plants, vertebrates, invertebrates, and pathogens. Historically, the Tonto NF has suffered from non-native invasive species that have threatened native communities through direct competition, predation, or by altering fire regimes and other ecosystem functions. Riparian and aquatic communities have been especially affected, but many ecosystems and native species remain at risk of further invasion of harmful or predatory invasive species.

INS desired conditions include:

- Invasive species do not disrupt ecological functionality, affect the sustainability of native species, cause economic harm, or negatively impact human health (INS-DC-1).
- Ground-disturbing activities are not a source of spreading invasive species (INS-DC-2).

INS objectives that may result in future projects and activities include:

- Treat and control invasive species on 200 to 1,500 acres annually (INS-O-1).
- Treat and control invasive species on 2 to 10 stream reaches every five years (INS-O-2).

INS guidelines direct management to prevent the spread of invasive species by:

- Avoiding storage or staging of equipment in infested areas (INS-G-1).

- Using certified weed-free materials (INS-G-2).
- Inspecting fill and rock material (INS-G-3).
- Monitoring areas post treatment with follow-up control where needed (INS-G-4).
- Taking measures to avoid aquatic invaders when drafting water (INS-G-6).
- Including designs to reduce invasions during other improvement projects (INS-G-7).

An additional guideline requires that:

- Chemical treatments avoid human developments and ecologically sensitive habitats (e.g., at-risk species and riparian areas), or techniques should be applied to minimize negative effects (e.g., chemical-free buffers, and spot treatments) (INS-G-5).

Soils (SL)

Functioning ecosystems depend on healthy soils, making soil the foundation for life. Soils on the Tonto NF include a wide variety of taxonomic classifications, reflecting the influences of several soil forming factors (e.g., parent material, climate, topography, and organisms). As a result, soil characteristics range from shallow, weakly-developed rocky soils on plateaus, mesas, cliffs, escarpments, and ridges to deeper, more productive soils on alluvial fans, plains, and valley bottoms. These soil properties greatly affect the response to precipitation as it infiltrates, moves through, and is stored in the ground. The Tonto NF uses information from the Terrestrial Ecological Unit Inventory to define the systematic description, classification (soil, vegetation, climate, geomorphology, and geology), mapping, and interpretation of ecological types (USFS 2005a).

SL desired conditions include:

- Management projects and activities should strive for intact functioning productive soils with appropriate vegetative cover, free from contaminates and invasive species (SL-DC-1 through 5).
- Soils do not exhibit accelerated or unnatural signs of water or wind erosion (e.g., pedestaling, rills, and gullies) (SL-DC-6).

SL guidelines include:

- The Tonto NF should use best management practices for ground disturbing activities that minimize both short and long-term effects (SL-G-1).
- Impaired soils should be managed to improve their conditions (SL-G-3).
- Areas at risk of severe erosion should restrict activities that encourage concentrated use (SL-G-4).

There are no objectives in the SL section of the LRMP.

Caves and Karsts (CVK)

Caves are natural biophysical features that include any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the Earth or within a cliff or ledge that is large enough to permit a person to enter, whether the entrance is excavated or naturally formed (16 USC Ch. 63 Sec. 4302). This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, karst feature or other opening which is an extension of a cave entrance, or which is an integral part of the cave. Caves provide specialized, seasonal, and year-round habitats for a variety of wildlife species, including bats, cliff-nesting birds, snails, reptiles, amphibians, insects,

and opportunistic use by a variety of small and large mammals.

CVK desired conditions aspire to conserve, maintain, and prevent degradation to cave and karst features, protecting a wide range of values including wildlife habitat (CVK-DC-1, CVK-DC-3).

CVK guidelines serve primarily to protect and minimize effects to these features (CVK-G-1 through 4).

While implementation of these Components may lead to some on-the-ground projects (e.g., gating), there are no objectives in the CVK section. Direction serves to modify projects and activities in other program areas and effects to listed species or critical habitat are not anticipated. Thus, this program is not discussed further.

Air Quality (AQ)
The Forest Service recognizes air quality as an important ecosystem service for National Forests to protect. AQ desired conditions are to meet state and federal air-quality standards, while AQ standards and guidelines direct projects to minimize smoke effects during fire operation, use dust abatement strategies during construction projects, and provide added protection for class I special areas of air protection (i.e., designated wilderness areas).

There are no objectives in the AQ section. Direction serves to modify projects and activities in other program areas and effects to listed species or critical habitat are not anticipated. Thus, this program is not discussed further.

Management Areas
The MA section contains Components applicable to specific areas that require management that differs from forestwide management. Maps of these areas are in Appendix E. Guidance for these areas may differ by:

- constraining an activity where forestwide direction does not;
- constraining an activity to a greater degree than forestwide direction; or
- providing for an exception to forestwide direction, when forestwide direction conflicts with the management emphasis of the management area.

Forestwide Components are applied unless there is direction specific to the management area. All management area Components are based on applicable authorities and the specific purposes for which the area was created, recommended, or designated.

Designated areas are a specific type of management area that are either statutorily (designated by Congress) or administratively designated (designated by Regional Forester, Forest Service Chief, Secretary of Agriculture, or the President). The current statutorily designated areas on the Tonto NF are wilderness, wild and scenic rivers, and national scenic trails. The current administratively designated areas on the Tonto NF are critical habitat, experimental forest, inventoried roadless areas, national recreation trails, research natural areas, and significant caves.

The LRMP also includes Components for created and recommended management areas including the Lakes and Rivers Management Area, Apache Leap Special Management Area, proposed research natural areas, recommended botanical areas, eligible wild & scenic rivers, and

recommended wilderness areas.

Designated Wilderness (DWMA)

Wilderness areas are congressionally designated and are defined in the Wilderness Act of 1964 as: "…those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

The Wilderness Act prohibits permanent roads and the use of any form of motorized or mechanized transport within wilderness areas, unless for access to inholdings that existed prior to designation. The Wilderness Act requires management of human-caused effects and protection of the area's wilderness character to ensure that it is "unimpaired for the future use and enjoyment as wilderness."

DWMA desired conditions and standards and guidelines for wilderness areas focus on preserving the wilderness character of each of the designated wilderness areas and directs management to comply with the most recent management for each of the respective areas.

Recommended Wilderness (RWMA)

Recommended wilderness areas are recommended for designation as a result of a 4-step process: (1) inventory; (2) evaluation; (3) analysis; and (4) recommendation. The purpose of the recommendation process is to identify all areas within the Tonto NF that are suitable for inclusion in the National Wilderness Preservation System, as defined in the 1964 Wilderness Act. It is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, the Secretary of Agriculture, and the President of the United States. The Tonto NF's intent in the LRMP is to provide direction that will retain or improve the wilderness characteristics of these areas if and until they are considered for designation by Congress. The direction stated will be applied until such time as the area is designated as wilderness by Congress.

RWMA desired conditions focus on maintaining the ecological and social characteristics that were the basis for recommendation. Standards prevent the permanent degradation of wilderness characteristics by restricting road construction and other developments without valid existing rights. Guidelines focus on other permitted and allowed uses in recommended wilderness.

Designated Wild and Scenic Rivers (DWSRMA)

In 1968, Congress passed the Wild and Scenic Rivers Act to preserve the beauty and free-flowing nature of some of the most precious waterways in America. To be designated, rivers or sections of rivers must be free-flowing and possess at least one outstandingly remarkable value such as scenic, recreational, geologic, fish, wildlife, historic, cultural, or other features identified under the Act. Wild and scenic rivers are congressionally designated and are meant to protect and preserve the rivers for the benefit and enjoyment of present and future generations.

LRMP Components for designated wild and scenic rivers serve to maintain the outstandingly remarkable values of each segment per the act and individual management plans.

Eligible Wild and Scenic Rivers (EWSRMA)
Eligible wild and scenic rivers meet the basic criteria for inclusion in the National Wild and Scenic Rivers System. They are free-flowing and possess at least one value that is outstandingly remarkable regionally or nationally.

All rivers in the Tonto NF were evaluated to determine their eligibility for inclusion in the National Wild and Scenic Rivers System. This evaluation resulted in 20 possible river segments with outstandingly remarkable values on the Tonto NF (USFS 2021b). Each river is assigned a classification of Wild, Scenic, or Recreational, based on the free-flowing condition and development level in and around the river at the time it was deemed eligible. There are approximately 46 miles classified as wild, 50 miles classified as scenic, and 32 miles classified as recreational.

The Tonto NF is required to manage agency-identified eligible wild and scenic river segments to retain their eligibility status until a determination has been made on whether to recommend them for inclusion in the National Wild and Scenic Rivers System. The Tonto NF may authorize projects and activities in eligible rivers or the surrounding river corridor so long as they preserve the free-flowing condition of the river, protect the outstandingly remarkable values that provide the basis of the river's eligibility for inclusion in the system, and do not affect the classification of the river segment.

LRMP Components for eligible wild and scenic rivers serve to maintain and protect the outstandingly remarkable values which made them eligible for designation.

Designated and Recommended Research Natural Areas and Botanical Areas (RNBAMA)
Management direction for botanical areas and research natural areas were combined because direction is applicable to both kinds of special areas (e.g., desired conditions that biological processes are maintained). Some Components only apply to botanical areas (recommended and designated), research natural areas (recommended and designated), or both—each component specifically states the type of special areas the direction applies to.

Both designated and recommended research natural areas and botanical areas are managed to maintain or enhance the characteristics which make them unique. Recommended research natural areas and botanical areas are designated during a separate National Environmental Policy Act process after the LRMP record of decision is signed.

Research natural areas are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on NFS lands. Research natural areas are principally for non-manipulative research, observation, and study. Research natural areas within existing wilderness are managed in accordance with agency policy on retaining wilderness character.

Botanical areas contain plant specimens, groups, or communities that are significant because of their form, color, occurrence, habitat, location, life history, arrangement, ecology, rarity, or other features.

LRMP Components for RNBAMA are to preserve and maintain the features and unique characteristics for which the areas were designated and provide opportunities for research, study, observations, monitoring, and for those educational activities that do not modify the conditions for which the areas were established.

There is one RNBAMA objective:

- Within one year of plan approval, complete closure of overnight camping and recreation campfire in designated or recommended botanical areas (RNBAMA-O-1).

Inventoried Roadless Areas (IRAMA)

The Tonto NF manages thirteen IRAMAs, totaling about 264,876 acres (USFS 2021b). Inventoried roadless areas contribute to ecological sustainability by providing clean drinking water and by functioning as biological strongholds for populations of threatened and endangered species. They provide large, relatively undisturbed landscapes that are important to biological diversity and the long-term survival of many at-risk species. They also serve as barriers against the spread of non-native invasive plant species and provide reference areas for study and research. Inventoried roadless areas also contribute to social sustainability by providing for dispersed recreation, opportunities for which diminish as open space and natural settings are developed elsewhere.

LRMP Components direct that characteristics of IRAMAs are sustained, they serve as safeguards against the spread of invasive species and that they appear natural and provide high scenic quality and opportunities for dispersed recreation.

National Trails (NTMA)

Congress passed the National Trails System Act in 1968. The act authorized creation of a national trail system comprised of national scenic trails, national historic trails, and national recreation trails. The Tonto NF administers four national trails: Highline Trail, Six Shooter Canyon Trail, Great Western Trail, and the Arizona National Scenic.

Significant Caves (SCMA)

The Tonto NF contains many significant caves and karst resources. The Federal Cave Resources Protection Act (FCRPA) of 1988 (16 U.S.C. 4301-4309; 102 Stat. 4546) defines a significant cave as a cave located on NFS lands that has been evaluated and shown to possess features, characteristics, values, or opportunities in one or more of the following resource areas: biota; cultural; geologic-mineralogic-paleontologic; hydrologic; recreational; or educational-scientific for scientific, educational or recreational purposes; and which has been designated "significant" by the forest supervisor. Caves determined to be significant will be governed under provisions of the FCRPA with an objective to secure, protect, and preserve significant caves for the perpetual use, enjoyment, and benefit of all people, and to foster increased cooperation and exchange of information with those who utilize caves for scientific, educational, or recreational purposes.

Lakes and Rivers Management Area (LRMA)

The purpose of the Lakes and Rivers Management Area is to prioritize and manage high-use developed and dispersed recreational opportunities in and around the lakes and major rivers of the Tonto NF. The management area consists of portions of Roosevelt Lake, Apache Lake,

Canyon Lake, Saguaro Lake, Horseshoe Lake, Bartlett Lake, the Verde River, and the lower Salt River (USFS 2021b). It provides additional guidance to sustain and promote the high-use and enhanced recreation in the area.

Lakes provide recreation opportunities such as boating, fishing, picnicking, swimming, and camping. The lower Salt River (below Saguaro Lake) provides opportunities for tubing, fishing, picnicking, rafting, and kayaking and can attract 7,000 recreationists on a busy day. The Verde River provides swimming, picnicking, and kayaking opportunities. Most access and facilities in these areas are highly developed, including campgrounds, picnic sites, boat launches, fishing piers, and paved parking lots. There are many special use permits issued for marinas, resorts, and shuttle services that provide additional recreation opportunities and services to visitors.

Much of the land around the lakes and rivers within this management area is withdrawn from "entry" for irrigation purposes. These "reclamation withdrawals" restrict the ability to occupy, or use the land (e.g., mining and homesteading) in a way that would conflict with the construction, operation, or maintenance of current or future reclamation projects. Reclamation Withdrawals on National Forests Section 3, Part 33 of the Reclamation Act of 1902 (Chap. 1093, 32 STAT. 388) states "Reclamation withdrawals within the national forests are dominant, but until needed by the Reclamation Service, the lands will remain for administrative and protection purposes under control and direction of the Forest Service."

Relevant LRMA guidelines:

- Native riparian vegetation, natural streambank stability, floodplain and wetland function, and soil heath and stability should be maintained, or impacts mitigated from high-use recreation opportunities in the Lakes and Rivers Management Area (LRMA-G-4).
- Permitted livestock grazing should not be authorized in the Lakes and Rivers Management Area except where existing infrastructure or natural boundaries prevent livestock from accessing the rivers and lakes (LRMA-G-5).
- Permitted livestock should not be authorized to cross the Verde River except where necessary and authorized in allotment management plans (LRMA-G-6).

Saguaro Wild Burro Management Area (SWBMA)

The Tonto NF contains one SWBMA established under the Wild Free-Roaming Horses and Burros Act of 1971. The Saguaro Wild Burro Territory covers 27,092 acres within the Sunflower grazing allotment, with the majority located in the Four Peaks Wilderness. Since the early 1990s, no known burros occur in the SWBMA and LRMP desired conditions and standards emphasize that burros shall not be introduced.

Salt River Horse Management Area (SRHMA)

The SRHMA includes the horses that inhabit and that have historically lived in and around the lower Salt River and Saguaro Lake areas in the Tonto NF and are absent a brand or other identifiers indicating ownership.

Arizona law (ARS ss 3-1491) protects the lower Salt River horse herd from being harassed, shot, injured, killed, or slaughtered. It requires written authorization from the Arizona Department of Agriculture or Maricopa County Sheriff's Office before interacting with a horse from the herd,

clarifies that horses from the lower Salt River horse herd are not considered stray under Arizona law, and directs the Arizona Department of Agriculture to enter into an agreement with the Forest Service to implement this article or address any issues relating to the lower Salt River horse herd.

SRHMA desired conditions:

- Salt River horse management allows for healthy, diverse plant communities, satisfactory soil conditions, and sustains the quality of wildlife habitat (SRHMA-DC-4).
- Natural resources in the Salt River Horse Management Area are resilient to disturbances, fluctuations, and extremes in the natural environment (e.g., fire, flooding, drought, climate variability) (SRHMA-DC-5).

SRHMA standard:

- Horses outside of the Salt River Horse Management Area shall be managed as unauthorized livestock (SRHMA-S-2).

Apache Leap Special Management Area (ALSMA)

The ALSMA consists of extremely rugged terrain located east of the town of Superior in the Globe Ranger District. Designated by Congress in December 2014, "Apache Leap's" name originates from its prominent feature, a western-facing escarpment of sheer cliff faces, hoodoos, and buttresses Other features of the special management area include eastern slopes containing canyons and drainages leading to Oak Flat, relatively undisturbed landscape, open space, and dominant backdrop to the Town of Superior and the adjacent U.S. Route 60 (a designated State Scenic Highway). The ALSMA includes approximately 839 acres of land currently under federal and private ownership. Upon completion of the Southeast Arizona Land Exchange (Section 3003 of PL 113-291), the ALSMA will include only federal lands.

The two Components for the ALSMA direct the Tonto NF to protect the cultural, archaeological, and historical resources of Apache Leap while providing access for recreation.

Action Area

The action area is defined as all areas to be 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 addressed in this PBO/PCO includes all lands under the jurisdiction of the Tonto NF (Appendix C, Figure C-1) and all adjacent lands that could be directly or indirectly affected by decisions or actions implemented under the direction of the LRMP.

At over 2.9 million acres, the Tonto NF is Arizona's largest national forest, and seventh largest in the nation. Elevations on the Tonto NF range from 1,300 to 7,900 feet, which gives rise to a variety in vegetation from Sonoran Desert cacti all the way to ponderosa pine forests of the Mogollon Rim.

The Tonto NF is located in portions of Gila, Maricopa, Yavapai, and Pinal counties in central Arizona and is administratively divided into six Ranger Districts: Cave Creek, Globe, Mesa, Payson, Pleasant Valley, and Tonto Basin and one supervisor's office located in Phoenix, Arizona.

STATUS OF THE SPECIES AND CRITICAL HABITAT[2]

The information in the Status of the Species sections summarize the rangewide status of each species that is considered in this PBO/PCO. Further information on the status of these species can be found in documents on our web page (www.fws.gov/southwest/es/arizona) under Document Library, Document by Species, and in other references cited in each summary below.

Plants

Arizona cliffrose (*Purshia subintegra*)

Legal Status
Arizona cliffrose was listed as endangered under the Act on May 29, 1984 (USFWS 1984). Critical habitat has not been designated. The Arizona Cliffrose Recovery Plan was completed in 1995 (USFWS 1995) and a 5-year Review was completed in 2013 (USFWS 2013).

Description
Arizona cliffrose is a long-lived, xerophytic, edaphic endemic woody perennial in the family Rosaceae. Plants are of low stature and open growth form compared with its congener Stansbury cliffrose (*P. stansburiana*). Arizona cliffrose generally flowers from late March through early May and is visited by a wide variety of insects, including lepidopterans, dipterans, and bees. Typically, hundreds of flowers are produced on each mature plant, which can reproduce for many years (USFWS 1995). Other life history traits, such as age at first reproduction, gross and net reproductive rates, and longevity, are unknown (USFWS 1995).

Habitat
This species has narrow habitat requirements and occurs in four widely separated areas in central Arizona: near Bylas (Graham County), the Horseshoe Lake vicinity (Maricopa County), near Burro Creek (Mohave County), and near Cottonwood in the Verde Valley (Yavapai County) (Rutman 1992). These sites differ slightly in elevation and associated vegetation, but all sites have limestone soils (generally white but also reddish in color) derived from Tertiary lakebed deposits, and at each site Arizona cliffrose is part of a locally unique vegetative community (Anderson 1993).

The soils where Arizona cliffrose occur are relatively infertile and have significantly lower amounts of phosphorus and organic matter compared with surrounding areas where the plant is absent (Anderson 1986, 1993). Creosote bush (*Larrea tridentata*) typically dominates surrounding areas and likely has a competitive advantage over Arizona cliffrose due to its aggressive seedling establishment (Anderson 1993). Creosote bush is unable to grow on the relatively infertile lacustrine soils. However, it has been found growing together with Arizona cliffrose in the Verde Valley, in areas with higher amounts of organic matter and phosphorus.

[2] Critical habitat definition is in Appendix A.

This suggests that the distribution of Arizona cliffrose is limited primarily by competition from creosote bush, rather than a requirement for specific soil properties (Anderson 1986, 1993).

Distribution, Abundance and Population Trends

Arizona cliffrose populations in the state are genetically variable, exhibit phenotypic plasticity in response to environmental conditions, and hybridize with Stansbury cliffrose (*P. stansburiana*). These factors have complicated taxonomic identification and quantification of population sizes. Introgression or hybridization between Arizona cliffrose and the more common Stansbury cliffrose has resulted in hybrid swarms in the Tonto Basin and Verde Valley of central Arizona (USFWS 1995). The proliferation of hybrids has the potential to negatively affect long-term population dynamics of Arizona cliffrose through loss of genetic integrity (Fitts et al. 1993).

The total population size of Arizona cliffrose is not known. Not all areas of potential habitat have been surveyed, and in some areas (e.g., Cottonwood/Verde Valley population) the presence of hybrids or introgressed forms has made quantification of total numbers difficult (USFWS 2001). In our most recent 5-year review, we estimated the population size at 20,000 plants (USFWS 2013). The Cottonwood population is the largest population; the most recent, intensive survey estimated that it contained 8,272 plants (Goodwin 2012).

Reproductive output is potentially large, but recruitment rates vary among populations. No demographic studies have been completed in any populations to determine whether recruitment rates are sufficient to maintain or increase population sizes (USFWS 1995). Factors potentially affecting reproductive output include browsing by animals; climatic conditions that influence fruit production, seed viability, and seedling recruitment; and ground-disturbance that affects seedling and adult survival.

Threats

Primary threats to the species include grazing by wildlife, livestock and feral burros, mining, road and utility development, recreational developments, off-highway vehicle (OHV) use, mining and exploration for bentonite; road maintenance and construction activities, and urban development (USFWS 1991, 2001).

Arizona cliffrose is subject to browsing by livestock and wildlife, which may affect its reproductive output. Plants are browsed by livestock, deer, and/or wild burros, which preferentially select tender seedlings, new growth, and branches with flowers and developing fruit and may therefore reduce plant vigor, reproduction, and seedling establishment (Bingham 1976, Phillips et al. 1980, USFWS 1984, Phillips 1986, Denham 1992, Rutman 1992, USFWS 1995). This relatively palatable shrub often receives moderate to heavy grazing pressure when exposed to ungulate herbivores, particularly in the vicinity of water sources and frequently used trails (Bingham 1976, Phillips et al. 1980, Reichenbacher 1987). Observations from Bureau of Land Management (BLM) exclosure studies in the Burro Creek population indicate that consistent yearly browsing pressure may have reduced the vigor and/or form-size class of the remaining plants. Reduced vigor may result in less-than-optimal reproductive success; additionally, the presence of livestock likely reduces seedling establishment (USFWS 1995). The extent to which browsing has altered successful reproduction in any Arizona cliffrose population has not been quantified (USFWS 2001). However, the studies conducted at Burro Creek showed that exclusion of livestock reduced browsing of Arizona cliffrose from 65% to between 16 and

18%. The relatively low levels of browsing following exclusion of livestock and burros were attributed to mule deer and other wildlife (USFWS 1995).

Previous Consultations

Between 1984 and 2021, there have been at least 24 formal section 7 consultations for Arizona cliffrose. Recent section 7 consultations addressing the Arizona cliffrose have included reinitiated or revised Land and Resource Management Plans, proposed grazing, and treatment of noxious weeds. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Arizona hedgehog cactus (*Echinocereus triglochidiatus var. arizonicus*)

Legal Status

Arizona hedgehog cactus was listed as an endangered variety (*Echinocereus triglochidiatus* var. *arizonicus*) rangewide on October 25, 1979 (USFWS 1979). Destruction of habitat from mining activities, significant insect damage, and collection of wild plants were cited as threats to the cactus' survival (USFWS 1979). Designation of critical habitat was not deemed prudent because it would increase threats to the plant from illegal collection. The Arizona hedgehog cactus is also protected by the Arizona Native Plant Law as a Highly Safeguarded Native Plant (Arizona Department of Agriculture 2021) and is protected from international trade by the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES).

At the time of listing, accurate identification of red-flowered claret cup cacti was difficult and multiple varieties of *Echinocereus triglochidiatus* were taxonomically difficult to separate. Subsequent to the listing rule, morphological and cytological investigations determined that the Arizona hedgehog cactus be placed within *Echinocereus arizonicus* instead of a variety of *Ehinocereus triglochidiatus* (Parfitt and Christy 1991, Blum et al. 1998, Baker 2006). The Flora of North America refers to the cactus as a subspecies of *Echinocereus arizonicus*. We are currently working on a technical name change revision and refer to the taxon by the scientific name, *Echinocereus arizonicus* subsp. a*rizonicus*.

Description

The Arizona hedgehog cactus is a succulent perennial, with dark green cylindroid stems that occur singly, or most often, in clusters of a few to twenty stems (Arizona Rare Plant Committee 2000). Occasionally, a plant may have over 50 stems. Stems arise from the base of the plant and are robust, typically 16 inches high and three to four inches in diameter. Each stem has 8 to 13 tuberculate ribs, nine being the most common. Spines are smooth and short; 5 to 11 radial spines per aerole (Arizona Rare Plant Committee 2000) but fewer than nine is often observed (Baker 2006).

Arizona hedgehog cactus flowers in early April to mid-May (Fletcher 1984). Flowers are brilliant red to crimson red, claret-cup shaped with red- or purple-colored anthers and green stigma lobes (Blum et al. 1998, Zimmerman and Parfitt 2003). Floral buds erupt through the upper one-third of the stem. Fruiting occurs from May to late July (Fletcher 1984, Arizona Rare Plant Society 2000). Fruits are globose, spiny, and green in color turning red with maturity (AGFD 2003). The cactus is self-incompatible requiring pollen from a genetically different plant to produce seed. Its pollinators include native bees (*Halictidae*), honeybees (*Apis mellifera*), and

hummingbirds (Anna's hummingbird (*Calypte anna*), broad-billed hummingbird (*Cynanthus latirostris*), and black-chinned hummingbird (*Archilochus alexandri*)) (Aslan 2015).

Habitat

The Arizona hedgehog cactus is endemic to central Arizona between the towns of Superior and Globe/Miami. Individual plants occur from 3,400 to 5,300 feet in elevation within the transition zone of the Mogollon Rim where the upland Sonoran Desert, montane woodlands, and interior chaparral communities converge. The taxon is associated with Apache Leap Tuff (dacite), Schultze Granite, and, to a lesser extent, Pinal Schist geologic substrates (Crosswhite 1992, Cedar Creek Associates 1996). Preferred habitat is characterized by exposed stable bedrock or entrenched boulders, with sufficient interstitial spaces or fissures, on 20–90-degree slopes exposed to 30–70% direct sunlight (Cedar Creek Associates 1996). These features allow retention of moisture and deposition of materials which create pockets of shallow soils needed for root establishment (Cedar Creek Associates 1996). Moderate habitat consists of unconsolidated sediments dominated by loose rock and poor habitat is characterized by deep soils, or shallow stable soils with occasional scattered surficial rock. Its preferred habitat is exposed and stable bedrock or boulders exhibiting sufficient fracturing or rock fields. The cactus' roots invade cracks, fissures, or interstices within exposed rock or narrow pockets between boulders where the microclimate provides the necessary periodic moisture, moist soils, and shelter from high temperatures (Crosswhite 1992, Cedar Creek Associates 1996). The majority of cacti occur scattered on open, rocky slopes of 20 to 90 degrees, and steep fissured cliffs (Philips et al. 1979, Crosswhite 1992). Some plants may be found on level ground in the understory of shrubs and herbaceous vegetation, but moderate to high shrub densities and associated deeper soils tend to preclude the cactus (Cedar Creek Associates 1996).

Distribution, Abundance and Population Trends

At the time of the listing, the Arizona hedgehog cactus was only known from the general vicinity of the type locality, a limited area along U.S. Highway 60 that extends between the towns of Miami and Superior in central Arizona (Fletcher 1984). Surveys and other investigations resulted in a better understanding of its distribution. Currently, the accepted range of the Arizona hedgehog cactus is a narrow geographic area between Superior and Globe in Gila and Pinal counties in central Arizona. The cactus is distributed from the Superstition Wilderness area south to Devils Canyon, east along U.S. 60 to Top of the World, and south to the Pinal Mountains. There is also a small population that occurs on El Capitan.

The Globe Ranger District on the Tonto NF manages over 90% of the known occupied habitat of Arizona hedgehog cactus. The remainder of occupied habitat occurs on land administered by the Bureau of Land Management (BLM), Arizona State Trust Land, and privately owned lands. Based on its known distribution and potential habitat, the estimated range of the Arizona hedgehog cactus is approximately 141,747 acres.

Rangewide surveys of potentially suitable habitat have not been completed. Direct access to a large portion of the species' range, including El Capitan, is limited due to the rugged topography and remoteness of its habitat, making surveys difficult to conduct. However, based on available survey data prior to January 2021 (AGFD 2016, USFWS files), there are approximately 7,053 known Arizona hedgehog cacti. The majority of Arizona hedgehog cactus occurrence data was reported by WestLand Resources, Inc. (WestLand Resources). From 2010 to 2012, Westland

Resources (2013) recorded 4,035 individual cacti on the Tonto NF, which helped improve knowledge about its distribution and abundance, although subsequent surveys and genetic studies found that some of the Arizona hedgehog cactus observed by Westland Resources were actually *Echinocereus santaritensis,* a similar cactus species (M. Baker, personal communication 2013; Fehlberg and Allen 2013).

It is likely that more plants exist in remote, unsurveyed areas. Thus, the total number of individuals and population trends are not well known; however, Fehlberg et al. (2013) found that Arizona hedgehog cactus populations that occur across several mountain ranges appear connected by high levels of gene flow and/or dispersal, which is encouraging for its conservation.

In summer 2021, the Telegraph Fire burned 180,757 acres south of U.S. 60 from Superior to Globe, effecting the Arizona hedgehog cactus and its habitat. About 1,578 Arizona hedgehog cacti were documented in the fire scar; however, many more plants occur in this area but are not accessible or are in unsurveyed areas. Post-fire reconnaissance of 350 individuals found roughly 39% survived apparently unburnt, 32% are partially burned with varying degrees of severity, and 29% appear entirely burnt. During the same period, the Mescal Fire burned 72,250 acres south of Globe and east of El Capitan moving westward. Both fires eventually merged in the area of the El Capitan population on BLM land. The status of this population is unknown. As more information becomes available, estimated abundance will be updated.

<u>Threats</u>
Threats to the Arizona hedgehog cactus include habitat loss and fragmentation from activities associated with mining, mineral exploration, road construction, power-line construction and utility corridors, illegal collection, habitat disturbance from livestock grazing, and climate change that influences increased temperatures and reduced precipitation. Additional threats to the cactus include wildfire, herbicide and pesticide application, and insect infestation (Philips et al. 1979, Cedar Creek Associates 1996).

<u>Previous Related Consultations</u>
Between 1983 and 2020, we have completed at least 25 formal section 7 consultations for the Arizona hedgehog cactus. Recent section 7 consultations addressing the cactus have included Resolution Copper Mine, Resolution Copper Mine Pre-Feasibility Study (22410-2009- F-0229), Frio Fire suppression activities (22410-2011-FE-0477), U.S. 60 highway widening and improvements (02EAAZ00-2012-F-0334), Pinto Bridge Replacement (02EAAZ00-2016-F-0450), and Pinto Valley Mine (02EAAZ00-2020-F-0490). A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Mexican spotted owl (Strix occidentalis lucida) and Critical Habitat

<u>Legal Status</u>
In 1993, USFWS listed the Mexican spotted owl as threatened under the Act (USFWS 1993) and designated critical habitat in 2004 (USFWS 2004). The USFWS appointed the Mexican spotted owl Recovery Team in 1993 (USFWS 1993), which produced the recovery plan for the Mexican spotted owl in 1995 (USFWS 1995). USFWS released the final Mexican spotted owl Recovery

Plan, First Revision (recovery plan) in December 2012 (USFWS 2012).

Description and Life History

The Mexican spotted owl is a medium-sized owl without ear tufts. Spotted owls have mottled feathers with irregular white spots on a brown 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. Mexican spotted owls have distinct annual breeding periods, with courtship beginning in March. Owls typically lay eggs in late March or early April, with eggs hatching approximately 30 days later. Nestling owls generally fledge in early to mid-June. A detailed account of the taxonomy, biology, and reproductive characteristics of the Mexican spotted owl is found in the Final Rule listing the owl as a threatened species (USFWS 1993), the original recovery plan (USFWS 1995), and in the revised recovery plan (USFWS 2012). We include the information provided in those documents by reference.

Habitat Requirements and Distribution

The Mexican spotted owl occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico (USFWS 2012). The owl ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several states in 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 owl occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known owl locations in forested habitats indicate that the species has an affinity for older, uneven-aged forests, and inhabits a physically diverse landscape in the southwestern United States and Mexico.

In the recovery plan (USFWS 2012), the recovery team defined specific forest cover types (mixed conifer and pine-oak) and rocky-canyon habitats that provide nesting, roosting, and foraging habitat for Mexican spotted owls. The availability of habitat used for nesting/roosting of Mexican spotted owls in forested and rocky-canyon environments limits owl distribution (meaning nesting and roosting habitat is a limiting factor for spotted owls). Habitat used for nesting/roosting also provides adequate conditions for foraging and dispersal activities. Thus, sustaining nesting/roosting habitat meets other survival and recovery requirements. Based on the specific forest cover type and rocky-canyon definitions, the recovery plan (USFWS 2012) focuses management recommendations on two categories of owl habitat: Protected Activity Centers (PACs) and "recovery habitat" (the recovery team previously called recovery habitat "restricted habitat" in the 1995 recovery plan; the terms are synonymous).

PACs are intended to sustain and enhance areas that are presently, recently, or historically occupied by breeding Mexican spotted owls (USFWS 2012). Minimum PAC area is 600 acres and is based on the median size of the adaptive kernel contour enclosing 75% of the foraging locations for 14 pairs of radio-marked owls (595 ac) (Ganey and Dick 1995). Thus, PACs protect activity centers used by owls rather than entire home ranges. Consequently, there is no upper limit for PAC sizes; managers may create larger PACs if appropriate. The USFWS and land managers establish PACs around owl sites (as defined in the recovery plan). All PACs should contain a designated 100-acre nest/roost core area, designed to offer additional protection to the nest or primary roost areas. The recovery plan (USFWS 2012) emphasizes protection of habitat used for nesting and roosting within PACs because the owls are most selective for such habitat

(Ganey and Dick 1995, USFWS 2012 [Appendix B]) and these forest conditions are most limited across the landscape. These areas also provide resources to meet other life-history needs of the owl. Therefore, designating PACs protects and maintains occupied owl habitat.

Recovery habitat occurs in forest types and rocky canyons used by owls for roosting, foraging, dispersal, and other life history needs; however, recovery habitat occurs outside of PACs. Recovery habitat is intended to: 1) provide protection for areas that may be used by owls; 2) foster creation of nest/roost habitat; 3) simultaneously provide managers with greater management flexibility than is allowed in PACs; and 4) facilitate development and testing of management strategies that could be applied in PACs (USFWS 2012). Areas not classified as either PACs or recovery habitats, are classified as “Other Forest and Woodland Types” and “Other Riparian Forest Types” (USFWS 2012). These areas, which nesting owls rarely use, but owls may use for foraging and dispersal, generally include pure ponderosa pine forest, pinyon-juniper woodland, or other habitat types. Given their relatively limited importance to nesting owls, the recovery plan (USFWS 2012) contains no owl-specific recommendations in “Other Forest and Woodland Types” and “Other Riparian Forest Types”.

In addition to this natural variability in habitat influencing owl distribution, human activities also 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 revision of the recovery plan (USFWS 2012), we renamed RUs as “Ecological Management Units” (EMUs) to be in accord with current USFWS guidelines. The recovery team divided the owl’s range within the United States into five EMUs: Colorado Plateau (CP), Southern Rocky Mountains (SRM), Upper Gila Mountains (UGM), Basin and Range-West (BRW), and Basin and Range-East (BRE) (USFWS 2012). 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.

<u>Threats</u>
The USFWS cited two primary reasons for the original listing of the Mexican spotted owl in 1993: (1) the historical alteration of its habitat as the result of timber-management practices; and (2) the threat of these practices continuing. We also identified the danger of stand-replacing fire as a looming threat at that time. Since publication of the original recovery plan (USFWS 1995), the USFWS and recovery team acquired new information on the biology, threats, and habitat needs of the owl. Threats to its population in the U.S. (but likely not in Mexico) have transitioned from commercial-based timber harvest to the risk of stand-replacing wildland fire (USFWS 2012). Recent forest management has moved away from a commodity focus, such as commercial-based timber harvest, and now emphasizes sustainable ecological function and a return toward pre-settlement fire regimes, both of which have potential to benefit the spotted owl. However, as stated in the revised recovery plan (USFWS 2012), there is much uncertainty regarding thinning and burning treatment effects and the risks to owl habitat with or without forest treatment as well.

Southwestern forests have experienced larger and more severe wildland fires from 1995 to the present, than prior to 1995 (Westerling 2016). Climate variability combined with unhealthy

forest conditions (i.e., too many trees, high levels of insects and disease, excessive fuel loads, etc.) also synergistically result in increased negative effects to habitat from fire (Fulé et al. 2004, Littell et al. 2009). The intensification of natural drought cycles and the ensuing stress placed upon overstocked forested habitats could result in even larger and more severe fires in owl habitat (Jones et al. 2016, Ganey et al. 2017). Currently, high-severity, stand-replacing fires are influencing the persistence of ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Wildland fire is likely the greatest threat to the Mexican spotted owl within the action area and fire severity and size have been increasing (USFWS 2012). Landscape level wildland fires, such as the Rodeo-Chediski Fire (2002), the Wallow Fire (2011), and the Whitewater-Baldy Complex (2012) have resulted in the degradation of tens of thousands of acres of occupied and potential nest/roost habitat across significant portions of the owl's range. Although owls will forage in severely burned areas, habitat is often lacking for nesting and roosting in these areas, particularly when high severity fire affects large patches of habitat (Jones et al. 2016).

Fuel reduction treatments, though critical to reducing the risk of severe wildland fire, can have short-term adverse effects to owls through habitat alteration and disturbance. As the human population grows in the southwestern United States, small communities within and adjacent to wildlands are being developed. This trend may have detrimental effects to spotted owls by further fragmenting habitat and increasing disturbance during the breeding season.

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

Historical and current anthropogenic uses of Mexican spotted owl habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of owl nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing are prevalent throughout the range of the owl and can have an adverse effect on the availability of grass cover for prey species. Recreation effects are increasing throughout the Southwest, especially in meadow and riparian areas. There is anecdotal information and research that indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior (Swarthout and Stiedl 2001, 2003).

Several fatality factors have been identified as particularly detrimental to the Mexican spotted owl, including predation, starvation, accidents, disease, and parasites. For example, West Nile Virus also has the potential to affect the owl. We have not documented the virus in spotted owls in Arizona, New Mexico, or Colorado, but preliminary information suggests that owls may be

highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of spotted owls and the lack of intensive monitoring of birds that we have banded, we will most likely not know when owls contract the disease or the extent of its effect on the owl rangewide.

Population Status and Process of Delisting

The recovery objective stated in the recovery plan (USFWS 2012) is "to support the Mexican spotted owl throughout its range into the foreseeable future, and to maintain the habitat conditions necessary to provide roosting and nesting habitat for the Mexican spotted owl." In addition, the USFWS and recovery team developed two recovery (or delisting) criteria (addressing listing factors A, C, and E) that we must meet before the owl can be delisted. These criteria are:

1. Owl occupancy rates must show a stable or increasing trend after 10 years of monitoring.

2. Indicators of habitat conditions (key habitat variables) are stable or improving for 10 years in roosting and nesting habitat.

Once the USFWS can show that we have met these two criteria across the range of the owl, the USFWS would then review the regulations and known distribution (the spatial arrangement across its range) of Mexican spotted owls to determine if the delisting process should proceed. At this time, we cannot describe the future desired distribution of owls across their range because changes in the species' range may occur due to factors such as climate change, which could result in shifts in the owl population to the northern portion of its range. In addition to meeting the delisting criteria, to delist the Mexican spotted owl, the USFWS must be able to demonstrate, using the best scientific information, that Federal, state, and tribal land managers have moderated and/or regulated anthropogenic and non-anthropogenic threats to the Mexican spotted owl (USFWS 2012). We derive the best scientific information from research, management experiments, and monitoring conducted at the appropriate scales and intensity. The USFWS must also conduct an analysis of the five listing factors to verify that threat levels are acceptable for likely persistence of owl populations into the future.

In the recovery plan (USFWS 2012), the recovery team identified two types of monitoring recommended for the Mexican spotted owl. The first is surveying for individual owls by using the USFWS's Mexican spotted owl survey protocol (USFWS 2012 [Appendix D]). These are surveys conducted to locate individual owls (which allows the USFWS and land managers to designate PACs) and to monitor the status of owls associated with known PACs (to locate nests and roosts and determine their reproductive status in a given year). Mexican spotted owl surveys conducted since the 1995 recovery plan have increased the USFWS's knowledge of owl distribution, but not necessarily of owl abundance. Population estimates, based upon owl surveys, recorded 758 owl sites from 1990 to 1993, and 1,222 owl sites from 1990 to 2004 in the United States. The 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 adult or subadult owls for nesting, roosting, or foraging. The increase in number of known owl sites is mainly a product of agencies completing new owl surveys within previously unsurveyed areas (e.g., several National Parks within southern Utah, Guadalupe National Park in West Texas, Guadalupe Mountains in southeastern New Mexico and West Texas, Dinosaur National Monument in Colorado, and the

Cibola and Gila National Forests in New Mexico). Thus, we cannot infer an increase in abundance in the species rangewide from these data (USFWS 2012). However, the recovery team and USFWS do assume that an increase in the number of occupied sites is a positive indicator regarding owl abundance.

In addition to the survey protocol for individual owls, the recovery team also developed and recommended a methodology for conducting Mexican spotted owl population monitoring, using an occupancy (presence/absence) model to determine the population trend (stable, increasing, decreasing) of owls rangewide (USFWS 2012 [Appendix E]). The USFWS is currently working with the Southwestern Region of the Forest Service to conduct the population monitoring recommended in the recovery plan (USFWS 2012 [Appendix E]) on NFS lands in Arizona and New Mexico. The effort to conduct this work has occurred during the 2014–2019 breeding seasons as well as the 2021 season (seven years). The recovery team, Forest Service, USFWS, and the Bird Conservancy of the Rockies (BCR, contractor) are continuing to collect data on NFS lands. Of the 200 quadrats sampled on NFS lands in Arizona and New Mexico, 15 are located on the Tonto NF. USFWS is developing a strategy for incorporating additional lands (e.g., National Park Service, Bureau of Land Management, and Department of Defense) into the monitoring. It is important to state that delisting criteria in the recovery plan (USFWS 2012) require that monitoring occur across the range of the owl, not just across an individual land management entity (e.g., must include lands managed by all entities, i.e., not just NFS lands). Currently, based on the work conducted by the Forest Service and BCR, we have further developed the process for conducting rangewide population monitoring (USFWS 2012 [Appendix E]).

It is important to note that the entire range of Mexican spotted owls covers area in five U.S. states (Arizona, Colorado, New Mexico, Texas, and Utah) and a large area of Mexico. Within the United States, Region 3 (Southwestern) NFS lands are located in Arizona and New Mexico, which is only a portion of the range of the Mexican spotted owl. Occupancy monitoring conducted on National Forests in Region 3 alone may not allow the USFWS to meet rangewide delisting criteria, but it will allow the USFWS and Forest Service to assess population trends on Region 3 NFS lands in Arizona and New Mexico. The spatial scale at which this monitoring is occurring allows for interpretation of owl population trends for all Region 3 NFS lands. However, we (BCR, the Forest Service and the USFWS) did not design the current NFS occupancy sampling scheme to scale down to monitor owl occupancy trends on any individual National Forest within the Southwestern Region. We did not design it to meet this smaller scale objective because the objective is to develop a trend for all NFS lands in Region 3, not for each individual forest.

Critical Habitat

USFWS designated critical habitat for the Mexican spotted owl in 2004 on approximately 8.6 million acres (3.5 million hectares) of Federal lands in Arizona, Colorado, New Mexico, and Utah (USFWS 2004). Critical habitat includes only those areas in designated critical habitat units (CHUs) that meet the definition of protected (PAC and steep slopes, as defined) and restricted (now called “recovery”) habitat (unoccupied owl foraging, dispersal, and future nest/roost habitat) as defined in the 1995 recovery plan (USFWS 1995). We determined the primary constituent elements (PCEs) for owl critical habitat from studies of their habitat requirements and information provided in the recovery plan (USFWS 1995). Since owl habitat can include

both canyon and forested areas, we identified PCEs for both habitat types.

The PCEs identified for the owl within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing are:

PCE 1: Forest structure:
a. A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30% to 45% of which are large trees with a trunk diameter of 12 inches or more when measured at 4.5ft (1.4 m) from the ground;
b. A shade canopy created by the tree branches covering 40% or more of the ground; and
c. Large dead trees (snags) with a trunk diameter of at least 12 inches when measured 4.5ft from the ground.

PCE 2: Maintenance of adequate prey species:
a. High volumes of fallen trees and other woody debris;
b. A wide range of tree and plant species, including hardwoods; and
c. Adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration.

The PCEs listed above usually are present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These PCEs may occur 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 older, larger trees persist.

Steep-walled rocky canyonlands occur typically within the Colorado Plateau EMU, but also occur in other EMUs. Owls use canyon habitat for nesting, roosting, and foraging, and includes landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to 1.2 miles (2 kilometers) in width (from rim to rim), with canyon reaches often 1.2 miles (2 kilometers) or greater, and with cool north-facing aspects. The PCEs related to canyon habitat include one or more of the following:

PCE 3: Canyon habitat include one or more of the following:
a. Presence of water (often providing cooler and often higher humidity than the surrounding areas);
b. Clumps or stringers of mixed-conifer, pine-oak, piñon-juniper, and/or riparian vegetation;
c. Canyon wall containing crevices, ledges, or caves; and
d. High percent of ground litter and woody debris.

<u>Mexican Spotted Owl and Critical Habitat Status Summary</u>
Overall, the status of the Mexican spotted owl and its designated critical habitat has not changed significantly since listing rangewide in the U.S. (which includes Utah, Colorado, Arizona, New Mexico, and extreme southwestern Texas). This means the distribution of owls continues to cover the same area, and critical habitat is continuing to provide for the life history needs of the

Mexican spotted owl throughout all the EMUs located in the U.S. We know this because project-level surveys continue to find Mexican spotted owls in the same locations across the range of the owl, and we continue to conduct section 7 consultations on federal agency actions and receive section 10(a)(1)(b) recovery reports that provide rangewide updates regarding owl and habitat status. We do not have detailed information regarding the status of the owl in Mexico, so we cannot make inferences regarding its overall status.

However, this is not to say that changes have not occurred within the owl's U.S. range. Wildland fire has resulted in the greatest degradation of PACs and critical habitat relative to other actions (e.g., such as forest management, livestock grazing, recreation, etc.) throughout the U.S. range of the Mexican spotted owl. These wildland fire effects have mainly affected Mexican spotted owls within the UGM EMU (e.g., Slide and Schultz Fires on the Coconino NF, Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves NF and Whitewater-Baldy Complex on the Gila National Forest) and BRW EMU (e.g., Bighorn Fire, Frye Fire, Nuttall-Gibson Complex, and Horseshoe 2 Fire on the Coronado National Forest). However, wildfire effects have caused significant effects to owl habitat within other EMUs as well (e.g., SRM EMU by the Las Conchas Fire, CP EMU by the Warm Fire).

Previous Consultations

Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Ocelot (Leopardus pardalis)

Legal Status

The ocelot was listed as endangered in 1972 under the authority of the Endangered Species Conservation Act of 1969 (USFWS 1972). The 1969 Act maintained separate lists for foreign and native wildlife. The ocelot appeared on the foreign list, but due to an oversight, not on the native list. Following passage of the ESA in 1973, the ocelot was included on the January 4, 1974, list of "Endangered Foreign Wildlife" that "grandfathered" species from the lists under the 1969 Act into a new list under the ESA (USFWS 1974). The entry for the ocelot included "Central and South America" under the "Where found" column in the new ESA list. Endangered status was extended to the U.S. portion of the ocelot's range with a final rule published July 21, 1982 (USFWS 1982). The "Historic range" column for the ocelot's entry in the rule reads, "U.S.A. (TX, AZ) south through Central America to South America." However, the current list now reads, "Wherever found" under "Where listed." The ocelot was upgraded to CITES Appendix I in 1986 (Nowell and Jackson 1996) and is considered endangered in Mexico under Mexican law (SEMARNAT 2010).

The species has a recovery priority number of 5C, meaning that it has a low potential for recovery with a relatively high degree of conflict.

Description

The ocelot, a medium-sized spotted cat, belongs to the genus Leopardus which also includes the margay (*Leopardus wiedii*) and the oncilla (*Leopardus tigrinus*). The ocelot has been divided into as many as 11 subspecies that range from the southwestern U.S. to northern Argentina (USFWS 2016). Two subspecies occur in the United States (U.S.): the Texas ocelot (*L. pardalis*

albescens) and the Sonora ocelot (*L. p. sonoriensis*) (USFWS 2016). The ocelot weighs from 7-16 kg (15–35 lbs), with males weighing more than females (USFWS 2016). The coloration of the upper parts of the body is pale gray to cinnamon. There are spots on the head, two black stripes on the cheeks and four to five longitudinal black stripes on the neck. The body shows elongated, black-edged spots arranged in chain-like bands. The rounded ears are black dorsally, with a conspicuous white spot. The underparts are whitish, spotted with black. The tail is marked with dark bars or incomplete rings (Hall 1981).

Life History and Habitat

The life history of the ocelot has been summarized by Laack (1991), Laack et al. (2005), Tewes and Schmidly (1987), and others. Ocelots may live greater than 10 years in the wild and can live longer (18 years plus) in captivity (Murray and Gardner 1997).

Although ocelots usually disperse from the natal range, sometimes females may remain in their natal range (Laack 1991). The age at which subadult ocelots disperse from the natal range varies but is about two years of age (Ludlow and Sunquist 1987, Laack 1991). Studies have shown that dispersal distance varies considerably, for example, in Texas, dispersal distances have been documented between 2.5 kilometers (km) and 42.5 km (Navarro-Lopez 1985, Tewes 1986, Laack 1991, USFWS 2016). The longest documented dispersal distance (50 km/31 miles) that we are aware of was of a male ocelot in Tamaulipas, Mexico (Booth-Binczik 2007).

No studies have documented dispersal distance of ocelots in Sonora and Arizona; however, a subadult male ocelot was documented in Arizona in 2010 just west of Globe (it was killed by a car) (Holbrook et al. 2011). Ocelots have also been recently detected in the Whetstone (detected in 2009) (Avila-Villegas and Lamberton-Moreno 2013) and Huachuca Mountains (detections from 2011 to 2017). The nearest recently (in 2011) documented female with young (one kitten) was located about 48 km (30 miles) south of the international border in the Sierra Azul of Sonora, Mexico (Avila-Villegas and Lamberton-Moreno 2013). If ocelots documented in Globe and the Huachuca and Whetstone mountains dispersed from the nearest breeding population, assuming the nearest breeding population is the one previously mentioned, it means the ocelots moved about 220 km (135 miles) to Globe; 55 km (35 miles) to the Huachuca Mountains (Snow 2013), and 110 km (70 miles) to the Whetstone Mountains (Avila-Villegas and Lamberton-Moreno 2013). Avila-Villegas and Lamberton-Moreno (2013), however, believe that travel from northern Sonora to Globe seems unlikely. Additionally, a minimal travel distance (round trip) of 84 km (52 miles) was documented for an ocelot in the Huachuca Mountains who subsequently was documented in the Patagonia Mountains and then back in the Huachucas (Culver 2016).

Ocelots are solitary animals that maintain home ranges (Emmons 1988, Ludlow and Sunquist 1987, Laack 1991, Crawshaw 1995). Home range size for the ocelot varies throughout its range. Adult female home range sizes vary from approximately 2 km^2 to 17 km^2 (494 to 4,201 acres) while adult male home range sizes vary from approximately 5 km^2 to 38 km^2 (1,235 to 9,390 acres), both depending on the habitat type in which they are found (Tewes 1986, Ludlow and Sunquist, 1987, Crawshaw and Quigley 1989, Emmons 1988, Konecny 1989, Laack 1991, Caso 1994, Crawshaw 1995, Fernandez 2002).

No home range studies have been done for ocelots in Arizona; recently, however, Culver (2016) estimated minimum observed ranges for ocelots in Arizona (two in the Huachuca Mountains and

one in the Santa Rita Mountains). The average minimum observed range of the three Arizona ocelots was 30.09 km^2 (11.62 mi^2), with minimum observed ranges ranging from 7.76 to 63.40 km^2 (3.00 to 24.48 mi^2).

Ocelots inhabit a wide variety of densely vegetated habitat types, including, but not limited to, thorn scrub, semi-arid woodland, tropical deciduous and semi-deciduous forest, subtropical forest, lowland rainforest, palm savanna, and seasonally flooded savanna woodland (Tewes 1986, Ludlow and Sunquist 1987, Crawshaw and Quigley 1989, Crawshaw 1995, Fernandez 2002). Although no habitat use studies have been conducted for ocelots in Arizona, based on limited records, Arizona ocelots appear to be associated with Madrean evergreen woodland (Culver 2016, Avila-Villegas and Lamberton-Moreno 2013), semi-desert grassland, and Great Basin grassland biotic communities (Culver 2016).

Of the six ocelots recently recorded in Arizona, the one in the Whetstone Mountains was documented (via remote camera) in Madrean evergreen woodland (Avila-Villegas and Lamberton-Moreno 2013). The male ocelot that was killed by a vehicle west of Globe, Arizona, in 2010 (Holbrook et al. 2011) was in the interior chaparral vegetation community, at an elevation of 1,334 m within the Greater Oak Flat Watershed (Featherstone et al. 2013). Recent detections of three other ocelots in Arizona (in the Huachuca and Santa Rita Mountains) were located in the semidesert grassland (46%), Madrean evergreen woodland (46%), and Great Basin grassland (8%) biotic communities (Culver 2016). On average, all ocelot locations had 23% tree cover and were found at an elevation of 1,832 m. Additionally, on average, they were 2,335 m from perennial water sites and 6,337 m from major roads (Culver 2016).

Despite the variation in habitat use, the species does not appear to be a habitat generalist. Ocelot spatial patterns are strongly linked to dense cover or vegetation, suggesting it uses a fairly narrow range of microhabitats (Emmons 1988, Horne 1998). No habitat use studies have been conducted in Arizona or Sonora.

Distribution and Abundance

Ocelots historically ranged from Louisiana, Arkansas, Texas, and Arizona in the U.S. southward through Mexico, Central and South America to Peru and northern Argentina (Murray and Gardner 1997). Currently, the ocelot ranges from extreme southern Texas and southern Arizona through Mexico and Central America to Ecuador and northern Argentina and Uruguay (Murray and Gardner 1997, USFWS 2016). In Mexico, it has disappeared from much of its historical range on the west coast (Caso et al. 2008). There are reports of the species up to 3,000 meters (9,842 feet) (Caso et al. 2008). We are not aware of any rangewide estimates of suitable ocelot habitat.

Estimating population sizes of secretive nocturnal carnivores, especially species that inhabit dense vegetative cover, such as the ocelot, is difficult. We are not aware of any rangewide estimates for ocelots; however, population size has been estimated in a number of countries. An effective population size of 10,000 to 528,732 individuals was estimated for Brazil (Oliveira et al. 2013). A total population of 1,500 to 8,000 individuals was estimated for Argentina (Aprile et al. 2012). A population of 2,025 +/- 675 ocelots in Sonora was estimated by López González et al. (2003) based on the distribution of these records and the availability of potential habitat. Gómez-Ramírez (2015) estimated a population of 1,421 ocelots in Sonora. The U.S. population

of the Texas ocelot subspecies has fewer than 100 individuals, found in two separate populations in southern Texas (USFWS 2016). A third and larger population of the Texas/Tamaulipas ocelot subspecies occurs more than 200 km (~124 mi) south of the Texas/Mexico border in the Sierra of Tamaulipas, Mexico (Caso 1994). Stasey (2012) reported a population estimate of 371 ocelots in a 1,560 km^2 patch of habitat in the Sierra of Tamaulipas.

Since 2009, a total of six ocelots have been detected in Arizona, including five detected by trail cameras and hunting dogs, and one dead ocelot that had been struck by a vehicle. In November 2009, a live ocelot (sex unknown) was documented in the Whetstone Mountains in Cochise County, Arizona (Avila-Villegas and Lamberton-Moreno 2013). In April 2010, a second ocelot was found dead on a road near Globe, Arizona. Origin of the ocelot recovered in Globe is still unclear due to a lack of comparative samples from Arizona or Sonora although in the DNA analysis, it clustered with samples from Mexico. A two-year camera-trap study in the area near Globe, Arizona, did not photograph any additional ocelots (Featherstone et al. 2013).

In February 2011, a third male ocelot was photographed in the Huachuca Mountains. In May 2012, a fourth male ocelot was detected in the Huachuca Mountains via trail camera. In April 2014, a fifth male ocelot was detected in the Santa Rita Mountains via trail camera. In March 2018, a 6th ocelot (male) was documented via trail camera in the Huachuca Mountains. In 2018, he was subsequently found dead in the Huachuca Mountains with injuries sustained from being struck by a vehicle.

In addition to the recent Arizona sightings, a number of ocelots have been documented just south of the U.S. border in Sonora, Mexico. Specifically, with the use of camera traps, six ocelots were documented between February 2007 and April 2011 in the Sierra Azul, about 30 miles southeast of Nogales, including two males, one female, one kitten, and two of undetermined sex (Avila-Villegas and Lamberton-Moreno 2013). Additionally, one ocelot was documented in 2009 in the Sierra de Los Ajos, about 30 miles south of the U.S. border near Naco, Mexico (USFWS 2016). Also in Sonora, López González et al. (2003) obtained 36 verified ocelot records, 21 of which were obtained after 1990, including 19 individual male records, 6 females, and 11 of undetermined sex. Out of these records, the northern-most record of a female was at 30°30' latitude and only one record was of a kitten (located in the southern part of Sonora) (López González et al. 2003).

Although methods used to calculate densities vary among studies, some ocelot population density estimates for particular habitats include: 2.02/100 km^2 (38.6 $miles^2$) in tropical thornscrub to tropical deciduous forest in Sonora, Mexico (Gómez Ramírez 2015); 25/100 km^2 to 360/100 km^2 in the tropical deciduous forest of Jalisco (Fernandez 2002, Casariego Madorell 1998); 30 adult ocelots/100 km^2 in Bolivian dry-forests (Maffei et al. 2005); and 40 adult ocelots/100 km^2 in the llanos (interspersed dry tropical forest in savanna) of central Venezuela (Ludlow and Sunquist 1987).

<u>Threats and Conservation Efforts</u>

A detailed account of threats to ocelots is included in the 2016 ocelot recovery plan, first revision. In summary, however, while the ocelot is protected over most of its range, it is still threatened by habitat degradation and fragmentation due to urban expansion, roads, mining, agriculture and livestock grazing, illegal killing (e.g., retaliatory killing due to depredation of

poultry), and illegal trade (pet and pelt) (Fernandez 2002, Caso et al. 2008, USFWS 2016). Increased illegal and law enforcement actions along the Mexico-U.S. border could limit ocelot movement across the border, but it is uncertain if and how much this is affecting that movement.

In Arizona and northern Sonora, since 2007, in there have been five documented cases of ocelots being killed by vehicles or illegally killed, including: one ocelot struck by a vehicle close to Globe; one ocelot struck by a vehicle in the Huachuca Mountains; one ocelot struck by a vehicle on Mexico Highway 2, between Imuris and Cananea, Sonora; and two ocelots illegally killed in the Sierra Azul (Avila 2013). The ocelot in the Huachuca Mountains was accidentally struck, while dark out, by a vehicle traveling at or below the speed limit in a 25 miles-per-hour single lane, paved road.

While not in the action area, border infrastructure that prevents passage of ocelots into Arizona from Mexico will affect the presence and status of ocelots in Arizona, including in the action area. Because Mexico is the source of ocelots in Arizona, connectivity to Mexico is likely essential for maintaining ocelots in Arizona (the northern portion of the Arizona-Sonora Management Unit [ASMU]). As included in the recovery criteria for this species, delisting the species will require that habitat linkages to facilitate an ASMU metapopulation are identified and conserved for the foreseeable future. Border infrastructure now exists along a majority of the Arizona border with Mexico; however, we are uncertain at this time how much of the fence is permeable to ocelots.

The ocelot is included on CITES Appendix I and is protected across most of its range (Caso et al. 2008). Part of the species range includes protected areas, including some capable of maintaining long-term viable populations (Caso et al. 2008). While degradation and fragmentation of habitat adversely affect ocelot populations, there have been notable efforts to acquire, protect, and restore habitat, and decrease mortality of the species throughout its range. There is a detailed account of planning and conservation efforts for the ocelots in the Texas-Tamaulipas and Arizona-Sonora Management Units in the 2016 ocelot recovery plan, first revision.

As described in the 2016 Recovery Plan for the Ocelot, First Revision, some planning and conservation efforts have been made for the Sonora subspecies.

Previous Consultations
A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files. There are no previous formal consultations for the ocelot in the action area.

Herptiles

Chiricahua leopard frog (*Lithobates chiricahuensis*) and Critical Habitat

Legal Status
The USFWS listed the frog as a threatened species without critical habitat in 2002 (USFWS 2002). Included was a special rule under Section 4(d) of the Act to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. Since that time, the taxonomists' subsumed the Ramsey Canyon leopard frog (*Lithobates subaquavocalis*) into *Lithobates chiricahuensis* (Crother 2008) and the USFWS recognizes it as

part of the listed entity (USFWS 2009, 2012). As a result, the USFWS reassessed the status of and threats to the currently described species *Lithobates chiricahuensis*, including the population previously described as the Ramsey Canyon leopard frog. We published a revised final rule on March 20, 2012 (USFWS 2012) that listed the species as threatened rangewide with designated critical habitat and included the special rule from the original listing. Final designation of critical habitat includes 39 areas in Arizona and New Mexico. The USFWS finalized the Chiricahua Leopard Frog Final Recovery Plan (recovery plan) in 2007 (USFWS 2007).

Description and Life History

The frog is distinguished from other members of the *Lithobates pipiens* complex by a combination of characteristics, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Platz and Mecham 1979, Davidson 1996). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Platz and Mecham 1979, Stebbins 2003).

Habitat Requirements and Distribution

The frog's range extends through the southeastern sections of Arizona and adjacent Sonora, Mexico, at elevations ranging from 1,219–4,023 feet, and from montane central Arizona east and south along the Mogollon Rim to montane parts of west-southwestern New Mexico, at elevations ranging from 3,500–8,040 feet. This species inhabits federal, tribal, and privately owned land.

The Chiricahua leopard frog no longer occurs in about 80% of its historical localities in Arizona and New Mexico. The species is still extant in the major drainage basins in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. However, we do not have recent detections from many rivers within those major drainage basins, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no records from 1995 to the present exist for the Pinaleño Mountains or Sulphur Springs Valley. As of 2009, there were 84 sites in Arizona at which Chiricahua leopard frogs occur or are likely to occur in the wild, with an additional four captive refuge sites. At least 33 of the wild sites support breeding. In Mexico, we know of 19 and 8 localities from Sonora and Chihuahua, respectively. The species' status in Mexico is unclear; however, in recent years, observers have detected the frog in western Chihuahua.

The primary habitat type for the Chiricahua leopard frog includes oak, mixed oak, and pine woodlands, although its habitat ranges into areas of chaparral, grassland, and desert, particularly for the southern populations. This species requires permanent water sources, including streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs. Natural aquatic systems include rocky streams with deep rock-bound pools, river overflow pools, oxbows, permanent springs, permanent pools in intermittent streams, and beaver dams. Human-influenced aquatic systems include earthen stock tanks, livestock drinkers, irrigation sloughs, mine entrances, abandoned swimming pools, and ornamental backyard pools

(USFWS 2007).

Population Status
The recovery plan identifies eight recovery units in portions of Arizona, New Mexico, and Mexico. The Tonto NF occurs within Recovery Unit 5 and includes five Management Units (USFWS 2007).

The recovery criteria to delist the Chiricahua leopard frog include:

- At least two metapopulations located in different drainages, plus at least one isolated and robust population in each recovery unit;
- Protection of these populations and metapopulations;
- Connectivity and dispersal habitat protection; and,
- Reduce or eliminate threats and causes of decline, and commitments of long-term management are in place in each Recovery Unit such that the frog is unlikely to need protection under the Act in the foreseeable future.

The total number of known sites occupied by leopard frogs in Arizona increased from 49 in 2002 to 90 in 2009 (USFWS 2011), although later reported as 84 occupied sites in 2009 (USFWS 2012). The USFWS assessed Chiricahua leopard frog populations in Arizona as trending between “roughly stable” and “experiencing substantial increases” (USFWS 2011).

Threats
The primary threats to this species are predation by non-native organisms and die-offs caused by a fungal skin disease—Chytridiomycosis. The Chytridiomycete skin fungus, (*Bd* is the organism that causes chytridiomycosis) is responsible for global declines of frogs, toads, and salamanders (Berger et al. 1998, Longcore et al. 1999, Hale 2001). Additional threats include drought, floods, degradation and destruction of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes, mining, development, and other human activities; disruption of metapopulation dynamics, resulting from an increased chance of extirpation or extinction resulting from small numbers of populations and individuals, and environmental contamination (USFWS 2007). Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey et al. 2001). Witte et al. (2008) analyzed risk factors associated with disappearances of ranid frogs in Arizona and found that mortality was more common at higher elevations and in areas where other ranid population disappearances occurred. Disappearances were also more likely where introduced crayfish occur, but were less likely in areas close to a source population of frogs.

Chytridiomycosis and non-native organisms, coupled with habitat fragmentation and destruction resulting from water diversion, groundwater pumping, and pollution, means that recovery criteria outlined in the recovery plan have not been met for this species. Climate change and increases in UV radiation will likely affect leopard frogs in the future. Other threats include drought, floods, wildfires, degradation and destruction of habitat, water diversions and groundwater pumping, disruption of metapopulation dynamics (relationships among populations of frogs), increased chance of extirpation or extinction resulting from small numbers of populations and individuals, and environmental contamination.

Critical Habitat

The 2012 critical habitat rule for the Chiricahua leopard frog designated 39 CHUs (approximately 10,346 acres [4,187 ha]) in the eight RUs within the range of the species in Arizona and New Mexico (USFWS 2012). The purpose of the designation of critical habitat is to conserve the physical or biological features that are essential to the conservation of the species and which 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 primary constituent elements (PCEs) specific to the Chiricahua leopard frog are:

1. Aquatic breeding habitat and immediately adjacent uplands exhibiting the following characteristics:
    a. Standing bodies of fresh water (with salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present), including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or rarely dry for more than a month. During periods of drought, or less than average rainfall, these breeding sites may not hold water long enough for individuals to complete metamorphosis, but we still consider these sites essential breeding habitat in non-drought years.
    b. Emergent and or submerged vegetation, root masses, undercut banks, fractured rock substrates, or some combination thereof, but emergent vegetation does not completely cover the surface of water bodies.
    c. Non-native predators (e.g., crayfish [*Orconectes virilis*], American bullfrogs [*Lithobates catesbeianus*], non-native predatory fishes) absent or occurring at levels that do not preclude presence of the Chiricahua leopard frog.
    d. Absence of chytridiomycosis, or if present, then environmental, physiological, and genetic conditions are such that allow persistence of Chiricahua leopard frogs.
    e. Upland areas that provide opportunities for foraging and basking that are immediately adjacent to or surrounding breeding aquatic and riparian habitat.

2. Dispersal and non-breeding habitat, consisting of areas with ephemeral (present for only a short time), intermittent, or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provides corridors (overland movement or along wetted drainages) for frogs among breeding sites in a metapopulation with the following characteristics:
    a. Are not more than 1.0 mile (1.6 kilometers) overland, 3.0 miles (4.8 kilometers) along ephemeral or intermittent drainages, 5.0 miles (8.0 kilometers) along perennial drainages, or some combination thereof not to exceed 5.0 miles (8.0 kilometers).
    b. In overland and non-wetted corridors, provides some vegetation cover or structural features (e.g., boulders, rocks, organic debris such as downed trees or logs, small mammal burrows, or leaf litter) for shelter, forage, and protection from predators; in wetted corridors, provides some ephemeral, intermittent, or perennial aquatic habitat.
    c. Are free of barriers that block movement by Chiricahua leopard frogs, including,

> but not limited to, urban, industrial, or agricultural development; reservoirs that are 50 acres (20 hectares) or more in size and contain predatory non-native fishes, bullfrogs, or crayfish; highways that do not include frog fencing and culverts; and walls, major dams, or other structures that physically block movement.

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

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

Approximately 36% of all designated critical habitat for the Chiricahua leopard frog is located on five Arizona NFs (the Coronado, Gila, Tonto, Coconino, and Apache-Sitgreaves). In total, approximately 3,762 acres (1,524 ha) of critical habitat occurs on these five NFs and the majority of these CHUs are represented by populations occupying stock tanks. The Tonto NF includes approximately 11% (417 acres [169 ha]) of the critical habitat designated on Region 3 NFS lands.

Previous Consultations

Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Narrow-headed gartersnake (*Thamnophis rufipunctatus*) and Critical Habitat

Legal Status

The Federal Register notice listing the narrow-headed gartersnake as threatened under the Act was published on July 8, 2014 (USFWS 2014). Please refer to this rule for more in-depth information on the ecology and threats to the species, including references. Critical habitat was designated on October 21, 2021 (USFWS 2021b). Details on critical habitat are provided below. The final listing and critical habitat rules are incorporated herein by reference.

Background

The following information is a summary of life history, habitat use, current distribution, and threats for the narrow-headed gartersnake. This information was taken from the final rule listing the species, and the most recent Biological and Conference Opinion for Wildlife and Sport Fish Restoration Funding of Arizona Game and Fish Department's Statewide and Urban Fisheries Stocking Program for 2021–2031 (USFWS 2021a). Information in these documents is incorporated by reference.

Description

The narrow-headed gartersnake is a small to medium-sized gartersnake with a maximum total

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 (but may darken) with conspicuous brown, black, or reddish spots that become indistinct towards the tail (Rosen and Schwalbe 1988, Boundy 1994). The scales are keeled. Degenhardt et al. (1996), Rossman et al. (1996), and Ernst and Ernst (2003) further describe the species.

Habitat and Natural History

The narrow-headed gartersnake is distributed across the Mogollon Rim of Arizona and New Mexico and is widely considered to be one of the most aquatic of the gartersnakes (Drummond and Marcias Garcia 1983, Rossman et al. 1996), as a function of its prey specificity. This species is strongly associated with clear, rocky, often perennial streams, using predominantly pool and riffle habitat that includes cobbles and boulders (Rosen and Schwalbe 1988, Degenhardt et al. 1996, Rossman et al. 1996, Nowak and Santana-Bendix 2002, Ernst and Ernst 2003), but has also been documented using isolated pools within intermittent streams as foraging habitat; in some cases over a half-mile away from the nearest reach with above-ground flow (Cotton et al. 2017).

Narrow-headed gartersnakes occur at elevations from approximately 2,300 to 8,200 ft (701 to 2,500 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). Despite the reputation of being highly aquatic, narrow-headed gartersnakes found in water represented less than 10% of total observations according to a multi-year telemetry study in New Mexico (Jennings and Christman 2012). These data suggest that this species may 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 and a variety of organic and inorganic cover for their thermoregulatory needs. 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). Crevices within bedrock associated with outcrops and cliffs along suitable streams appear to provide critical microsites for sheltering and are often used by aggregations of narrow-headed gartersnakes (Rosen et al. 2012).

Narrow-headed gartersnakes eat fish (Rosen and Schwalbe 1988, Degenhardt et al. 1996, Rossman et al. 1996, Nowak and Santana-Bendix 2002, Nowak 2006, Jennings and Christman 2012), and are considered specialists in this regard. This species is an underwater ambush hunter, believed to be heavily dependent on visual cues when foraging (de Queiroz 2003, Hibbitts and Fitzgerald 2005). Therefore, sediment and turbidity levels within the water column may affect foraging success. While the preponderance of literature and expert opinion find that narrow-headed gartersnakes eat primarily fish, a late-stage Arizona toad (*Anaxyrus microscaphus*) larva was regurgitated from a wild narrow-headed gartersnake in Saliz Creek, New Mexico (Christman et al. 2021), the first observation of its kind from wild specimens.

Growth rates of wild narrow-headed gartersnakes can be significant; indicating that growth to maturity may be achieved over a relatively short period of time, perhaps as short as 2 years of age (Jennings and Christman 2012). Narrow-headed gartersnakes are viviparous, breeding annually. Females give birth to 4 to 17 offspring from early- to mid-July (Jennings and Christman 2012) into early August, perhaps earlier at lower elevations (Rosen and Schwalbe 1988). Longevity in this species may be up to 10 years in the wild (Rosen and Schwalbe 1988).

Home ranges of narrow-headed gartersnakes were recorded using ingested telemetry technology and determined using minimum convex polygons in New Mexico (Jennings and Christman 2012). The maximum home range calculated was 5.5 acres but ingested telemetry techniques significantly limit the tracking duration of individuals, so estimates are likely smaller than actual (Jennings and Christman 2012). Home ranges tended to have their long axis parallel the associated stream (Jennings and Christman 2012).

Historical Distribution

Historical distribution of the narrow-headed gartersnake ranged across the Mogollon Rim and along associated perennial stream drainages from central and eastern Arizona, southeast to southwestern New Mexico at elevations ranging from 2,300 to 8,200 ft (700 to 2,500 m) (Rosen and Schwalbe 1988, Rossman et al. 1996, Holycross et al. 2006). The species was historically distributed in headwater streams of the Gila River subbasin that drain the Mogollon Rim and 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). Despite the 2,300 ft low elevation record for narrow-headed gartersnakes at Horseshoe Bend along the Salt River (Rosen and Schwalbe 1988), 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. Numerous records for the narrow-headed gartersnake (through 1996) in Arizona are maintained in the AGFD's Heritage Database.

Current Distribution and Population Status

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 decimated 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 chemical fish renovation project (NMDGF 2017), the Whitewater Creek population is now considered extirpated. Based on the most recent capture rates and survey results from Diamond Creek, New Mexico, (Gartersnake Conservation Working Group [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 (Jennings et al. 2019).

The 2014 Slide Fire which occurred within the Oak Creek and West Fork Oak Creek watersheds,

posed a unique threat to the resident narrow-headed gartersnake population but recent surveys (GCWG 2016) suggest the fish community may not have been as severely affected as originally thought. Nowak (2006) demonstrates population reductions in narrow-headed gartersnakes and fewer snakes per person-search hour effort, as compared to that of Rosen and Schwalbe (1988) in this same area; a trend which may be continuing according to visual encounter survey detection rates at repeated transects in Oak Creek and West Fork Oak Creek (Nowak 2016). Detection rates in Oak Creek declined from 0.65 snakes detected per person-search hour in 1985 to 0.1 per person-search hour in 2015 (Nowak et al. 2017).

Across its range, many areas where previous records occur are heavily affected by predatory non-native species or are vulnerable to drought or human water use effects. Existing sampling data suggest that perhaps only three populations of narrow-headed gartersnakes are considered relatively dense where the species remains somewhat reliably detected: 1) Tularosa River (NM); 2) Middle Fork Gila River (NM); and 3) Oak Creek/ West Fork Oak Creek.

Occupancy, Surveys, and Detection

Gartersnakes, like snakes in general, are notoriously difficult to detect due to their small size, fossorial behavior, camouflage, rarity, inaccessibility of shelter sites (Kery 2002), ability to occur in low densities, and they are often unobservable in their chosen habitats (Ward et al. 2017). Like most reptiles, snakes have low energy demands, exhibit surface activity patterns that are unpredictable, and frequently forgo surface activity to avoid predation (Boback et al. 2020). Snakes that prefer lentic or lotic aquatic habitat are particularly problematic for detection. Habitat characteristics and preferences can affect detection using visual encounter surveys (Boback et al. 2020). Snakes can simply be unavailable for detection, whether underground, in vegetation, or underwater, which is considered availability bias. Whereas snakes that are available for detection but are not seen, result in perception bias. Both availability bias and perception bias are quite common in reptiles and amphibians and result in underestimation of distribution or abundance (Boback et al. 2020). Significant gaps in the history of records of the narrow-headed gartersnake ranging from 23 to 74 years underscore how narrow-headed gartersnakes elude detection from surveys for decades at a time.

Further complicating our assessment of occupancy is the limited accessibility to long stream reaches that flow through roadless or wilderness areas, presenting significant logistical challenges to surveying. Thus, most, if not all, survey locations occur in conjunction with access points (i.e., road crossings), but do not adequately represent the species' population status elsewhere along streams that are hundreds of river miles long and possess suitable habitat attributes along their course. Model simulations using trap data suggest the best way to decrease uncertainty in estimates of gartersnake occupancy is to increase the number of sampled sites (Halstead et al. 2015) within stream systems.

The number of surveys required to have confidence in species absence of a given area is highly dependent upon survey effort and associated species detectability; greater effort is required to infer population trends (Ward et al. 2017). The number of surveys required to infer absence of gartersnakes from any particular stream may be orders of magnitude higher than the current level of effort afforded to this purpose over recent history. The cost of making Type II errors may be high for snake conservation. Therefore, a more stringent probability factor of 99% may be necessary to lower the risk of Type II errors, which would require a minimum of 40 independent

surveys be conducted to infer species absence.

Falsely declaring a species absent can result in improper conservation decisions or even extirpation of populations due to the lack of appropriate protections (Kery 2002, Halstead et al. 2011). Given the imperfect nature of gartersnake surveys and limited inferences that can be made about population status as well as the presence of known stressors to narrow-headed gartersnakes throughout much of their known range, and the ability of gartersnakes to elude detection during protocol surveys, we expect the species remains extant in all historically streams (except for Whitewater Creek within the San Francisco Subbasin). Currently, we expect narrow-headed gartersnakes to generally occur as low-density subpopulations that are spatially isolated along stream courses where habitat retains important characteristics. The history of records from 1980 to present (representing the most-surveyed period of time for this species) throughout all known historically occupied streams portrays the universe of potentially extant populations with imperfect resolution, which demonstrates the need to expand survey effort both in terms of the number of sites sampled within streams and the number and duration of traps and trapping effort across seasons and years.

Factors Associated with Population Declines and Range Contraction

Predatory Non-native Species - The best available commercial and scientific information confirms that predatory non-native species such as bass (*Micropterus* sp.), flathead catfish (*Pylodictis* sp.), channel catfish (*Ictalurus* sp.), bullheads (*Ameiurus* sp.), sunfish (*Lepomis* sp.), crappie (*Pomoxis* sp.), brown trout (*Salmo trutta*), American bullfrogs (*Lithobates catesbeiana*), and crayfish (northern (virile) crayfish (*Orconectes virilis*) and red swamp crayfish (*Procambarus clarkii*) are the most significant threat to narrow-headed gartersnakes and their prey base, and have had a profound role in their rangewide decline.

In addition to risking physical injury from the dorsal or pectoral spines of predatory non-native fish while attempting to ingest them (Emmons et al. 2016), complex ecological interactions between these predatory non-native species and the native aquatic community have resulted in 1) direct predation on gartersnakes; 2) shifts in biotic community structure from largely native to largely non-native; and 3) competition for a diminished gartersnake prey base that can ultimately result in the injury, starvation, or death of individual narrow-headed gartersnakes. These circumstances can result in 1) reduced recruitment within populations; 2) subsequent population declines; and ultimately 3) local and regional extirpations.

Diminishing Surface Water - Activities that reduce flows or dewater habitat, such as dams and diversions (Ligon et al. 1995, Turner and List 2007), flood-control projects, and groundwater pumping (Stromberg et al. 1996, Rinne et al. 1998, Voeltz 2002, Haney et al. 2009, USGS 2013), seriously threaten the physical habitat of the gartersnakes' prey base and are second only to predatory non-native species in their scope and magnitude of effect on the narrow-headed gartersnake itself.

High Severity Wildfire - High intensity wildfires lead to excessive sedimentation and ash flows which can, in turn, result in sharp declines in fish communities downstream and even complete fish kills. Post-fire flooding with significant ash and sediment loads can result in significant declines, or even the collapse, of resident fish communities, which poses significant concern for the persistence of resident gartersnake populations in affected areas. Sedimentation can adversely

affect fish populations used as prey by narrow-headed gartersnakes by: (1) Interfering with respiration; (2) reducing the effectiveness of fish's visually based hunting behaviors; and (3) filling in interstitial (spaces between cobbles, etc., on the stream floor) spaces of the substrate, which reduces reproduction and foraging success of fish (Wheeler et al. 2005).

Increasing Demand for Water - Human population growth in the southwest has been significant (Gammage et al. 2008) and is expected to increase. This projected population growth will intensify pressure on the region's water resources (Overpeck 2008), in particular larger perennial or near-perennial streams which are integral to the recovery of the narrow-headed gartersnake. The combination of greater human use of water and climate change-induced drought, could significantly limit surface water in the Southwest, exacerbate the ecological effect of predatory non-native species, and therefore the recovery of narrow-headed gartersnakes on a rangewide scale.

Climate Change and Drought - The future of the narrow-headed gartersnake is also intrinsically linked to climate change. As discussed above, the narrow-headed gartersnake depends on fish populations as prey. Climate change is expected to disproportionately affect the prey base of narrow-headed gartersnakes both through effects to habitat and through community interactions between native and non-native species. Effects of climate change in the southwestern United States are predicted to benefit predatory non-natives over native aquatic species. Climate change is predicted to foster the expansion of predatory non-native aquatic species into new areas, magnify the effects of existing aquatic non-native species where they currently occur, increase predation rates from non-native predators, and heighten the virulence of disease outbreaks in North America (Rahel et al. 2008). As annual precipitation amounts lower, base flows weaken, and pools decline in volume and persistence, aquatic vertebrate populations will be forced to occupy smaller aquatic spaces which will increase the frequency of interactions between predatory non-native species and native species, thus increasing predation and hastening the decline of native aquatic species throughout the southwestern United States.

Genetic Effects - Collectively, threats affecting this species have created isolated populations, which have reduced the genetic connectivity among extant narrow-headed gartersnake populations and resulted in genetic drift and subsequently, the potential for inbreeding and limited adaptive potential to address abiotic and biotic changes over time (Wood 2018).

Estimates of effective population size for narrow-headed gartersnakes across sites resulted in values (13–42) well below the threshold (≥ 100) to limit inbreeding depression, with effective population sizes being found particularly low at Canyon Creek, Blue River, and Middle Fork Gila River (Wood et al. 2018). Wood et al. (2018) also detected significant bottlenecks at all sites which suggests loss of genetic diversity has occurred across the range of this species within the last 2–4 generations.

Synergistic Stressors - Many other factors have contributed to the decline of the narrow-headed gartersnake, and in some cases, continue to present a significant threat to low-density populations through synergistic mechanisms, including: climate change and drought (IPCC 2007, Seager et al. 2007, Overpeck 2008); development and recreation within riparian corridors (Briggs 1996, Ernst and Zug 1996, Green 1997, Wheeler et al. 2005, Paradzick et al. 2006);

indirect effects from fisheries management activities (Dawson and Kolar 2003, Carpenter and Terrell 2005, Holycross et al. 2006, Finlayson et al. 2010); road construction, use, and maintenance (Klauber 1956, Waters 1995, Shine et al. 2004, Ouren et al. 2007, Breininger et al. 2012); adverse human interactions with gartersnakes (Fleharty 1967, Green 1997, Nowak and Santana-Bendix 2002, Hibbitts and Fitzgerald 2005); environmental contaminants (Hopkins et al. 1999, Campbell et al. 2005, Rainwater et al. 2005, Wylie et al. 2009); and mortality from entanglement hazards such as erosion control products (Stuart et al. 2001, Barton and Kinkead 2005, Kapfer and Paloski 2011, Barragán-Ramírez and Ascencio-Arrayga 2013, NMDGF 2013).

For a detailed analysis on the status of and threats to the narrow-headed gartersnake, please review the final listing rule (USFWS 2014) which is incorporated herein by reference.

Critical Habitat

Critical habitat for the narrow-headed gartersnake has been designated in eight units in portions of Arizona and New Mexico totaling 23,785 acres. Within these areas, the physical and biological features essential to narrow-headed gartersnake conservation are:

1. 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, and cobble and boulder substrate, with low amount of fine sediment and substrate embeddedness;
    b. Organic and natural inorganic structural features (e.g., cobble bars, rock piles, large boulders, logs or stumps, aquatic vegetation, vegetated islands, logs, and debris jams) in the stream channel for basking, thermoregulation, shelter, prey base maintenance, and protection from predators;
    c. Water quality that meets or exceeds applicable State surface water quality standards; and
    d. Terrestrial habitat up to 328 feet (100 meters) from the active stream channel (water's edge) that includes flood debris, rock piles, and rock walls containing cracks and crevices, small mammal burrows, downed woody debris, and streamside vegetation (e.g., alder, willow, sedges, and shrubs) for thermoregulation, shelter, brumation and protection from predators throughout the year.
2. 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.
3. A combination of native fishes, and soft-rayed, non-native fish species such that prey availability occurs across seasons and years.
4. An absence of non-native aquatic predators, such as fish species of the families Centrarchidae and Ictaluridae, American bullfrogs (*Lithobates catesbeianus*), and/or crayfish (*Orconectes virilis*, *Procambarus clarki*, etc.), or occurrence of these non-native

species at low enough levels such that recruitment of narrow-headed gartersnakes is not inhibited and maintenance of viable prey populations is still occurring.
5. Elevations of 2,300 to 8,200 ft (700 to 2,500 m).

Previous Consultations
Several Federal actions affect this species every year that require formal section 7 consultation. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files. Survey work and recovery projects also occur periodically and are summarized in the listing document (USFWS 2014b).

Northern Mexican gartersnake (*Thamnophis eques megalops*) and Critical Habitat

Legal Status
Northern Mexican gartersnake was listed as threatened under the Endangered Species Act on July 8, 2014 (USFWS 2014). Please refer to this rule for more in-depth information on the ecology and threats to the species, including references. Critical habitat was designated as final on April 28, 2021 (USFWS 2021a). Details on critical habitat are provided below. The final listing and critical habitat rules are incorporated herein by reference.

Background
The following information is a summary of life history, habitat use, current distribution, and threats for the northern Mexican gartersnake. This information was taken from the final rule listing the species, and the most recent Biological and Conference Opinion for Wildlife and Sport Fish Restoration Funding of Arizona Game and Fish Department's Statewide and Urban Fisheries Stocking Program for 2021–2031 (USFWS 2021b). Information in these documents is incorporated by reference.

Description
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 for people without specific expertise to identify because of its similar appearance to other native gartersnake species. The position of the lateral strip 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.

Habitat and Natural History
Considered a "terrestrial-aquatic generalist" by Drummond and Marcías-García (1983), the northern Mexican gartersnake is often found in riparian habitat, but also may spend time in terrestrial habitat removed from water (Emmons and Nowak 2016). Examples include grasslands up to a mile away from any surface water (Cogan 2015), several hundred yards from mainstem rivers (Ryan 2019), 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(er)-distance dispersal. Terrestrial habitat serves three basic 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.

Aquatic habitat is used for prey acquisition and can be either lentic (stock tanks, ponds, cienegas, etc.) or lotic (low-gradient streams). In 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 key role in protecting northern Mexican gartersnakes when in the presence of predatory non-native species (Boyarski et al. 2015) but is likely not critical in wholly native aquatic communities. Aquatic edge habitat is frequently used, followed by terrestrial habitat (for thermoregulatory purposes such as gestation and periods of dormancy) (Boyarski et al. 2015) and developed areas, with snakes documented using artificial, human-created objects as surface cover (Boyarski et al. 2015).

Foraging behavior of northern Mexican gartersnakes includes moving along vegetated shorelines, searching for prey in water and on land, using different strategies. Primarily, its diet consists of aquatic or semi-aquatic prey such as fishes, amphibians (metamorphosed and larval forms), and leeches followed secondarily by terrestrial prey items such as earthworms, lizards, or small rodents (Rosen and Schwalbe 1988, Manjerrez et al. 2017).

Sexual maturity occurs at two years of age in males and at two to three years of age in females (Rosen and Schwalbe 1988). Northern Mexican gartersnakes are viviparous. Mating has been documented 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, Cobbold 2018). A staggered or biennial reproductive strategy is believed to be used by northern Mexican gartersnakes (Rosen and Schwalbe 1988, Boyarski et al. 2019).

Periods of surface activity depend on temperature which depends on elevation; stronger seasonality of surface activity in individuals is expected at higher elevations and vice versa at lower elevations. Longevity in the wild was estimated to be at least 10–11 years by Boyarski et al. (2019).

Historical Distribution

The northern Mexican gartersnake was historically found in nearly every major watershed in Arizona (with the exception of 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 rangewide 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).

Current Distribution in the United States

Within the range of this species in the southwestern United States, many areas where previous records occur are heavily affected by predatory non-native species or are vulnerable to drought or human water use impacts. Existing sampling data suggest that perhaps only four populations of northern Mexican gartersnakes in the United States are considered relatively dense where the species remains somewhat reliably detected: 1) upper Santa Cruz River in the San Rafael Valley;

2) Verde Valley; and 3) the Aquatic Research and Conservation Center (formerly known as the Page Springs and Bubbling Ponds State Fish Hatcheries) adjacent to Oak Creek.

Occupancy, Surveys, and Detection

Gartersnakes, like snakes in general, are notoriously difficult to detect due to their small size, fossorial behavior, camouflage, rarity, inaccessibility of shelter sites (Kery 2002), ability to occur in low densities, and are often unobservable due to their chosen habitats (Ward et al. 2017). Snakes, like most reptiles, have low energy demands, exhibit surface activity patterns that are unpredictable, and frequently forgo surface activity to avoid predation (Boback et al. 2020). Snakes that prefer lentic or lotic aquatic habitat are particularly problematic for detection. Snakes can simply be unavailable for detection, whether underground, in vegetation, or underwater, which is considered availability bias. Whereas snakes that are available for detection but are not seen, result in perception bias. Both availability bias and perception bias are quite common in reptiles and amphibians and result in underestimation of distribution or abundance (Boback et al. 2020). Significant gaps in the history of records of the northern Mexican gartersnake range from 22 to 123 years and underscore how northern Mexican gartersnakes elude detection from surveys, within management subunits for decades at a time.

Further complicating our assessment of occupancy is the limited accessibility to long stream reaches that flow through roadless or wilderness areas, presenting significant logistical challenges to surveying. Thus, most, if not all, survey locations occur in conjunction with access points (i.e., road crossings), but do not adequately represent the species' population status elsewhere along streams that are hundreds of river miles long and possess suitable habitat attributes along their course. Model simulations using trap data suggest the best way to decrease uncertainty in estimates of gartersnake occupancy is to increase the number of sampled sites (Halstead et al. 2015) within stream systems.

The number of surveys required to have confidence in species absence of a given area is highly dependent upon survey effort and associated species detectability; greater effort is required to infer population trends (Ward et al. 2017). The number of surveys required to infer absence of gartersnakes from any particular stream may be orders of magnitude higher than the current level of effort afforded to this purpose over recent history. The cost of making Type II errors may be high for snake conservation. Therefore, a more stringent probability factor of 99% may be necessary to lower the risk of Type II errors, which would require a minimum of 40 independent surveys be conducted to infer species absence.

Falsely declaring a species absent can result in improper conservation decisions or even extirpation of populations due to the lack of appropriate protections (Kery 2002, Halstead et al. 2011). Given the imperfect nature of gartersnake surveys and limited inferences that can be made about population status as well as the presence of known stressors to northern Mexican gartersnakes throughout much of their known range, and the ability of gartersnakes to elude detection during protocol surveys, we expect the species remains extant in all locations where there's a record from 1980 or later. Currently, we expect northern Mexican gartersnakes to generally occur as low-density subpopulations where habitat retains important characteristics. The history of records from 1980 to present (representing the most-surveyed period of time for this species) throughout all known occupied areas portrays the universe of potentially extant populations with imperfect resolution, which demonstrates the need to expand survey effort both

in terms of the number of sites sampled within streams and the number and duration of traps and trapping effort across seasons and years.

Factors Associated with Population Declines and Range Contraction

Predatory Non-native Species - The phrase "predatory non-native species" is used throughout this document. The adjective "predatory" is important because not all non-native species affect northern Mexican gartersnake populations equally.

Predatory non-native species include fish in the families Centrarchidae and Ictaluridae. Specific examples of predatory non-native fish that occur with northern Mexican gartersnakes and are managed by state wildlife agencies as sportfish include bass (*Micropterus* sp.), flathead catfish (*Pylodictis* sp.), channel catfish (*Ictalurus* sp.), Chihuahuan catfish (*Ictalurus chihuahua*), bullheads (*Ameiurus* sp.), sunfish (*Lepomis* sp.), and crappie (*Pomoxis* sp.). American bullfrogs (*Lithobates catesbeiana*) are widely recognized as predatory to native species where found outside their native distribution. All crayfish are non-native to the western United States and are considered predatory to both aquatic communities and aquatic habitats. Northern (virile) crayfish (*Orconectes virilis*) and red swamp crayfish (*Procambarus clarkii*) are the most common species which occur within the distribution of the northern Mexican gartersnake.

Predatory non-native species can directly threaten northern Mexican gartersnakes passively, such as through physical injury to northern Mexican gartersnakes from the dorsal or pectoral spines of predatory non-native fish during ingestion (Emmons et al. 2016) or actively through direct predation of neonatal or juvenile northern Mexican gartersnakes (Young and Boyarski 2013, Akins 2012). Neonatal and juvenile gartersnakes are considered the most at risk from predation by predatory non-native species but adult gartersnakes could still be prey for predatory fish that reach large sizes and possess large gapes, such as largemouth bass and flathead catfish.

Diminishing Surface Water - Other threats are secondary to predatory non-natives in terms of scope but can permanently alter large habitat areas rendering them completely unsuitable for northern Mexican gartersnakes by reducing or eliminating their ability to meet the biological needs of their prey base. Primary examples of these threats include activities that reduce or alter flows or dewater habitat, such as dams and diversions (Ligon et al. 1995, Turner and List 2007), flood-control projects, and groundwater pumping (Stromberg et al. 1996, Rinne et al. 1998, Voeltz 2002, Haney et al. 2009, USGS 2013).

Increasing Demand for Water - Human population growth in the southwest has been significant (Gammage et al. 2008) and is expected to increase. This projected population growth will intensify pressure on the region's water resources (Overpeck 2008), in particular larger perennial or near-perennial streams which are integral to the recovery of the northern Mexican gartersnake. The combination of greater human use of water and climate change-induced drought, could significantly limit surface water in the Southwest, exacerbate the ecological effect of predatory non-native species, and therefore the recovery of northern Mexican gartersnakes on a rangewide scale.

Climate Change and Drought - The future of the northern Mexican gartersnake is also intrinsically linked to climate change. As discussed above, the northern Mexican gartersnake strongly depends on aquatic species as prey (Manjerrez et al. 2017). Projected climate change in

the southwestern United States includes increasing temperatures, decreasing precipitation, decreasing snowpack, decreasing runoff and stream flow (Cayan et al. 2013). Increasing temperature increases the rate of evaporation and transpiration of surface water, further reducing the amount of water for gartersnake prey species.

Climate change is expected to disproportionately affect the prey base of northern Mexican gartersnakes. Amphibians may be among the first vertebrates to exhibit broad-scale changes in response to climate change (Reaser and Blaustein 2005). Changes in temperature and water availability may cause amphibians to experience increased physiological stress and decreased immune system function, which could worsen the effect of disease on amphibian populations (Carey and Alexander 2003, Pounds et al. 2006).

Climate change is predicted to foster the expansion of predatory non-native aquatic species into new areas, magnify the effects of existing aquatic non-native species where they currently occur, increase predation rates from non-native predators, and heighten the virulence of disease outbreaks in North America (Rahel et al. 2008). As annual precipitation amounts lower, base flows weaken, and pools decline in volume and persistence, aquatic vertebrate populations will be forced to occupy smaller aquatic spaces which will increase the frequency of interactions between predatory non-native species and native species, thus increasing predation and hastening the decline of native aquatic species throughout the southwestern United States and Mexico.

Genetic Effects - Collectively, threats identified above have created isolated populations, which have reduced the genetic connectivity among extant northern Mexican gartersnake populations and resulted in genetic drift and subsequently, the potential for inbreeding and limited adaptive potential to address abiotic and biotic changes over time (Wood 2018). Ralls et al. (2017) reiterate that small and genetically isolated populations can lose genetic diversity, becoming increasingly inbred with each generation.

Synergistic Stressors - Many other factors have likely contributed to the decline of the northern Mexican gartersnake through synergistic mechanisms, including: development and recreation within riparian corridors (Briggs 1996, Ernst and Zug 1996, Green 1997, Wheeler et al. 2005, Paradzick et al. 2006); indirect effects from fisheries management activities (Dawson and Kolar 2003, Carpenter and Terrell 2005, Holycross et al. 2006, Finlayson et al. 2010); road construction, use, and maintenance (Klauber 1956, Waters 1995, Shine et al. 2004, Ouren et al. 2007, Breininger et al. 2012); environmental contaminants (Hopkins et al. 1999, Campbell et al. 2005, Rainwater et al. 2005, Wylie et al. 2009); and mortality from entanglement hazards such as erosion control products (Stuart et al. 2001, Barton and Kinkead 2005, Kapfer and Paloski 2011, Barragán-Ramírez and Ascencio-Arrayga 2013, NMDGF 2013).

<u>Critical Habitat</u>
Revised critical habitat for the northern Mexican gartersnake was designated in nine units in portions of Arizona and New Mexico totaling 20,326 acres. Within these areas, the physical and biological features essential to northern Mexican gartersnake conservation are:

1. Perennial or spatially intermittent streams that provide both aquatic and terrestrial habitat that allows for immigration, emigration, and maintenance of population connectivity of northern Mexican gartersnakes and contain:

    a. Slow-moving water (walking speed) with in-stream pools, off-channel pools, and backwater habitat;
    b. Organic and natural inorganic structural features (e.g., boulders, dense aquatic and wetland vegetation, leaf litter, logs, and debris jams) within the stream channel for thermoregulation, shelter, foraging opportunities, and protection from predators;
    c. Terrestrial habitat adjacent to the stream channel that includes riparian vegetation, small mammal burrows, boulder fields, rock crevices, and downed woody debris for thermoregulation, shelter, foraging opportunities, brumation, and protection from predators; and
    d. Water quality that meets or exceeds applicable State surface water quality standards.
2. Hydrologic processes that maintain aquatic and terrestrial 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; and
    b. Physical hydrologic and geomorphic connection between a stream channel and its adjacent riparian areas.
3. A combination of amphibians, fishes, small mammals, lizards, and invertebrate prey species such that prey availability occurs across seasons and years.
4. An absence of non-native fish species of the families Centrarchidae and Ictaluridae, American bullfrogs (*Lithobates catesbeianus*), and/or crayfish (*Orconectes virilis, Procambarus clarki,* etc.), or occurrence of these non-native species at low enough levels such that recruitment of northern Mexican gartersnakes is not inhibited and maintenance of viable prey populations is still occurring.
5. Elevations from 130 to 8,497 feet (40 to 2,590 meters).
6. Lentic wetlands including off-channel springs, cienegas, and natural and constructed ponds (small earthen impoundment) with:
    a. Organic and natural inorganic structural features (e.g., boulders, dense aquatic and wetland vegetation, leaf litter, logs, and debris jams) within the ordinary high-water mark for thermoregulation, shelter, foraging opportunities, brumation, and protection from predators;
    b. Riparian habitat adjacent to ordinary high-water mark that includes riparian vegetation, small mammal burrows, boulder fields, rock crevices, and downed woody debris for thermoregulation, shelter, foraging opportunities, and protection from predators; and
    c. Water quality that meets or exceeds applicable State surface water quality standards.
7. Ephemeral channels that connect perennial or spatially intermittent perennial streams to lentic wetlands in southern Arizona where water resources are limited.

<u>Previous Consultations</u>
Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Fishes

Desert pupfish (*Cyprinodon macularius macularius*)

Legal Status
The desert pupfish was listed as an endangered species with critical habitat on March 31, 1986 (USFWS 1986). The Mexican government also listed the desert pupfish as endangered. The reasons for decline of this fish include competition from exotic fishes, water pollution, groundwater pumping, agricultural pesticide drift, stream channelization and habitat alteration. A recovery plan was completed in 1993 (USFWS 1993). Designated critical habitat for the desert pupfish does not occur within proposed action area.

Description
The desert pupfish is a small fish, less than three inches long, and a member of the Cyprinodontidae family (Minckley 1973). The body is thickened and laterally compressed; coloration is a silvery background with narrow dark vertical bars on the sides. The protruding mouth is equipped with tricuspid teeth and the desert pupfish has an opportunistic, omnivorous diet, consisting of invertebrates, plants, algae, and detritus (Cox 1966, 1972; Naiman 1979). Males are larger than females and become bright blue with orange-tipped fins during the breeding season and exhibit aggressive, territorial behavior (USFWS 1993).

Life History and Habitat
Spawning occurs from spring through autumn, but reproduction may occur year-round depending on conditions (Constanz 1981). Desert pupfish populations appear to go through cycles of expansion and contraction in response to natural weather patterns (USFWS 1986, 1993, Weedman and Young 1997). In very wet years, populations can rapidly expand into new habitats (Hendrickson and Varela-Romero 1989). Historically, this scenario would have led to panmixia among populations over a very large geographic area (USFWS 1993). The desert pupfish is opportunistic and feeds on algae, detritus, pile worms, aquatic crustaceans, aquatic and terrestrial insect larvae, and mollusks (Moyle 1976, USFWS 1993). They forage in shallows in early morning and deeper water most of the day (USFWS 1993).

The desert pupfish has a tolerance for high temperatures, high salinities, and low dissolved oxygen concentrations that exceed the levels known for many other freshwater fishes (Lowe et al. 1967, USFWS 1993). Habitats have included clear, shallow waters with soft substrates associated with cienegas, springs, streams, margins of larger lakes and rivers, shoreline pools, and irrigation drains and ditches below 5,200 feet in elevation (Minckley 1973, Hendrickson and Varela-Romero 1989).

Distribution, Abundance, Population Trends
Historical collections of desert pupfish occurred in Baja California and Sonora, Mexico, and in the U.S. in California and Arizona. Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Agua Fria rivers, although collections are lacking for the latter three. The desert pupfish was also found in the Lower Colorado River, Rio Sonoyta basin, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888, Garman 1895, Gilbert and Scofield 1898, Evermann 1916, Miller 1943, Minckley 1980, Black 1980, Turner 1983, Miller and Fuiman 1987). Additional life history information can be found in the recovery plan (USFWS 1993) and five-

year review (USFWS 2010 and other references cited there).

In Arizona, the desert pupfish genus Cyprinodon was historically comprised of two recognized subspecies, (*C. m. macularius*) and (*C. m. eremus*), and an undescribed taxon, the Monkey Spring pupfish (USFWS 2010). However, desert pupfish subspecies are now recognized as the following separate species, as supported by Echelle et al. (2007) and Koike et al. (2008): 1) the desert pupfish (*C. macularius*); 2) the Rio Sonoyta (Quitobaquito) pupfish (*C. eremus*) (Echelle et al. 2000), and 3) the undescribed Monkey Spring form has since been described and renamed the Santa Cruz pupfish (*C. arcuatus*) (Minckley et al. 2002). Under the ESA, both desert pupfish and Rio Sonoyta pupfish are still listed as subspecies of *C. macularius*, although updates to this listing are proposed.

Because only desert pupfish occur on the Tonto NF, the rest of this status will focus on this species (*C. macularius* or *C. m. macularius*). Naturally occurring populations of desert pupfish (*C. m. macularius or C. macularius*) in the U.S. are restricted to two streams tributaries, in shoreline pools and irrigation drains of the Salton Sea, and in the Sea itself in California (Lau and Boehm 1991, Keeney 2013).

No natural populations of *C. m. macularius* remain in Arizona, although numerous captive and wild, reestablished populations currently exist (AGFD and USFWS, unpublished data). These populations have been established on private, municipal, county, state, and Federal lands. Additional captive sites persist in southern Arizona, with a number of refuge and wild ponds having recently been created under a Safe Harbor Agreement (AGFD 2015).

Although many reestablishments have been attempted, approximately 25 transplanted populations of the desert pupfish exist in the wild at present. This number fluctuates due to the establishment (and failure) of populations (Moyle 2002) (Tier 2 populations in the Recovery Plan) (USFWS 1993, Voeltz and Bettaso 2003, USFWS files). There are 47 captive or refuge desert pupfish populations (that do not qualify as Tier 3), comprised of 34 in Arizona, 8 in California, and 5 in Sonora, Mexico. The rangewide status of desert pupfish is poor but stable, although increasing in Arizona due to an active recovery program (Duncan and Clarkson 2013, Crowder and Robinson 2015, Robinson and Crowder 2015). The fate of the species depends heavily upon future developments in water management of the Salton Sea and Santa de Clara Cienega in Mexico.

<u>Threats</u>

Threats to the species include destruction and degradation of suitable habitat through ground water pumping or water diversion; contamination from agricultural return flows, as well as other contaminants, and physical changes to water properties involving suitable water quality (USFWS 1986, 2006, 2010; Moyle 2002; Martin and Saiki 2005; Echelle et al. 2007; Minckley and Marsh 2009). Water availability for the desert pupfish will continue to suffer with predicted trends for warmer, drier, and more extreme hydrological conditions associated with climate change. New non-native aquatic species continue to establish within the desert pupfish's range, and previously existing non-native species increase in numbers and distribution (Minckley and Marsh 2009).

On Federal lands, Endangered Species Act section 7 consultations have addressed effects of grazing, roads and bridges, agency planning, fire, flooding, recreation, pest control programs,

irrigation drain maintenance, water transfers, and water development as potential threats to desert pupfish habitat. Although effects from these threats continue to be moderated for the desert pupfish, biologically, these threats can create fragmented populations in poorer quality habitat that are small and restricted in range, which can further endanger the desert pupfish.

Habitat loss and alteration - Groundwater extraction was considered a threat in the listing (USFWS 1986), recovery plan (USFWS 1993), and in the five-year review (USFWS 2010). Water extraction removes and degrades habitat, leaving higher concentrations of salts, toxic contaminants, and sediment in the remaining volumes of water and lower amounts of dissolved oxygen, and thus interacts with other compounding threats. Water reductions could lead to less shallow-water habitat preferred by the desert pupfish. Slight increases in salinity could benefit desert pupfish, by reducing populations of problematic non-native fishes. However, if salinity keeps increasing, wetland areas may become unsuitable even for pupfish. The proposed changes to the configuration of the Salton Sea will reduce pupfish habitat, but there will still be habitat for numerous populations to persist. Any change to the water budget at Cienega de Santa Clara could be detrimental to the desert pupfish there.

Since the 19th century, desert pupfish habitat has been affected by streambank erosion, the construction of water impoundments that dewatered downstream habitat, excessive groundwater pumping, the application of pesticides to nearby agricultural areas, and the introduction of non-native aquatic species as both predators and potential competitors (Matsui 1981, Hendrickson and Minckley 1984, Minckley 1985, Schoenherr 1988). The bullfrog is an opportunistic omnivore with a diet that includes fish (Frost 1935, Cohen and Howard 1958, Brooks 1964, McCoy 1967, Clarkson and deVos 1986). Introduced salt cedar (Tamarisk spp.) growing adjacent to desert pupfish habitat might cause a lack of water at critical times (Bolster 1990, Bransfield 1999); however, recent scientific information contradicts the long-held belief that tamarisk consumes more water than native trees (Glenn and Nagler 2005).

Recreation and Grazing - Watershed condition has been and continues to be a concern over most of the Southwest. Recreational pursuits that have the potential to increase soil erosion (i.e., off-road vehicles are a concern for desert pupfish because of their effects to watershed health, rather than any direct effects. Overgrazing and historically extensive logging combined with climatic events (drought followed by rain events), have led to increased erosion and deeper channelization (Miller 1961, Bahre 1991), which do not provide the more shallow, clear, and vegetatively complex wetlands preferred by the desert pupfish (Hanes 1996). Extensive logging is no longer a threat to desert pupfish or their habitats. Improper grazing at a watershed level probably does not affect desert pupfish populations anymore. Grazing of occupied sites still occurs in Mexico and the U.S. However, grazing in the U.S. is better managed and much less of a concern for its effects on desert pupfish habitat. Urbanization and other human activities can and continue to effect watershed health and functioning.

Livestock grazing was not mentioned as a threat in the final rule (USFWS 1986), although habitat alteration from grazing was mentioned in the recovery plan (USFWS 1993). The small size and high physical tolerance of the desert pupfish allow it to exist in small amounts of water spanning a wide variety of extreme habitat and water quality conditions (USFWS 1993). Due to the scarcity of water in the desert pupfish's desert habitat and the tendency for cattle to

congregate in watered areas, cattle are attracted to desert pupfish habitats that can lead to local effects quickly. Low water conditions combined with congregations of cattle activity (grazing, watering, hoof action) can lead to additional reductions in water, physiological effects of reduced water quality, bank trampling, fragmentation of contiguous water, isolation/stranding and trampling of fish and eggs (Roberts and White 1992), and degradation of habitat through de-watering.

Long-term or seasonal drought can also exacerbate these conditions. Round-up of trespass cattle within these small, enclosed areas could cause cattle congregations to increase their hoof action and cause movement into fish habitat. Cattle can cause disturbance, a decline in water quality, and mortality of fish and desert pupfish eggs, particularly at the perimeter of ponds, springs, wells, and shallow wetland areas, by reducing the distribution and abundance of water and isolating fish and eggs into inhospitable areas (Kauffman and Krueger 1984, Fleischner 1994, Belsky et al. 1999). Carefully controlled grazing around some of the small pond habitats as a tool to manage problematic aquatic vegetation could actually benefit the desert pupfish (Kodric-Brown and Brown 2008). Although effects from livestock grazing have been problematic in some areas, consultations have alleviated many of the effects through fencing and grazing rotations.

Environmental contaminants and elevated salinity have been identified as threats to desert pupfish in the Salton Sea.

Predation and Competition - Desert pupfish are susceptible to parasites and predation and competition from non-native fish and other species. Predation and competition from non-native fish have been identified as a main cause of the decline of the species (USFWS 1986, 1993, 2010). Non-native fish are still a major threat to the desert pupfish. Martin and Saiki (2005) found the abundance of *C. m. macularius* to be inversely related to the abundance of non-native fish. Because non-native aquatic species are present in many occupied or potential desert pupfish habitats and non-native aquatic species are exceedingly difficult to get rid of once established, non-native aquatic species continue to be a major threat to the conservation of the desert pupfish. These threats still occur today and continue to be impacted by increasing human development and demand for water, as well as interactions with predicted trends for warmer, drier, and more extreme hydrological conditions associated with climate change.

Climate Change - Climate models predict not only temperature increases but also an increase in the frequency and severity of storm events, heat waves, and precipitation events. Temporal asynchronicity will exacerbate the effects on aquatic habitats and organisms. Ultimately, climate change predicts regionally drier conditions for the Southwest and an increasing probability of drought.

Assuming those predictions hold, we anticipate that fish species in the southwest will face the following conditions as a result of climate change:

- Increased water temperature;
- Decreased stream flow;
- A change in the hydrograph; and
- An increased occurrence of extreme events (such as fire, drought, and floods)

Temperature is a key factor defining the gradients of performance and the absolute bounds of life for most aquatic organisms. It also affects rates of growth and timing of key life history events or transitions (Rieman and Isaak 2010). Increased air temperature is likely to lead to increased water temperature, streams will become increasingly intermittent, and aquatic habitat will degrade. That being said, desert pupfish can survive and thrive at temperatures well above those of other native species (Carveth et al. 2006) and therefore may be able to tolerate increases in water temperature.

Conservation, Consultation and Recovery Planning
Past recovery efforts have focused on establishing populations of desert pupfish, including within NFS boundaries. Temporary maintenance of populations in man-made sites may be possible during times other than during the drought the Southwest is currently experiencing. Recovery efforts should consider riverine habitat and manipulations of flows or other disturbances for conservation (Hendrickson and Varela-Romero 1989). In 2010 there was a total of 46 captive or refuge desert fish population's rangewide in Arizona, California, and Mexico (USFWS 2010). The status of the species rangewide is poor but stable and conservation depends heavily on future developments in water management of the Salton Sea in California and the Santa de Clara Cienega in Mexico (USFWS 2010).

The 1993 recovery plan for desert pupfish includes downlisting criteria, but no delisting criteria for the subspecies. Insoluble threats and limited habitat are stated as preventing delisting for desert pupfish in the foreseeable future. Many efforts have been made to reestablish populations of desert pupfish in the wild and to protect them in refuge ponds, including in Arizona. Efforts to monitor desert pupfish are also implemented.

Critical Habitat
Critical habitat for the desert pupfish does not occur in the action area.

Previous Consultations
A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Gila chub (*Gila intermedia*) and Critical Habitat

Legal Status
A final rule listing Gila chub as an endangered species with critical habitat was published Nov. 2, 2005 (USFWS 2005). Critical habitat was designated in 25 units totaling 258.1 km (160.3 mi) within seven areas: the Agua Fria, Babocomari, lower San Pedro, lower Santa Cruz, middle and upper Gila, and upper Verde rivers. There is no recovery plan for this species. Gila chub was formerly considered a separate taxonomic entity but is now recognized, along with headwater chub and roundtail chub, as a single taxonomic species—the roundtail chub (*G. robusta*) (USFWS 2017). We intend to reevaluate the status of the Gila chub, which is currently listed as endangered with critical habitat (USFWS 2005). However, until that evaluation is completed and potential proposed and final rules to delist the Gila chub are published, its legal status remains as an endangered species with designated critical habitat. Our effects analysis in this BO reflects this current status.

Background
The following is a summary of life history, habitat use, current distribution, threats, and conservation actions for the Gila chub. This information was taken from the final rule listing the species (USFWS 2005), Weedman et al. (1996), Desert Fishes Team (2003), and the most recent Central Arizona Project biological opinion (USFWS 2008). Information in these documents is incorporated by reference.

Life History and Habitat
Generally, breeding is initiated with warmer water temperatures of 68 to 79.7ºF (20 to 26.5ºC). Gila chub prefers to spawn over submerged aquatic vegetation or root wads.

Griffith and Tiersch (1989) describe Gila chub as omnivorous. Rinne and Minckley (1991) identify that Gila chub feed on large and small aquatic and terrestrial invertebrates, and small fishes. Smaller individuals feed on organic debris, aquatic plants (especially filamentous algae), and diatoms (unicellular or colonial algae). Griffith and Tiersch (1989) found that Gila chub in Redfield Canyon consumed speckled dace, dobsonfly nymphs (order Megaloptera), and terrestrial insects (i.e., ants, caterpillars, and beetles).

Gila chub commonly inhabit pools in smaller streams, springs, and cienegas, and can survive in artificial impoundments. Generally, Gila chub are often associated with cover including terrestrial vegetation, boulders, and 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 and eddies below areas with swift currents (Minckley 1973). Young-of-the-year inhabit shallow water among plants or eddies, and older juveniles use higher-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 and sub-adults were observed farther from cover and frequently in shallow areas or higher current areas during summer as water temperature warmed.

Distribution, Abundance, Population Trends
The draft Gila Chub Recovery Plan (USFWS 2015) lists 22 extant wild remnant or replicated populations of Gila chub throughout their range, with an additional seven wild remnant or replicated populations classified as not having been detected in the last 20 to 49 years, but not yet confirmed to have been extirpated, and two refuge populations. Since then, one replicate population (Bear Canyon) thought to be extirpated was detected in 2018. In 2019, a replicate population was stocked into Rarick Canyon. Three new refuge populations were established in 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. Populations are spread across the drainages, and most are isolated from other populations.

Threats
The primary threat to Gila chub survival is habitat degradation from groundwater pumping, damming, diversions, and stream channelization, all leading to dewatering and alteration of channel morphology. In southeast Arizona poor watershed conditions due to overgrazing, mining, timber harvesting and fire suppression are identified as habitat threats (Bahre 1991, Humphrey 1958, Martin 1975). The Bureau of Land Management (BLM 1998) suggested

recreation (e.g., all-terrain vehicles, concentrated walking, stream hiking, wading, and swimming) may negatively affect habitat through increased sediment disturbance, fish displacement, and trampling bank vegetation. Destruction of stream habitat and dewatering lead to fragmentation of habitat and populations which in turn restricts movement and reduces colonization and gene flow.

Perhaps the most serious threat to Gila chub is predation by and competition with non-native organisms, including numerous non-native fish species, bullfrogs, and virile crayfish. The effects of non-native fish species on native fish have been well documented (Hubbs 1955, Miller 1961, Minckley and Deacon 1968, Minckley 1973, Meffe 1985, Moyle 1986, Williams and Sada 1985, Minckley and Deacon 1991, Ruppert et al*.* 1993, Clarkson et al. 2005). Additionally, largescale wildfires, such as the Aspen Fire in 2003, Cave Creek Complex Fire in 2005, Wallow Fire in 2011, Miller Fire in 2011, Whitewater/Baldy fire in 2012, and Brooklyn Fire in 2017 have affected Gila chub populations and their habitats in Eagle/East Eagle creeks, O'Donnell Canyon, Silver Creek, Larry Creek and Lousy Canyon, Sabino Canyon, and others (USFWS 2015, Sitzmann 2018).

Conservation, Consultation and Recovery Planning

There is no final recovery plan for the Gila chub; however, a draft recovery plan was completed in 2015 (USFWS 2015), and guides management of Gila chub until such time as a final recovery plan can be completed. The draft recovery plan identified 5 recovery units, and Recovery Unit 1 is the Agua Fria River Subbasin. This recovery unit includes the entire Agua Fria River upstream from the confluence with the Gila River. The recovery plan identified three remnant populations in the Agua Fria subbasin in two management units. Silver and Sycamore/Little Sycamore creeks form Management Unit 1A, with Silver Creek serving as the source population for two established replications (Larry Creek and Lousy Canyon). Indian Creek forms Management Unit 1B. There are no replications into either wild or refuge sites for this population.

Management Unit 1A meets the downlisting and delisting goals of having been replicated at least twice in the wild. Management Unit 1B requires establishment of at least one wild replication and one refuge replication for downlisting goals, and replacement of the refuge with another stream replication for delisting. Three potential refuges and eight potential replication streams have been identified within the geographic boundaries of the recovery unit that might serve as redundant populations for the Indian Creek remnant population, which include Black Canyon Heritage Park, Phoenix Zoo, and Bubbling Ponds Native Fish Conservation Facility. Potential replication streams include Black Canyon Creek, New River, Grapevine Canyon (Tonto NF), Poland Creek/Horse Thief Canyon, Yellow Jacket Creek, Ash Creek, Little Ash Creek/Dry Creek, and the Agua Fria River.

In addition to replication of remnant populations, threats-based criteria were included in the recovery plan. Threats-based criteria were not geographically specific but included ensuring that all remnant populations and their replicates are protected against non-native fish predation and competition, as measured by the achievement of the demographic criteria. Additionally, recruitment and survival rates are to be used to determine when significant threats to remnant and replicate populations are controlled to manageable levels. Significant threats include water availability, habitat alteration, and fragmentation, but can also be site-specific. Recruitment and survival rates will be used to determine when threats-based criteria are met.

Conservation measures under the Gila River Basin Native Fishes Conservation Program for the Gila chub include barrier construction and renovation of streams to remove non-native species and reintroductions into the historical range. Additionally, Gila chub from Indian Creek were stocked into Horseshoe Ranch Pond in 2018 to create a refugia population.

Critical Habitat

Critical habitat was designated for 25 stream reaches in the occupied range of the species. There are seven PBFs, which include those habitat features required for the physiological, behavioral, and ecological needs of the species. These are:

1. Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies all found in headwaters, springs, and cienegas, generally of smaller tributaries;
2. Water temperatures for spawning ranging from 63 to 75°F (17 to 24°C), and seasonally appropriate temperatures for all life stages (varying from about 50 to 86°F [10 to 30°C]);
3. Water quality with reduced levels of contaminants, including excessive levels of sediments adverse to Gila chub health, and adequate levels of pH (e.g., ranging from 6.5 to 9.5), dissolved oxygen (e.g., ranging from 3.0 to 10.0 parts per million) and conductivity (e.g., 100 to 1000 milliohms);
4. Food base consisting of invertebrates (e.g., aquatic and terrestrial insects) and aquatic plants (e.g., diatoms and filamentous green algae);
5. Sufficient cover consisting of downed logs in the water channel, submerged aquatic vegetation, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs, a high degree of streambank stability, and a healthy, intact riparian vegetation community;
6. Habitat devoid of nonindigenous aquatic species detrimental to Gila chub or habitat in which detrimental nonindigenous species are kept at a level that allows Gila chub to continue to survive and reproduce; and
7. Streams that maintain a natural flow pattern including periodic flooding.

Of the 25 designated critical habitat units, six are in the vicinity of stocking sites and are not likely to be affected by the proposed action due to presence of fish barriers as described below.

Previous Consultations

Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Gila topminnow (*Poeciliopsis occidentalis*)

Legal Status

Gila topminnow was listed as endangered in 1967 without critical habitat (USFWS 1967). Only Gila topminnow populations in the U.S., and not in Mexico, are listed under the ESA. The Sonoran topminnow (Gila and Yaqui) Recovery Plan was finalized in 1984 (USFWS 1984), and a draft revision was completed in 1998 (USFWS 1998). While the 1998 revision is not final, it represents a more current understanding of the species' conservation. Life history information

can be found in the 1984 recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and references cited in the plans.

Distribution, Abundance, Population Trends
Historically, the Gila topminnow was abundant in the Gila River drainage in Arizona and was one of the most common fishes of the Gila River basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). Gila topminnow were also recorded from the Gila River basin in New Mexico (Minckley and Marsh 2009). In the last 50 years, this was reduced to only 16 naturally occurring populations. As of 2008, Gila topminnow existed in nine of the 16 recent natural populations and in 21 translocated localities (USFWS 2008). Two of the natural populations are contaminated by non-native fish species. Voeltz and Bettaso (2003) reported that three of 18 extant repatriated or translocated populations (as of 2003) were contaminated by non-native fish species. Additional reintroductions by the Gila River Basin Native Fishes Conservation Program of Gila topminnow were made since 2008 (Robinson 2010).

Threats
The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing non-native fishes (Miller 1961, Minckley 1985). Other listed fish suffer from the same effects (Moyle and Williams 1990).

Conservation, Consultation and Recovery Planning
The draft recovery plan revision (1998) states that delisting of the Gila topminnow is not feasible in the foreseeable future. The short-term goal of the draft recovery plan is to prevent extirpation of the species from its natural localities in the U.S. and reintroduce it into suitable habitat within its former range. The eventual downlisting of the Gila topminnow will be considered when: (1) survival of the species in the U.S. is ensured by protecting existing natural populations and maintaining refugia stocks from each; (2) populations are reestablished within the species' historic range according to guidelines identified in the recovery plan; (3) protocols for population, habitat and genetic monitoring are developed, funded, and started.

Previous Consultations
Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Gila trout (*Oncorhunchus gilae*)

Legal Status
The Gila trout was designated as an endangered species under the Federal Endangered Species Preservation Act of 1966. The species continued to be Federally listed as endangered throughout its range under the Endangered Species Act of 1973 (USFWS 1967). Reasons for listing included hybridization, competition and predation by non-native trout, and habitat degradation. The Gila trout was listed as federally endangered before USFWS developed a critical habitat policy, therefore there is no critical habitat for this species (USFWS 2006). In 2006, the Gila trout was reclassified from an endangered to a threatened species. The 2006 reclassification included a special rule under section 4(d) of the ESA that enabled the NMDGF and AGFD to promulgate

special regulations, in collaboration with USFWS, allowing recreational fishing for Gila trout (USFWS 2006).

The Gila trout 4(d) rule can be found at 71 FR 40669, 50 C.F.R.§ 17.44 (z), or online at https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/GilaTrout/FR_reclass_final.pdf.

Background
The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the Gila trout. This information was taken from the 2003 recovery plan (USFWS 2003), the 2006 reclassification final rule (USFWS 2006) and the most recent Biological and Conference Opinion for Wildlife and Sport Fish Restoration Funding of Arizona Game and Fish Department's Statewide and Urban Fisheries Stocking Program for 2021–2031 (USFWS 2021). Information in these documents is incorporated by reference.

Description
Gila trout are readily identified by their iridescent gold sides that blend to a darker shade of copper on the opercles (bony plates surrounding the gills). Spots on the body of this trout are small and profuse, generally occurring above the lateral line and extending onto the head, dorsal fin, and caudal fin. Spots are irregularly shaped on the sides and increase in size dorsally. A faint, salmon-pink band is present on adults, particularly during spawning season when the normally white belly may be streaked with yellow or reddish orange. A yellow cutthroat mark is present on most mature specimens. Parr marks (markings present when trout are less than a year old) are commonly retained by adults, although they may be faint or absent (Miller 1950, David 1976).

Life History and Habitat
Spawning occurs mainly in April, with temperatures of 46°F (7.8°C). Day length may also be a cue to initiate spawning. Females reach maturity at age two to four or at about 6 in (15.2 cm) or greater. Males reach maturity at age two or three and at approximately the same size.

Gila trout are primarily insectivorous with adult dipterans, aquatic insect larvae or nymphs, and aquatic beetles commonly taken. Gila trout may also be somewhat piscivorous. In streams, they establish a feeding hierarchy in the pools and larger fish would chase away smaller fish.

Adult Gila trout are mainly found in pools, particularly those over one foot deep with low velocity areas adjacent to higher velocity waters where the individual may forage but not be exposed to the higher velocity waters. Large woody debris is an important component for both pool formation and cover. Subadults are primarily found in riffles.

Genetics
There are five known remnant genetic lineages: Main Diamond Creek, South Diamond Creek, Whiskey Creek, Spruce Creek (USFWS 2006), and Iron Creek (Tuner and Camack 2017). Analysis has found that the Iron Creek population is at least as "pure," genetically, as any of the other remnant populations (Turner and Camack 2017). None of the remnant lineages have indication of rainbow trout introgression (Iron Creek: Turner and Camak 2017, remaining 4 lineages: Wares et al. 2004). Gila trout have 56 chromosomes (Beamish and Miller 1977) and 106 chromosomal arms, rainbow trout have 64 to 68 (Behnke 2002).

Distribution, Abundance, Population Trends
Gila trout is endemic to mountain streams in the Gila, San Francisco, Agua Fria and Verde River drainages in New Mexico and Arizona (Miller 1950, Minckley 1973, Behnke 1992). Although Gila trout were known in the upper Gila River basin since at least 1885, it was not described until 1950, by which time its distribution had been dramatically reduced (Miller 1950).

Since the 1990s and up through 2020, there have been several Gila trout translocation efforts with varying success in Arizona and New Mexico. Stockings have occurred on the Prescott, Apache-Sitgreaves (ASNFs), Tonto, and Coconino National Forests in Arizona, and the Gila National Forest in New Mexico. All Gila trout in New Mexico are located in the Gila National Forest, mostly in Wilderness.

As of January 2020, there were 22 recovery populations of Gila trout inhabiting approximately 149.8 km of stream (Gila trout Recovery Team 2020). In August 2020 Coleman Creek was stocked with Spruce Creek lineage fish. In October 2020 Marijilda Creek was stocked with different lineages, and in October 2021 KP Creek was stocked with Iron Creek lineage fish. Increasing the number of recovery streams in Arizona to eight. The current recovery streams in AZ are Grapevine Creek (2 miles (mi) Prescott National Forest), Dude Creek (2 mi Tonto), Chase Creek (2 mi, Tonto), Frye Creek (5 mi Coronado National Forest), Marijilda Creek (Coronado National Forest), Raspberry Creek (2.5 mi ASNFs) (AGFD 2020), Coleman Creek (ASNFs; (Beard 2020), and KP Creek (ASNFs; Beard 2021b).

An introduced population previously existed in Gap Creek (Yavapai County) in Prescott NF in Arizona but has been extirpated. It was noted that the high gradient and extremely variable flow regime in Gap Creek was not suitable habitat for the species (USFWS 2003).

Sportfishing and stocking for Gila trout also occurs on the Tonto NF. Locations that overlap with recovery populations are catch and release, while nonrecovery locations are put-and-take. In the fall of 2019, AGFD began stocking the East Verde River with Gila trout for recreation put-and-take fishing in lieu of the rainbow trout that were stocked historically. Beginning in 2021, AGFD approved a rule to open Dude Creek to catch-and-release angling between May 1–December 31. Gila trout were stocked into Christopher Creek in 2021, and AGFD has completed section 7 consultation on plans to stock Haigler, Workman, Bonita, and Ellison Creeks and the lower Verde River (USFWS 2021).

Threats
Major threats to Gila trout include aspects of both fisheries and land management practices. Gila trout populations are small, isolated, and fragmented throughout the species range. Overutilization due to unregulated fishing greatly reduced Gila trout populations and by the early 1900s state game agencies began stocking hatchery raised non-native rainbow (*Oncorhynchus mykiss*) and brown (*Salmo trutta*) trout into Gila trout streams. Competition between native Gila trout and both introduced species, predation on Gila trout by brown trout, and hybridization between Gila and rainbow trout were all major factors in the decline and eventual federal listing of this species (USFWS 2003).

Historical land management practices such as overutilization of upland and riparian vegetation by grazing, timber thinning practices, and decades of fire suppression changed watershed

characteristics (infiltration, runoff, erosion, etc.) and stream habitat characteristics (sediment transfer, nutrient cycling, physical habitat features, water temperature, etc.) throughout the southwest (USFWS 2003). These practices have also left much of the historic range of Gila trout at risk of catastrophic fires, a threat rarely observed in the pre-European settlement period.

Previous Consultations
A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Razorback sucker (*Xyrauchen texanus*) and Critical Habitat

Legal Status
The razorback sucker was first proposed for listing under the Act on April 24, 1978 (USFWS 1978), as a threatened species. The proposed rule was withdrawn on May 27, 1980 (USFWS 1980), due to changes to the listing process included in the 1978 amendments to the Act. In March 1989, a consortium of environmental groups petitioned the USFWS to list the razorback sucker as an endangered species. USFWS published a positive 90-day finding on the petition in the Federal Register on August 15, 1989 (USFWS 1989). The finding stated that a status review was in progress and provided for submission of additional information through December 15, 1989. The proposed rule to list the species as endangered was published on May 22, 1990 (USFWS 1990), and the final rule published on October 23, 1991, (USFWS 1991).

USFWS published a recovery plan for razorback sucker in 1998, as well as an amendment and supplement to the recovery plan in 2002 (USFWS 1998, 2002). The recovery plan developed a recovery objective of protection and expansion of three existing populations and establishment of five new populations for razorback sucker.

Description
The razorback sucker is the only representative of the genus *Xyrauchen* and was described from specimens taken from the "Colorado and New Rivers" (Abbott 1861). This native sucker is distinguished from all others by the sharp-edged, bony keel that rises abruptly behind the head. The body is robust with a short and deep caudal peduncle (Bestgen 1990). The razorback sucker may reach lengths of 3.3 ft (1.0 m) and weigh 11 to 13 pounds (5.0 to 5.9 kilograms) (Minckley 1973). Adult fish in Lake Mohave reached about half this maximum size and weight (Minckley and Deacon 1991). Razorback suckers are long-lived, reaching the age of at least 40 years (Minckley et al. 1991).

Life History and Habitat
Adult razorback suckers use most of the available riverine habitats, although there may be an avoidance of whitewater type habitats. Main channel habitats used tend to be of low velocity such as pools, eddies, nearshore runs, and channels associated with sand or gravel bars (Bestgen 1990). Adjacent to the main channel, backwaters, oxbows, sloughs, and flooded bottomlands are also used. From studies conducted in the upper Colorado River basin, habitat selection by adult razorback suckers changes seasonally. They move into pools and slow eddies from November through April, runs and pools from July through October, runs and backwaters during May, and backwaters, eddies, and flooded gravel pits during June. In early spring, adults move into flooded bottomlands. They use relatively shallow water (ca. three ft [0.9 m]) during spring and deeper water (five to six ft [l.5–1.8 m]) during winter (USFWS 2002). Razorback suckers also use

reservoir habitat, where the adults may survive for many years. In reservoirs, they use all available habitat types, but prefer backwaters and main impoundment areas (USFWS 1998). Much of the information on spawning behavior and habitat comes from fishes inhabiting reservoirs where observations can readily be made.

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

The razorback sucker is somewhat sedentary; however, several studies have noted considerable movement over a year (USFWS 1998). Spawning migrations have been observed or inferred in several locales (Jordan 1891, Minckley 1973, Osmundson and Kaeding 1989, Bestgen 1990, Tyus and Karp 1989). During the spring spawning season, razorback suckers may travel long distances in both lacustrine and riverine environments and exhibit some fidelity to specific spawning areas (USFWS 1998). Since 1997, significant new information on recruitment to the wild razorback sucker population in Lake Mead has been developed (Albrecht et al. 2008, Kegerries et al. 2017) that indicate some degree of reproduction is occurring at three locations in Lake Mead, and another spawning group was documented in 2010 at the Colorado River inflow area of the lake (Albrecht et al. 2010, Kegerries and Albrecht 2011).

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

Distribution, Abundance and Population Trends

The historical range of the razorback sucker included the main stem Colorado River and its tributaries from northern Mexico through Arizona and Utah into Wyoming, Colorado, and New Mexico. Distribution and abundance of the razorback sucker declined during the last century throughout the known range, and the species now exists only in eight small populations, the majority of which are reliant on stocking to maintain presence. The razorback sucker inhabiting the large reservoirs of the Lower Colorado River have maintained populations long after dams changed the river to a string of impoundments. The populations existed almost solely by virtue of the species' longevity, not by documented recruitment to reproductive age into existing populations. Razorback sucker populations rely on the Lower Colorado Multi-species Conservation Program’s augmentation which is expected to release 660,000 razorback suckers throughout its historical range over the program's 50-year period (2005 through 2055).

Threats

Water manipulations, habitat degradation, and invasion of non-native aquatic species have severely affected the range and abundance of the razorback sucker. Construction of dams, reservoirs, and diversions destroyed, altered, and fragmented habitats needed by razorback suckers. Channel alterations have reduced habitat diversity and caused degradation of riparian areas and altered upland area stream morphology and hydrology. Finally, invasion of these degraded habitats by a host of non-native, predacious and competitive species has created a

hostile environment for razorback sucker larvae and juveniles. Although razorback suckers spawn each year and produce large numbers of larvae, the larvae are preyed on by non-native fish species (Minckley et al. 1991) and recruitment to reproductive age is not occurring in most populations (USFWS 2002).

Critical habitat

Critical habitat was designated in 15 river reaches in the historical range of the razorback sucker on March 21, 1994, with an effective date of April 20, 1994 (USFWS 1994). Critical habitat included portions of the Colorado, Duchesne, Green, Gunnison, San Juan, White, and Yampa rivers in the Upper Colorado River Basin (Upper Basin), and the Colorado, Gila, Salt, and Verde rivers in the Lower Colorado River Basin (Lower Basin).

The following are the physical and biological factors (PBFs) identified for razorback sucker critical habitat. The biological support document (Maddux et al. 1993) discusses in depth how each designated reach PBFs. The PBFs are:

1. Water - This includes a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminations, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage.
2. Physical habitat - this includes areas of the Colorado River system that are inhabited by fish or potentially habitable for use in spawning, nursery, feeding, rearing, or corridors between these areas. In addition to river channels, these areas also include bottomlands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which, when inundated, provide spawning, nursery, feeding, and rearing habitats.
3. Biological environment - Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation, although considered a normal component of this environment, may be out of balance due to introduced fish species in some areas. This may also be true of competition, particularly from non-native fish species.

Previous Consultations

Section 7 consultations on razorback sucker include programmatic efforts for the Upper Basin and San Juan recovery programs and Lower Colorado River Multi-Species Conservation Program for new water diversions or changes in points of diversion. Information on these programs is available at their websites. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Loach minnow (*Tiaroga cobitis*) and Critical Habitat

Legal Status

Loach minnow was listed as a threatened species on October 28, 1986 (USFWS 1986) but was reclassified as an endangered species on February 23, 2012 (USFWS 2012). The current critical habitat designation was published simultaneously with the reclassification to endangered status.

Critical habitat was designated for the loach minnow in 2007. A final rule altering the existing designation was published on February 23, 2012 and became effective on March 26, 2012 (USFWS 2012). The original 2007 designation did not include any streams on the Tonto NF, but the recently published 2012 revised designation included Fossil Creek, which is the boundary between the Coconino and Tonto NFs (4.7 miles extending from the confluence with the Verde River upstream to an unnamed tributary) and is primarily managed by the Coconino NF.

Background

The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the loach minnow. This information was taken from the 1991 recovery plan (USFWS 1991) and the most recent Biological and Conference Opinion for Wildlife and Sport Fish Restoration Funding of Arizona Game and Fish Department's Statewide and Urban Fisheries Stocking Program for 2021–2031 (USFWS 2021). Information in these documents is incorporated by reference.

Description

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

The limited taxonomic and genetic data available for loach minnow indicate there are substantial differences in morphology and genetic makeup between remnant loach minnow populations. The main difference between the mtDNA and allozyme data was that mtDNA suggest that the San Francisco/Blue and Gila groups of loach minnow are separate, while the allozyme data places the Gila group within the San Francisco/Blue group. Tibbets (1993) concluded that the level of divergence in both allozyme and mtDNA data indicated that all three main populations (Aravaipa Creek, Blue/San Francisco Rivers, and Gila River) were historically isolated and represent evolutionarily distinct lineages.

Life History and Habitat

Loach minnow are an opportunistic, benthic insectivore, largely deriving food from riffle-dwelling larval Ephemeropterans (mayflies) and Simuliid and Chironomid dipterans (true flies); larvae of other aquatic insect groups, such as Plecopterans (stoneflies), Trichopterans (caddisflies), and occasionally pupae or emerging adults, may be seasonally important (Britt 1982, Propst et al. 1988, Propst and Bestgen 1991, Pilger et al. 2010).

Loach minnow live two to three years in the wild with reproduction occurring primarily in the second summer of life (Minckley 1973, Sublette et al. 1990). Spawning occurs from March through May (Britt 1982, Propst et al. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). Loach minnow eggs are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst et al. 1988, Vives and Minckley 1990).

Loach minnow are a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow use the spaces between, and in the lee of, larger substrate for resting and spawning (Propst et al. 1988, Propst and Bestgen 1991, Rinne 1989). They are rare or absent from habitats where fine sediments fill interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feed exclusively on aquatic insects (Schreiber 1978, Abarca 1987).

Distribution, Abundance and Population Trends
Loach minnow are believed to occupy approximately 15–20% of their historical range, and are now restricted to the following:

- portions of the Gila River and its tributaries West, Middle, and East Fork Gila River in Grant, Catron, and Hidalgo Counties, New Mexico (Paroz and Propst 2007, Propst 2007, Propst et al. 2009);
- the San Francisco and Tularosa rivers and their tributaries Negrito and Whitewater creeks in Catron County, New Mexico (Propst et al. 1988, Arizona State University [ASU] 2002, Paroz and Propst 2007, Propst 2007);
- the Blue River and its tributaries Dry Blue, Campbell Blue, Pace, and Frieborn creeks in Greenlee County, Arizona and Catron County, New Mexico (Miller 1998, ASU 2002, Carter 2005, Carter 2008, Clarkson et al. 2008, Robinson 2009a);
- Aravaipa Creek and its tributaries Turkey and Deer creeks (Graham and Pinal Counties, Arizona) (Stefferud and Reinthal 2005);
- Eagle Creek in Graham and Greenlee Counties, Arizona (Knowles 1994, Bagley and Marsh 1997, Marsh et al. 2003, Carter et al. 2007, Bahm and Robinson 2009a);
- North Fork East Fork Black River in Apache and Greenlee Counties, Arizona (Leon 1989, Lopez 2000, Gurtin 2004, Carter 2007, Robinson et al. 2009) and;
- possibly the White River and its tributaries, the East and North Fork White River in Apache, Gila, and Navajo Counties, Arizona.

Loach minnow have been translocated to additional streams as part of recovery efforts for the species. Translocation efforts include Hot Springs and Redfield canyons in the San Pedro Watershed (2007), Fossil Creek in the Verde River Watershed (2007), and Bonita Creek in the Gila River Watershed (2008) in Arizona. Of these three efforts, loach minnow are considered established in Hot Springs Canyon; however, augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Efforts in both Fossil Creek and Bonita Creek are considered unsuccessful at this point, although further attempts may be made at Bonita Creek. In New Mexico, loach minnow were translocated to Saliz Canyon in the San Francisco Watershed (2017), and into Little Creek in the upper Gila Watershed (2014). To date, insufficient time has passed to determine if these translocations will be successful.

Threats
Primary threats to loach minnow include habitat alteration and destruction, introduction and spread of non-native species, wildfire, drought, and climate change.

Diminishing Surface Water - Within the historical range of loach minnow, groundwater withdrawals, surface water diversions, and construction of impoundments have converted large portions of flowing streams into intermittent streams, large reservoirs, or dewatered channels, and eliminated suitable loach minnow habitat in effected areas (Propst et al. 1988, Tellman et al. 1997).

Recreation - Effects to loach minnow from recreation can occur from movement of people, vehicles, and horses or mules along streambanks, trampling, soil compaction and erosion, destruction of vegetation, water quality issues, and increased danger of fire (Northern Arizona University [NAU] 2005, Monz et al. 2010). In the arid Gila River Basin, recreational effects are disproportionately distributed along streams as a primary focus for recreation (Briggs 1996). Overuse through camping and other recreational activities can lead to decreased riparian vegetation (USFS 2008) and subsequent increases in stream temperatures, as well as soil compaction and vegetation destruction, which in turn can lead to increased runoff and sedimentation in waterways (Monz et al. 2010, Andereck 1993).

Livestock grazing - Livestock grazing has been one of the most widespread and long-term causes of adverse effects to native fishes and their habitat (Miller 1961, Platts 1990). Improper livestock grazing can destabilize stream channels, disturb riparian ecosystem functions, and contribute to nutrient loading in streams (Platts 1990, Armour et al. 1991, Tellman et al. 1997, Wyman et al. 2006, Brown and Froemke 2012). Effects from livestock grazing have been reduced in the last 20 years due to improved management on Federal lands (USFWS 1997) and discontinuation of grazing in many riparian and stream corridors.

Predatory Non-native Species - In the Gila River basin, introduction of non-native species is considered the primary factor in the decline of native fish species (Minckley 1985, Williams et al. 1985, Minckley and Deacon 1991, Douglas et al. 1994, Rinne and Stefferud 1997, Bonar et al. 2004, Rinne 2004, Clarkson et al. 2005, Olden and Poff 2005, Minckley and Marsh 2009). Non-native fish affect loach minnow through predation and competition for resources. Nearly all non-native species that inhabit streams and rivers of the Gila River basin are likely predators on at least some life stages of natives like loach minnow (Schooley et al. 2008). The final critical habitat and reclassification rule (USFWS 2012) provides additional detail on studies completed regarding increases in non-natives and declines in loach minnow throughout its historical range.

Effects of non-native fishes often occur with, or are exacerbated by, changes in flow regimes or declines in habitat conditions (see Factor A above) and should be considered against the backdrop of historical habitat degradation that has occurred over time (Minckley and Meffe 1987, Rinne 1991). Propst et al. (2008) conclude that, while native fish assemblages persist through drought, their resistance and resilience are compromised if non-native predators are present, and that removal and preclusion of non-native predators and competitors are equally important as natural hydrologic regime (Propst et al. 2008). Marks et al. (2010) concluded that removal of non-native fish provided a three-fold greater benefit to native fishes than did flow restoration.

Wildfires - Wildfires have increased in ponderosa pine forests of the Southwest (Swetnam and Betancourt 1990, 1998). Wildfires affect streams and fish in a variety of ways. The fire itself can

increase temperatures, resulting in fish kills. Fire suppression efforts often involve use of fire retardants, which can contaminate streams. Following removal of vegetation by a fire, post-fire runoff from damaged watersheds affects water quality due to ash flows and increasing sedimentation.

Within the range of loach minnow, the Wallow Fire in 2011 and the Whitewater-Baldy Fire in 2013 cumulatively burned approximately 838,000 ac (339,128 ha). Several rivers and streams that contain suitable habitat for loach minnow originate within or flow through areas that have been affected by recent fires including the Gila, San Francisco, Blue, Tularosa, Black, and Verde Rivers, and Eagle Creek. Ash and fine particulate matter created by fire can suffocate fish, fill interstitial spaces between gravel particles, eliminating spawning habitat or, depending on the timing, suffocate embryos that are in the gravel. Ash and debris flows can decimate aquatic invertebrate populations that fish depend on for food (Molles 1985). An increase in fires has led to an increase in the use of fire retardant, some of which can be toxic to aquatic wildlife (Angeler et al. 2006, Calfee and Little 2003, Little and Calfee 2002, Buhl and Hamilton 1998, Poulton et al. 1997, Gaikwokski et al. 1996).

Drought - Effects of current drought conditions may be more pronounced due to their combination with reduced habitat suitability from other effects, as described above. Drought can eliminate or reduce streamflow, elevate water temperatures beyond the species' upper tolerance limits, and cause crowding as surface waters shrink, which in turn can result in more crowded habitats with higher levels of predation or competition. In other areas, drought reduces flooding that would normally rejuvenate habitat and reduce populations of some non-native species that are less adapted to the relatively large floods of southwestern streams (Minckley and Meffe 1987, Rinne and Stefferud 1996). Drought conditions may have a more severe effect on loach minnow than in the past due to their current fragmented distribution. Small, fragmented populations are less likely to be recolonized from areas that may have provided refugia habitat in the past when the species was more widely distributed. Their ability to rebound from these conditions also may be compromised by other factors such as non-native species, habitat alteration, or lack of genetic diversity.

Climate Change - Examples of effects of climate change include warming of the global climate system over recent decades, and substantial increases in precipitation in some regions of the world and decreases in others (IPCC 2007, Solomon et al. 2007). With respect to effects of climate change on species, Fleishman et al. (2013) concluded that observed changes in climate are strongly associated with changes in geographic distributions of species, and that the extent of these observed changes in geographic distribution varies considerably. Fleishman et al. (2013) also concluded that observed changes in climate are strongly associated with some observed changes in timing of seasonal events in the life cycles of species, with some variation in the magnitude among species. While no climate change studies have been completed specific to loach minnow, studies on effects to aquatic species in general conclude that climate change could lead to changes in flooding and flow patterns, which in turn can affect the timing of fish spawning, increase the probability that embryos will be scoured from gravel nests, and wash away newly emerged fry (Warren et al. 2009, Wenger et al. 2011).

<u>Recovery</u>
USFWS completed a loach minnow recovery plan in 1991 (USFWS 1991). Steps outlined as

necessary for recovery included:

- Protection of existing populations of loach minnow;
- Monitoring the status of existing populations;
- Identifying the nature and significance of interaction with non-native fishes;
- Quantifying loach minnow habitat needs and the effects of physical habitat modification on life cycle completion;
- Enhancing or restoring habitats occupied by depleted populations;
- Reintroducing populations of loach minnow to selected streams within their historic range;
- Determination of qualitative criteria for describing a self-sustaining population;
- Considering contingency planning and completing preliminary investigations for captive holding, propagation, and rearing; and
- Developing an information and education program.

A recovery plan revision is underway; however, it has not yet been completed.

Critical Habitat
When critical habitat was designated in 2012, USFWS determined the PCEs for loach minnow. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and non-native species levels (USFWS 2012). PCEs for the loach minnow include:

1. Habitat to support all egg, larval, juvenile, and adult loach minnow which includes:
    a. Perennial flows with a stream depth generally less than 3.3 ft (1.0 meter), and with slow to swift flow velocities between 0.0 and 31.5 inches per second (in/sec) (80.1 cm per second [cm/sec]);
    b. Appropriate stream microhabitat types including pools, runs, riffles, and rapids over sand, gravel, cobble, and rubble substrates with low or moderate amounts of fine sediment and substrate embeddedness;
    c. Appropriate stream habitat with a low gradient of less than approximately 2.5%, at elevations below 8,202 ft (2,500 m); and
    d. Water temperatures in the general range of 46.4 to 77°F (8 to 25°C);
2. An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies;
3. Streams with no or no more than low levels of pollutants;
4. Perennial flows, or interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted;
5. No non-native aquatic species or levels of non-native aquatic species that are sufficiently low as to allow persistence of loach minnow; and
6. 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 flows capable of transporting sediments.

The loach minnow critical habitat designation includes eight units based on river subbasins,

including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins.

Previous Consultations
Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Spikedace (*Meda fulgida*) and Critical Habitat

Legal Status
Spikedace was originally listed as a threatened species on July 1, 1986 (USFWS 1986) and was reclassified to endangered status on February 23, 2012 (USFWS 2012). The current critical habitat designation was published simultaneously with the reclassification of spikedace to endangered status.

Background
The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the spikedace. This information was taken from the 1991 recovery plan (USFWS 1991) and the most recent Biological and Conference Opinion for Wildlife and Sport Fish Restoration Funding of Arizona Game and Fish Department's Statewide and Urban Fisheries Stocking Program for 2021–2031 (USFWS 2021). Information in these documents is incorporated by reference.

Description
Spikedace is a small, silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Taxonomic and genetic work on spikedace indicates there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations occupy fragmented stream segments in the Gila River basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek are morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992, 1993).

Life History and Habitat
Spikedace are omnivores that feed primarily on insects transported in stream drift. They have specific preferences, depending on season and location, for members of the families Baetidae (mayflies) and Simulidae (black flies) and/or Chironomidae (midges) and Hydropsychidae (Anderson 1978, Schreiber and Minckley 1981, Barber and Minckley 1983, Propst et al. 1986). There is both spatial and temporal variation associated in their diets due to resource availability.

Spikedace spawn from March through May with some yearly and geographic variation (Barber et al. 1970, Anderson 1978, Propst et al. 1986). Spawning behavior and captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate.

Spikedace live about two years in the wild, with reproduction occurring primarily in one-year old

fish (Barber et al. 1970, Anderson 1978, Propst et al. 1986). They feed primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh et al. 1989). Additional details on habitat preferences are provided in the 2012 critical habitat designation (USFWS 2012).

Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst et al. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst et al. 1986). Juveniles are found in quiet areas along pool edges over finer-grained substrate. Specific habitat can vary seasonally, among streams and ontogenetically (Anderson 1978; Rinne 1985, 1991; Propst et al. 1986).

Current Distribution

Spikedace were once common throughout much of the Gila River basin, including the mainstem Gila River upstream of Phoenix, and the Verde, Agua Fria, Salt, San Pedro, and San Francisco subbasins. Habitat destruction and competition and predation by non-native aquatic species reduced their range and abundance (Miller 1961, Lachner et al. 1970, Ono et al. 1983, Moyle 1986, Moyle et al. 1986, Propst et al. 1986). Spikedace are now restricted to 10 to 15% of their historical range, and are restricted to:

- portions of the upper Gila River (Grant, Catron, and Hidalgo Counties, New Mexico);
- Aravaipa Creek (Graham and Pinal Counties, Arizona);
- Eagle Creek (Graham and Greenlee Counties, Arizona);
- and the Verde River (Yavapai County, Arizona) (Marsh et al. 1990, Brouder 2002, Stefferud and Reinthal 2005, Paroz et al. 2006, Propst 2007).

Spikedace have recently been translocated to additional streams as part of recovery efforts for the species. Translocation efforts include Hot Springs and Redfield canyons, in Cochise County and Pima counties, Arizona (2007); Fossil Creek in Gila County, Arizona (2007); Bonita Creek in Graham County, Arizona (2008), the upper San Francisco River in Catron County, New Mexico (2011), and the Blue River, Greenlee County (2012). Efforts to establish spikedace in Hot Springs and Redfield canyons were not successful, nor were efforts at Bonita Creek to date.

Spikedace have become established in Fossil Creek and the Blue River (Robinson et al. 2014a, Robinson et al. 2014b, Hickerson et al. 2021). Monitoring through traditional means and with the use of eDNA detected spikedace in the San Francisco River in 2017. Monitoring, and potentially augmentation of spikedace, in the San Francisco River will continue; however, insufficient time has elapsed to determine if the translocation effort will ultimately be successful and result in establishment of a new population of spikedace in the San Francisco River in New Mexico.

Spikedace are now common only in Aravaipa Creek in Arizona (ASU 2002, Reinthal 2021) and one section of the Gila River south of Cliff, New Mexico (NMDGF 2008, Propst et al. 2009). The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey (Brouder 2002). Spikedace from the Eagle Creek population have not been detected since 1989 (Marsh 1996).

Threats
Primary threats to spikedace include habitat alteration and destruction, introduction and spread of non-native species, wildfire, and drought and climate change.

Diminishing Surface Water - Within the historical range of spikedace, groundwater withdrawals, surface water diversions, and construction of impoundments have converted large portions of flowing streams into intermittent streams, large reservoirs, or dewatered channels, and eliminated suitable spikedace habitat in effected areas (Propst et al. 1986, Tellman et al. 1997). Removal of groundwater in hydrologically connected areas can change the long-term average rates of inflow to and outflow from aquifer systems through time, which directly affects the presence of surface water (USGS 2010, 2013; Barlow and Leake 2012).

Recreation - Effects to spikedace from recreation can occur from movement of people, vehicles, and horses or mules along streambanks, trampling, soil compaction and erosion, destruction of vegetation, water quality issues, and increased danger of fire (NAU 2005, Monz et al. 2010). In the arid Gila River Basin, recreational effects are disproportionately distributed along streams as a primary focus for recreation (Briggs 1996). Overuse through camping and other recreational activities can lead to decreased riparian vegetation (USFS 2008) and subsequent increases in stream temperatures, as well as soil compaction and vegetation destruction, which in turn can lead to increased runoff and sedimentation in waterways (Monz et al. 2010, Andereck 1993).

Livestock grazing - Livestock grazing has been one of the most widespread and long-term causes of adverse effects to native fishes and their habitat (Miller 1961, Platts 1990). Improper livestock grazing can destabilize stream channels, disturb riparian ecosystem functions, and contribute to nutrient loading in streams (Platts 1990, Armour et al. 1991, Tellman et al. 1997, Wyman et al. 2006, Brown and Froemke 2012). Effects from livestock grazing have been reduced in the last 20 years due to improved management on Federal lands (USFWS 1997) and discontinuation of grazing in many riparian and stream corridors.

Predatory Non-native Species - In the Gila River basin, introduction of non-native species is considered the primary factor in the decline of native fish species (Minckley 1985, Williams et al. 1985, Minckley and Deacon 1991, Douglas et al. 1994, Rinne and Stefferud 1997, Bonar et al. 2004, Rinne 2004, Clarkson et al. 2005, Olden and Poff 2005, Minckley and Marsh 2009). For spikedace and loach minnow, every habitat that has not been renovated or protected by barriers has at least six non-native fish species present, at varying levels of occupation and several of the non-native species now in spikedace habitat arrived since the species was listed. Non-native channel catfish, flathead catfish, and smallmouth bass all prey on spikedace, as indicated by prey remains of native fishes in the stomachs of these species (Propst et al. 1986, Propst et al. 1988, Bonar et al. 2004). Declines of native fish species appear linked to increases in non-native fish species.

Most areas considered occupied by spikedace have seen a shift from a predominance of native fishes to a predominance of non-native fishes. For spikedace, this is best demonstrated on the upper Verde River, where native species dominated the total fish community at greater than 80% from 1994 to 1996, before dropping to approximately 20% in 1997 and 19% in 2001. At the same time (1994 to 2000), three non-native species increased in abundance (Rinne et al. 2005).

Similar changes in the dominance of non-native fishes have occurred on the Middle Fork Gila River, with a 65% decline of native fishes between 1988 and 2001 (Propst 2002). Generally, when the species composition of a community shifts in favor of non-native fishes, a decline in spikedace abundance occurs (Olden and Poff 2005). The effects of non-native fishes often occur with, or are exacerbated by, changes in flow regimes or declines in habitat conditions and should be considered against the backdrop of historical habitat degradation that has occurred over time (Minckley and Meffe 1987, Rinne 1991).

Wildfires - Wildfires affect streams and fish in a variety of ways. The effects of fire are many and can vary and are described above under loach minnow and are incorporated here by reference. Several rivers and streams that contain suitable habitat for spikedace originate within or flow through areas that have been affected by recent fires including the Gila, San Francisco, Blue, and Verde Rivers, and Eagle Creek.

Drought - Effects of current drought conditions may be more pronounced due to their combination with reduced habitat suitability from other effects, as described above. Drought can eliminate streamflow, or result in lower streamflow, and consequently can elevate water temperatures beyond the species' upper tolerance limits. Drought also can cause crowding as surface waters shrink, which in turn can result in more crowded habitats with higher levels of predation or competition. In other areas, drought reduces flooding that would normally rejuvenate habitat and reduce populations of some non-native species that are less adapted to the relatively large floods of southwestern streams (Minckley and Meffe 1987, Stefferud and Rinne 1996). Drought conditions may have a more severe effect on loach minnow than in the past due to their current fragmented distribution. Small, fragmented populations are less likely to be recolonized from areas that may have provided refugial habitat in the past when the species was more widely distributed. Their ability to rebound from these conditions also may be compromised by other factors such as non-native species, habitat alteration, or lack of genetic diversity.

Climate Change - Examples of effects of climate change include warming of the global climate system over recent decades, and substantial increases in precipitation in some regions of the world and decreases in others (IPCC 2007, Solomon et al. 2007). With respect to effects of climate change on species, Fleishman et al. (2013) concluded that observed changes in climate are strongly associated with changes in geographic distributions of species, and that the extent of these observed changes in geographic distribution varies considerably. Fleishman et al. (2013) also concluded that observed changes in climate are strongly associated with some observed changes in timing of seasonal events in the life cycles of species, with some variation in the magnitude among species. While no climate change studies have been completed specific to spikedace, studies on impacts to aquatic species in general conclude that climate change could lead to changes in flooding and flow patterns, which in turn can affect the timing of fish spawning, increase the probability that embryos will be scoured from gravel nests, and wash away newly emerged fry (Warren et al. 2009, Wenger et al. 2011).

Recovery

USFWS completed a spikedace recovery plan in 1991 (USFWS 1991). Steps outlined as necessary for recovery included:

- Protection of existing populations of spikedace;
- Monitoring the status of existing populations;
- Identifying the nature and significance of interaction with non-native fishes;
- Quantifying loach minnow habitat needs and the effects of physical habitat modification on life cycle completion;
- Enhancing or restoring habitats occupied by depleted populations;
- Reintroducing populations of loach minnow to selected streams within their historic range;
- Determination of qualitative criteria for describing a self-sustaining population;
- Planning and conducting investigations on captive holding, propagation, and rearing; and
- Developing an information and education program.

A recovery plan revision is underway; however, it has not yet been completed.

Critical Habitat

When critical habitat for spikedace was designated in 2012, the USFWS determined the PCEs for spikedace. The spikedace critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins. Occupancy within these units is described in USFWS (2012).

PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and non-native species levels (USFWS 2012). PCEs for the spikedace include:

1. Habitat to support all egg, larval, juvenile, and adult spikedace, which includes: a. Perennial flows with a stream depth generally less than 3.3 ft (1 meter), and with slow to swift flow velocities between 1.9 and 31.5 in/sec (4.8 and 80 cm/sec); b. Appropriate stream microhabitat types including glides, runs, riffles, and the margins of pools and eddies, and backwater components over sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness; c. Appropriate stream habitat with a low gradient of less than approximately 1%, at elevations below 6,890 ft (2,100 m); and d. Water temperatures in the general range of 46.4 to 82.4°F (8 to 28°C);
2. An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies;
3. Streams with no or no more than low levels of pollutants;
4. Perennial flows, or interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted;
5. No non-native aquatic species or levels of non-native aquatic species that are sufficiently low as to allow persistence of spikedace; and
6. 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 flows capable of transporting sediments.

Previous Consultations
Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Riparian and Wetland Birds

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

Legal Status
USFWS listed the southwestern willow flycatcher (hereafter, referred to as southwestern willow flycatcher and flycatcher) as endangered, without critical habitat on February 27, 1995 (USFWS 1995). Critical habitat was designated on July 22, 1997 (USFWS 1997a). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (USFWS 1997b).

On January 3, 2013, USFWS completed the flycatcher critical habitat revision, designating approximately 1,227 stream miles (USFWS 2013). Designated areas are stream segments, with the lateral extent including the riparian areas and streams that occur within the 100-year floodplain or flood-prone areas encompassing a total area of approximately 208,973 acres.

A final southwestern willow flycatcher recovery plan was released in March 2003 (USFWS 2002). Recovery strategy is to reach numerical and habitat related goals for each specific Management Unit established throughout the subspecies range and establish long-term conservation plans (USFWS 2002).

A five-year review and a 12-month finding on a petition to de-list the flycatcher were completed in December 2017 and posted it on the Arizona Ecological Services Field Office's web site (USFWS 2017) (http://www.fws.gov/southwest/es/arizona/Southwes.htm).

Description
The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches. It is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

Life History
Throughout its range, the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge et al. 1997 and 2010, USFWS 2002). Nesting begins in early May and June, and young fledge from late June through mid-August (Sogge et al. 1997 and 2010, USFWS 2002). Typically, flycatchers raise one brood per year, but birds have been documented raising two broods during one season and renesting after a failure (USFWS 2002). The entire breeding cycle, from egg laying to fledging, is approximately 28 days.

Southwestern willow flycatcher nests are fairly small (3.2 inches tall and wide) and are open cup structures typically placed in the fork of a branch. Nest height varies considerably (1.6 to 60 feet off the ground), and is related to height of the nest plant, overall canopy height, and/or the height of the vegetation strata that contain small twigs and live growth (USFWS 2002). Most typically, nests are relatively low, 6.5 to 23 feet above ground (USFWS 2002). Flycatcher nests built in habitat dominated by box elders occur higher in the tree (to 60 feet) (USFWS 2002).

The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. The bird typically perches on a branch and makes short direct flights, or sallies to capture flying insects. Drost et al. (1998) found that the major southwestern willow flycatcher prey items (in Arizona and Colorado) consisted of true flies (*Diptera*); ants, bees, and wasps (*Hymenoptera*); and true bugs (*Hemiptera*). Other insect prey taxa included leafhoppers (*Homoptera: Cicadellidae*); dragonflies and damselflies (*Odonata*); and caterpillars (*Lepidoptera larvae*). Non-insect prey included spiders (*Araneae*), sowbugs (*Isopoda*), and fragments of plant material.

Habitat Requirements

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to approximately 8,500 feet in Arizona and southwestern Colorado (Sogge et al. 2010; USFWS 1995, 2002). Historical egg/nest collections and species' descriptions throughout its range describe the flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987). Currently, southwestern willow flycatchers primarily use saltcedar (*Tamarix* spp.), Goodding’s willow (*Salix gooddingii*), coyote willow (*Salix exigua*), Geyer willow (*Salix geyeriana*), boxelder (*Acer negundo*), Russian olive (*Elaeagnus angustifolio*), and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include buttonbush (*Cephalanthus* spp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Based on the diversity of plant species composition and complexity of habitat structure, we described four basic flycatcher habitat types: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al. 1997, 2010; USFWS 2002).

The flycatcher’s habitat is dynamic and can change rapidly because its location along waterways can frequently flood. Flooding is an important process for the long-term maintenance of elevated groundwater aquifers, and recycling and maintenance of breeding habitat (Poff et al. 1997). Nesting habitat can grow into and out of suitability quickly. Saltcedar and willow trees can develop from seeds to nesting habitat in about four to five years. Heavy precipitation runoff can remove/reduce habitat suitability in a day. Also, through time, river channels, floodplain width, vegetation location, and vegetation density may change, affecting habitat quality. The flycatcher’s use of habitat in different successional stages can also be dynamic. For example, over-mature or young habitat not suitable for nest placement can be occupied and used for foraging and shelter by migrating, breeding, dispersing, or non-territorial southwestern willow flycatchers (McLeod et al. 2005, Cardinal and Paxton 2005). Overall, flycatcher habitat can quickly change and vary in suitability, location, use, and occupancy over time (Finch and Stoleson 2000).

Tamarisk is an important component of the flycatcher's nesting and foraging habitat in Arizona, southern Nevada and Utah, and western New Mexico. In 2001, flycatchers in Arizona built 323 of their 404 (80%) known nests in tamarisk trees (Smith et al. 2002). Biologists had once incorrectly concluded that tamarisk, because it was an exotic plant, was lesser quality flycatcher habitat (USFWS 2002, 2017). Comparisons of flycatcher reproductive performance (USFWS 2002), prey populations (Durst 2004) and physiological conditions (Owen and Sogge 2002) using native and exotic vegetation revealed no difference (Sogge et al. 2005).

Because tamarisk is a component of about 50% of all known flycatcher territories (Durst et al. 2008, Durst 2017), the introduction and spread of the tamarisk leaf beetle can substantially alter the distribution, abundance, and quality of flycatcher nesting habitat and adversely affect breeding attempts. The introduced tamarisk leaf beetle was first detected affecting tamarisk within the southwestern willow flycatcher's breeding range in 2008 along the Virgin River in St. George, Utah. Along this Virgin River site in 2009, 13 of 15 flycatcher nests failed following vegetation defoliation (Paxton et al. 2010). Initially, Animal Plant and Health Inspection Services (APHIS 2010) believed this insect's introduction and natural history prevented it from moving into and thriving within the southwestern United States and flycatcher's breeding range. In 2012, people detected the beetle within the flycatcher's breeding range in southern Nevada/Utah and northern Arizona/New Mexico. By 2021 in Arizona, the beetle occurred along the entire lower Colorado River (Grand Canyon to Mexico), Little Colorado River, and Bill Williams, Santa Maria, and Big Sandy rivers (including Alamo Lake) in northern and western Arizona; Hassayampa and upper Verde rivers in central Arizona; and San Francisco and upper Gila rivers in eastern Arizona. In New Mexico, the beetle occurs along much of the Rio Grande within the flycatcher's breeding range.

Distribution

Rangewide distribution and abundance - There are currently 308 known southwestern willow flycatcher breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 2012 where a territorial flycatcher was detected) holding an estimated 1,629 territories (Durst 2017). Since surveyors do not visit all sites annually, it is difficult to arrive at a grand total of flycatcher territories. There are many territories included in the rangewide estimate where surveyors have not returned for many years, reducing the estimate's accuracy. Territory numbers have increased since listing and some habitat remains unsurveyed. Since Unitt's (1987) estimate of 500–1,000 rangewide territories and about 25 years of targeted surveys, the most recent estimate is not too far beyond his initial conclusion. About 70% of the 1,629 estimated territories throughout the subspecies range are located at five general locations (Cliff/Gila Valley and Middle Rio Grande in New Mexico and the Upper Gila River, Roosevelt Lake, and San Pedro River/Gila River confluence in Arizona) (Durst 2012).

While flycatcher territory numbers increased, distribution across the bird's range has not proportionally improved. The increase in known numbers is largely due to territory abundance at the five largest population centers in Arizona and New Mexico. Concurrent large territory increases in other parts of its breeding range, such as southern California, Colorado, Nevada, and Utah have not occurred and have retained similar size and distribution since the previous 2008 rangewide estimate (Durst et al. 2008).

Arizona distribution and abundance - While territory numbers have increased in Arizona (145

to 679 territories from 1993 to 2012) (Durst 2017), overall distribution of flycatchers throughout the state has not proportionally grown. We believe population stability in Arizona is largely dependent on the presence of three population centers (Roosevelt Lake, San Pedro/Gila River confluence, upper Gila River). Lower Colorado River nesting sites are still few and limited to Topock Marsh, and adjacent tributaries in southern Nevada and Arizona (e.g., Bill Williams River). We have few consistent surveys and known territories from the Santa Cruz, Powell, Middle Colorado, San Francisco, Little Colorado, and Hassayampa/Agua Fria Management Units. Biologists in the 2010s discovered more territories in the Verde Valley (Perkinsville to Camp Verde), improving the known distribution and abundance of territories/sites within the Verde Management Unit. The result of catastrophic events or substantial population changes either in size or location could greatly change the status and persistence of the bird. Conversely, expansion into new habitats or discovery of populations would improve the known stability and status of the flycatcher.

Threats

We have attributed the flycatcher's decline primarily to removal, alteration, degradation, and alteration of riparian breeding habitat, along with a host of other factors including affects to wintering habitat and brown-headed cowbird (*Molothrus ater*) brood parasitism (USFWS 1995, 2002; Sogge et al. 1997, 2010; McCarthey et al. 1998). A variety of factors cause habitat degradation, including water diversion and groundwater pumping, channelization, and dams; urban, recreational, and agricultural development; and excessive livestock grazing (USFWS 2002). Fire is an increasing threat to willow flycatcher habitat, especially in monotypic saltcedar vegetation and where water diversions and/or groundwater pumping desiccates riparian vegetation (DeLoach 1991, Busch 1995, Paxton et al. 1996, Sogge et al. 1997, USFWS 2002). Willow flycatcher nests can be parasitized by brown-headed cowbirds, which lay their eggs in the host's nest. The presence of livestock and range improvements such as waters and corrals, agriculture, urban areas, golf courses, bird feeders, and trash areas can enhance cowbird-feeding sites. When these feeding areas are near flycatcher breeding habitat, especially coupled with habitat degradation, cowbird parasitism of flycatcher nests may increase (USFWS 2002).

Critical Habitat

The primary constituent elements (PCE) of designated critical habitat are riparian plant species, structure and quality of habitat and insects for prey.

1. *Riparian vegetation* - Riparian habitat along a dynamic river or lakeside, in a natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Gooddings willow, coyote willow, Geyer's willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:
    a. Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 2 to 30 m (about 6 to 98 ft). Lower-stature thickets (2 to 4 m or 6 to 13 ft tall) are found at higher elevation riparian forests and tall-stature thickets are found at middle and lower-elevation riparian forests;
    b. Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 ft) above ground or dense foliage only at the shrub or tree level as a low,

dense canopy;

c. Sites for nesting that contain a dense (about 50–100%) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground);
d. Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 ha (0.25 ac) or as large as 70 ha (175 ac).

2. *Insect prey populations* - A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (*Hymenoptera*); dragonflies (*Odonata*); flies (*Diptera*); true bugs (*Hemiptera*); beetles (*Coleoptera*); butterflies, moths, and caterpillars (*Lepidoptera*); and spittlebugs (*Homoptera*).

The physical and biological features of flycatcher critical habitat are the principal biological or physical elements essential to flycatcher conservation which may require special management considerations or protection (USFWS 2013). We primarily identified the features and functions of rivers that generate flycatcher habitat and its food such as low gradient/broad floodplains, water, saturated soil, hydrologic regimes, elevated groundwater, plant growth and germination, and fine sediments, etc. (USFWS 2013).

Previous Consultations

Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Our biological opinion for the U.S. Forest Service's (USFS) Southwestern Regional Land Resource Management Plan (LRMP) concluded that ongoing upland grazing associated with Tonto Creek's Management Area 6J (Code 1423) on the Tonto National Forest would cause a sub-lethal response (-2) to the flycatcher (USFWS 2005). They also concluded that continued grazing can facilitate decreased bank stabilization, increased run-off, increased sedimentation, increased erosion, and reduced capacity of soils to hold water. These factors would reduce the occurrence, longevity, and quality of flycatcher critical habitat. The USFS completed the LRMP prior to adopting a policy of rangeland adaptive management in Chapter 90 of FSH 2209.13.

A previous programmatic consultation to treat noxious and invasive plants across the Tonto NF concluded that the project "may adversely affect" the southwestern willow flycatcher (Treatment of Noxious or Invasive Plants on the Tonto National Forest; AESO/SE 22410-2009-F-0018).

Western yellow-billed cuckoo (*Coccyzus americanus*) and Critical Habitat

Legal status

The USFWS listed the Western Distinct Population Segment (DPS) of the yellow-billed cuckoo as threatened on October 3, 2014 (USFWS 2014). The USFWS finalized critical habitat for the cuckoo on April 21, 2021 (USFWS 2021).

The yellow-billed cuckoo is a member of the avian family Cuculidae and the American

Ornithologists' Union (AOU) recognizes it as a species (Chesser et al. 2019). The AOU does not currently recognize the western yellow-billed cuckoo as a subspecies; however, we accept this classification. The USFWS's Genetics Community of Practice concluded that the yellow-billed cuckoo genetics studies (Fleisher 2001, Pruett et al. 2001, Farrell 2006, Farrell 2013, and McNeil 2015) are inconclusive as to whether the eastern and western yellow-billed cuckoo populations are genetically differentiated, primarily due to small sample size and lack of geographic representation in genetics samples (USFWS 2020).

Description and Life History

Adult western yellow-billed cuckoos have a stout and slightly down-curved bill, a slender, elongated body with a long tail and a narrow yellow ring of colored, bare skin around the eye (USFWS 2014). The plumage is loose and grayish-brown above and white below, with reddish primary flight feathers. The tail feathers have large white spots on a black tail. They are a medium-sized bird about 12 inches (30 centimeters) in length, and about 2 ounces (60 grams) in weight. The bill is blue-black with yellow on the basal half of the lower mandible. The legs are short and bluish-gray. Females are slightly larger than males (Hughes 2015).

The yellow-billed cuckoo is a neotropical migrant bird that breeds in North America and spends the winter in South America, primarily east of the Andes, south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (Sechrist et al. 2012, Hughes 2015, McNiel et al. 2015).

Western yellow-billed cuckoos breed from late May through September, although most nesting occurs from late June through August. Both adults build loose platform nests composed of dry twigs. Clutch size is variable, usually two or three. Nestlings grow rapidly, with a period of 17 days from start of incubation to fledgling, which is among the shortest for most bird species (Hughes 2015).

Habitat Requirements

Western populations of the cuckoo are most commonly found in large tracks of dense, multi-layered gallery forests consisting primarily of cottonwood (*Populus* spp.), willow (*Salix* spp.), and mesquite (*Prosopis* spp.) (including mesquite bosque) along riparian corridors in otherwise arid areas (Laymon and Halterman 1989, Hughes 2015). Other riparian tree species are often present, including but not limited to boxelder (*Acer negundo*), ash (*Fraxinus* spp.), walnut (*Juglans* spp.), sycamore (*Platanus* spp.), and tamarisk (*Tamarix* spp.) (Gaines 1974, Gaines and Laymon 1984, Groschupf 1987, Laymon and Halterman 1989, Corman and Magill 2000, Dettling and Howell 2011). Home range size is highly variable and territories may overlap in this weakly territorial species (Halterman 2009, McNeil et al. 2013, Sechrist et al. 2013, Dillon and Moore 2020). Rangewide, individual home ranges during the breeding season average over 100 ac (Laymon and Halterman 1987; Laymon et al. 1997; Laymon and Williams 2002; Halterman 2009; McNeil et al. 2013; Sechrist et al. 2009, 2013). However, Laymon and Halterman (1985) reported an average cuckoo home range size of 43 ac and home range estimates for radio-telemetered cuckoos in New Mexico varied from 12 to 697 acres (Sechrist et al. 2009). In New Mexico, the average maximum daily distance traveled was 2,795 ft, (0.52 mile) and the average maximum seasonal distance traveled was 4,790 ft (0.91 mile) (Sechrist et al. 2009).

Extensive riparian forests may support the greatest density of breeding cuckoos, but other

habitats are also important for recovery (USFWS 2021). In parts of the Southwestern United States, including Arizona, western yellow-billed cuckoo breeding habitat is more variable than in the rest of its range and includes more arid riparian woodlands (including mesquite bosques), desert scrub and desert grassland with a tree component, and Madrean evergreen woodland (oak and other tree species) in perennial, intermittent, and ephemeral drainages (USFWS 2021). Southwestern breeding habitat is more water-limited, contains a greater proportion of xeroriparian and nonriparian 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, sometimes less than 200 ac (81 ha). In addition to the riparian tree species found rangewide, the vegetation includes some other native and non-native xero-riparian and upland non-riparian trees and large shrubs, such as mesquite, hackberry (*Celtis reticulata* and *C. ehrenbergiana*), soapberry (*Sapindus saponaria*), oak, acacia (*Acacia* spp., *Senegalia greggi*), mimosa (*Mimosa* spp.), greythorn (*Ziziphus obtusifolia*), desert willow (*Chilopsis linearis*), juniper (*Juniperus* spp.), Arizona cypress (*Cupressus arizonica*), pine (*Pinus* spp.), alder (*Alnus rhombifolia* and *A. oblongifolia*), wolfberry (*Lycium* spp.), and Russian olive (*Elaeagnus angustifolia*) (Groschupf 1987, Corman and Magill 2000, Corson 2018, Sferra et al. 2019).

Tamarisk may be a component of breeding habitat, but there is usually a native riparian tree component present (Gaines and Laymon 1984, Johnson et al. 2008, McNeil et al. 2013, Carstensen et al. 2015, Dillon and Moore 2020). Site-specific variation is likely a result of characteristics unique to each location (e.g., type and quality of habitat, patch configuration) (Halterman 2009, Sechrist et al. 2013). Habitat occurs in relatively contiguous stands of dense vegetation, in irregularly shaped mosaics of dense and open vegetation, and in patches that are narrow and linear or savannah-like.

Humid conditions created by surface and subsurface moisture and a multi-layered canopy appear to be important for successful hatching and rearing of young (Hamilton and Hamilton 1965, Gaines and Laymon 1984). Within the boundaries of the DPS, cuckoos occur from sea level to elevations up to 7,000 ft or more. However, the moist conditions that support riparian plant communities typically occur at lower elevations.

Cuckoo breeding habitat in much of the species' range is associated with perennial rivers and streams in regulated and unregulated flows (Poff et al. 1997). In southeastern Arizona, cuckoos nest along more arid ephemeral and intermittent drainages (Corman and Magill 2000, Corman and Wise-Gervais 2005, AGFD 2015, Sferra et al. 2019). Hydrologic conditions at cuckoo breeding sites can vary widely in a single year and among years, and due to these changes, cuckoos may move from one area to another in the same season and from year to year.

Cuckoos are more flexible in their choice of foraging and migration stopover habitat than they are in selecting nesting habitat. Foraging areas can be less dense or patchier than nesting areas, with lower levels of canopy cover (Carstensen et al. 2015, Sechrist et al. 2009). In Arizona, adjacent foraging habitat is usually more arid than nesting habitat. Habitat flexibility during migration may extend to monotypic tamarisk and shrubby habitats, hedgerows, coastal scrub, orchards, and semi-desert grasslands.

<u>Threats</u>

The primary threat to the western yellow-billed cuckoo is destruction or fragmentation of high-

quality riparian nesting habitat. Many factors have altered and eliminated cuckoo habitats, including damming, water diversions, ground water pumping, stream channelization and stabilization, agricultural development, mining, livestock grazing, high-severity wildfires, establishment of non-native vegetation, drought, defoliation of tamarisk by the introduced tamarisk leaf beetle, and prey scarcity due to pesticides (Ehrlich et al. 1992; Corman and Wise-Gervais 2005; USFWS 2014, 2020). Habitat fragmentation has led to the isolation of small populations and has increased their susceptibility to further declines and local extirpations due to all the factors discussed above and to stochastic factors such as weather, fluctuating prey populations, and climate change (Thompson 1961, McGill 1975, Wilcove et al. 1986).

<u>Population Status and Distribution</u>
Rangewide Distribution – Based on historical accounts, the cuckoo was formerly widespread and locally common in California and Arizona, more narrowly distributed but locally common in New Mexico, Oregon, and Washington, and uncommon along the western front of the Rocky Mountains north to British Columbia (American Ornithologists' Union 1998, Hughes 2015). The species may now be extirpated from British Colombia, Washington, and Oregon (Hughes 2015, USFWS 2021), and rare in scattered drainages in western Colorado, Idaho, Nevada, and Utah, with single, nonbreeding birds most likely to occur (USFWS 2014, 2020). Currently, the species' rangewide territory estimates are near 1,300 (USFWS 2019) with the largest remaining core breeding populations occurring in Arizona, along the Rio Grande in New Mexico, and in northwestern Mexico (USFWS 2020, 2021). Population declines continue to occur due to continuing and new threats to the western DPS (USFWS 2020).

Arizona Distribution – Historically, the species was a common resident chiefly in the lower Sonoran zones of southern, central, and western Arizona (Phillips et al. 1964, Groschupf 1987). The cuckoo now nests primarily in the central and southern parts of the state. Populations in Arizona have declined in many perennial riparian areas from historical levels as well as over the past 35 years, with recent declines at some of the largest populations (e.g., Bill Williams River). Currently there are an estimated 450 western yellow-billed cuckoo territories across Arizona (USFWS 2019). The San Pedro River supports the largest population of cuckoos in Arizona in an unregulated riparian system and one of the largest in the DPS. The Gila River and lower Colorado River also contain large populations of western cuckoos in Arizona. Since listing, surveyors have documented western yellow-billed cuckoos breeding in ephemeral and intermittent drainages with a mix of xeroriparian and non-riparian trees, indicating a broader range of habitats and geographic areas than previously known. Fewer than 10 territories are present within most drainages, but combined they make up a large amount of occupied habitat across the landscape. The western yellow-billed cuckoo currently nests primarily in the central and southern parts of the state, as well as at revegetation sites along the lower Colorado River (Groschupf 1987; Corman and Magill 2000; Halterman 2009; McNeil et al. 2013; Griffin 2015; MacFarland and Horst 2015, 2016, 2017; Sferra et al. 2019; USFWS 2014, 2021).

In addition to sites designated as critical habitat, within Arizona cuckoos occur in the drainages on the Prescott NF, Upper Santa Cruz River in the San Raphael Valley, Babocomari River, Hooker Hot Springs, Santa Maria River, and many smaller drainages (Corman and Magill 2000, Vernardaro Group 2009, Prescott NF unpublished data 2016–2019, AGFD 2018, Cornell Lab of Ornithology 2020). Additional surveys are needed to confirm occupancy and breeding status in drainages in the Apache-Sitgreaves NF, sky island drainages north of I-10 on the Coronado NF,

Aravaipa Canyon, Hot Springs Canyon, many drainages of the Coconino and Tonto NFs, Little Colorado River, upper Big Sandy River, and drainages west of the Prescott NF. Unknown is whether cuckoos occur on the Kaibab NF. The San Carlos Apache, White Mountain Apache, and Tohono O'odham Nations may have breeding cuckoos in several drainages.

Critical Habitat

USFWS designated critical habitat for the cuckoo on April 21, 2021 (USFWS 2021) encompassing 298,845 acres (120,939 hectares) across the western United States. Critical habitat units do not include all known occupied habitat, or all reaches of occupied drainages.

Given the wide variety and extent of foraging habitat outside breeding habitat, and the large geographic areas in which western yellow-billed cuckoos search for food, we did not designate foraging habitat as critical habitat. Based on our current knowledge of the habitat characteristics required to sustain the species' life-history processes including breeding and dispersing, we have determined that the specific physical or biological features essential to the conservation of the western yellow-billed cuckoo consist of the following three components:

1. *Rangewide breeding habitat* - Riparian woodlands across the DPS; *Southwestern breeding habitat*, primarily in Arizona and New Mexico: Drainages with varying combinations of riparian, xeroriparian, and/or nonriparian trees and large shrubs. This physical or biological feature includes breeding habitat found throughout the DPS range as well as additional breeding habitat characteristics unique to the Southwest.
    a. *Rangewide breeding habitat (including areas in the Southwest)* - Rangewide breeding habitat is composed of riparian 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 3% but may be greater in some instances. Nesting sites within the habitat have an above-average canopy closure (greater than 70%), and have a cooler, more humid environment than the surrounding riparian and upland habitats. Rangewide breeding habitat is composed of varying combinations of riparian species including the following nest trees: cottonwood, willow, ash, sycamore, boxelder, alder, and walnut.
    b. *Southwestern breeding habitat* - Southwestern breeding habitat, found primarily in Arizona and New Mexico, is more variable than rangewide breeding habitat. Southwestern breeding habitat occurs within or along perennial, intermittent, and ephemeral drainages in montane canyons, foothills, desert floodplains, and arroyos. It may include woody side drainages, terraces, and hillsides immediately adjacent to the main drainage bottom. Drainages intersect a variety of habitat types including, but not limited to, desert scrub, desert grassland, and Madrean evergreen woodlands (presence of oak). Southwestern breeding habitat is composed of varying combinations of riparian, xeroriparian, and/or nonriparian tree and large shrub species including, but not limited to, the following nest trees: cottonwood, willow, mesquite, ash, hackberry, sycamore, walnut, desert willow, soapberry, tamarisk, Russian olive, juniper, acacia, and/or oak. In perennial and intermittent drainages, Southwestern riparian breeding habitat is often narrower, patchier, and/or sparser than rangewide riparian breeding habitat and may contain

a greater proportion of xeroriparian trees and large shrub species. Although some cottonwood and willow may be present in Southwestern riparian habitat, xeroriparian species may be more prevalent. Mesquite woodland may be present within the riparian floodplain, flanking the outer edges of wetter riparian habitat, or scattered on the adjacent hillsides. The more arid the drainage, the greater the likelihood that it will be dominated by xeroriparian and nonriparian nest tree species. Arid ephemeral drainages in southeastern Arizona receive summer humidity and rainfall from the North American Monsoon (PBF 3), with a pronounced green-up of grasses and forbs. These arid ephemeral drainages often contain xeroriparian species like hackberry or nonriparian species associated with the adjacent habitat type like oak, mesquite, acacia, mimosa, greythorn, and juniper. In southeastern Arizona mountains, breeding habitat is typically below pine woodlands (~6,000 ft (1,829 m)).

2. *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.
3. *Hydrologic processes* - The movement of water and sediment in natural or altered systems that maintains and regenerates breeding habitat. This physical or biological feature includes hydrologic processes found in rangewide breeding habitat as well as additional hydrologic processes unique to the Southwest in southwestern breeding habitat:
    a. Rangewide 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.
    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 western yellow-billed cuckoos breed in intermittent and ephemeral drainages.

Previous Consultations

Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files.

Yuma Ridgway's rail (*Rallus obsoletus yumaensis*)

Legal Status
The Yuma Ridgway's (clapper) rail (*Rallus obsoletus [=longirostris] yumanensis*) was federally listed as a species in danger of extinction in the United States (U.S.) on March 11, 1967, under the Endangered Species Preservation Act (ESPA) of 1966 (USFWS 1967). Included under the 1969 Act was the population in Mexico; it was listed rangewide under the Endangered Species Act of 1973 (as amended). There is no designated critical habitat.

Species Description and Life History
The Yuma Ridgway's rail is a medium-sized subspecies of the Ridgway's rail genus, with adults standing 20–23 centimeters (cm) (8 inches [in]) tall. Males tend to average between 266.8 grams (g) (9.3 ounces [oz]) in weight (Todd 1986) while females are slightly smaller, averaging between 226.2 g (8.0 oz) (Todd 1986) and 193.0 g (6.8 oz) (Eddleman 1989). Several external measurements can differentiate between the sexes (Eddleman 1989).

Adult Yuma Ridgway's rails of both sexes are similar in plumage; they possess a long, slender, slightly de-curved bill, a laterally compressed body, and relatively long legs and toes compared to body size. The upper mandible (bill) is dark grey, fading to orange at the base and the tip. The head and scapular (shoulder) areas are grey, with browns and oranges appearing on the sides of the neck and under the head. The chin and upper throat are white, and there is a light eyebrow stripe extending from above the eye to the upper mandible. The breast is tawny- or burnt-orange in the male, and a brick-orange in breeding females. The upper body is light grey to dark brown, becoming blotchy and dominant on the rump and distally on the wings. The underside and flanks forward of the legs are dark greys with vertical white stripes. The tail is dark brown above and white below. Legs are un-feathered and orange-flesh in color (Todd 1986).

Adult rails have a basic pre-body molt in May-August, with simultaneous molt of rectrices (tail feathers) and remiges (wing feathers), which both allow for flight. Between mid-July and the end of September, these adults are flightless. A second, pre-alternate molt occurs from September to December and does not involve the wing or tail flight feathers (Eddleman 1989). Hatchlings are downy black, with many having some white downy feathers on their anterior abdominal region (Meanley 1985). This down makes hatchlings susceptible to drowning before their juvenile molt that occurs one month after hatching.

Yuma Ridgway's rails are secretive, and more often heard than seen, especially in the morning and evening hours (Eddleman 1989). They are good swimmers, and with laterally compressed bodies, can maneuver through cattails relatively quickly. They are capable of long-distance flights but are not well adept at short distance flying.

The diet of the Yuma Ridgway's rail is varied. Crayfish are believed to dominate the rail's diet, with small fish, tadpoles, clams, and other aquatic invertebrates also utilized (Ohmart and Tomlinson 1977, Anderson and Ohmart 1985, Todd 1986, Eddleman 1989, Conway 1990). Crayfish (*Procamberus clarki* and *Orconectes virilis*) were introduced to the Colorado River basin in 1968 for aquatic weed control and to provide forage for sportfish (Inman et al. 1998). The spread of crayfish in the lower Colorado River may have assisted the expansion of Yuma Ridgway's rail, as crayfish provided a more abundant and secure food supply during the breeding

season (Ohmart and Tomlinson 1977).

Habitat Requirements and Limiting Factors

The Yuma Ridgway's rail is the only subspecies of Ridgway's rail primarily found in freshwater marshes. Historically, cattail/bulrush marshes in the Colorado River Delta in Sonora, Mexico, were the apparent stronghold for the species. However, the virtual elimination of freshwater flows down the lower Colorado River to the Delta due to upstream diversions from the river for agriculture, and municipal uses drastically reduced the habitat in Mexico. Rails responded by dispersing to the freshwater marshes along the lower Colorado River in the U.S. and fringes of the Salton Sea.

The Yuma Ridgway's rail has a relatively broad potential range in which it utilizes habitat ranging from small patches that have formed from agricultural drains to larger patches along river channels. Despite this flexibility, habitat quality drives the number of individuals present in a particular area. The primary components of good quality rail habitat include freshwater marshes dominated by cattail (*Typha* sp.) and bulrush (*Scirpus* ssp.) averaging greater than 2 m (6 ft) high, shallow (1–15 cm [6 in]) water and limited fluctuations during the breeding season (Anderson and Ohmart 1985, Eddleman 1989). Open water areas that contain dry ground, or mudflats, that are slightly higher than the water level between the water and vegetation are also components of high-quality habitat because these areas provide foraging (Tomlinson and Todd 1973, Gould 1975, Smith 1975, Eddleman 1989, Conway et al. 1993).

The primary limiting factor that threatens recovery of the Yuma Ridgway’s rail is the amount, distribution, and persistence of suitable habitat across its range, especially as it relates to cattail marshes. Cattail marshes have a natural succession process that makes them less suitable, which then requires active management. Without this management and protection of water sources to support the habitat, the areas the rail occupies could be lost. Other factors for this species include continuing land-use changes in floodplains, human activities, environmental contaminants (primarily increases in selenium levels), climate change, and reductions in connectivity between habitat areas.

Population Status

Yuma Ridgway’s rail population estimates fluctuate annually due to habitat quality, surveyor expertise, the timing of the surveys within the official period, and other factors. Population estimates currently use relative abundance, calculated by taking the sum of the highest counts, to indicate population estimates. This method of population tracking is useful for comparing long-term trends among populations and years (e.g., increasing vs. decreasing population); however, it does not provide an estimate of the total abundance of a given population. The relative abundance of rails has increased from 432 individuals in 2015 to 839 in 2019, rangewide. The focus on rail habitat management and increase in survey effort throughout the rail’s range likely caused this increase.

There are five population centers across the rail’s range of 14 watersheds within the Colorado River Basin. Of the five, three are considered core population areas. The first is along the lower Colorado River, with the highest densities at the Imperial, Cibola, and Havasu National Wildlife Refuges. The second large population center is at the Salton Sea in California, which includes the Salton Sea National Wildlife Refuge and the Wellton Mohawk Irrigation District. The third

major population center, the Cienega de Santa Clara in Sonora, Mexico, supports the largest marsh in the rail's U.S.-Mexico range and >70% of the global population (Hinojosa-Huerta et al. 2013). The two peripheral populations, which are smaller and represent the expansion of the species; occur along the lower Gila and Salt Rivers in central Arizona, and in southern Nevada along the Las Vegas Wash. All suitable habitat fluctuates in size and quality depending on annual effluent inflows, earthquake-related changes to hydrology, episodic fire, and maintenance dredging (Hinojosa-Huerta et al. 2013). Despite these fluctuations, the rail population has remained high during the most recent survey period from 2017 to 2019.

Summary
Despite a multi-year decline, the Yuma Ridgway's rail population appears to be rebounding with 2019 having the highest count of individuals in over ten years. The focus on rail habitat management and increase in survey effort throughout the rail's range likely caused this increase. It is likely the Yuma Ridgway's rail high fecundity, ability to disperse, generalized diet, and flexibility in occupying various habitat sizes has assisted in its ability to expand into newly formed and revitalized habitat. To maintain the current population, if not increase it further, the availability of water for conservation and agriculture, habitat management in favor of marshbirds, and connectivity of suitable habitat needs to continue.

Previous Consultations
Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations in Arizona is located on our Arizona Ecological Services website and in our files. None of the formal consultations have reduced the habitat base of the species, and none have resulted in jeopardy conclusions. This is in part because those projects, with the most considerable potential of direct or indirect effects, have committed to avoid and offset adverse effects and conserve habitat for the species.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as 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 environmental baseline includes the past and present effects of all Federal, State, or private actions and other human activities in the action area, the anticipated effects of all proposed Federal projects in the action that have already undergone formal or early section 7 consultation, and the effect of State or private actions which are contemporaneous with the consultation in process. 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.

Plants

Arizona cliffrose

Status of the Species within the Action Area
The only known occurrences of Arizona cliffrose on the Tonto NF occur near Horseshoe Lake on the Cave Creek Ranger District at elevations between 2,100 to 2,700 feet (Appendix D, Figure D-1). The Horseshoe Lake population includes several subpopulations, and there is

potentially suitable habitat that has not been thoroughly surveyed.

Factors Affecting the Species within the Action Area
The Horseshoe Lake populations are in an area closed to OHV use, except where posted as open. Despite the presence of a lake and campground, no off-highway vehicle use has occurred in the subpopulations. The Horseshoe Lake population occurs mostly in the Sears Club-Chalk Mountain grazing allotment. The management plan for this allotment is a five-pasture rest-rotation system and was written before Arizona cliffrose was discovered here; however, currently the allotment is not in use. A portion of the population occurs in the St. Clair Allotment to the south (USFS 2021). The grazing permit for the St. Clair Allotment was cancelled in 1992.

Arizona hedgehog cactus

Status of the Species within the Action Area
The Arizona hedgehog cactus only occurs on the Globe Ranger District (USFWS 2020) (Appendix D, Figure D-2). Its status in the action area is the same as described in the Status of the Species section.

Factors Affecting the Species within the Action Area
Many of the factors affecting this species have not changed since previous forestwide consultations and are incorporated herein by reference (USFWS 2012a, 2012b). All Arizona hedgehog cactus occupied habitat is within six livestock grazing allotments. Although most cacti grow on steep slopes and/or are situated in cracks and crevices within bedrock that are largely unfavorable for grazing, a few plants occur on gentle slopes or in the soil matrix that may be at risk of damaged or injury by livestock. There are a few observations of plants damaged by cattle, but these incidences are rare. Habitat effects from grazing and rangeland improvements have not been documented. Most recreational activities do not conflict with Arizona hedgehog cactus because of its remoteness and it's rocky, steep, vegetative-dense chaparral habitat. Occasionally, plant-loving visitors that enjoy the unique flora on the Tonto NF may seek out the Arizona hedgehog cactus (unknowingly) to photograph the taxon's bright red flowers. Some plants grow along NFS roads, making them easily accessible. In the past few years, several plants have been reported missing and it is highly possible that their presence next to roads contributed to potential theft. The recently authorized Resolution Copper Mine is anticipated to remove 165 to 246 Arizona hedgehog cacti and 823 acres of occupied habitat, further diminishing the baseline of this species (USFWS 2020).

Arizona hedgehog cactus conservation actions associated with the recent biological opinion for Arizona's Department of Transportation Pinto Bridge replacement project are helping to minimize the effects of this and other federal projects while improving the success of future recovery actions (USFWS 2018). The Desert Botanical Garden completed salvage and propagation efforts of cacti along Pinto Creek that were within the construction footprint. The Desert Botanical Garden is currently preparing to transplant the approximately 100 propagated individuals back into available native habitat near their original growing location. The Desert Botanical Garden was also awarded funds under Section 6 of the Act to collect additional Arizona hedgehog cacti, propagate 300 individuals, and transplant them into native habitat at a chosen undisturbed reintroduction site. These efforts are designed to augment the population by countering losses from previous federal actions.

Mexican spotted owl

Status of the Species and Critical Habitat within the Action Area
The Tonto NF is located primarily within the Basin and Range West (BRW) and Upper Gila Mountain (UGM) EMUs. Biologists from the Forest Service and USFWS have delineated 80 PACs within the boundaries of the Tonto NF: 45 within the UGM EMU and 35 within the BRW EMU (Appendix D, Figure D-3 and Appendix F, Table F-4), which is an increase from the 72 listed in the 2011 LRMP BA (USFS 2019). There are approximately 49,369 PAC acres and a total of approximately 205,568 acres of critical habitat (acres PAC/Recovery Habitat within CHUs) (Ullberg 2021). PACs occur on the Payson, Pleasant Valley, Globe, Tonto Basin, and Mesa Ranger Districts of the Tonto NF.

Four CHUs occur entirely or partially within the boundaries of the Tonto NF (CHUs BRW-4, BRW-5, BRW-6, and UGM-10) for a total area of 449,171 acres. The UGM-10 CHU intersects the northern portion of the Tonto NF; BRW-4 CHU covers the Mazatzal Wilderness; BRW-5 CHU includes half of the Salome and Sierra Ancha wilderness areas; and BRW-6 CHU is located primarily in the Pinal Mountains. Only areas identified as protected and recovery (formerly called restricted) habitat within these CHUs are considered critical habitat (USFWS 2004).

Factors Affecting the Species and Critical Habitat within the Action Area
In 1996, the Forest Service amended the Tonto NF LRMP to incorporate Forest Service Southwestern Region guidance for Mexican spotted owl recovery. As a result, the Tonto NF forestry program shifted emphasis from predominantly even-aged to predominantly uneven-aged forest management practices (USFS 2017). Although projects and activities addressing hazardous fuel loading had been a part of the vegetation management approach since at least the 1980s, the 2000 National Fire Plan provided directional emphasis to reduce the effects of wildfires on communities and to restore fire-adapted ecosystems. The directive of the Tonto NF's forestry program was to integrate with wildlife, watershed, and fuels management programs, subsequently providing wood products as a byproduct of other management objectives rather than a primary objective. The Forest Service has carried out actions to improve Mexican spotted owl habitat and is reducing the threat of stand-replacing wildfire by implementing vegetation and watershed restoration treatments. Although these projects can result in short-term adverse effects, USFWS works with the Tonto NF (and other NFs) to reduce effects and implement projects that result in long-term benefits to owls and their habitat by reducing the risk of high severity, stand replacing, landscape-scale fires.

Since 2019 (date of our last BO on the continued implementation of the Tonto NF LRMP), the Tonto NF and USFWS have not completed any formal consultations for the owl. Since 2019, no other projects, including those in Forestry and Fire Management, implemented in owl habitat on the Tonto NF have resulted in adverse effects to the Mexican spotted owl or its habitat.

On the Tonto NF, Mexican spotted owls occur in a variety of habitats, including pinyon-juniper evergreen shrub, pinyon-juniper grass, ponderosa pine-evergreen oak, ponderosa pine, mixed conifer-frequent fire, and riparian ERUs (USFS 2017). All ERUs used by the Mexican spotted owl are moderately to highly departed from reference conditions (USFS 2017). This is due largely to past policies of fire exclusion, selective logging, and intensive grazing in fire-adapted

forests. Currently, theses habitats have trended towards higher stand densities and altered species compositions that favor more shade-tolerant, less fire-resistant species. While the Forest Service expects pinyon-juniper evergreen shrub and pinyon-juniper grass ERUs to move more towards reference conditions in the future, they project that ponderosa pine-evergreen oak, ponderosa pine, and mixed conifer-frequent fire ERUs will continue to infill with understory trees, trending away from reference conditions.

Fire is a keystone process across southwestern landscapes that are adapted to frequent fire. Wildfires have burned across this landscape, shaping the vegetative composition and structure of the forested environment for centuries. However, extended drought and changing environmental conditions are resulting in stand replacing, landscape level fires on the Tonto NF. Between 2013 and 2021 there were 267 wildfires across the Tonto NF, with 110 occurring just in 2021. Of the 267 fires, 15 burned through or immediately adjacent to owl PACs (USFS, unpublished data). Although many of these fires likely had beneficial effects to forest vegetation and owl habitat, there are fires, such as the Poco Fire (USFWS 2019) that burned with such high intensity, that the effect on the environment is extremely negative in terms of loss of owl nesting, roosting, foraging and dispersal habitat. Historically, dry mixed conifer and ponderosa pine would have burned more frequently with less severity, but long-term drought associated with climate change as well as removal of periodic fire from these areas is resulting in stand replacing fires that are removing owl habitat from the landscape. Without frequent, low-intensity fires, these systems will be at greater risk of tree mortality from high intensity fire, insects, and disease, further reducing available owl habitat.

The interrelated effects from severe wildland fire, historical and current fire management practices, historical silvicultural practices, grazing practices, recreational activities, and a changing climate have affected the Mexican spotted owl and its critical habitat through direct habitat degradation, alteration or elimination of vegetation that may develop into roosting or nesting habitat. The potential for future wildland fire exists within the action area and has already resulted in the destruction of extensive patches of habitat associated with fires such as the Bush, Woodbury, Telegraph, Sunflower, Pinal, Highline, Fulton, Poco, Juniper, and Mistake Peak fires, which burned at high intensity across PAC, recovery, and critical habitat on the Tonto NF (USFWS 2019).

Ocelot

<u>Status of the species within the Action Area</u>
The proposed action falls within the range of the Sonora subspecies as well as within the ASMU as defined in the Ocelot Recovery Plan (USFWS 2016). Ocelots are rare in Arizona. As discussed in the Status of the Species, since 2009, six ocelots have been documented in Arizona, including near Globe, and in the Santa Rita, Patagonia, Huachuca, and Whetstone mountains. The only recent evidence of an ocelot in the action area was a road-killed animal west of Globe (found on Highway 60 east of Superior, Arizona, between Oak Flat Campground and Top of the World; Featherstone et al. 2013) in 2010. While on the highway, the location is within the Tonto NF's administrative boundary.

<u>Factors Affecting the Species within the Action Area</u>
The primary factors affecting the ocelot in the action area and across the ASMU include habitat

destruction and fragmentation due to, among other things, urban expansion, mining, roads, and border infrastructure. Fragmentation and habitat destruction reduces connectivity among ocelot populations and may inhibit colonization of unoccupied habitats. Arizona represents the northernmost distribution of ocelots and ocelots were likely never common or as densely distributed in this portion of their range as compared to core areas of their range. That said, the aggregate effects of habitat loss and fragmentation and disturbance to ocelots resulting from a myriad of human activities are likely partially responsible for the scarcity of ocelots present in Arizona today.

Herptiles

Chiricahua leopard frog

Status of the Species and Critical Habitat within the Action Area
There are eight Recovery Units (RU) identified in the Chiricahua leopard frog recovery plan. The Tonto NF occurs only in RU 5 (Mogollon Rim-Verde River, Arizona). RU 5 is divided into five Management Areas (MA), two of which occur on the Tonto NF—the Gentry Creek MA, on the Pleasant Valley Ranger District and Upper East Verde MA, on the Payson Ranger District (Appendix D, Figures D-4a and D-4b).

About 417 acres (169 ha) of critical habitat in two CHUs are designated on the Tonto NF; the Crouch, Gentry, and Cherry Creeks and Parallel Canyon Unit corresponds with the Gentry Creek MA on the Pleasant Valley Ranger District and the Ellison and Lewis Creeks Unit, corresponds with the Upper East Verde MA on the Payson Ranger District. In the BA, the Tonto NF defines potential habitat for the species as all sites where frog has been detected or released since 1998 plus a one-mile buffer to account for overland dispersal. This results in approximately 42,274 acres of potential Chiricahua leopard frog habitat on the Tonto NF.

Since 1998, surveys for Chiricahua leopard frogs have been conducted by AGFD and the Tonto NF in the two MAs and Chiricahua leopard frogs have been detected in and released at over 30 sites in creeks, springs, and stock tanks. Releases or transplants of every age class have occurred in each MA. AGFD and Tonto NF staff have cooperatively examined Chiricahua leopard frog sites on a regular basis since 2016 (McCall et al. 2017, McCall et al. 2018, Mosley et al. 2019). In 2019, nine of 24 sites surveyed in the Gentry Creek MA were occupied and 5 supported breeding populations. In the Upper East Verde MA, four of 13 sites surveyed were occupied, but no breeding was found (Mosley et al. 2020). Bullfrogs, crayfish, non-native fishes, Bd, wildfire, and drought continue to threaten Chiricahua leopard frogs in each RU. The status of the Chiricahua leopard frog is stable and threats are stable to increasing.

Gentry Creek MA, Crouch, Gentry, and Cherry Creeks and Parallel Canyon CHU within Pleasant Valley Ranger District
This unit includes 334 ac (135 ha) of Tonto NF lands, 64 ac (26 ha) of AGFD lands, and 6 ac (3 ha) of private lands in Gila County, Arizona. Included as critical habitat are Trail Tank, HY Tank, Carroll Spring, West Prong of Gentry Creek, Pine Spring, and portions of Cherry and Crouch Creeks, all of which provide breeding or potential breeding habitat. Also included are intervening drainages and uplands needed for connectivity among breeding sites. The connectivity of Pine Spring to Cunningham Spring and other sites upstream in Crouch Creek is complicated by a waterfall below Cunningham Spring; however, an overland route of less than 1

mile provides access around the waterfall. There are also eight sites near Parallel Canyon which are outside of mapped critical habitat.

Threats in this unit include predation by non-native species, including bullfrogs, crayfish, and sportfish; predation by tiger salamanders (presumably native); Bd, which was found in a Cherry Creek frog in 2009; and minimal water.

Reproduction has been observed at West Prong of Gentry Creek and Crouch Creek (above the falls) since 2008 and 2009, respectively and most recently (2019) at Carroll Spring, Trail Tank, Cherry Creek and two unnamed tanks. Chiricahua leopard frogs were first noted in Cherry Creek in 2008, just before additional frogs were released into that site. Reproduction was documented in 2009 and Chiricahua leopard frogs were observed in Cherry Creek in 2010. Due to drought conditions, water levels were very low in Cherry Creek in 2011 and no frogs were observed.

Chiricahua leopard frogs were moved to Pine Spring in 2006, and habitat work was accomplished there to improve pool habitats. However, no Chiricahua leopard frogs have been observed there since 2008.

Trail Tank has nearly permanent water. In May 2010, it was renovated to remove a breeding population of bullfrogs and green sunfish. Bullfrogs at the nearby ephemeral Roadside Tank were also eliminated in 2010. Additional follow-up removal of bullfrogs occurred in July 2010 at Trail Tank, but bullfrogs were observed in September 2010. Removal efforts were repeated at Trail Tank in May 2011 with follow-up removals occurring between June and September 2011. Bullfrogs were also removed from Ramer Tank, within overland dispersal distance of Trail Tank, and at Upper Tank and the Tank Southwest of Upper Tank, which are located within overland dispersal distance of Cunningham Spring. As of October 2011, no bullfrogs had been observed at any of these locations. Trail Tank does not have historical records for CLF but is considered important habitat for the Gentry Creek MA and will be managed as such into the future with the goal of establishing Chiricahua leopard frogs there under the time frame covered by this consultation.

None of the populations are robust due to the small size of breeding habitats. It is hoped that Trail Tank may provide enough aquatic habitat for a robust population. The Carroll Spring site was enhanced in 2018 (contractors restored habitat by digging out portions of the channel and creating groundwater dams and installing aquatic liner). Other sites have renovation potential and could possibly support robust populations in the future, but none of the other sites currently have the PCEs due to presence of non-native species or other factors. This unit has received habitat work, renovations, non-native species control, headstarting, population reestablishment, and population augmentation.

Upper East Verde River MA, Ellison and Lewis Creeks CHU within Payson Ranger District
This CHU includes 83 ac of Tonto NF lands and 15 ac of private lands in Tonto County, Arizona. This unit includes Moore Saddle Tank #2, Ellison Creek just east of Pyle Ranch, Lewis Creek downstream of Pyle Ranch, and Low Tank.

In 1998, small numbers of Chiricahua leopard frogs were found in the unit but not seen again

until 2006. No Chiricahua leopard frogs were observed in Ellison Creek during routine surveys in 2019 (Mosley et al. 2020), but they were found in two unnamed tanks, Pieper Hatchery Spring, and East Verde River. In 2019, 176 juveniles were released at Pieper Hatchery Spring (genetic source was a Buckskin/Gentry Cross).

Factors Affecting the Species and Critical Habitat within the Action Area
In the 2012 Biological Opinion for the Continued Implementation of the Tonto's LRMP, the BO stated that since 2005 five site-specific BOs have been issued to the Tonto NF addressing adverse effects to Chiricahua leopard frogs, all of which were from grazing allotments. Since the issuance of the 2012 BO, there has been one additional BO (USFWS 2017), a reinitiation of consultation which addressed adverse effects to Chiricahua leopard frog for the continued authorization of a term livestock grazing permit on the Diamond Rim Allotment.

Like previous opinions, the 2017 opinion anticipated incidental take of frogs in the form of harm and/or harassment and the Tonto NF included conservation measures in the BA that would minimize effects to frogs. All BOs for projects conducted on the Tonto NF were determined to be non-jeopardy for the species.

Suitable habitat types include stock tanks, springs, and streams; however, little data exist describing how many stock tanks or springs within the proposed area 1) are no longer functional, 2) are inhabited by non-native aquatics like bullfrogs or barred salamanders, or 3) harbor amphibian diseases like chytrid fungus. The presence of chytrid fungus has been known to occur within the action area. Although no strategized sample efforts have taken place, AGFD opportunistically collects tissue samples from Chiricahua leopard frogs to test for chytrid.

Sportfishing and stocking also occurs on the Tonto NF and does overlap Chiricahua leopard frog locations and critical habitat. AGFD completed section 7 consultation and effects to Chiricahua leopard frog were analyzed in that Biological Opinion (USFWS 2021, 02EAAZ00-2008-F-0486-R1).

Narrow-headed gartersnake

Status of the Species and Critical Habitat within the Action Area
Two of the eight CHUs USFWS designated for the narrow-headed gartersnake occur on the Tonto NF (Appendix D, Figure D-5). One is the Canyon Creek Unit which is generally located along the Mogollon Rim in east-central Arizona and falls within Gila County. The Tonto NF manages all lands within this unit. The unit includes 204 ac (82 ha) along 5 stream mi (8 km) of Canyon Creek. The other CHU is the Tonto Creek Subbasin Unit which consists of 2,293 ac (928 ha) in three subunits along 41 stream mi (66 km): 28 stream mi (46 km) of Tonto Creek, 0.7 stream mi (1.2 km) of Houston Creek, and 12 stream mi (19 km) of Haigler Creek. The Tonto Creek Subbasin Unit is generally located southeast of Payson, Arizona, and northeast of the Phoenix metropolitan area, in Gila County. Land ownership or land management within this unit consists of lands managed by the Tonto NF in the Hellsgate Wilderness and privately owned lands.

The narrow-headed gartersnake may occur in the East Verde, Salt, and Verde Rivers and Canyon, Haigler, Houston, and Tonto Creeks on the Cave Creek, Globe, Payson, Pleasant

Valley, and Tonto Basin Ranger Districts. Populations of narrow-headed gartersnakes on the Tonto NF are considered “likely low density”, meaning there is a post-1980 record for the species, it is not reliably found with minimal to moderate survey effort, and threats exist that suggest the population may be low density or could be extirpated, but there is insufficient evidence to support extirpation of the areas (USFWS 2014b).

According to Ryan et. al (2019), the portion of Canyon Creek on the Tonto NF, near Payson, Arizona supports a small population of narrow-headed gartersnake. From 2015–2018, this area was surveyed six times using a combination of trapping and visual encounter surveys. Narrow-headed gartersnake was observed during each sampling period and year with a low of four specimens in 2017 and a high of eight in 2015.

In 2018, narrow-headed gartersnake surveys were conducted in portions of Gordon Creek, Haigler Creek, Chase Creek, and the East Verde River on the Tonto NF. Despite more than 109,000 trap hours, gartersnakes were not detected (O’Donnell et. al 2018). There are no historical records of narrow-headed gartersnakes in Gordon or Chase Creeks. We expect narrow-headed gartersnakes to occur at low densities in Haigler Creek and the East Verde River, where previous records have occurred.

Further history on status of the species in the action area can be found in the 2012 Reinitiation of Consultation on the 1985 Tonto NF LRMP (USFWS 2012) and the 2018 East Verde River Restoration Project Biological Opinion (USFWS 2018).

Factors Affecting the Species and Critical Habitat within the Action Area

The primary factors affecting the narrow-headed gartersnake and its critical habitat on the Tonto NF are the presence and introduction of predatory non-native aquatic species (bullfrogs, brown trout, crayfish, and predatory warm water fish) that compete with and prey upon both the narrow-headed gartersnake and its native prey species, and the decline of the native fishes that are the gartersnake’s primary prey. Other factors include, but are not limited to, water diversions or other water-related actions that decrease water quantity and quality and limit native fish needed for the gartersnake’s prey base, development or construction activities that trample, remove or degrade suitable stream bank habitat, drought, improper livestock grazing levels that reduce habitat quality for native fish or riparian habitat structure needed by gartersnakes, catastrophic fires and associated effects, unauthorized off road vehicle use in riparian corridors, and intentional or unintentional killing of snakes by Tonto NF visitors.

Sportfishing and stocking also occurs on the Tonto NF and does overlap narrow-headed gartersnake locations and critical habitat. AGFD completed section 7 consultation and effects to narrow-headed gartersnake were analyzed in that Biological Opinion (USFWS 2021a, 02EAAZ00-2008-F-0486-R1).

Northern Mexican gartersnake

Status of the Species and Critical Habitat within the Action Area

Critical habitat for the northern Mexican gartersnake occurs in the Tonto Creek Unit which consists of 3,176 ac (1,285 ha) of critical habitat along 29 stream mi (47 km) of Tonto Creek (Appendix D, Figure D-6). The Tonto Creek Unit is generally located near the towns of Gisela

and Punkin Center, Arizona, in Gila County. The downstream end of critical habitat is the Conservation Storage elevation of Theodore Roosevelt Lake (2,151 ft (656 m)) near the confluence with Ash Creek. The Tonto National Forest is the primary land manager in this unit, with additional lands privately owned.

The northern Mexican gartersnake occurs in portions of the Verde River on the Cave Creek Ranger District and in portions of Tonto Creek on the Payson and Tonto Basin Ranger Districts. Its population on the Tonto NF along lower Tonto Creek remains demonstrably extant (Altemus 2020). The Verde River represents a large, complex, and difficult area to survey for a secretive species such as the northern Mexican gartersnake, but these records document that at least a low-density, but reproducing and potentially viable, northern Mexican gartersnake population occurs within the upper Verde River.

Between 2015 and 2017 over 212,592 trap-hours and approximately 290 person-hours of visual encounter surveys at three primary locations between the former Orange Peel Recreation Area and the Bar-X Road crossing of Tonto Creek yielded 81 individual northern Mexican gartersnakes of all age classes (Nowak et. al 2019).

In 2020 AGFD staff did not capture nor observe northern Mexican gartersnakes during surveys of Tonto Creek at Gun Creek (Ryan 2020).

Factors Affecting the Species and Critical Habitat within the Action Area

The primary factors affecting the northern Mexican gartersnake on the Tonto NF are the presence and introduction of predatory non-native aquatic species (bullfrogs, crayfish, green sunfish, and other warm-water sport fish) that compete with and prey upon both the northern Mexican gartersnake and its native prey species; as well as the loss and/or the decline of the gartersnake's primary prey species. Several of its prey species are also endangered or threatened, and have declined in waterways occupied by the gartersnake, contributing to its decline in distribution and density.

Other factors affecting the gartersnake include, but are not limited to: heavy recreation such as unauthorized off-road vehicle use in riparian corridors; development or construction activities that trample, remove or degrade suitable stream bank habitat; drought that may exacerbate potential effects of non-native species on native fish species, particularly in the portion of Tonto Creek (Gisela to Roosevelt Lake) due to its proximity to Roosevelt Lake; water diversions or other water-related actions that decrease water quantity and quality and limit native fish needed in gartersnake diets; and improper livestock grazing levels that reduce habitat quality for native fish or riparian habitat structure needed by gartersnakes.

Factors that may affect critical habitat are competition with predatory non-native species, water diversions, flood-control projects, and development of areas adjacent to and within Tonto Creek. In the Verde River, proposed groundwater pumping of the Big Chino Aquifer may adversely affect future base flow, reducing habitat and prey for the gartersnake. In addition, the elimination or reduction of crayfish, bullfrogs, and non-native fish is needed.

Sportfishing and stocking also occurs on the Tonto NF and does overlap northern Mexican gartersnake locations and critical habitat. AGFD completed section 7 consultation and effects to

northern Mexican gartersnake were analyzed in that Biological Opinion (USFWS 2021b, 02EAAZ00-2008-F-0486-R1).

Fishes

Desert pupfish

<u>Status of the Species and Critical Habitat within the Action Area</u>
There is one population of desert pupfish on the Tonto NF, Mud Spring (Appendix D, Figures D-7a and D-7b). In June 2007, biologists from AGFD and the Tonto NF transplanted desert pupfish to the Mud Spring area on the Forest. The Mud Spring population was monitored in 2012, and the population was persisting (Pearson et al. 2013). In 2008 the species was reintroduced to Walnut Spring, also on the Tonto NF; however, the Walnut Spring pupfish stocking appears to have failed but is likely to be re-attempted (Yarush et al. 2011). There are proposals to reintroduce the desert pupfish to other locations on the Tonto NF but plans for these potential reintroduction projects have not been finalized. Several occupied desert pupfish watersheds contain or adjoin NFS lands within the action area of the Tonto NF (i.e., Redfield Canyon, Larry Creek, Lousy Canyon).

Critical habitat has been designated for desert pupfish; however, no designated critical habitat is within the proposed action area.

<u>Factors Affecting the Species within the Action Area</u>
The desert pupfish's status within the action area is not necessarily secure; several efforts in the past to translocate populations of desert pupfish to locations on NFS lands failed due to a myriad of reasons unrelated to land management (USFS 2010a, 2010b). The currently occupied sites have not demonstrated occupancy over a sufficiently long time, and may lack the ability to survive the current, chronic drought. The reestablishment history of desert pupfish illustrates that even sites that were thought to be secure may fail for various reasons. Desert pupfish populations on federal lands, such as the Tonto NF, are widely dispersed and, in some cases, vulnerable to events beyond the respective land management agencies' control. Such events include invasions or unauthorized introductions of non-native fishes and stochastic events such as floods, wildfire, or chronic drought. Except for the Mud Spring site, the likelihood of maintaining desert pupfish populations for the long-term on the Tonto NF appears to be low.

Gila chub

<u>Status of the Species and Critical Habitat within the Action Area</u>
4.6 mi (7.4 km) of Gila chub critical habitat occurs within the Tonto NF boundaries in Silver Creek in the Agua Fria River Area and Mineral Creek in the Middle Gila River Area (Appendix D, Figure D-8). Nearby, critical habitat occurs in Indian Creek and Sycamore Creeks on the Coconino NF. The Silver Creek population and its critical habitat were severely affected by the Cave Creek Complex fire in 2005. Much of the habitat is filled in with sediment and surveys post-fire have not detected Gila chub. AGFD plans to continue to evaluate habitat on the Tonto NF and restock the Tonto NF critical habitat section of Silver Creek once the system has stabilized.

Historically, populations of Gila chub also occurred on the Tonto NF in Cave Creek/Seven

Springs Wash, Fish Creek, and Haunted Canyon in the Salt River basin; however, these populations are considered extirpated (AGFD 2002, USFWS 2015).

Factors Affecting the Species and Critical Habitat within the Action Area
Tonto NF populations are declining or locally extirpated; threats include habitat degradation due to water use practices and introduction of non-native species (AGFD 2002). This may restrict repatriation in already limited habitats and refugia (USFWS 2015).

Gila topminnow

Status of the species within the Action Area
Historically, Gila topminnow were among the most common fishes in the Gila River drainage in Arizona. Currently, the remaining extant native populations exist outside the Tonto NF in the Santa Cruz River watershed; however, recovery work has allowed re-establishment of small, isolated populations on the Tonto NF (Appendix D, Figures D-9a and D-9b). While several locations were stocked on the Tonto NF in the past, many have failed or been restocked over time. At present the Tonto NF is aware of existing populations in Arnett Creek/Telegraph Canyon (restocked in Telegraph Canyon May 2021 and observed in Arnett Creek in October 2021), Charlebois Spring (last monitored October 2020), Tortilla Creek/Mesquite Creek (stocked 2017, last monitored October 2021), La Barge Spring (stocked April 2019; burned over by the Sawtooth Fire in 2020; last monitored October 2020), Mud Spring (last monitored July 2020 after the Bush Fire), Walnut Spring #20 (last monitored August 2020), Walnut Spring #392 (last monitored August 2020), Lime Creek (population augmented 2011), Hidden Water Spring (last monitored November 2020; Hickerson 2020).

Gila topminnow were likely extirpated from West Fork Pinto Creek after heavy flooding and drought events. The most recent surveys from November 2020 failed to find fish that had been stocked at the site in 2017. While there is continued monitoring at the site, there are no plans to restock due to lack of suitable conditions. Similarly, AGFD verified that topminnow from Unnamed Drainage #68B were extirpated in 2021. While there are no immediate plans to restock the site, conditions appear similar to previous visits and may be suitable, if severe flooding does not occur regularly (Grube 2021).

No critical habitat has been designated for Gila topminnow; therefore, none occurs within the proposed action area.

Factors Affecting the Species within the Action Area
The Gila topminnow's status within the action area is not necessarily secure; the currently occupied sites have not demonstrated occupancy over a sufficiently long time, and may lack the ability to survive the current, chronic drought. The reestablishment history of Gila topminnow illustrates that even sites that were thought to be secure may fail for various reasons. Gila topminnow on federal lands are widely dispersed and, in some cases, are vulnerable to events beyond the respective land management agencies' control. Such events include invasions or unauthorized introductions of non-native fishes, pumping water, dams, stream diversions, and unrestricted livestock grazing, or stochastic events such as wildfire or floods. Infrequent yet large floods have transported topminnow (Unnamed Drainage #68B) or destroyed structures intended to minimize the effects of livestock use (Bureau of Land Management's Tule Creek and Cienega

Creek). The likelihood of maintaining Gila topminnow populations for the long-term across the Tonto NF seems low.

Gila trout

Status of the Species within the Action Area
Although the historical distribution of Gila trout is not known with certainty (Behnke 2002), based on the location of remnant populations, the Gila River drainage represents the core of the species' historical distribution. It is believed they occurred in the Verde River watershed on the Tonto NF but were extirpated in the early 1900s. Fish were reestablished, and currently recovery populations exist in Dude Creek and Chase Creek on the Payson Ranger District (Appendix D, Figure D-10). Dude Creek consists of mixed lineage (Main Diamond, South Diamond, Whiskey, and Spruce x Whiskey) and were stocked 2015–2017 with evidence of reproduction in 2018 and 2019. Fish in Chase Creek came from Iron Creek and were stocked in 2017 and 2018.

AGFD conducted visual surveys in Chase Creek in 2020 and 2021 (Beard 2021a). In 2021 they observed 5 Adults (>130 mm), 3 Sub-Adults (80–130 mm) and no young-of-year (<80 mm). These numbers are lower than the 2020 observations (2020: 23 Adults, 12 subadults and 18 young-of-year). This is the first time since 2018 that they did not observe natural recruitment at Chase Creek. AGFD plans to augment Chase Creek with 100 additional Iron Creek lineage Gila Trout from Mora National Fish Hatchery in the fall of 2021. In addition, they also plan to complete a full population estimate for Chase Creek next year (2022).

AGFD conducted visual surveys in Dude Creek in 2019 and 2021 (Beard 2021a). They observed 8 adults, 21 sub-adults, and 11 young-of-year. As compared with the last visual survey of Dude Creek in 2019, the number of adults and young-of-year are lower, but the number of sub-adults is slightly higher from (2019: 42 adults, 19 sub-adults, 183 young-of-year).

Gila trout are also stocked as sportfish on the Tonto NF. Locations that overlap with recovery waters are catch and release, while nonrecovery locations are put-and-take. In the fall of 2019, AGFD began stocking the East Verde River with Gila trout for recreation put-and-take fishing in lieu of the rainbow trout that were stocked historically. Beginning in 2021, AGFD approved a rule to open Dude Creek to catch-and-release angling between May 1–December 31. Gila trout were stocked into Christopher Creek in 2021, and AGFD has completed section 7 consultation on plans to stock Haigler, Workman, Bonita, and Ellison Creeks and the lower Verde River (USFWS 2021).

No critical habitat was designated for Gila trout; therefore, none occurs within the proposed action area.

Factors Affecting the Species within the Action Area
Gila trout populations are small, isolated, and fragmented throughout the species range. Currently, the primary factor affecting Gila trout in the planning area is hybridization and competition with, or predation by, non-native trout. Past and present federal, state, private, and other human activities that may affect Gila trout and their habitat include stocking of non-native trout by AGFD and private citizens in the early to mid-1900s, overutilization of upland and riparian vegetation by grazing, timber thinning practices, recreational activities and decades of

fire suppression that has changed watershed characteristics (infiltration, runoff, erosion, etc.) and stream habitat characteristics (sediment transfer, nutrient cycling, physical habitat features, water temperature, etc.) and leaves much of the historic range of Gila trout at risk from catastrophic fires.

Razorback sucker

Status of the Species and Critical Habitat within the Action Area
Within the Tonto NF, razorback sucker critical habitat occurs on the Verde River upstream of Bartlett Dam, and upper Tonto Creek and the upper Salt River above Roosevelt Dam (USFWS 1991) on the Payson, Tonto Basin, Globe, and Cave Creek Ranger Districts (AGFD 2002) (Appendix D, Figures D-11a and D-11b). In the mid-1980s, the USFWS and AGFD began to reintroduce razorback sucker to the Verde and Salt Rivers. Razorback sucker was detected in the Verde River between 2002 and 2006 but has not been detected since. Surveys in 2016, 2018, and 2019 also failed to detect razorback sucker in the Salt River. There may be a remnant population left from the original stockings, but it is likely small. Future stockings of razorback sucker on the Lower Verde River and at Horseshoe Reservoir are planned as part of a telemetry study with the University of Arizona, AGFD, and USFWS.

Factors Affecting the Species and Critical Habitat within the Action Area
Large numbers of non-native predators and altered hydrology appear to have thwarted reintroduction efforts (Minckley and Deacon 1991).

Loach minnow

Status of the Species and Critical Habitat within the Action Area
There are historical loach minnow records from the Salt River and tributaries, with the closest record to the Tonto NF being at the mouth of Cibecue Creek on the adjacent Fort Apache Indian Reservation (ASU 2002). Prior to 2007, loach minnow was believed to be extirpated from streams on the Tonto NF. During 2007 and 2008 loach minnow were stocked in Fossil Creek on the northern boundary of the Tonto NF (Robinson 2009b) (Appendix D, Figure D-12). Monitoring in 2009 determined that loach minnow persisted in Fossil Creek (Boyarski et. al 2011) but monitoring in 2010 did not locate loach minnow (Marsh et al. 2010) and in 2011, monitoring only located one individual. No natural reproduction was observed (USFWS 2012, Mosher 2016) and translocation efforts have been discontinued. The species is not currently considered to be present on the Tonto NF.

In 2012 approximately 13.8 miles of critical habitat was designated for loach minnow in Fossil Creek (Verde River Subbasin) from its confluence with the Verde River upstream to the old Fossil Diversion Dam site (USFWS 2012). Fossil Creek is the border between the Tonto and Coconino NFs and the Coconino NF is lead on management.

Factors Affecting the Species and Critical Habitat within the Action Area
Loach minnow populations have been affected by dewatering of stream reaches by water diversions and dams, livestock grazing, habitat alteration, and introduced or invasive non-native fish, especially catfishes and red shiner (AGFD 2010).

Spikedace

Status of the Species and Critical Habitat within the Action Area
Spikedace were historically present in Tonto Creek and the Salt River. The last known records of spikedace in Tonto Creek and the Salt River are from 1937 and 1967, respectively (ASU 2002). Based on this information, spikedace are considered extirpated from Tonto Creek and the Salt River.

More recently, spikedace were stocked into Fossil Creek multiple times between 2007 and 2019 (AGFD 2019). In 2009 spikedace were believed to be present in six to seven miles of the stream. Monitoring in August 2011 detected spikedace (Crowder 2011). Monitoring in 2016 also confirmed spikedace to be present in Fossil Creek (Mosher 2016). Because they were stocked as recently as 2019, spikedace are presumed present in Fossil Creek at this time.

Spikedace critical habitat was designated in 2012, and includes a total of 61.3 miles (98.6 km) in the Salt River Subbasin (CHU 2), including 29.7 miles of Tonto Creek from the confluence with Greenback Creek to the confluence with Houston Creek; 9.4 miles of Greenback Creek from the confluence with Tonto Creek upstream to Lime Springs; 1.8 miles of Rye Creek from its confluence with Tonto Creek upstream to the confluence with Brady Canyon; 16.9 miles of Spring Creek from the confluence with the Tonto River upstream to the confluence with Sevenmile Canyon; and 3.6 miles of Rock Creek from the confluence with Spring Creek upstream to the confluence with Buzzard Roost Canyon (Appendix D, Figures D-13a and D-13b). All designated critical habitat within the Salt Watershed is on the Tonto NF. In addition, designated critical habitat includes streams within the Verde River Subbasin (CHU 1), including 13.8 miles of Fossil Creek from its confluence with the Verde River upstream to the old Fossil Diversion Dam. This section of Fossil Creek forms part of the northern boundary between the Tonto NF and Coconino NFs. CHU 1 also includes 105.9 miles of the Verde River from its confluence with Fossil Creek upstream to Sullivan Dam. The portions of the Verde River from the boundary between the Prescott NF and the Tonto NF downstream to the confluence with Fossil Creek are on the Tonto NF.

The Tonto NF cooperates with partners to monitor the fish community in Fossil Creek. Spikedace are estimated to be present in six to seven miles of Fossil Creek. Fossil Creek on the Tonto NF is excluded from livestock grazing.

Factors Affecting the Species and Critical Habitat within the Action Area
Spikedace and its designated critical habitat may be affected on the Tonto NF by groundwater pumping, watershed conditions, stormwater runoff, non-native fish species, livestock grazing, timber harvest, wildfire, recreational activities, and other habitat alterations. Management needs include conservation, protection, and monitoring of existing populations; amelioration of effects from non-native predatory and competitor species; enhancement or restoration of select habitats within its historical range; and further reintroduction into select historical habitats (AGFD 2013).

Riparian and Wetland Birds

Southwestern willow flycatcher

Status of the Species and Critical Habitat within the Action Area

The Tonto NF may have the largest number of known southwestern willow flycatcher territories of all the national forests in the Forest Service's Southwest Region (Bush 2016, 2017). The Tonto NF lies within the Gila Recovery Unit, which includes the Roosevelt and Verde Management Units (USFWS 2002) and overlaps the Cave Creek, Tonto Basin, and Globe Ranger Districts (Appendix D, Figure D-14). Southwestern willow flycatcher critical habitat occurs along lower Tonto Creek, the upper Salt River, and the Verde River upstream and downstream of Horseshoe Lake. We excluded the conservation spaces of both Roosevelt and Horseshoe Lake from critical habitat based upon SRP's Habitat Conservation Plans (HCP) and ongoing Forest Service management (USFWS 2013). Flycatcher critical habitat segments are primarily on free-flowing streams (aside from a short segment below Horseshoe Lake) and have flycatcher territories and use by migrating flycatchers (USFWS 2013). Some private lands adjacent to the Tonto NF have southwestern willow flycatcher territories, but much of the habitat within these two Management Units occurs on USFS lands. Streams within these two Management Units where southwestern willow flycatchers have been detected nesting are the Verde River, Tonto Creek, Roosevelt Lake, the Salt River, Cherry Creek, and Pinal Creek.

The BA estimates that from 1993 through 2007 the number of southwestern willow flycatcher territories on Tonto NF lands ranged from six in 1993 to a high of 212 in 2004 (USFS 2021). It is likely a combination of survey effort, habitat changes due to flooding and plant regeneration, management, and associated population growth contributed to the increase in territory numbers and distribution (USFWS 2002, Durst 2017).

As of 2007, the USFS reported 81 territories on the Tonto NF. In 2017, surveyors documented 44 flycatcher territories in the Roosevelt Lake HCP area. The Rockhouse Demonstration Site (habitat created near Roosevelt Lake) had an additional 21 territories. Surveys continue at Roosevelt Lake and tributary streams but are no longer comprehensive. They now occur at priority sites identified annually by the Tonto NF and cooperators and may be protocol presence/absence surveys (Sogge et al. 2010). Most territories occur in riparian areas surrounding Roosevelt Lake and tributary streams to the lake. Tributary streams where territories occur include the upper Salt River, Cherry Creek, Pinal Creek, and Tonto Creek. Surveyors have recorded between zero and seven territories along Pinal Creek on private land adjacent to the Forest.

The flycatcher recovery plan (USFWS 2002) identified 50 territories as the numerical goal for the Roosevelt Management Unit, and in 2020 and 2021, surveyors within the Roosevelt Lake area recorded 236 and 130 flycatcher territories, respectively. In 2020, Ecoplan (Likeness and Ashbeck 2021) recorded 236 flycatcher territories within Roosevelt Lake's flood control and conservation space (below 2,175 feet in elevation) (58% on the Tonto Arm and 42% on the Salt River Arm). In 2021, Tonto NF biologists and surveyors (SRP 2021), with much less dedicated effort, recorded 130 territories on the Salt River and its tributaries. From Gisela along Tonto Creek down into the Tonto Arm of Roosevelt Lake, surveyors found 68 flycatcher territories. Along the Salt River arm of Roosevelt Lake, the Rockhouse Demonstration Site, and Cherry

Creek, surveyors found 62 territories.

The Flycatcher Recovery Plan (USFWS 2002) identified 50 territories as the numerical goal for the Verde Management Unit, which includes portions of the Tonto, Prescott, and Coconino NFs. On the Prescott and Coconino NFs and other non-federal lands, we estimate surveyors recorded about 25 separate territories from Perkinsville through the Verde Valley since 2012 (USFWS 2021). On the Tonto NF, surveyors recorded approximately 25 separate territories since 2015 at the Horseshoe Lake area (upstream, within, and downstream) and Needle Rock below Bartlett Dam.

Overall, on the Tonto NF, since listing, biologists have detected more flycatcher territories and their distribution and abundance has expanded along major drainages and into tributaries. In 1994, we knew of only seven territories along the length of the Verde River, with none on the Tonto NF (Ellis et al. 2008). In 1994 on the Salt River drainage, we knew of just 33 flycatcher territories along Tonto Creek and the Salt River at Roosevelt Lake (Ellis et al. 2008). Now, depending on the year and habitat conditions, both the Verde and Roosevelt Management Units are reaching and surpassing flycatcher numerical recovery goals.

<u>Factors Affecting the Species and Critical Habitat within the Action Area</u>
Southwestern willow flycatcher territories have fluctuated on the Tonto NF, particularly within the Tonto Basin Ranger District. The lowering and raising of Roosevelt Lake has helped to create and inundate large amounts of southwestern willow flycatcher habitat. After the water storage of Roosevelt Lake dropped to a low of 10% in 2002, the number of southwestern willow flycatcher territories within the Roosevelt Management Unit reached their highest in 2004 (Ellis et al. 2008). But after Roosevelt Lake filled to about 96% capacity in 2005, southwestern willow flycatcher habitat inundation within the conservation space caused birds to establish territories along other nearby streams (Ellis et al. 2008). Southwestern willow flycatchers were recently detected furthest upstream on Tonto Creek (near the Town of Gisela) and on Rye Creek at its confluence with Tonto Creek (personal communication, A. Madara, Tonto NF). Similarly, on the upper Salt River, flycatchers established territories (< 10) farther upstream along Horseshoe Bend/Redmond Flat and at Gleason Flats (personal communication, A. Madara, Tonto NF). Flycatchers established a similar number of territories on Salt River tributaries of Pinal Creek (mostly on private land) and Cherry Creek (personal communication, A. Madara, Tonto NF).

Southwestern willow flycatcher territories fluctuate within the Verde Management Unit and specifically at Horseshoe Lake within the Cave Creek Ranger District, but not to the degree observed at Roosevelt Lake. Unlike Roosevelt Lake, Horseshoe Lake is much smaller in capacity with a greater ability to manage lake levels. As a result, the number of southwestern willow flycatcher territories at Horseshoe Lake grew from six territories in 2002 to 20 in 2005 but decreased to 12 in 2007 (Sogge and Durst 2008) and seven in 2008 (SRP 2008).

At both the Horseshoe and Roosevelt Lake flycatcher populations, Salt River Project's HCPs (SRP 2002, 2008) help to conserve flycatchers and their habitat in combination with Tonto NF management. The flycatcher territories within these lake bottoms are likely important due to their larger numbers, and in combination with nearby streams, help support populations on the Verde and Salt rivers.

Western yellow-billed cuckoo

Status of the Species and Critical Habitat within the Action Area
The yellow-billed cuckoo has six critical habitat units and two HCPs on the Tonto NF: Horseshoe Dam-Salt River Project Horseshoe Bartlett HCP (Unit 11), Tonto Creek (Unit 12), Salt River-Salt River Project Roosevelt Lake HCP (Unit 23), Pinto Creek South (Unit 26), Pinto Creek (Unit 29) and Mineral Creek (Unit 30) (Appendix D, Figures D-15a and D-15b). The areas around Roosevelt Lake and Horseshoe Lake were both proposed but excluded from the final critical habitat designation due to the Salt River Project's HCPs (SPR 2002, SRP 2012). The Horseshoe Bartlett HCP is 400 acres and the Roosevelt Lake HCP is 2,250 acres.

CHU 11 contains two subunits. Critical habitat in these two subunits is 3,577 ac (1,447 ha) in extent and is a 33 mi (54 km) long continuous segment of the Verde River immediately upstream of Horseshoe Dam and a continuous segment of the Verde River immediately downstream of Horseshoe Dam in Yavapai County, Arizona. Approximately 3,361 ac (1,378 ha) is under Federal management.

CHU 12 is 3,180 ac (474 ha) in extent and is made up of a 12 mi (19 km) long continuous segment of Tonto Creek upstream from the lakebed at Theodore Roosevelt Lake in Gila County, Arizona. Approximately 2,045 ac (828 ha) is under Federal management.

CHU 23 is 581 ac (1,048 ha) in extent and is a 5 mi (8 km) long continuous segment of the Salt River upstream from the lakebed at Theodore Roosevelt Lake in Gila County, Arizona. Approximately 502 ac (203 ha) is under Federal management.

CHU 26 is 373 ac (151 ha) in extent and is a 4 mi (6 km) long continuous segment of Pinto Creek in Gila and Pinal Counties, Arizona. Approximately 368 ac (149 ha) is under Federal management.

CHU 29 is 427 ac (173 ha) in extent and is a 6 mi (10 km) long continuous segment of Pinto Creek, located approximately 7 mi (11 km) upstream of Roosevelt Lake in Gila County, Arizona. Approximately 415 ac (168 ha) is under Federal management.

CHU 30 is 380 ac (154 ha) in extent and is a 7 mi (11 km) long continuous segment of Mineral Creek in Pinal and Gila Counties, Arizona. Approximately 1 ac (<1 ha) is under Federal management.

Although cuckoo breeding territory numbers have not been compiled for the Tonto Basin area, breeding cuckoos occur on a variety of creeks and rivers. Breeding cuckoos have occurred on the Verde River, Pinto Creek, Tonto Creek from Gisela downstream to Roosevelt Lake, including tributaries like Rye and Cucamunga Creek. Additionally, breeding cuckoos occur within the Roosevelt Lake HCP where Tonto Creek and the Salt River converge. Cuckoos also breed on the Salt River Arm of Roosevelt Lake at the off-channel Rockhouse Demonstration Restoration Site, Pinal Creek, and Cherry Creek (and possibly the East Verde River). Future surveys are likely to detect cuckoos in other Tonto Creek and Salt River tributaries. These streams retain the natural hydrologic regime, and in the case of Roosevelt Lake, is where water is stored, generate the dynamic conditions and elevated groundwater to support cuckoo breeding habitat.

Factors Affecting the Species and Critical Habitat within the Action Area
Tonto NF land use and management actions such as livestock grazing and recreation may have broad watershed and site-specific influences affecting riparian habitat quality within and surrounding the action area. Ongoing mining and associated actions (light, traffic, dust, noise, etc.), including groundwater withdrawal, can influence cuckoos or the quality of cuckoo riparian habitat and critical habitat.

Yuma Ridgway's rail

Status of the Species within the Action Area
The Tonto NF lies at the extreme eastern portion of the range occupied by Yuma Ridgway's rail. In April 2015, in conjunction with USFWS, Tonto NF biologists used GIS data to identify potential habitat for the species. Potential habitat in the Tonto NF is limited to approximately 40.53 acres of cattail habitat on Roosevelt Lake and areas immediately adjacent on the Salt River and Tonto Creek (Appendix D, Figure D-16). Formal Yuma Ridgway's rail surveys have been conducted on the Tonto NF as part of the Salt River Project under the Roosevelt Lake HCP. These surveys are conducted when conditions are conducive to providing a minimum of 3 acres of potential habitat at the confluence of Tonto Creek and Roosevelt Lake. Two Yuma Ridgway's rails were detected in 2002, and a lone bird was detected in 2004. The Salt River Project has not conducted surveys since 2004 due to reservoir fluctuations and the lack of the 3-acre minimum habitat requirement.

Factors Affecting the Species within the Action Area
In the Tonto NF's assessment of riparian conditions at the local scale Tonto Basin, 37% of riparian areas were classified as unstable, 49% as impaired, and 14% as stable (USFS 2021). Small and large dams, channelization, bank stabilization, levee construction, and control of water flows to streams and rivers have disrupted the natural hydrologic cycles that create and destroy marshes and floodplains used by Yuma Ridgway's rail (USFWS 2009). At present, available habitat is largely man-made as part of effluent-supported marshes or habitat created by dams and diversions (USFWS 2009).

Riparian systems are likely to continue to be stressed from climate-related drought, increasing water demands from a growing human population, and higher risk of catastrophic fire in upland areas. Full restoration of the hydrologic cycles that provide habitat for the rail is not likely to occur; thus, future habitat depends on human management of marsh wetlands (USFWS 2009). Climate change may also play a role in the future condition of rail habitat if warming results in water shortages and shrinking available wetlands (USFWS 2009).

EFFECTS OF THE ACTION

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of all other activities that are caused by the proposed action. A consequence is caused by the proposed action 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 (see §402.17).

We anticipate that implementation of the LRMP may result in net beneficial effects to listed species on the Tonto NF by, among other actions, maintaining and managing for wildlife habitat. Overall, such management should provide opportunities for listed species to use the Tonto NF on a long-term (i.e., establish a home range) or short-term (i.e., use a movement corridor) basis. That said, implementation of site-specific projects under the LRMP (future Federal actions) may have adverse effects, which are discussed in the LRMP Components' sections below.

Because this is a programmatic level consultation, it is not possible to assess the potential effects (adverse or beneficial) of the action in detail (e.g., spatial extent, location, timing, frequency, duration). Furthermore, the LRMP does not authorize any projects, but simply states objectives that are the parameters or guidance that may lead to future projects. Projects that implement LRMP objectives will be addressed in future project-specific section 7 consultations. Potential adverse effects of these future Federal actions may be minimized through implementing conservation measures. Because these measures will be developed through project-level section 7 consultation, the level to which adverse effects may be avoided or minimized is difficult to estimate at the LRMP level.

The aim of the analysis below is to assess whether LRMP Components may affect listed species and designated critical habitat, and to discuss the general types of effects these Components may have. In some cases, management direction lacks detail to allow us to understand if LRMP Components will have associated on-the-ground effects to listed species and designated critical habitats. In these cases, effects will be addressed by the Tonto NF in future project-level consultations. A summary of which LRMP Components were analyzed for each species can be found in Appendix F, Table F-5.

The following effects discussion is presented in two main sections. The first is a consideration of the Broad Level Effects to all species from programmatic direction in eight of the 24 resource areas identified in the LRMP. These resource areas include: 1) Special Uses; 2) Energy Production and Delivery; 3) Facilities; 4) Lands and Access; 5) Riparian Ecological Response Units; 6) Fires and Fuels; 7) Soils; and 8) Management Areas.

The second is a consideration of effects to plants (two species), Mexican spotted owl, ocelot, herptiles (three species), fishes (seven species), and birds (three species), and their habitats, from programmatic actions in 10 of the 24 resource areas identified in the LRMP. These resource areas include: 1) Recreation; 2) Rangelands, Forage, and Grazing; 3) Forestry and Forest Products; 4) Mining, Minerals, and Abandoned Mines; 5) Roads; 6) Vegetation and Ecological Response Units; 7) Watersheds and Water Resources; 8) Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones; Wildlife, Fish, and Plants; and 10) Invasive Species.

Six of the 24 resource areas will not result in any on-the-ground projects and therefore will not be discussed individually as they are either completely administrative in nature or meant to provide added considerations for project implementation under other programs. These resource areas include: 1) Partnerships and Volunteers; 2) Cultural and Historic Resources; 3) Tribal Relations and Areas of Tribal Importance; 4) Scenery; 5) Caves and Karsts; and 6) Air Quality.

Broad Level Effects

Some programs described in the Tonto NF's LRMP do not contain objectives that are likely to lead to projects or activities that may affect listed species or whose effects are covered under other programs. All future projects that may lead to effects to listed species will be covered in separate section 7 consultation.

Special Uses (SU)

Because the Tonto NF applies SU authorizations across many different program areas, many of the specific effects of this program are discussed elsewhere (Recreation, Energy Production and Delivery, Roads, Mining, Minerals, and Abandoned Mines). In other cases, it is difficult to predict the wide range of requests for SU authorizations and assess their potential effects (e.g., commercial filming, hunting-guiding outfits, apiaries, etc.).

The Tonto NF anticipates SU Permit requests for recreation, communication, and electronic sites to increase over current levels; however, LRMP implementation does not specifically issue new SU authorizations or promote special uses. We know from past section 7 consultations (e.g., utility line corridor maintenance and development) that there are likely to be effects to listed species and their habitat from issuance of some SU permits.

Short- and long-term adverse effects to listed species and their habitats may occur due to habitat fragmentation and destruction, noise, and disturbance. The standards and guidelines required under the SU section are expected to minimize, but may not eliminate, all adverse effects. Over the life of this consultation, we expect that implementation of the SU Program will result in adverse effects to listed species and their habitats; however, LRMP Components are likely to direct future SU authorizations in ways that avoid or minimize many of these effects.

Energy Production and Delivery (EG)

EG direction in the Tonto NF's LRMP is to improve electricity delivery and renewable energy production while minimizing adverse long-term effects to ecosystems and watersheds. There are no LRMP objectives, and no EG proposals associated with or specially promoted by the LRMP. As such, the actual effect of yet unplanned and unapproved EG projects on listed species cannot be determined. Any future proposals for EG would be subject to LRMP standards and guidelines and individual project section 7 consultation. The BA indicates that the Tonto NF anticipates EG proposals during the life of the LRMP will be rare.

LRMP guidelines specify that energy facilities and corridors should avoid areas with a high risk to wildlife, including riparian areas, which will minimize adverse effects to listed species and their habitat. Guidelines to co-locate existing lines within previously disturbed areas may also reduce future ground-disturbing projects in listed species habitat and reduce wildlife collisions (including listed species).

A guideline in the WFP section of the LRMP states that projects and activities should include specific management objectives and species protection measures directly from approved recovery plans. Thus, future proposals related to energy production and delivery may also include conservation measures that: 1) minimize disturbance by avoiding work during the breeding season and use least impactful methods; 2) establish non-occupancy of listed species through protocol surveys; and 3) assess case-specific effects, such as noise levels and frequency.

Facilities (FC)
FC direction focuses on facility construction, maintenance, and overall management. Facilities include recreation sites, dams, and wastewater treatment plants, all of which may have effects on listed species and their habitats. There are no LRMP objectives for FC and authorizations for new or existing facilities are not part of the proposed action. However, management and maintenance of existing facilities has the potential to adversely affect listed species and their habitats. We discuss the possible effects in both the REC and RD effects sections of this analysis. The Tonto NFs desired conditions identify that facility construction and operation should have minimal long-term effects to surrounding soil and vegetation, should not consist of invasive vegetation, and should not cause damage to ecologically sensitive areas. Guidelines state that new facility construction should avoid environmentally sensitive areas, prevent resource damage, and minimize any negative effects to wildlife, fish, and rare plants (e.g., aquatic passage for fish and other aquatic organisms).

Lands and Access (LA)
The LA section addresses land ownership adjustments (e.g., purchases, donations, exchanges, etc.) or access roads. The LRMP does not authorize any adjustments and there are no objectives in the LA section.

Desired conditions for LA recommend land ownership adjustments that improve management activities, specifically mentioning improving wildlife connectivity, reducing human-wildlife conflicts, and retaining key lands for fish and wildlife. Guidelines in the LA section are likely to increase constraints and mitigations designed to reduce impacts to federally listed species and their habitats during future proposals for land adjustments or requests for access. Ownership adjustments are largely administrative but may have indirect effects on listed species which we cannot evaluate prior to a project-specific proposal. Future actions taken in LA that may affect listed species will be subject to separate section 7 consultation.

Riparian Ecological Response Units (RERU)
The RERU section may help inspire future projects to consider riparian communities. The LRMP provides desired conditions, standards and guidelines that will direct the Tonto NF to any new system of riparian ecosystem typing. There will be no on-the-ground projects; thus, we expect this program will not result in adverse effects to listed species. Instead, guidelines should serve to minimize adverse effects from implementation of other programs.

Fire and Fuels (FF)
The Fire and Fuels (FF) section does not contain objectives; however, desired conditions, standards and guidelines aim to modify future fire management to consider listed species and their habitats. Standards and guidelines call for proactive measures that will reduce excessive fuel accumulation around streams and riparian areas to protect against uncharacteristic or damaging fire effects. Wildland fire activities should avoid disturbance to at-risk species and temporary fire facilities placed to avoid negative effects to sensitive species areas, riparian areas, and waterways.

Over the long term, FF will reduce the risk of uncharacteristic wildfire and increase herbaceous ground cover to promote water infiltration and reduce runoff and sedimentation in watersheds. In fire-adapted ecosystems, wildland fires can improve, maintain, and/or protect public safety,

ecosystem function, vegetation composition and structure, property and infrastructure, wildlife habitat, and socio-economic values.

Soils (SL)
LRMP direction in the soils section is not expected to result in projects or activities and implementation of soil Components is unlikely to result in adverse effects to federally listed species or associated habitats. However, direction will serve to influence and guide other activities on the Tonto NF in ways that are likely to convey indirect benefits to species.

Management Areas
Several Management Areas have listed species and/or critical habitat. Detailed Management Area descriptions are included the BA and are incorporated by reference (USFS 2021). Implementation of direction/Components in the Management Areas section of the LRMP is not expected to affect listed species because the program is largely administrative in nature and aims to manage for the protection of the unique features and values for which each management area was designated. Site-specific projects will require separate consultation pursuant to section 7 of the Act.

Plants

Recreation (REC)
The Arizona cliffrose recovery plan (USFWS 1995) identifies potential adverse effects from recreation and associated conservation/recovery actions, including effects to plant survival and seedling establishment from trampling (e.g., recreation foot traffic and off-highway vehicles), wildland fire ignition, invasive species, and soil compaction. The Arizona cliffrose recovery plan anticipates recreational effects to increase in the future and recommends monitoring effects and not constructing recreation facilities, such as campgrounds, within ½ mile of the nearest Arizona cliffrose occurrence.

Similar to Arizona cliffrose, adverse effects to the Arizona hedgehog cactus from recreation may include habitat disturbance from trampling, invasive species, and effects to surrounding vegetation (dust) that provide cover to individual plants. There are at least five recreation sites and multiple trails that occur within its occupied habitat which could result in adverse effects. Recreation from off-highway vehicle use is one of the biggest threats to the Arizona hedgehog cactus (Fletcher 1984) because it may increase illegal collection (USFWS 1979). Although Arizona hedgehog cactus occurs in inaccessible areas, many grow along trails or roads maintained for off-road use, increasing its accessibility and its risk of being illegally collected (e.g., illegal collection includes the entire or any part of a plant and seeds). There are 55.25 miles of routes within Arizona hedgehog cactus distribution. Since the cactus was listed, there have been several reports of plants being illegally collected. Several plants growing alongside a primitive road were reported missing in 2018, and seeds may have been collected without a permit in 2013.

The Tonto NF's desired conditions for REC are to support a wide range of activities while conserving fish and wildlife habitats, including listed plants. The Tonto NF's goal is to have minimal effects to natural resources when implementing projects and activities. While the LRMP does not describe specific Arizona cliffrose and hedgehog cactus conservation actions, the Tonto NF describes that recreation opportunities should protect water quality, sensitive habitats, and

landscapes. Recreation developments and improvements should be planned, designed, and managed for activities and capacities that minimize resource damage (e.g., soil erosion and vegetation trampling) and adverse effects to landscape character.

The Tonto NF may propose projects resulting in adverse effects to listed plants, such as localized mortality and habitat degradation/fragmentation, but projects are expected to affect relatively small areas and will have long-term benefits that decrease recreational traffic and reduce effects from unsustainable trails. Collectively, activities related to developed and dispersed recreation could adversely affect individual listed plants or their habitat. Should the Tonto NF propose projects and activities in areas where listed plants occur, LRMP desired conditions, standards and guidelines will consider those plants during project development. Furthermore, the Tonto NF may rehabilitate existing disturbed sites, resulting in long-term habitat improvement.

<u>Rangelands, Forage, and Grazing (GRZ)</u>
The GRZ program primarily includes grazing and browsing by cattle, sheep, and horses, and development and maintenance of range improvements such as earthen stock tanks and troughs, fences, cattle guards, etc. The LRMP provides generalized, forestwide guidance for livestock grazing. Specific grazing allotment plans occur in annual operating instructions. Annual operating instructions (AOI) outline site-specific grazing operations, such as permitted livestock categories and numbers, pasture rotation schedules, utilization standards, and maintenance procedures. The Tonto NF updates AOIs every 5 to 10 years, and generally includes conservation measures for fish, wildlife, and listed plants. AOIs are subject to separate section 7 consultation.

Grazing activities have the potential to adversely affect Arizona hedgehog cactus, and the Arizona cliffrose recovery plan identifies grazing as a threat (USFWS 1995). Adverse effects from grazing include over utilization, soil compaction, spread of invasive species, and trampling. The detrimental effects from grazing can depend on duration, timing, and intensity. Much of the Tonto NF's Arizona cliffrose habitat occurs within the Sears Club-Chalk Mountain Allotment, which is currently not in use. The Arizona hedgehog cactus occurs in the Devil's Canyon, Bellevue, Brushiest, Superior, Millsite, Coolidge-Parker, and Bohme Allotments. The cactus, or a similar appearing cactus (*Echinocereus santaritensis*) that is mistaken for the Arizona hedgehog cactus, may occur in the Hobbs, Lyons Fork, and Pinto Creek Allotments. Cacti growing in a soil matrix on slopes less than 60% or on the shoulders of roads risk physical damage from livestock, but this has not been fully documented by the Tonto NF (USFS 2021). LRMP Components will minimize detrimental effects to Upland Sonoran Desert and interior chaparral ecosystems that support the Arizona hedgehog cactus.

The LRMP GRZ section includes strategies to minimize detrimental effects to ecosystems. Desired conditions will drive management towards healthy rangelands, plant communities, soil conditions, and riparian habitats. We expect the Tonto NF's guidelines will reduce or minimize adverse effects by limiting grazing intensity through rotational grazing, dispersing livestock with diversionary tactics, and removing unauthorized livestock. The Tonto NF's grazing strategies are to maintain riparian vegetation and stream function and reduce sedimentation and trampling. Grazing management also emphasizes drought preparedness and considers shifts in climate and range conditions. Over the life of this consultation, we expect implementation of GRZ Components may reduce or minimize effects, but still result in adverse effects to listed plants and

their habitats.

There are two GRZ objectives. The first is focused on installing wildlife escape ramps to troughs. Each ranger district will annually install wildlife escape ramps to at least two water troughs or open storage tanks until all troughs and tanks have ramps. We expect ramp installation can occur without adverse effects to listed plants because troughs do not occur adjacent to Arizona hedgehog cactus or cliffrose plants. The Tonto NF's second objective is to evaluate vacant allotments for one of three options (convert for forage reserve, grant to a current or new permittee, or close to grazing). This allotment evaluation is largely administrative and directs future actions which we cannot evaluate prior to a proposal because we do not know which allotments would be involved, whether or not listed species are present, or the actual conditions on the ground.

The Tonto NF's LRMP recommends establishing the Horseshoe Botanical Area which would include all the known Arizona cliffrose plants in the Horseshoe Lake population. The LRMP standards for Designated and Recommended Research Natural Areas and Botanical Areas state that livestock grazing will not be authorized in these special management areas. This standard will minimize livestock use and grazing effects on the Horseshoe Lake Arizona cliffrose population. Any future actions taken on allotments where there may be effects to listed plants will be subject to separate section 7 consultation.

Guidance in the LRMP for range management primarily serves to place constraints on grazing but does not outline or authorize allotment-specific practices. We expect GRZ standards and guidelines to minimize, but not eliminate adverse effects. Therefore, over the life of this consultation, we expect the livestock grazing program will result in adverse effects to listed plants.

Forestry and Forest Products (FP)

Given the specialized location, preferred soil types, and desert vegetation surrounding Arizona cliffrose and hedgehog cactus, we find it unlikely that FP activities will occur near or adversely affect these listed plants.

Mining, Minerals, and Abandoned Mines (MMAM)

The Forest Service's minerals management program administers mining, oil, gas, and geothermal activities while protecting surface resources (36 CFR 228) such as vegetation and aquatic resources. The LRMP does not authorize or explicitly promote mining activities or projects; however, the long history of mining in central Arizona suggests potential for continued mining developments in the future. We cannot predict if new mines will occur that will affect listed plants, but we do know from past Tonto NF mining consultations that adverse effects to listed plants have occurred.

Future mining projects and activities can adversely affect Arizona hedgehog cactus, its habitat and recovery. The Resolution Copper Mine, if permitted (permitting is currently on indefinite hold), will adversely affect the cactus through construction of pipelines, transmission corridors, and infrastructure, as well as closure and reclamation activities. For Arizona cliffrose, the recommended Horseshoe Botanical Area includes a standard that prohibits the sale or extraction of common variety minerals.

The LRMP objective to close at least 10 abandoned mines over the life of the LRMP is not expected to result in effects to listed plants. Most abandoned mines on the Tonto NF are historic shafts with small footprints and likely only require gating, not remediation. If an abandoned mine requiring remediation for closure occurs in listed plant habitat, section 7 consultation will be conducted.

Examples of MMAM standards and guidelines include requiring reclamation activities, closure of abandoned mine features, and plans for operations that will cause significant disturbance of resources. These requirements should minimize potential MMAM effects to listed plants but will not remove all potential for adverse effects if mineral exploration/extraction is approved in areas where listed plants occur or have the potential to occur. Therefore, over the life of this consultation, we expect that MMAM activities will result in adverse effects to listed plants. We anticipate that the programmatic direction in the Tonto LRMP will also likely influence future management actions in beneficial ways by adding additional constraints and mitigations to reduce impacts to listed plants.

Roads (RD)

RD activities include road construction, maintenance, relocation, alteration, and decommissioning. With the signing of its travel management decision in October 2021 (as described in the proposed action), the Tonto NF prohibited motor vehicle use off the designated system of roads and trails. There are exceptions identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public safety.

RD objectives include decommissioning 100 to 600 miles of unauthorized routes and NFS roads every 10 years as well as grading surfaces and cleaning culverts and ditches on at least 500 miles of roads annually. Both Chalk Mountain (#479) and Lime Creek roads (#1530) occur within occupied Arizona cliffrose habitat surrounding Horseshoe Lake. Approximately 47 (46.83) miles of roads pass through occupied Arizona hedgehog cactus habitat. Road maintenance could lead to effects to listed plants due to dust, habitat alteration/destruction, and injury/damage causing death. In general, roads can increase risk of wildland fire ignition and serve as vectors for invasive species. LRMP Components in the RD section serve to guide projects to consider, avoid, and reduce/minimize road effects. Furthermore, a guideline for the Horseshoe Recommended Botanical Area prohibits new roads or trails. We expect that this direction will support future efforts to protect Arizona cliffrose from risks associated with off-road vehicle use.

Collectively, we expect RD Components will reduce and minimize effects to listed plants and their habitat by reducing the number of Tonto NF roads and limiting motor-vehicle use to authorized roads. Road maintenance projects or decommissioning may have adverse effects but are also likely to have some long-term benefits by decreasing unauthorized routes and preventing habitat destruction from roads in poor condition.

Vegetation and Ecological Response Units (ERU)

The ERU section focuses on habitat improvement in terrestrial ERUs (e.g., forest, woodlands, shrublands, and grasslands) and reducing threats from uncharacteristic fire and flooding. Habitat improvement tools include prescribed fire, managed natural wildfires, mechanical treatments,

herbicides, and restoration/rehabilitation using native seeds and materials.

The Tonto NF's objective to reduce invasive species (e.g., buffelgrass, fountain grass, and red brome) by surveying, inventorying, and treating 10,000 to 15,000 acres in desert ecological response units (Sonoran Desert plant communities and Sonora-Mojave mixed-salt desert scrub) could incidentally affect Arizona cliffrose through spray drift, resulting in death. See the INS effects section below for additional discussion.

The Tonto NF's objective to treat 400 to 2,000 acres of pinyon-juniper grass, juniper grass, and Madrean pinyon oak mechanically and 20,000 to 200,000 acres with prescribed fire could adversely affect Arizona hedgehog cactus and its habitat from habitat alteration/destruction and individual injury/death.

While ERU activities may result in adverse effects to listed plants, as described above, we also expect that long-term adoption of LRMP desired conditions, standards, and guidelines will be beneficial to listed plants. Generally, Tonto NF LRMP direction guides habitat improvement and restoration of historical fire regimes, native plant communities, soil conditions, seral state conditions, and other ecological conditions. We expect ERU Components will lead to thoughtful proposed activities and project implementation. Specific project-level controls (including both engineering and administrative), constraints, or mitigations (such as reseeding with native species and measures to eradicate exotic and invasive plant species after ground-disturbing activities) designed to reduce impacts to distinct vegetation types should help to maintain the ecological conditions (soils, native plant communities, pollinators, etc.) that support listed plants.

<u>Watersheds and Water Resources (WAT)</u>
The WAT section contains substantial direction to improve watershed condition and water resources across the Tonto NF. The Tonto NF manages for properly functioning watersheds (based on criteria provided in the Watershed Condition Framework or similar current protocol) that exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.

As described in the proposed action, the WAT section contains objectives to improve watershed conditions. These objectives largely target aquatic, riparian, and upland areas that are unlikely to occur in Arizona cliffrose or Arizona hedgehog cactus habitats. The Tonto NF does not anticipate WAT proposed projects will occur in Arizona cliffrose habitat near Horseshoe Lake due to the recommended botanical area. As such, we expect adverse effects to listed plants from WAT activities to be discountable.

<u>Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)</u>
Because Arizona cliffrose and Arizona hedgehog cactus do not occupy riparian or wetland areas, we expect RMZ direction and project implementation will not adversely affect these listed plants.

<u>Wildlife, Fish, and Plants (WFP)</u>
The WFP section aims to support ecological conditions that contribute to threatened and endangered species recovery and proposed/candidate species conservation. A WFP objective is to implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to at-risk species recovery every 10 years. Project

implementation may result in adverse effects from disturbance or habitat alteration; however, listed plants will ultimately benefit as desired conditions provide properly functioning habitats, self-sustaining populations, and listed plant survival and recovery. A specific desired condition for listed plants supports the presence of landscape features (e.g., limestone cliffs, calcareous soils, margins of seeps and springs, canyons/cliffs, hanging gardens) to maintain well-distributed native, endemic, and rare plant populations.

WFP desired conditions and guidelines increase consideration for listed plants during future project design.

<u>Invasive Species (INS)</u>
INS activities include monitoring, preventing, assessing, controlling, and eradicating priority invasive species populations. INS objectives are to treat and control invasive species on 200 to 1,500 acres annually, and specifically on 2 to 10 stream reaches every 5 years. Actions could include manual removal (hand pulling, netting, seining, etc.) or chemical treatment (pesticides, piscicides, or herbicides).

Manual or chemical treatments in riparian areas are unlikely to affect Arizona hedgehog cactus or Arizona cliffrose because these two species are not found in riparian areas. Upland herbicide use could have effects to listed plants through death and habitat disturbance; however, LRMP guidelines direct the Tonto NF to use chemical-free buffers and spot treatment application in sensitive habitats, which decreases the likelihood of adverse effects.

Invasive species effect the survival and reestablishment of native species. Future projects implementing objectives in this section may adversely affect listed plants but are also expected to result in long-term ecosystem benefits. Red brome (*Bromus rubens*) and Malta starthistle (*Centaurea melitensis*) may increase fire frequency in low desert systems and are considered an emerging threat to Arizona cliffrose (USFWS 2013) and Arizona hedgehog cactus.

Cumulative Effects

Cumulative effects are those "effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to native listed plants include activities such as residential and commercial development, improper livestock grazing and associated activities outside of federal allotments, road maintenance and recreation without a federal nexus.

Increasing recreational, residential, or commercial use of non-federal lands in listed plant habitat may result in increased cumulative adverse effects from habitat destruction and plant injury or death.

Mexican spotted owl

<u>Recreation (REC)</u>
The Tonto NF's desired conditions for REC are to support a wide range of activities while

conserving fish and wildlife habitats. The Tonto NF's goal is to have minimal effects to natural resources while implementing projects and activities; however, there is also direction in the LRMP to increase and/or improve recreational opportunities. Over the life of the LRMP, this could result in adverse effects to Mexican spotted owls and their habitat. Recreation activities may affect Mexican spotted owls directly through disturbances caused by human activity (e.g., hiking, shooting, and OHV use at nesting, roosting, or foraging sites) or indirectly through habitat alteration such as vegetation damage, soil compaction, illegal trail creation, and increased risk of wildland fire. Public recreation can come into conflict with Mexican spotted owl management across the Tonto NF and may result in disturbance to owls. Other recreation projects in the region that have resulted in potential adverse effects to Mexican spotted owl include building trails and developing recreational facilities within PACs.

Effects are variable depending on season, time of day/night, intensity, frequency, and distance to Mexican spotted owls. Some developed recreation sites are within Mexican spotted owl habitat and some are adjacent to PACs; however, these sites have been in place for decades. Persistent noises are likely more disruptive than infrequent disturbances, and intensity of disturbance is proportional to noise level.

REC objectives may result in projects that involve adverse effects such as disturbance, harassment, mortality, and habitat destruction/fragmentation, but have long-term benefits if they decrease recreational traffic and reduce effects from unsustainable trails.

The Tonto NF may propose projects that decrease recreational traffic, rehabilitate existing disturbed sites, and reduce effects from unsustainable trails. These activities can adversely affect Mexican spotted owls via noise and habitat destruction/fragmentation but have long-term benefits. If projects occur in areas with Mexican spotted owl, LRMP Components will consider owls during project development.

<u>Rangelands, Forage, and Grazing (GRZ)</u>
The GRZ program primarily includes grazing and browsing by cattle, sheep, and horses, and development and maintenance of range improvements such as earthen stock tanks and troughs, fences, cattle guards, etc. The LRMP provides generalized, forestwide guidance for livestock grazing. Specific grazing allotment plans occur in annual operating instructions. Annual operating instructions (AOI) outline site-specific grazing operations, such as permitted livestock categories and numbers, pasture rotation schedules, utilization standards, and maintenance procedures. The Tonto NF updates AOIs every 5 to 10 years, and generally includes conservation measures for fish, wildlife, and listed plants. AOIs are subject to separate section 7 consultation.

Grazing can adversely affect Mexican spotted owls and their critical habitat through (1) alteration of food and cover resources needed by the owl's prey species and (2) adverse alteration or elimination of vegetation (e.g., riparian vegetation and oak seedlings) that could ultimately develop into owl roosting or nesting habitat. Therefore, GRZ implementation could result in adverse effects to owl prey habitat and adversely affect owl reproductive success (ability to breed and rear young). However, effects of livestock grazing to PACs on the Tonto NF may be minimal because the steep, forested areas where they occur provides less forage. Furthermore, the Tonto NF also manages livestock grazing to provide the woody and herbaceous vegetation

necessary for prey species habitat, the residual biomass to support prescribed natural and ignited fires, and riparian tree regeneration. This, along with avoiding human disturbance or construction actions associated with the livestock grazing in PACs during the owl breeding season (March 1–August 31), is resulting in much reduced affects to the owl from the GRZ program.

The GRZ section includes strategies to minimize detrimental effects to ecosystems. Desired conditions will drive management towards healthy rangelands, plant communities, soil conditions, and riparian habitats. We expect the Tonto NF's guidelines will reduce or minimize adverse effects by limiting grazing intensity through rotational grazing, dispersing livestock with diversionary tactics, and removing unauthorized livestock. The Tonto NF's grazing strategies are to maintain riparian vegetation and stream function and reduce sedimentation and trampling. This should promote understory vegetation production in forested, grassland and riparian habitats, which will help maintain prey species habitat. Grazing management also emphasizes drought preparedness and considers shifts in climate and range conditions. Over the life of this consultation, we expect that implementation of Components in the GRZ section may minimize or eliminate most adverse effects but may still result in unanticipated adverse effects to Mexican spotted owl and its habitat from implementing future actions consistent with programmatic direction.

There are two GRZ objectives. The first is focused on installing wildlife escape ramps to troughs. Each ranger district will install wildlife escape ramps to at least two water troughs or open storage tanks annually until all troughs and tanks have ramps. We expect ramp installation can occur without adverse effects to Mexican spotted owl and should in fact convey a benefit as ramps will allow owls and their prey to safely utilize these water sources. The Tonto NF's second objective is to evaluate vacant allotments for one of three options (convert for forage reserve, grant to a current or new permittee, or close to grazing). This allotment evaluation is largely administrative and directs future actions which we cannot evaluate prior to a proposal because we do not know which allotments would be involved, whether or not listed species are present, or the actual conditions on the ground.

GRZ Components primarily serve to place constraints on grazing practices and do not outline or authorize allotment-specific practices. We expect GRZ standards and guidelines to minimize, but not eliminate adverse effects. Therefore, over the life of this consultation, we expect that implementation of the livestock grazing program will result in adverse effects to Mexican spotted owls, their prey species, and their habitats.

Forestry and Forest Products (FP)

The FP section focuses on providing commercial and personal timber products in a manner that contributes to watershed health and function and protects wildlife habitat. Activities include firewood collection and harvest of sawtimber, pulpwood, and other products. FP Components strive to supplement restoration and maintenance treatments while working towards a balance between the economic value of dead and dying trees with the needs of wildlife habitat and other ecosystem functions. Standards and guidelines direct the Tonto NF to promote seral-state diversity and move timbered systems towards desired conditions using sustainable harvest techniques that protect sensitive resources including fish, wildlife, and their habitats.

The single FP objective is to provide at least 34,000 hundred cubic feet (CCF) or 15,400

thousand board feet (MBF) of timber every 10 years to the forest product industry. This objective does not describe or authorize any site-specific timber projects, but instead is intended to encourage future work.

FP section effects could include the destruction, alteration, or redistribution of key components such as snags, downed logs or individual large trees, and canopy cover in PACs and foraging and nest/roost habitat. Noise and/or smoke from thinning operations and early entry burns may disturb individual owls. Long-term changes could include alterations to multi-layered canopy structure which may affect nesting and foraging habitat.

In summary, we anticipate that some FP activities may adversely affect Mexican spotted owls, PACs and recovery through habitat alteration and disturbance, depending on location of such projects in relation to owls. A specific determination of effects will be made at the project-specific level during additional section 7 consultation. Over the long-term, FP Components may benefit the owl and its habitat by reducing high-severity wildland fire risk to PACs and nest-roost replacement recovery habitat.

Mining, Minerals, and Abandoned Mines (MMAM)

The Forest Service's minerals management program administers mining, oil, gas, and geothermal activities while protecting surface resources (36 CFR 228) such as vegetation and aquatic resources. The LRMP does not authorize or explicitly promote mining activities or projects; however, the long history of mining in central Arizona suggests potential for future mining developments. We cannot predict if new mines will occur that will affect Mexican spotted owls, but we do know from past Tonto NF mining consultations that adverse effects to Mexican spotted owls and their habitat have occurred.

While we expect that many MMAM activities are likely to be implemented outside of Mexican spotted owl critical habitat, future projects have the potential to adversely affect the owl and its habitat. Activities associated with mineral projects include blasting, drilling, vegetation clearing, and other ground disturbing activities which can cause habitat fragmentation/destruction and noise disturbance.

The objective to close at least ten abandoned mines over the life of the LRMP could result in disturbance related effects if remediation work is required. However, most abandoned mines on the Tonto NF are historic shafts with small footprints and likely only require gating, not remediation. Standards and guidelines in this and the WFP sections should minimize effects.

Examples of MMAM standards and guidelines include requiring reclamation activities, closure of abandoned mine features, and plans for operations that will cause significant disturbance of resources. These requirements should minimize potential MMAM effects to Mexican spotted owls and their critical habitat but will not remove all potential for adverse effects if mineral exploration/extraction is approved in owl habitat. Therefore, over the life of this consultation, we expect that MMAM activities will result in adverse effects to Mexican spotted owl, its prey species, and its habitat. We anticipate that the programmatic direction in the Tonto LRMP will also likely influence future management actions in beneficial ways by adding additional constraints and mitigations to reduce impacts to Mexican spotted owl and its habitat by ensuring that activities occurring in Mexican spotted owl habitat apply habitat management objectives and

protection measures from its recovery plan.

Roads (RD)
RD activities include road construction, maintenance, relocation, alteration, and decommissioning. With the signing of its travel management decision in October 2021 (as described in the proposed action), the Tonto NF prohibited motor vehicle use off the designated system of roads and trails. There are exceptions identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public safety.

Roads (including road maintenance) and related recreation activities (e.g., all-terrain vehicles) result in noise, disturbance, and habitat destruction/fragmentation. High road densities increase human presence which can result in owls flushing or leaving their roost. On a local scale, roads and trails through PACs may fragment habitat continuity, alter natural movement patterns, and increase disturbance to resident owls. Effects are variable depending on season, time of day/night, intensity, frequency, and distance. Persistent noises are likely more disruptive than infrequent disturbances, and intensity of disturbance is proportional to noise level. Roads in nest/roost replacement areas and other recovery habitats may result in removal of habitat components (e.g., large logs, snags, and hardwoods) as people access these areas for fuelwood cutting.

RD objectives include decommissioning 100 to 600 miles of unauthorized routes and NFS roads every 10 years as well as grading surfaces and cleaning culverts and ditches on at least 500 miles of roads annually. Transportation projects can have localized adverse effects to the Mexican spotted owl and its habitat. Long-term effects to the species include disturbance and habitat destruction/fragmentation. The actual effects to Mexican spotted owl and/or recovery habitat are dependent on project methods, location, and timing. Permanently closing roads will reduce the amount of disturbance, which is of particular importance during the breeding season (March 1 to August 31).

RD Components serve to guide projects to consider, avoid, and reduce/minimize road effects. Furthermore, the Forest Service typically implements measures to minimize effects to the owl and its habitat from road construction and maintenance (such as avoiding maintenance activities near PACs during the breeding season, avoiding construction of new roads in PAC habitat, etc.).

Collectively, we expect RD Components will reduce potential effects to Mexican spotted owl, its habitat, and prey species by reducing the number of Tonto NF roads and limiting motor-vehicle use to authorized roads. Road maintenance projects or decommissioning may have adverse effects but are also likely to have some long-term benefits by decreasing unauthorized routes and preventing habitat destruction from roads that are in poor condition.

Vegetation and Ecological Response Units (ERU)
The ERU section focuses on habitat improvement in terrestrial ERUs (e.g., forest, woodlands, shrublands, and grasslands) and reducing threats from uncharacteristic fire and flooding. Habitat improvement tools include prescribed fire, managed natural wildfires, mechanical treatments, herbicides, and restoration/rehabilitation using native seeds and materials.

ERU objectives focus on treating frequent-fire (i.e., ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire) and woodland ERUs with a combination of prescribed fire, naturally managed fire, and mechanical treatments. There are also objectives to restore semi-desert grasslands and reduce the effect of invasive species (primarily grasses) in the desert units.

These objectives could adversely affect Mexican spotted owl and its habitat. Presence of heavy machinery, work crews, and noise during project implementation can disturb owls and alter their behavior, destroy habitat, and affect prey species. Thinning and/or prescribed burning activities in PAC and recovery habitat may indirectly affect Mexican spotted owls by affecting habitat structure including snags, downed logs, woody debris, multi-storied canopies, and dense canopy cover. However, reintroducing fire under controlled management into frequent-fire forest types is appropriate forest management and in the long-term would result in positive effects to owls by reducing the risk of high-severity fire effects to Mexican spotted owl habitat.

Under the proposed action, the Forest Service would design all treatments in PAC and recovery habitats to move toward the desired conditions as identified in the recovery plan and to focus removal on small-diameter trees. We expect these actions to be beneficial to reducing the threat of high severity fire effects in owl habitat. High-severity, landscape-level fire that results in the removal of the key habitat components owls need to successfully survive, nest, and reproduce (such as large live trees; live tree canopy cover; large, old snags) is a substantial threat to owl habitat (USFWS 2012; Jones et al. 2016).

The recovery plan (USFWS 2012) recommends implementing fuels reduction and prescribed fire to reduce the threat of these large-scale, high-severity, stand-replacing fires. In addition, prescribed burning also increases vegetative diversity, which may result in a more diverse and productive prey base for owls. When conducting prescribed burning in areas with high levels of coarse woody debris that have not burned in a long time, there is a likelihood that rare key habitat components (i.e., snags, logs, large trees) will be unintentionally lost, which could result in short-term adverse effects to Mexican spotted owls. However, we expect that low intensity, site-specific or local scale prescribed fire will remove far fewer key habitat components than a high intensity, landscape-scale wildfire; therefore, this program aligns with recovery plan recommendations by helping to maintain key habitat components (i.e., snags, logs, large trees), which contribute to meeting recovery objectives. Furthermore, applying guidelines from the Mexican spotted owl recovery plan during future project planning will likely result in treatment area limitations, seasonal restrictions, types and placement of treatments, and subsequent monitoring.

We address possible effects from herbicide use to restore semi-desert grasslands and desert units in the INS effects section.

While activities conducted under the ERU Program may result in adverse effects to listed species, as described above, we also expect that long-term adoption of LRMP desired conditions, standards, and guidelines will be beneficial to Mexican spotted owl and its critical habitat. Generally, Tonto NF LRMP direction guides habitat improvement and restoration of historical fire regimes, native plant communities, soil conditions, seral state conditions, and other

ecological conditions. Specific project-level controls (including both engineering and administrative), constraints, and mitigations designed to reduce impacts should help to maintain the ecological conditions (soils, native plant communities, pollinators, etc.) that support Mexican spotted owl and its habitat.

Watersheds and Water Resources (WAT)
The WAT section contains substantial direction to improve watershed condition and water resources across the Tonto NF. The Tonto NF manages for properly functioning watersheds (based on criteria provided in the Watershed Condition Framework or similar current protocol) that exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.

As described in the proposed action, the WAT section contains objectives to improve watershed conditions. Actions that disturb the ground or streambeds, heavy machinery use, or vegetation alteration may result in habitat degradation or disturbance. Major construction projects during the breeding season could adversely affect individual owls via displacement or disruption. Watershed improvement activities occurring outside the breeding season are less likely to adversely affect individual Mexican spotted owls.

WAT Components address numerous aspects of watershed health, conservation, and restoration to benefit Mexican spotted owls. While WAT activities may result in short-term adverse effects to Mexican spotted owls, we also expect that long-term adoption of WAT Components will benefit Mexican spotted owl and its critical habitat.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)
The RMZ section aims to generate additional project-level controls (including both engineering and administrative), constraints, and mitigations designed to reduce impacts to riparian areas by focusing management on discrete riparian zones, preventing contamination from unintended herbicide and pesticide use, protecting springs and source waters, and preventing stream bank and channel alteration.

Relevant objectives call for projects that promote ecological integrity of 125+ miles of streams and improve 10 to 15 individual springs during each 10-year period. Potential effects from these projects would be similar to those discussed in the WAT section. We expect that most projects will be planned to avoid or minimize adverse effects to Mexican spotted owl and its habitat.

Wildlife, Fish, and Plants (WFP)
The WFP section aims to support ecological conditions that contribute to threatened and endangered species recovery and proposed/candidate species conservation. A WFP objective is to implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to at-risk species recovery every 10 years. Project implementation may result in adverse effects from disturbance or habitat alteration; however, we anticipate in the long-term, Mexican spotted owls will benefit as desired conditions provide properly functioning habitats, survival and recovery, and support self-sustaining populations.

WFP desired conditions and guidelines increase project-level controls, constraints, and mitigations to reduce impacts to Mexican spotted owl during future project design by including a guideline that states activities occurring within federally-listed species habitat should apply

habitat management objectives and species protection measures from approved recovery plans.

Invasive Species (INS)
INS activities include monitoring, preventing, assessing, controlling, and eradicating priority invasive species populations. INS objectives are to treat and control invasive species on 200 to 1,500 acres annually, and specifically on 2 to 10 stream reaches every 5 years. Actions could include manual removal (hand pulling, netting, seining, etc.) or chemical treatment (pesticides, piscicides, or herbicides).

Treatment within Mexican spotted owl habitat could disturb owls and their prey and destroy vegetative cover. Guidelines stipulating timing restrictions, chemical-free buffers and spot treatments near ecologically sensitive habitat should minimize effects.

Invasive species effect the survival and reestablishment of native species. Future projects implementing objectives in this section may adversely affect Mexican spotted owls but are also expected to result in long-term ecosystem benefits by reducing competition for native species, increasing biodiversity, and reducing wildfire risk.

Effects of the Action on Mexican spotted owl Critical Habitat

Overall, beneficial effects to Mexican spotted owl critical habitat are anticipated due to maintaining and managing for forest health. That said, direct and indirect adverse effects to critical habitat are anticipated from various LRMP Components, such as fire and fuels management under the FP and ERU programs.

Because this is a programmatic consultation, it is not possible to assess the specific potential effects (adverse and beneficial) of the action on Mexican spotted owl critical habitat in detail (e.g., spatial extent, location, timing, frequency, duration). The Tonto NF will conduct these evaluations for individual projects during future section 7 consultations. Furthermore, the Tonto NF may reduce, minimize, or avoid adverse effects by implementing conservation measures. Because the Tonto NF will likely develop conservation measures during individual project-specific section 7 consultation, the level to which the Tonto NF may avoid or minimize adverse effects is difficult to evaluate for the LRMP.

The aim of the analysis below is to point out activities in the LRMP that may affect Mexican spotted owl critical habitat and discuss the general types of effects these activities may have on PCEs. In some cases, management direction lacks detail to understand if it will have associated on-the-ground activities that may affect Mexican spotted owl critical habitat. In these cases, we assume the management action will not affect Mexican spotted owl and that possible effects inadvertently overlooked at the programmatic level will be addressed by the Tonto NF in future implementation level consultations.

Below we describe the PCEs related to forest structure and maintenance of adequate prey species and the effects from implementation of the LRMP.

Primary Constituent Elements related to forest structure:

PCE: A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30–45% of which are large trees with a dbh of 12 inches or more.
EFFECT: We expect that actions implemented under the LRMP would retain the range of tree species (i.e., conifers and hardwoods associated with owl habitat) and would not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy Mexican spotted owls use. Some loss of trees, of all types and dbh size classes, would occur from actions such as hazard tree removal, prescribed fire, and forest thinning (as implemented under the FP and ERU programs). However, we expect that actions implemented under the LRMP would maintain a range of tree species and sizes needed to maintain this PCE in PACs and recovery habitat across the Tonto NF. The Forest Service would implement recovery plan guidelines (USFWS 1995 and 2012) such as retaining large trees, providing appropriate canopy cover levels, and managing for a diverse range of tree species such as oak in pine-oak forests and several conifer species in mixed conifer forest. The proposed action would not compromise the function and recovery role of this PCE.

PCE: A shade canopy created by the tree branches covering 40% or more of the ground.
EFFECT: We expect that hazard tree removal, thinning, and burning treatments implemented under the LRMP in the FP and ERU programs would reduce tree shade canopy. However, we do not expect tree thinning to reduce canopy cover in Mexican spotted owl forested habitat below 40%, because the proposed action adopted the 2012 recovery plan (USFWS 2012) recommendations, which include managing for higher basal area and denser canopy cover in owl habitat versus pure ponderosa pine or other forest and woodland habitats. We would expect that some small reduction in existing canopy cover (5–10%) might aid in increasing understory herbaceous vegetation and forb production, which will benefit spotted owl prey species by providing more food for prey, thus potentially increasing prey populations. The proposed action would not compromise the function and recovery role of this PCE.

PCE: Large, dead trees (snags) with a dbh of at least 12 inches.
EFFECT: Large snags would most likely be reduced following proposed prescribed burning and hazard tree removal conducted under the ERU program. Currently, large snags are rare across the action area, and any loss of this habitat component may be significant in terms of maintaining Mexican spotted owls and prey habitat. Prescribed burning may create some snags, which could benefit the owl. However, snags currently used by Mexican spotted owls for nesting are typically very old, large dbh, highly decayed snags with cavities. In individual burning projects, the Tonto NF would attempt to minimize loss of these large snags through conservation measures (such as lining or using lighting techniques to avoid snags). It is likely that following burning treatments, approximately 20% of these existing snags may be lost within treated (i.e., burned) PAC and recovery habitat, resulting in short-term adverse effects to this PCE (Randall Parker and Miller 2000). This is why conservation measures that the Tonto NF implements to protect the largest and oldest snags (particularly those with nest cavities) are so important. As such, the proposed action would not compromise the function and recovery role of this PCE.

Primary Constituent Elements related to maintenance of adequate prey species:

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

EFFECT: Prescribed burning treatments (broadcast, piling, and maintenance burning) would likely reduce fallen trees and woody debris as part of the ERU program. Based on past research, we expect prescribed burning to reduce logs by approximately 50% in forested Mexican spotted owl habitat (Randall Parker and Miller 2000). This loss of large logs would result in short-term adverse effects to this PCE and could result in localized effects to prey species habitat. However, over the long-term, we would expect the proposed action to maintain this PCE across the landscape, but at a more sustainable level. As such, the proposed action would not compromise the function and recovery role of this PCE.

PCE: A wide range of tree and plant species, including hardwoods.
EFFECT: ERU objectives would positively affect this PCE. Plant species richness would likely increase following thinning and/or burning treatments that result in small, localized canopy gaps. Individual projects conducted under the LRMP typically propose conservation measures that focus on retaining oaks and other hardwoods, but some level of short-term loss could occur at the individual project level. However, the proposed action would not compromise the function and recovery role of this PCE because prescribed fire results in increased plant species diversity by creating openings in the canopy and reducing small diameter conifer density. In frequent-fire forests (that are the focus of Tonto NF fire management), herbaceous understory response and plant regeneration tends to be positive following tree removal and prescribed fire (Springer et al. 2001). As such, the proposed action would not compromise the function and recovery role of this PCE.

PCE: Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.
EFFECT: A short-term decrease in plant cover will result from prescribed burning conducted under the ERU program that may result in short-term adverse effects to the owl by modifying prey habitat within treatment areas. However, we expect long-term increases in residual plant cover because treatments would provide conditions suitable for increased herbaceous plant growth by removing a thick layer of dead plant debris within treated areas. We expect that the mosaic effect created by burned and unburned areas and by creating small openings within protected habitat to increase herbaceous plant species diversity and, in turn, assist in the production and maintenance of the Mexican spotted owl prey base. The proposed action would not compromise the function and conservation role of this PCE.

Under the GRZ program, the Tonto NF is managing livestock grazing to provide the woody and herbaceous vegetation necessary for prey species habitat, the residual biomass that will support prescribed natural and ignited fires, and the regeneration of riparian trees. Therefore, the proposed action would not compromise the function and conservation role of this PCE.

Cumulative Effects

Cumulative effects are those "effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. In comparison to other listed species, Mexican spotted owl occupied habitat, recovery habitat, and critical habitat within the action area is almost exclusively managed by the Forest Service; therefore, most

activities that could potentially affect the species are Federal activities and subject to additional section 7 consultations.

Actions on private, tribal, and State lands that could contribute to cumulative long-term adverse effects to Mexican spotted owl include residential and commercial development, improper livestock grazing and associated activities outside of federal allotments, mining, water developments, road construction and maintenance, and recreation without a federal nexus. These actions can affect owl through mortality, disturbance, and foraging habitat effects from livestock grazing on herbaceous plant cover and the removal of coarse woody debris, snags, and trees from localized development and construction.

The State of Arizona, via the AGFD, manages game animals on all jurisdictions in the State including the Tonto NF. Wild ungulates, such as elk (*Cervus canadensis*), have the potential to affect Mexican spotted owl and its critical habitat on the Tonto NF. Grazing by large ungulates may affect habitat for Mexican spotted owl prey species by reducing herbaceous and woody vegetation that small mammals use for food and cover. The effect varies across the action area. However, game numbers within the management units on the Tonto NF are stable and at a size that does not result in significant effects (e.g., loss of herbaceous understory or woody plant species) to owl prey habitat (USFS 2019). AGFD is active, both directly and indirectly, in species conservation and recovery, including for the Mexican spotted owl.

Ocelot

We anticipate that the proposed action, the Tonto NF LRMP, will result in net beneficial effects for ocelots by, among other actions, maintaining and managing for wildlife habitat. Overall, such management should provide opportunities for ocelots to use the Tonto NF on a long-term (i.e., establish a home range) or short-term (i.e., use a movement corridor) basis. That said, individual Components of the Tonto LRMP are likely to adversely affect ocelots; these effects are discussed in the LRMP Components' sections below. However, as discussed in the status of the species and environmental baseline, it is important to reiterate that ocelots are very rare in Arizona and have never been documented on the Tonto NF. Therefore, while we do not anticipate adverse effects to ocelots will occur frequently, because the Tonto NF likely provides suitable habitat for ocelots and because the duration of the action is 10 to 15 years, it is possible that ocelots may occur on the Tonto NF during the implementation of the proposed action.

<u>Recreation (REC)</u>

The Tonto NF's desired conditions for REC are to support a wide range of activities while conserving fish and wildlife habitats. The Tonto NF's goal is to have minimal effects to natural resources while implementing projects and activities; however, there is also direction in the LRMP to increase and/or improve recreational opportunities. Over the life of the LRMP, this could result in adverse effects to ocelots. Recreation activities such as hiking, horseback riding, off-highway vehicle recreation, hunting, wildlife viewing, dispersed camping, backpacking, and target shooting are likely to adversely affect ocelots, should they occur in the area. Possible effects include disturbance, avoidance of areas heavily occupied by recreationists, displacement from formerly occupied areas, habitat alteration or degradation, direct injury or mortality from recreational vehicle use and interactions with dogs, and increased potential for illegal shooting. While these are allowed uses of Forest Service lands, the LRMP does not authorize or explicitly promote these activities and desired conditions for recreation seek to minimize effects from

recreational activities.

REC objectives include developing or modifying one to four systems of motorized trails and one to four systems of nonmotorized trails. These projects may result in disturbance to ocelots. Ocelots are sensitive to human disturbance and tend to use areas away from paved roads and human settlements (Rorabaugh et al. 2020, Wang et al. 2019). Near human settlements, ocelots become more nocturnal (Cruz et al. 2018, Massara et al. 2018). Disturbance to ocelots may occur from both auditory and visual stimulus arising from both implementation and the resultant human recreational presence on completed trails. Disturbance to ocelots can result in behavioral changes, increased energetic expenditures, and interference with habitat use, including use of movement corridors, and movement patterns. These could lead to decreased dispersal opportunities; changes in home range size and location; increased inter- and intra-specific competition; increased difficulty meeting energetic needs; etc. Because ocelots are primarily nocturnal and crepuscular (i.e., active at night and dawn and dusk), activities that occur during dusk, night, and dawn are more likely to disturb ocelots when they are active. Daytime activities are less likely to disturb active ocelots but could disturb resting ocelots if the activities are close to a den or resting location.

The degree of potential disturbance that REC activities may have on ocelots would depend on various aspects of the action, including its spatial extent, location, timing, frequency, and duration. In general, larger (in size), longer (in duration), and/or more frequent projects are more likely to disturb ocelots resulting in adverse behavioral changes. Projects that are smaller, shorter, and/or less frequent are less likely to disturb ocelots. Furthermore, because ocelots are secretive animals that generally avoid areas of high human use and associated noise, infrastructure, and lights, project activities in more remote areas may have a greater chance of disturbing ocelots compared to activities in areas with high baseline levels of human use.

REC objectives may also lead to projects that decrease recreational traffic, rehabilitate existing disturbed sites, and reduce effects from unsustainable trails. These activities can adversely affect ocelots via noise and habitat destruction/fragmentation but will have long-term benefits. If projects occur in areas with ocelots, LRMP Components will consider the species during project development.

In summary, REC objectives may result in projects that involve adverse effects such as disturbance, harassment, mortality, and destruction/fragmentation of habitat, while some projects may have long-term benefits if they decrease recreational traffic and reduce effects from unsustainable trails.

Rangelands, Forage, and Grazing (GRZ)

The GRZ program primarily includes grazing and browsing by cattle, sheep, and horses, and development and maintenance of range improvements such as earthen stock tanks and troughs, fences, cattle guards, etc. The LRMP provides generalized, forestwide guidance for livestock grazing. Specific grazing allotment plans occur in annual operating instructions. Annual operating instructions (AOI) outline site-specific grazing operations, such as permitted livestock categories and numbers, pasture rotation schedules, utilization standards, and maintenance procedures. The Tonto NF updates AOIs every 5 to 10 years, and generally includes conservation measures for fish, wildlife, and listed plants. AOIs are subject to separate section 7

consultation.

Grazing and livestock management activities can adversely affect ocelots through 1) human-related disturbance; 2) reduction of cover; 3) diminished prey availability and abundance; and 4) direct mortality (USFWS 2016). The GRZ section includes strategies to minimize detrimental effects to ecosystems. Desired conditions will drive management towards healthy rangelands, plant communities, soil conditions, and riparian habitats. Grazing and livestock management activities are not expected to significantly reduce cover, water, or prey for ocelots because the Tonto NF's guidelines will lead to light to moderate forage utilization by limiting grazing intensity through rotational grazing, dispersing livestock with diversionary tactics, and removing unauthorized livestock. The Tonto NF's grazing strategies are to maintain riparian vegetation and stream function and reduce sedimentation and trampling, which should promote understory vegetation production in forested, grassland and riparian habitats. The GRZ section also emphasizes drought preparedness and considers shifts in climate and range conditions.

There are two GRZ objectives. The first is focused on installing wildlife escape ramps to troughs. Each ranger district will annually install wildlife escape ramps to at least two water troughs or open storage tanks until all troughs and tanks have ramps. We expect ramp installation can occur without adverse effects to ocelot and should convey a benefit as ramps will allow ocelots and their prey to safely utilize these water sources. The Tonto NF's second objective is to evaluate vacant allotments for one of three options (convert for forage reserve, grant to a current or new permittee, or close to grazing). This allotment evaluation is largely administrative and directs future actions which we cannot evaluate prior to a proposal because we do not know which allotments would be involved, whether or not listed species are present, or the actual conditions on the ground.

GRZ Components primarily serve to place constraints on grazing practices and do not outline or authorize allotment-specific practices. We expect GRZ standards and guidelines to minimize, but not eliminate adverse effects. Therefore, over the life of this consultation, we expect that implementation of the livestock grazing program will result in adverse effects to ocelots, should they occur in the area.

Forestry and Forest Products (FP)

The FP section focuses on providing commercial and personal timber products in a manner that contributes to watershed health and function and protects wildlife habitat. Activities include firewood collection and harvest of sawtimber, pulpwood, and other products. FP Components strive to supplement restoration and maintenance treatments while working towards a balance between the economic value of dead and dying trees with the needs of wildlife habitat and other ecosystem functions. Standards and guidelines direct the Tonto NF to promote seral-state diversity and move timbered systems towards desired conditions using sustainable harvest techniques that protect sensitive resources including fish, wildlife, and their habitats.

The single FP objective is to provide at least 34,000 hundred cubic feet (CCF) or 15,400 thousand board feet (MBF) of timber every 10 years to the forest product industry. This objective does not describe or authorize any site-specific timber projects, but instead is intended to encourage future work. Any future actions will be subject to separate section 7 consultation.

Overall, FP, which aims to contribute to watershed health and function and protect wildlife habitat, should result in long-term beneficial effects to ocelots; however, multiple FP activities may adversely affect ocelots. For example, thinning operations, early entry burns (i.e., pile burning), and harvest of sawtimber may disturb ocelot or alter their movement patterns. These treatments may also result in a temporary loss or reduction in vegetation, thus reducing habitat suitability for ocelots and their prey. Prescribed fire could directly injure or kill an ocelot, although this is unlikely to occur as prescribed fire moves slowly on the landscape. Disturbance to ocelots because of these actions is anticipated to occur intermittently throughout the life of the LRMP; however, overall, potential effects from these treatments should be localized and short-lived and benefit ocelots and their prey in the long-term. Additionally, treatments would be spread over time and space, allowing ocelot to move to adjacent areas not being treated. Long-term effects could include alterations to multi-layered canopy structure which may affect ocelots and their prey.

In summary, we anticipate that some FP activities may adversely affect ocelots, should they occur in the area, through disturbance and habitat alteration. An effects determination will be made at the project-specific level during additional section 7 consultation. Over the long-term, FP Components may benefit the ocelot by reducing wildland fire risk.

Mining, Minerals, and Abandoned Mines (MMAM)

The Forest Service's minerals management program administers mining, oil, gas, and geothermal activities while protecting surface resources (36 CFR 228) such as vegetation and aquatic resources. The LRMP does not authorize or explicitly promote mining activities or projects; however, the long history of mining in central Arizona suggests potential for future mining developments. We cannot predict if new mines will occur that will affect ocelots, but we do know from past consultations that should ocelots occur on the Tonto NF, there are likely to be some effects to ocelots from this program.

Future projects have the potential to adversely affect ocelot. Activities associated with mineral resources include blasting, drilling, vegetation clearing, and other ground disturbing activities which can cause destruction and fragmentation of ocelot and ocelot prey habitat, auditory and visual disturbance of ocelots, and direct injury or mortality due to collisions with vehicles associated with MMAM.

The objective to close at least ten abandoned mines over the life of the LRMP could result in disturbance related effects if remediation work is required. However, most abandoned mines on the Tonto NF are historic shafts with small footprints and likely only require gating, not remediation. Standards and guidelines in this and the WFP sections should minimize effects.

Examples of MMAM standards and guidelines include requiring reclamation activities, closure of abandoned mine features, and plans for operations that will cause significant disturbance of resources. These requirements should minimize potential MMAM effects to ocelots but will not remove all potential for adverse effects. Therefore, over the life of this consultation, we expect that MMAM activities will result in adverse effects to ocelots. We anticipate that the programmatic direction in the Tonto LRMP will also likely influence future management actions in beneficial ways by adding additional constraints and mitigations to reduce impacts to ocelots.

Roads (RD)
RD activities include road construction, maintenance, relocation, alteration, and decommissioning. With the signing of its travel management decision in October 2021 (as described in the proposed action), the Tonto NF prohibited motor vehicle use off the designated system of roads and trails. There are exceptions identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public safety.

Roads (including road maintenance and construction) and related recreation activities (e.g., all-terrain vehicles) could adversely affect ocelots through auditory and visual disturbance, habitat destruction and fragmentation, and injury or death (due to collisions with vehicles). Collisions with vehicles represent the largest known cause of ocelot deaths in south Texas and Arizona in recent history.

High road densities increase human presence which can result in ocelots avoiding otherwise suitable habitat. Ocelots are sensitive to human disturbance and tend to use areas away from paved roads and human settlements (Rorabaugh et al. 2020, Wang et al. 2019). Disturbance to ocelots can result in behavioral changes, increased energetic expenditures, and interference with habitat use, including use of movement corridors, and movement patterns. These could lead to decreased dispersal opportunities; changes in home range size and location; increased inter- and intra-specific competition; increased difficulty meeting energetic needs; etc.

Noise associated with the RD program could disturb ocelots and cause them to avoid areas with human use. Unpredictable noise is often perceived as a threat and can cause startle and flight responses, physiological stress, and displacement or habitat avoidance. Chronic and frequent noise inhibits the ability of wildlife to detect important sounds (Francis and Barber 2013). Both unpredictable and chronic noise will result from recreational and travel management activities (e.g., motorized vehicle use) and continue as for the life of the LRMP.

RD objectives include decommissioning 100 to 600 miles of unauthorized routes and NFS roads every 10 years as well as grading surfaces and cleaning culverts and ditches on at least 500 miles of roads annually. Decommissioning unauthorized roads may result in temporary adverse effects to ocelots and their prey; however, permanently closing roads will reduce the overall amount of disturbance to ocelots, reduce habitat fragmentation, improve habitat conditions for ocelots and their prey, and reduce the risk of injury or mortality to ocelots due to collisions with vehicles.

RD Components may result in adverse effects to ocelots, should they occur in the area. Roads and vehicle use are a significant source of mortality, disturbance, and habitat fragmentation for ocelots throughout their range. That being said, we expect the LRMP RD section will reduce potential effects to ocelots and their prey species by reducing the number of Tonto NF roads (through decommissioning) and limiting motor-vehicle use to authorized roads. Additionally, road maintenance projects may prevent habitat destruction from roads that are in poor condition, thereby benefiting ocelots.

Vegetation and Ecological Response Units (ERU)
The ERU section focuses on habitat improvement in terrestrial ERUs (e.g., forest, woodlands, shrublands, and grasslands) and reducing threats from uncharacteristic fire and flooding. Habitat

improvement tools include prescribed fire, managed natural wildfires, mechanical treatments, herbicides, and restoration/rehabilitation using native seeds and materials.

Although habitat use patterns of ocelots in Arizona are not well known, based on recent ocelot detections, we anticipate that ocelots are most likely to use four of five of the vegetation “system types” (see Appendix A, Table A-1 for the names and acreage of “ecological response units” per system type) communities found within the Tonto NF, including shrublands/interior chaparral grasslands/semi-desert grassland, woodlands forests. Ocelots are less likely to use the “system type” of shrublands/deserts. Activities that reduce or destroy vegetative cover may decrease the amount of suitable habitat available for ocelots. ERU objectives focus on treating frequent-fire (i.e., ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire) and woodland ERUs with a combination of prescribed fire, naturally managed fire, and mechanical treatments. There are also objectives to restore semi-desert grasslands and reduce the effect of invasive species (primarily grasses) in the desert units.

Overall, ERU Components aim to maintain/enhance vegetation communities and should result in long-term beneficial effects to ocelots. Temporary reductions in cover that benefit ecosystems, such as prescribed fires that prevent catastrophic fires from occurring in the future, will likely be beneficial for ocelots and their prey. However, multiple habitat improvement actions may adversely affect ocelots. For example, vegetation treatments, such as herbicide use, prescribed fire, and mechanical treatments may disturb ocelots or alter their movement patterns. These treatments may also result in a temporary loss or reduction in vegetation, thus reducing its suitability for ocelots and their prey. Prescribed fire could directly injure or kill an ocelot, although this is not likely to occur as prescribed fire moves slowly on the landscape. Disturbance to ocelots as a result of these actions is anticipated to occur intermittently throughout the life of the LRMP; however, overall, potential effects from these treatments should be localized and short-lived and benefit ocelots and their prey in the long-term. Additionally, these treatments would be spread over time and space, allowing ocelot to move to adjacent areas not being treated.

We expect ERU standards and guidelines to minimize, but not eliminate adverse effects. Future project-specific actions will likely include conservation measures for treatment area limitations, review of types and placement of treatments, subsequent monitoring, etc. Applying these guidelines will result in a ERU program that is likely to provide long-term benefits for the ocelot.

We address possible effects from herbicide use to restore semi-desert grasslands and desert units in the INS section.

Watersheds and Water Resources (WAT)

The WAT section contains substantial direction to improve watershed condition and water resources across the Tonto NF. The Tonto NF manages for properly functioning watersheds (based on criteria provided in the Watershed Condition Framework or similar current protocol) that exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.

As described in the proposed action, the WAT section contains objectives to improve watershed conditions. Actions that disturb the ground or streambeds, heavy machinery use, or vegetation alteration may result ocelot habitat degradation or disturbance that could alter ocelot habitat use

and movement patterns.

WAT Components address numerous aspects of watershed health, conservation, and restoration to benefit ocelots. While WAT activities may result in short-term adverse effects to ocelots, we also expect that long-term adoption of WAT Components will benefit ocelot.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)
The RMZ section aims to generate additional project-level controls, constraints, and mitigations to reduce impacts to for riparian areas by focusing management on discrete riparian zones, preventing contamination from unintended herbicide and pesticide use, protecting springs and source waters, and preventing stream bank and channel alteration.

Relevant objectives call for projects that promote ecological integrity of 125+ miles of streams and improve 10 to 15 individual springs during each 10-year period. Potential effects from these projects would be similar to those discussed in the WAT section. We expect that most projects will be planned to avoid or minimize adverse effects to ocelots because a guideline in the WFP section states that activities occurring within federally-listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.

Wildlife, Fish, and Plants (WFP)
The WFP section aims to support ecological conditions that contribute to threatened and endangered species recovery and proposed/candidate species conservation. A WFP objective is to implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to at-risk species recovery every 10 years. Project implementation may result in adverse effects from disturbance or habitat alteration; however, ocelots will ultimately benefit as desired conditions provide properly functioning habitats, survival and recovery of listed species, and support self-sustaining populations of species.

WFP desired conditions and guidelines increase project-level controls, constraints, and mitigations to reduce impacts to ocelots during future project design by including a guideline that states activities occurring within federally-listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.

Invasive Species (INS)
INS activities include monitoring, preventing, assessing, controlling, and eradicating priority invasive species populations. INS objectives are to treat and control invasive species on 200 to 1,500 acres annually, and specifically on 2 to 10 stream reaches every 5 years. Actions could include manual removal (hand pulling, netting, seining, etc.) or chemical treatment (pesticides, piscicides, or herbicides).

Invasive species can affect the survival and reestablishment of native species. Future projects implementing objectives in this section may adversely affect ocelot but are also expected to result in long-term ecosystem benefits. However, various treatments could disturb ocelots and their prey and alter their movement patterns as well as reduce or destroy vegetative cover. Guidelines stipulating timing restrictions, chemical-free buffers and spot treatments near ecologically sensitive habitat should minimize effects.

Disturbance to ocelots because of INS objectives is anticipated to occur intermittently throughout the life of the LRMP; however, overall, potential effects from treatments should be localized and short-lived and benefit ocelots and their prey in the long-term by reducing competition for native species, increasing biodiversity, and reducing wildfire risk. Additionally, treatments would be spread over time and space, allowing ocelot to move to adjacent areas not being treated.

Cumulative Effects

Cumulative effects are those "effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate section 7 consultation.

Residential and commercial development, improper livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, road maintenance and recreation without a federal nexus are some of the activities that could contribute substantially to cumulative long-term adverse effects to ocelots. Increasing recreational, residential, or commercial use of non-federal lands all result in disturbance that could result in increased predation and/or competition for space and food for the ocelot.

Herptiles

<u>Recreation (REC)</u>
The Tonto NF's desired conditions for REC are to support a wide range of activities while conserving fish and wildlife habitats. The Tonto NF's proximity to the Phoenix metropolitan area results in large amounts of recreational use that disproportionally occurs near lakes, rivers, streams, and riparian areas that serve as important habitat for listed herptiles. The Tonto NF's goal is to have minimal effects to natural resources while implementing projects and activities; however, there is also direction in the LRMP to increase and/or improve recreational opportunities. Public recreation can come into conflict with listed herptile management across the Tonto NF and may result in disturbance to these species.

Heavy recreational use along waterways can lower water quality, increase spread of invasive species, erode or compact banks, degrade riparian vegetation, or alter herptile behavior. Human visitation to aquatic sites may increase adverse human interactions with listed herptiles and potentially increase herptile (and specifically gartersnake) mortality due to the public's general fear and dislike of snakes. Roads, trails, and recreation sites may affect watershed health by increasing sedimentation or other pollutants through runoff. There is also an increased risk of fire due to human-caused ignitions.

REC objectives may result in projects that involve adverse effects such as disturbance, harassment, mortality, and destruction/fragmentation of habitat, but have long-term benefits if they decrease recreational traffic and reduce effects from unsustainable trails.

The Tonto NF may propose projects that decrease recreational traffic, rehabilitate existing disturbed sites and reduce effects from unsustainable trails. These activities can adversely affect listed herptiles via noise and habitat destruction/fragmentation but have long-term benefits. If projects occur in areas with listed herptiles, LRMP Components will consider them during

project development.

Rangelands, Forage, and Grazing (GRZ)
The GRZ program primarily includes grazing and browsing by cattle, sheep, and horses, and development and maintenance of range improvements such as earthen stock tanks and troughs, fences, cattle guards, etc. The LRMP provides generalized, forestwide guidance for livestock grazing. Specific grazing allotment plans occur in annual operating instructions. Annual operating instructions (AOI) outline site-specific grazing operations, such as permitted livestock categories and numbers, pasture rotation schedules, utilization standards, and maintenance procedures. The Tonto NF updates AOIs every 5 to 10 years, and generally includes conservation measures for fish, wildlife, and listed plants. AOIs are subject to separate section 7 consultation.

Livestock grazing can affect listed herptiles and their habitat by disturbing/destroying riparian vegetation, altering stream morphology and effecting water quality from sedimentation. Effects may be minimized by use of riparian pasture management including exclusion, limited pasture use, and timing restrictions for livestock use in riparian areas. Livestock grazing may still adversely affect important listed herptile habitat outside of these protected or specially managed areas.

The GRZ section includes strategies to minimize detrimental effects to ecosystems. Desired conditions will drive management towards healthy rangelands, plant communities, soil conditions, and riparian habitats. We expect the Tonto NF's guidelines will reduce or minimize adverse effects by limiting grazing intensity through rotational grazing, dispersing livestock with diversionary tactics, and removing unauthorized livestock. The Tonto NF's grazing strategies are to maintain riparian vegetation and stream function and reduce sedimentation and trampling. This should promote understory vegetation production in forested, grassland and riparian habitats, which will help maintain listed herptile habitat. Grazing management also emphasizes drought preparedness and considers shifts in climate and range conditions. Over the life of this consultation, we expect that implementation of GRZ section Components may reduce or minimize effects, but still result in adverse effects to listed herptiles and their habitat.

There are two GRZ objectives. The first is focused on installing wildlife escape ramps to troughs. Each ranger district will annually install wildlife escape ramps to at least two water troughs or open storage tanks until all troughs and tanks have ramps. We expect ramp installation can occur without adverse effects to listed herptiles and should in fact convey a benefit as ramps will allow herptiles to safely utilize these water sources. The Tonto NF's second objective is to evaluate vacant allotments for one of three options (convert for forage reserve, grant to a current or new permittee, or close to grazing). This allotment evaluation is largely administrative and directs future actions which we cannot evaluate prior to a proposal because we do not know which allotments would be involved, whether or not listed species are present, or the actual conditions on the ground.

GRZ Components primarily serve to place constraints on grazing practices and do not outline or authorize allotment-specific practices. We expect GRZ standards and guidelines to minimize, but not eliminate adverse effects. Therefore, over the life of this consultation, we expect that implementation of the livestock grazing program will result in adverse effects to listed herptiles

and their habitats.

Forestry and Forest Products (FP)
The FP section focuses on providing commercial and personal timber products in a manner that contributes to watershed health and function and protects wildlife habitat. Activities include firewood collection and harvest of sawtimber, pulpwood, and other products. FP Components strive to supplement restoration and maintenance treatments while working towards a balance between the economic value of dead and dying trees with the needs of wildlife habitat and other ecosystem functions. Standards and guidelines direct the Tonto NF to promote seral-state diversity and move timbered systems towards desired conditions using sustainable harvest techniques that protect sensitive resources including fish, wildlife, and their habitats.

The single FP objective is to provide at least 34,000 hundred cubic feet (CCF) or 15,400 thousand board feet (MBF) of timber every 10 years to the forest product industry. This objective does not describe or authorize any site-specific timber projects, but instead is intended to encourage future work.

While timber harvest projects are limited spatially and temporally, and generally avoid riparian and aquatic systems, short-term effects from FP objectives could include increases in flood runoff, stream channel scouring, or sediment deposition into listed herptile habitat. Mechanical treatments frequently involve temporary road construction and heavy equipment traffic, which can cause habitat fragmentation, disturbance, and soil compaction. Some long-term effects are expected to be positive as these activities reduce the chances of uncharacteristic wildfires that can affect riparian areas.

In summary, we anticipate that some FP activities may adversely affect listed herptiles and their habitat through habitat alteration and disturbance, depending on location of such projects in relation to listed herptile habitat. A specific determination of effects will be made at the project-specific level during additional section 7 consultation. Over the long-term, FP Components may benefit herptiles and their habitat by reducing wildland fire risk.

Mining, Minerals, and Abandoned Mines (MMAM)
The Forest Service's minerals management program administers mining, oil, gas, and geothermal activities while protecting surface resources (36 CFR 228) such as vegetation and aquatic resources. The LRMP does not authorize or explicitly promote mining activities or projects; however, the long history of mining in central Arizona suggests potential for future mining developments. We cannot predict if new mines will occur that will affect listed herptiles, but we do know from past Tonto NF mining consultations that adverse effects to listed herptiles and their habitat have occurred.

Mineral extraction can affect listed herptiles and/or their habitats by reducing water quality and quantity, effecting surface water availability, removing trees and surface vegetation, displacing surface soils, and constructing roads, buildings, wells, pumping stations, wastewater ponds and transmission lines. Effects include erosion and sedimentation into riparian areas and streams, habitat destruction and noxious weed invasion. In addition, surface occupancy and human occupation increases the chances of herptile harassment and mortality.

MMAM desired conditions specifically encourage consideration of surface and groundwater resources, watershed and forest ecosystem health, wildlife, and wildlife habitat. Standards and guidelines state that mineral materials (e.g., sand and gravel) should not be removed from the riparian management zone without adequate engineering controls to protect surface waters, and placer mining (i.e., streambed mining) should avoid damaging riparian vegetation, degrading water quality, and negatively affecting channel stability.

The objective to close at least ten abandoned mines over the life of the LRMP could result in disturbance related effects if remediation work is required. However, most abandoned mines on the Tonto NF are historic shafts with small footprints and likely only require gating, not remediation. Standards and guidelines in this and the WFP sections should minimize effects. Furthermore, open vertical pits or shafts kill many vertebrates that fall into them including tortoises, lizards, toads, and snakes. Reducing these features on the landscape will lessen the effect abandoned mines have on wildlife.

MMAM standards and guidelines require reclamation activities, closure of abandoned mine features, plans for operations that will cause significant disturbance of resources, and disallow mineral material removal or placer mining in the riparian management zone. These requirements should minimize potential MMAM effects to listed herptiles and their habitats but will not remove all potential for adverse effects. Therefore, over the life of this consultation, we expect that MMAM activities will result in adverse effects to listed herptiles. We anticipate that the programmatic direction in the Tonto LRMP will also likely influence future management actions in beneficial ways by adding additional constraints and mitigations to reduce impacts to listed herptiles and their habitat.

Roads (RD)
RD activities include road construction, maintenance, relocation, alteration, and decommissioning. With the signing of its travel management decision in October 2021 (as described in the proposed action), the Tonto NF prohibited motor vehicle use off the designated system of roads and trails. There are exceptions identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public safety.

RD objectives include decommissioning 100 to 600 miles of unauthorized routes and NFS roads every 10 years as well as grading surfaces and cleaning culverts and ditches on at least 500 miles of roads annually. Transportation projects can have localized adverse effects to listed herptiles and their habitat from disturbance and habitat destruction/fragmentation. Roads may act as a barrier to listed herptile movement and dispersal. Traffic on roads near occupied sites may result in fatality of dispersing herptiles. Thus, decommissioning and closing roads can benefit listed herptiles by reducing habitat fragmentation and road mortalities. Restoring existing roads can reduce effects to listed herptiles because properly functioning and maintained roads minimize effects to riparian areas. Improperly designed or maintained, roads can increase erosion and sedimentation, create new channels, affect stream channel function, and increase runoff flow rates. Poorly designed culverts can create barriers to herptile movement and affect downstream erosion and upstream sediment deposition during high flow events. Implementing LRMP standards and guidelines will help reduce overall effects from RD activities.

Collectively, we expect RD Components will reduce potential effects to listed herptiles and their habitat by reducing the number of Tonto NF roads and limiting motor-vehicle use to authorized roads. Road maintenance projects or decommissioning may have short-term adverse effects to listed herptiles and their habitat while implementing projects but are also likely to have some longer-term benefits by decreasing unauthorized routes and preventing habitat destruction from roads that are in poor condition.

Vegetation and Ecological Response Units (ERU)

The ERU section focuses on habitat improvement in terrestrial ERUs (e.g., forest, woodlands, shrublands, and grasslands) and reducing threats from uncharacteristic fire and flooding. Habitat improvement tools include prescribed fire, managed natural wildfires, mechanical treatments, herbicides, and restoration/rehabilitation using native seeds and materials.

ERU objectives focus on treating frequent-fire (i.e., ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire) and woodland ERUs with a combination of prescribed fire, naturally managed fire, and mechanical treatments. There are also objectives to restore semi-desert grasslands and reduce the effect of invasive species (primarily grasses) in the desert units.

These objectives could adversely affect listed herptiles and their habitat. Listed herptiles may occur throughout these ERUs. On the Tonto NF, Chiricahua leopard frog critical habitat occurs in ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire. Narrow-headed gartersnake critical habitat ranges from Sonoran-Mojave desert scrub to ponderosa pine forest. Northern Mexican gartersnake critical habitat occurs along Tonto Creek in desert and grassland ERUs. Vegetation projects tend to focus on upland areas; therefore, we expect most effects to be indirect. However, use of wildland fire (both prescribed and wildfire) and mechanical treatments can affect aquatic habitats (e.g., water temperature, water quality, steam bank stability, etc.) from sediment deposits and riparian vegetation destruction. Mechanical treatments frequently involve temporary road construction and heavy equipment traffic, which can affect streams and riparian habitats (see RD and REC sections for further discussion of effects).

We address possible effects from herbicide use to restore semi-desert grasslands and desert units in the INS section.

While ERU activities may result in adverse effects to listed species, as described above, we also expect that long-term adoption of LRMP desired conditions, standards, and guidelines will be beneficial to listed herptiles and their critical habitats. Generally, Tonto NF LRMP direction guides habitat improvement and restoration of historical fire regimes, native plant communities, soil conditions, seral state conditions, and other ecological conditions. Specific considerations for distinct vegetation types should help to maintain the ecological conditions (soils, native plant communities, pollinators, etc.) that support listed herptiles and their habitat.

Watersheds and Water Resources (WAT)

The WAT section contains substantial direction to improve watershed condition and water resources across the Tonto NF. The Tonto NF manages for properly functioning watersheds (based on criteria provided in the Watershed Condition Framework or similar current protocol)

that exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.

As described in the proposed action, the WAT section contains objectives to improve watershed conditions. Actions that disturb the ground or streambeds, heavy machinery use, or vegetation alteration may result in a temporary increase in sedimentation and turbidity, increased risk of contamination (i.e., pollutants, aquatic disease, or invasive species), a temporary block to instream movement, degradation of riparian/aquatic vegetation, and direct disturbance from machinery such as crushing injuries or mortality. Major construction projects may disrupt herptile behavior and result in direct mortality.

One WAT objective is to apply for state-based water rights for threatened streams that support highly valued resources (e.g., listed species, species of conservation concern, river-based recreation) or contain unique qualities (e.g., a perennial Sonoran Desert stream). Should the Tonto NF acquire instream flow rights in listed herptile habitats, this would benefit listed herptiles by helping maintain necessary water levels.

WAT Components address numerous aspects of watershed health, conservation, and restoration to benefit listed herptiles. While WAT activities may result in short-term adverse effects to listed herptiles, we also expect that long-term adoption of WAT Components will benefit listed herptiles and their critical habitats.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)
The RMZ section aims to generate additional project-level controls, constraints, and mitigations to reduce impacts to for riparian areas by focusing management on discrete riparian zones, preventing contamination from unintended herbicide and pesticide use, protecting springs and source waters, and preventing stream bank and channel alteration.

Relevant objectives call for projects that promote ecological integrity of 125+ miles of streams and improve 10 to 15 individual springs during each 10-year period. Potential effects from these projects would be similar to those discussed in the WAT section. We expect that most projects will be planned to avoid or minimize adverse effects to listed herptiles and their habitats.

Wildlife, Fish, and Plants (WFP)
The WFP section aims to support ecological conditions that contribute to threatened and endangered species recovery and proposed/candidate species conservation. A WFP objective is to implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to at-risk species recovery every 10 years. Projects that occur in watersheds, riparian areas, or aquatic habitats near listed herptiles or their critical habitats could affect water-quality, vegetation, soil, or other habitat components important to listed herptiles. Depending on project location or activity, disturbance to an individual herptile and its habitat could alter breeding, sheltering, or feeding and increase predation risk. However, we anticipate in the long-term, listed herptiles will benefit as desired conditions provide properly functioning habitats, survival and recovery, and support self-sustaining populations.

WFP desired conditions and guidelines increase project-level controls, constraints, and mitigations to reduce impacts to listed herptiles during future project design by including a guideline that states activities occurring within federally-listed species habitat should apply

habitat management objectives and species protection measures from approved recovery plans.

Invasive Species (INS)
INS activities include monitoring, preventing, assessing, controlling, and eradicating priority invasive species populations. INS objectives are to treat and control invasive species on 200 to 1,500 acres annually, and specifically on 2 to 10 stream reaches every 5 years. Actions could include manual removal (hand pulling, netting, seining, etc.) or chemical treatment (pesticides, piscicides, or herbicides).

Chemical treatment guidelines stipulating timing restrictions, chemical-free buffers, and spot treatments near ecologically sensitive habitat (such as riparian and aquatic habitats) should minimize adverse effects to listed herptiles. However, there is some risk of death or sublethal toxic effects to reproduction, embryonic development, and hormone and immune system regulation. Other short-term adverse effects include reduced vegetative cover and prey-base destruction. Additionally, the LRMP directs the Tonto NF to take preventative measures against the spread of parasites or pathogens that spread disease (e.g., chytrid fungus and whirling disease).

Invasive species can affect the survival and reestablishment of native species. Future projects implementing objectives in this section may adversely affect listed herptiles but are also expected to result in long-term ecosystem benefits by reducing competition for native species, increasing biodiversity, and reducing wildfire risk.

Effects of the Action on Herptile Critical Habitat

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

Because this is a programmatic consultation, it is not possible to assess the specific potential effects (adverse and beneficial) of the action on Chiricahua leopard frog, narrow-headed gartersnake and northern Mexican gartersnake critical habitat in detail (e.g., spatial extent, location, timing, frequency, duration). The Tonto NF will conduct these evaluations for individual projects during future section 7 consultations. Furthermore, the Tonto NF may reduce, minimize, or avoid adverse effects by implementing conservation measures. Because the Tonto NF will likely develop conservation measures during individual project-specific section 7 consultation, the level to which the Tonto NF may avoid or minimize adverse effects is difficult to evaluate for the LRMP.

Generally, we know there may be adverse effects to critical habitat from implementing objectives in the LRMP's REC, FP, MMAM, RD, ERU, WAT, RMZ, WFP and INS sections. We anticipate adverse effects from upland and watershed condition and function degradation, streamflow and streambank alteration, decreased water quality from sedimentation, disturbance, disruption of prey base, and vegetation reduction. Ground disturbance from projects can also increase the risk of non-native invasive or undesirable plant and animal introductions to critical habitats. We expect that these projects may temporarily reduce critical habitat function, yet in the long-term and across the Forest, the Tonto NF will maintain or improve critical habitat PCEs/PBFs and these activities will not diminish the ability of critical habitat to contribute to the conservation and recovery of the species.

The LRMP guides the Tonto NF in fulfilling its stewardship responsibilities for integrated resource management and ecological sustainability. As such, we anticipate projects will result in long-term improvements to soil, vegetation, and riparian condition. Implementing LRMP standards and guidelines will reduce the effects of future project implementation and will not diminish the ability of critical habitat to contribute to Chiricahua leopard frog, narrow-headed gartersnake and northern Mexican gartersnake conservation and recovery.

<u>Chiricahua leopard frog Designated Critical Habitat</u>
PCE 1: Aquatic breeding habitat and immediately adjacent uplands exhibiting the following characteristics:

a. Standing bodies of fresh water (with salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present), including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, off-channel pools, and other ephemeral or permanent water bodies that typically hold water or rarely dry for more than a month. During periods of drought, or less than average rainfall, these breeding sites may not hold water long enough for individuals to complete metamorphosis, but they would still be considered essential breeding habitat in non-drought years.
b. Emergent and/or submerged vegetation, root masses, undercut banks, fractured rock substrates, or some combination thereof, but emergent vegetation does not completely cover the surface of water bodies.
c. Non-native predators (e.g., crayfish, bullfrogs, non-native fish) absent or occurring at levels that do not preclude presence of the Chiricahua leopard frog.
d. Absence of chytridiomycosis, or if present, then environmental, physiological, and genetic conditions are such that allow persistence of Chiricahua leopard frogs.
e. Upland habitats that provide opportunities for foraging and basking that are immediately adjacent to or surrounding breeding aquatic and riparian habitat.

EFFECT: REC program allowed activities such as dispersed camping, hiking, and other activities could result in diminished riparian and upland habitat from vegetation manipulation and disturbance. There are numerous LRMP Components that address potential effects of recreation to riparian areas, which include those designated as critical habitat. The function of streams may require special management considerations or protection; however, actions implemented under the LRMP have required standards and guidelines to protect instream flow, consistent with existing water rights and laws, that are expected to retain and protect this PCE.

Livestock grazing can affect leopard frog habitat by disturbing/destroying riparian vegetation,

altering stream/pool morphology and affecting water quality from sedimentation. Effects are minimized by use of riparian exclosures, limited pasture use, and timing restrictions for livestock use in riparian areas.

Programs whose objectives may lead to implementation of improvement projects in the riparian zone may have short-term adverse effects to Chiricahua leopard frog PCEs from habitat disturbance and vegetation removal; however, these effects will be minimized by standards and guidelines. Furthermore, we expect that watershed improvement projects will have long-term benefits to PCEs of critical habitat by maintaining, and possibly improving, their ability to contribute to the conservation and recovery of the leopard frog.

Transportation projects can have localized adverse effects from disturbance and habitat destruction/fragmentation. A RD guideline is to locate new or reconstructed roads outside of riparian management zones, which will limit future RD activities in riparian areas to road maintenance and decommissioning. Roads can act as a barrier to movement and dispersal. Traffic on roads near occupied sites may result in fatalities in dispersing Chiricahua leopard frogs. Thus, decommissioning and closing roads can benefit frogs by reducing habitat fragmentation and road mortalities. Restoring existing roads can reduce effects to frogs because properly functioning and maintained roads minimize effects to riparian areas. Improperly designed or maintained, roads can increase erosion and sedimentation, create new channels, affect stream channel function, and increase runoff flow rates. Poorly designed culverts can create barriers to herptile movement and affect downstream erosion and upstream sediment deposition during high flow events. Implementing LRMP standards and guidelines will help reduce overall effects from RD activities.

While non-natives are already present in some streams, LRMP standards and guidelines ensure that Tonto NF actions do not result in the incidental movement of non-native species into critical habitat. A desired condition of the INS section is that invasive species do not disrupt ecological functionality or affect the sustainability of native species.

PCE 2: Dispersal and nonbreeding habitat, consisting of areas with ephemeral (present for only a short time), intermittent, or perennial water that are generally not suitable for breeding, and associated upland or riparian habitat that provides corridors (overland movement or along wetted drainages) for frogs among breeding sites in a metapopulation with the following characteristics:

a. Are not more than 1.0 mile (1.6 kilometers) overland, 3.0 miles (4.8 kilometers) along ephemeral or intermittent drainages, 5.0 miles (8.0 kilometers) along perennial drainages, or some combination thereof not to exceed 5.0 miles (8.0 kilometers).
b. In overland and nonwetted 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.
c. Are free of barriers that block movement by Chiricahua leopard frogs, including, but not limited to, urban, industrial, or agricultural development; reservoirs that are 50 acres (20 hectares) or more in size and contain non-native 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.

EFFECT: Actions implemented under the LRMP should not significantly reduce or modify habitats needed for dispersal from one water body to another, nor result in the creation of barriers to movement. As described in PCE 1, individual actions may temporarily result in habitat disturbance, but effects will be localized. The RMZ section of the LRMP establishes riparian management zones within approximately 100 feet of the edges of all lakes, stream ecosystems (perennial and intermittent), springs, seeps, and wetlands. Riparian management zone width may vary based on ecological or geomorphic factors (such as areas identified to have riparian vegetation) or by type of water body. A desired condition of the RMZ section is that riparian systems provide habitat connectivity for the movement and dispersal of species. Furthermore, a WFP guideline stipulates that activities occurring within federally listed species habitat should apply habitat management objectives and species protection measure from approved recovery plans.

Narrow-headed gartersnake Designated Critical Habitat

PCE 1: 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, and cobble and boulder substrate, with a low amount of fine sediment and substrate embeddedness;
b. Organic and natural inorganic structural features (*e.g.,* cobble bars, rock piles, large boulders, logs or stumps, aquatic vegetation, vegetated islands, logs, and debris jams) in the stream channel for basking, thermoregulation, shelter, prey base maintenance, and protection from predators;
c. Water quality that meets or exceeds applicable State surface water quality standards; and
d. Terrestrial habitat up to 328 feet (100 meters) from the active stream channel (water's edge) that includes flood debris, rock piles, and rock walls containing cracks and crevices, small mammal burrows, downed woody debris, and streamside vegetation (e.g., alder, willow, sedges, and shrubs) for thermoregulation, shelter, brumation, and protection from predators throughout the year.

EFFECT: Any activity or program that results in adverse effects to potential prey or their critical habitat may also indirectly affect narrow-headed gartersnake, thus effects described under listed fish apply here as well. There may be adverse effects to this PCE from future watershed improvement projects (implementing objectives in the FP, ERU, WAT, RMZ and WFP sections), roads and trails, livestock grazing, and minerals projects in aquatic habitats such as streambank disturbance and sediment input which may deposit in important pool habitats. These projects may have temporary negative effects to critical habitat through diminished pool habitat and movement of flood debris, rock piles, etc. used for shelter and brumation; however, we anticipate that this PCE will be maintained or improved in the long-term. In the long-term, projects are expected to improve soil and vegetation condition in the uplands and may improve, or at least minimize, effects to aquatic and riparian conditions along streams. Implementation of LRMP standards and guidelines are anticipated to reduce the effects of forest programs in the sub-watersheds occupied by narrow-headed gartersnake.

LRMP activities could result in adverse effects to streambanks, riparian vegetation, and water quality. Objectives that involve mechanized equipment have guidelines that prevent fuels and other contaminants from entering aquatic habitats. The livestock grazing may cause short-term adverse effects to water quality related PCEs, but we anticipate that that these activities will be

limited in location, duration, and frequency and will not decrease the functionality or conservation potential of critical habitat over the long-term. Effects to water quality will be greatest during seasonal low flow periods, warm weather and during droughts. There are numerous program desired conditions, objectives, standards, and guidelines that address preventing excessive sediment, fuel, and other contaminants from entering aquatic habitats. We do not anticipate that activities will diminish the ability of critical habitat to contribute to the conservation and recovery of the species.

PCE 2: 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.

EFFECT: Actions implemented under the LRMP are expected to retain and recover this PCE. There are desired conditions, objectives, standards, and guidelines to ensure that instream flow is protected and that areas supporting narrow-headed gartersnake are not dewatered or impaired to the point where they cannot support the species. There are also objectives, standards, and guidelines to enhance or restore stream and riparian habitat.

As described under Chiricahua leopard frog PCE 2, actions implemented under the LRMP should not significantly reduce or modify habitats needed for dispersal from one water body to another, nor would they be expected to result in the creation of barriers to movement.

PCE 3: A combination of native fishes, and soft-rayed, non-native fish species such that prey availability occurs across seasons and years.
EFFECT: LRMP Components intend to improve conditions to continue to support native fish populations.

PCE 4: An absence of non-native aquatic predators, such as fish species of the families Centrarchidae and Ictaluridae, American bullfrogs (*Lithobates catesbeianus*), and/or crayfish (*Orconectes virilis, Procambarus clarki,* etc.), or occurrence of these non-native species at low enough levels such that recruitment of narrow-headed gartersnakes is not inhibited and maintenance of viable prey populations is still occurring.
EFFECT: While non-natives are already present in some streams, LRMP standards and guidelines ensure that Tonto NF actions do not result in the incidental movement of non-native species into critical habitat. A desired condition of the INS section is that invasive species do not disrupt ecological functionality or affect the sustainability of native species.

PCE 5: Elevations of 2,300 to 8,200 feet (700 to 2,500 meters).
EFFECT: This PCE will not be affected by the Tonto NF LRMP.

<u>Northern Mexican gartersnake Designated Critical Habitat</u>
PCE 1: Perennial or spatially intermittent streams that provide both aquatic and terrestrial habitat that allows for immigration, emigration, and maintenance of population connectivity of northern Mexican gartersnakes and contain:

a. Slow-moving water (walking speed) with in-stream pools, off-channel pools, and

backwater habitat;

b. Organic and natural inorganic structural features (e.g., boulders, dense aquatic and wetland vegetation, leaf litter, logs, and debris jams) within the stream channel for thermoregulation, shelter, foraging opportunities, and protection from predators;
c. Terrestrial habitat adjacent to the stream channel that includes riparian vegetation, small mammal burrows, boulder fields, rock crevices, and downed woody debris for thermoregulation, shelter, foraging opportunities, brumation, and protection from predators; and
d. Water quality that meets or exceeds applicable State surface water quality standards.

EFFECT: See response for PCE 1 for narrow-headed gartersnake.

PCE 2: Hydrologic processes that maintain aquatic and terrestrial 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; and
b. Physical hydrologic and geomorphic connection between a stream channel and its adjacent riparian areas.

EFFECT: See response for PCE 2 for narrow-headed gartersnake.

PCE 3: A combination of amphibians, fishes, small mammals, lizards, and invertebrate species such that prey availability occurs across seasons and years.
EFFECT: LRMP Components intend to improve conditions to continue to support native species populations.

PCE 4: An absence of non-native fish species of the families Centrarchidae and Ictaluridae, American bullfrogs (*Lithobates catesbeianus*), and/or crayfish (*Orconectes virilis*, *Procambarus clarki*, etc.), or occurrence of these non-native species at low enough levels such that recruitment of northern Mexican gartersnakes is not inhibited and maintenance of viable prey populations is still occurring.
EFFECT: See response for PCE 4 for narrow-headed gartersnake.

PCE 5: Elevations from 130 to 8,497 feet (40 to 2,590 meters).
EFFECT: This PCE will not be affected by the Tonto NF LRMP.

PCE 6: Lentic wetlands including off-channel springs, cienegas, and natural and constructed ponds (small earthen impoundment) with:

a. Organic and natural inorganic structural features (e.g., boulders, dense aquatic and wetland vegetation, leaf litter, logs, and debris jams) within the ordinary high water mark for thermoregulation, shelter, foraging opportunities, brumation, and protection from predators;
b. Riparian habitat adjacent to ordinary high water mark that includes riparian vegetation, small mammal burrows, boulder fields, rock crevices, and downed woody debris for thermoregulation, shelter, foraging opportunities, and protection from predators; and
c. Water quality that meets or exceeds applicable State surface water quality standards.

EFFECT: LRMP Components address numerous aspects of watershed health that favor conserving and restoring watersheds to the benefit of northern Mexican gartersnake. The RMZ

section of the LRMP in particular generates additional project-level controls, constraints, and mitigations to reduce impacts to for riparian areas by focusing management on discrete riparian zones, preventing contamination from unintended herbicide and pesticide use, protecting springs and source waters, and preventing adverse alterations to stream banks and channels.

PCE 7: Ephemeral channels that connect perennial or spatially intermittent perennial streams to lentic wetlands in southern Arizona where water resources are limited.
EFFECT: As described for PCE 6, the LRMP contains substantial direction to improve watershed condition and water resources across the Tonto NF. Ephemeral channels will not be eliminated by implementation of the LRMP.

Cumulative Effects

Cumulative effects are those "effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate section 7 consultation.

Cumulative effects to native aquatic animals include residential and commercial development, improper livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization, road maintenance and recreation without a federal nexus. Some of these activities, such as irrigated agriculture, are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native aquatic animals. Other activities, such as recreation, are increasing.

Increasing recreational, residential, or commercial use of non-federal lands near riparian areas will likely result in increased cumulative adverse effects to occupied, as well as potentially occupied, native herptile habitat through increased water use, reduced water quality and quantity, increased pollution and sedimentation, and increased streambank alteration from riparian vegetation suppression, bank trampling, changing flow regimes and erosion. Non-native fish stocking for recreational sportfishing in or near occupied listed herptile habitat in waters on non-federal lands would result in increased predation and/or competition for space and food.

Drought and climate change could eventually exacerbate existing threats to streams in the southwestern U.S. (Cayan et al. 2013). Increased and prolonged drought associated with changing climatic patterns could adversely affect streams by reducing water availability and altering food availability and predation rates. Drying or warming streams is of particular concern because listed herptiles depend on permanent water of appropriate quality for survival. Long-term climate change could exacerbate the effects of drought.

A cumulative beneficial effect in the action area is the role SRP plays in maintaining baseflows in the mainstem and tributaries of the Salt and Verde Rivers. SRP provides water to more than 2.6 million people in the Phoenix metro for irrigation, municipal, and other uses pursuant to a 1917 contract with the United States. Because the reservoirs are near the bottom of their watersheds, and in order to protect SRPs interests, and that of the millions of people they serve, SRP aggressively pursues any potential challengers to in-stream flow, creating a net positive effect to aquatic wildlife that require water in streams.

Fishes

Recreation (REC)
The Tonto NF's desired conditions for REC are to support a wide range of activities while conserving fish and wildlife habitats. The Tonto NF's proximity to the Phoenix metropolitan area results in high levels of recreational use that disproportionally occurs near lakes, rivers, streams, and riparian areas that serve as important habitat for listed fish. As described in the LRMP, the Tonto NF's goal is to have minimal effects to natural resources while implementing projects and activities; however, there is also direction in the LRMP to increase and/or improve recreational opportunities. Public recreation can conflict with listed fish management across the Tonto NF and may result in disturbance to these species.

Heavy recreational use along waterways can lower water quality, increase spread of invasive species, erode or compact banks, degrade riparian vegetation, or alter fish behavior. Roads, trails, and recreation sites may affect watershed health by increasing sedimentation or other pollutants through runoff. There is also an increased risk of fire due to human-caused ignitions.

REC objectives may result in projects that involve adverse effects such as disturbance, harassment, mortality, and destruction/fragmentation of habitat, but have long-term benefits if they decrease recreational traffic, rehabilitate existing disturbed sites and reduce effects from unsustainable trails. These activities can adversely affect listed fish via noise and habitat destruction/fragmentation but have long-term benefits. If projects occur in areas with listed fish, LRMP Components will consider them during project development.

Rangelands, Forage, and Grazing (GRZ)
The GRZ Program primarily includes grazing and browsing by cattle, sheep, and horses, and development and maintenance of range improvements such as earthen stock tanks and troughs, fences, and cattle guards. The LRMP provides generalized, forestwide guidance for livestock grazing. Specific grazing allotment plans occur in annual operating instructions (AOI), which outline site-specific grazing operations such as permitted livestock categories and numbers, pasture rotation schedules, utilization standards, and maintenance procedures. The Tonto NF updates AOIs every 5 to 10 years, and generally includes conservation measures for fish, wildlife, and listed plants. AOIs are subject to separate section 7 consultation.

Livestock grazing can affect listed fish and their habitat by disturbing/destroying riparian vegetation, altering stream morphology and affecting water quality from sedimentation. Effects may be minimized by use of riparian pasture management including exclusion, limited pasture use and pasture rotation schedules, and timing restrictions for livestock use in riparian areas. However, livestock grazing may still adversely affect important listed fish habitat outside of these protected or specially managed areas.

The GRZ section includes strategies to minimize detrimental effects to ecosystems. Desired conditions will drive management towards healthy rangelands, plant communities, soil conditions, and riparian habitats. We expect the Tonto NF's guidelines will reduce or minimize adverse effects by limiting grazing intensity through rotational grazing, dispersing livestock with diversionary tactics, and removing unauthorized livestock. The Tonto NF's grazing strategies are to maintain riparian vegetation and stream function and reduce sedimentation and trampling.

This should promote understory vegetation production in forested, grassland and riparian habitats, which will help maintain listed fish habitat. Grazing management also emphasizes drought preparedness and considers shifts in climate and range conditions. Over the life of this consultation, we expect that implementation of the grazing program may reduce or minimize effects, but still result in adverse effects to listed fish and their habitat.

There are two GRZ objectives. The first is focused on installing wildlife escape ramps to troughs. Each ranger district will annually install wildlife escape ramps to at least two water troughs or open storage tanks until all troughs and tanks have ramps. We expect ramp installation can occur without adverse effects to listed fish. The Tonto NF's second objective is to evaluate vacant allotments for one of three options (convert for forage reserve, grant to a current or new permittee, or close to grazing). This allotment evaluation is largely administrative and directs future actions which we cannot evaluate prior to a proposal because we do not know which allotments would be involved, whether or not listed species are present, or the actual conditions on the ground.

GRZ Components primarily serve to place constraints on grazing practices and do not outline or authorize allotment-specific practices. We expect GRZ standards and guidelines to minimize, but not eliminate adverse effects. Therefore, over the life of this consultation, we expect that implementation of the livestock grazing program will result in adverse effects to listed fish and their habitats.

Forestry and Forest Products (FP)

The FP section focuses on providing commercial and personal timber products in a manner that contributes to watershed health and function and protects wildlife habitat. Activities include firewood collection and harvest of saw timber, pulpwood, and other products. FP Components strive to supplement restoration and maintenance treatments while working towards a balance between the economic value of dead and dying trees with the needs of wildlife habitat and other ecosystem functions. Standards and guidelines direct the Tonto NF to promote seral-state diversity and move timbered systems towards desired conditions using sustainable harvest techniques that protect sensitive resources including fish, wildlife, and their habitats.

The single FP objective is to provide at least 34,000 hundred cubic feet (CCF) or 15,400 thousand board feet (MBF) of timber every 10 years to the forest product industry. This objective does not describe or authorize any site-specific timber projects, but instead is intended to encourage future work.

While timber harvest projects are limited spatially and temporally, and generally avoid riparian and aquatic systems, FP effects could include increases in flood runoff, stream channel scouring, or sediment deposition into listed fish habitat. Mechanical treatments frequently involve temporary road construction and heavy equipment traffic, which can cause habitat fragmentation, disturbance, and soil compaction. Some long-term effects are expected to be positive as these activities reduce the chances of uncharacteristic wildfires that can affect riparian areas.

In summary, we anticipate that some FP activities may adversely affect listed fish and their habitat through habitat alteration and disturbance, depending on location of such projects in relation to listed fish species. A specific determination of effects will be made at the project-

specific level during additional section 7 consultation. Over the long-term, FP Components may benefit fish and their habitat by reducing wildland fire risk.

Mining, Minerals, and Abandoned Mines (MMAM)
The Forest Service's minerals management program administers mining, oil, gas, and geothermal activities while protecting surface resources (36 CFR 228) such as vegetation and aquatic resources. The LRMP does not authorize or explicitly promote mining activities or projects; however, the long history of mining in central Arizona suggests potential for future mining developments. We cannot predict if new mines will occur that will affect listed fish, but we do know from past Tonto NF mining consultations that adverse effects to listed fish and their habitat have occurred.

Mineral extraction can affect listed fish and/or their habitats by reducing water quality and quantity, reducing surface water availability, removing trees and surface vegetation, displacing surface soils, and constructing roads, buildings, wells, pumping stations, wastewater ponds and transmission lines. Effects include erosion and sedimentation into riparian areas and streams, habitat destruction and noxious weed invasion. In addition, surface occupancy and human occupation increases the chances of fish harassment and mortality.

MMAM desired conditions specifically encourage consideration of surface and groundwater resources, watershed and forest ecosystem health, wildlife, and wildlife habitat. Standards and guidelines state that mineral materials (e.g., sand and gravel) should not be removed from the riparian management zone without adequate engineering controls to protect surface waters, and placer mining (i.e., streambed mining) should avoid damaging riparian vegetation, degrading water quality, and negatively affecting channel stability.

The objective to close at least ten abandoned mines over the life of the LRMP could result in disturbance related effects if remediation work is required. However, most abandoned mines on the Tonto NF are historic shafts with small footprints and likely only require gating, not remediation. Standards and guidelines in this and the WFP sections should minimize effects.

MMAM standards and guidelines require reclamation activities, closure of abandoned mine features, plans for operations that will cause significant disturbance of resources, and disallow mineral material removal or placer mining in the riparian management zone. These requirements should minimize potential MMAM effects to listed fish and their habitat but will not remove all potential for adverse effects. Therefore, over the life of this consultation, we expect that MMAM activities will result in adverse effects to listed fish and their habitat. We anticipate that the programmatic direction in the Tonto LRMP will also likely influence future management actions in beneficial ways by adding additional constraints and mitigations to reduce impacts to listed fish and their habitat.

Roads (RD)
RD activities include road construction, maintenance, relocation, alteration, and decommissioning. With the signing of its travel management decision in October 2021 (as described in the proposed action), the Tonto NF prohibited motor vehicle use off the designated system of roads and trails. There are exceptions identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public

safety.

RD objectives include decommissioning 100 to 600 miles of unauthorized routes and NFS roads every 10 years as well as grading surfaces and cleaning culverts and ditches on at least 500 miles of roads annually. Transportation projects can have localized adverse effects to listed fish and their habitat from disturbance and habitat destruction/fragmentation. However, decommissioning, closing, and restoring existing roads can also benefit listed fish because decommissioned roads remove/avoid effects, and properly functioning and maintained roads minimize effects to riparian areas. Improperly designed or maintained, roads can increase erosion and sedimentation, create new channels, affect stream channel function, and increase runoff flow rates. Poorly designed culverts can create barriers to fish movement and affect downstream erosion and upstream sediment deposition during high flow events. Implementing LRMP standards and guidelines will help reduce overall effects from RD activities.

Collectively, we expect RD Components will reduce potential effects to listed fish and their habitat by reducing the number of Tonto NF roads and limiting motor-vehicle use to authorized roads. Road maintenance projects or decommissioning may have short-term adverse effects to listed fish and their habitat while implementing projects but are also likely to have some longer-term benefits by decreasing unauthorized routes and preventing habitat destruction from roads that are in poor condition.

Vegetation and Ecological Response Units (ERU)

The ERU section focuses on habitat improvement in terrestrial ERUs (e.g., forest, woodlands, shrublands, and grasslands) and reducing threats from uncharacteristic fire and flooding. Habitat improvement tools include prescribed fire, managed natural wildfires, mechanical treatments, herbicides, and restoration/rehabilitation using native seeds and materials.

ERU objectives focus on treating frequent-fire (i.e., ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire) and woodland ERUs with a combination of prescribed fire, naturally managed fire, and mechanical treatments. There are also objectives to restore semi-desert grasslands and reduce the effect of invasive species (primarily grasses) in the desert units.

Vegetation projects tend to focus on upland areas; therefore, we expect most effects to be indirect. However, use of wildland fire (both prescribed and wildfire) and mechanical treatments can affect aquatic habitats (e.g., water temperature, water quality, steam bank stability, etc.) from sediment deposits and riparian vegetation destruction. Mechanical treatments frequently involve temporary road construction and heavy equipment traffic, which can affect streams and riparian habitats (see RD and REC sections for further discussion of effects).

We address possible effects from herbicide use to restore semi-desert grasslands and desert units in the INS section.

While ERU activities may result in adverse effects to listed species, as described above, we also expect that long-term adoption of LRMP desired conditions, standards, and guidelines will be beneficial to listed fish and their critical habitats. Generally, Tonto NF LRMP direction guides habitat improvement and restoration of historical fire regimes, native plant communities, soil

conditions, seral state conditions, and other ecological conditions. Specific considerations for distinct vegetation types should help to maintain the ecological conditions (soils, native plant communities, pollinators, etc.) that support listed fish and their habitat.

Watersheds and Water Resources (WAT)

The WAT section contains substantial direction to improve watershed condition and water resources across the Tonto NF. The Tonto NF manages for properly functioning watersheds (based on criteria provided in the Watershed Condition Framework or similar current protocol) that exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.

As described in the proposed action, the WAT section contains objectives to improve watershed conditions. Actions that disturb the ground or streambeds, heavy machinery use, or vegetation alteration may result in a temporary increase in sedimentation and turbidity, increased risk of contamination (i.e., pollutants, aquatic disease, or invasive species), a temporary block to instream movement, degradation of riparian/aquatic vegetation, and direct disturbance from machinery such as crushing injuries or mortality. Major construction projects may disrupt fish behavior and result in mortality.

One WAT objective is to apply for state-based water rights for threatened streams that support highly valued resources (e.g., listed species, species of conservation concern, river-based recreation) or contain unique qualities (e.g., a perennial Sonoran Desert stream). Should the Tonto NF acquire instream flow rights in listed fish habitats, this would benefit these fish by helping maintain necessary water levels.

WAT Components address numerous aspects of watershed health, conservation, and restoration to benefit listed fish. While WAT activities may result in short-term adverse effects to listed fish, we also expect that long-term adoption of WAT Components will benefit listed fish and their habitats.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)

The RMZ section aims to generate additional project-level controls, constraints, and mitigations to reduce impacts to for riparian areas by focusing management on discrete riparian zones, preventing contamination from unintended herbicide and pesticide use, protecting springs and source waters, and preventing stream bank and channel alteration.

Relevant objectives call for projects that promote ecological integrity of 125+ miles of streams and improve 10 to 15 individual springs during each 10-year period. Potential effects from these projects would be similar to those discussed in the WAT section. We expect that most projects will be planned to avoid or minimize adverse effects to listed fish and their habitats.

Wildlife, Fish, and Plants (WFP)

The WFP section aims to support ecological conditions that contribute to threatened and endangered species recovery and proposed/candidate species conservation. A WFP objective is to implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to at-risk species recovery every 10 years. Projects that occur in watersheds, riparian areas, or aquatic habitats near listed riparian/wetland birds or their critical habitats could affect water-quality, vegetation, soil, or other habitat components

important to listed fish. Depending on project location or activity, disturbance to an individual fish and its habitat could alter breeding, sheltering, or feeding and increase predation risk. However, we anticipate in the long-term, listed fish will benefit as desired conditions provide properly functioning habitats, survival and recovery, and support self-sustaining populations.

WFP desired conditions and guidelines increase project-level controls, constraints, and mitigations to reduce impacts to listed fish during future project design by including a guideline that states activities occurring within federally-listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.

Invasive Species (INS)

INS activities include monitoring, preventing, assessing, controlling, and eradicating priority invasive species populations. INS objectives are to treat and control invasive species on 200 to 1,500 acres annually, and specifically on 2 to 10 stream reaches every 5 years. Actions could include manual removal (hand pulling, netting, seining, etc.) or chemical treatment (pesticides, piscicides, or herbicides).

Chemical treatment guidelines stipulating timing restrictions, chemical-free buffers, and spot treatments near ecologically sensitive habitat (such as riparian and aquatic habitats) should minimize adverse effects to listed fish. However, there is some risk of death or sublethal toxic effects to reproduction, embryonic development, and hormone and immune system regulation. Other short-term adverse effects include reduced vegetative cover and prey-base destruction. Additionally, the LRMP directs the Tonto NF to take preventative measures against the spread of parasites or pathogens that spread disease (e.g., chytrid fungus and whirling disease).

Invasive species can affect the survival and reestablishment of native species. Future projects implementing objectives in this section may adversely affect listed fish but are also expected to result in long-term ecosystem benefits by reducing competition for native species, increasing biodiversity, and reducing wildfire risk.

Effects of the Action on Gila chub, razorback sucker, loach minnow, and spikedace Critical Habitat

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

Because this is a programmatic consultation, it is not possible to assess the specific potential effects (adverse and beneficial) of the action on Gila chub, razorback sucker, loach minnow, and

spikedace critical habitat in detail (e.g., spatial extent, location, timing, frequency, duration). The Tonto NF will conduct these evaluations for individual projects during future section 7 consultations. Furthermore, the Tonto NF may reduce, minimize, or avoid adverse effects by implementing conservation measures. Because the Tonto NF will likely develop conservation measures during individual project-specific section 7 consultation, the level to which the Tonto NF may avoid or minimize adverse effects is difficult to evaluate for the LRMP.

Generally, we know there may be adverse effects to critical habitat from implementing objectives in the LRMP's REC, FP, MMAM, RD, ERU, WAT, RMZ, WFP and INS sections. We anticipate adverse effects from upland and watershed condition and function degradation, streamflow and streambank alteration, decreased water quality from sedimentation, disturbance, disruption of prey base, and vegetation reduction. Ground disturbance from projects can also increase the risk of non-native invasive or undesirable plant and animal introductions to critical habitats. We expect that these projects may temporarily reduce critical habitat function, yet in the long-term and across the Forest, the Tonto NF will maintain or improve critical habitat PCEs/PBFs and these activities will not diminish the ability of critical habitat to contribute to the conservation and recovery of the species.

The LRMP guides the Tonto NF in fulfilling its stewardship responsibilities for integrated resource management and ecological sustainability. As such, we anticipate projects will result in long-term improvements to soil, vegetation, and riparian condition. Implementing LRMP standards and guidelines will reduce the effects of future project implementation and will not diminish the ability of critical habitat to contribute to Gila chub, razorback sucker, loach minnow, and spikedace conservation and recovery.

<u>Gila Chub Designated Critical Habitat</u>
PCE 1: Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies all found in headwaters, springs, and cienegas, generally of smaller tributaries.
EFFECT: There may be adverse effects to this PCE from future watershed improvement projects (implementing objectives in the FP, ERU, WAT, RMZ and WFP sections), roads and trails, livestock grazing, and minerals projects in aquatic habitats such as streambank disturbance and sediment input which may deposit in important pool habitats. These projects may have temporary negative effects to critical habitat through diminished pool habitat, which serve as refuges in hot weather; however, we anticipate that this PCE will be maintained or improved in the long-term. In the long-term, projects are expected to improve soil and vegetation condition in the uplands and may improve, or at least minimize, effects to aquatic and riparian conditions along streams. Implementation of LRMP standards and guidelines are anticipated to reduce the effects of forest programs in the sub-watersheds occupied by Gila chub.

PCE 2: Water temperatures for spawning and seasonally appropriate temperatures for all life stages.
EFFECT: The effects described under PCEs 1 and 3 indirectly address water temperature thresholds required to meet Gila chub life cycle needs.

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

conductivity (100 to 1000 millimhos).
EFFECT: LRMP activities could result in adverse effects to streambanks, riparian vegetation, and water quality. Objectives that involve mechanized equipment have guidelines that prevent fuels and other contaminants from entering aquatic habitats. The livestock grazing may cause short-term adverse effects to water quality related PCEs, but we anticipate that that these activities will be limited in location, duration, and frequency and will not decrease the functionality or conservation potential of critical habitat over the long-term. Effects to water quality will be greatest during seasonal low flow periods, warm weather and during droughts. In addition, there are numerous program desired conditions, objectives, standards, and guidelines that address preventing excessive sediment, fuel, and other contaminants from entering aquatic habitats. We do not anticipate that activities will have adverse effects to this PCE that will diminish the ability of critical habitat to contribute to the conservation and recovery of the species.

PCE 4: Food base consisting of invertebrates and aquatic plants.
EFFECT: These effects are discussed under PCEs 2 and 3. Aquatic insects that are prey for Gila chub rely on adequate water quality (temperature, dissolved oxygen, contaminant-free water). Objectives that involve vegetation removal and/or mechanized equipment have guidelines that prevent or lessen the effect of sediment, fuels, and other contaminants from entering aquatic habitats. LRMP objectives that improve riparian vegetation would increase the availability of terrestrial organic matter required by many aquatic and terrestrial insects, which are prey for Gila chub.

PCE 5: Sufficient cover.
EFFECT: The availability of cover depends upon the presence of woody riparian vegetation growing along the stream channel. The LRMP has numerous plan Components that protect or promote the growth of riparian vegetation along stream habitats, including in Gila chub critical habitat.

PCE 6: Non-native aquatic species.
EFFECT: While non-natives may already be present in some streams, LRMP standards and guidelines ensure that actions implemented under the LRMP do not result in the incidental movement of non-native species into critical habitat. A desired condition of the INS section is that invasive species do not disrupt ecological functionality or affect the sustainability of native species.

PCE 7: Streams that maintain a natural flow pattern including periodic flooding.
EFFECT: Actions that result in destabilization of soils in uplands and riparian areas may affect residency and flow of water, which can lead to changes in stream flow patterns. Programs that may result in soil destabilization include REC, GRZ, MMAM, RD, ERU, WAT, RMZ, WFP and INS. However, there are numerous LRMP Components to protect riparian areas and instream flow and that will reduce effects from program activities.

<u>Razorback sucker Designated Critical Habitat</u>
PCE 1: Water: This includes a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for this species.

EFFECT: There may be adverse effects to water quality from future watershed improvement projects (implementing objectives in the FP, ERU, WAT, RMZ and WFP sections), roads and trails, livestock grazing, and minerals projects. These projects/activities may have temporary negative effects to critical habitat through streambank disturbance and sediment input; however, we anticipate that this PCE will be maintained or improved in the long-term as projects are expected to improve soil and vegetation condition in the uplands and may improve, or at least minimize, effects to aquatic and riparian conditions along streams. Implementation of LRMP standards and guidelines are anticipated to reduce the effects of forest programs in the sub-watersheds occupied by razorback sucker.

Actions implemented under the LRMP are expected to retain and protect water quantity. There are standards and guidelines to ensure that instream flow is protected and areas supporting listed species are not dewatered or impaired to the point that they cannot support razorback sucker.

PCE 2: Physical Habitat: This includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottomlands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide spawning, nursery, feeding, and rearing habitats, or access to these habitats.
EFFECT: As discussed in PCE 1, there may be adverse effects to this PCE from watershed improvement projects, roads and trails, livestock grazing, and minerals projects in aquatic habitats such as streambank disturbance and sediment input. In the long-term, projects are expected to improve soil and vegetation condition in the uplands and may improve or at least minimize effects to aquatic and riparian conditions along streams. Implementation of LRMP standards and guidelines are anticipated to reduce the effects of forest programs in sub-watersheds occupied by the razorback sucker.

PCE 3: Biological Environment: Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced non-native fish species in many areas.
EFFECT: Aquatic insects that are prey for razorback sucker rely on adequate water quality (temperature, dissolved oxygen, contaminant-free water), which is discussed in PCE 1. The LRMP has standards and guidelines that prevent or lessen the effect of sediment, fuels, and other contaminants from entering aquatic habitats. LRMP objectives that improve riparian vegetation will increase the availability of terrestrial organic matter required by many aquatic and terrestrial insects, which are prey for razorback sucker.

While non-natives are already present in some streams, LRMP standards and guidelines ensure that Tonto NF actions implemented under the LRMP do not result in the incidental movement of non-native species into critical habitat. A desired condition of the INS section is that invasive species do not disrupt ecological functionality or affect the sustainability of native species.

<u>Loach Minnow Designated Critical Habitat</u>
PCE 1: Habitat to support all egg, larval, juvenile, and adult loach minnow which includes:

a. Perennial flows.
b. Appropriate microhabitat types including pools, runs, riffles, and rapids.
c. Appropriate stream gradient of less than 2.5%.
d. Appropriate water temperatures.

EFFECT: Standards and guidelines ensure that instream flow is protected and areas supporting listed species are not dewatered or impaired to the point that they cannot support loach minnow.

There may be adverse effects to microhabitat and water temperature from future watershed improvement projects (implementing objectives in the FP, ERU, WAT, RMZ and WFP sections), roads and trails, livestock grazing, and minerals projects. These projects/activities may temporarily adversely affect this PCE if ground disturbing activities result in the disruption of microhabitat. Water temperature may be affected if vegetation on the streambank is removed. We anticipate that this PCE will be maintained or improved in the long-term as projects are expected to improve soil and vegetation condition in the uplands and may improve, or at least minimize, effects to aquatic and riparian conditions along streams. Implementation of LRMP standards and guidelines are anticipated to reduce the effects of forest programs in the sub-watersheds occupied by loach minnow.

PCE 2. An abundant aquatic insect food base.
EFFECT: Aquatic insects that are prey for loach minnow rely on adequate water quality (temperature, dissolved oxygen, contaminant-free water), which are discussed for PCE 1. The LRMP has standards and guidelines that prevent or lessen the effect of sediment, fuels, and other contaminants from entering aquatic habitats. LRMP objectives that improve riparian vegetation would increase the availability of terrestrial organic matter required by many aquatic and terrestrial insects, which are prey for loach minnow.

PCE 3. Streams with no or no more than low levels of pollutants.
EFFECT: Objectives that involve mechanized equipment have guidelines that prevent fuels and other contaminants from entering aquatic habitats. LRMP guidelines state that if chemical treatments are necessary, chemical-free buffers will be used to minimize effects on non-target species.

REC program allowed activities such as dispersed camping, hiking, and other activities could result in turbidity and sedimentation. There are numerous LRMP Components that address potential effects of recreation to riparian areas, which include those designated as critical habitat.

Livestock grazing can increase sedimentation and turbidity in streams where livestock are able to access the stream channel. The adverse effects are minimized by use of riparian exclosures, limited pasture use, and timing restrictions for livestock use in riparian areas.

Programs whose objectives may lead to implementation of improvement projects in the riparian zone may temporarily increase sedimentation and turbidity; however, these effects will be minimized by standards and guidelines. Furthermore, we expect that watershed improvement projects will have long-term benefits to PCEs of critical habitat by maintaining, and possibly improving, their ability to contribute to the conservation and recovery of the loach minnow.

Transportation projects can cause temporary increases in sedimentation and turbidity. A RD guideline is to locate new or reconstructed roads outside of riparian management zones, which will limit future RD activities in riparian areas to road maintenance and decommissioning. While decommissioning and closing roads may temporarily increase sedimentation and turbidity, these projects can benefit loach minnow in the long term because improperly designed or maintained, roads can increase erosion and sedimentation, create new channels, affect stream channel function, and increase runoff flow rates. Implementing LRMP standards and guidelines will help reduce overall effects from RD activities.

PCE 4. Perennial flows, or interrupted stream courses that serve as connective corridors between occupied or seasonally occupied habitat.
EFFECT: As described under PCE 1, actions implemented under the LRMP are expected to retain and recover this PCE for loach minnow.

PCE 5. Non-native aquatic species.
EFFECT: While non-natives are already present in some streams, LRMP standards and guidelines ensure that Tonto NF actions implemented under the LRMP do not result in the incidental movement of non-native species into critical habitat. A desired condition of the INS section is that invasive species do not disrupt ecological functionality or affect the sustainability of native species.

PCE 6. Streams with a natural, unregulated flow regime or, if flows are modified or regulated, a flow regime that allows for flows capable of transporting sediments.
EFFECT: As described under PCE 1, actions implemented under the LRMP are expected to retain and recover this PCE for loach minnow.

<u>Spikedace Designated Critical Habitat</u>
The PCEs of spikedace critical habitat are very similar to those developed for the loach minnow. The effects of the proposed action to these PCEs would be the same as those described above under loach minnow.

Cumulative Effects

Cumulative effects are those “effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area” (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate section 7 consultation.

Cumulative effects to listed fish include residential and commercial development, improper livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization, road maintenance and recreation without a federal nexus. Some of these activities, such as irrigated agriculture, are declining and are not expected to contribute to cumulative long-term adverse effects to listed fish. Other activities, such as recreation, are increasing.

Increasing recreational, residential, or commercial use of non-federal lands near riparian areas may result in increased cumulative adverse effects to occupied, and potentially occupied, listed

fish habitat through increased water use, reduced water quality and quantity, increased pollution and sedimentation, increased streambank alteration and riparian vegetation suppression, bank trampling, changing flow regimes and erosion. Non-native fish stocking for recreational sport fishing in or near occupied listed fish habitat in waters on non-federal lands could result in increased predation and/or competition for space and food.

Drought and climate change could eventually exacerbate existing threats to streams in the southwestern U.S. (Cayan et al. 2013). Increased and prolonged drought associated with changing climatic patterns could adversely affect streams by reducing water availability and altering food availability and predation rates. Drying or warming streams is of particular concern because listed fish depend on permanent flowing water of appropriate quality for survival. Long-term climate change could exacerbate the effects of drought.

A cumulative beneficial effect in the action area is the role SRP plays in maintaining baseflows in the mainstem and tributaries of the Salt and Verde Rivers. SRP provides water to more than 2.6 million people in the Phoenix metro for irrigation, municipal, and other uses pursuant to a 1917 contract with the United States. Because the reservoirs are near the bottom of their watersheds, and in order to protect SRPs interests, and that of the millions of people they serve, SRP aggressively pursues any potential challengers to in-stream flow, creating a net positive effect to aquatic wildlife that require water in streams.

Riparian and Wetland Birds

<u>Recreation (REC)</u>
The Tonto NF's desired conditions for REC are to support a wide range of activities while conserving fish and wildlife habitats. The Tonto NF's proximity to the Phoenix metropolitan area results in greater recreational use that disproportionally occurs near lakes, rivers, streams, and riparian areas important for listed birds (flycatchers, cuckoos, and rails). The lower Salt and Verde rivers and their associated lakes are popular destinations for recreationists and the Tonto NF recreation program. The Tonto NF's goal is to have minimal effects to natural resources while implementing projects and activities; however, there is also LRMP direction to increase and/or improve recreational opportunities. Public recreation can conflict with listed riparian/wetland bird management across the Tonto NF and may affect listed birds and their habitat.

Heavy recreational use along waterways can lower water quality, increase spread of invasive species, erode or compact banks, degrade riparian vegetation, or alter bird behavior. Roads, trails, and recreation sites may affect watershed health by increasing sedimentation or other pollutants through runoff. There is also an increased risk of fire due to human-caused ignitions. All these potential effects may affect listed bird habitat or lead to avoidance or abandoning nests or fledglings.

REC objectives may result in projects that involve adverse effects such as disturbance, harassment, mortality, and habitat destruction/fragmentation, but have long-term benefits if they decrease recreational traffic and reduce effects from unsustainable trails.

The Tonto NF may propose projects that decrease recreational traffic, rehabilitate existing

disturbed sites and reduce effects from unsustainable trails. These activities can adversely affect listed riparian/wetland birds via noise and habitat destruction/fragmentation but have long-term benefits. If projects occur in areas with listed riparian/wetland birds, LRMP Components will consider them during project development.

Rangelands, Forage, and Grazing (GRZ)
The GRZ program primarily includes grazing and browsing by cattle, sheep, and horses, and development and maintenance of range improvements such as earthen stock tanks and troughs, fences, cattle guards, etc. The LRMP provides generalized, forestwide guidance for livestock grazing. Specific grazing allotment plans occur in annual operating instructions. Annual operating instructions (AOI) outline site-specific grazing operations, such as permitted livestock categories and numbers, pasture rotation schedules, utilization standards, and maintenance procedures. The Tonto NF updates AOIs every 5 to 10 years, and generally includes conservation measures for fish, wildlife, and listed plants. AOIs are subject to separate section 7 consultation.

Livestock grazing can affect listed riparian/wetland birds and their habitat by disturbing nesting birds, disturbing/destroying riparian/wetland vegetation, compacting soils, altering stream morphology, and reducing water quality from sedimentation. Effects may be minimized by use of riparian pasture management including exclusion, limited pasture use, and timing restrictions for livestock use in riparian areas. Livestock grazing may still adversely affect important listed riparian/wetland bird habitat outside of these protected or specially managed areas.

The GRZ section includes strategies to minimize detrimental effects to ecosystems. Desired conditions will drive management towards healthy rangelands, plant communities, soil conditions, and riparian/wetland habitats. We expect the Tonto NF's guidelines will reduce or minimize adverse effects by limiting grazing intensity through rotational grazing, dispersing livestock with diversionary tactics, and removing unauthorized livestock. The Tonto NF's grazing strategies are to maintain riparian vegetation and stream function and reduce sedimentation and trampling. This should promote understory vegetation production in forested, grassland and riparian habitats, which will help maintain listed riparian/wetland bird habitat. Grazing management also emphasizes drought preparedness and considers shifts in climate and range conditions. Over the life of this consultation, we expect that implementation of the grazing program may reduce or minimize effects, but still result in adverse effects to listed riparian/wetland birds and their habitat.

Livestock grazing and congregation in riparian areas may reduce vegetation density which increases cowbird parasitism and nest predation on listed riparian birds, reducing their reproduction success. We anticipate the Tonto NF can minimize these parasitism and predation effects through management techniques such as exclosures, corral and stock tank placement, seasonal placement, and planned movements.

There are two GRZ objectives. The first focuses on installing wildlife escape ramps to troughs. Each ranger district will annually install wildlife escape ramps to at least two water troughs or open storage tanks until all troughs and tanks have ramps. We expect ramp installation can occur without adverse effects to listed riparian/wetland birds and can be beneficial because ramps can provide any birds drawn to these water sources an escape route. The Tonto NF's second

objective is to evaluate vacant allotments for one of three options (convert for forage reserve, grant to a current or new permittee, or close to grazing). This allotment evaluation is largely administrative and directs future actions which we cannot evaluate prior to a proposal because we do not know which allotments would be involved, whether or not listed species are present, or the actual conditions on the ground.

GRZ Components primarily serve to place constraints on grazing practices and do not outline or authorize allotment-specific practices. We expect GRZ standards and guidelines to minimize, but not eliminate adverse effects. Therefore, over the life of this consultation, we expect that implementation of the livestock grazing program will result in adverse effects to listed riparian/wetland birds and their habitats.

Forestry and Forest Products (FP)

The FP section focuses on providing commercial and personal timber products in a manner that contributes to watershed health and function and protects wildlife habitat. Activities include firewood collection and harvest of sawtimber, pulpwood, and other products. FP Components strive to supplement restoration and maintenance treatments while working towards a balance between the economic value of dead and dying trees with the needs of wildlife habitat and other ecosystem functions. Standards and guidelines direct the Tonto NF to promote seral-state diversity and move timbered systems towards desired conditions using sustainable harvest techniques that protect sensitive resources including fish, wildlife, and their habitats.

The single FP objective is to provide at least 34,000 hundred cubic feet (CCF) or 15,400 thousand board feet (MBF) of timber every 10 years to the forest product industry. This LRMP objective does not describe or authorize any site-specific timber projects, but instead encourages future work.

While timber harvest projects are limited spatially and temporally, and generally avoid riparian and aquatic systems, FP activities could lead to increases in flood runoff, stream channel scouring, or sediment deposition into listed riparian/wetland bird habitat. Mechanical treatments frequently involve temporary road construction and heavy equipment traffic, which can cause habitat fragmentation, disturbance, and soil compaction; however, we do not anticipate commercial harvests to occur in or near listed riparian/wetland bird habitats. We expect long-term effects to be positive as these activities reduce the chances of uncharacteristic wildfires that can affect riparian/wetland areas.

In summary, we anticipate that some FP activities may adversely affect listed riparian/wetland birds and their habitat through habitat alteration and disturbance, depending on location of such projects in relation to listed riparian/wetland birds. The Tonto NF will make effects determinations during project-specific section 7 consultation. Over the long-term, FP Components may benefit riparian/wetland birds and their habitat by reducing wildland fire risk.

Mining, Minerals, and Abandoned Mines (MMAM)

The Forest Service's minerals management program administers mining, oil, gas, and geothermal activities while protecting surface resources (36 CFR 228) such as vegetation and aquatic resources. The LRMP does not authorize or explicitly promote mining activities or projects; however, the long history of mining in central Arizona suggests potential for future mining

developments. We cannot predict if new mines will occur that will affect listed riparian/wetland birds, but we know from past Tonto NF mining consultations that adverse effects to listed riparian/wetland birds and their habitats have occurred.

Although unlikely to occur directly within listed riparian/wetland bird habitat or designated critical habitat, activities associated with mining could result in adverse effects to listed riparian/wetland birds and/or their habitats by reducing water quality and quantity, reducing surface water availability, removing trees and surface vegetation, displacing surface soils, and constructing roads, buildings, wells, pumping stations, wastewater ponds and transmission lines. Effects include noise disturbance, habitat destruction and noxious weed invasion. In addition, surface occupancy and human occupation increases the chances of harm, harassment, and death.

MMAM desired conditions specifically encourage consideration of surface and groundwater resources, watershed and forest ecosystem health, wildlife, and wildlife habitat. Standards and guidelines state that mineral materials (e.g., sand and gravel) should not be removed from the riparian management zone without adequate engineering controls to protect surface waters, and placer mining (i.e., streambed mining) should avoid damaging riparian vegetation, degrading water quality, and negatively affecting channel stability.

The objective to close at least ten abandoned mines over the life of the LRMP could result in disturbance related effects if remediation work is required. However, most abandoned mines on the Tonto NF are historic shafts with small footprints and likely only require gating, not remediation. Standards and guidelines in this and the WFP sections should minimize effects.

MMAM standards and guidelines require reclamation activities, closure of abandoned mine features, plans for operations that will cause significant disturbance of resources, and disallow mineral material removal or placer mining in the riparian management zone. These requirements should minimize potential MMAM effects to listed riparian/wetland birds and their habitats but will not remove all potential for adverse effects. Therefore, over the life of this consultation, we expect that MMAM activities will result in adverse effects to listed riparian/wetland birds and their habitat. We anticipate that the programmatic direction in the Tonto LRMP will also likely influence future management actions in beneficial ways by adding additional constraints and mitigations to reduce impacts to listed riparian/wetland birds.

Roads (RD)

RD activities include road construction, maintenance, relocation, alteration, and decommissioning. With the signing of its travel management decision in October 2021 (as described in the proposed action), the Tonto NF prohibited motor vehicle use off the designated system of roads and trails. There are exceptions identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public safety.

RD objectives include decommissioning 100 to 600 miles of unauthorized routes and NFS roads every 10 years as well as grading surfaces and cleaning culverts and ditches on at least 500 miles of roads annually. Transportation projects can have localized adverse effects to listed riparian/wetland birds and their habitat from noise, disturbance, and vegetation alteration/destruction; however, improperly designed or maintained roads can increase erosion,

result in riparian vegetation removal, and degrade watershed function and integrity. Implementing LRMP standards and guidelines will help reduce overall effects from RD activities.

Collectively, we expect RD Components will reduce potential effects to listed riparian/wetland birds and their habitat by reducing the number of Tonto NF roads and limiting motor-vehicle use to authorized roads. Road maintenance projects or decommissioning may have short-term adverse effects to listed riparian/wetland birds and their habitat while implementing projects but are also likely to have some longer-term benefits by decreasing unauthorized routes and preventing habitat destruction from roads that are in poor condition.

Vegetation and Ecological Response Units (ERU)

The ERU section focuses on habitat improvement in terrestrial ERUs (e.g., forest, woodlands, shrublands, and grasslands) and reducing threats from uncharacteristic fire and flooding. Habitat improvement tools include prescribed fire, managed natural wildfires, mechanical treatments, herbicides, and restoration/rehabilitation using native seeds and materials.

ERU objectives focus on treating frequent-fire (i.e., ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire) and woodland ERUs with a combination of prescribed fire, naturally managed fire, and mechanical treatments. There are also objectives to restore semi-desert grasslands and reduce the effect of invasive species (primarily grasses) in the desert units.

Generally, these ERUs are outside typical habitat for the three listed riparian/wetland birds, but yellow-billed cuckoo occasionally nests in woodlands and Sonoran Desert scrub communities. Sonora-Mojave desert scrub is more common near cuckoo habitats on the Tonto NF, but only a small amount of cuckoo designated critical habitat is within or near Tonto NF woodlands. Use of wildland fire (both prescribed and wildfire) and mechanical treatments during the migration and breeding seasons could adversely affect cuckoo and its habitat. Careful project planning can avoid or minimize potential adverse effects.

We address possible effects from herbicide use to restore semi-desert grasslands and desert units in the INS section.

While ERU activities may result in adverse effects to listed riparian/wetland bird species, we also expect that long-term adoption of LRMP desired conditions, standards, and guidelines will benefit listed riparian/wetland birds and their critical habitats. Generally, Tonto NF LRMP direction guides habitat improvement and restoration of historical fire regimes, native plant communities, soil conditions, seral state conditions, and other ecological conditions. Specific considerations for distinct vegetation types should help to maintain the ecological conditions (soils, native plant communities, pollinators, etc.) that support listed riparian/wetland birds and their habitat.

Watersheds and Water Resources (WAT)

The WAT section contains substantial direction to improve Tonto NF watershed condition and water resources. The Tonto NF manages for properly functioning watersheds (based on criteria provided in the Watershed Condition Framework or similar current protocol) that exhibit high

geomorphic, hydrologic, and biotic integrity relative to their potential condition.

As described in the proposed action, the WAT section contains objectives to improve watershed conditions. Actions that disturb the ground or streambeds, heavy machinery use, or vegetation alteration may result in listed riparian/wetland bird habitat degradation or disturbance. Major construction projects during the migration or breeding season could adversely affect listed birds via displacement or disruption. Watershed improvement activities occurring outside the migration period or breeding season are less likely to adversely affect individual listed birds.

One WAT objective is to apply for state-based water rights for threatened streams that support highly valued resources (e.g., listed species, species of conservation concern, river-based recreation) or contain unique qualities (e.g., a perennial Sonoran Desert stream). Should the Tonto NF acquire instream flow rights in listed riparian/wetland bird habitats, this would benefit these birds by helping maintain necessary water levels.

WAT Components address numerous aspects of watershed health, conservation, and restoration to benefit listed riparian/wetland birds. While WAT activities may result in short-term adverse effects to listed bird species, we also expect that long-term adoption of WAT Components will benefit listed riparian/wetland birds and their critical habitats.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)
The RMZ section aims to generate additional project-level controls, constraints, and mitigations to reduce impacts to for riparian areas by focusing management on discrete riparian zones, preventing contamination from unintended herbicide and pesticide use, protecting springs and source waters, and preventing stream bank and channel alteration.

Relevant RMZ objectives promote ecological integrity of 125+ miles of streams and improvement to 10 to 15 individual springs during each 10-year period. Potential effects from these projects would be similar to those discussed in the WAT section. We expect that most projects will be planned to avoid or minimize adverse effects to listed riparian/wetland birds and their habitats.

Wildlife, Fish, and Plants (WFP)
The WFP section aims to support ecological conditions that contribute to threatened and endangered species recovery and proposed/candidate species conservation. A WFP objective is to implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to at-risk species recovery every 10 years. Projects that occur in watersheds, riparian areas, or aquatic habitats near listed riparian/wetland birds or their critical habitats could affect water-quality, vegetation, soil, or other habitat components important to listed riparian/wetland birds. Depending on project location or activity, disturbance to an individual bird and its habitat could alter breeding, sheltering, or feeding and increase predation risk. However, we anticipate in the long-term, listed riparian/wetland birds will benefit as desired conditions provide properly functioning habitats, survival and recovery, and support self-sustaining populations.

WFP desired conditions and guidelines increase project-level controls, constraints, and mitigations to reduce impacts to listed riparian/wetland birds during future project design by

including a guideline that states activities occurring within federally-listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.

Invasive Species (INS)
INS activities include monitoring, preventing, assessing, controlling, and eradicating priority invasive species populations. INS objectives are to treat and control invasive species on 200 to 1,500 acres annually, and specifically on 2 to 10 stream reaches every 5 years. Actions could include manual removal (hand pulling, netting, seining, etc.) or chemical treatment (pesticides, piscicides, or herbicides).

Chemical treatment guidelines stipulating timing restrictions, chemical-free buffers, and spot treatments near ecologically sensitive habitat (such as riparian and aquatic habitats) should minimize adverse effects to listed riparian/wetland birds. However, there is some risk of death or sublethal toxic effects to reproduction, embryonic development, and hormone and immune system regulation. Other short-term adverse effects include reduced vegetative cover and prey-base destruction. Additionally, the LRMP directs the Tonto NF to take preventative measures against the spread of parasites or pathogens that spread disease (e.g., chytrid fungus and whirling disease).

Invasive species can affect the survival and reestablishment of native species. Future projects implementing objectives in this section may adversely affect listed riparian/wetland birds but are also expected to result in long-term ecosystem benefits by reducing competition for native species, increasing biodiversity, and reducing wildfire risk.

Effects of the Action on southwestern willow flycatcher and yellow-billed cuckoo Critical Habitat

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

Because this is a programmatic consultation, it is not possible to assess the specific potential effects (adverse and beneficial) of the action on southwestern willow flycatcher and yellow-billed cuckoo critical habitat in detail (e.g., spatial extent, location, timing, frequency, duration). The Tonto NF will conduct these evaluations for individual projects during future section 7 consultations. Furthermore, the Tonto NF may reduce, minimize, or avoid adverse effects by implementing conservation measures. Because the Tonto NF will likely develop conservation measures through individual project-specific section 7 consultation, the level to which the Tonto

NF may avoid or minimize adverse effects is difficult to evaluate for the LRMP.

Generally, we know there may be adverse effects to critical habitat from implementing objectives in the LRMP's REC, FP, MMAM, RD, ERU, WAT, RMZ, WFP and INS sections. We anticipate adverse effects from upland and watershed condition and function degradation, streamflow and streambank alteration, decreased water quality from sedimentation, disturbance, disruption of prey base, and vegetation reduction. Ground disturbance from projects can also increase the risk of non-native invasive or undesirable plant and animal introductions to critical habitats. We expect that these projects may temporarily reduce critical habitat function, yet in the long-term and across the Forest, the Tonto NF will maintain or improve critical habitat PCEs/PBFs and these activities will not diminish the ability of critical habitat to contribute to the conservation and recovery of the species.

The LRMP guides the Tonto NF in fulfilling its stewardship responsibilities for integrated resource management and ecological sustainability. As such, we anticipate projects will result in long-term improvements to soil, vegetation, and riparian condition. Implementing LRMP standards and guidelines will reduce the effects of future project implementation and will not diminish the ability of critical habitat to contribute to southwestern willow flycatcher and yellow-billed cuckoo conservation and recovery.

<u>Southwestern willow flycatcher Designated Critical Habitat</u>
PCE 1: *Riparian vegetation* - Riparian habitat in a dynamic river or lakeside, natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Goodding's willow, coyote willow, Geyer willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:

a. Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 6 to 98 ft. Lower-stature thickets (6 to 13 ft tall) are found at higher elevation riparian forests and tall-stature thickets are found at middle and lower elevation riparian forests; and/or (b) Areas of dense riparian foliage at least from the ground level up to approximately 13 ft above ground or dense foliage only at the shrub or tree level as a low, dense canopy; and/or
b. Sites for nesting that contain a dense (about 50–100%) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground); and/or
c. Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.25 ac or as large as 175 ac.

EFFECT: REC program allowed activities such as dispersed camping, hiking, and other activities could diminish riparian habitat from vegetation manipulation and disturbance. There are numerous LRMP Components that address potential recreation effects to riparian areas, which include those designated as critical habitat. We anticipate the LRMP's required standards and guidelines to protect instream flow, consistent with existing water rights and laws, can retain, protect, and enhance stream function that support riparian habitat germination, growth,

and recycling.

Livestock grazing in flycatcher critical habitat could result in adverse effects from habitat alteration and degradation. Livestock consume young age-class riparian woody vegetation that flycatchers could eventually use for territory establishment, nesting, foraging, and cover. Continued forage use on young riparian vegetation can result in long-term adverse effects if suitable breeding habitat cannot develop.

Programs whose objectives may lead to implementing instream improvement projects that have short-term adverse effects to riparian vegetation and long-term benefits. There may be localized, short-term adverse effects from instream habitat improvement projects in riparian zones from vegetation removal. We anticipate effects will likely be temporary and the Tonto NF will minimize them by standards and guidelines. We expect the long-term results and benefits to critical habitat PCEs from instream improvement projects will maintain, and possibly improve flycatcher conservation and recovery.

A RD guideline is to locate new or reconstructed roads outside of riparian management zones, which will limit future RD activities in riparian areas to road maintenance and decommissioning. These activities can have short term negative effects from noise, disturbance, and vegetation alteration/destruction but will result in long term benefits because improperly designed or maintained roads can increase erosion, result in riparian vegetation removal, and degrade watershed function and integrity.

PCE 2: *Insect prey populations* - A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (*Hymenoptera*); dragonflies (*Odonata*); flies (*Diptera*); true bugs (*Hemiptera*); beetles (*Coleoptera*); butterflies, moths, and caterpillars (*Lepidoptera*); and spittlebugs (*Homoptera*).
EFFECT: We can anticipate there may be various projects that temporally reduce vegetation abundance that supports flycatcher insect prey populations. We expect most adverse effects to insect prey populations will likely accompany effects to supporting riparian vegetation and water resources. The LRMP does not propose to use insecticides that could kill southwestern willow flycatcher food sources.

<u>Yellow-billed cuckoo Designated Critical Habitat</u>
PBF 1: *Rangewide breeding habitat* - Riparian woodlands across the DPS; *Southwestern breeding habitat*, primarily in Arizona and New Mexico: Drainages with varying combinations of riparian, xeroriparian, and/or nonriparian trees and large shrubs. This physical or biological feature includes breeding habitat found throughout the DPS range as well as additional breeding habitat characteristics unique to the Southwest.
and
PBF 2: *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.
EFFECT:
REC program allowed activities such as dispersed camping, hiking, and other activities could result in diminished riparian habitat from vegetation manipulation and disturbance. There are

numerous LRMP Components that address potential effects of recreation to riparian areas, which include those designated as critical habitat. The function of streams may require special management considerations or protection; however, actions implemented under the LRMP have required standards and guidelines to protect instream flow, consistent with existing water rights and laws, that are expected to retain and protect this PBF.

Livestock grazing in cuckoo critical habitat could result in adverse effects through habitat manipulation. Livestock consume young age-class riparian woody vegetation that cuckoo could eventually use for breeding. Continued forage use on young riparian vegetation can result in long-term adverse effects if suitable breeding habitat is not permitted to develop. Livestock grazing could also result in adverse effects to populations of invertebrate prey species (PBF2) that rely on grasses, forbs, and woody vegetation.

Programs whose objectives may lead to implementation of instream improvement projects may have short-term adverse effects to riparian vegetation. There may be localized, short-term adverse effects from projects in riparian zones such as temporary habitat disturbance from vegetation removal; however, these effects will be minimized by standards and guidelines. Furthermore, while watershed improvement projects related to instream habitat improvements would likely have short-term adverse effects, we anticipate that long-term benefits to PBFs of critical habitat will occur by maintaining, and possibly improving, their ability to contribute to the conservation and recovery of the species.

A RD guideline is to locate new or reconstructed roads outside of riparian management zones, which will limit future RD activities in riparian areas to road maintenance and decommissioning. These activities can have short term negative effects from noise, disturbance, and vegetation alteration/destruction but will result in long term benefits because improperly designed or maintained roads can increase erosion, result in riparian vegetation removal, and degrade watershed function and integrity.

PBF 3: *Hydrologic processes* - The movement of water and sediment in natural or altered systems that maintains and regenerates breeding habitat.
EFFECT: Actions implemented under the LRMP are expected to retain and recover this PBF. There are desired conditions, objectives, standards, and guidelines to ensure that instream flow is protected and that areas supporting yellow-billed cuckoo are not dewatered or impaired to the point where they cannot support the species. There are also objectives, standards, and guidelines to enhance or restore stream and riparian habitat.

Cumulative Effects

Cumulative effects are those "effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate section 7 consultation.

Cumulative effects to listed riparian/wetland birds include residential and commercial development, livestock grazing and associated activities outside of federal allotments, irrigated agriculture, pesticide use, groundwater pumping, stream diversion, bank stabilization,

channelization, road maintenance, and recreation without a federal nexus. Some of these activities, such as irrigated agriculture, are declining and we can expect a reduced contribution to cumulative long-term adverse effects to listed riparian/wetland birds. Other activities, such as recreation, are increasing.

Increasing recreational, residential, or commercial use of non-federal lands near riparian areas may result in increased cumulative adverse effects to occupied, and potentially occupied, listed riparian/wetland bird habitat through increased water use, increased alteration of streambanks and riparian vegetation suppression, bank trampling, changing flow regimes, and erosion.

Drought and climate change could eventually exacerbate existing threats to streams in the southwestern U.S. (Cayan et al. 2013). Increased and prolonged drought associated with changing climatic patterns could adversely affect streams by reducing water availability and altering food availability. Stream drying is of particular concern because listed riparian/wetland birds depend on riparian ecosystems for survival. Long-term climate change could exacerbate the effects of drought and increases in temperature could increase physiological demands on adults, eggs, and nestlings.

A cumulative beneficial effect in the action area is the role SRP plays in maintaining baseflows in the mainstem and tributaries of the Salt and Verde Rivers. SRP provides water to more than 2.6 million people in the Phoenix metro for irrigation, municipal, and other uses pursuant to a 1917 contract with the United States. Because the reservoirs are near the bottom of their watersheds, and in order to protect SRPs interests, and that of the millions of people they serve, SRP aggressively pursues any potential challengers to in-stream flow, creating a net positive effect to aquatic wildlife that require water in streams.

TIPPING POINT ANALYSIS

In *Wild Fish Conservancy v. Salazar*, 628 F.3d 513 (9th Cir.2010), the Ninth Circuit held that the Service must identify when a species will likely pass the tipping point for recovery and determine whether the proposed action will cause the species to reach that tipping point. That case, and subsequent cases addressing “tipping point,” involved challenges to biological opinions that analyzed the effects of project-specific Federal actions. The Tonto NF’s LRMP is not a project-specific Federal action; it is a programmatic plan which provides program management direction and guidance and does not authorize future project-specific actions or ground-disturbing activities that may result in “take” of threatened or endangered species or adverse effects on designated critical habitat. 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 consultations, as appropriate. Objectives in the proposed action for this programmatic biological opinion describe desired conditions, but do not describe or authorize future project-specific actions or ground-disturbing activities. The proposed action includes standards and guidelines which may be used in future project-planning activities to minimize effects of future actions and which may also function as conservation measures.

As we discussed in the Status of the Species and the Environmental Baseline sections, listed species that may be affected by implementing the Tonto NF LRMP can occur inside the Tonto NF. We expect that the Tonto NF LRMP will not cause listed species to reach their tipping point for recovery because:

1) the Tonto NF LRMP is a programmatic plan and does not authorize future actions;
2) the Tonto NF LRMP's land management goals and direction will cause some adverse effects, yet overall will maintain or improve listed species habitats;
3) this biological opinion does not authorize any incidental take of listed species; and
4) for reasons identified below for each listed species analyzed in this biological opinion.

All future actions that may affect listed species on the Tonto NF will have their own tipping point analysis completed in stand-alone biological opinions. Therefore, subsequent section 7 analyses could result in a finding that the species has reached a tipping point resulting from the effects of the action in light of the status of the species, environmental baseline, and/or the cumulative effects.

Arizona cliffrose

We expect the Tonto NF's LRMP will not cause Arizona cliffrose to reach the tipping point for recovery because it provides direction to maintain and/or enhance habitat; manage invasive plant species, recreation, grazing, roads, and fire; and because the genetically variable and soil specific growing cliffrose occurs at a single managed location on the Tonto NF (Horseshoe Lake). We estimated the total species population size at 20,000 plants, with the largest estimated population (8,272 plants) in the Verde Valley (Goodwin 2012, USFWS 2013). The Tonto NF has successfully managed land use surrounding its lone Arizona cliffrose population near Horseshoe Lake, and the LRMP creates the Horseshoe Recommended Botanical Area to protect Arizona cliffrose and its unique habitat.

Arizona hedgehog cactus

We expect the Tonto NF's LRMP will not cause Arizona hedgehog cactus to reach the tipping point for recovery because it provides direction to maintain and/or enhance habitat; manage recreation, invasive species, grazing, roads, and fire; and because the genetically variable hedgehog cactus' (Fehlberg et al. 2013) distribution and abundance has increased since listing (occurring almost solely on the Tonto NF). Since listing, surveys and studies have defined and expanded the taxon's range beyond its type locality, even though surveys are difficult to conduct due to a large portion of its range being rugged and remote. There were approximately 7,053 Arizona hedgehog cacti known prior to January 2021 (AGFD HDMS 2016, USFWS files). Westland Resources (2013) recorded 4,035 individual cacti on the Tonto NF that helped improve our knowledge about its distribution and abundance. Some of Westland Resources' surveys identified Arizona hedgehog cacti that were a different, but similar cactus species (*Echinocereus santaritensis*) (M. Baker, personal communication 2013; Fehlberg and Allen 2013). Wildfires in the summer of 2021 reduced Arizona hedgehog cactus numbers, but we do not yet know the severity. Fehlberg et al. (2013) found that Arizona hedgehog cactus populations that occur across several mountain ranges appear connected by high levels of gene flow and/or dispersal, which is encouraging for its conservation.

Mexican spotted owl

We expect the Tonto NF's LRMP will not cause Mexican spotted owls to reach the tipping for recovery because it includes direction for forest and fire management to reduce the potential for large, high-intensity wildfire; and watershed, stream, grazing, and habitat management to improve the ecological function of these areas. Future site-specific actions carried out pursuant to objectives in the Tonto NF's LRMP will increase the resiliency of owl habitat, specifically through reducing the risk of high intensity wildfire, and adverse effects to habitat and/or individual owls through disturbance from programmatic and site-specific implementation will be short-term.

Ocelot

We expect the Tonto NF's LRMP will not cause the ocelot to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams, and habitat; manage roads, fire, grazing, and recreation; and because the United States (specifically the Tonto NF) contains a small portion of the ocelot's range, which occurs from extreme southern Texas and southern Arizona through Mexico and Central America to Ecuador and northern Argentina and Uruguay (Murray and Gardner 1997, USFWS 2016). Relatively few ocelots have been known to occur at any one time in Arizona, suggesting that ocelot density in the state might be quite low (USFWS 2016). The Tonto NF is at the periphery of the ocelot's United States range, with a single ocelot detected since 1970 (Holbrook et al. 2011, USFWS 2016), and none since 2010 (Featherstone et al. 2013). We identified ocelot recovery to rely primarily within the United States in southern Texas and also prominently in Mexico (USFWS 2016).

Chiricahua leopard frog

We expect the Tonto NF's LRMP will not cause Chiricahua leopard frogs to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams, and habitat; manage fire, roads, grazing, and recreation; and because frogs have improved in distribution and abundance since listing. Since 1998 and near its listing in 2002, surveyors and biologists in the two Tonto NF Management Areas on the Payson and Pleasant Valley Ranger Districts have detected and released Chiricahua leopard frogs at over 30 sites in creeks, springs, and stock tanks. Ongoing stock tank management can have short-term adverse effects but is important for maintaining habitat and conditions for long-term frog persistence and possible expansion. We anticipate forest, fire, watershed, and stream management will reduce bare soils, decrease erosion and sedimentation, improve water quality, and minimize effects to aquatic habitat from stand-replacing, high-intensity wildfire and site-specific projects, which will contribute to maintaining or improving streams and adjacent habitat for frogs and their food.

Narrow-headed and northern Mexican gartersnakes

We expect the Tonto NF's LRMP will not cause narrow-headed or northern Mexican gartersnakes to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams, and habitat, and manage fire, roads, grazing, and recreation. We anticipate forest, fire, watershed, and stream management will reduce bare soils, decrease erosion and sedimentation, improve water quality, and minimize effects to aquatic habitat from stand-replacing, high-intensity wildfire and site-specific projects, which will contribute to maintaining or improving streams and adjacent riparian habitat for gartersnakes and

their prey.

Desert pupfish, Gila chub, Gila topminnow, Gila trout, razorback sucker, loach minnow, and spikedace

We expect the Tonto NF's LRMP will not cause listed fishes to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams and habitat, and manage fire, roads, grazing, and recreation. We anticipate forest, fire, watershed, stream, recreation, grazing, and habitat management will reduce bare soils, decrease erosion and sedimentation, improve water quality, and minimize effects to aquatic habitat from stand-replacing, high-intensity wildfire and site-specific projects, which will contribute to maintaining or improving streams, springs, and off-site waters for listed fishes. Wild and Scenic River designations on the Verde River and Fossil Creek will help maintain/improve free-flowing streams and habitat for listed fishes. Overall, Tonto NF LRMP implementation will help maintain/improve streams for existing listed fishes and opportunities for continued expansion/stocking for recovery.

Southwestern willow flycatcher

We expect the Tonto NF's LRMP will not cause the southwestern willow flycatcher to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams, and habitat; manage fire, recreation, and grazing; and because rangewide territory estimates have increased from 500–1,000 at listing (Unitt 1987) to just over 1,600 (Durst 2017); and the two Management Units on the Tonto NF (Roosevelt and Verde) have approached/exceeded numerical territory recovery goals (USFWS 2002).

Western yellow-billed cuckoo

We expect the Tonto NF's LRMP will not cause the western yellow-billed cuckoo to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams, and habitat; manage fire, recreation, and grazing; and because its rangewide territory estimates are near 1,300 and is widely distributed across Arizona (estimated 450 territories) (USFWS 2019) and the Tonto NF. Since listing, Arizona surveyors have helped improve our knowledge about increased cuckoo territory distribution and abundance (especially in southern Arizona xeroriparian habitat and along the lower Colorado River in riparian trees planted in agricultural fields). Similarly, surveyors on the Tonto NF have found breeding cuckoos on a variety of Tonto NF rivers and creeks along the Verde and Salt Rivers (including Horseshoe and Roosevelt Lake conservation spaces), and Pinto, Tonto, Rye, Cucamunga, Pinal, and Cherry creeks (and possibly the East Verde River), and planted vegetation at the Rockhouse Demonstration Site. We expect future surveys are likely to detect cuckoos in other Tonto NF streams.

Yuma Ridgway's rail

We expect the Tonto NF's LRMP will not cause Yuma Ridgway's rail to reach the tipping point for recovery because it provides direction to maintain and/or enhance forests, watersheds, streams, and habitat; the rail's relative rangewide population and distribution has increased; and because the Tonto NF is at the eastern portion of the rail's breeding range (with only periodic and minor occurrences of rails and wetland rail habitat). Rail recovery in the United States relies primarily on lower elevation wetland habitat along the Colorado and Gila rivers in Arizona

outside of the Tonto NF boundaries, and waterbodies in California. The relative rangewide abundance of rails has increased from 432 individuals in 2015 to 839 in 2019, with recent expansion of two smaller peripheral populations, along the lower Gila and Salt Rivers in central Arizona, and in southern Nevada along the Las Vegas Wash.

JEOPARDY AND ADVERSE MODIFICATION ANALYSIS

Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

Jeopardy Analysis Framework

Our jeopardy analysis relies on the following:

"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). The following analysis relies on four components: (1) Status of the Species, which evaluates the rangewide condition of the listed species addressed, the factors responsible for that condition, and the species' survival and recovery needs; (2) Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) Effects of the Action (including those from conservation measures), which determines the direct and indirect effects of the proposed federal action and the effects of any interrelated or interdependent activities on the species; and (4) Cumulative Effects, which evaluates the effects of future, non-federal activities in the action area on the species. The jeopardy analysis in this biological opinion emphasizes the rangewide survival and recovery needs of the listed species and the role of the action area in providing for those needs. We evaluate the significance of the proposed Federal action within this context, taken together with cumulative effects, for making the jeopardy determination.

Destruction/Adverse Modification Analysis Framework

The final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" became effective on March 14, 2016 (81 FR 7214). The revised definition states: "Destruction or adverse modification means a direct or indirect modification that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such modifications may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

Similar to our jeopardy analysis, our adverse modification analysis of critical habitat relies on the following four components: (1) the Status of Critical Habitat, which evaluates the rangewide condition of designated critical habitat in terms of PCEs, the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the

Environmental Baseline, which evaluates the condition of the 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, which determine the direct and indirect effects of the proposed federal action and how they will influence the recovery role of affected critical habitat units; and (4) Cumulative Effects, which evaluate the effects of future, non-federal activities in the action area on the PCEs and how they will influence the recovery role of affected critical habitat units.

CONCLUSION

After reviewing the current status of the species and their critical habitat, the environmental baseline for the action area, the effects of the proposed Tonto NF LRMP, and the cumulative effects, it is the Service's biological opinion that implementation of the Tonto NF Revised Land and Resource Management Plan located in Coconino, Gila, Maricopa, Pinal, and Yavapai counties, Arizona, as proposed, is not likely to jeopardize the continued existence of the endangered Arizona cliffrose, Arizona hedgehog cactus, ocelot, desert pupfish, Gila chub, Gila topminnow, razorback sucker, loach minnow, spikedace, southwestern willow flycatcher, and Yuma Ridgway's rail; and the threatened Mexican spotted owl, Chiricahua leopard frog, narrow-headed gartersnake, northern Mexican gartersnake, Gila trout, western yellow-billed cuckoo and, in conference, the Mexican wolf and Colorado pikeminnow non-essential experimental 10j populations. The proposed action is also not likely to destroy or adversely modify designated critical habitat for the Mexican spotted owl, Chiricahua leopard frog, narrow-headed gartersnake, northern Mexican gartersnake, desert pupfish, Gila chub, razorback sucker, loach minnow, spikedace, southwestern willow flycatcher, or the western yellow-billed cuckoo. There is no designated critical habitat for the Arizona cliffrose, Arizona hedgehog cactus, ocelot, Gila topminnow, Gila trout or the Yuma Ridgway's rail, therefore none will be affected.

Conclusions Applicable to All Listed Species and Critical Habitats

- Any future project-specific activities under the Tonto NF LRMP that may affect listed species and/or critical habitats will receive Service review and/or section 7 consultation as appropriate.
- Projects and activities that may negatively impact at-risk species, including plants, will consider protections and design elements to address impacts, especially considering the timing and location of vulnerable life history processes (e.g., reproduction, molting, migration, and hibernation). Examples include, but are not limited to, timing restrictions, adaptive percent utilization levels, and distance buffers.
- Activities within federally listed species habitat will apply protection measures from approved recovery plans.
- The best available science and/or conservation measures will be used to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain viable populations of species of conservation concern.
- The proposed action is a "framework programmatic action" which establishes a framework for the development of specific future action(s) but does not authorize any future action(s).
- The Tonto NF LRMP does not make site-specific decisions about exactly how, when, and where activities will be carried out.

- Many of the objectives in the LRMP will lead to projects that result in long-term benefits to listed species and critical habitat.
- Many standards and guidelines within the LRMP serve as conservation measures that will result in beneficial effects to listed species and critical habitat.

Plants

Arizona cliffrose and Arizona hedgehog cactus

It is our biological opinion that implementation of the Tonto NF's revised LRMP will not jeopardize the continued existence of the Arizona cliffrose or the Arizona hedgehog cactus. There is no designated critical habitat for these plant species. We base our conclusions on the following:

- The Tonto NF LRMP will continue to conserve and protect listed plants. LRMP objectives, standards, and guidelines will contribute to listed plant conservation and recovery by guiding the Tonto NF to implement recovery plans, improve listed plant habitat, and use their section 7(a)(1) authorities to carry out conservation for threatened and endangered species.
- The LRMP creates the Horseshoe Recommended Botanical Area to protect Arizona cliffrose and the fragile habitat on which it occurs. The LRMP prohibits livestock grazing, sales or extraction of mineral materials, timber harvest, and fuelwood cutting within the Horseshoe Recommended Botanical Area, and once established, the area will protect/conserve Arizona cliffrose and its habitat.
- The Tonto NF will implement techniques such as rest/rotation, fencing, and conservative use that avoid, reduce, or minimize adverse effects from livestock grazing to listed plants, which will aid in their recovery.
- The LRMP details objectives for watershed and riparian improvement (WAT, RMZ), forest restoration/maintenance (FP, ERU, INS) general improved conditions (REC, MMAM, RD) and listed species habitat improvement (WFP). Future projects implementing these objectives can result in adverse effects to listed plants, but the Tonto NF will avoid or minimize effects through implementation of LRMP standards and guidelines as well as project-specific planning and conservation measures. Projects will maintain or improve listed plant habitats by reducing the risk of high-severity, stand-replacing, landscape level fire and other factors that reduce the ability of these plants to survive and reproduce. These efforts to improve forest condition and sustainability will result in long-term benefits to the plants by fostering ecological conditions that are resilient to climate change and drought and by protecting and maintaining individual plants and their habitat, thereby aiding in their survival and recovery.

Mexican spotted owl and Critical Habitat

It is our biological opinion that implementation of the Tonto NF's revised LRMP will not jeopardize the continued existence of the Mexican spotted owl and will not destroy or adversely modify its designated critical habitat. We base our conclusion on the following:

- The proposed action requires the Forest Service to manage for Mexican spotted owl survival and recovery on the Tonto NF. It is required because the Tonto NF LRMP explicitly directs the Forest Service to protect PACs (occupied owl sites) and to manage for future nest/roost replacement habitat. This meets the recovery objective as defined in

the Recovery Plan for the Mexican spotted owl, First Revision (USFWS 2012).

- Objectives, standards, and guidelines in the FP, ERU, and INS sections of the Tonto NF LRMP will improve forest condition and sustainability by reducing the risk of high-severity, stand-replacing, landscape level fire in mixed conifer and pine-oak forests that the Mexican spotted owl may occupy on the Tonto NF. These efforts to improve forest condition and sustainability and reduce the loss of owl habitat, specifically nest/roost habitat, which is a limiting factor for the owl. The protection and maintenance of Mexican spotted owls and their critical habitat will aid in the survival of Mexican spotted owls.
- While some adverse effects may occur as part of future site-specific actions carried out pursuant to guidance found in the LRMP, the LRMP's standards and guidelines will help to minimize those effects over the long-term by minimizing disturbance to breeding Mexican spotted owls (i.e., not conducting actions in or immediately adjacent to PACs during the breeding season). By implementing objectives, standards and guidelines in the LRMP, the Tonto NF will also improve the sustainability and resiliency of forested owl habitat through tree thinning, prescribed burning, and other forest management actions.
- Based on the discussion provided in the Effects to Mexican Spotted Owl Critical Habitat section above, the four CHUs affected by the implementation of the Tonto NF LRMP will continue to serve the function and recovery role of critical habitat for the Mexican spotted owl. The Forest Service is conducting forest thinning and prescribed burning that will improve the forest structure (reducing number of trees), function (ability of forest to withstand stochastic events), and processes (reintroduction of fire to frequent fire forests). These actions will allow critical habitat to better serve its role in owl recovery by increasing the forests' ability to withstand long-term drought and disease and still provide nesting, roosting, foraging, and dispersal habitat for owls.

Ocelot

It is our biological opinion that implementation of the Tonto NF's revised LRMP will not jeopardize the continued existence of ocelot. There is no ocelot designated critical habitat. We base our conclusion on the following:

- LRMP objectives, standards, and guidelines include contributing to ocelot conservation and recovery by guiding the Tonto NF to implement recovery plans, improve listed species habitat, and use their section 7(a)(1) authorities to carry out conservation for threatened and endangered species.
- The United States contains a small portion of the ocelot's range and habitat and there has only been one detection of an ocelot on the Tonto NF in recent history (in 2010). Projects carried out under the LRMP will ensure that conservation measures consider effects to ocelot.
- Objectives, standards, and guidelines in the FP, ERU, and INS sections of the Tonto NF LRMP will improve forest condition and sustainability by reducing the risk of high-severity, stand-replacing, landscape level fire in mixed conifer and pine-oak forests that the ocelot may occupy on the Tonto NF. The protection and maintenance of forest condition will reduce the loss of ocelot habitat and aid in the survival of ocelots.

Herptiles and Critical Habitat

Chiricahua leopard frog and critical habitat, narrow-headed gartersnake and critical habitat, northern Mexican gartersnake and critical habitat

It is our biological opinion that implementation of the Tonto NF's revised LRMP will not jeopardize the continued existence of the Chiricahua leopard frog, narrow-headed gartersnake or the northern Mexican gartersnake and will not destroy or adversely modify their designated critical habitat. We base our conclusions on the following:

- LRMP objectives, standards, and guidelines include contributing to listed herptile conservation and recovery by guiding the Tonto NF to implement recovery plans, improve listed species habitat, and use their section 7(a)(1) authorities to carry out conservation for threatened and endangered species.
- The LRMP will guide the Tonto NF to manage livestock grazing to maintain or improve aquatic and riparian habitat and critical habitat PCEs/PBFs for listed herptiles. The Tonto NF will implement techniques such as rest/rotation, fencing, conservative use, and stock tank management that avoid, reduce, or minimize adverse effects to herptile habitat and move streams towards properly functioning condition. These actions will allow critical habitat to better serve its role in herptile recovery by increasing the forests' ability to improve aquatic habitat resiliency to long-term drought and climate change.
- The LRMP details objectives for watershed and riparian improvement (WAT, RMZ), forest restoration/maintenance (FP, ERU, INS) general improved conditions (REC, MMAM, RD) and listed species habitat improvement (WFP). Future projects implementing these objectives can result in adverse effects to listed herptiles and their designated critical habitats, but the Tonto NF will avoid or minimize effects through implementation of LRMP standards and guidelines as well as project-specific planning and conservation measures. Projects will maintain or improve listed herptile habitats by reducing the risk of high-severity, stand-replacing, landscape level fire and other factors that reduce the function of critical habitat PCEs/PBFs. These efforts to improve forest condition and sustainability will result in long-term benefits by fostering ecological conditions that are resilient to climate change and drought and contribute to the recovery of listed herptiles by supporting essential PCEs/PBFs (specifically water quality and availability, prey base, instream flow and suitable upland habitat) and ensuring critical habitat will continue to serve its recovery function and conservation role. The protection and maintenance of listed herptile critical habitat will aid in the survival of listed herptiles.

Fishes and Critical Habitat

Desert pupfish and critical habitat, Gila chub and critical habitat, Gila topminnow, Gila trout, razorback sucker and critical habitat, loach minnow and critical habitat, spikedace and critical habitat

It is our biological opinion that implementation of the Tonto NF's revised LRMP will not jeopardize the continued existence of the desert pupfish, Gila chub, Gila topminnow, Gila trout, razorback sucker, loach minnow or spikedace and will not destroy or adversely modify designated critical habitat for desert pupfish, Gila chub, razorback sucker, loach minnow or spikedace. We base our conclusions on the following:

- LRMP objectives, standards, and guidelines include contributing to listed fish

conservation and recovery by guiding the Tonto NF to implement recovery plans, improve listed species habitat, and use their section 7(a)(1) authorities to carry out conservation for threatened and endangered species.
- The LRMP will guide the Tonto NF to manage livestock grazing to maintain or improve aquatic and riparian habitat and critical habitat PCEs/PBFs for listed fish. We expect the Tonto NF will implement techniques such as rest/rotation, fencing, and conservative use that avoid, reduce, or minimize adverse effects to fish habitat and move streams towards properly functioning condition. These actions will allow critical habitat to better serve its role in listed fish recovery by increasing the forests' ability to improve aquatic habitat resiliency to long-term drought and climate change.
- The LRMP details objectives for watershed and riparian improvement (WAT, RMZ), forest restoration/maintenance (FP, ERU, INS) general improved conditions (REC, MMAM, RD) and listed species habitat improvement (WFP). Projects implementing these objectives can result in adverse effects to listed fish and their designated critical habitats, but the Tonto NF will avoid or minimize effects through implementation of LRMP standards and guidelines as well as project-specific planning and conservation measures. Projects will maintain or improve listed fish habitats by reducing the risk of high-severity, stand-replacing, landscape level fire and other factors that reduce the function of critical habitat PCEs/PBFs. These efforts to improve forest condition and sustainability will result in long-term benefits by fostering ecological conditions that are resilient to climate change and drought and contribute to the recovery of listed fish by supporting essential PCEs/PBFs (specifically water quality and availability, prey base and instream flow) and ensuring critical habitat will continue to serve its recovery function and conservation role. The protection and maintenance of listed fish critical habitat will aid in the survival of listed fish.

Riparian and Wetland Birds and Critical Habitat

Southwestern willow flycatcher and critical habitat, yellow-billed cuckoo and critical habitat, Yuma Ridgway's rail

It is our biological opinion that implementation of the Tonto NF's revised LRMP will not jeopardize the continued existence of the southwestern willow flycatcher, yellow-billed cuckoo or the Yuma Ridgway's rail and will not destroy or adversely modify designated critical habitat for southwestern willow flycatcher or yellow-billed cuckoo. We base our conclusions on the following:

- LRMP objectives, standards, and guidelines include contributing to listed riparian/wetland bird conservation and recovery by guiding the Tonto NF to implement recovery plans, improve listed species habitat, and use their section 7(a)(1) authorities to carry out conservation for threatened and endangered species.
- The LRMP will guide the Tonto NF to manage livestock grazing to maintain or improve aquatic and riparian habitat and critical habitat PCEs/PBFs for listed birds. The Tonto NF will implement techniques such as rest/rotation, fencing, and conservative use that avoid, reduce, or minimize adverse effects and move streams towards properly functioning condition. These actions will allow critical habitat to better serve its role in listed riparian/wetland bird recovery by increasing the forests' ability to improve aquatic habitat resiliency to long-term drought and climate change.

- The LRMP details objectives for watershed and riparian improvement (WAT, RMZ), forest restoration/maintenance (FP, ERU, INS) general improved conditions (REC, MMAM, RD) and listed species habitat improvement (WFP). Projects implementing these objectives can result in adverse effects to listed riparian/wetland birds and their designated critical habitats, but the Tonto NF will avoid or minimize effects through implementation of LRMP standards and guidelines as well as project-specific planning and conservation measures. Projects will maintain or improve listed riparian/wetland bird habitats, specifically high-quality breeding habitat, which is a limiting factor for these birds, by maintaining or improving watersheds and hydrologic conditions and associated critical habitat PCEs/PBFs (stream function, hydrologic regime, groundwater, etc.). This will result in long-term benefits by fostering ecological conditions that are resilient to climate change and drought and contribute to the recovery of listed riparian/wetland birds by supporting essential PCEs/PBFs and ensuring critical habitat will continue to serve its recovery function and conservation role. The protection and maintenance of listed riparian bird critical habitat will aid in the survival of listed riparian birds.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined (50 CFR § 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR § 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

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 effects on Mexican spotted owl, ocelot, Chiricahua leopard frog, narrow-headed gartersnake, northern Mexican gartersnake, desert pupfish, Gila chub, Gila topminnow, Gila tout, razorback sucker, loach minnow, spikedace, southwestern willow flycatcher, western yellow-billed cuckoo, and Yuma Ridgway's rail, but we lack reasonable certainty of where, when, and how much incidental take may occur. Therefore, we cannot quantify the amount and extent of incidental take that may result from the proposed action and have not exempted such take in this biological opinion.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Plants

Arizona cliffrose

1. Regularly monitor the Arizona cliffrose population on the Tonto NF.
2. Implement recommendations in the 1995 Arizona Cliffrose Recovery Plan.
3. Determine if the Arizona cliffrose plants in the Sears Club-Chalk Mountain Allotment need protection from livestock or activities associated with livestock grazing. This allotment is currently in non-use.
4. Use locally-sourced native plant species for restoration efforts.
5. Conduct annual monitoring of grazing activities to assess needed changes and regularly check and maintain pasture and exclosures fences and remove trespass cattle from exclosures.
6. Participate in genetic studies to determine population and meta-population dynamics of Arizona cliffrose throughout its range.

Arizona hedgehog cactus

1. Develop a monitoring plan for populations of Arizona hedgehog cactus on the Tonto NF.
2. Implement the species and habitat management objectives outlined in the conservation strategy for Arizona hedgehog cactus, such as developing "safe sites" for this species that will protect its habitat and contribute to recovery.
3. Participate in the development of a recovery plan for this species.
4. Work with mining applicants to develop agreements where applicants purchase land and establish conservation easements or mitigation banks to offset their activities and protect the species from further losses due to mineral extraction activities.
5. Use locally-sourced native plant species for restoration efforts.
6. Conduct annual monitoring of grazing activities to assess needed changes and regularly check and maintain pasture and exclosure fences and remove trespass cattle from exclosures.
7. We recommend the Tonto NF support research and monitoring proposals that increase understanding of important Arizona hedgehog cactus conservation efforts such as the

effectiveness of translocating the cactus, appropriate management of conservation banks and lands to promote cactus recovery, growing the cactus from seed within occupied sites, and effects on the cactus from climate change and fire.

8. When feasible, we recommend that Tonto NF use 5-gallon buckets to cover individual Arizona hedgehog cactus prior to herbicide application.
9. If individual Arizona hedgehog cactus will be adversely affected by Tonto NF project activities, the USFWS recommends the Tonto NF work with our agency to experimentally transplant those cacti to appropriate locations (i.e., those with no future development potential, including areas with non-severed mineral rights).
10. We recommend the Tonto NF work to secure Arizona hedgehog cactus seed on the Forest and vicinity in a secure seedbank (preferably the USDA National Center for Genetic Resources Preservation) for long-term storage and future use. At a minimum, seed from individuals that will adversely affected due to a project should be collected prior to project implementation.
    a. We further recommend research to determine if survivorship is better by immediately transplanting individuals to a new location, or by first transferring individuals to an off-site cultivation facility (botanical garden partner, etc.) until they have formed new root tissue before transplanting them in the wild.

Mexican spotted owl

1. We recommend the Tonto NF implement actions to protect protected activity centers from high severity fire and improve the resiliency of fire-adapted forested habitats. Annual reports will provide information to assist the USFWS in determining whether these long-term activities are occurring in such a way as to reduce fire risk to existing protected activity centers and replacement nest/roost habitat (nest/roost replacement recovery habitat).
2. We recommend the Tonto NF work with USFWS to conduct spotted 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 us in understanding the short- and long-term effects of these actions on the owl, and their subsequent effect on the status of the species.
3. We recommend the Tonto NF work with 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 spotted owl habitat across the landscape. Protected activity centers gain substantial protection from wildland fire by emphasizing fuels reduction and forest restoration in surrounding areas outside of protected activity centers and nest/roost replacement recovery habitat.

Ocelot

1. We recommend the Tonto NF support ocelot recovery through implementing and/or funding priority recovery actions as determined by the Ocelot Recovery Team.
2. We recommend that the Tonto NF contribute to the protection and management of corridors to provide habitat connectivity and allow for ocelot movement.
3. We recommend the Forest Service support efforts to evaluate and enhance wildlife crossings (e.g., wildlife overpasses or underpasses and associated fencing) along and across Highway 60.

Herptiles

Chiricahua leopard frog, Narrow-headed gartersnake and Northern Mexican gartersnake

1. We recommend the Tonto NF participate in, implement, and/or help fund studies of topics identified in the species' recovery plans that may improve our understanding of the conservation and recovery needs of the Chiricahua leopard frog, narrow-headed, and northern Mexican gartersnakes.
2. There are many objectives for watershed, forest, and habitat management/restoration. We recommend the Tonto NF prioritize projects that allow for the greatest benefit to listed species using a combination of factors including level of environmental degradation and listed species occupied sites.
3. We recommend the Tonto NF implement recovery actions as described within the Chiricahua leopard frog recovery plan and future recovery plans developed for narrow-headed and northern Mexican gartersnake.
4. We recommend the Tonto NF prevent the introduction or movement of non-native aquatic species, as well as implement a landscape-level removal program for non-native aquatic species on the Forest.
5. We recommend the Tonto NF regularly monitor for, or assist with monitoring for, these species and implement future monitoring plans that may be developed by USFWS to better determine the distribution, abundance, and trends of the species' populations on the Tonto NF.
6. We recommend the Tonto NF maintain active participation in the Gartersnake Conservation Working Group as well as the Chiricahua leopard frog Steering Committee and Local Recovery Groups, by ensuring Tonto NF biologists and other appropriate staff attend meetings and coordinate in monitoring and recovery planning.
7. We recommend the Tonto NF continue to identify factors that limit the recovery of these and other listed species on Tonto NF lands and work to correct them, particularly with respect to the occurrence and spread of non-native predatory aquatic species.
8. We recommend the Tonto NF design fire use, chemical use, range and timber management, recreational and other site-specific projects to minimize or eliminate adverse effects to listed herptiles. This includes maintaining a buffer adjacent to riparian and stream zones and utilizing habitat stabilization and/or erosion and sediment control techniques after ground disturbing activities.

Fishes

Desert pupfish, Gila chub, Gila topminnow, Gila trout, Loach minnow, Razorback sucker, Spikedace

1. We recommend the Tonto NF continue to assist USFWS and AGFD in conserving and recovering listed fish by developing monitoring plans and conducting surveys, helping complete recovery plans and implementing recovery actions.
2. We recommend the Tonto NF continue to work with USFWS and AGFD to remove non-native species and reestablish listed fish throughout their historical range on the Forest.
3. We recommend the Tonto NF continue to work cooperatively with USFWS, AGFD and adjacent land managers, to establish populations of these species wherever possible.

4. We recommend the Tonto NF continue to identify factors that limit the recovery of these and other listed species on Tonto NF lands and work to correct them, particularly with respect to the occurrence and spread of non-native predatory aquatic species.
5. We recommend the Tonto NF design fire use, chemical use, range and timber management, recreational and other site-specific projects to minimize or eliminate adverse effects to listed fish. This includes maintaining a buffer adjacent to riparian and stream zones and utilizing habitat stabilization and/or erosion and sediment control techniques after ground disturbing activities.

Riparian and Wetland Birds

Southwestern willow flycatcher, Western yellow-billed cuckoo, Yuma Ridgway's rail

1. We recommend the Tonto NF develop and implement survey and monitoring plans to better determine the distribution, abundance, and trends of listed riparian/wetland bird populations on the Forest.
2. We recommend the Tonto NF implement specific actions to assist in recovery of listed riparian/wetland birds throughout the Forest.
3. We recommend the Tonto NF implement projects that reduce stressors and create landscape conditions to favor the growth of native riparian vegetation. Please see the Exotic Vegetation and Riparian Restoration appendices in the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002).
4. We recommend the Tonto NF retain ground cover, understory, midstory, and overstory vegetation (vertical habitat diversity) in suitable riparian habitat and upland habitats to maintain healthy watersheds and allow for natural water infiltration and transport across the landscape.
5. We recommend that vegetation-altering activities (such as thinning, limbing, and herbicide or pesticide treatment) not occur in riparian areas and Madrean evergreen woodland drainages that function as listed riparian bird breeding habitat. Breeding habitat may consist of a mix of native trees, tamarisk, and shrubs.
6. We recommend retaining foraging habitat containing a mix of trees (including tamarisk), shrubs, and ground cover adjacent to current or potential suitable breeding habitat for listed riparian birds.
7. We recommend the Tonto NF avoid grazing practices that reduce the suitability or regeneration of woody riparian or upland species and that grazing exclosures be regularly checked and maintained in riparian areas.
8. We recommend the Tonto NF avoid grazing activities that do not comply with the descriptions provided in Table 2, Appendix G of the 2002 U.S. Fish and Wildlife Service Southwestern Willow Flycatcher Final Recovery Plan (Appendix A). The guidelines for the southwestern willow flycatcher are used as a surrogate for all three of the listed birds in this analysis.
9. We recommend the Tonto NF not conduct activities effecting listed riparian birds during their breeding seasons.

For the USFWS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the USFWS requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes the conference for Revised Tonto NF Land and Resource Management Plan. You may ask us to confirm the conference opinion as a biological opinion issued through formal consultation if the proposed species is listed or critical habitat is designated. The request must be in writing. If we review the proposed action and find there have been no significant changes in the action as planned or in the information used during the conference, we will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

After listing as threatened or endangered and any subsequent adoption of this conference opinion, the Forest Service shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect 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 a listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

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

Please refer to consultation number 2022-0001651 in future correspondence concerning this project. Should you require further assistance, or if you have any questions, please contact Rebekah Karsch (Rebekah_Karsch@fws.gov), Mary Richardson (Mary_Richardson@fws.gov) or Julie McIntyre (Julie_McIntyre@fws.gov).

Sincerely,

MARK LAMB
Digitally signed by MARK LAMB
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Mark A. Lamb
Acting Field Supervisor

cc (electronic):

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Flagstaff, AZ
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Assistant Field Supervisors, Fish and Wildlife Service, Phoenix/Flagstaff/Tucson, AZ (Attn: M. Richardson, J. McIntyre)
Fish and Wildlife Biologist Species Leads, Phoenix/Tucson, AZ (Attn: G. Beatty, C. Crawford, M. Conway, N. Engelmann, D. Duncan, R. Gordan, R. Gonzalez, S. Hedwall, E. Fernandez, J. Miller, K. Robertson, J. Servoss, J. Douglas)
Manager, Him-Dak Department, Ak Chin Indian Community, Maricopa, AZ
Manager, Cultural Center, Fort McDowell Yavapai Nation, Fountain Hills, AZ
Director, Hopi Cultural Preservation Office, Kykotsmovi, AZ
Director, Zuni Heritage and Historic Preservation Office, Zuni, NM
Director, Historic Preservation Department, Navajo Nation, Window Rock, AZ
Tribal Historic Preservation Officer, Historic Preservation, Pascua Yaqui Tribe, Tucson, AZ
Director, Cultural Resources Department, Salt River Pima-Maricopa Indian Community, Scottsdale, AZ
Director, Tribal Historic Preservation Office, San Carlos Apache Tribe, San Carlos, AZ
Director, Recreation and Wildlife, San Carlos Apache Tribe, San Carlos, AZ
Director, Cultural Resources Department, Tonto Apache Tribe, Payson, AZ
Director, Cultural Resources Department, White Mountain Apache Tribe, Whiteriver, AZ
Director, Game and Fish Department, White Mountain Apache Tribe, Whiteriver, AZ
Director, Apache Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ
Director, Yavapai Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ
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Director, Environmental Programs, Bureau of Indian Affairs, Phoenix, AZ

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APPENDIX A: DEFINITIONS

CRITICAL HABITAT
“Critical habitat,” as defined in Section 3(5)(A) of the Act, means: (i) the specific areas within the geographical area occupied by the species at the time it is listed, on which are found those physical and biological features (PBFs) (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species. The term “conservation,” as defined in Section 3(3) of the Act, means: the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary. Therefore, in the case of critical habitat, conservation represents the areas required to recover a species to the point of delisting (i.e., the species is recovered and is removed from the list of endangered and threatened species). In this context, critical habitat preserves options for a species’ eventual recovery.

In our analysis of the effects of the action on critical habitat, we consider whether or not the proposed action will result in the destruction or adverse modification of critical habitat. In doing so, we must determine if the proposed action will result in effects that appreciably diminish the value of critical habitat for the recovery of a listed species (see p. 4-34, USFWS and National Marine Fisheries Service [NMFS] 1998). To determine this, we analyze whether the proposed action will adversely modify any of those physical or biological features (PBFs) that were the basis for determining the habitat to be critical. To determine if an action results in an adverse modification of critical habitat, we must also evaluate the current condition of all designated critical habitat units, and the PBFs of those units, to determine the overall ability of all designated critical habitat to support recovery. Further, the functional role of each of the critical habitat units in recovery must also be defined.

Table A-1. Commonly used abbreviations and acronyms.

Abbreviation or acronym	Full text
ac	acres
AGFD	Arizona Game and Fish Department
BA	Biological Assessment
BMPs	Best Management Practices
BO	Biological Opinion
BO/CO	Biological/Conference Opinion
CH	Critical Habitat
CHU	Critical Habitat Unit
dbh	Diameter at breast height
EG	Energy Production and Delivery
ERU	Vegetation and Ecological Response Units
FC	Facilities
FF	Fire and Fuels
FP	Forestry and Forest Products
ft	feet

Abbreviation or acronym	Full text
GRZ	Rangelands, Forage, and Grazing
ha	hectares
INS	Invasive Species
km	kilometers
LA	Lands and Access
LRMP	Land and Resource Management Plans (Forest Plans)
m	meters
MA	Management Area
mi	miles
MMAM	Mining, Minerals, and Abandoned Mines
NF	National Forest
NFS	National Forest System
NM	New Mexico
NMDGF	New Mexico Department of Game and Fish
OHV	Off Road Vehicle
PAC	Protected Activity Center
PBF	Physical Biological Features
PCE	Primary Constituent Element
RD	Roads
REC	Recreation
RERU	Riparian Ecological Response Units
RMZ	Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones
SL	Soils
SRP	Salt River Project
Sq	square
SU	Special Uses
TMR	Travel Management Rule
U.S.	United States
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WAT	Watersheds and Water Resources
WFP	Wildlife, Fish, and Plants

APPENDIX B: CONFERENCE REPORT FOR NONESSENTIAL EXPERIMENTAL 10(j) POPULATIONS

This appendix contains our "not likely to jeopardize determinations" for the nonessential experimental populations of the Colorado pikeminnow (*Ptychocheilus lucius)* and Mexican gray wolf (*Canis lupus baileyi)*. Section 10(j) of the Act authorizes listed species to be released as experimental populations outside their currently occupied range, but within probable historic habitat, to further species conservation. Before making a release, the Services determine by rulemaking whether a population is "essential" or "nonessential" to the survival of the species in the wild. Experimental populations are also referred to as "10(j)" populations.

The May 18, 2021, biological assessment (BA) includes a complete description of the proposed action. In summary, the proposed action is the implementation of the Tonto National Forest's revised Land and Resource Management Plan in Gila, Maricopa, Yavapai, and Pinal counties, Arizona.

Information on the life history, distribution, threats, and status of these species are found in the 2021 BA (USFS 2021a), and the listing and recovery documents for each of these species on our AESO website and on the Environmental Conservation Online System. We incorporate this information here by reference.

Colorado Pikeminnow (Inside the Nonessential Experimental Boundaries)
Colorado pikeminnow (*Ptychocheilus lucius*) was listed as an endangered species in 1967 (USFWS 1967). In 1985, portions of the Salt River and the Verde River were designated as nonessential experimental populations (USFWS 1985) (Appendix D, Figure D-17a and 17b).

The USFWS concurs with your determination that the proposed action is *not likely to jeopardize* the Colorado pikeminnow nonessential experimental population. There is no designated critical habitat for Colorado pikeminnow in Arizona. Our concurrence is based on the following:

- The implementation of actions under the Tonto NF LRMP will have limited effects to the lower Verde River, where stocking of pikeminnow has occurred. Management is directed towards achieving desired conditions, which include sustaining flows and natural flow regimes in streams; maintaining water quality suitable for supporting growth, reproduction, and migration of native aquatic species; and maintaining a diversity of instream habitats and organic materials that support fish and aquatic invertebrates.
- The Forest Service has made efforts to acquire water rights to improve the flow regime on the Verde River as well as to monitor non-native fish populations (in partnership with University of Arizona, ADGF and Rocky Mountain Research Station) in relation to the Colorado pikeminnow. These monitoring activities are being used to further guide management in the future to improve habitat conditions that will benefit Colorado pikeminnow.

Mexican Wolf (Inside the Non-essential Experimental Boundary)
The Mexican gray wolf (*Canis lupus baileyi*) was listed as an endangered species in April 1976 (USFWS 1976). In 1998 a nonessential experimental population of Mexican gray wolf was

designated in portions of Arizona and New Mexico (USFWS 1998) (Appendix D, Figure D-18). A detailed account of the taxonomy, biology, and reproductive characteristics of the Mexican gray wolf is found in the Mexican Wolf Conservation Assessment (USFWS 2010), as well as the Mexican Wolf Recovery Plan (USFWS 1982). This information is incorporated herein via reference. There are no known wolves occurring within the action area.

The USFWS concurs with your determination that the proposed action is *not likely to jeopardize* the nonessential experimental population of Mexican gray wolves. There is no designated critical habitat for Mexican wolf. Our concurrence is based on the following:

- Because of the Mexican wolf's status as a nonessential experimental population, wolves found in Arizona are treated as though they are proposed for listing for section 7 consultation purposes. By definition, a nonessential experimental population is not essential to the continued existence of the species. Thus, no proposed action impacting a population so designated under the Act §10(j) could lead to a jeopardy determination for the entire species.

APPENDIX C: OVERVIEW MAP OF THE TONTO NATIONAL FOREST AND VICINITY

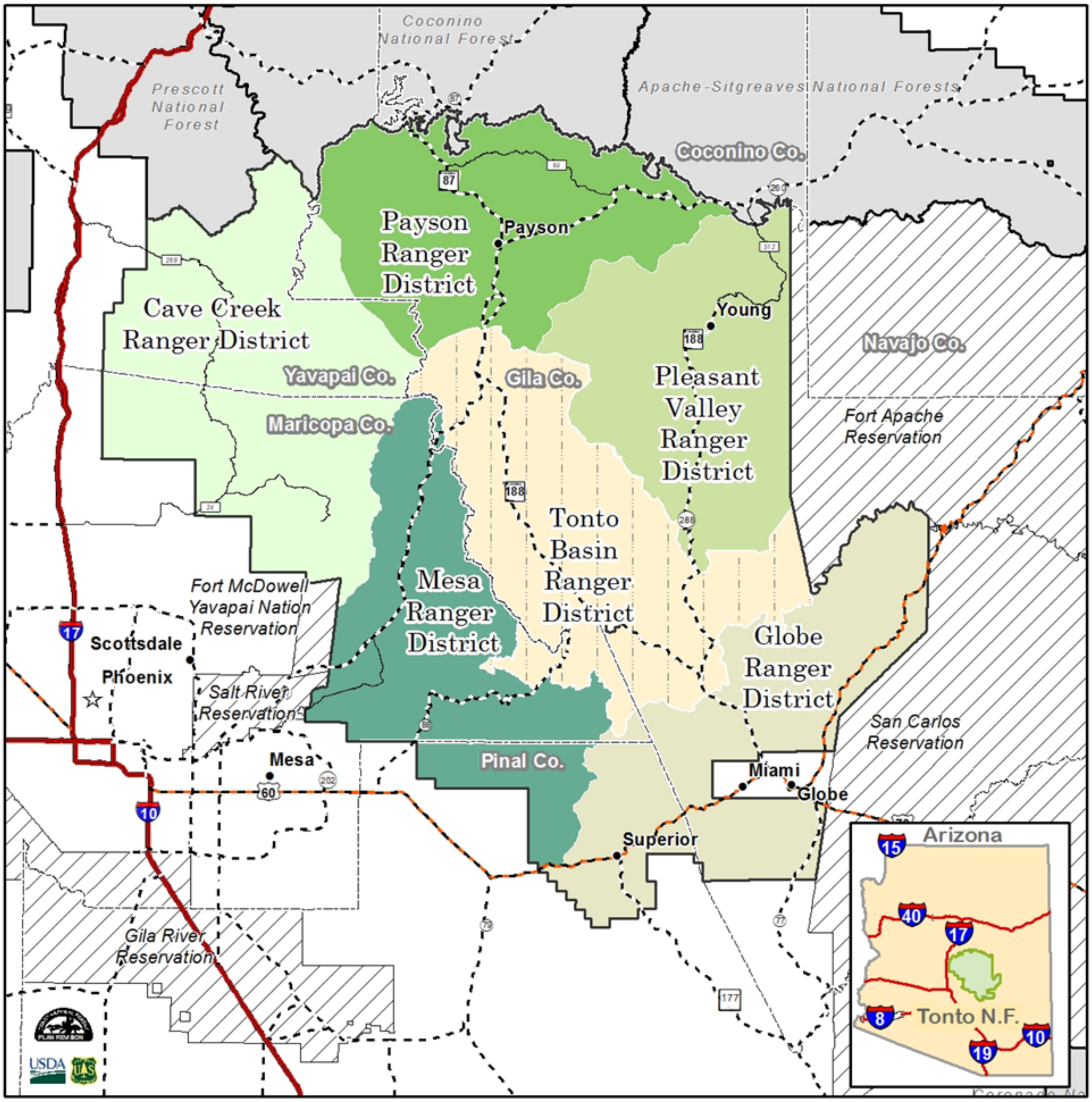


Figure C-1. Map of the Tonto National Forest and vicinity.

APPENDIX D: LISTED SPECIES MAPS ON THE TONTO NATIONAL FOREST

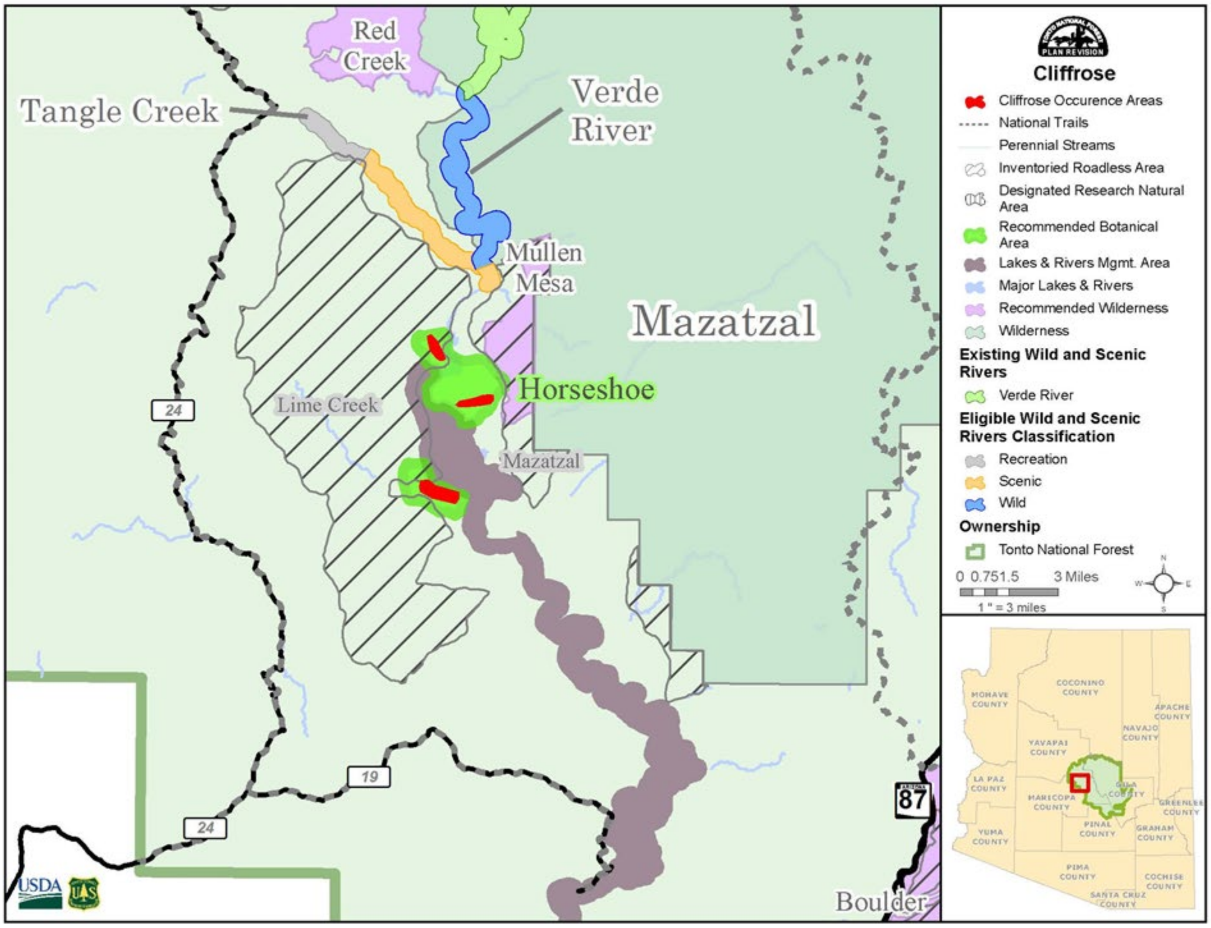


Figure D-1. Distribution of Arizona cliffrose and management areas on the Tonto National Forest.

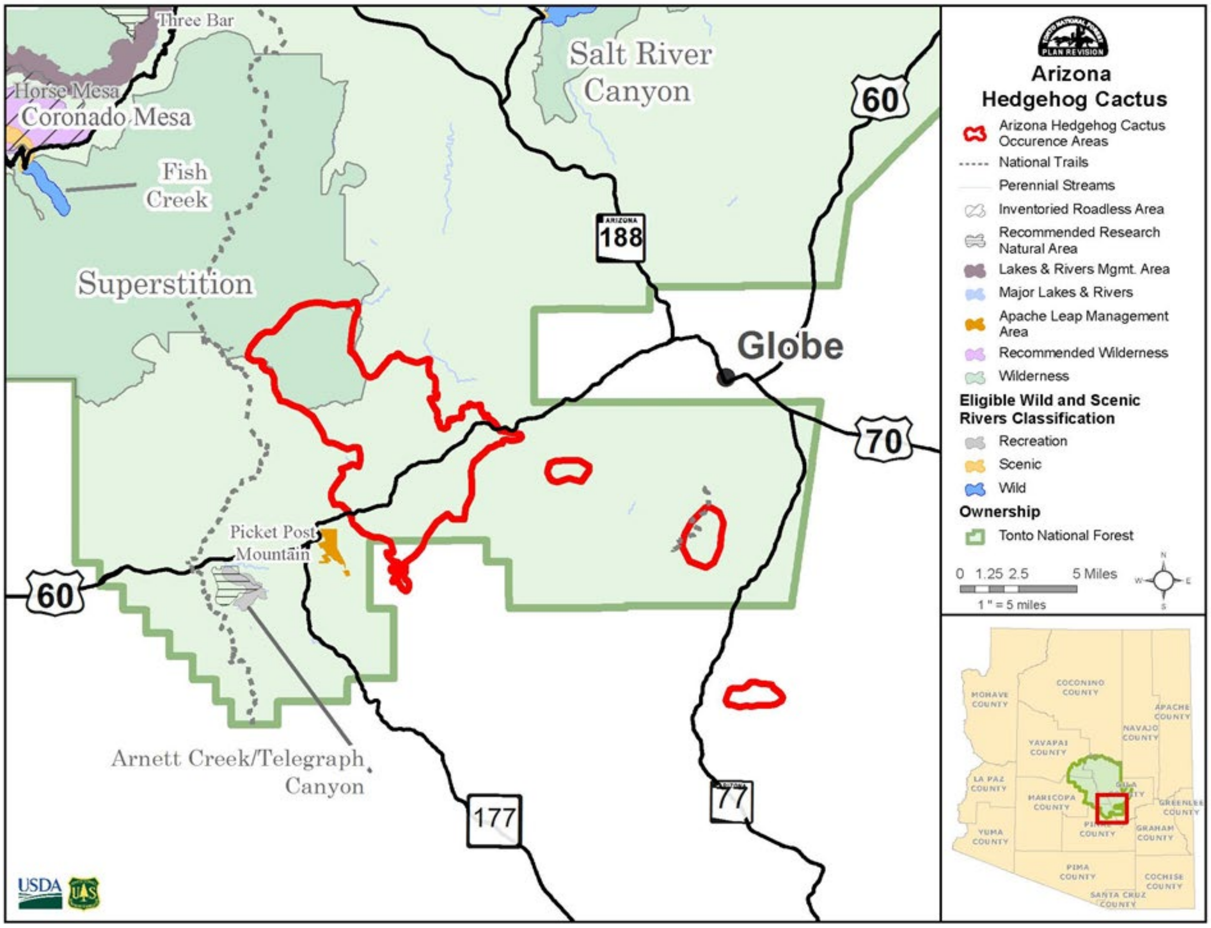


Figure D-2. Distribution of Arizona hedgehog cactus and management areas on the Tonto National Forest.

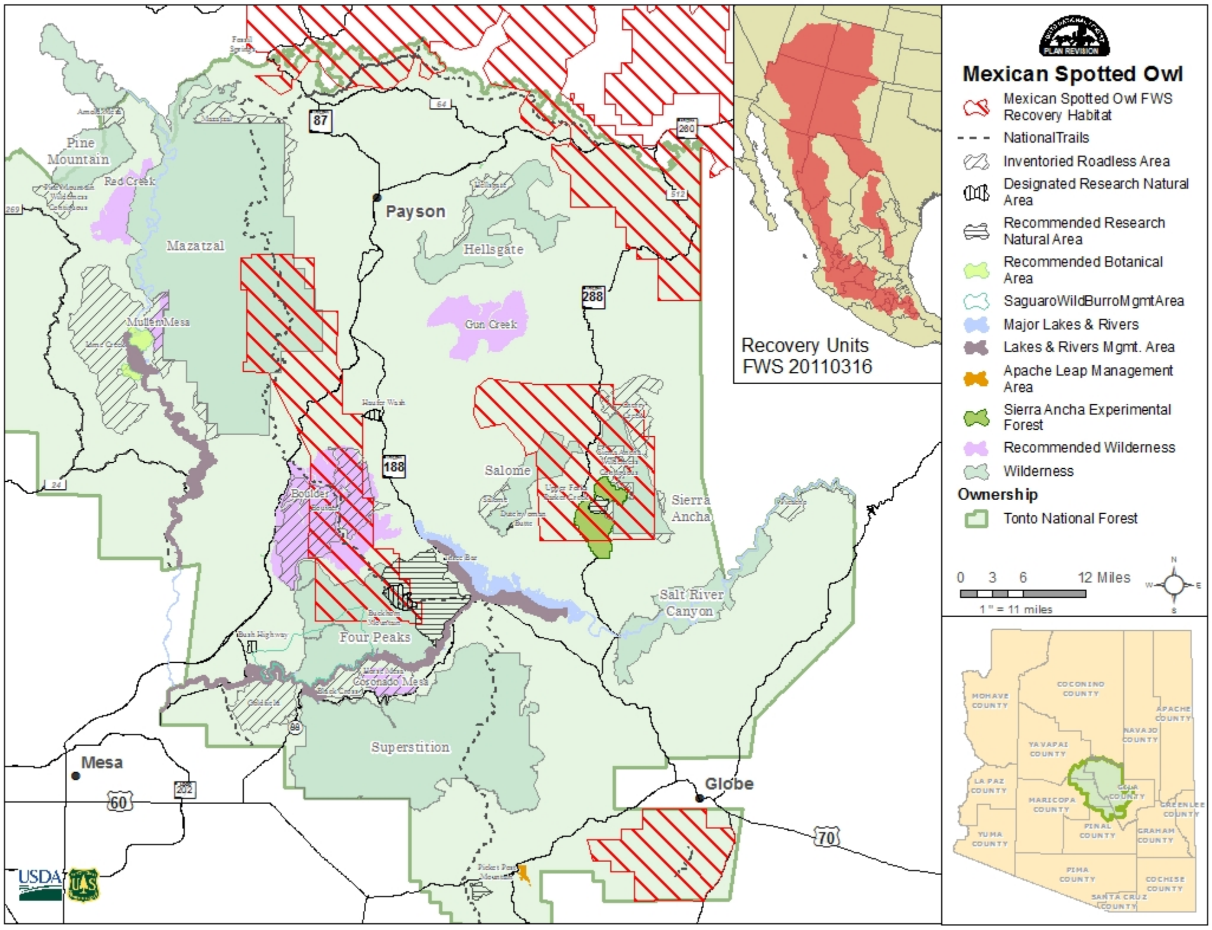
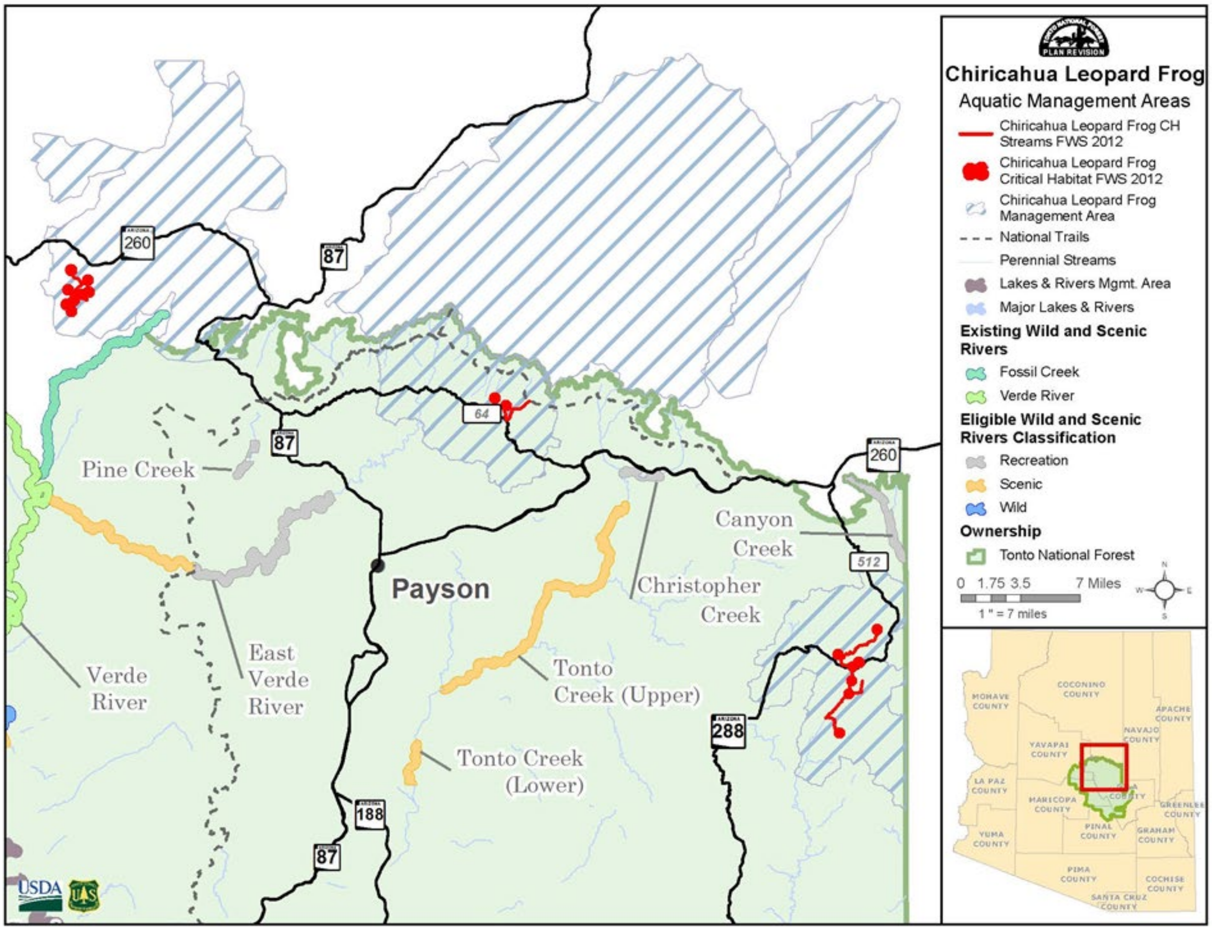


Figure D-3. Mexican spotted owl critical habitat and Protected Activity Centers (PACs) and management areas on the Tonto National Forest.



Chiricahua Leopard Frog
Aquatic Management Areas
Chiricahua Leopard Frog CH Streams FWS 2012
Chiricahua Leopard Frog Critical Habitat FWS 2012
Chiricahua Leopard Frog Management Area
National Trails
Perennial Streams
Lakes & Rivers Mgmt. Area
Major Lakes & Rivers
Existing Wild and Scenic Rivers
Fossil Creek
Verde River
Eligible Wild and Scenic Rivers Classification
Recreation
Scenic
Wild
Ownership
Tonto National Forest
0 1.75 3.5 7 Miles
1 " = 7 miles
Payson
Pine Creek
Canyon Creek
Christopher Creek
East Verde River
Verde River
Tonto Creek (Upper)
Tonto Creek (Lower)
260
87
64
260
512
288
188
87
USDA

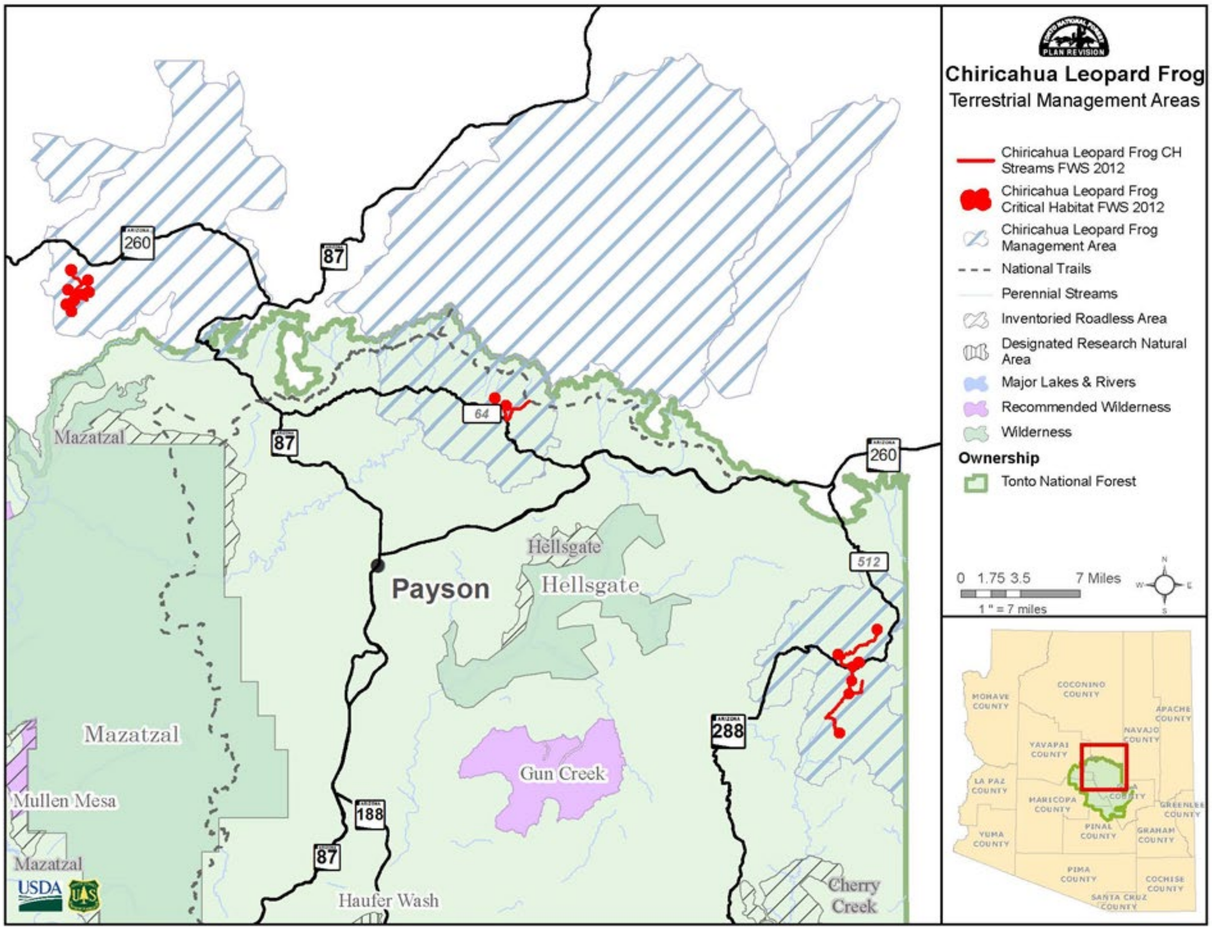


Figure D-4b. Distribution of Chiricahua leopard frog and terrestrial management areas on the Tonto National Forest.

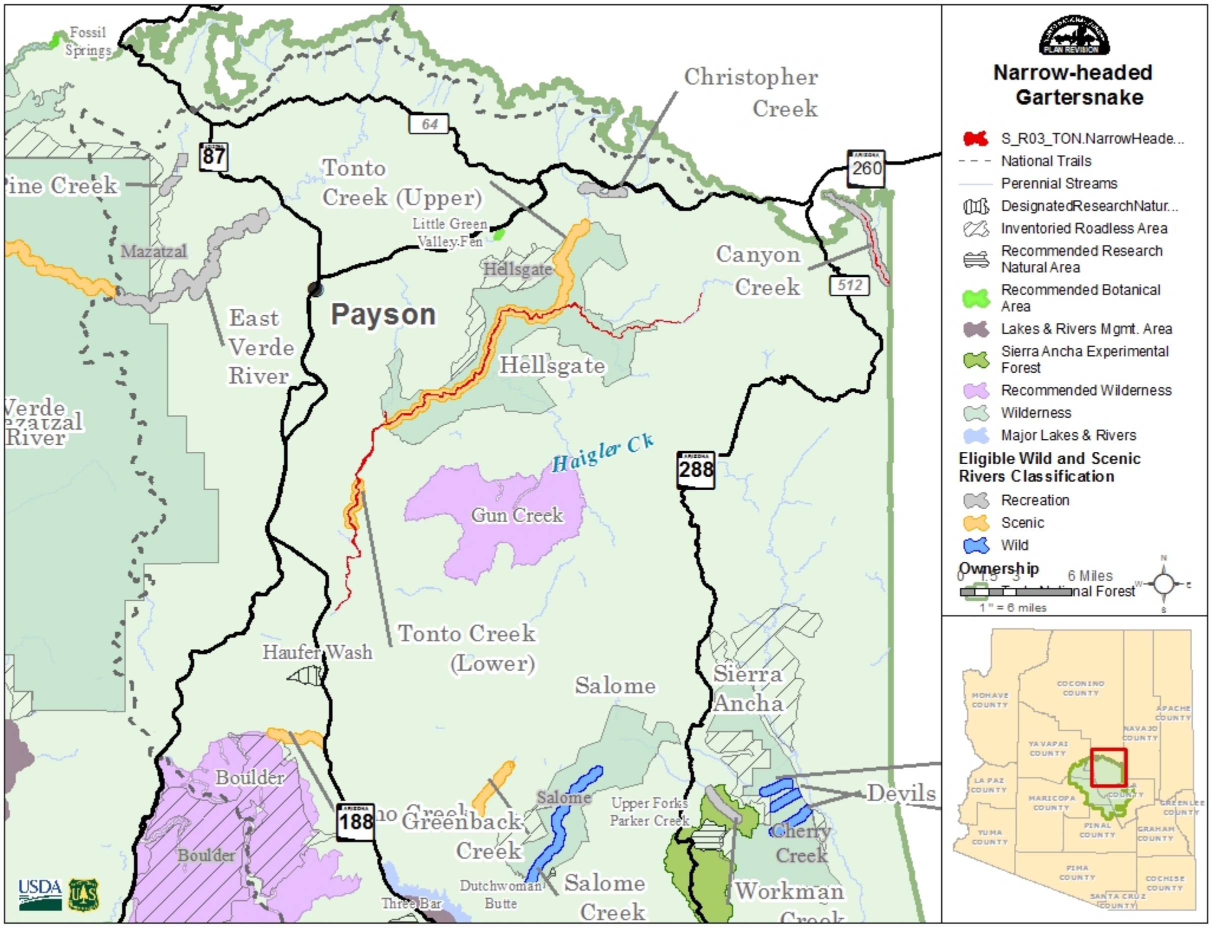


Figure D-5. Distribution of narrow-headed gartersnake and management areas on the Tonto National Forest.

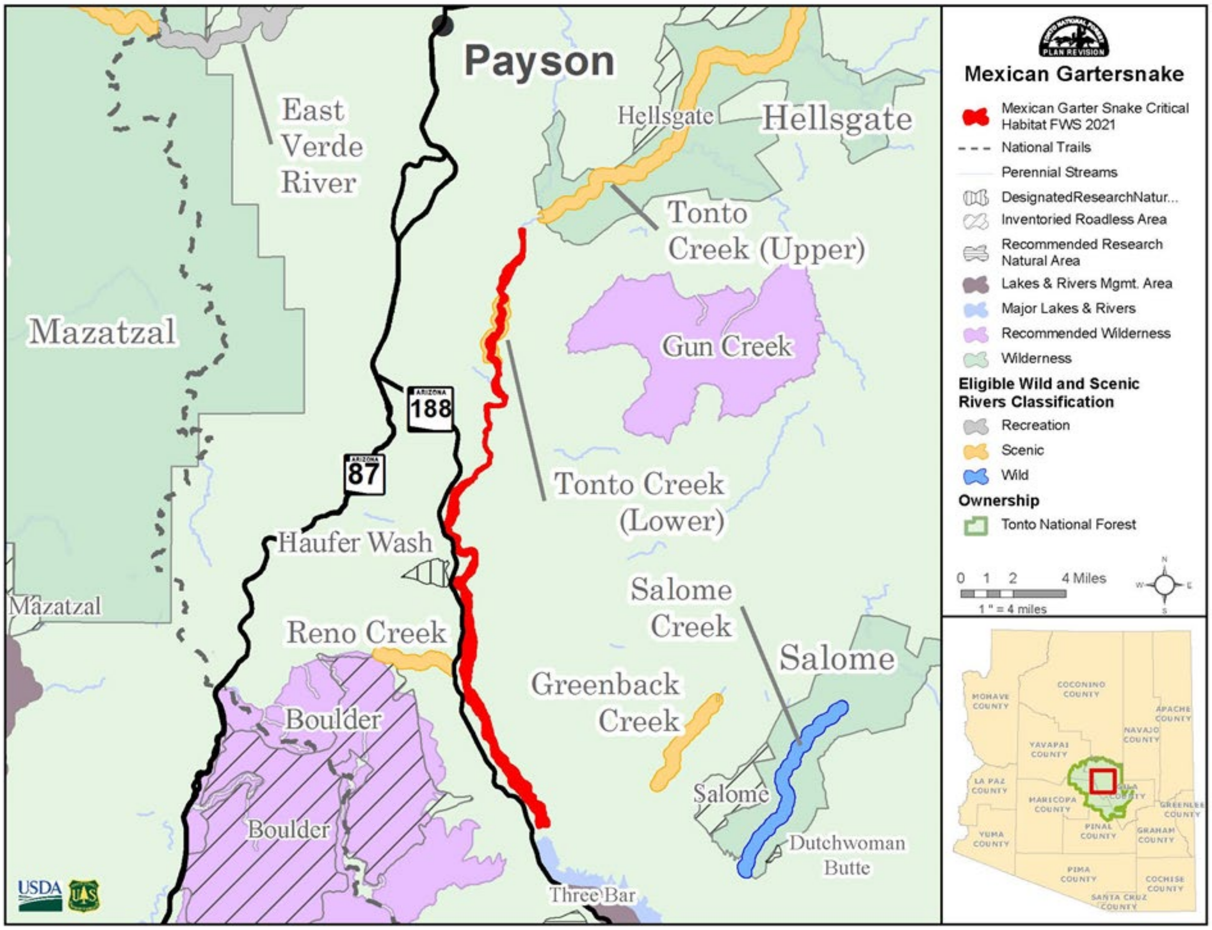


Figure D-6. Distribution of northern Mexican gartersnake and management areas on the Tonto National Forest.

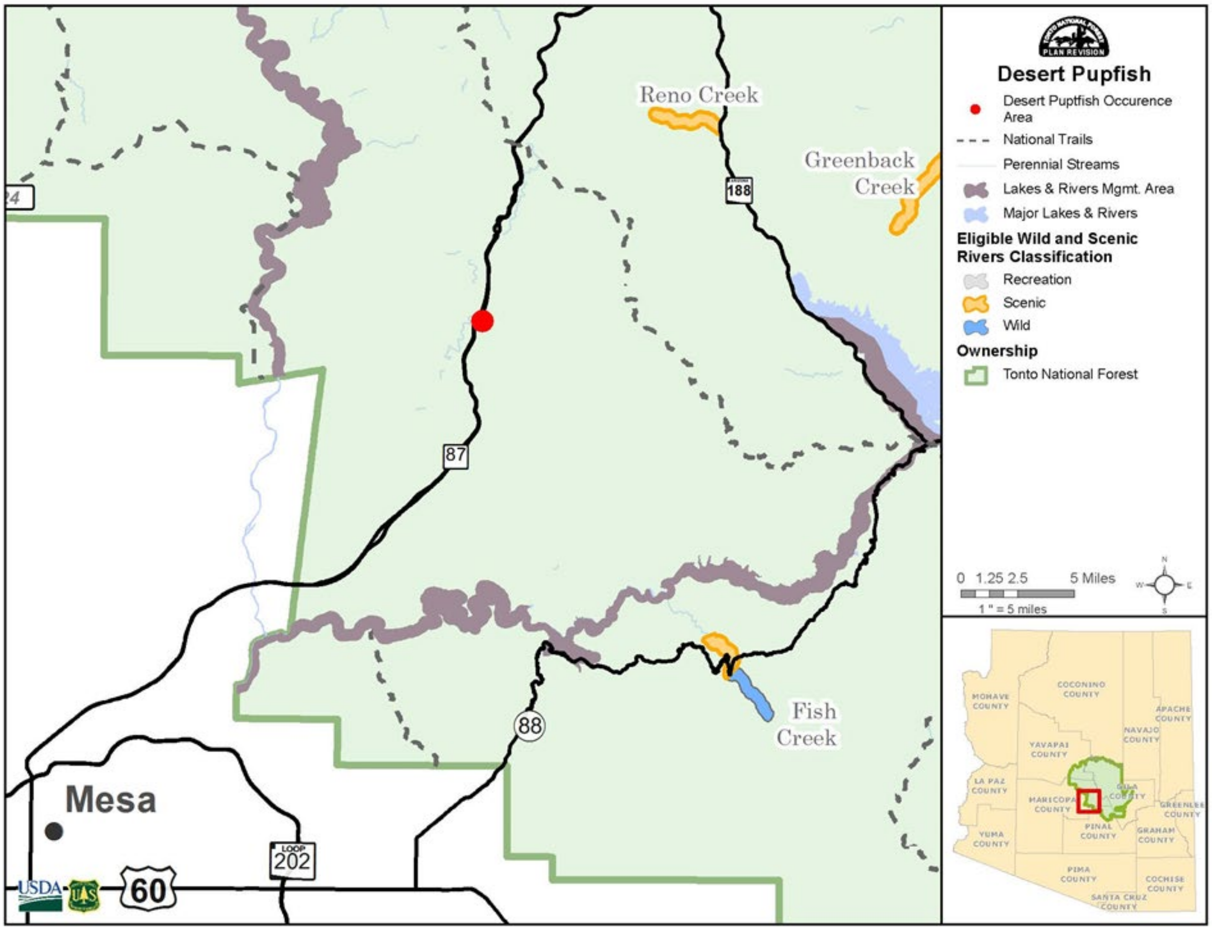


Figure D-7a. Distribution of desert pupfish and aquatic management areas on the Tonto National Forest.

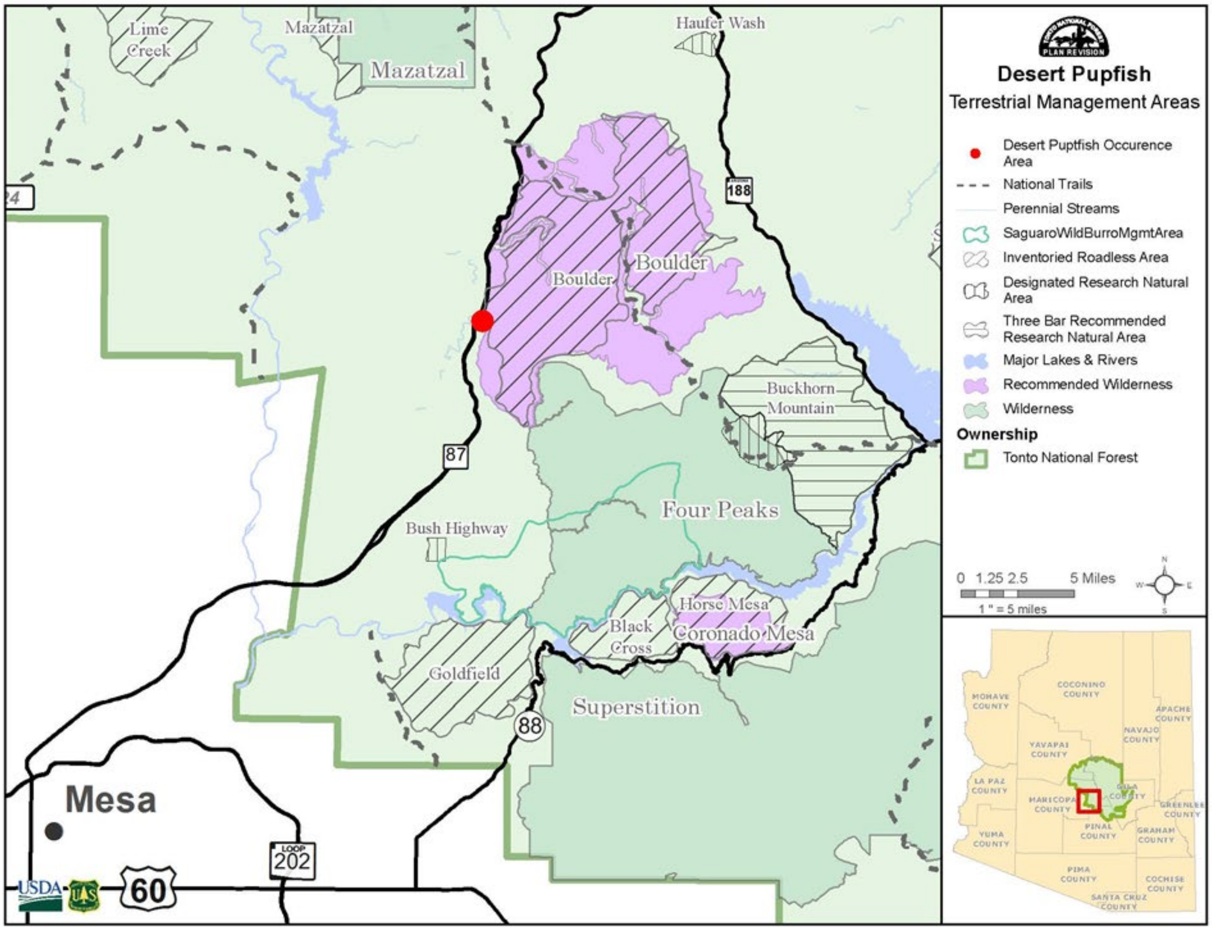


Figure D-7b. Distribution of desert pupfish and terrestrial management areas on the Tonto National Forest.

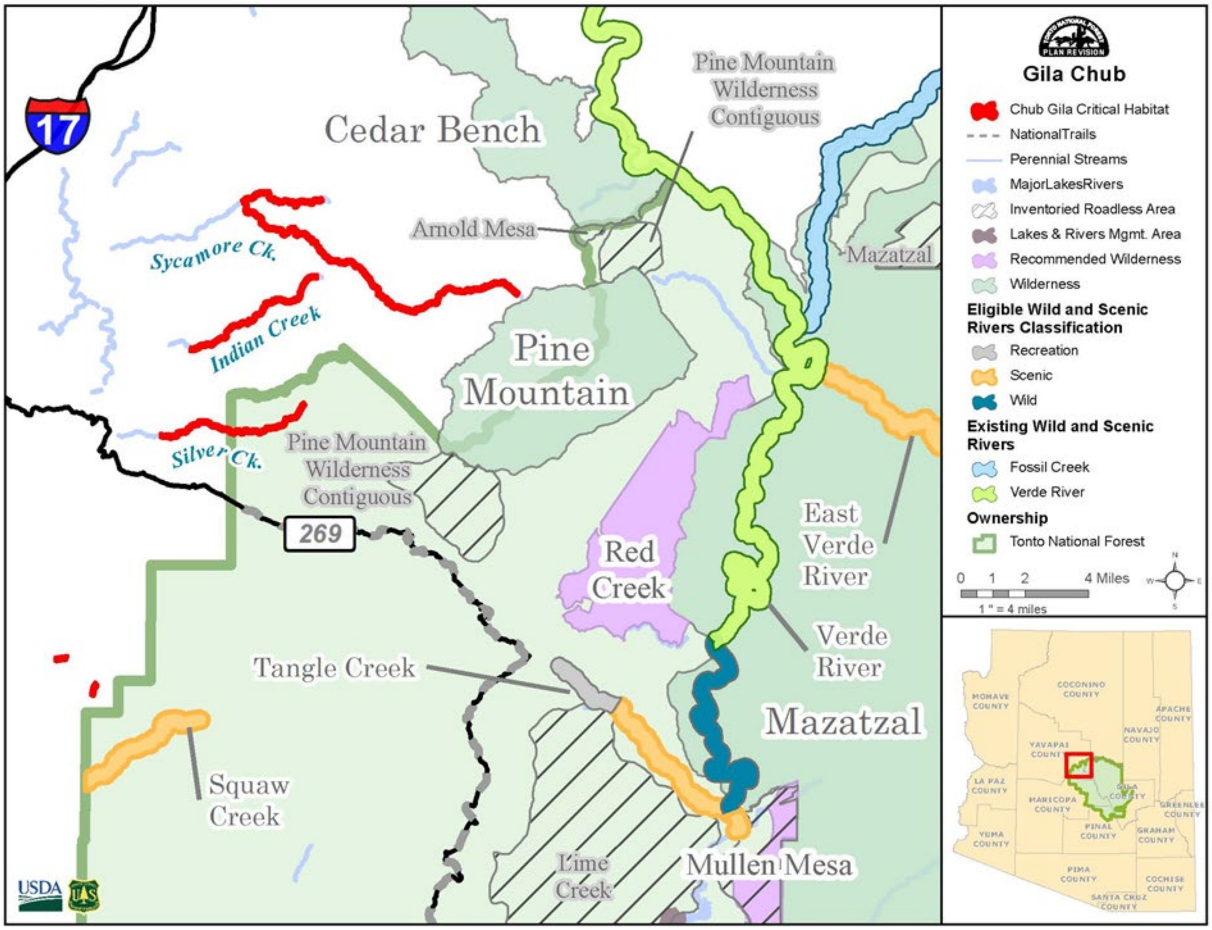


Figure D-8. Distribution of Gila chub and aquatic management areas on the Tonto National Forest.

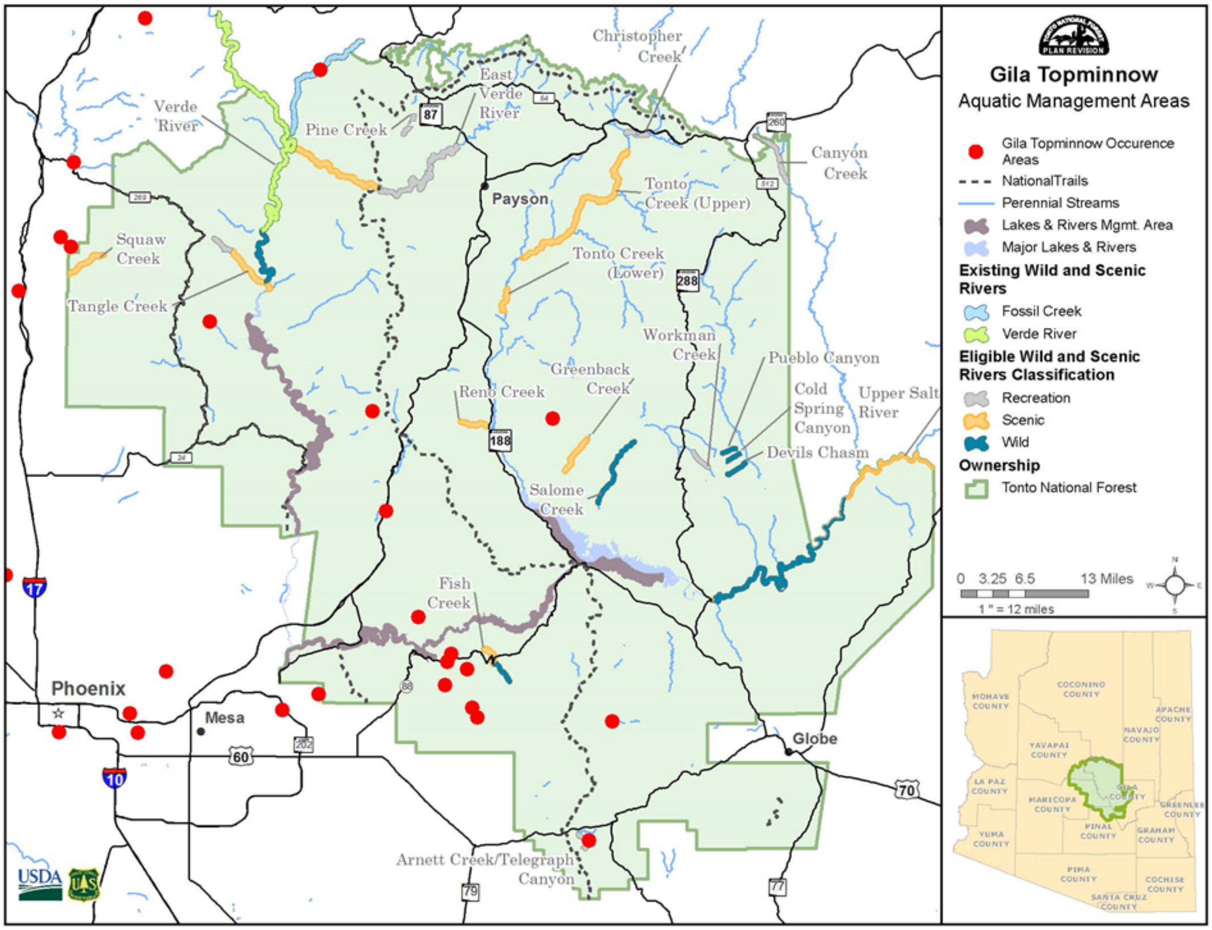


Figure D-9a. Distribution of Gila topminnow and aquatic management areas on the Tonto National Forest.

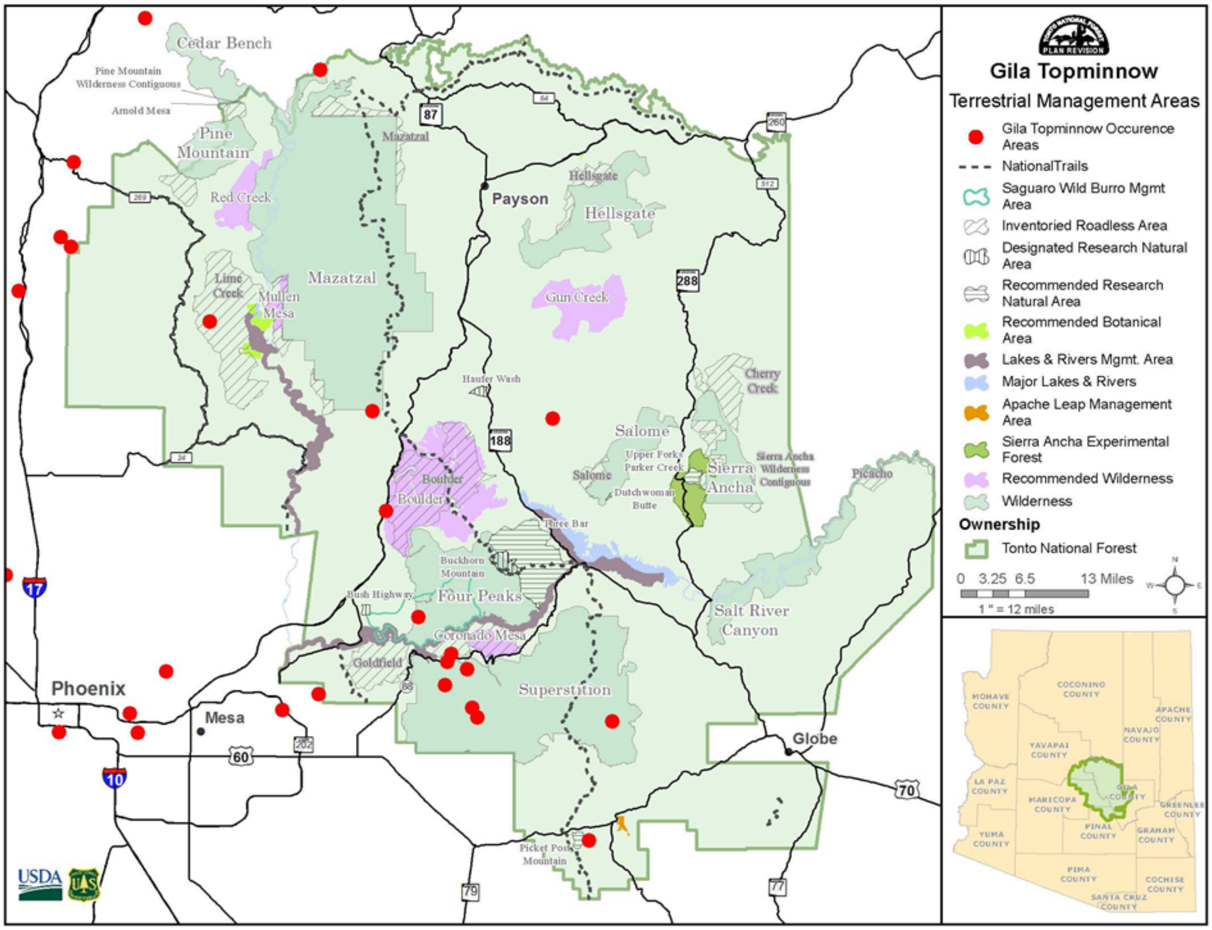


Figure D-9b. Distribution of Gila topminnow and terrestrial management areas on the Tonto National Forest.

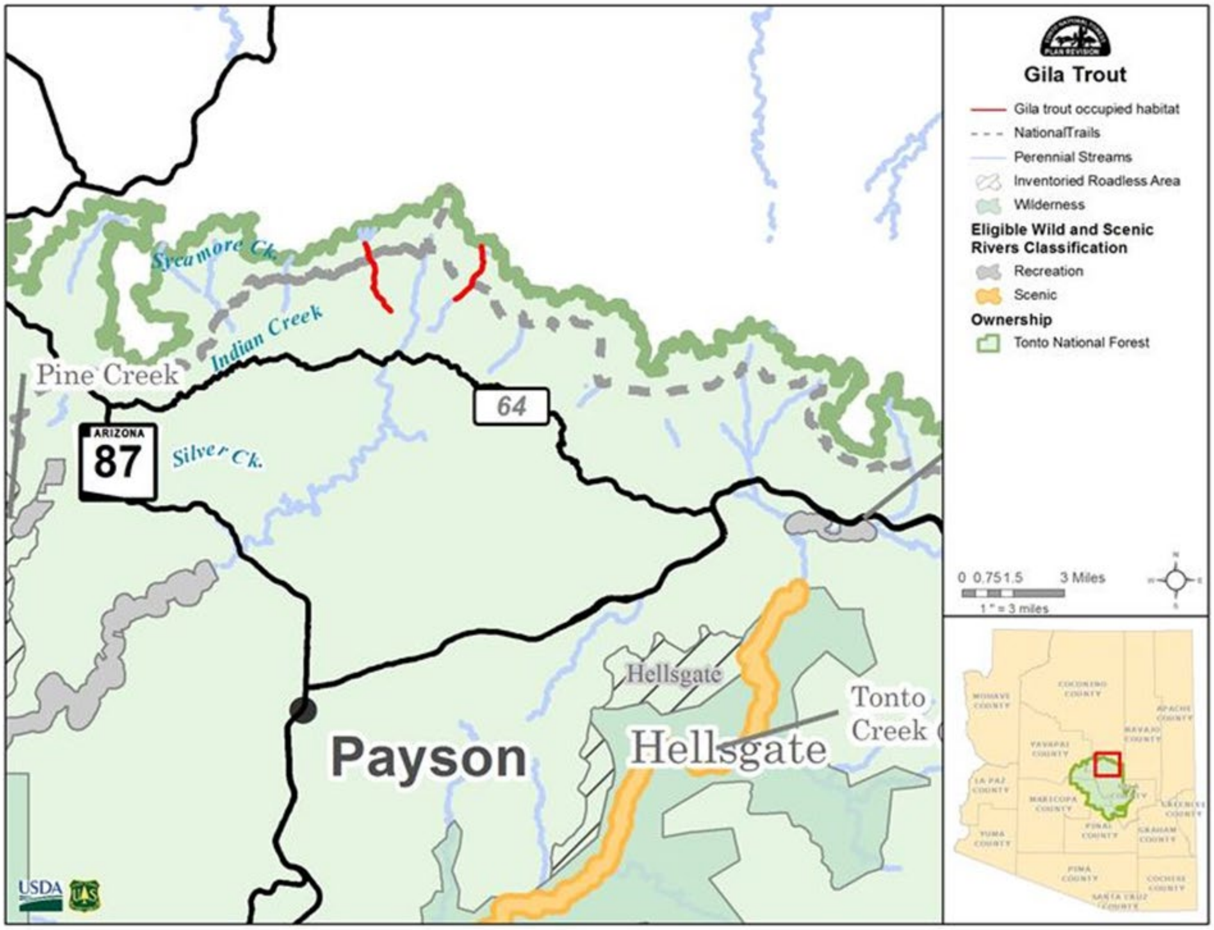


Figure D-10. Distribution of Gila trout and management areas on the Tonto National Forest.

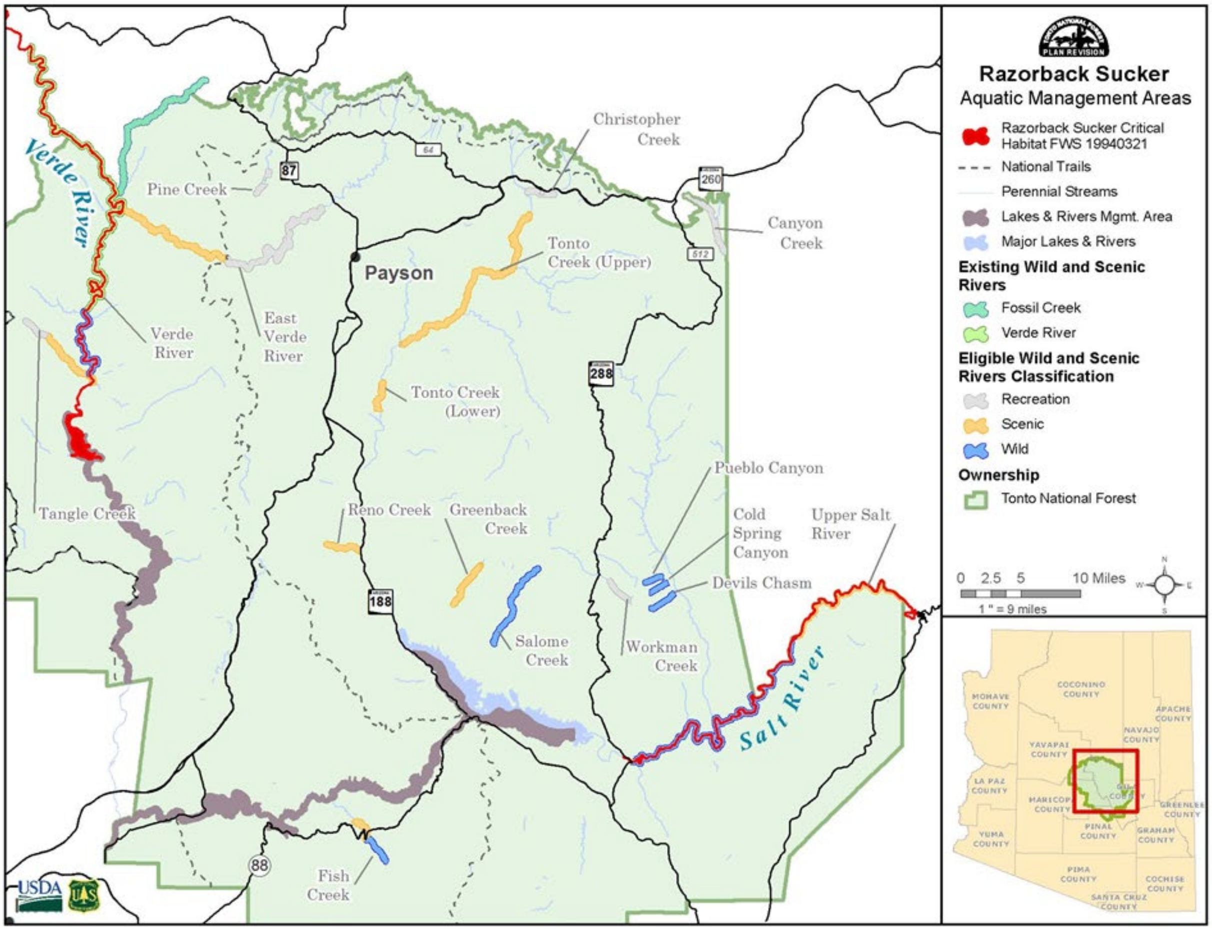


Figure D-11a. Distribution of razorback sucker and aquatic management areas on the Tonto National Forest.

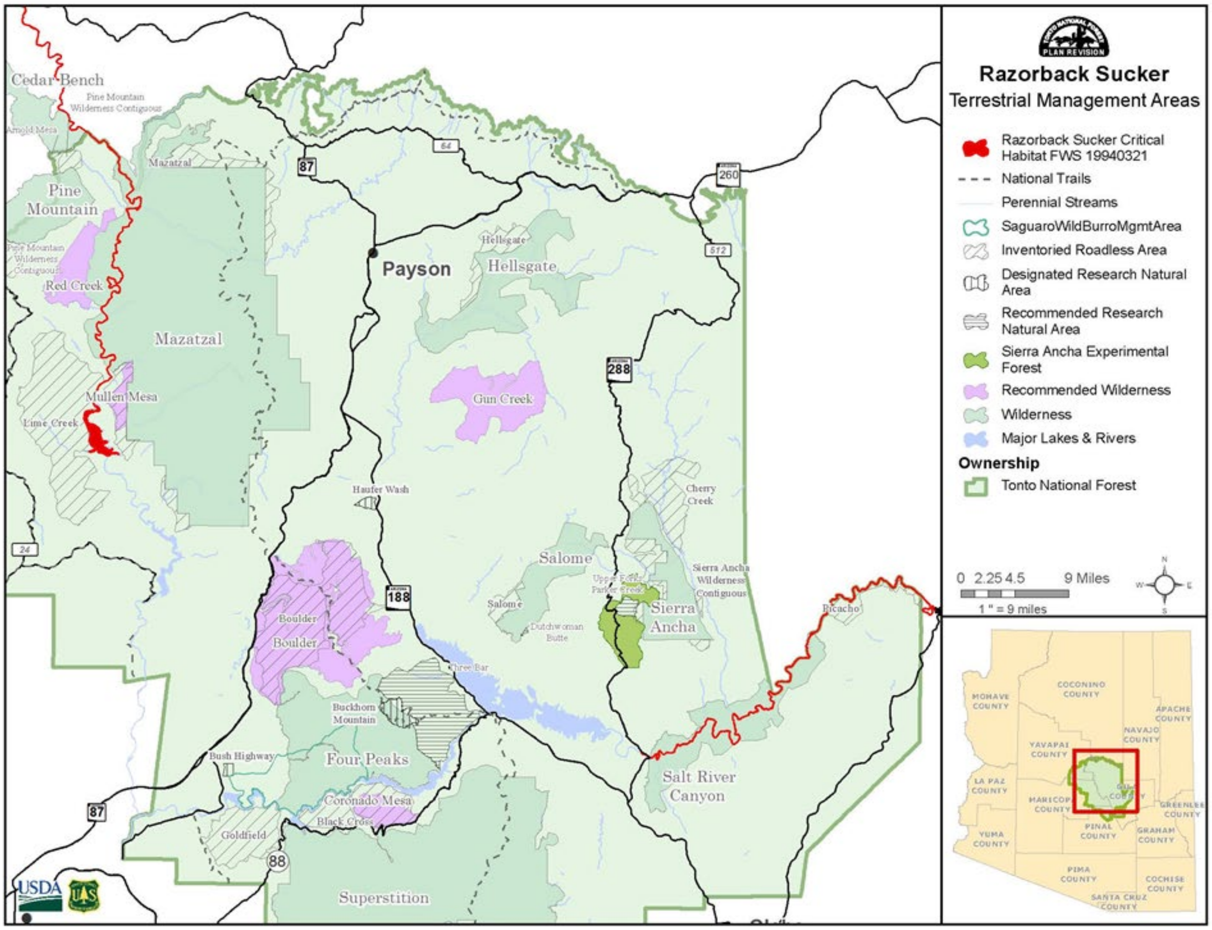


Figure D-11b. Distribution of razorback sucker and terrestrial management areas on the Tonto National Forest.

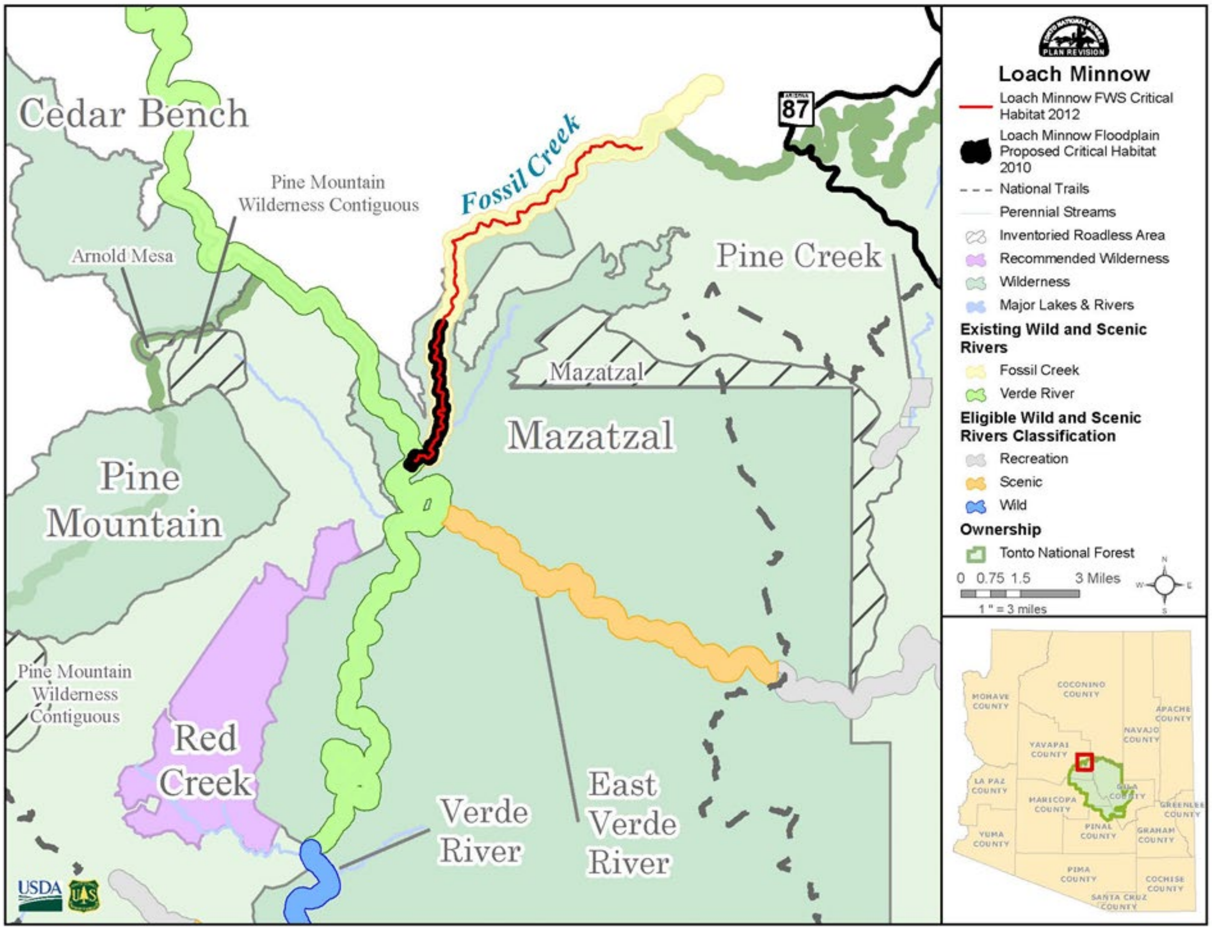


Figure D-12. Distribution of loach minnow and management areas on the Tonto National Forest.

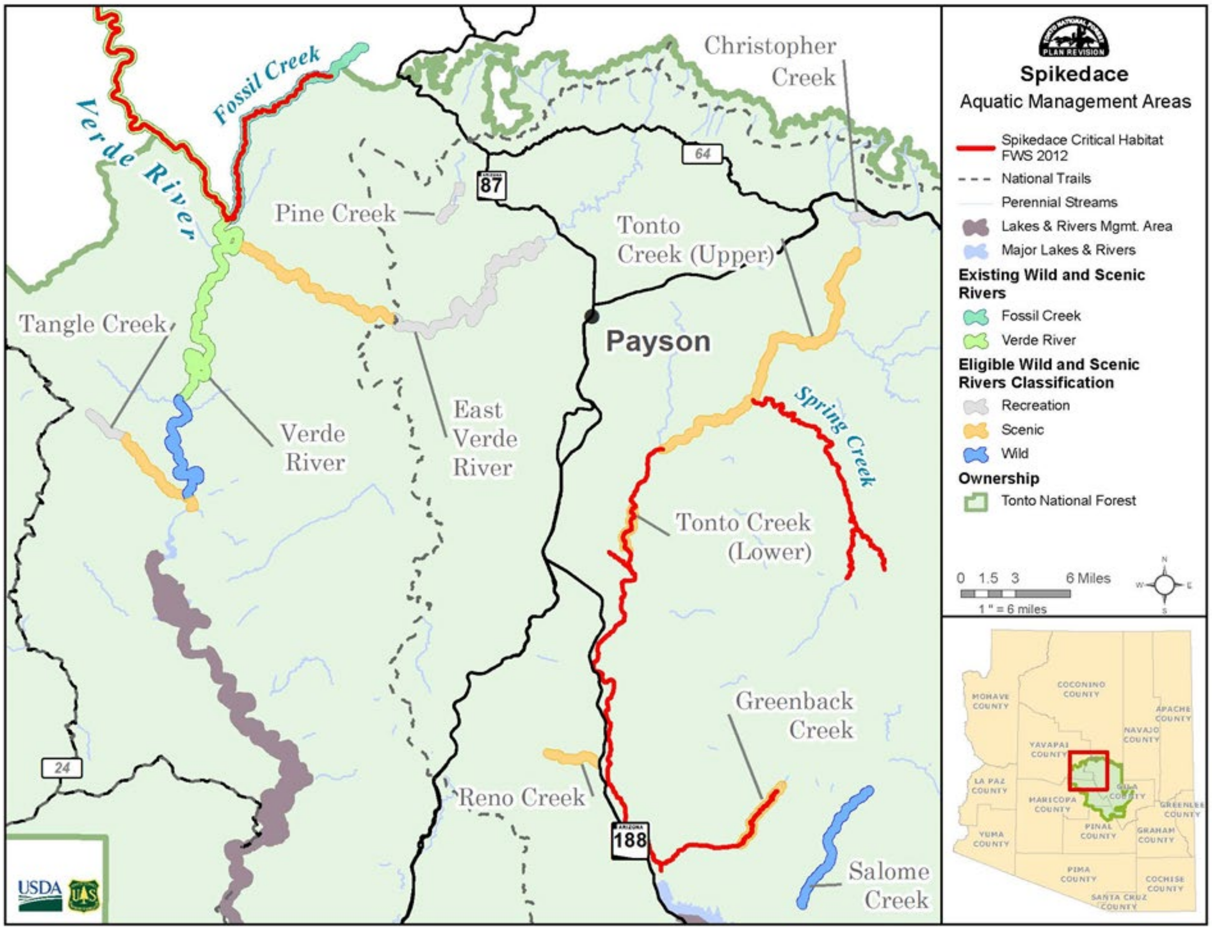


Figure D-13a. Distribution of spikedace and aquatic management areas on the Tonto National Forest.

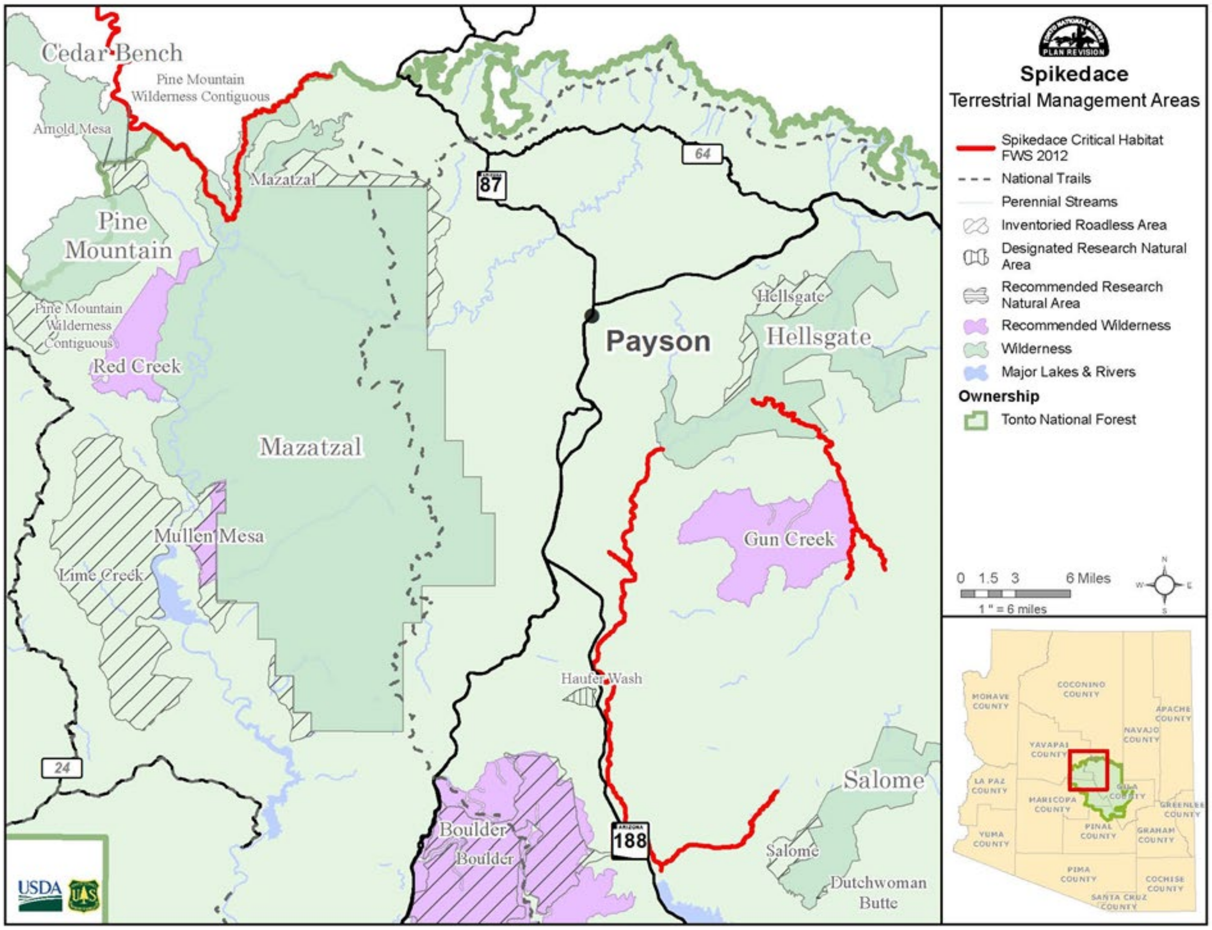


Figure D-13b. Distribution of spikedace and terrestrial management areas on the Tonto National Forest.

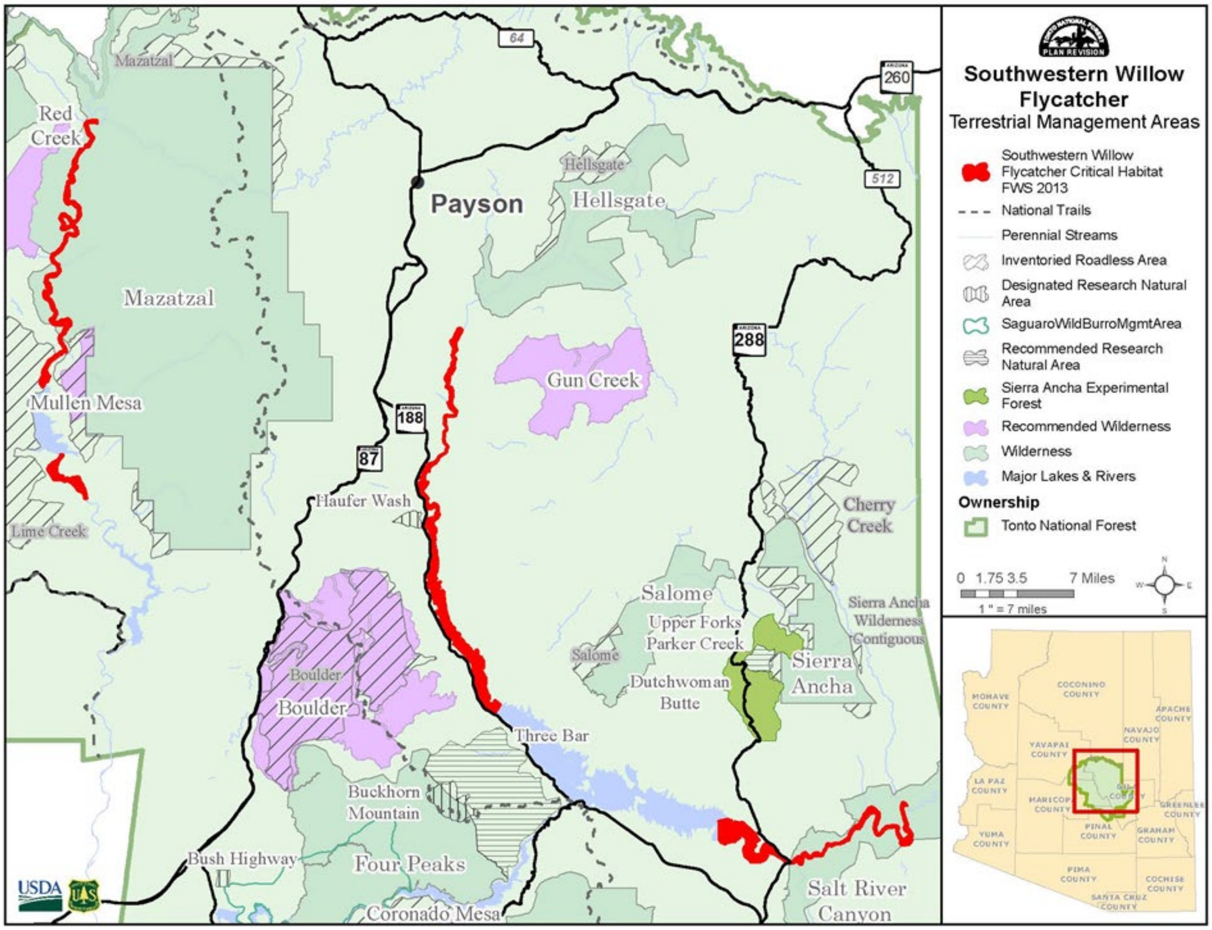


Figure D-14. Southwestern willow flycatcher critical habitat and terrestrial management areas on the Tonto National Forest.

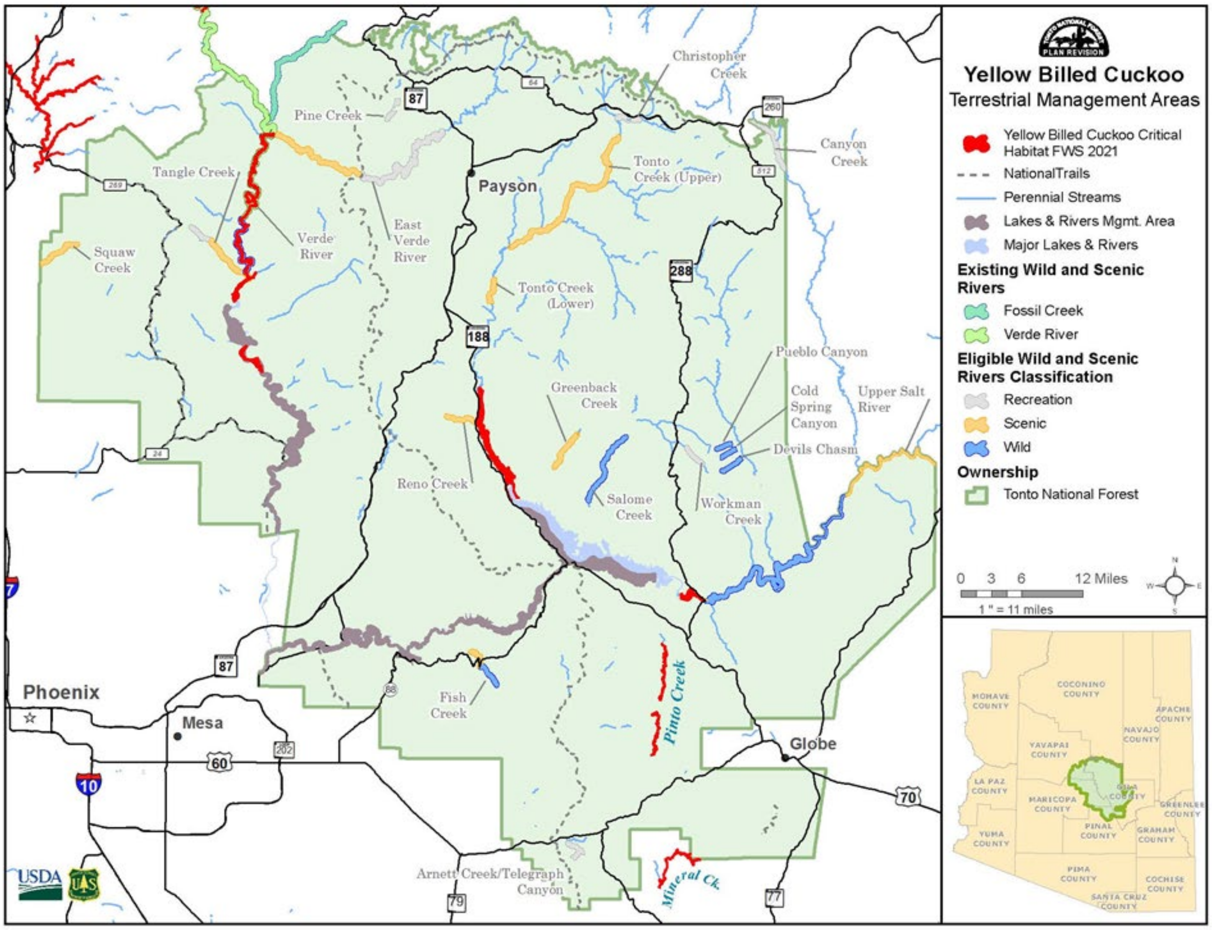


Figure D-15a. Yellow-billed cuckoo critical habitat and aquatic management areas on the Tonto National Forest.

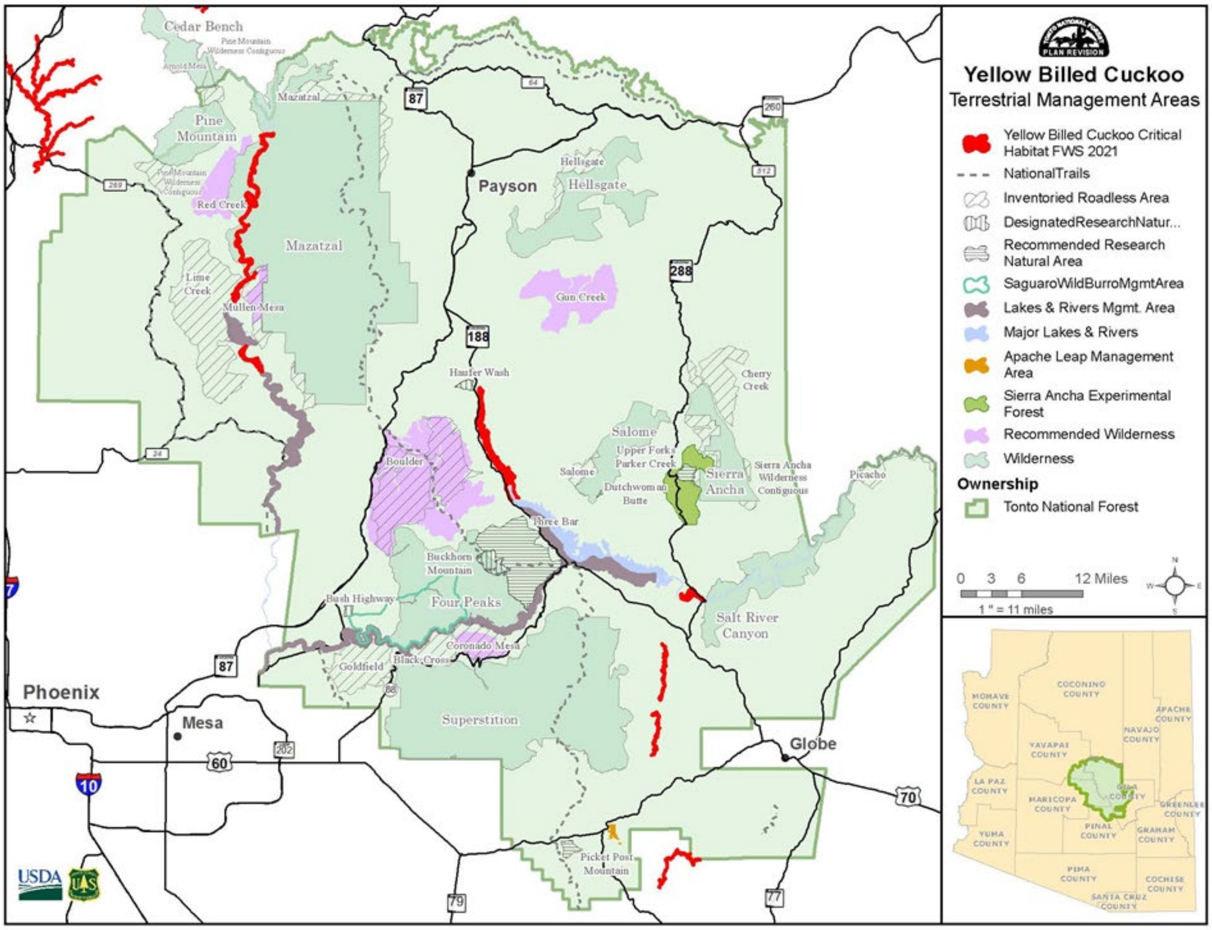


Figure D-15b. Yellow-billed cuckoo critical habitat and terrestrial management areas on the Tonto National Forest.

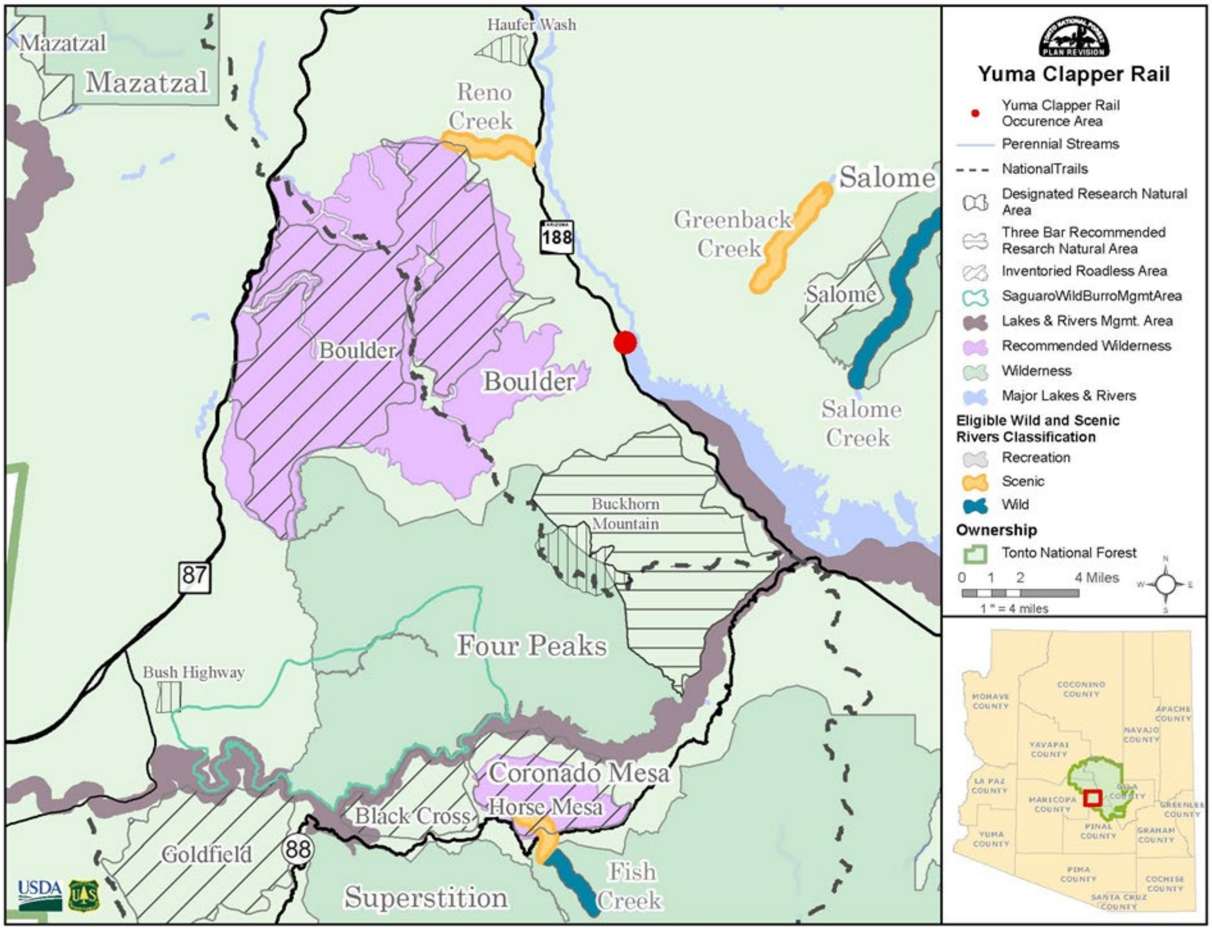


Figure D-16. Distribution of Yuma Ridgway's rail management areas on the Tonto National Forest.

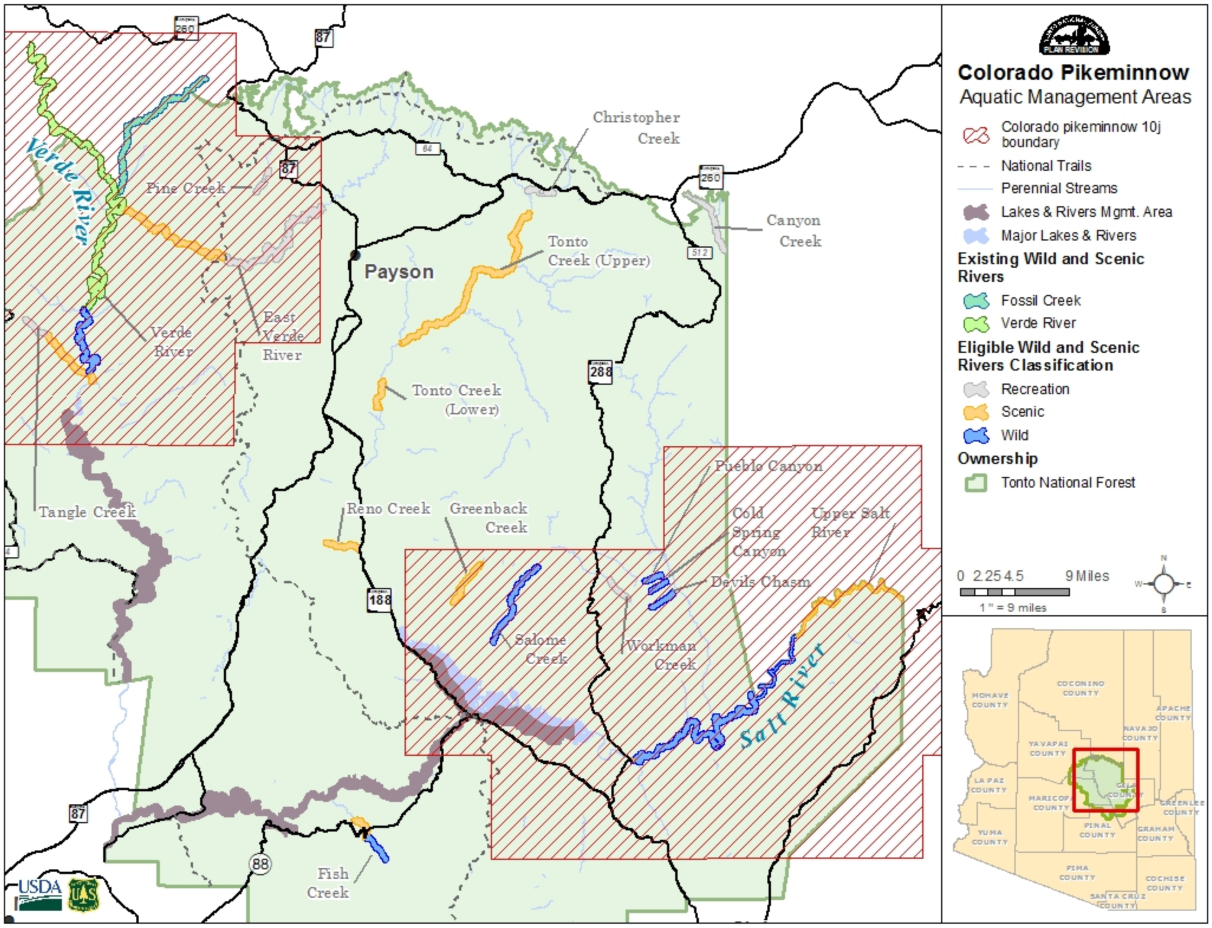


Figure D-17a. Colorado pikeminnow 10(j) boundary and aquatic management areas on the Tonto National Forest.

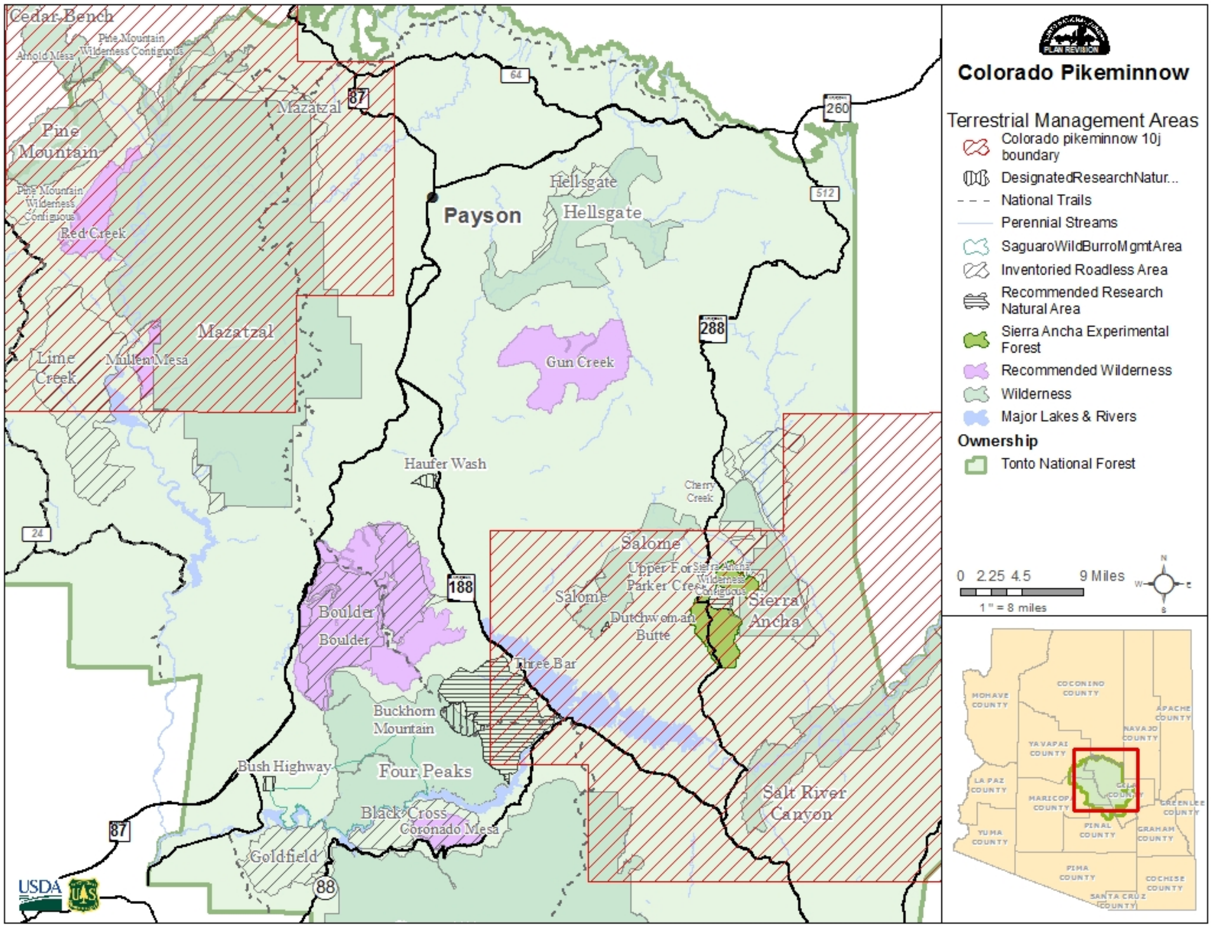


Figure D-17b. Colorado pikeminnow 10(j) boundary and terrestrial management areas on the Tonto National Forest.

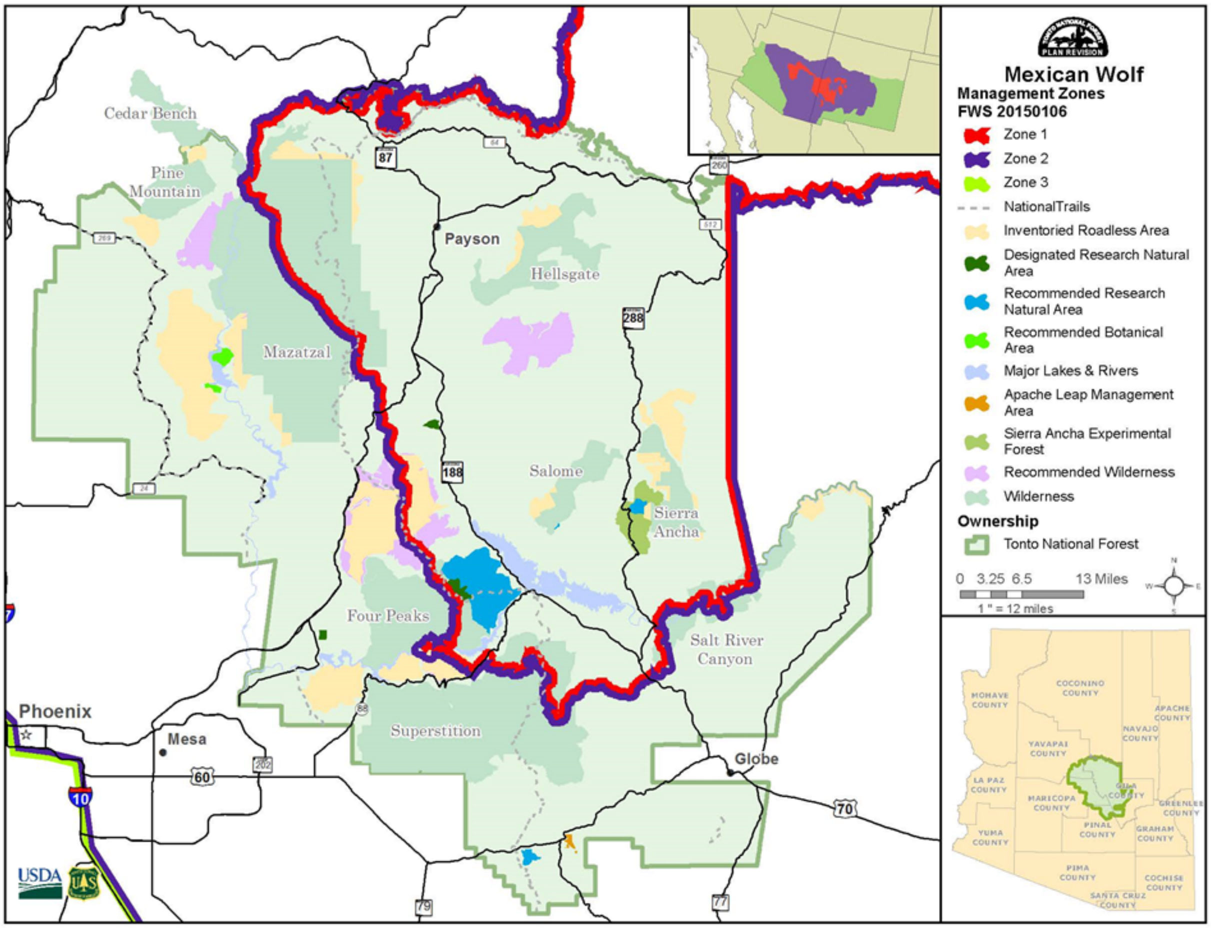


Figure D-18. Mexican wolf 10(j) boundary and management areas on the Tonto National Forest.

APPENDIX E: MANAGEMENT AREAS ON THE TONTO NATIONAL FOREST

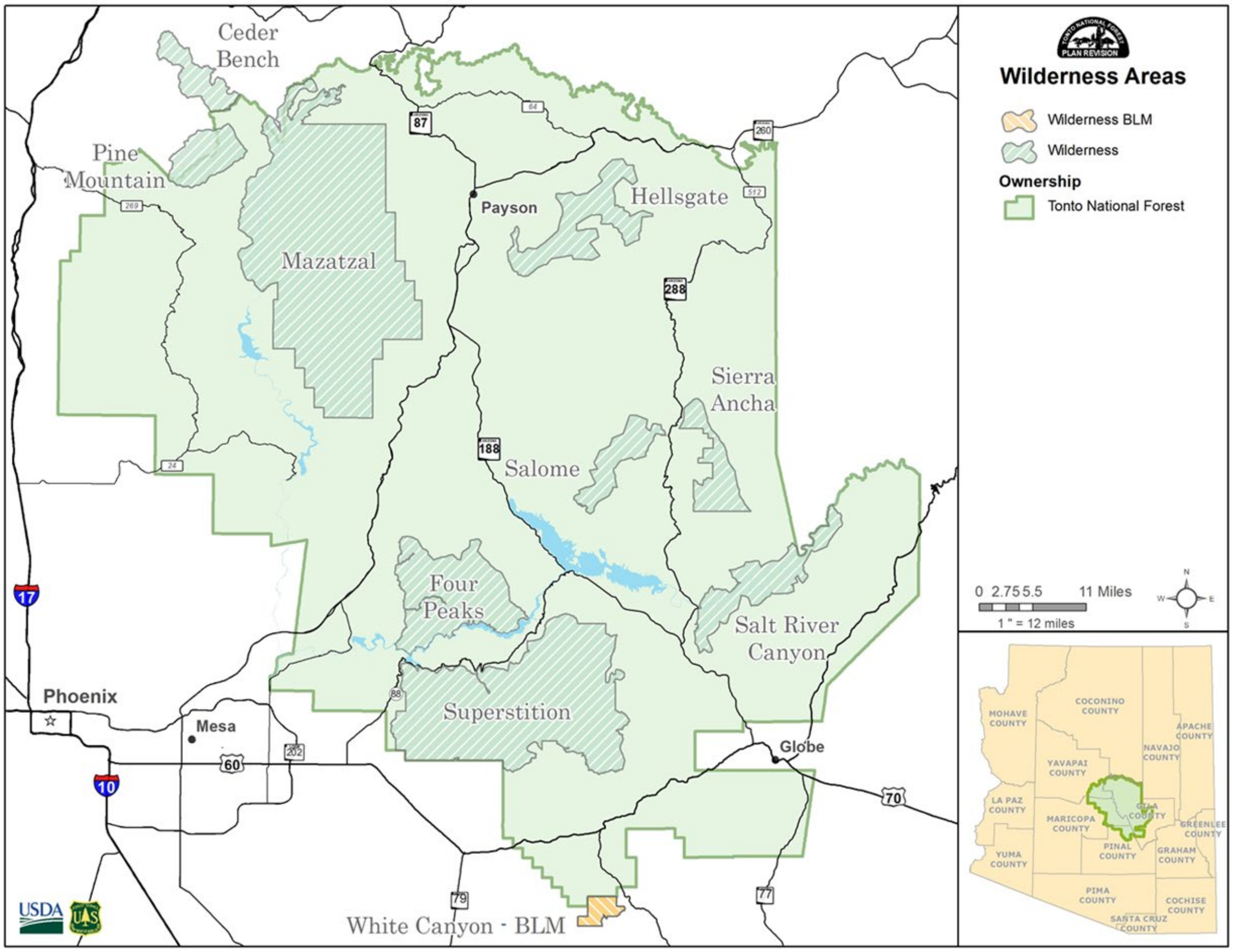


Figure E-1. Designated wilderness areas on the Tonto National Forest.

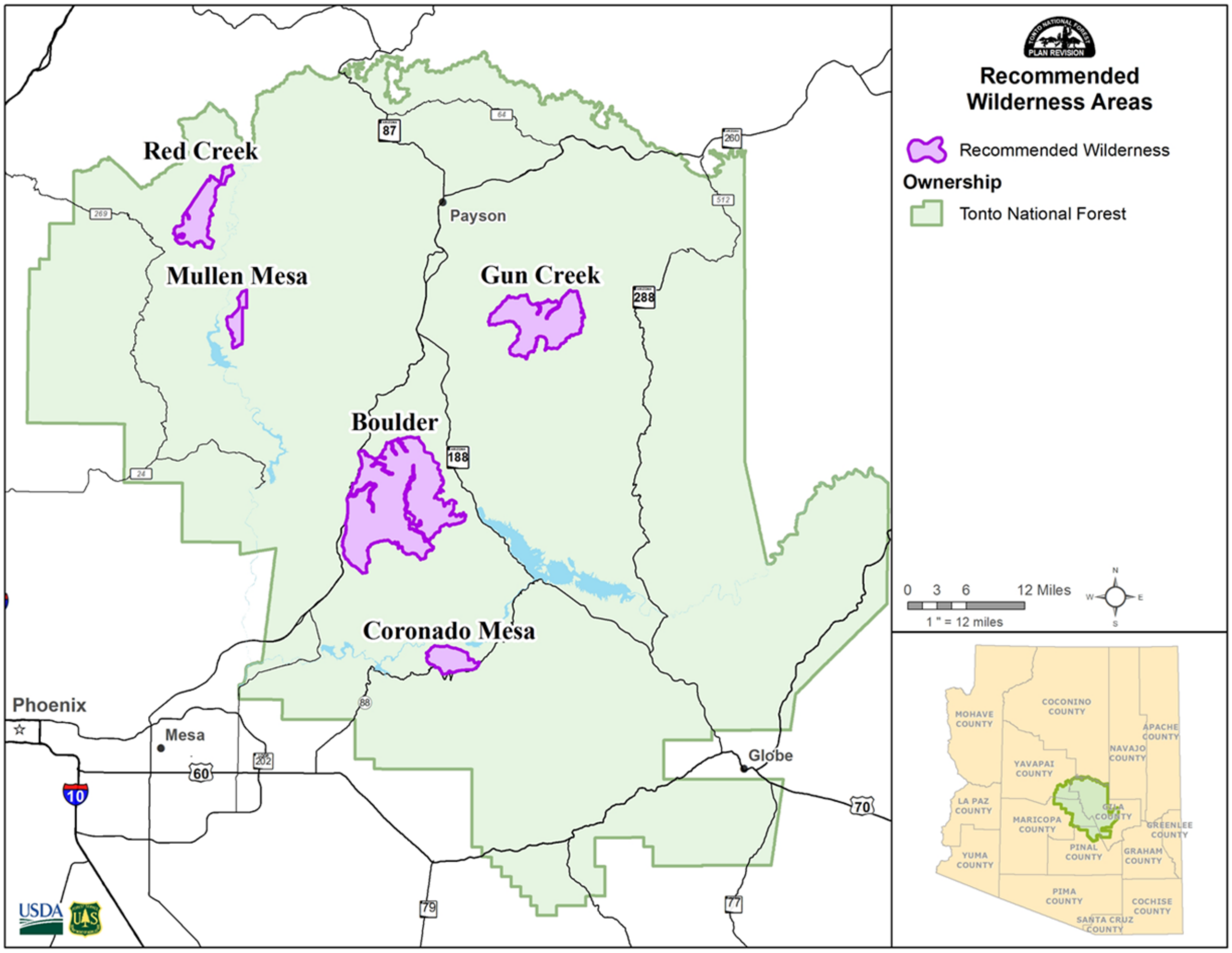


Figure E-2. Recommended wilderness areas on the Tonto National Forest.

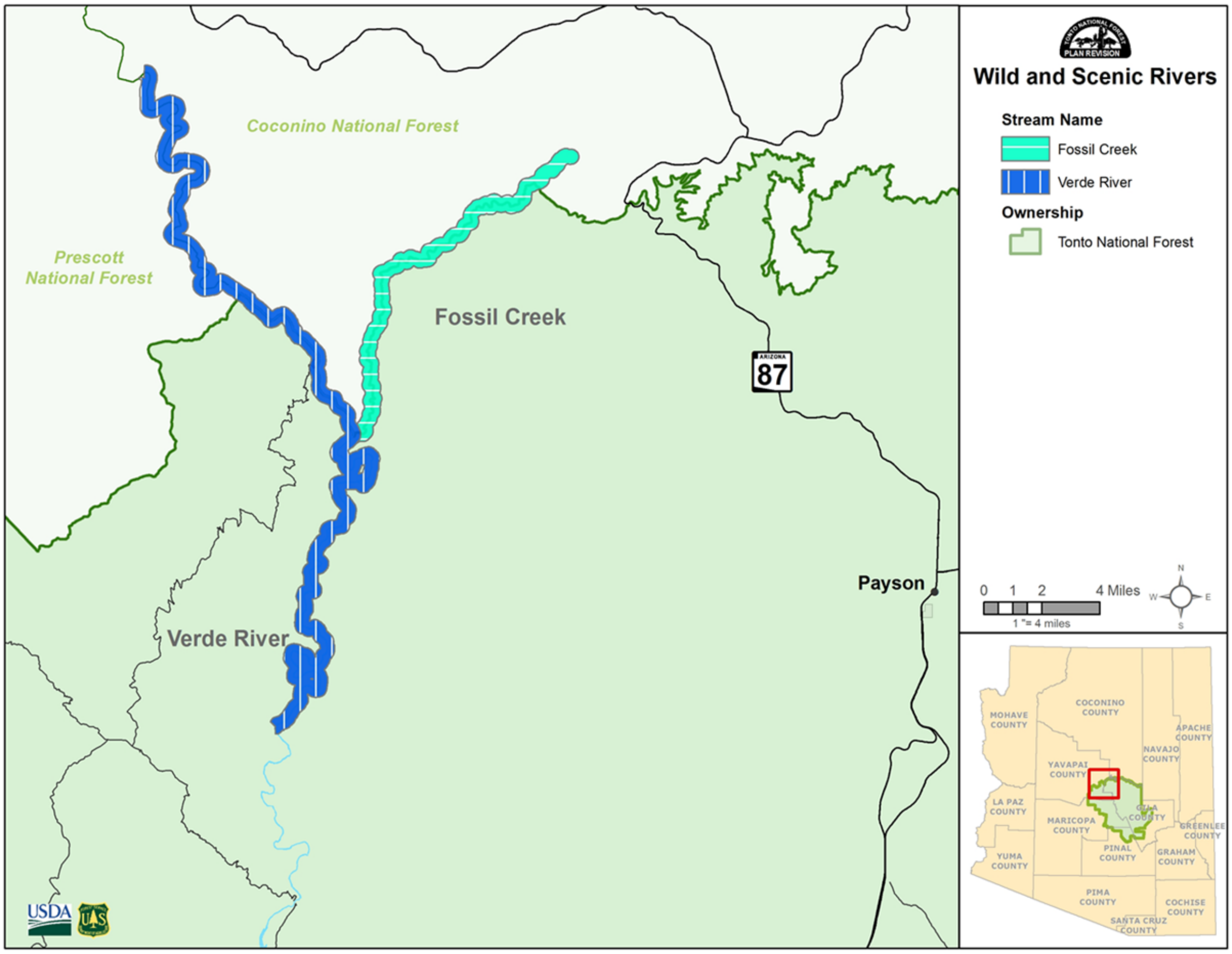


Figure E-3. Designated wild and scenic rivers on the Tonto National Forest.

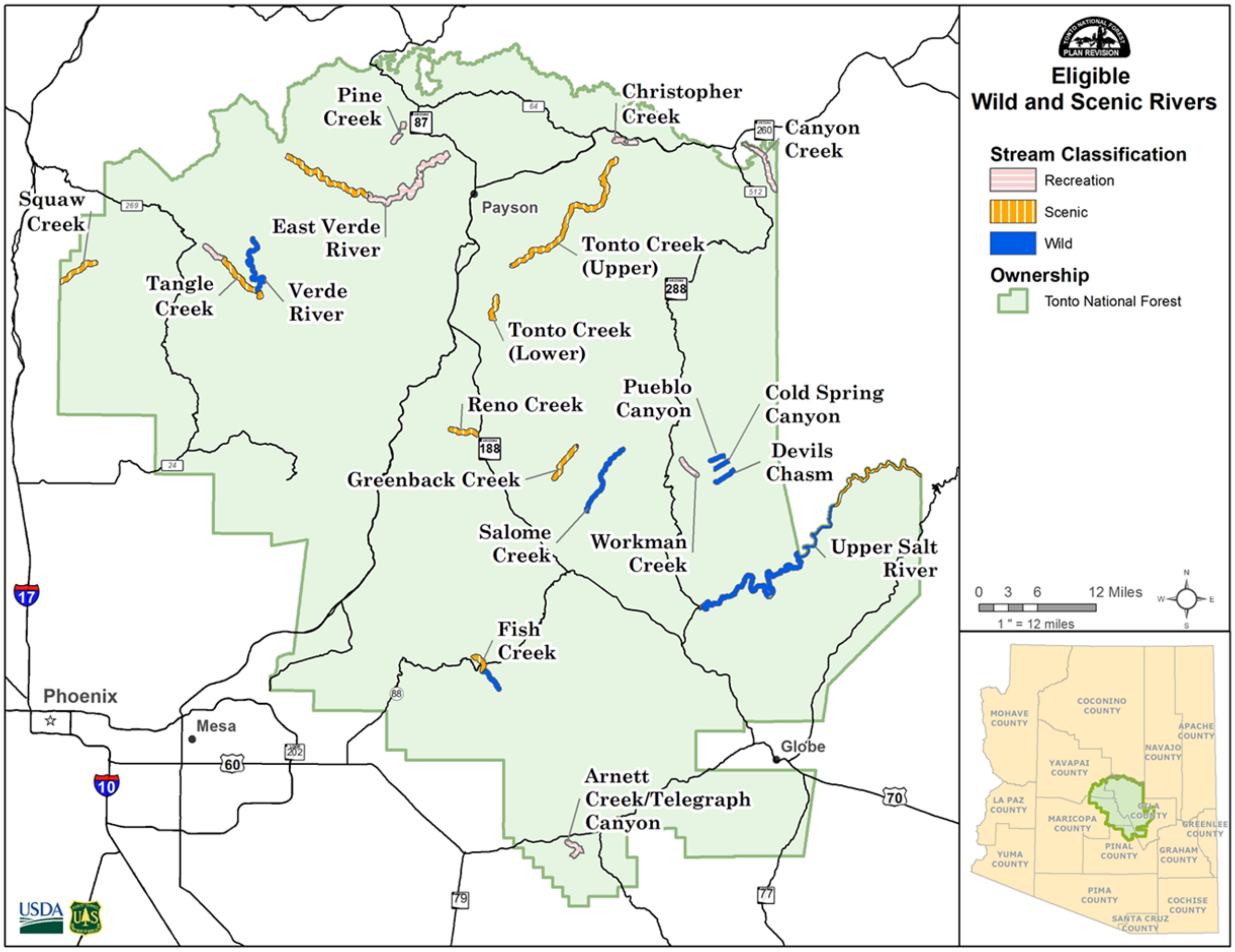


Figure E-4. Eligible wild and scenic rivers on the Tonto National Forest.

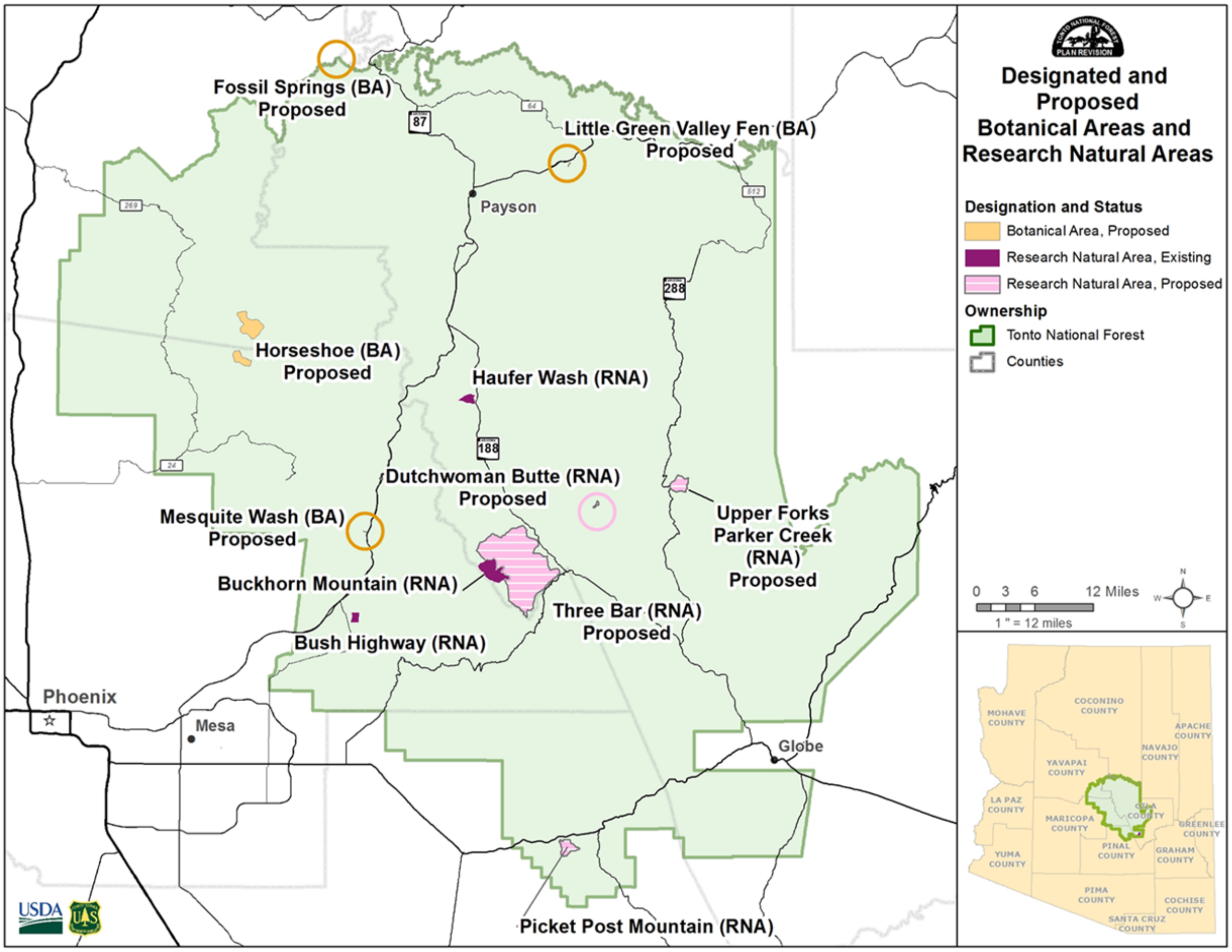


Figure E-5. Proposed botanical areas and existing and proposed research natural areas on the Tonto National Forest.

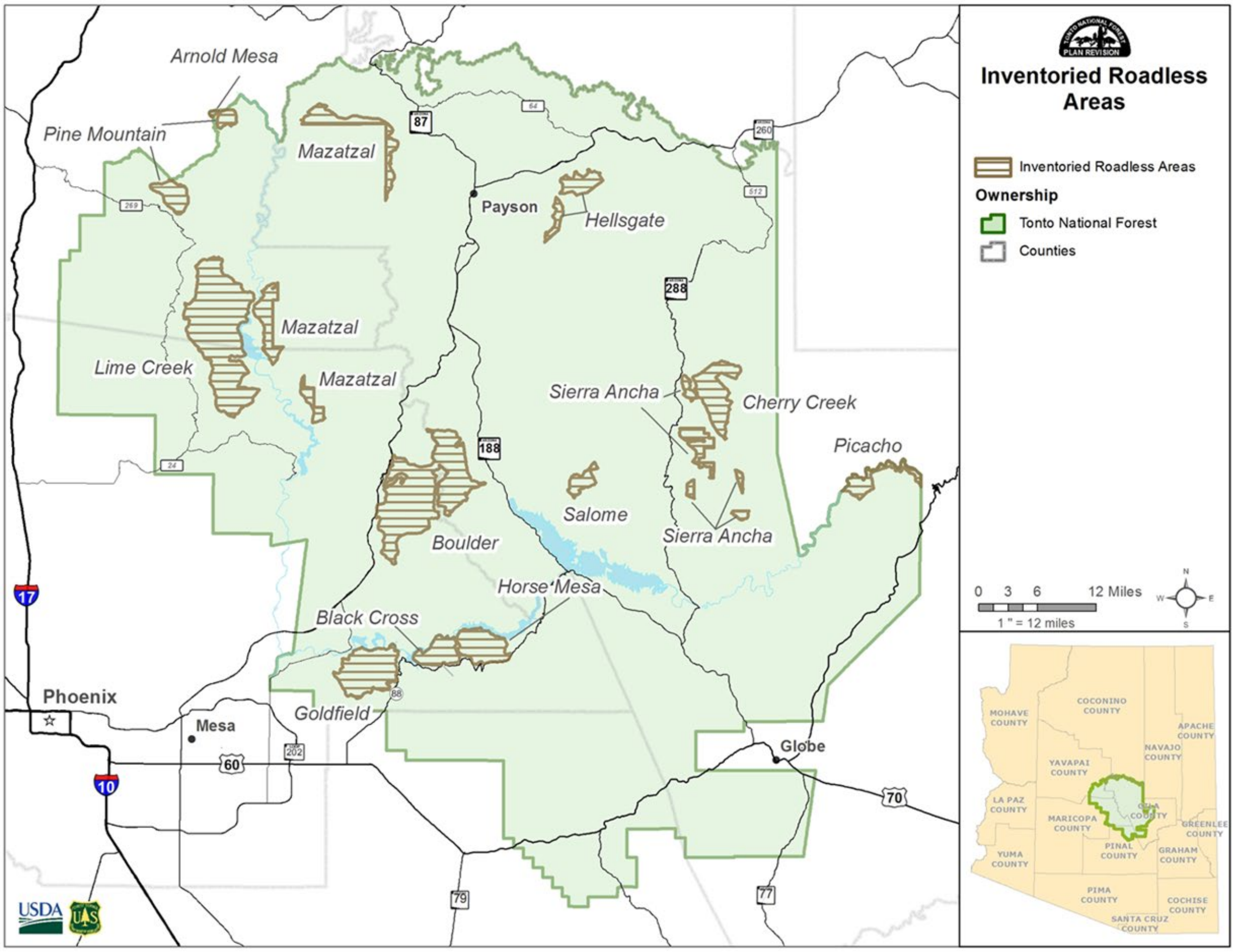


Figure E-6. Inventoried roadless areas on the Tonto National Forest.

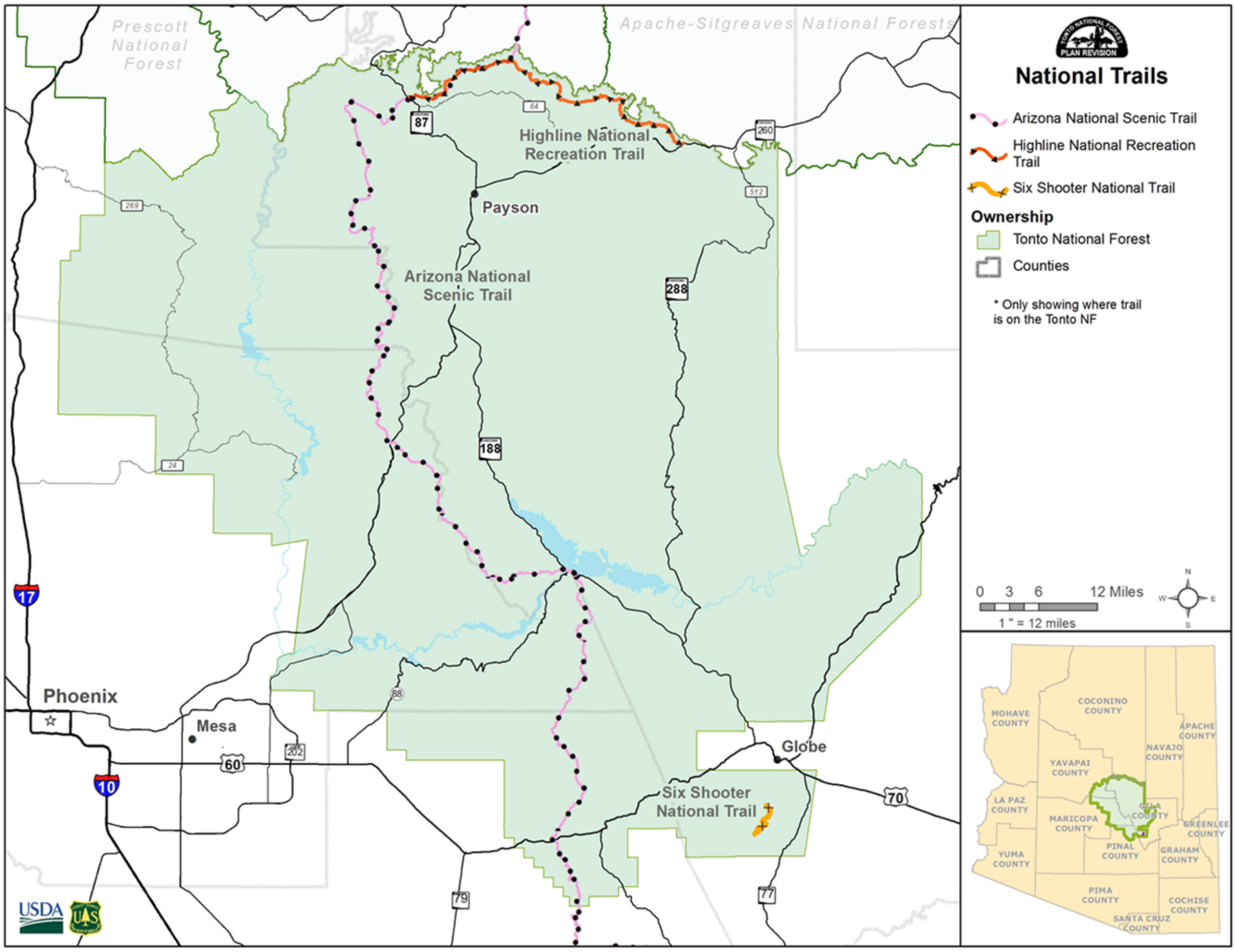


Figure E-7. National trails on the Tonto National Forest.

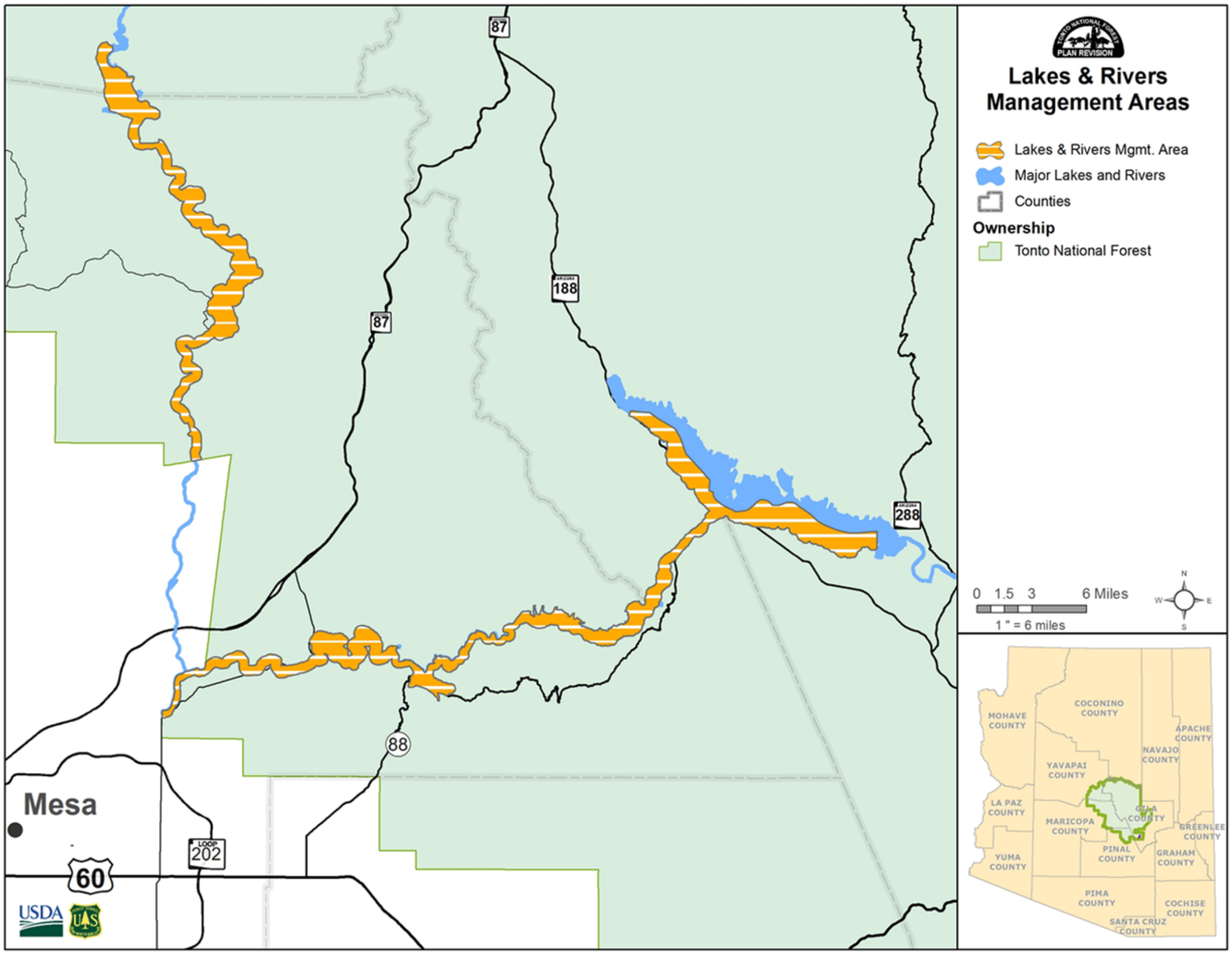


Figure E-8. Lakes and rivers management areas on the Tonto National Forest.

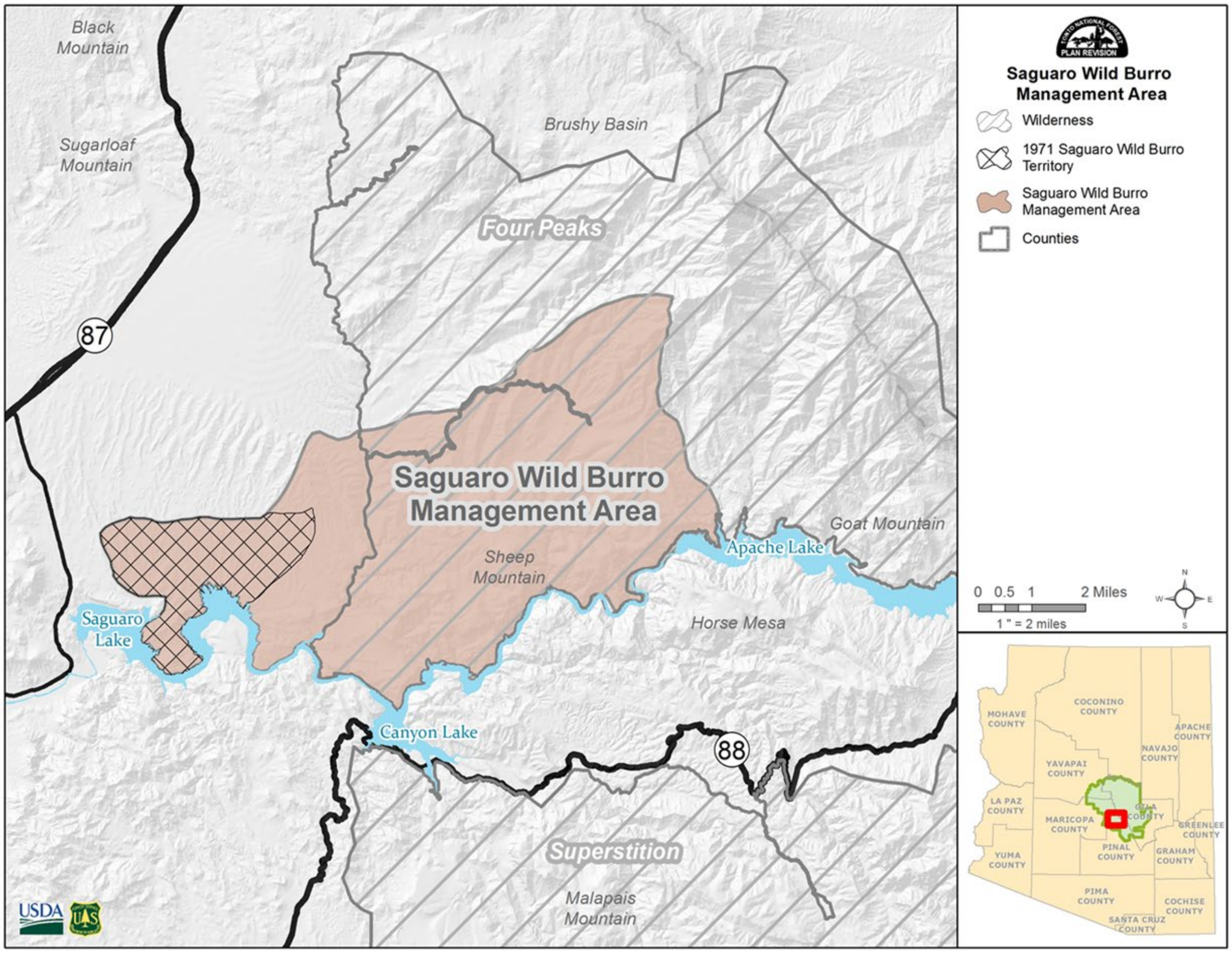


Figure E-9. Saguaro Wild Burro Management Area on the Tonto National Forest.

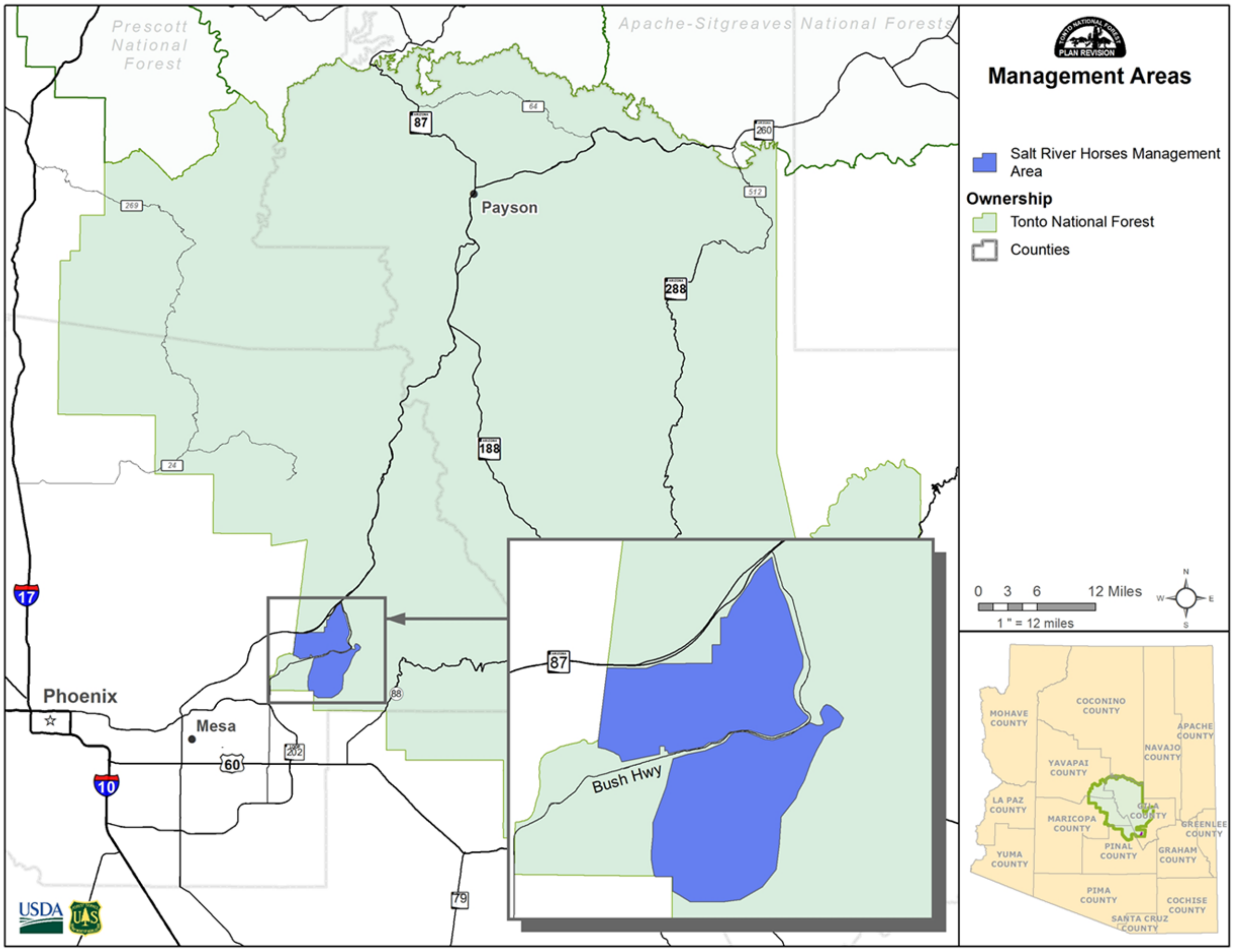


Figure E-10. Salt River Horses Management Area on the Tonto National Forest.

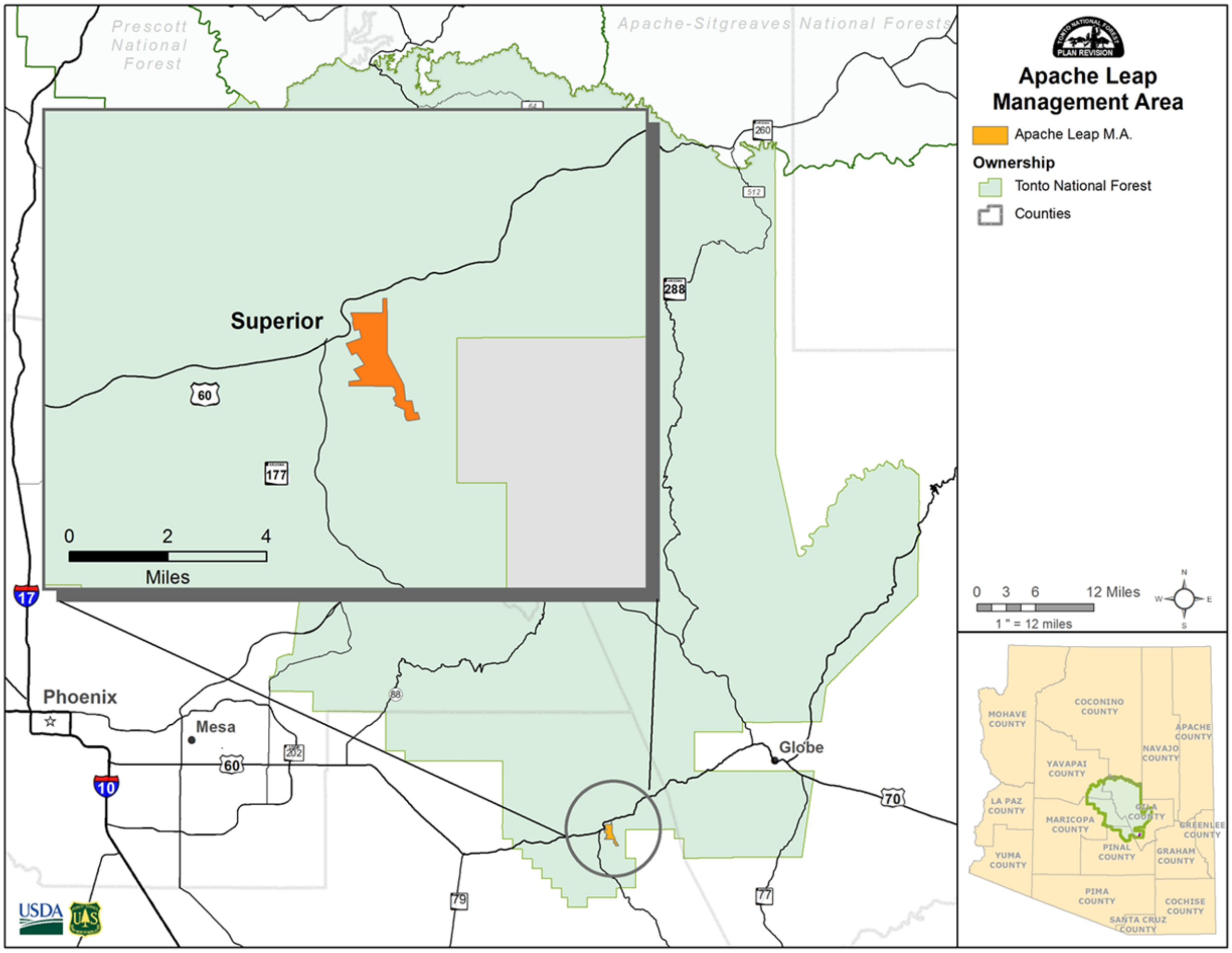


Figure E-11. Apache Leap Special Management Area on the Tonto National Forest.

APPENDIX F: TABLES

Table F-1. Ecological response units by system type.

System Type	Ecological Response Units	Acres	Elevation (feet)
Shrublands/Deserts	Mojave Sonoran Desert Scrub, Sonora-Mojave Mixed-Salt Desert Scrub	791,284	1,300-5,800
Shrublands/Interior Chaparral	Interior Chaparral	290,771	2,300-7,800
Grasslands/Semi-desert grassland	Semi-Desert Grassland	340,983	1,800-6,800
Woodlands	Pinyon-Juniper Woodland, Pinyon-Juniper Grassland, Juniper Grassland, Pinyon-Juniper Evergreen Oak, Madrean Encinal Woodland	1,035,449	2,200-7,800
Forests	Madrean Pinyon-Oak, Ponderosa Pine-Evergreen Oak, Ponderosa Pine Forest, Mixed Conifer-Frequent Fire, Wet Mixed Conifer	302,436	1,700-5,100

Table F-2. Status of recovery plans for federally listed species on the Tonto NF.

Common Name	Recovery Plan and Year
Arizona cliffrose	Recovery Plan; 1995
Arizona hedgehog cactus	Agency Review Draft; 1984
Mexican spotted owl	Revised Recovery Plan; 2012
Ocelot	Recovery Plan; 2016
Chiricahua leopard frog	Recovery Plan; 2007
Narrow-headed gartersnake	Currently no recovery plan
Northern Mexican gartersnake	Currently no recovery plan
Desert pupfish	Recovery Plan; 1993
Gila chub	Draft Recovery Plan; 2015
Gila topminnow	Revised Recovery Plan; 1984
Gila trout	Revised Recovery Plan; 2003
Razorback sucker	Recovery Plan; 2002
Loach minnow	Recovery Plan; 1991
Spikedace	Recovery Plan: 1991
Southwestern willow flycatcher	Recovery Plan; 2002
Western yellow-billed cuckoo	Currently no recovery plan
Yuma Ridgeway's rail	Draft Revision; 2009
Colorado pikeminnow	Recover Goals; Amendment to recovery Plan; 2002
Mexican wolf	Revised Draft Recovery Plan; 2017

Table F-3. Species for which the Tonto NF has conservation agreements.

Species	**Document Type**	**Conservation Agreement Title**	**Year**	**Status**
Arizona bugbane (*Cimicifuga arizonica*)	Conservation Agreement	Arizona bugbane (*Cimicifuga arizonica*) Conservation Agreement	1998	This agreement was set to expired five years after its signing. In general, the forest continues to operate under the agreement terms. Revisions are underway and should be available for signing in the near future.
Blumer's dock *(Rumex orthoneurus)*	Conservation Plan	A Conservation Assessment for *Rumex orthoneurus* on the Tonto National Forest 1993-1997	1993	This strategy was intended to last five years but specifies that it remains in effect indefinitely unless or until superseded by a new, revised, or amended plan. There are no current plans to update at this time.
Roundtail Chub (*Gila robusta*), Headwater Chub (*Gila nigra*), Flannelmouth Sucker (*Catostomus latipinnis*), Little Colorado River Sucker (*Catostomus* spp.), Bluehead Sucker (*Catostomus discobolus*) and Zuni Bluehead Sucker (*Catostomus discobolus yarrowi*)	Conservation Agreement	Arizona Statewide Conservation Agreement for Roundtail Chub (*Gila robusta*), Headwater Chub (*Gila nigra*), Flannelmouth Sucker (*Catostomus latipinnis*), Little Colorado River Sucker (*Catostomus* spp.), Bluehead Sucker (*Catostomus discobolus*) and Zuni Bluehead Sucker (*Catostomus discobolus yarrowi*)	2006	Expired five years after signing. In general, the forest continues to operate under the agreement terms. Revisions are planned and will be sent for signing in the near future.
Sonoran Desert Tortoise (*Gopherus morafkai*)	Candidate Conservation Agreement	Candidate Conservation Agreement for the Sonoran Desert Tortoise (*Gopherus morafkai*) in Arizona	2015	The initial period of this agreement is 10 years which can then be extended in 5 year increments. As of 2022 this agreement is still in effect.
Central Arizona Springsnails	Draft Conservation Plan	Draft Strategic Conservation Plan for Central Arizona Springsnails	2020	This document is currently not signed but is being drafted by the Cooperating Partners of the Central Arizona Springsnails Working Group. Two of the springsnails addressed in the document are found on the Tonto National Forest.

Species	**Document Type**	**Conservation Agreement Title**	**Year**	**Status**
Bald Eagle (*Haliaeetus leucocephalus*)	Memorandum of Understanding	Memorandum of Understanding for Conservation of the Bald Eagle in Arizona	2013	This agreement was set to expire five years after its signing. In general, the forest continues to operate under the agreement terms. We are not aware of plans to renew this agreement, but we expect that an updated agreement will likely be submitted in the near future.

Table F-4. Acres of Mexican spotted owl habitat on the Tonto NF.

Ranger District (RD)	Total Acres RD	PAC (acres)	Mixed Conifer Recovery Habitat (acres)	Pine-Oak Recovery Habitat (acres)	Riparian Recovery Habitat (acres)	Critical Habitat (acres PAC/Recovery Habitat within CHUs)
Cave Creek	610,514	1	0	1,720	16,057	3,939
Globe	470,553	5,766	0	4,915	8,728	12,326
Mesa	444,292	908	223	2,820	7,286	3,254
Payson	462,822	16,964	15,913	77,862	8,372	61,370
Pleasant Valley	436,663	21,390	236	23,887	4,089	111,404
Tonto Basin	538,663	4,340	0	3	21,367	13,275
Total (acres)	**2,962,918**	**49,369**	**16,372**	**111,207**	**65,899**	**205,568**

Table F-5. Tonto NF LRMP Components considered for each species and critical habitat (CH) in the analysis.

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
Recreation REC-DC-1	x																
REC-DC-8	x																
REC-DIS-DC-1	x																
REC-DIS-DC-4	x																
REC-DIS-DC-6	x																
REC-DIS-MO-DC-3	x																
REC-DIS-WB-DC-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
REC-DIS-RS-DC-1, 4 and 5	x																
REC-O-1	x																
REC-O-3 and 4	x																
REC-O-5	x																
REC-DEV-O-1				x	x										x	x	x
REC-G-3	x																
REC-G-4	x																
REC-G-7	x																
REC-G-9				x	x	x	x	x	x	x	x	x	x	x	x	x	x

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
REC-DIS-G-1c	x																
REC-DIS-G-2	x																
REC-DIS-MO-S-2	x																
REC-DIS-G-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
REC-DIS-MO-G-1	x																
REC-DIS-MO-G-3	x																
REC-DIS-WB-G-1	x																
REC-DIS-NMO-G-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
REC-DIS-RS- G-2	x																
Special Use SU-DC-1	x																
SU-S-3	x																
SU-G-1	x																
SU-G-2	x																
SU-G-4	x																
SU-G-8	x																
Energy Production and Delivery EG-DC-2	x																
EG-DC-3	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
EG-G-1, EG-G-2	x																
EG-G-3, EG-G-4	x																
Rangelands, Forage, and Grazing GRZ-DC-2	x																
GRZ-DC-3	x																
GRZ-DC-4	x																
GRZ-O-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
GRZ-O-2	x																
GRZ-S-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
GRZ-G-2	x																
GRZ-G-3	x																
GRZ-G-4, GRZ-G-8	x																
GRZ-G-7	x																
GRZ-G-9	x																
Fire and Forest Products FP-DC-1, FP-DC-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
FP-DC-5				x	x	x	x	x	x	x	x	x	x	x	x	x	x
FP-O-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
FP-S-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
FP-S-5, FP-S-7				x	x												
FP-S-6				x	x												
FP-G-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
FP-G-6				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mining, Minerals, and Abandoned Mines MMAM-DC-1	x																
MMAM-DC-3	x																
MMAM-DC-2	x																
MMAM-DC-5	x																
MMAM-O-1	x																
MMAM-S-1	x																
MMAM-S-2, MMAM-G-4, MMAM-G-5	x																
MMAM-G-6	x																
MMAM-S-4	x																
MMAM-G-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
MMAM-G-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Roads RD-DC-1	x																
RD-DC-4, RD-DC-6	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
RD-DC-5	x																
RD-O-1	x																
RD-O-2	x																
RD-S-1	x																
RD-S-2	x																
RD-S-3	x																
RD-S-4	x																
RD-G-1, RD-G-2	x																
RD-G-3	x																
RD-G-4			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
RD-G-5			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
RD-G-6						x	x	x	x	x	x	x	x	x			
RD-G-7						x	x	x	x	x	x	x	x	x			
RD-G-9						x	x	x	x	x	x	x	x	x			
Facilities FC-DC-2	x																
FC-DC-6	x																
FC-G-2	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
FC-G-3	x																
Lands and Access LA-DC-1, LA-DC-2	x																
LA-S-1	x																
Vegetation and Ecological Response Units ERU-DC-1	x																
ERU-DC-2				x	x										x	x	x
ERU-DC-3				x	x												
ERU-DC-5	x																
ERU-DC-6	x																
ERU-DC-7	x																
ERU-DC-10	x																
ERU-DC-11	x																
ERU-DC-13	x																
ERU-DC-14	x																
ERU-DC-15	x																
ERU-O-1				x	x	x	x	x	x	x	x	x	x	x	x	x	
ERU-O-2				x	x	x	x	x	x	x	x	x	x	x	x	x	
ERU-O-3	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
ERU-O-4	x																
ERU-G-1	x																
ERU-G-2	x																
ERU-G-3	x																
ERU-G-4				x	x		x	x									
ERU-G-6				x	x		x	x									
ERU-G-5				x	x												
ERU-G-8				x	x												
ERU-G-9	x																
ERU-G-12	x																
Riparian Ecological Response Units RERU-DC-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-DC-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-DC-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-DC-4				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-DC-7				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-DC-11, RERU-DC-12				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-DC-8				x	x	x	x	x	x	x	x	x	x	x	x	x	x

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
RERU-G-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-G-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-G-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RERU-G-4				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Fire and Fuels FF-DC-4	x																
FF-S-1	x																
FF-G-3	x																
FF-S-4	x																
FF-G-4	x																
FF-G-5				x	x	x	x	x	x	x	x	x	x	x	x	x	x
FF-G-7				x	x	x	x	x	x	x	x	x	x	x	x	x	x
FF-G-6				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Watersheds and Water Resources WAT-DC-1	x																
WAT-DC-2	x																
WAT-DC-3, WAT-DC-4	x																
WAT-DC-8				x	x	x	x	x	x	x	x	x	x	x	x	x	x
WAT-O-1	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
WAT-O-2	x																
WATO-3	x																
WAT-O-4				x	x	x	x	x	x	x	x	x	x	x	x	x	x
WAT-O-5				x	x	x	x	x	x	x	x	x	x	x	x	x	x
WAT-S-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
WAT-S-2, WAT-G-1, WAT-G-4	x																
WAT-G-2	x																
WAT-S-4	x																
WAT-G-6				x	x	x	x	x	x	x	x	x	x	x	x	x	x
WAT-G-7						x	x	x	x	x	x	x	x	x			
WAT-G-11	x																
WAT-G-14	x																
RMZ-DC-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones RMZ-DC-2, RMZ-DC-3						x	x	x	x	x	x	x	x	x	x	x	x
RMZ-DC-4, RMZ-DC-5				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-DC-6						x	x	x	x	x	x	x	x	x	x	x	x

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
RMZ-DC-7				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-O-1																	
RMZ-O-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-S-1				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-S-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-S-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-G-2						x	x	x	x	x	x	x	x	x			
RMZ-G-3				x	x	x	x	x	x	x	x	x	x	x	x	x	x
RMZ-G-4						x	x	x	x	x	x	x	x	x			
RMZ-G-6						x	x	x	x	x	x	x	x	x			
Wildlife, Fish, and Plants WFP-DC-1	x																
WFP-DC-2	x																
WFP-DC-3	x																
WFP-DC-4	x																
WFP-DC-5	x																
WFP-DC-6	x																
WFP-DC-7	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
WFP-DC-8		x	x														
WFP-O-1	x																
WFP-O-2	x																
WFP-G-1	x																
WFP-G-2	x																
WFP-G-3	x																
WFP-G-4, WFP-G-5	x																
WFP-G-6	x																
WFP-G-7	x																
WFP-G-8	x																
Invasive Species INS-DC-1	x																
INS-DC-2	x																
INS-O-1	x																
INS-O-2				x	x	x	x	x	x	x	x	x	x	x	x	x	x
INS-G-1	x																
INS-G-2	x																
INS-G-3	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
INS-G-4	x																
INS-G-6	x																
INS-G-7	x																
INS-G-5	x																
Soils SL-DC-1 through 5	x																
SL-DC-6	x																
SL-G-1	x																
SL-G-3	x																
SL-G-4	x																
Caves and Karst CVK-DC-1, CVK-DC-3	x																
CVK-G-1 through 4	x																
Designated and Recommended Research Natural Areas and Botanical Areas RNBAMA-O-1		x	x														
Lakes and Rivers Management Area LRMA-G-4				x	x	x	x	x	x	x	x	x	x	x	x	x	x
LRMA-G-5				x	x	x	x	x	x	x	x	x	x	x	x	x	x
LRMA-G-6				x	x	x	x	x	x	x	x	x	x	x	x	x	x
Salt River Horse Management Area SRHMA-DC-4	x																

Proposed Action and Component Number	All listed species	Arizona cliffrose	Arizona hedgehog cactus	Mexican spotted owl and CH	Ocelot	Chiricahua leopard frog and CH	Narrow-headed gartersnake and CH	Northern Mexican gartersnake and CH	Desert pupfish	Gila chub and CH	Gila topminnow	Gila trout	Razorback sucker and CH	Loach minnow and CH	Southwestern willow flycatcher and CH	Western yellow-billed cuckoo and CH	Yuma Ridgway's rail
SRHMA-DC-5	x																
SRHMA-S-2	x																