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January 25, 2018

Memorandum

To: Assistant Regional Director, Endangered Species Program, Albuquerque, New Mexico, (Attn: Susan Jacobsen)

From: Field Supervisor, Arizona Ecological Services Office

Subject: Re-initiation of the Intra-Service Consultation on the Granting of Section 6 Non-traditional Recovery Land Acquisition Funds to the Arizona Game and Fish Department for the Purchase of the Horseshoe Ranch Property, Yavapai County, Arizona

This memorandum is in response to your request to reinitiate consultation pursuant to Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act), on the granting of Section 6 Non-traditional Recovery Land Acquisition (RLA) funds to the Arizona Game and Fish Department (Department) for the purchase of the 200-acre Horseshoe Ranch property (Ranch), Yavapai County, Arizona. A requirement of the RLA grant is the development and implementation of a management plan for the Ranch. At issue are impacts that may result from the Department's implementation of their Horseshoe Ranch Wildlife Habitat Enhancement Plan.

You concluded that the proposed action "may affect and is likely to adversely affect" the endangered desert pupfish (*Cyprinodon macularius macularius*, pupfish), Gila chub (*Gila intermedia*, chub), and Gila topminnow (*Poeciliopsis occidentalis occidentalis*, topminnow). In addition, you requested our concurrence that the proposed action is not likely to adversely affect the threatened northern Mexican gartersnake (*Thamnophis eques megalops*; gartersnake), yellow-billed cuckoo (*Coccyzus americanus*; cuckoo) and their proposed critical habitats. We concur with your determinations and provide our rationale in Appendix A. You also determined that the proposed action would have "no effect" on the endangered southwestern willow flycatcher (*Empidonax trailii extimus*). Therefore, this species is not addressed further in this biological opinion (BO). This consultation is for a 20-year period.

This BO is based on the Horseshoe Ranch Wildlife Habitat Enhancement Plan's proposed project description (AGFD 2017), information provided by the Department's Environmental Assessment Checklists (EAC), telephone conversations, meetings between Service staff and the Department, literature, and other sources of information to support this BO. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern. A complete administrative record of this consultation is on file at the Arizona Ecological Services office.

The Horseshoe Ranch Wildlife Habitat Enhancement Plan (hereafter the Plan) describes activities intended to benefit wildlife, including federally-listed and non-listed species, facilitate research that could be valuable to habitat management while allowing continued operation of the Ranch, and allows the Department to continue to participate in partnerships and research activities. It is not to be confused with the Horseshoe Ranch Property Operational Plan, which details other Ranch uses such as routine day-to-day management activities, operations and maintenance of buildings and structures, and general upkeep of the property. Actions associated with the Operational Plan are not included herein and were determined by the Department to have "no effect" on listed species or their habitats.

BACKGROUND

The Wildlife and Sport Fish Restoration Program (WSFRP) awarded RLA funds to the Department to acquire Horseshoe Ranch in 2009. Section 6 Non-traditional RLA grants are matched by State and non-Federal entities to purchase habitat that is essential for recovery of listed species. Mandatory conditions of the funds are the habitat must be set aside in perpetuity for conservation, and the funds should contribute to implementing the goals and objectives from an approved final or draft recovery plan for at least one listed species. Acquisition of the Ranch allowed for the protection of a 0.6 mile reach of the Agua Fria River and a portion of Indian Creek, both of which run through the deeded property and contribute to the recovery of five listed species (chub, topminnow, pupfish, cuckoo, Sonoran desert tortoise (*Gopherus morafkai*), and gartersnake) with historical habitat on the property. The Department and WSFRP completed an informal consultation for the issuance of the RLA funds with WSFRP providing a concurrence of "may affect, not likely to adversely affect" to the Department.

In June 2014, the Department initiated talks with the Arizona Ecological Services Office (AESO) to develop a Safe Harbor Agreement (SHA) for the Ranch to include the chub, gartersnake, cuckoo, and southwestern willow flycatcher. The purpose of the SHA was to establish a captive to semi-captive breeding population of the gartersnake, provide a replicate population for the chub, and create an experimental cottonwood garden for climate change research while conducting otherwise legal activities on the Ranch. Additional activities, which would be proposed at a later date, would include tamarisk removal, native plant re-vegetation, and stream bank stabilization along deeded reaches of the Agua Fria River.

In September 2014, the Department enrolled the Ranch under the 2007 SHA for Topminnows and Pupfish in Arizona (AGFD 2007). The intra-Service BO on the SHA's implementation was completed in 2008 (AESO file number 22410-2003-F-0022) and addressed various other listed species that may be present on enrolled lands (see the Environmental Baseline section).

From June 2014 to January 2016, the Department worked with AESO to draft several revisions of the SHA for the Ranch. Of concern was the ability to “return to baseline” any land-enrolled under the SHA and potential conflicts with the requirement of the RLA grant to protect habitat in-perpetuity. The Department requested to continue with the SHA so they could receive regulatory assurances allowing them greater management flexibility. However, no policy exists within the Service that authorizes land purchased with RLA funds to be enrolled under a SHA. In July 2016, staff from the AESO, Service’s Regional Endangered Species Program (Regional Office), and WSFRP met with the Department to discuss Horseshoe Ranch management and potential actions resulting in incidental take. The AESO would reinitiate consultation with WSFRP on the administration of the RLA funds to the Department. As of November 2017, the RLA grant program is administered by the Region’s Ecological Services Program Office.

CONSULTATION HISTORY

- September 16, 2014: Horseshoe Ranch was enrolled under the SHA for Topminnows and Pupfish in Arizona. Desert pupfish and Gila topminnow were introduced into the Horseshoe Ranch pond in 2015 and 2016, respectively (see the Environmental Baseline section).
- October 14, 2014: Staff from AESO met with the Department to discuss development of a SHA for Horseshoe Ranch, proposed activities to be covered, and statuses of listed species to be included in the agreement.
- November 6 –
November 21, 2014: The Department and AESO discussed introducing Gila chub to the Horseshoe Ranch pond and identifying catch and release fishing as a covered action.
- February 26, 2016: The Department submitted an electronic copy of the draft SHA for Horseshoe Ranch that included Gila chub, northern Mexican gartersnake, southwestern willow flycatcher, and yellow-billed cuckoo.
- March 9–
April 22, 2016: Staff from AESO and the Department worked on revisions in several iterations of the draft SHA that focused on the incidental take section and clarifying source populations used for species’ introductions into the pond.
- April 29 –
July 15, 2016: AESO, the Department, WSFRP, and the Regional Office held discussions and meetings to determine the appropriate process for consulting on the proposed management actions.
- January 4, 2017: The Department submitted a draft Horseshoe Ranch Wildlife Enhancement Plan to the Regional Office and AESO, replacing the draft SHA.
- March 16, 2017: The Department submitted a final version of the Horseshoe Ranch Wildlife Enhancement Plan to the Service.

- May 3 –
July 14, 2017: AESO, the Regional Office, and Department addressed questions on the proposed action and incidental take on actions covered under the Department's research and recovery permit. We also requested the Department disenroll Horseshoe Ranch from the Topminnows and Pupfish SHA.
- July 18 –
Aug. 16, 2017: The Department requested the Gila chub be removed from the consultation because of its revised taxonomic status. AESO recommended including the chub due to its legal status but removed from the consultation all actions already covered under the Department's recovery and research permits and those covered by other BOs; only non-recovery/land management actions would be evaluated.
- August 31, 2017: AESO received a revised Horseshoe Ranch Wildlife Enhancement Plan from the Department.
- September 26, 2017: AESO received electronic notification by the Department of their intent to disenroll Horseshoe Ranch from the Topminnows and Pupfish SHA after this BO is finalized.
- October 20, 2017: The Department translocated captive-reared northern Mexican gartersnakes into the Horseshoe Ranch pond.
- December 14, 2017: We sent the draft of the final BO for your review and a courtesy copy for the Department's review.
- December 15, 2017: We received your comments on the draft BO.
- January 10, 2017: We received the Department's comments on the draft BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the Department's in-perpetuity wildlife enhancement improvements, and management on their 200-acre Ranch (Figure 1), consistent with the requirements of the RLA grant, as described in the Plan. The Plan describes the following:

- establishment of a replicate chub, topminnow, and pupfish population within the existing pond, establishment of a semi-captive gartersnake breeding population as a replicate population, and for all of these species to be potential sources for future re-introduction into the Agua Fria watershed;
- an experimental cottonwood garden for use in climate change and genetics research, which may be used by the yellow-billed cuckoo; and
- establishment of a native grass and forb plant community and annual upland game bird seed crops on fallow cropland to benefit upland game birds and pollinator species.

If future funding permits, the Department may seek tamarisk (*Tamarix* spp.) removal and planting of additional native riparian vegetation along portions of the Agua Fria River. The proposed management activities on the property are described in detail below.

Pond Management

As part of the in-perpetuity management of the property, the Department intends to manage the existing pond for the chub, topminnow, pupfish, and gartersnakes. Northern Mexican gartersnakes were translocated into the pond in October 2017. The ability for long-term vegetation control will be crucial to the pond's success in providing for listed species' habitat. Chemical non-native and native vegetation control may be used to manage upland terrestrial and aquatic vegetation to optimize habitat conditions for native wildlife species. Approved terrestrial herbicides for removal and control of weeds and noxious plants will be used around the upland perimeter of the pond. The preferred management methods for cattail are infrequent manual removal methods using hand pulling and/or weed whacking. Pond levels fluctuate naturally and therefore drawdowns (e.g., approximately one to two feet below the surface) may be limited if work is done during a naturally low water level. The intent is to periodically treat cattails in order to provide suitable habitat for the various listed and non-listed aquatic species and their life stages. Temporary relocation of the aquatic species would not be required for drawdowns and treatments. The treatment is short-term in duration and drawdowns would only result in temporary exposure of the emergent zone and would not compromise aquatic habitat quality.

The herbicides Triclopyr, Clopyralid, and Picloram, and additional chemicals that become available, may be used on woody upland vegetation to control mesquite (*Prosopis* spp.), catclaw (*Acacia* spp.) and *Mimosa* species. These herbicides will be applied per the label by an authorized applicator to control vegetation growing along the perimeter fence surrounding the pond. These plants are causing buried parts of the fence to be pulled to the surface and exposing holes where bullfrogs can enter. These herbicides have been approved for use on adjacent public lands for woody plant species management. Impacts to listed aquatic species will be reduced by having certified applicators administer the chemicals per the label instructions, which specifies application rates, frequency, techniques, and additional guidelines. The Department will also

follow internal guidance and consult land and resource management agencies' guidance on recommended protection measures when using these herbicides near listed aquatic species habitat.

Chemical application of Rodeo Aquatic Herbicide may be used for chemical removal of cattails. The herbicide falls within Ecotoxicity Rating Class 0 (nontoxic) to small avian species, terrestrial reptiles, terrestrial and aquatic amphibians, terrestrial and aquatic arthropods, and warm water fish (White 2007). Treatments would require backpack sprayer application to foliage of target species (cattail), and manual cut back may or may not be done prior to treatment to limit the amount of biomass for herbicide application. The chemical would be applied by certified applicators and per the chemical label. After foliar contact, it may take 30 days or more for visible above ground plant mortality and below ground stem and root deterioration.

Native vegetation has been planted and may be augmented in the future as needed to enhance habitat diversity and structure around the pond. Native aquatic vegetation such as sedges and rushes may be hand dug from the Agua Fria channel in the active floodplain on the Ranch. Vegetation may be translocated from the channel to the pond to enhance establishment of additional aquatic vegetation. Native plant seed or potted transplants may be used to enhance upland vegetation surrounding the pond.

The Department will also actively remove bullfrogs, crayfish, and any other non-native species from the pond by netting, trapping, or shooting if either species are detected. Bullfrogs were eliminated from the pond during renovations in 2012, which included adding and maintaining a perimeter fence to preclude re-colonization. A breeding population of bullfrog remains in the Agua Fria River in areas adjacent to the Ranch, and pond and routine maintenance of the pond perimeter fence is required to keep them out. Although it is part of the proposed action, removal of bullfrogs, crayfish, and other non-native aquatic species from waters occupied by listed fish species was previously analyzed in another consultation (AESO file number 22410-2011-F-0290) with a BO finalized in 2011. For this reason, non-native aquatic species removal is not evaluated in this consultation, but any effects to listed species from the maintenance of the perimeter fence are considered because it is a proposed land management action. Please refer to the Environmental Baseline for details.

Maintenance of Experimental Garden

After the Ranch was acquired, the Department and researchers with Northern Arizona University (NAU) collaborated on a research and riparian restoration project funded by a National Science Foundation grant. In 2014, a 3-acre experimental garden of Fremont cottonwood trees (*Populus fremontii*) was planted on the Ranch to investigate the impacts of climate change and exotic species invasions on riparian ecosystems, as well as genetic responses to assisted migration. Approximately 4,096 cottonwood seedlings were planted on the upper terrace of the Agua Fria River channel, and irrigation infrastructure was installed. Irrigation water is provided via the existing Horseshoe Irrigation Well. Although maintenance of the experimental garden is outside the requirements of the RLA grant, it is included in this BO because the Department anticipates it could provide foraging and possibly nesting habitat to the cuckoo.

Operation and maintenance of the experimental garden requires access during the spring through fall growing season (defined as April through October) to conduct the following activities: planting and removal of trees, understory weed management, fence and water infrastructure maintenance, and biological monitoring and research. All of these activities require access to the garden area by multiple researchers and maintenance staff year-round. These activities are described in more detail below.

a. Research and Monitoring

- Research and monitoring activities will include: measurement of plant growth; phenology, and morphology and chemical characteristics (including tree survivorship, height/diameter, below ground root growth, budset and leaf nutrient resorption); monitoring soil properties (nutrients and carbon availability, soil moisture, and soil temperature); monitoring plant water stress through rates of gas exchange, transpiration, and water potential; monitoring weather using a portable weather station; and monitoring tree litter using a portable 2-foot (ft) x 2-ft litter trap.
- Monitoring will also include the use of pitfall traps and flight-intercept traps to estimate invertebrate diversity.
- Researchers will use an octocopter Unmanned Aerial Vehicle (UAV) or drone equipped with a hyperspectral sensor to determine if spectral differences exist among the different genotypes and to establish baseline data for phenotyping. Repeat images acquired at varying frequency will be used to estimate growth rates. One flight session (there are three flights in one session) per year will be performed during the growing season. These flights will occur during mid-day close to solar noon and under clear sky conditions. Only one UAV will be in the air at a time. UAV flights will only occur over the garden and will cover approximately one acre per each flight. Maximum flight altitude is 230 ft above ground, although the maximum altitude authorized by the Federal Aviation Administration is less than 400 ft. Each flight will last approximately nine minutes, for a total of 27 minutes of flight time each season.

b. Garden Maintenance

- The garden will be watered with approximately five gallons of water per tree, three days per week during the growing season, totaling about six acre-feet of water per year.
- Drip irrigation will be used to irrigate during the summer growing season until roots reach ground water (expected in 3 to 5 years). If the tree roots do not reach the water table after five years of irrigation, the design would be re-evaluated to determine the amount and/or timing of irrigation, or if it is necessary to thin the plot.
- Competing vegetation will be cleared from the garden using a hand mower and gasoline-powered weed eater.
- Occasionally gopher traps may be used to eradicate gophers depreddating seedling trees.
- Insecticide may be used to control harvester ant colonies that are harvesting seedling trees.
- Wildlife exclusion fencing around the fence will be maintained. Maintenance activities may include: fence repair, fence removal, or fence replacement to a standard barbed-wire type fence once the garden is well established and trees are mature.

- There may be a need to cut and remove dead and/or live cottonwood trees or other native species for the purpose of thinning to: improve stand health, plant other species, alter age class composition, and remove dead tree safety hazards.
- There may be a need to remove the garden in its entirety due to significant management constraints related to sustainability or a change in management direction. The garden is considered additional habitat beyond what existed when the Ranch was acquired, and its removal would not conflict with the RLA grant requirements. However, the circumstances regarding the removal of trees are uncertain and therefore are not part of the proposed action.
- The understory of the garden may be enhanced by seeding and/or potted plants or plugs of native upland grasses, forbs, or shrubs appropriate for the site and native to the surrounding landscape. Planting of one liter or larger pots will be done by drilling holes approximately 12 inches deep with a gas-powered auger operated manually, or with an auger attachment to a bobcat tractor.
- Three erosional head-cuts are located along the southern boundary of the garden. If these head-cuts present a threat to the garden, they may be filled in with rip-rap and soil, and native grasses may be planted to provide a buffer between the garden and the head-cuts and to help stabilize the soil on and around the erosion.
- Two piezometers are installed in the garden to evaluate subsurface water table levels and estimate depth to groundwater. Water levels are monitored monthly and require access to the garden.

Future Tamarisk Removal

If future funding permits, the Department may consider tamarisk (*Tamarix* spp.) removal within the Agua Fria and Indian Creek drainages, native plant (i.e., cottonwood and willow) re-vegetation through pole and/or pot plantings, and implementation of practices to stabilize stream banks along areas with threatened infrastructure. It is anticipated that the experimental garden may be the source of cottonwood, and possibly other native plant species, stock or cuttings for these future in-channel restoration activities. To identify areas for tamarisk treatment, the Department mapped the vegetation with estimated densities of tamarisk that would be removed (Figure 2). These include: a 1-acre continuous patch occurring on a mid-channel bar in the Agua Fria River (Map area 27), removal of scattered individuals (map units 21, 22, 23, 25, 26, 27, 28) in less than 1/4 acre area, and a few sparsely scattered individual plants (map units 7 and 8) within an area less than 0.125 acre area. Map units 7 and 8 are within dense, native riparian vegetation, and removal methods have not been planned but would not involve any ground disturbance. If removal occurs in the future, it is anticipated that manual chainsaw cuts and stump treatments would be used. If and when this project (Phase II) is initiated, additional planning with specifics on methods and targets would occur with coordination with the Service to determine if reinitiation of consultation will be required.

Re-vegetation of Fallow Cropland

The Department has begun to establish a native grass and forb plant community and annual upland game bird seed crops in approximately 15 acres of fallow cropland adjacent to the experimental garden. The cropland is also used occasionally to hold horses and cows for

shipping and pasturing and has been impacted by past plowing, vehicles, livestock grazing, and trampling.

The cropland has been planted with an interior area of cool and warm season annual grain seed crops such as oats, barley, wheat, triticale and cereal rye, or forage type sorghums. Annual grain crops will be sterile so that they cannot colonize the surrounding landscape. In addition, a 50 to 75-ft buffer of native grasses, forbs, and pollinator plants will surround the annual grain seed crop. Plant species important to native pollinators will be established. The cropland will be planted in phases according to funding.

Farming and livestock management activities will be conducted within the cropland. Typically activities such as tilling and planting would be conducted for a short period in fall, winter, and spring. To improve soil condition and reduce weeds, an annual cover crop may be planted before establishing the native plant buffer and annual grain seed crops. To help with the establishment of the annual grain seed crops and native plant buffer, an existing above ground center pivot irrigation system is used. The irrigation system would be a portable system of pipes and sprinklers and would use water from the existing Horseshoe Irrigation Well. Farming practices will use mechanized tractors and planting implements, as well as motorized utility terrain vehicles (UTV), all-terrain vehicles (ATV), and trucks and trailers throughout the cropland areas as needed. However, it is anticipated that mechanized activities of any type would be of limited duration (approximately 1 hour per planting period) due to the small size of the cropland.

Two farming practices will be used to manage the cropland as described below. Both options would include continued use by livestock and occasional vehicle access to repair fencing or conduct farming activities. The two methods include:

- a. *No-till Drill (<6 in depth of ground disturbance)*: the cropland will be planted with a no-till seed drill. The drill has variable widths (would use a 10 to 12-ft wide drill) and is pulled by a tractor; an additional row of discs cuts through compact ground like a knife up to 3 to 4 in (using round rolling knife blades). A second row of angled, round disc blades opens the soil like a grain drill; a seed is dropped into the slice and then packer wheels roll over and close the slice around the seed.
- b. *Traditional 3-step process of till, landplane, grain drill and irrigation (up to 18 in depth of ground disturbance)*: the cropland is tilled using a tractor to pull a 12-ft wide disc with rotating round individual disc blades that till up to a depth of 12 in; the front row cuts the ground and throws dirt to the left and the back row throws dirt to the right to roll the soil over the cut. After discing, a landplane pulled by a tractor smooths the surface of uneven valleys/berms in preparation for seeding and more efficient planting and germination. Planting uses a grain drill approximately 12 ft wide with one disc blade that opens soil at an adjustable depth for the seed mix (up to 3 in; most likely < ½ in for native grasses) and then uses a chain to cover the seed by dragging over the ground and moving the soil over the top of the seed.

Action Area

According to 50 CFR § 402.02 pursuant to section 7 of the Act, the “action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. For purposes of this consultation, we define the action area as the 200-acre deeded Ranch which was purchased using WSFRP RLA funds and will be managed in perpetuity by the Department. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area as determined by the Service.

STATUS OF THE SPECIES

Gila Chub

The Gila chub was listed as endangered with critical habitat in 2005 (USFWS 2005, 67 FR 51948). Primary threats to Gila chub, such as predation by and competition with non-native organisms, and secondary threats identified as habitat alteration, destruction, and fragmentation are all factors identified in the final rule that contribute to the consideration that the Gila chub is endangered or likely to become extinct throughout all or a significant portion of its range.

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 (*Gila robusta*) (82 FR 16981). We intend to reevaluate the status of the Gila chub, which is currently listed as endangered with critical habitat (67 FR 51948). 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. Moreover, because we have not completed a range-wide status assessment of *Gila robusta*, we briefly provide below general life history and habitat information about the entity formerly known as *Gila intermedia*.

Background

Gila chub is a highly secretive species, remaining near cover including undercut banks, terrestrial vegetation, boulders, root wads, fallen logs, and thick overhanging or aquatic vegetation in deeper waters, especially pools (Rinne and Minckley 1991; Nelson 1993, Weedman et al. 1996). Recurrent flooding and a natural hydrograph are important in maintaining Gila chub habitats and in helping the species maintain a competitive edge over invading nonnative aquatic species (Propst et al. 1986, Minckley and Meffe 1987). They can survive in larger stream habitats, such as the San Carlos River, and artificial habitats, like the Buckeye Canal (Minckley 1985, Rinne and Minckley 1991, Stout et al. 1970, Rinne 1976), and they interact with spring and small-stream fishes regularly (Meffe 1985).

Gila chub generally spawn in late spring and summer; however, in some habitats, it may extend from late winter through early autumn (Minckley 1973). Schultz and Bonar (2006) data from Bonita and Cienega creeks suggested that multiple spawning attempts per year per individual were likely, with a major spawn in late February to early March followed by a secondary spawn in autumn after monsoon rains. Bestgen (1985) concluded that temperature was the most significant environmental factor triggering spawning.

Young Gila chub are active throughout the day and feed on small invertebrates as well as aquatic vegetation (especially filamentous algae) and organic debris (Bestgen 1985, Griffith and Tiersch 1989, Rinne and Minckley 1991). Adult Gila chub are crepuscular feeders, consuming a variety of terrestrial and aquatic invertebrates, and fishes (Griffith and Tiersch 1989, Rinne and Minckley 1991). Benthic feeding may also occur, as suggested by presence of small gravel particles.

Gila chub evolved in a fish community with low species diversity and where few predators existed, and as a result developed few or no mechanisms to deal with predation (Carlson and Muth 1989). This species is known to be associated with speckled dace (*Rhinichthys osculus*), longfin dace, desert sucker (*Catostomus clarki*), Sonora sucker (*Catostomus insignis*), Gila topminnow, desert pupfish, and Monkey Spring pupfish (*Cyprinodon arcuatus*). Prior to the widespread introduction of nonnative fishes, Gila chub was probably the most predatory fish within the habitats it occupied. In the presence of the non-native green sunfish (*Lepomis cyanellus*) in lower Sabino Creek, Arizona, Gila chub failed to recruit young (Dudley and Matter 2000). Direct predation by green sunfish on young Gila chub was the acknowledged cause of this observation. Adult Gila chub are crepuscular feeders, consuming a variety of terrestrial and aquatic invertebrates, and fishes (Bestgen 1985, Griffith and Tiersch 1989, Minckley and Rinne 1991).

Status and Distribution

The Gila chub is considered a habitat generalist (Schultz and Bonar 2006), and commonly inhabits pools in smaller streams, cienegas, and artificial impoundments throughout its range in the Gila River basin at elevations between 2,000 to 5,500 ft (Miller 1946, Minckley 1973, Rinne 1975, Weedman et al. 1996).

Historically, the Gila chub was recorded from nearly 50 rivers, streams and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona, and northern Sonora, Mexico (Miller and Lowe 1967, Minckley 1973). The Gila chub now occupies an estimated 10 to 15 percent of its historical range, and is limited to about 25 small, isolated, and fragmented populations throughout the Gila River basin in Arizona and New Mexico (Weedman et al. 1996, USFWS 2015).

The Agua Fria subbasin is the system furthest downstream in the Gila River basin that currently supports or is historically known to have supported Gila chub. This subbasin sustains or recently sustained four remnant Gila chub populations. The Agua Fria River mainstem was historically occupied, but that population is now considered extirpated. The four extant populations are Indian Creek, Little Sycamore Creek, Silver Creek (with replicates Larry and Lousy Canyon), and Sycamore Creek. In 1996, all remnant populations were considered threatened by Weedman et al. (1996), and two of the four were considered unstable.

In 2005, the Silver, Sycamore, Little Sycamore and Indian creek populations were impacted by the Cave Creek Complex Fire. Since then, stream habitat continues to deteriorate from sediment filling in the pools. In Silver Creek, the upper reach on Forest Service managed land is inundated by sediment and no longer maintains any surface flows to support any fish species (USDA 2016, USDI 2016 and 2017). This area includes the designated critical habitat portion of

the creek. Below the critical habitat boundary, on Bureau of Land Management (BLM) land, Gila chub have been identified in low numbers where stretches of pool habitat remain; however, in 2017, no Gila chub were captured (USDI 2016 and 2017). The aquatic habitat in Sycamore Creek is limited to three main pool areas separated by dry reaches. These areas continue to support Gila chub in low numbers (USDA 2017). The Gila chub population in Little Sycamore Creek inhabits two short perennial reaches totaling only about 1 km in length. The Indian Creek population was not detected until 1995, and in 2005 a portion of the population was salvaged as a precaution following the Cave Creek Fire Complex and later successfully returned. In 2016, Gila chub were collected from Indian Creek and transported to a refuge pond at the Phoenix Zoo's Conservation Center. The replicated populations in Lousy and Larry canyons are doing well, and there are no threats from non-native fishes.

Critical Habitat

Critical habitat for the Gila chub is designated for about 160.3 miles (mi) of stream reaches in Arizona and New Mexico that includes cienegas, headwaters, spring-fed streams, perennial streams, and spring-fed ponds. Critical habitat includes the area of bankfull width plus 300 ft on either side of the banks (67 FR 51948). The bankfull width is the width of the stream or river at bankfull discharge (i.e., the flow at which water begins to leave the channel and move into the floodplain) (Rosgen 1996). Designated critical habitat is organized into seven areas or river units (67 FR 51948). Critical habitat has not been designated within the action area of this consultation.

Gila Topminnow

The Gila topminnow was listed as endangered in 1967 without critical habitat (32 FR 4001). Only Gila topminnow populations in the United States, and not in Mexico, are presently listed under the Act. 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). Life history information can be found in the 1984 Recovery Plan (USFWS 1984), the Draft Gila topminnow Revised Recovery Plan (Weedman 1999), and references cited in the plans; this information is incorporated herein by reference.

Gila topminnows are highly vulnerable to adverse effects from non-native aquatic species (Johnson and Hubbs 1989). Predation and competition from non-native fishes have been major factors in their decline and continue to be the major threats to the remaining populations (Meffe et al. 1983, Brooks 1986, Stefferud and Stefferud 1994, Minckley and Marsh 2009). The native fish fauna of the Gila basin and of the Colorado basin, overall, was naturally depauperate and contained few fish that were predatory on or competitive with Gila topminnow (Carlson and Muth 1989). In the riverine backwater and side-channel habitats that formed the bulk of Gila topminnow natural habitat, predation and competition from other fishes was essentially absent. Thus Gila topminnow did not evolve mechanisms for protection against predation or competition and is predator- and competitor-naive. Due to the introduction of many predatory and competitive non-native fish, frogs, crayfish, and other species, Gila topminnow could no longer survive in many of their former habitats, or the small pieces of those habitats that had not been

lost to human alteration. Both large (Bestgen and Propst 1989) and small (Meffe et al. 1983) non-native fish cause problems for Gila topminnow, as can non-native crayfish (Fernandez and Rosen 1996) and bullfrogs.

Desert Pupfish

The desert pupfish was listed as an endangered species with critical habitat in 1986 (51 FR 10842). Historical collections occurred in Baja California and Sonora, Mexico and in California and Arizona. Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, and Salt rivers, and likely the Agua Fria, Hassayampa, and Verde rivers, although collections are lacking for the latter three. The desert pupfish was also found in the Lower Colorado River, Salton Sink basin, and Laguna Salada basin in Mexico (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 other references cited there.

One or more threats imperil most natural and transplanted desert pupfish populations. Since the 19th century, desert pupfish habitat has been steadily destroyed by stream bank 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 nonindigenous fish species. Non-native bullfrogs may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet throughout its range that includes fish (Cohen and Howard 1958, Clarkson and deVos 1986). There is also a concern that introduced tamarisk (*Tamarix* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990). The remaining populations continue to face these threats, and the Salton Sea area populations, in particular, are severely threatened.

Critical Habitat

Critical habitat was designated for the desert pupfish at Quitobaquito Spring, Organ Pipe Cactus National Monument, Pima County, Arizona; and along portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash, Imperial County, California (51 FR 10842). These areas provide the PCEs necessary to maintain pupfish, including adequate food and cover, and are at least partially isolated from predatory and competing exotic fishes. Critical habitat has not been designated within the action area for this consultation.

Climate Change

Drought is a natural occurrence that influences water quality and availability, and increases susceptibility to wildfire, flooding, and interactions with non-native fishes. Model projections for the southwestern North America show a sustained warmer and drier climate that began in the late 20th and early 21st centuries that is expected to consistently become drier (Seager et al. 2007), with water supplies projected to increasingly become more limited (USGCRP 2009). These warmer and drier trends are expected to increase water temperatures and alter streamflow patterns (Rahel and Olden 2008).

We anticipate that Gila chub, Gila topminnow, and desert pupfish populations will be negatively affected by climate change occurring into the future based on the projected decrease availability of water within streams and springs from lower precipitation trends and drought (USFWS 2008 and 2014). Increased and prolonged drought associated with changing climatic patterns is likely to reduce water availability and impact riparian vegetation, thereby reducing suitable aquatic/riparian habitat for these species. Although there is potential for adverse effects from climate change, we lack sufficient certainty to accurately predict how climate change will ultimately affect Gila chub, Gila topminnow, and desert pupfish populations range-wide.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Horseshoe Ranch is an in-holding within the Agua Fria National Monument in central Arizona, about 50 miles north of Phoenix in Yavapai County, Arizona. The property is an active ranch that serves as a destination for meetings and public events. It is used by Department personnel and other outside visitors for large and small scale events. The Ranch serves as base property for the Copper Creek Allotment on the Tonto National Forest and the Horseshoe Allotment administered by BLM. The Department separately acquired the management rights to the Horseshoe Allotment, and the Copper Creek Allotment was waived back to the Forest Service under a Memorandum of Understanding.

Both developed and undeveloped areas occur on the Ranch. Developed areas include fallow cropland, livestock facilities and various housing and ranch building structures. Undeveloped upland habitat on the Ranch is predominantly Arizona Uplands Sonoran Desert scrub/Semi-desert grassland transition. The property includes a 0.6-mi reach of the Agua Fria River and a 0.2-mi reach of Indian Creek, a tributary to the Agua Fria River. Flows on the Agua Fria are seasonal, and the Indian Creek flows are ephemeral. Habitats along the river corridors include both Interior Riparian Deciduous Woodland and more xeric Sonoran Riparian Scrubland.

The existing pond is approximately 0.5 acre in size with an estimated capacity of 2.4 acre-feet that is supplied from the Horseshoe Irrigation Well. It was designed to have various depths, shoreline areas with and without vegetation and spawning substrate, and to provide habitat for native fish, frogs, and gartersnakes. After acquiring the Ranch, the Department began renovating the pond in 2012. As of 2017, completed renovations include draining and lining the pond; excavating heavy sediment; eliminating bullfrogs; adding and maintaining a fence to preclude bullfrogs; renovating the well; planting native plants and seeds; removing non-native vegetation; constructing a wintering hibernaculum for snakes; and installing an above-ground irrigation line for upland vegetation management.

SHA for Topminnows and Pupfish in Arizona

In 2007, we entered into a programmatic SHA with the Department for the Gila and Yaqui topminnow (*Poeciliopsis sonoriensis*), and desert and Quitobaquito pupfish (*Cyprinodon macularius eremus*) over a 50-year period (AGFD 2007). Enrolled non-Federal landowners are able to conduct any legal activity while allowing the Department to establish topminnow and/or pupfish on their property, and in return landowners receive regulatory assurances to alter or modify their property in the future back to its original baseline condition.

The associated intra-Service biological and conference opinion (BCO, 22410-2003-F-0022) on the SHA and issuance of the Enhancement of Survival Permit (10(a)(1)(A) was finalized in 2008. It addressed the potential effects of implementing the agreement on the topminnow and pupfish species as well as eleven other species that may already be present on enrolled properties including the chub with designated critical habitat, and the cuckoo, a candidate species at that time. Our analysis addressed the reestablishment of the topminnow and pupfish and other actions undertaken by the Department to manage enrolled sites that could negatively impact the species resulting in take. These covered activities included: aquatic site maintenance, actions to remove non-native aquatic species, vegetation management, any normal day-to-day land use and management activity, and returning the site to baseline conditions. We provided incidental take statements for all species including the cuckoo once it became listed, in which any project would be reviewed at that time to determine if take had occurred.

During this consultation, we identified conflicts with incidental take statements provided to topminnow/pupfish under the SHA and the chub under the SHA's BCO. For instance, the same actions identified in the SHA that may result in take are also proposed in the Plan. However, there are minor differences in how actions would be implemented in the Plan versus the SHA and how they could potentially affect listed species. Under the SHA, the level of take anticipated for the topminnow and pupfish is the loss of all individuals including the "return to baseline" conditions. Under the SHA's BCO, incidental take for the chub was quantified as up to 100 Gila chub, their eggs and young that could be taken annually, which would be difficult to track once they are introduced into the Ranch's pond. Additionally, the SHA's return to baseline conflicts with the requirements of the RLA grant. Due to the difficulty this posed, we requested the Department disenroll the property from the SHA once this BO is finalized and the Department agreed. Any incidental take issued to topminnow, pupfish, and chub from actions on the Ranch will be covered under this BO.

Actions Covered under Previous Consultations

Several of the proposed management actions for the Ranch were funded and informally evaluated by WSFRP or analyzed in another BO. For WSFRP funded projects, the Department's Environmental Assessment Checklist (e.g. M12-02282231) is provided below for tracking purposes if or when they seek future Federal funds. It also helps to clearly identify Federal actions from non-federal actions. Any action that was previously evaluated in another BO with an incidental take statement provided to the chub, topminnow, pupfish, or gartersnake are treated herein as baseline information.

- Arizona Game and Fish Department Operation and Maintenance Statewide Programmatic Environmental Assessment Checklist (MI0-08025232): WSFRP awarded the Department a Comprehensive Management System grant (AZ FW-100-P-18; July 1, 2010 - June 30, 2015) for the operations and maintenance of Arizona Game and Fish Commission-owned properties, fish hatcheries, wildlife management areas, shooting ranges, wildlife water developments, and other private, State, and Federal lands. WSFRP evaluated these actions and any effects that may result from implementation on 57 listed, 1 proposed, and 20 candidate species in Arizona and concurred with the Department's "may affect, not likely to adversely affect" finding. These funds supported mechanical and chemical control/removal of weeds and noxious plants around the pond and in the experimental garden; and planting of native plants/seed in the cropland.
- Horseshoe Ranch Pond Renovation and Maintenance, and Native Aquatic Species Stocking and Management (M12-02282231): WSFRP evaluated this project and provided grant funds (for the permit cycle April 17, 2012 – April 17, 2017) to the Department in 2012. Besides the pond renovations that were completed from 2012 to 2017, the project included stocking of lowland leopard frogs (*Rana/Lithobates yavapaiensis*), longfin dace (*Agosia chrysoaster*), chub, topminnow, pupfish, and gartersnakes; species monitoring; and population augmentations as needed. WSFRP and the Department completed informal consultation with WSFRP concurring with a "may affect not likely to adversely affect" finding for the chub, topminnow, and pupfish based on the creation of viable habitat for the species; and a "no jeopardy" finding on the gartersnake and cuckoo (the gartersnake and cuckoo were candidate species at that time). The stocking of topminnow and pupfish occurred after the Ranch was enrolled under the statewide SHA for topminnows and pupfish in 2014. These funds supported the pond renovations, stocking of listed and non-listed species into the pond, bullfrog removal efforts, augmentations, and operations and maintenance of the pond.
- Biological and Conference Opinion for Federal Funding of Aquatic Inventory, Survey, and Monitoring Activities, and Conservation Activities for Aquatic Species (22410-2011-F-0290;M12-01193810): The Plan proposes to remove bullfrogs, crayfish, and any other non-native species through netting, trapping, or shooting if either species is detected in the pond. However, impacts to listed species that may result from federally funding a suite of activities related to aquatic species management by the Department, including the opportunistic capture and removal of non-native species, was analyzed under the 2011 BCO (22410-2011-F-0290). We issued a non-jeopardy opinion to WSFRP for the chub, topminnow, and pupfish, and provided a concurrence for the cuckoo. The gartersnake, a candidate species then, was included in the consultation and effects to the species from the proposed action were documented. The BCO will expire in 2021 and we assume the Department will re-initiate consultation to continue implementing actions regarding aquatic species management and have coverage for effects to any affected listed species. Therefore, the Plan's proposed removal of bullfrogs and crayfish and any effects that action may cause to listed species is not addressed in this consultation.

Actions Covered under the Department's Section 10(a)(1)(A) permit and Section 6 Authority

The collection, translocation, and release of the chub, topminnow, pupfish, and gartersnake from source populations to the pond are conservation actions that contribute to the recovery of the species. Even though translocations, augmentations, and releases are proposed management actions in the Plan, these actions are not evaluated as part of the proposed action in this BO. These actions will be conducted by the Department in a manner that is consistent with the terms and conditions of their section 10(a)(1)(A) Enhancement of Survival permit (TE821577-5, 2015), and their section 6 agreement authority under the Act. Any take that may occur during capture, handling, transport, and release of listed species is covered under the permit and in the incidental take statement in the associated BO for the issuance of the permit for the endangered fishes. No incidental take coverage is needed for the Department to collect, handle, transport, release, etc. the gartersnake as long as the Department's action is consistent with their section 6 authority under the Act.

Part of the proposed action is augmenting the pond's populations of chub, topminnow and pupfish, as needed, and maintaining replicate populations of these species, consistent with recovery objectives in the Draft Gila Chub Recovery Plan (USFWS 2015), Draft Revised Gila topminnow Recovery Plan (Weedman 1998), and the Desert Pupfish Recovery Plan (USFWS 1993). The Department will collect fish and gartersnakes from different locations, transport them to the Ranch, and release them into the pond. The complete description of augmentation and translocation methods is found in the Plan (AGFD 2017). Any injury or mortality that may occur to listed species from these actions are covered under their Section 10(a)(1)(A) permit and section 6 authority (i.e., this consultation only considers take that may occur from habitat management actions proposed on the Ranch). Establishing and maintaining replicate populations of these species will help ensure their survival in the event of a catastrophic loss of remnant populations. In addition, the replicate populations of chub, topminnow, and pupfish could serve as source populations for future reintroductions of these species into areas outside of the Ranch.

Status of the Species in the Action Area

Gila Chub

Gila chub do not currently occur within the action area, but there are two nearby populations to the Ranch. The first population is located about three miles upstream of the Ranch within Indian Creek. Establishing the chub in the pond would provide secure habitat and a replicate population that enables individuals to be translocated back into Indian Creek in the future. Indian Creek, a tributary to the Agua Fria River is estimated to have fewer than 500 adults and is considered to be one of the smaller remaining chub populations (USFWS 2015). The second nearby chub population is in Silver Creek, a downstream tributary to the Agua Fria River. That population is about one mile from the Ranch, but does not have a direct water connection. Most of the Agua Fria River and Indian Creek within the Ranch is normally dry. No designated critical habitat for the Gila chub occurs within the action area.

Gila Topminnow

As part of Department's 2007 *SHA for Topminnows and Pupfish in Arizona*, 247 Gila topminnow were released into the existing pond in 2016. Reproduction was documented during surveys conducted later in the year. As of September 2017, 367 topminnows were documented in the pond (Lashway 2017, pers. comm.).

Desert Pupfish

As part of Department's 2007 *Safe Harbor Agreement for Topminnows and Pupfish in Arizona*, approximately 422 pupfish were released into the existing pond in 2015. Reproduction was documented during surveys conducted later in 2015. As of September 2017, 126 pupfish were documented in the pond (Lashway 2017, pers. comm.). No designated critical habitat for the pupfish occurs within the action area

EFFECTS OF THE ACTION

The proposed action of the original consultation was the granting of RLA funds to the Department for the purchase of the Ranch. All effects to the chub, topminnow, and pupfish that may occur as a result of proposed management and monitoring by the Department, pursuant to the Plan, are indirect effects of granting the RLA funds and are discussed below.

Gila Chub, Gila Topminnow, and Desert Pupfish

The overall effects of the proposed action are anticipated to be beneficial to the chub, topminnow, and pupfish by securing and maintaining suitable habitat for these species in perpetuity. Since acquiring the Ranch in 2011, using the RLA funds, the Department has renovated an existing stock pond on the property to remove sediment, lined the pond, removed bullfrogs, added a perimeter fence to preclude re-colonization by bullfrogs, renovated a well, planted native plant, and removed non-native vegetation. Implementation of these actions created viable habitat for these species. Pursuant to the RLA grant conditions and the Plan, the Department will fund and implement in-perpetuity management of the renovated stock pond consistent with the conservation needs of the chub, topminnow, and pupfish.

The proposed pond management activities are designed to maintain aquatic habitat for listed fish, but in implementing the activities we expect adverse effects will occur to the species. On rare occasions in the event of a severe non-native species invasion, the pond may be drained using a pump. Although efforts will be made to minimize impacts to the chub, topminnow, and pupfish (i.e., salvage individuals before pond drying), individuals can be killed or injured during drying events. Because the pond will be monitored frequently to maintain the fencing around the pond and remove any bullfrogs/crayfish observed, it is anticipated that pond drying would rarely be required. No effects to the fish species are anticipated from actions to repair or maintain the pond's perimeter fence.

We anticipate that mortality of Gila chub, topminnow, and pupfish will occur from interspecies predation because of their availability as a food source for the northern Mexican gartersnake. Gila chub and the gartersnake are known to prey on native fish species and will likely feed on the

eggs, young, and adult topminnow and/or pupfish; and gartersnakes prey on individual chub. Gila chub, northern Mexican gartersnakes, topminnow and pupfish have historically coexisted in the wild, and we anticipate that these impacts would replicate the natural, historic predator/ prey relationship between these species. While predation may result in the loss of individual chub, topminnows and pupfish, these species have a high reproductive output (USFWS 1993, 1998, and 2015), and lost individuals would likely be replaced quickly. Additionally, the Department will conduct annual surveys to determine continued presence/absence of these species for at least three years following the first introduction. Additional surveys will also be conducted as needed to determine the success or failure of the establishment of the chub. If populations of fish species are declining, annual augmentations of chub, topminnow, and pupfish are proposed to occur to ensure that no fish species are entirely lost in the pond as a result of predation.

Adverse effects to topminnow, pupfish, and chub may occur from herbicide use for vegetation control. Picloram is known to have low to moderate toxicity to aquatics and may result in adverse effects to topminnow, pupfish, and chub. Injury or death may occur as a result of sublethal effects such as endocrine disruptions or abnormal behavioral changes, or indirectly through the loss of the fishes' prey species (White 2007). Triclopyr and Clopyralid may be toxic to some aquatics species depending on the formulation. These terrestrial herbicides are not intended to be used in aquatic environments and therefore any potential drift or runoff into the pond may adversely affect chub, topminnow, and pupfish. Impacts to listed fish species will be reduced by having certified applicators administer the chemicals per the label instructions, which specifies application rates, frequency, techniques, and additional guidelines. The Department will also follow internal guidance and consult land and resource management agencies' guidance on recommended protection measures when using these herbicides near listed aquatic species habitat.

Separate from applying the herbicides Picloram, Triclopyr, and Clopyralid for terrestrial vegetation control, Rodeo Aquatic Herbicide may be used for cattail removal. Rodeo Aquatic Herbicide is not known to be toxic to cold and warm water fishes. Therefore, we do not expect the use of Rodeo Aquatic Herbicide for cattail removal will have any adverse effects to topminnow, pupfish, and chub.

Effects on Recovery

The *Gila Chub Draft Recovery Plan* (Service 2015), *Draft Revised Gila Topminnow Recovery Plan* (Weedman 1998), and the *Desert Pupfish Recovery Plan* (Service 1993) identify threat-based criteria to recover the chub, topminnow, and pupfish. The proposed action will contribute to meeting recovery goals and criteria of these species by: 1) establishing and securing replicate populations of the species; 2) managing the property to protect the replicate populations; and 3) monitoring the status of the species on the property to ensure populations are stable and persist. Thus, implementation of the proposed action will not appreciably reduce the likelihood of recovery of the species in the wild.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section, because they require separate consultation following section 7 of the Act.

The land within the action area (Horseshoe Ranch) is privately owned. Ongoing activities on the Ranch include operations and maintenance of the property, meetings and public events, and management of the livestock grazing allotments and rangeland use. These activities will continue during the 20 year consultation period and are not expected to effect the listed fish species due to the pond's restricted access. There are no present or future projects, authorized or under review that are expected to contribute cumulative losses to the Gila chub, topminnow, and pupfish.

CONCLUSION

Gila chub

Section 7(a)(2) of the Act directs each Federal agency, in consultation with the Secretary (of the Interior and/or Commerce), to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. A biological opinion resulting from formal consultation constitutes the Service's finding whether a proposed agency action is likely to jeopardize a listed species or destroy or adversely modify critical habitat. Although the legal status of Gila chub is an endangered species, taxonomically it is now part of a single taxonomic species that includes the roundtail chub (*Gila robusta*) and formerly recognized headwater chub (*Gila nigra*). In this BO, we have not considered the effects of the proposed action on the newly recognized *Gila robusta* that includes, but is not fully comprised of, Gila chub. Our conclusion below applies only to the federally-listed Gila chub.

Gila Chub, Gila Topminnow, and Desert Pupfish

After reviewing the current status of the Gila chub, Gila topminnow, and desert pupfish; the environmental baseline for the action area; the effects of the proposed action; and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of these species. We reached this conclusion by considering the following:

1. The overall effects of the proposed action will be beneficial to Gila chub, Gila topminnow, and desert pupfish by creating, securing, enhancing, and maintaining habitat in perpetuity that would not exist naturally for these species;
2. Any adverse impacts to Gila chub, Gila topminnow, and desert pupfish during implementation of the proposed actions are not expected to appreciably reduce the numbers, reproduction, or distribution of the species in the action area or throughout the species' range; and

3. Implementation of the proposed action will contribute to meeting the recovery goals of the Gila chub, Gila topminnow, and desert pupfish by a) establishing replicate populations of the species; b) managing the property to protect the replicate populations; and c) monitoring the status of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The grant proposal and conditions for the Horseshoe Ranch property identify the management activities that will be implemented to contribute to the conservation and recovery of the affected listed species. All management activities are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within the incidental take statement pursuant to 50 CFR §402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 7(o)(2) of the Act to apply. If the terms and conditions are not adhered to, the protective coverage of section 7(o)(2) may lapse. However, the Service may agree that modifications to the management activities are needed. These new modifications will be incorporated as reasonable and prudent measures, superseding the former management activities.

AMOUNT OR EXTENT OF TAKE

Gila Chub, Gila Topminnow, and Desert Pupfish

We anticipate harm to Gila chub, Gila topminnow, and desert pupfish will occur from pond maintenance; mortality and injury that can be expected as a result of chemical vegetation control and in the event of complete pond draining. Mortality and injury to Gila topminnow and desert pupfish is anticipated to occur due to predation from Gila chub and northern Mexican gartersnake, similar to naturally occurring species' interactions within an aquatic ecosystem. We are unable to quantify the number of individual Gila chub, Gila topminnow, and desert pupfish that may be taken from the proposed action due to their small size, mortality/injury occurring underwater, and augmentation. Because the proposed action is creating habitat and introducing species within an isolated environment, incidental take for each fish species will be exceeded

when they are no longer present in the pond due to either pond management activities or a level of predation that results in the species' extirpation from the pond.

EFFECT OF THE TAKE

In the accompanying biological opinion, we determined that this level of take is not likely to result in jeopardy to Gila chub, Gila topminnow, and desert pupfish.

REASONABLE AND PRUDENT MEASURES

The following reasonable and prudent measure is necessary and appropriate to minimize or avoid impacts of incidental take to the Gila chub, Gila topminnow, and desert pupfish.

1. The Department shall monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.

There are no additional reasonable and prudent measures required if this project is implemented as proposed.

TERMS AND CONDITIONS

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

- 1.1 The Service shall require that the Department provide a report of management activities that are implemented from the Plan every 10 years.
- 1.2 The Service shall also require that the Department report to us in the event that there is a significant observed decline in the status of any of the listed fish species in the pond.

The reasonable and prudent measure, with the implementing terms and conditions, is designed to minimize or avoid the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided.

Disposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the Service's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact

specimens of listed animal species shall be submitted as soon as possible to this office or the nearest Department office, educational, or research institutions (e.g., NAU in Flagstaff) holding appropriate State and Federal permits. Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend the following:

1. We recommend that the Department coordinate with the Service to implement adaptive management procedures to regularly assess and improve attainment of the conservation goals of the Gila chub, Gila topminnow, and pupfish.

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

REINITIATION NOTICE

This concludes formal consultation. 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.

Certain project activities may also affect species protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a Service permit, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you think migratory birds and/or eagles will be affected by this project, we recommend seeking our Technical Assistance to identify available conservation measures that you may be able to incorporate into your project.

For more information regarding the MBTA and Eagle Act, please visit the following websites. More information on the MBTA and available permits can be retrieved from: [USFWS Migratory Bird Program web page](#) and [USFWS Permits Application web page](#). For information on protections for bald eagles, please refer to the Service's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) published in the Federal Register on June 5, 2007, as well at the Conservation Assessment and Strategy for the Bald Eagle in Arizona ([Southwest Bald Eagle Management Committee website](#)).

We appreciate the Regional Office and the Department's efforts to identify and minimize effects to listed species from this project. Please refer to the consultation number, 02EAAZ00-2017-F-1271 in future correspondence concerning this project. Should you require further assistance or if you have any questions, please contact Kathy Robertson at (602) 889-5957 or Greg Beatty at (602) 889-5941.

Steven L. Spangle

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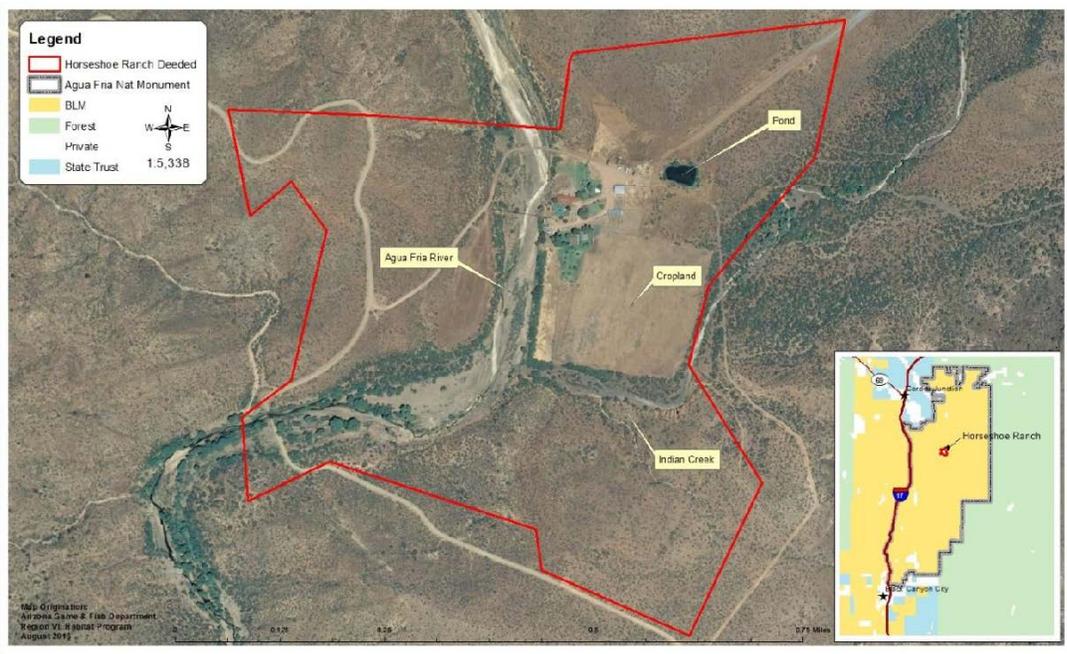


Figure 1. 2014 Aerial image of the 200 acres of deeded land of Horseshoe Ranch.

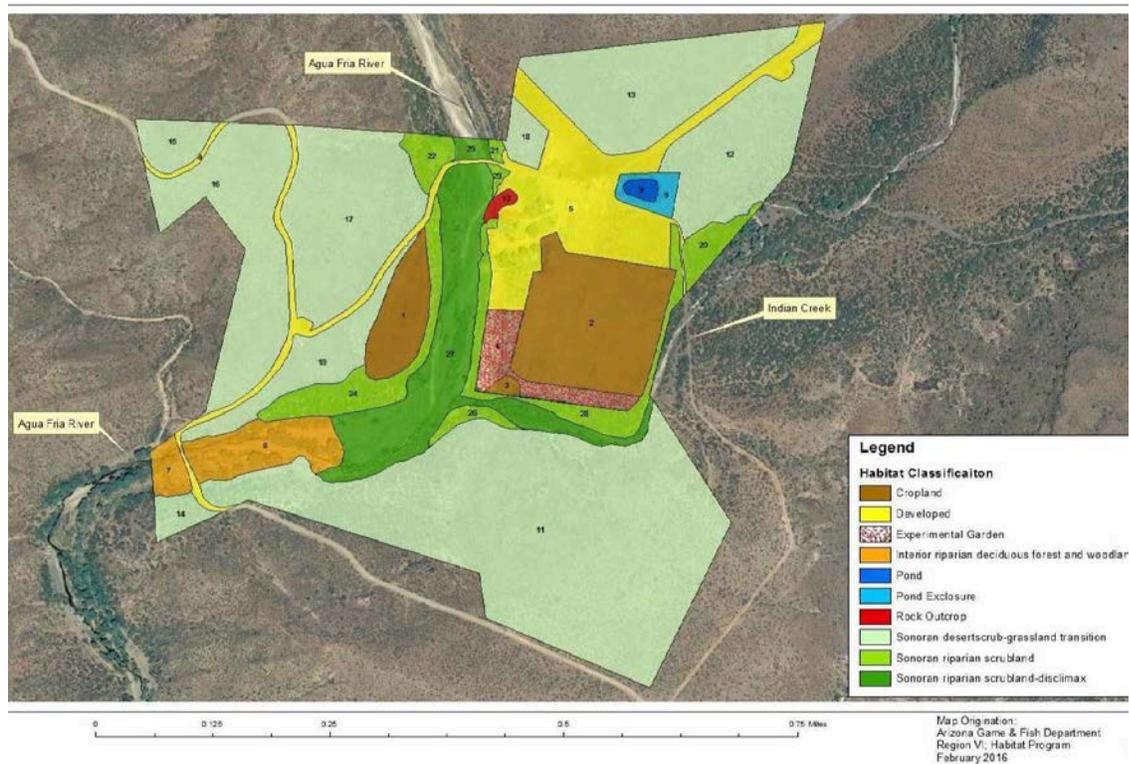


Figure 2. Landcover types on Horseshoe Ranch deeded land.

APPENDIX A: CONCURRENCES

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for the threatened northern Mexican gartersnake (*Thamnophis eques megalops*; gartersnake), the threatened western Distinct Population Segment of the yellow-billed cuckoo (*Coccyzus americanus*; cuckoo), and their respective proposed critical habitats. We concur with your determinations and provide our rationales below.

Northern Mexican Gartersnake

The northern Mexican gartersnake was listed as threatened under the Act on July 8, 2014 (79 FR 38678). As part of this rulemaking, a 4(d) rule was also established which allows for construction, continued use, and maintenance of stock tanks on non-Federal lands. Critical habitat was proposed on July 10, 2013 (78 FR 41550) and has not yet been finalized.

The Northern Mexican gartersnake is an active predator and is thought to heavily depend upon a native prey base (Rosen and Schwalbe 1988). Northern Mexican gartersnakes forage along vegetated streambanks, searching for prey in water and on land, using different strategies (Alfaro 2002). Primarily, its diet consists of amphibians and fishes, such as adult and larval (tadpoles) native leopard frogs, as well as juvenile and adult native fish (Rosen and Schwalbe 1988), but earthworms, leeches, lizards, and small mammals are also taken. In situations where native prey species are rare or absent, this snake’s diet may include nonnative species, including larval and juvenile bullfrogs, western mosquitofish (Holycross et al. 2006, Emmons and Nowak 2013), or other nonnative fishes. In gartersnake populations where the prey base is skewed heavily towards harmful nonnative species, recruitment of gartersnakes is often diminished or nearly absent.

Prior to 2017, the gartersnake did not occur on the Ranch despite numerous surveys by various groups. Several historical records from the 1980s document the gartersnake occurring in the Agua Fria River, from its tributaries above Cordes Junction to approximately Table Mesa Road (Holycross et al. 2006). Surveys for the gartersnake at four locations in 2004 and 2005 failed to detect any individuals. Intensive survey efforts during June 2016 were conducted along the Agua Fria River within 1.9 miles upstream and downstream of the Ranch. That effort consisted of approximately 15,728 trap-hours and 237 person-search hours, but no gartersnakes were detected. Crayfish and non-native species numerically dominated the captures with species/taxa caught in traps (in order of abundance) being crayfish (*Orconectes virilis*), green sunfish (*Lepomis cyanellus*), longfin dace, fathead minnow (*Pimephales promelas*), bullfrogs (larval and metamorphosed) and bullhead catfish (*Ameiurus* sp.).

In October 2017, eleven captive-reared gartersnakes were introduced into the pond. The release was planned under the Department’s EAC M12-02282231 and for the purposes of the Conservation and Mitigation Program (CAMP), which was developed to offset the negative impacts to native species from the Department’s statewide sportfish stocking (22410-2008-F-0486). The Department committed to providing two gartersnake populations either through securing existing but threatened populations or establishment of a new population. The Ranch’s pond was evaluated and selected as a site to establish a population. Over the last several years, the Department translocated longfin dace, lowland leopard frogs, and hundreds of individual

pupfish and topminnows into the pond to serve as the gartersnake's native prey base. Following the gartersnake's release, the Department plans to monitor individuals next spring once they emerge from hibernation, to verify their status. While establishing a new population on the Ranch is for recovery purposes, we are not aware of any instance where this species has been kept in an enclosed, semi-wild enclosure like the pond. We are tentatively optimistic that the eleven individuals will survive to reproduce and become established.

Approximately 84.85 acres of proposed critical habitat for the gartersnake occurs along the Agua Fria River and is within the action area.

Conservation Measures

The Department will follow internal guidance and consult land and resource management agencies' guidance on recommended protection measures when using these herbicides near listed aquatic species habitat to minimize effects to gartersnakes. This includes surveying areas prior to treatments to ensure no gartersnakes are present and applying appropriate buffers. If appropriate buffers cannot be implemented and there is the potential for the herbicide to enter the pond by drift or surface runoff that may adversely affect gartersnakes, discussion with the Service should be initiated, and additional project specific consultation may be required.

Conclusion

We concur with your determination that the proposed action may affect, but is not likely adversely to affect the northern Mexican gartersnake and is not likely to destroy or adversely modify proposed critical habitat. We base our concurrence on the following:

1. We do not anticipate injury or mortality of northern Mexican gartersnakes will occur as a result of the future proposed pond management activities to maintain gartersnake habitat. Any behavioral disturbance or displacement, such as being startled or flushed into the water or into/under terrestrial cover is anticipated to be normal predatory response. We anticipate the activities will be short in duration, provide minor habitat modifications, and will be designed to minimize any short-term effects, given that the gartersnakes' release is for conservation purposes. Therefore, any potential effects to gartersnake feeding, sheltering, or breeding activity are expected to be insignificant or discountable.
2. Chemical application of Rodeo Aquatic Herbicide will be used to prevent the spread of cattails overtaking the pond. The herbicide is not considered to be toxic to gartersnakes or their preferred prey (native fish and frogs); thus any potential effects to the gartersnake from cattail treatments would be discountable.
3. The Department's implementation of the conservation measure for gartersnakes during herbicide use near the pond will minimize any negative effects to the species. Therefore, we anticipate that effects to the northern Mexican gartersnake from appropriately applied herbicides will be insignificant.
4. The Plan also includes tamarisk removal within the Agua Fria and Indian Creek drainages and planting of native riparian tree, shrub, or herbaceous species along portions

of the Agua Fria River. These activities will have no effect to the gartersnake because no ground disturbing activities will occur that could injure, trap, or kill individual gartersnakes; and areas with tamarisk are considered to be unsuitable habitat due to lack of water, a prey base, and shoreline vegetation that provides for cover. Tamarisk removal would also occur within a very small area (approximately 1.025 acres) within 84.85 acres of proposed gartersnake critical habitat. Thus, the proposed removal is not expected to alter, directly or indirectly, stream flow, bankside vegetation, or the gartersnake prey species that are associated with the primary constituent elements of proposed critical habitat. We expect that there will be no effects to the PCEs of proposed critical habitat from future tamarisk removal.

Western Yellow-billed Cuckoo

The western Distinct Population Segment (DPS) of the yellow-billed cuckoo was listed as a threatened species on October 3, 2014 (79 FR 59991). Critical habitat was proposed on August 15, 2014 (79 FR 48548) and has not been finalized. Yellow-billed cuckoos have a long breeding season which runs from May 15th through September 30th. In Arizona, cuckoos start migrating through the State in mid-May, although there are some earlier records of migration. Along the Agua Fria River, cuckoos generally arrive in mid-June and typically nest from July through early August. Breeding peaks during the monsoon season when the presence of water and humidity, and large insect production are the greatest. By September cuckoos begin to migrate south (Hamilton and Hamilton 1965, Corman and Magill 2000, Corman 2005). However, nests and fledglings are still being found into September and adults have been observed feeding fledglings in late September at several Arizona sites.

Protocol level surveys within the Agua Fria National Monument for the yellow-billed cuckoo have been conducted annually since 2010 by Audubon Arizona, in partnership with Sonoran Audubon, BLM, Friends of Agua Fria National Monument, and the Department. Up to three estimated territories per year have been detected along the Agua Fria River downstream of the Ranch's boundary.

The Department conducted protocol surveys for the yellow-billed cuckoo on the Ranch four times each in 2014, 2015, 2016 and 2017. They covered portions of the Agua Fria River from the Bloody Basin Road crossing upstream to the Ranch's access road and the lowest portion of Indian Creek. No cuckoos were detected in 2014 or 2017. In 2015, one cuckoo was detected in each of the four required surveys. In 2016, one cuckoo was detected in three of the four required surveys. The detections were near the Bloody Basin Road crossing and downstream near the end of deeded land, approximately 0.4 miles from the cottonwood garden; and upstream between the Indian Creek confluence and the Ranch access road, immediately adjacent to the garden along the Agua Fria corridor. Sonoran Audubon surveys conducted in 2017 detected a cuckoo on the Ranch just upstream of the Bloody Basin Road crossing. They also detected a pair at the road crossing, but located on BLM land. Additional surveys that year along the Agua Fria River detected cuckoos less than a mile and further from the Ranch (Audubon 2017).

As of 2017, there is no evidence of cuckoos breeding on the Ranch. Yellow-billed cuckoos detected on the Ranch are believed to be from the upstream or downstream territories or transient birds. Data collected from surveys suggests that territories, and likely a nest, have been on BLM

land downstream of the Ranch along the Agua Fria River. Based on the Department's assessment, approximately 6.7 acres on the Ranch are currently suitable as nesting habitat. Approximately 65.47 acres of proposed critical habitat for the cuckoo occurs within the Ranch (e.g., action area).

As the cottonwood garden matures, cuckoos may begin to rely upon the trees for nesting, or nearby nesting cuckoos may rely upon the garden to forage. Since there is uncertainty on whether breeding cuckoos may depend (nesting/foraging) on the 3-acre garden and the specific methods, timing, and needs for future cottonwood tree management (removal, thinning, safety hazards, etc.), we have not analyzed the effects to breeding cuckoos from any future live/dead tree removal. These live/dead tree removal activities could adversely affect cuckoos depending on the location within the garden, extent of removal, and location of cuckoo nests, and are actions that we cannot adequately address at this time. Therefore, our analysis only considers the effect to nesting, foraging, and migrating cuckoo behavior from routine maintenance and researcher activities.

The Department is uncertain whether the entire cottonwood garden may need to be removed in the future due to management constraints or a change in management direction. Because of this uncertainty and the uncertainty of whether breeding cuckoos will nest within the garden or if nearby nesting cuckoos will rely upon the garden for foraging, removal of the garden is not part of the proposed action or our analysis. If the decision is made to remove the garden and the Department detects a cuckoo nesting in one of the cottonwood trees or relying upon the garden for food, reinitiation of consultation will be required.

If cuckoos are not detected in the cottonwood garden, all of the proposed activities for the cottonwood garden may be implemented without further consultation; these include cutting or removing live and/or dead trees or other native species for thinning purposes, removing hazardous dead trees, and removing the entire cottonwood garden.

If future funding permits, the Department may consider tamarisk (*Tamarix* spp.) removal within the Agua Fria and Indian Creek drainages, native plant re-vegetation through pole and/or pot plantings (i.e., cottonwood and willow), and implementation of practices to stabilize stream banks along areas with threatened infrastructure (Phase II). Our analysis only considers tamarisk removal using manual chainsaw cuts and stump treatments within a 1.25 acre area, as described in the Proposed Action. If the Department develops additional tamarisk removal methods or there is a change in targeted areas that may result in effects to the cuckoo that have not been considered, the Department will coordinate with the Service to determine if reinitiation will be required.

Conservation Measures

- The Department commits to conducting cuckoo surveys throughout the Ranch that will help to identify whether future reinitiation of consultation is needed for cottonwood garden management and tamarisk removal.
- The cottonwood garden has been planted with a high density of trees. There will be a need to cut and remove live and/or dead cottonwood trees or other native species for the purpose of thinning to: improve stand health, plant other species, alter age class composition, and

remove dead tree safety hazards. If a cuckoo is detected in the garden and there are plans to thin or remove individual trees for safety reason, the Department will meet with us and coordinate to determine if reinitiation of consultation is needed.

Conclusion

We concur with your determination that the proposed action may affect, but is not likely adversely to affect the yellow-billed cuckoo and is not likely to destroy or adversely modify proposed critical habitat. We base our concurrence on the following:

1. If breeding or migrating cuckoos are present when researchers are collecting cottonwood measurement data or maintenance staff is accessing the garden, increased human activity levels are not anticipated to adversely affect nesting/foraging activities. Because of the short period of time researchers or maintenance staff (waterline maintenance, weeding, mowing, and farming) will be in the garden, we anticipate any alteration of cuckoo behavior (flushing, etc.) will be temporary and cuckoos will return to normal activities once researchers or maintenance staff depart. Many of these human activities will occur routinely and cuckoos may acclimate to the low level of noise and disturbance. Therefore, we expect any alteration of the cuckoo's behavior from the researchers and garden maintenance activities will be insignificant.
2. We expect UAV flights in the cottonwood garden will not result in adversely affecting breeding/migrant cuckoo behavior. Because noise from UAVs or their perception as an aerial predator will be temporary and short-term (9 minutes per flight, altitude maximum of 400 ft. and limited flights per year), we expect any alteration of cuckoo behavior from the UAV flights will be insignificant.
3. Future tamarisk removal treatments will occur between October 1st and May 14th to avoid the cuckoo breeding season (May 15 to September 30) and prevent disturbance to breeding/foraging cuckoos. Approximately 1.25 acres of tamarisk (spread across the site) will be removed along the Agua Fria River. This small amount of vegetation removal, compared to the cuckoo's large home range and amount of remaining vegetation (65.47 acres) is not anticipated to alter prey availability or habitat structure or suitability. Any gaps in the vegetated cover are expected to be short-term and occur in small amounts. Therefore, we consider any effect to cuckoo behavior or its habitat from tamarisk removal will be discountable.
4. We do not anticipate the small amount (1.25 acres) of removed tamarisk will adversely affect proposed yellow-billed cuckoo critical habitat. The 1.25 acres will occur within the 65.47 acres of proposed yellow-billed cuckoo critical habitat at the Ranch. Native riparian vegetation will be planted in its place. The small amount of removed tamarisk vegetation compared to overall amount of vegetation available is not expected to alter the primary constituent element related to its adequate prey base (PCE #2).
5. We do not expect any effects will occur to the cuckoo from proposed management activities for the fallow cropland because the cropland does not contain potential, suitable or foraging habitat for the cuckoo.