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In reply refer to:
AESO/SE
02EAAZ00-2012-F-0353

August 31, 2012

E-Mail Transmission
Memorandum

To: Chief, Wildlife and Sport Fish Restoration Program, Fish and Wildlife Service, Albuquerque, New Mexico (Attn: Nicole Jimenez)

From: Field Supervisor

Subject: Biological and Conference Opinion for Federal Funding to Arizona Game and Fish Department to Conduct Native Fish Salvage and Piscicide Application in Fossil Creek

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation and conference was dated August 28, 2012, and received by us via electronic mail on the same day. At issue are impacts that may result to listed and candidate species from the proposed Federal funding by Wildlife and Sport Fish Restoration (WSFR) for the Arizona Game and Fish Department (AGFD) to conduct fish salvage and apply the piscicide rotenone to a portion of Fossil Creek under the State Wildlife Grant (SWG) and Sport Fish Restoration (SFR) Grant. The proposed action may affect the endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*) and the candidate headwater (*Gila nigra*) and roundtail (*Gila robusta*) chubs.

You also requested our concurrence that the proposed project may affect, but is not likely to adversely affect, the endangered spikedace (*Meda fulgida*) and its critical habitat, the endangered loach minnow (*Tiaroga cobitis*) and its critical habitat, the endangered razorback sucker (*Xyrauchen texanus*), and the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*).

This biological and conference opinion (BCO) is based on information provided in the project description and supporting information provided with your request for consultation, other materials provided subsequent to August 28, 2012, by AGFD and the Forest Service, and other sources of information. Literature cited in this BCO is not a complete bibliography of all literature available on the species of concern, fish salvage protocols and piscicide application, effects of such activities on aquatic species, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Details of the consultation history are summarized in Table 1.

Table 1. Summary of Consultation History

Date	Event
Spring 2010 to present	AGFD has worked cooperatively with us and our Federal and state partners to address barrier repair and nonnative fish issues in Fossil Creek.
August 27, 2012	We participated in a conference call with WSFR and AGFD to determine how to proceed with consultation on the proposed fish salvage and re-application of piscicide in Fossil Creek.
August 28, 2012	We received a request from WSFR for a formal consultation and conference on the salvage of native fish and re-application of piscicide in Fossil Creek.

BIOLOGICAL AND CONFERENCE OPINION

DESCRIPTION OF THE PROPOSED ACTION

Background Information for the proposed action: Fossil Creek is a perennial, spring-fed tributary of the Verde River that forms the border between the Tonto and Coconino National Forests, near Strawberry, Arizona. In fall 2004, the AGFD, FWS, U.S. Bureau of Reclamation (BOR), and Forest Service (Coconino and Tonto National Forests) constructed a permanent concrete fish barrier and used a chemical piscicide to remove nonnative fishes from Fossil Creek. For seven years, monitoring showed that Fossil Creek remained free of nonnative fish above the permanent fish barrier. However, in July 2011, nonnative smallmouth bass (*Micropterus dolomieu*) were detected above the permanent barrier. The agencies collectively determined that during the winter of 2009-2010, a very large flood event resulted in the deposition of rocks and boulders below the left notch of the barrier (looking downstream). Additionally, one of the concrete abutments to the barrier was damaged. The damage below the left barrier notch likely provided the avenue for the nonnative smallmouth bass to swim up and over the fish barrier.

A temporary barrier made of wire gabion baskets filled with sandbags was installed in August 2011 upstream of the nonnative smallmouth bass invasion in order to contain the bass to as small of a reach of the stream as possible. The temporary barrier is located 2.8 miles upstream from the permanent fish barrier at the confluence with Sally May Wash. The AGFD, with assistance from FWS and others, manually removed as many of the smallmouth bass as possible but were unable to remove them all. Since then, the bass have reproduced within this reach and are now prevalent in this section of Fossil Creek.

In April 2012, nine large adult bass were observed in one location <u>above</u> the temporary fish barrier, but below Irving. Because of their size and indicators such as their location in one pool in

close proximity to the road, these nine smallmouth bass appear to have been illegally transported from another location and released into Fossil Creek. The AGFD has removed all but one of these bass. The remaining individual fish was re-detected in the same pool in late August 2012, and manual efforts will continue to remove this bass. It is important to note that comprehensive surveys since this time have not detected young-of-the-year bass in the reach between the temporary barrier and Irving. Therefore, it appears smallmouth bass have not reproduced in this reach, and application of rotenone is not necessary at this time.

Additionally, continuous monitoring of stock tanks in the uplands and tributaries that drain into Fossil Creek detected nonnative fish in two stock tanks that could be a potential source of contamination into Fossil Creek should these stock tanks overflow. The two stock tanks that were found to contain nonnative fish are Sandrock Tank and Soldier Mesa Tank, both of which have been treated with piscicide in the past to remove nonnative fishes.

The 2004 Environmental Analysis (EA) (USDA and USBOR 2004) conducted for the original renovation of Fossil Creek included the potential for additional applications of the piscicide antimycin A if nonnative fish were found in Fossil Creek in the future. The EA called for the Forest Service to prepare a supplemental information report (Section 18 review) to evaluate if these additional treatment(s) are consistent with the EA or not. The selected alternative in the 2004 EA also disclosed the potential for upland treatments based on surveys. The piscicide used for the stream treatment in 2004 was antimycin A, but it is no longer commercially available. The only approved piscicide currently available is rotenone. The Forest Service, with assistance from FWS and AGFD, has completed this Section 18 review of the 2004 EA and has determined that the proposed stream retreatment using rotenone instead of antimycin A is within the scope and range of effects of the 2004 decision.

Proposed Action: In order to protect the native fish assemblage in Fossil Creek, the nonnative bass currently located between the temporary and permanent fish barriers in Fossil Creek and the nonnative fishes found in the two stock tanks need to be completely removed. Because of the complexity of habitat, the amount of flow present in Fossil Creek, and the fact that the smallmouth bass have reproduced below the temporary barrier, manual removal methods have not been and would continue to be unsuccessful in removing bass. Therefore, AGFD, FWS, and the Forest Service determined that in order to completely remove the smallmouth bass and the threat they pose to the entire aquatic species community in Fossil Creek, treatment using the chemical piscicide rotenone is needed. Currently, the action area is the section of Fossil Creek located between the temporary and permanent fish barriers. However, if smallmouth bass are detected reproducing above the temporary barrier, the area of rotenone application could be extended to include Fossil Creek from Irving (where the next known barrier to bass movement is located) down to the permanent barrier.

Prior to application of rotenone to any section of Fossil Creek, native fish will be salvaged from the creek and placed upstream of the treated area. A combination of seines, baited hoop nets, dip nets and angling in appropriate habitat types of the treated reach may be used for salvaging native fish. Fish salvage activities will take place prior to piscicide application. Salvage efforts will focus on collection and transport of the following focal fish species: longfin dace, headwater chub, roundtail chub, Sonora sucker (*Catostomus insignis*), desert sucker (*Catostomus*

[*Pantosteus*] *clarki*), and Gila topminnow. Longfin dace (*Agosia chrysogaster*) and Gila topminnow of all size classes will be captured and moved; for the other species, only individuals greater than 200 millimeters (mm) total length will be translocated since there are likely a large number of these fish present in the 2.8 mile stretch of creek to be treated. Likewise, although other species have not been detected or encountered during past surveys within the treated reach, any other native fish captured will be moved. Captured fish will be held in live cars (i.e., in-stream fish containers) prior to transport and then taken via vehicle and released at appropriate locations and similar habitat in readily accessible portions of Fossil Creek above the treated reach.

The proposed rotenone retreatment will use the same techniques as were used during the 2004 project to apply chemical piscicide and potassium permanganate to detoxify the rotenone below the permanent fish barrier. Similar to the decision implemented in the 2004 EA (see USDA and USBOR 2004), a certified pesticide applicator will supervise rotenone and potassium permanganate application, following label requirements that will protect applicators and mitigate point and non-point source pollution of water quality. Rotenone will be applied to approximately 2.8 miles of stream (or 5.8 miles if the reach between Irving and the temporary barrier is found to contain smallmouth bass young-of-the-year). Rotenone will also be applied to the stock tanks in the uplands that have been illegally stocked with nonnative fishes. Potassium permanganate will only be applied below the permanent fish barrier to detoxify the rotenone and mark the end of the treatment.

STATUS OF THE SPECIES

Gila Topminnow

Listing: Gila topminnow was listed as endangered in 1967 without critical habitat (32 FR 4001, USFWS 1967). Only Gila topminnow populations in the United States, and not in Mexico, are listed under the Act.

Background: The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the Gila topminnow. This information was taken from the 1984 recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and the most recent CAP biological opinion (USFWS 2008a) and references cited therein. Information in these documents is incorporated by reference.

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

Habitat use: Gila topminnow use shallow shorelines and slackwater areas of small streams, springs, and marshes. They concentrate in protected inlets, shoreward of sandbars or debris, or are associated with aquatic or streamside vegetation. They are tolerant of a wide range of temperature and water chemistry.

Current distribution: As of 2008, Gila topminnow existed in 9 of the 16 recent natural populations and in 21 reintroduced localities (USFWS 2008b). Two of the natural populations are contaminated by nonnative fish species. Voeltz and Bettaso (2003) reported that 3 of 18 extant reintroduced populations (as of 2003) were contaminated by nonnative fish species. Additional reintroductions by the Gila River Basin Native Fishes Conservation Program of Gila topminnow have been made since 2008 (Robinson 2010).

Threats: The reasons for decline of this fish include past dewatering of rivers, springs and marshlands; impoundments, channelization, diversions, and regulation of flow; land management practices that promote erosion and arroyo formation; and the introduction of predacious and competing nonindigenous fishes.

Conservation actions: As part of their ongoing commitment to conservation for this species, AGFD is an active participant in implementation of the Gila topminnow recovery plan. Conservation measures under the Gila River Basin Native Fishes Conservation Program are underway in the range of the species and include creation of reestablishment areas through barrier construction and chemical renovation to remove nonnative species. Gila topminnow is also a covered species in the Horseshoe-Bartlett Habitat Conservation Plan (HCP) (SRP 2008) for the Verde River. In addition, the Safe Harbor Agreement for Gila topminnow and desert pupfish allows private individuals and non-Federal landowners in Arizona to establish and maintain populations of this species for conservation purposes (USFWS 2008b).

Previous consultations: Section 7 consultations on Gila topminnow include programmatic efforts for Forest Land and Resource Management Plans that address watershed management and multiple uses (livestock grazing, timber harvest, recreation, and other issues), and more site-specific efforts that are more focused on implementing recovery actions such as barrier construction and stream renovations. Biological opinions on actions potentially affecting Gila topminnow may be found at our website www.fws.gov/southwest/es/arizona in the Section 7 Biological Opinion page of the Document Library.

Headwater chub

Listing: Headwater chub became a candidate species in May, 2006 (71 FR 26007, USFWS 2006).

Background: The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the headwater chub. This information was taken from Voeltz (2002), the 12-month finding (USFWS 2006), the 2009 petition for emergency listing (Stefferud et al. 2009), and the most recent candidate assessment form (USFWS 2010a) and references cited therein. Information in these documents is incorporated by reference.

Life history: Spawning typically occurs in spring and has been observed in March in pool-riffle areas with sandy-rocky substrates. The diet of headwater chub includes aquatic insects, ostracods, and plant material.

The species is closely related to the Gila chub (*Gila intermedia*) and roundtail chub and has only recently been identified as a separate taxon (Minckley and DeMarais 2000).

Habitat: Headwater chubs occur in the middle to upper reaches of moderately-sized streams. Habitats containing headwater chubs consist of tributary and mainstem habitats in the Gila River at elevations of approximately 1,325 m (4,347 ft) to 2,000 m (6,562 ft). Maximum water temperatures for habitats of the Gila, headwater and roundtail chub vary from 20 to 27°C (68 to 81°F), with minimum water temperatures of 7° C (45°F). Typical adult habitats containing headwater chub consist of nearshore pools adjacent to swifter riffles and runs over sand and gravel substrate. Young-of-the-year and juveniles use smaller pools and areas with undercut banks and low velocity.

Current Distribution: The historical range of headwater chub is the Gila River basin in Arizona and New Mexico. The historical distribution of headwater chub in Arizona remains poorly understood due in part to the taxonomic confusion with other *Gila* species, the lack of early collections, and widespread manmade changes to habitats within the basin that likely affected distribution.

The species occupies the East, Middle, and West forks of the Gila River and may occupy lower Turkey Creek below a barrier and the Gila River below the forks area in New Mexico, although these fish have not been definitively identified (Stefferud et al. 2009). In Arizona, headwater chub occupy: tributaries of the Verde River including Fossil Creek, East Verde River (including Tributaries, The Gorge, Pine Creek, and Webber Creek), Wet Beaver Creek, Deadman Creek; and Tonto Creek and several of its tributaries (Buzzard Roost, Dinner, Gordon, Gunn, Haigler, Horton, Marsh, Rock, Spring, and Turkey creeks) (Voeltz 2002, Stefferud et al. 2009). Headwater chub may still occur in parts of the San Carlos River basin, although recent survey information for these streams is unavailable because San Carlos tribal survey information is proprietary and confidential (Voeltz 2002, Stefferud et al. 2009). The taxonomic status of chub in upper West Clear Creek has still not been resolved; however, the most recent findings do not place them clearly with either headwater or roundtail chub. Genetic and morphometric confirmation as headwater chub is also lacking for The Gorge and Pine Creek sites on the East Verde River, and for Wet Beaver Creek on the Verde River. Recently completed genetic research includes recommendations for management units for headwater chub, as well the closely-related Gila and roundtail chubs (Schwemm 2006, Dowling et al. 2008).

Threats: Threats to headwater chub include loss of habitat due to water withdrawals and other modifications to streamflow, channelization, improper livestock grazing, mining, roads, logging, and development activities. These threats have been significant and continue to occur. Climate change may also have an effect on the availability of habitat in the future if droughts continue. High-severity wildfires are also a risk to the species since it is found in isolated headwater streams with little ability for reoccupation of affected streams.

The introduction and spread of nonnative fish that can be predators or competitors on headwater chub has significantly affected the species.

Conservation Actions: As part of their ongoing commitment to conservation for this species, AGFD is an active participant in implementation of conservation actions for the headwater chub.

Survey and recovery work for the headwater chub is guided by a Recovery Plan in New Mexico (Carman 2006) and includes monitoring of the extant populations. In Arizona, headwater chub is covered by the Six Species Conservation Program (AGFD 2006). This program has provided administrative oversight on the species and is making progress on numerous projects planned for implementation over the next ten years. The conservation efforts of this program, led by the AGFD, have led to the completion of a considerable amount of genetic research as well as the documentation of two new occupied waters. The Fossil Creek restoration in 2004 (funded by the Gila River Basin Native Fishes Conservation Program) provided significant benefits for headwater chub; and further benefits could be realized from this funding program if the Spring Creek restoration project moves forward. However, the Spring Creek project may not be implemented for several years.

The recently completed sport fish stocking program consultation (USFWS 2011) contains a suite of required conservation measures for headwater chub that will be implemented over the next ten years. These measures include additional surveys and securing populations of headwater chub within its historical range in Arizona.

Previous consultations: Headwater chub is a candidate for listing under the Act and as such is not subject to the consultation requirements of section 7 for activities of Federal agencies. Federal agencies may, at their discretion, include consideration for candidate species in their environmental compliance under the Act. However, it is the policy of the FWS that candidate species are considered in intra-Service consultations on FWS actions, including funding activities of other entities, such as AGFD. The species was considered in the intra-Service consultation on Federal funding of sport fish stocking in Arizona (USFWS 2011).

Roundtail Chub

Listing: Roundtail chub in the Lower Colorado River basin became a candidate species under the Act on July 7, 2009 (74 FR 32352, USFWS 2009).

Background: The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the roundtail chub. This information was taken from the 2010 report for the Candidate Notice of Review (USFWS 2010b), which was developed from the 2009, 12-month finding (USFWS 2009) and references therein. Information in these documents is incorporated by reference.

Life history: Spawning has been documented from 57 to 75 °F (14 to 24 °C) from February through June in pool, run, and riffle habitats, with slow to moderate water velocities. Roundtail chubs live for approximately five to seven years and begin spawning at age two. Roundtail chubs are omnivores, consuming foods proportional to their availability, including aquatic and terrestrial invertebrates, aquatic plants, detritus, and fish and other vertebrates; algae and aquatic insects can be major portions of their diet.

Habitat use: Roundtail chubs in the lower Colorado River basin are found in cool to warm waters of rivers and streams, and often occupy the deepest pools and eddy of large streams. Although roundtail chubs are often associated with various cover features such as boulders, vegetation, and undercut banks, they are less likely to use cover than other related species such as the headwater chub and Gila chub.

Current distribution: The roundtail chub is found in the upper and lower Colorado River basins; however, the candidate entity is the Distinct Population Segment (DPS) in the lower Colorado River basin of Arizona and New Mexico (USFWS 2009). Streams containing roundtail chub in the DPS are found in five separate drainages that are isolated from one another (the Little Colorado River, Bill Williams River, Gila River, Salt River, and Verde River), and occupied streams within the drainages have varying amounts of connectivity between them. Roundtail chub in the lower Colorado River basin in Arizona currently occurs in two tributaries of the Little Colorado River; eight tributaries of the Bill Williams River; the Salt River and 10 of its tributaries; the Verde River and five of its tributaries; Aravaipa Creek (a tributary of the San Pedro River); Eagle Creek (a tributary of the Gila River); and in New Mexico in the upper Gila River (USFWS 2010b). The Salt and Verde rivers are occupied in several reaches that are fragmented and isolated by two large dams and reservoirs on the Verde River, and four large dams and reservoirs on the Salt River. Roundtail chubs also occur in canals in Phoenix that are fed by the lower Salt and Verde rivers.

Threats: Threats to the roundtail chub are fully examined in the 12-month finding (USFWS 2009) and in the 2010 candidate assessment (USFWS 2010b). The information in those documents is incorporated herein by reference. Major threats include loss of habitat due to dewatering of rivers and streams and the introduction of nonnative predators and competitors.

Conservation actions: The AGFD initiated and leads the "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*)" (AGFD 2006; also known as the Six Species Conservation Program). Recent conservation actions implemented by signatories to the plan are detailed in USFWS (2010b) and listed below:

- Acquisition of lands within the upper and middle Verde River by The Nature Conservancy and AGFD that assist in protection of instream flows and adjacent riparian areas.
- Acquisition of lands in Aravaipa Canyon by The Nature Conservancy to enhance flows and restore aquatic habitats for native fish including roundtail chub.
- Efforts by the U.S. Forest Service, AGFD, and Salt River Project (SRP) to protect stream flows in Cherry Creek and on the Verde River.
- Creation of two new roundtail chub populations in Ash Creek and Roundtree Canyon by AGFD.
- Establishment of broodstocks and refugia at AGFD's Bubbling Ponds State Fish Hatchery of Verde River and Eagle Creek roundtail chub for use in restoration projects funded through the agreement partners.
- The Gila River Basin Native Fishes Conservation Program projects such as Fossil Creek that provide benefits to roundtail chub as part of the benefits to target species.

- Roundtail chub is a covered species under the Horseshoe-Bartlett HCP (SRP 2008) and some recent conservation actions are related to this HCP and have been undertaken with SRP funding by AGFD.

The recently completed sport fish stocking program consultation (USFWS 2011) contains a suite of required conservation measures for roundtail chub that will be implemented over the next ten years. These measures include additional surveys and securing populations of roundtail chub within its historical range in Arizona.

Previous consultations: The roundtail chub is a candidate for listing under the Act and as such is not subject to the consultation requirements of section 7 for activities of Federal agencies. Federal agencies may, at their discretion, include consideration for candidate species in their environmental compliance under the Act. However, it is the policy of the FWS that candidate species are considered in intra-Service consultations on FWS actions, including funding activities of other entities such as AGFD. The species was considered in the intra-Service consultation on Federal funding of sport fish stocking in Arizona (USFWS 2011).

ENVIRONMENTAL BASELINE

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

Status of the Species in the Action Area

Gila Topminnow

We have no historical records of Gila topminnow in Fossil Creek. However, since 2007, Gila topminnows have been stocked into multiple locations in Fossil Creek above the location of the temporary barrier at Sally May Wash. Suitable habitat, including vegetated stream margins and backwaters, exists from the perennial spring inflow in the upper-most reach of Fossil Creek to the permanent barrier. Though the greatest numbers of Gila topminnow occur above the temporary barrier in Fossil Creek (24 separate locations from the temporary barrier to Irving), surveys in 2012 observed topminnow downstream of the temporary barrier in eight locations. As Gila topminnow have survived and reproduced in Fossil Creek, it is logical that they would be expanding the extent of their use of Fossil Creek; surveys are beginning to document this expansion of occupied areas within the creek.

The Gila topminnow, as with many native fishes, is highly vulnerable to adverse effects from nonnative aquatic species (Johnson and Hubbs 1989). Predation and competition from species such as smallmouth bass have resulted in Gila topminnow declines and continue to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997). If smallmouth bass

are not removed from Fossil Creek, Gila topminnow would not be able to survive long-term, and could be extirpated from below the temporary barrier in as few as one or two years due to the piscivorous nature of smallmouth bass.

Headwater and Roundtail Chub

Following the removal of nonnative fishes from Fossil Creek and restocking of salvaged native fish in 2004, the chub population in Fossil Creek grew exponentially. Monitoring from 2004 to present day indicates that chub have not only recovered in Fossil Creek, but exist at incredibly high densities that are not known from any other location in Arizona. Genetic analysis indicates that the chub population in Fossil Creek consists predominantly of headwater chub or "intergrades" of headwater and roundtail chub, with only 25% of chub between Irving and the fish barrier genetically assignable as roundtail (Dowling and Marsh 2009). However, because there is no physical means for fish biologists to identify an individual chub as headwater or roundtail (other than through genetic analysis), we assume that both species are present within the action area (though headwater chub are likely much more predominant).

Both headwater and roundtail chub are vulnerable to predation and competition with smallmouth bass. When smallmouth bass first invaded Fossil Creek in the mid-1990s (prior to the 2004 renovation action), it took less than three years for the bass to completely reduce the ability of young-of-the-year chub to recruit into the population (pers. obs. Chuck Benedict, AGFD).

EFFECTS OF THE ACTION

Effects of the action means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Effects of the Action on the Gila topminnow, headwater chub, and roundtail chub

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family (Leguminosae). It has been used for centuries for capture of fishes by native peoples where the plants are naturally found. In North America, rotenone has been used for modern fishery management purposes since the 1930s and continues to be a valuable tool in fisheries management (Finlayson et al. 2000). Piscicide application is the only method other than dewatering that can consistently and completely eradicate undesirable fish communities.

Rotenone has several advantages for obtaining control of fish populations over other control techniques: 1) fish eradication using piscicides has been found to be more successful than control efforts for improving desirable aspects of a fishery; 2) adjustments in rotenone applications can result in spatially selective eradications; 3) rotenone can be used in large river systems to control all post-embryonic (fish) life stages; and, 4) the results are nearly immediate. The recognized disadvantages to rotenone use are: 1) temporary loss of potable water supplies and recreational

opportunities; 2) temporary effects on aquatic habitat and non-target species; and, 3) rotenone does not kill fish eggs.

Rotenone affects fish by inhibiting respiration by blocking biochemical pathways of cell metabolism, specifically the reduced nicotinamide adenine dinucleotide (NADH)-dehydrogenase segment of the respiratory chain (Mangum and Madrigal 1999). In other words, contact with the piscicide causes fish to suffocate and die. All fish that are not salvaged from the treated reach will be killed by the application of rotenone.

To reduce the impacts of the proposed action to native fish (including Gila topminnow, headwater chub, and roundtail chub), a salvage operation will be conducted as described in the proposed action. This action will allow for removing as many topminnow and chub (among other native fishes) as possible prior to applying the piscicide. In their management of aquatic wildlife, AGFD regularly implements fish salvage activities and has documented minimal losses to target species. By following established agency procedures for the salvage operations, we expect the number of fatalities to be minimal.

Effects of the Action on Recovery

The proposed action will not appreciably reduce the likelihood of Gila topminnow, headwater chub, and roundtail chub recovery in Fossil Creek based on the following:

- The section of Fossil Creek that contains smallmouth bass (above the barrier) is no longer a safe haven for native fish. Smallmouth bass are likely preying on and competing for resources with the native fishes, including topminnow and chub, within this reach. Removing the smallmouth bass will ensure that Fossil Creek continues to be a refuge for native fish, including the listed Gila topminnow and candidate headwater and roundtail chubs.

- Many Gila topminnow and chub will be salvaged prior to the rotenone application and released following treatment. Therefore, these fish will continue to contribute to recovery in Fossil Creek. The number of topminnow and chub killed through piscicide application will not reduce the existing populations of these fish to the point that they cannot recover the number of fish lost.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Fossil Creek Watershed is predominately managed by the Coconino and Tonto National Forests. Since the land within the action area is almost exclusively managed by the Forest Service, most activities that could potentially affect listed species are Federal activities and subject to additional section 7 consultations.

Future non-Federal actions within the project area that may be reasonably certain to occur include the potential development and/or modification of a private property in-holding along Fossil Creek and high-volume streamside recreation. These activities may result in increased overland flow and/or sedimentation into aquatic species habitat (from construction of impermeable surfaces) and the potential for further nonnative aquatic species introductions. There is only one private in-holding on Fossil Creek, and the landowners are cooperative and helpful in the management of Fossil Creek.

Unregulated activities on Federal and non-Federal lands, such as trespass livestock, inappropriate use of off-highway vehicles, and illegal introduction of nonindigenous aquatic species, are cumulative effects and can adversely affect the species through a variety of avenues.

CONCLUSION

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

The FWS anticipates that some unknown number of Gila topminnow, headwater chub, and roundtail chub will be killed as a result of this action. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- The proposed fish salvage will salvage as many Gila topminnow and chub as possible to reduce the number of fish killed by the piscicide and return salvaged fish to the creek, thus maintaining populations of these species in Fossil Creek.

- This action will remove a threat to the Gila topminnow, headwater and roundtail chub populations in Fossil Creek by eliminating smallmouth bass from the protected portion (above the permanent fish barrier) of Fossil Creek.

- Although Gila topminnow and chub will be killed as part of the proposed action, smallmouth bass occupying habitat between the temporary and permanent barriers are currently preying upon and competing with topminnow and chub. Without the proposed action, Gila topminnow and chub will be systematically removed by bass from this section of Fossil Creek and these populations may be lost. This action allows for long-term occupancy of Fossil Creek by these (and other) native fishes.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

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

Amount or Extent of Take Anticipated

Despite the provisions for safe capture, transport, holding, and release of Gila topminnow and headwater and roundtail chub from the treatment reach, there is always a risk of mortality when handling fish in these situations. The proposed action includes standard AGFD provisions for safe handling of salvaged fish; however, conditions cannot always be controlled to eliminate the risk of mortality. Further, it is unlikely that all Gila topminnow and headwater and roundtail chub will be removed by the salvage operation, and any individuals remaining in the treatment area will die due to the effects of rotenone.

Incidental take of Gila topminnow and headwater and roundtail chub is reasonably certain to occur as a result of the proposed piscicide application in Fossil Creek to remove smallmouth bass. Incidental take will result as fish die from contact with the piscicide rotenone and from injuries acquired during capture or handling stress during salvage operations, and from harassment during capture, holding, and release.

The FWS anticipates incidental take of Gila topminnow, headwater, and roundtail chub from exposure to rotenone will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely as fish that are exposed to rotenone typically disappear quickly as they are carried downstream, sink to the creek bottom, or are eaten by birds and mammals. Although we cannot estimate the number of individual fish that will be incidentally taken during treatment, based upon surveys conducted in the proposed action area and experience from past rotenone treatments, the number of topminnow and chub killed by rotenone will be significantly less than the number of topminnow and chub that remain above the treated reach and will re-colonize the area following the treatment.

We also anticipate incidental take of Gila topminnow and headwater and roundtail chub in the form of death, injury, and harassment from salvage activities. Based on experience during previous salvage operations, we do not expect mortality of salvaged fish to exceed 10% of those captured. The remaining fish will be subject to non-lethal harassment due to handling activities and stress prior to their release back into the creek.

Effect of the Take

In the accompanying BCO, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Gila topminnow or to the candidate headwater and roundtail chubs.

REASONABLE AND PRUDENT MEASURES

No reasonable and prudent measures are necessary for the action addressed in this biological opinion. The fish salvage effort prior to piscicide treatment will minimize take of topminnow and chub from rotenone treatment. The AGFD is following established protocols to minimize take of the topminnow and chub from the fish salvage effort.

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.

1. We recommend that AGFD continue to work with us and the Forest Service to continue monitoring Fossil Creek to ensure early detection of nonnatives should they invade or be illegally stocked in the future.

2. We recommend that AGFD continue to work with us and the Forest Service to evaluate potential stocking of native aquatic species in Fossil Creek. We are particularly interested in further discussions regarding stocking of Verde River roundtail chub above the permanent barrier to ensure that Fossil Creek provides a refuge for roundtail, as well as headwater chub.

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

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible,

and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

REINITIATION NOTICE

This concludes the BCO for the SWG and SFR funded fish salvage and piscicide treatment in Fossil Creek and identified stock tanks. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation if the candidate headwater and roundtail chub species are listed or critical habitat is designated. The request must be in writing. If the FWS reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during the conference, the FWS 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 Federal agency 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 the species in a manner or to an extent not considered in the conference opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

This concludes formal consultation on the proposed action outlined in the request for 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.

We appreciate your efforts to assist in implementing this important conservation and recovery action. Funding provided by WSFR for conservation and sport fish management purposes results in significant benefits to many aquatic species.

If you have any questions about this consultation, or we can be of additional assistance, please contact Shaula Hedwall at (928) 556-2118 or Brenda Smith at (928) 556-2157. In future communications about this consultation please refer to consultation number 02EAAZ00-2012-F-0353.

Brenda H. Smith

for Steven L. Spangle

cc (electronic):

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APPENDIX A - CONCURENCES

This appendix contains our concurrences with your "may affect, not likely to adversely affect" determinations for the endangered spikedace (*Meda fulgida*) and its critical habitat, the endangered loach minnow (*Tiaroga cobitis*) and its critical habitat, the endangered razorback sucker (*Xyrauchen texanus*), and the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*).

Spikedace and critical habitat, loach minnow and critical habitat:

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the spikedace and its critical habitat or the loach minnow and its critical habitat. We base this concurrence on the following:

- Repeated surveys indicate that there are no spikedace or loach minnow present within the action area. Therefore, if these fish should ever be reintroduced to or colonize this area from an upstream location, the action of removing smallmouth bass is wholly beneficial to these fish and their habitat.

- The invasion of smallmouth bass into Fossil Creek modified the designated critical habitat for loach minnow and spikedace as these fish cannot coexist with smallmouth bass. By implementing the proposed action and removing smallmouth bass from Fossil Creek, the primary constituent element of "No nonnative aquatic species, or levels of nonnative aquatic species that are sufficiently low as to allow persistence" will be restored for both species.

Razorback sucker:

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the razorback sucker. We base this concurrence on the following:

- Repeated surveys indicate that there are no razorback suckers present within the action area. Therefore, if these fish should ever be reintroduced to or colonize Fossil Creek, the action of removing smallmouth bass is wholly beneficial to the razorback sucker.

Chiricahua leopard frog:

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the Chiricahua leopard frog. We base this concurrence on the following:

- The stock tanks identified for rotenone application are not occupied by Chiricahua leopard frogs. However, these stock tanks occur in near proximity to areas in which the FWS, AGFD, and Forest Service are working to recover these frogs. Therefore, the removal of nonnative fishes from the identified stock tanks is wholly beneficial to the frog and is a reasonable and prudent measure in the biological opinion completed for the frog on the

Hackberry and Pivot Rock Allotment (USFWS 2009). This allotment contains the stock tanks identified for treatment.

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