



# United States Department of the Interior

U.S. Fish and Wildlife Service

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August 30, 2005

## Memorandum

To: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico  
(ARD-ES)(Attn: Luella Roberts)

From: Field Supervisor, Arizona Ecological Services Field Office, Phoenix, Arizona

Subject: Intra-Service Biological Opinion Regarding the Proposed Issuance of an  
Incidental Take Permit (TE-099809-0) and Approval of a Safe Harbor  
Agreement for Gila topminnow and desert pupfish for the Arizona Chapter of  
The Nature Conservancy

This memorandum represents our Biological Opinion (BO), furnished under Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act) on the issuance of a permit authorizing incidental take of the endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*) and endangered desert pupfish (*Cyprinodon macularius*) under the authority of Section 10(a)(1)(A) of the Act to the Arizona Chapter of The Nature Conservancy (TNC). Along with the permit application, TNC submitted a draft Safe Harbor Agreement (Agreement) for conservation of Gila topminnow and desert pupfish that was available for public review for 30 days (70 FR 9093). The Agreement would cover TNC-owned lands and non-Federal activities which may affect the reestablishment sites designated within the Agreement in the Aravaipa watershed, Pinal and Graham counties, Arizona (See Figure 1).

This biological opinion analyzes the potential effects that issuance of the permit and implementation of the Agreement may have on the endangered Gila topminnow, endangered desert pupfish, threatened loach minnow (*Tiaroga cobitis*), and threatened spinedace (*Meda fulgida*). We determined that this action may adversely affect Gila topminnow and desert pupfish. Further, we have determined that this action may affect, but is not likely to adversely affect the loach minnow and spinedace. Concurrences for loach minnow and spinedace are included in Appendix A. A summary of the species on which we determined this action would have no effect are in Appendix B.

This biological opinion is based on information provided in the July 18, 2005 draft Safe Harbor Agreement, telephone conversations, field investigations, Fish and Wildlife Service (FWS) files, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, the activities covered in the Agreement, and its effects, or on other subjects considered in this opinion. A complete

administrative record of this consultation is on file in the Arizona Ecological Services Field Office.

## CONSULTATION HISTORY

- January 17, 2002: Potential reestablishment sites were evaluated by the Applicant, Arizona Game and Fish Department, and the Bureau of Land Management (BLM).
- November 01, 2002: a draft Safe Harbor Agreement was reviewed by our office and Arizona Game and Fish Department.
- February 11, 2005: TNC submitted the application for their Section 10(a)(1)(A) Enhancement of Survival permit and a Draft of the Safe Harbor Agreement for Gila Topminnow (*Poeciliopsis Occidentalis Occidentalis*) and Desert Pupfish (*Cyprinodon Macularius*) on Lands Owned by The Nature Conservancy Acting Through its Arizona Chapter, within the Aravaipa Creek Watershed.
- February 24, 2005 The Notice of Availability of the draft Safe Harbor Agreement, permit application, and "Low Effect" determination document were published in the Federal Register (70 FR 9093) for a 30-day public review.
- April 13, 2005: We met with TNC to go over public comments and draft revisions to address comments.
- July 6, 2005: Revisions to the draft Safe Harbor Agreement were sent to TNC for review.
- July 11, 2005: We received email from TNC approving revisions to the draft Safe Harbor Agreement.

## BIOLOGICAL OPINION

### DESCRIPTION OF THE PROPOSED ACTION

The fishes of the Gila River system are all biologically imperiled to various degrees. Reasons for the decline of these species are well documented in published, peer-reviewed literature and recovery plans (Douglas et al. 1994; Miller 1961; Minckley 1985; USFWS 1984, 1986a, 1986b, 1986c, 1991a, 1993, 1994; Weedman 1999; Williams et al. 1985). The widespread introduction, spread, and establishment of non-native aquatic species, along with habitat alteration and destruction, has resulted in declines of native fish species. Ongoing conservation and recovery efforts have done little to reduce or eliminate the decline of these species.

The Arizona Chapter of The Nature Conservancy (TNC), BLM Safford Field Office, and Arizona Game and Fish Department (AGFD), jointly propose to establish Gila topminnow and desert pupfish into multiple springs and streams that lie within the watershed of the south rim of Aravaipa Canyon. The proposed project area includes all aquatic habitats on the south rim of Aravaipa Canyon managed by BLM and TNC and, although not inclusive, includes the

tributaries of Aravaipa Creek such as Oak Grove Canyon (T.7S R.18E), Garden Spring Canyon (T.7S R.19E), Parson Canyon (T.7S R.18E, T.6S R.18E), Turkey Creek (T.7S R.18E, T.6S R.18E), and Virgus Canyon (T.7S R.18E, T.6S R.18E) (Figure 1). The BLM reinitiated formal section 7 consultation on the effects of ongoing activities identified in their Land Use Plan and effects of the reestablishment on existing populations of loach minnow and spikedace. A BO was issued on April 6, 2005 (AESO 02-21-04-F-0022).

This BO addresses the effects of reestablishing Gila topminnow and desert pupfish on TNC-owned lands, as illustrated in Figure 1 and listed in Appendix C. Suitable habitat for these species has been identified in four reestablishment sites on TNC-owned lands. The Agreement does not provide for specific enhancements within these reestablishment sites, but recognizes the benefits of the watershed-level improvements that TNC has initiated on its property. TNC has proposed the Agreement as a way to aid in the recovery efforts for these two species and get assurances that, through the Agreement, these land treatments may continue.

Reestablishment sites will be stocked with Gila topminnow and desert pupfish. Up to approximately 500 desert pupfish and 500 Gila topminnows will be collected from population donor sites; however, population sizes at donor sites may not be able to sustain the removal of 500 individuals at one time. In this event, populations will be augmented over time until self-sustaining populations become established. The number of desert pupfish and Gila topminnows collected and stocked will depend on the size and health of the donor population. Fish will be collected from several different captive localities to optimize genetic diversity and to reduce the likelihood of genetic drift and population bottlenecks. The genetic lineage and origin of Gila topminnow and desert pupfish stock for introduction will be consistent with the draft revised Gila topminnow recovery plan (Weedman 1999) and the desert pupfish recovery plan (USFWS 1993a). The multi-year stockings will provide new genetic material to the translocated population in the event of future and/or extensive mortalities. The effects of the capture, translocation, and release have been analyzed as part of the section 10(a)(1)(A) research and recovery permit held by AGFD (TE-821577), and will not be included in this analysis.

### **Conservation Measures**

The following measures will be taken to minimize take of Gila topminnow and desert pupfish from ongoing land management activities covered by the Agreement and its associated section 10(a)(1)(A) enhancement of survival permit. These conservation measures are:

1. Prescribed fire will only be used to restore upland habitat, and burning in the riparian areas will be avoided.
2. TNC and other participants will periodically monitor for intrusions of cattle into the riparian areas and covered sites. Fence repairs and erosion control projects will be initiated as needed and as funding becomes available.
3. TNC will continue monitoring of the closed road, and projects to reduce erosion will be initiated as needed and as funding becomes available.

4. TNC and other participants will monitor recreational use within and adjacent to covered areas for excessive impacts. If impacts become excessive in an area, discussion of potential minimization measures among TNC, the FWS, and other interested parties such as AGFD and BLM will occur.
5. TNC and other participants will continue to sample fish populations as part of population monitoring. Monitoring will be carried out by qualified biologists who hold all necessary State and Federal permits.
6. All staff, students, and volunteers working in or around these habitats will be instructed on proper safeguards prior to initiating work in or around these habitats.

## STATUS OF THE SPECIES

### GILA TOPMINNOW

The FWS listed the Gila topminnow as endangered on March 11, 1967, without critical habitat (USFWS 1967). The reasons for the decline of this fish include past dewatering of rivers, springs, and marshlands; impoundment, channelization, diversion, and regulation of flow; land management practices that promote erosion and arroyo formation; and the introduction of predacious and competing nonindigenous fishes (Miller 1961, Minckley 1985). Life-history information can be found in the 1984 Sonoran topminnow recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and references cited in the plans and in this biological opinion.

The Gila topminnow was listed in 1967 as *Poeciliopsis occidentalis*. The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (1969, 1973b). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, are collectively known as the Sonoran topminnow. Both subspecies are protected under the Act. Recent information presented by Minckley (1999) and others (Minckley 1973b, Quattro *et al.* 1996), considers the two subspecies to be separate species. Regardless of their taxonomy, both species or subspecies are protected under the Act.

A summary of Gila topminnow habitat requirements includes: 1) unpolluted water that can have wide variation in temperature, pH, and salinity; 2) shallow water with abundant aquatic plants, including algae, that provide cover and habitat for invertebrate prey; 3) channel morphology that prevents habitats from scouring severely, which otherwise may remove this weak swimmer from its habitat; 4) habitat areas free of non-native competitors and predators; and 5) areas with slow currents and soft bottoms.

Gila topminnows are highly vulnerable to adverse effects from nonindigenous aquatic species (Johnson and Hubbs 1989). Predation and competition from nonindigenous fishes have been a major factor in their decline 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). The native fish fauna of the Gila basin, and of the

Colorado basin overall, was naturally depauperate and contained few fish that prey on or compete with Gila topminnow (Carlson and Muth 1989). With the introduction of many predatory and competitive nonindigenous 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) nonindigenous fish cause problems for Gila topminnow, as can nonindigenous crayfish (Fernandez and Rosen 1996) and bullfrogs.

Historically, Gila topminnow were abundant in the Gila River drainage and the species was once referred to as "...one of the commonest fishes in the southern part of the Colorado River drainage basins" (Hubbs and Miller 1941). Gila topminnow eventually declined to only 15 naturally occurring populations. Bagley *et al.* (1991) reported only nine remaining natural topminnow sites. More recently, 15 natural Gila topminnow populations were reported, with 12 considered extant (Table 3) (Weedman and Young 1997). Only three (Cienega Creek, Monkey Spring, Cottonwood Spring) have no nonindigenous fish present and therefore can be considered secure from nonindigenous fish threats (Abarca *et al.* 1994). There have been at least 178 wild sites stocked (sometimes on multiple occasions) with Gila topminnow; however, topminnows persist at only 20 of these localities. Of the 20, one site is outside the topminnow historical range and four now contain nonindigenous fish (Weedman and Young 1997).

The *Sonoran Topminnow Recovery Plan* (USFWS 1984) established criteria for down- and de-listing. Criteria for downlisting were met for a short period; however, due to concerns regarding the status of several populations, downlisting was delayed. Subsequently, the number of reestablished populations dropped below that required for downlisting, where it has remained. A draft revised recovery plan for the Gila topminnow is available (Weedman 1999). The plan's short-term goal is to prevent extirpation of the species from its natural range in the U.S. and reestablish it into suitable habitat within its historical range. Downlisting criteria require a minimum of 82 reestablished populations, some of which must persist at least 10 years.

The status of the species is poor and declining. Gila topminnow has gone from being one of the most common fishes of the Gila basin to one that exists at no more than 32 localities (12 natural and 20 stocked). Many of these localities are small and highly threatened, and topminnow have not been found in some recent surveys at these sites.

Gila topminnows historically occupied larger streams and rivers including the Gila, Salt, Santa Cruz, San Pedro, and San Carlos rivers, and many of their tributaries. Although not documented from the Verde, Hassayampa, or Agua Fria rivers, they likely occurred in the lower elevation (<1500 m) reaches of those rivers.

Our information indicates that, rangewide, more than 64 consultations have been completed or are underway for actions affecting Gila topminnow. The majority of these opinions concerned the effects of grazing (approximately 11 percent), roads and bridges (approximately 6 percent), agency planning (approximately 16 percent), or recovery (approximately 23 percent). The remaining 44 percent of consultations considered effects of fire, flooding, recreation, realty, animal stocking, water development, border security, and water-quality issues.

## DESERT PUPFISH

The FWS listed the desert pupfish as an endangered species, with critical habitat, on April 30, 1986 (USFWS 1986a). The name "desert pupfish" is often incorrectly applied to all 10 pupfish species in the American Southwest (Williams *et al.* 1989, Pister 1996). In Arizona, there are three pupfish species: desert pupfish (*Cyprinodon macularius*); Quitobaquito pupfish (*C. eremus*, Echelle *et al.* 2000); and an extinct form, the Santa Cruz pupfish (*C. arcuatus*, Minckley *et al.* 2002). Critical habitat for the desert pupfish, which at the time included all three subspecies, has been designated in Arizona at Quitobaquito Spring and in California along parts of San Felipe Creek, Carrizo Wash, and Fish Creek Wash (USFWS 1986a) in the vicinity of the Salton Sea (Moyle 2002). Critical habitat for desert pupfish is not located within the action area

The desert pupfish recovery plan was finalized in 1993. The objective of the recovery plan is to downlist the species, as delisting the species is not considered feasible in the foreseeable future. In order to attain this objective, the following actions are necessary: protection of natural populations, reestablishment of new populations, establishment and maintenance of refuge populations, development of protocols for the exchange of genetic material between stocked pupfish populations, determination of factors affecting population persistence, and information and education to foster recovery efforts (USFWS 1993a).

Historical distribution of desert pupfish included the Gila River basin, lower Colorado River, Rio Sonoyta basin, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888, Garman 1895, Gilbert and Scofield 1898, Evermann 1916, Thompson 1920, Jordan 1924, Coleman 1929, Jaeger 1938, Miller 1943, Minckley 1973b, 1980; Black 1980, Turner 1983, Miller and Fuiman 1987). Historical collection localities occurred in Mexico, in Baja California and Sonora, and in the United States, in California and Arizona. Populations and distribution probably expanded and contracted historically as regional and local climatic conditions varied.

Thirteen natural populations persist; nine of these are in Mexico. Approximately 20 transplanted populations exist in the wild (USFWS 1993a), though this number fluctuates widely due to climatic variation and the establishment (or failure) of refugium populations (Moyle 2002). Many natural and transplanted populations are imperiled by one or more threats. Threats to the species include loss and degradation of habitat through groundwater pumping or diversion, contamination of agricultural return flows, predation and competition from non-native fish species, populations outside of historical range, populations of questionable genetic purity, restricted range, small populations, and environmental contaminants (USFWS 1986a, Moyle 2002).

Aspects of the natural history and habitat of desert pupfish in Arizona are similar to those of the Gila topminnow. In Arizona, desert pupfish and Gila topminnow were historically known from similar habitats (though the former was not as widespread) and the two species are managed together by the AGFD (Weedman and Young 1997, Voeltz and Bettaso 2003). The primary difference in life history between these fish is that desert pupfish lay eggs and Gila topminnow are live-bearers.

Our information indicates that, rangewide, more than 63 consultations have been completed or are underway for actions affecting desert pupfish. The majority of these opinions concerned the effects of grazing (approximately 11 percent), roads and bridges (approximately 1 percent), agency planning (approximately 15 percent), or recovery (approximately 25 percent). The remaining 47 percent of consultations considered timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water-quality issues.

## **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 impact 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.

### **Description of the Action Area**

The Aravaipa watershed area is approximately 537 mi<sup>2</sup> (14,000 km<sup>2</sup>), with an elevation range of 2,160-8,441 ft. In the upper watershed, surface flow is ephemeral to intermittent in a broad alluvial valley between the Pinaleño and Santa Teresa mountains to the east and Galiuro Mountains to the west. The creek becomes perennial at Aravaipa Spring, at the head of Aravaipa canyon near Stowe Gulch, and cuts westward through the Galiuros (Draper and Turner 2004). Average annual precipitation ranges from 14 inches at Klondyke to 20 inches in the upper watershed, and is winter-dominated (Norgren and Spears 1980).

Aravaipa Creek's 17-mile-long perennial-flow stretch is considered to have the best remaining assemblage of desert fishes in Arizona, with seven native species, including two federally listed threatened species: spikedace and loach minnow. Other wildlife using the canyon includes the threatened Mexican spotted owl (*Strix occidentalis lucida*) and candidate western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). Several side tributaries coming in from the south rim of Aravaipa Canyon are a mixture of perennial and intermittent stream reaches. It is private lands owned by TNC along these perennial reaches that have been identified as potential reestablishment sites for Gila topminnow and desert pupfish under this Agreement.

Riparian vegetation along the creek and its tributaries support mixed forests of sycamore, cottonwood, willow, walnut, ash, and white oak. Mesquite bosques line higher terraces above the floodplain. Low-elevation upland areas are dominated by Sonoran desert scrub with creosote, palo verde, diverse shrubs, and saguaro. Mid-elevation slopes have semidesert grassland/scrub with native perennial grasses. Steeper slopes at middle and upper elevations support evergreen woodlands of oak and juniper and mixed chaparral.

The BLM manages the Federal lands adjacent to TNC parcels covered in the Agreement. The BLM has proposed to reestablish Gila topminnow and desert pupfish into these same tributaries where perennial sites exist on Federal land. They have completed their planning process and are

planning to reestablish these species in the sites they manage with the assistance of AGFD in the fall of 2005.

The BLM manages the Aravaipa Canyon Wilderness and two Areas of Critical Environmental Concern within this area. This area is a popular backpacking and hiking area. The BLM issues up to 50 permits per day for entry to the wilderness area. The land use within the watershed is predominately rural rangeland, with several rural residents along the downstream portion of Aravaipa Creek. Two fish barriers have been constructed to prevent upstream movements of non-native aquatic predators in the San Pedro River from entering the upper watershed. While some non-native aquatic predators and competitors exist above the fish barriers, they have not become well established in the upper watershed. These non-native predators and competitors entered the watershed from livestock tanks in the upper watershed and potentially from illegal stocking. Efforts are ongoing to identify and mitigate the sources of these non-native species.

### **Status of the Species within the Action Area**

#### **Gila Topminnow**

The range of the Gila topminnow is considered to be the Gila River watershed. The sites in the tributaries proposed for reestablishment are a fraction of the entire historical range. However, the proposed reestablishment sites would provide four additional population sites.

Within the Aravaipa watershed, native fish surveys have been conducted since 1943 and Gila topminnow have never been collected. A cienega condition existed in Aravaipa Creek above the canyon. This would have provided ideal habitat for Gila topminnow, which are known from the San Pedro Watershed. However, this habitat type, in the upstream portion of the Aravaipa drainage, was gone before the first fish sampling began in 1943. It was likely that topminnow occupied the cienega, but uncontrolled grazing, channelization, and erosion destroyed this habitat (Stefferd and Reinthal 2004). The sites proposed for reestablishment of Gila topminnow are currently void of fish species. Downstream movements to other perennial reaches of the tributaries and Aravaipa Creek are likely to occur through voluntary dispersal or the result of flooding. While they may become established within the tributaries, it is unlikely that Gila topminnow would persist in Aravaipa Creek due to the presence of non-native predators and competitors and the general lack of suitable habitat.

#### **Desert Pupfish**

The range of the desert pupfish has been drastically reduced. The species is currently found in only about 12 localities in the United States and Mexico. BLM lands represent a large proportion of the former range of the desert pupfish, the only two extant reestablished sites, and much of the remaining suitable, but unoccupied, habitat. The status of the desert pupfish in the action area is therefore similar to the status of the species throughout its range. No natural populations of desert pupfish remain in Arizona, although two wild, re-established populations currently exist (AGFD, unpublished data), at Cold Springs along the Gila River near Safford, and Lousy Canyon in the Agua Fria drainage on the Agua Fria National Monument (Voeltz and Bettaso 2003). The Cold Spring and Lousy Canyon sites are managed by BLM's Safford and

Phoenix field offices, respectively, and represent critical efforts in the recovery of the desert pupfish. Both sites appear stable, with Lousy Canyon being notable in containing an intact ichthyofauna of desert pupfish, Gila topminnow, and Gila chub.

Within the Aravaipa watershed, native fish surveys have been conducted since 1943 and desert pupfish have never been collected. A cienega condition existed in Aravaipa Creek above the canyon. This is ideal habitat for desert pupfish, which are known from the San Pedro Watershed. However, this habitat type in the upstream portion of the Aravaipa drainage was gone before the first fish sampling began in 1943. It was likely that desert pupfish occupied the cienega, but uncontrolled grazing, channelization, and erosion destroyed this habitat (Stefferd and Reinthal 2004). The sites proposed for reestablishment of desert pupfish are currently void of fish species. Downstream movements to other perennial reaches of the tributaries and Aravaipa Creek are likely to occur through voluntary dispersal or the result of flooding. While they are liable to become established within the tributaries it is unlikely that desert pupfish would persist in Aravaipa Creek due to the presence of non-native predators and competitors and the general lack of suitable habitat.

#### **Factors Affecting Species' Environment within the Action Area**

The action area as described above includes the TNC-owned lands covered under the Agreement and the adjacent federally owned lands. These federally owned lands are managed through the BLM's Phoenix District Resource Management Plan. This includes the Aravaipa Wilderness Area, the Turkey Creek Riparian Area of Critical Environmental Concern (ACEC), and the Table Mountain Research Natural Area ACEC.

The BLM manages Federal livestock grazing allotments within the Aravaipa Watershed. The South Rim Allotments include the Federal lands adjacent to, and continuous with the covered TNC lands in the Agreement. Grazing has resumed on this allotment this year (2005) after being in non-use since 1996. BLM has set utilization levels at an average of 40% and these levels will remain until conditions improve. Past grazing activities precipitated bank erosion, creating cut banks 10 to 15 feet high. However, since the period of non-use (includes the private portions of the project area, as well as the BLM-administered portions), the banks have begun to stabilize with a diversity of riparian vegetation filling in as ground cover.

Livestock grazing on BLM-administered lands within the project area will continue within authorized levels, as delineated in the 1991 BLM Safford District RMP/EIS which called for immediate initiation of a 50% suspension (2,890 AUMs) on the South Rim Allotment (4259) to allow the uplands and riparian areas to improve. Grazing use may be modified by implementation of BLM's Standards and Guides for Rangeland Health or other BLM efforts designed to improve or maintain upland and riparian habitat conditions.

The BLM developed a prescribed burn plan under the Phoenix RMP. The Aravaipa Prescribed Burn Plan was approved in March 1999, with the purpose of improving watershed conditions and reducing erosion. There have been four prescribed fires implemented within the watershed under this plan. The West Virgus Prescribed Burn was carried out in June 1999. It included approximately 6,177 acres, two thirds of which are within the wilderness area. In June 2003,

three prescribed burns were ignited. The Turkey Creek prescribed burn included the south rim above the reestablishment sites and was planned to cover 7,756 acres. The Javelina and PZII prescribed burns, located on the north rim of Aravaipa Canyon, burned within planning boundaries of 1,261 and 2,269 acres, respectively. All four prescribed burns in this area burned in a highly irregular pattern within their boundaries. This was due to fuels being sparse and discontinuous. The Aravaipa Prescribed Burn Plan identifies a 6 to 8 year return interval, but no plans have been developed for future prescribed burns within the watershed.

Currently, the primary factor affecting fish species in Aravaipa Canyon may be the permitted hiking that occurs in Aravaipa Creek. Hikers access this canyon through Aravaipa Creek. Hikers traveling in the upper creek reaches may be affecting native fish production during the fall and late winter-early spring spawning period. There is the potential for eggs and young fry to be killed from hikers traveling through these spawning beds. Access to the Aravaipa Canyon Wilderness is administered by BLM's Safford Office. BLM Wilderness Area permits are required to access both the east and west ends of the Aravaipa Canyon Wilderness. The BLM issues up to 50 permits per day to hike in this area. Much of the canyon is traveled by routes on the flood plain and upper terrace.

Several State and Federal actions have been implemented to limit or control non-native fish in Aravaipa Creek. Two fish barriers were constructed by the Bureau of Reclamation in 2001 in the lower reaches of Aravaipa Creek to prevent non-native fishes in the San Pedro River from entering this area. Stock tanks on Federal lands have been surveyed in the upper watershed to identify additional sources of non-native species. In 1987, two stock tanks were identified as sources of non-native fish. In August 1987, one of the tanks was chemically renovated. The other was on private land and renovation was not possible. However, that tank reportedly went dry in the summer of 2003 (Stefferd and Reinthal 2004). The BLM has financed surveys of the livestock tanks in the upper watershed with an aim of identifying the potential sources of non-native fish and to develop plans for renovation of these sites.

TNC is currently planning and implementing management that could result in impacts to this species, including erosion control, vegetation monitoring, and a prescribed fire program. These activities are primarily beneficial to the watershed and listed species, but may have short-term negative impacts (e.g., increased sediment flows after fires). Many of these activities are done in conjunction with the BLM and are thus considered Federal activities (e.g., prescribed burns are covered under section 7 of the Act).

Some downstream private property owners have agricultural diversions, livestock, and homes adjacent to Aravaipa Creek. While there may be impacts from sedimentation during maintenance of diversions, livestock moving in the creek, and general recreation activities around these homes, the major impacts to the native fish in the area are the presence of non-native predatory fish in the lower portion of the action area. A change in the current effects to the covered species in this area is unlikely. Occasional construction and maintenance of structures occurs, but no major new changes in land use are anticipated.

The native fish community within Aravaipa Creek has been monitored at least annually in recent years, if not more often, by a combination of State and Federal agencies, academic institutions,

and TNC. It is considered to have one of the most stable populations of loach minnow and spinedace in Arizona. A large portion of the Federal management activities are aimed at maintaining the native fish community and improving the watershed condition. Management of TNC property in the watershed seems to be consistent with Federal management. On the properties in the lower watershed, there is currently little or no impact on the native fish community. It is unlikely that the current management of the watershed is contributing to any change in the status of the loach minnow and spinedace populations in Aravaipa Creek. The greatest threat to the continued existence of loach minnow and spinedace, as well as the success of the reestablishment of Gila topminnow and desert pupfish, is the presence of non-native predators and competitors in Aravaipa Creek.

In addition to the programmatic consultation on the RMP, the Southeastern Arizona Grazing Plan, and the Aravaipa Prescribed Burn Plan, which authorize the management practices discussed above, there have been 11 informal consultations and four formal consultations for actions within the Aravaipa watershed. Informal consultations have covered actions for the enhancement and protection of the watershed, repair of flood damage, removal of non-native fish, and enhancement of recreation facilities. Three formal consultations covered actions dealing with repair of flood damage and flood control activities by the Federal Emergency Management Agency and the Army Corps of Engineers, respectively. The fourth formal consultation covered the reestablishment of Gila topminnow and desert pupfish into sites on BLM lands (AESO 02-21-04-F-0020). This consultation not only covered the effects of the reestablishment, but also amended the consultations for the RMP, grazing, and prescribed burn plans mentioned above, to include Gila topminnow and desert pupfish.

## EFFECTS OF THE ACTION

Effects of the action refer to 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. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Issuance of a Section 10(a)(1)(A) enhancement of survival permit will contribute to the conservation and recovery of the Gila topminnow and desert pupfish. The overall effect of the proposed action should be beneficial, as the Agreement is designed to provide a net conservation benefit for both species. The proposed action will provide level 3 populations (those in need of continued management) of topminnow and pupfish, and can also serve as a source of fish for other reestablishment efforts. The topminnow and pupfish can be used in genetic exchange between level 2 (those populations believed to be self-sustaining) and level 3 populations. The proposed action is compatible with step-down objectives 1.1, 2.1, 2.2, 2.4, 2.6, 5, and 6 of the Draft Revised Gila topminnow Recovery Plan (Weedman 1998) and 2, 5, and 7 of the Desert Pupfish Recovery Plan (USFWS 1993).

The loss of individuals or even entire populations of topminnow and pupfish in the reestablishment sites is possible. Topminnow and pupfish could be removed from reestablishment sites before known management actions occur that might cause their extirpation. If populations in these reestablishment sites are extirpated, they will be reestablished as necessary, and appropriate, for the duration of the Agreement. Fish stocked in these sites would be additional fish to the current baseline for both species, so loss of the populations would have no significant negative impact on the overall recovery of either species.

Management actions occurring at the site may cause short-term negative impacts, but provide long-term beneficial effects on the health of the watershed and, therefore, the populations covered under the Agreement. Those impacts which may occur are anticipated to be minimized and mitigated by complete Agreement implementation. Critical habitat will not be affected by the Agreement

### **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.

Other than those aspects of the present project delineated in the Agreement (Section 1.07), there are no present and future projects, authorized or under review, that are expected to contribute to any cumulative losses to the species of concern.

### **CONCLUSION**

We completed examination of the permit application, Agreement, and procedures for mitigating the permitted incidental take. After reviewing the status of the 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 issuance of a Section 10(a)(1)(A) permit for incidental take, as proposed, is not likely to jeopardize the continued existence of these species. No designated critical habitat exists within the project area. This Biological Opinion is based on information provided by the Applicant and information from the Arizona Ecological Services Office

We base our conclusion on the following:

- 1) The Agreement and issuance of a section 10(a)(1)(A) permit is likely to provide a net conservation benefit to Gila topminnow and desert pupfish through reestablishment of populations within the Aravaipa Creek watershed.
- 2) Populations established under the Agreement will serve as refugia for the species, and reestablishment of these populations into suitable habitats achieve specific recovery goals.

- 3) Proposed activities may have short-term adverse effects, but will provide long-term benefits to the watershed.

The conclusions of this biological opinion are based on full implementation of the Agreement and all terms and conditions of the section 10(a)(1)(A) enhancement of survival permit 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 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 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 Agreement for TNC clearly identifies the actions and activities that will be implemented to provide a net conservation benefit and contribution to recovery of Gila topminnow and desert pupfish covered by the Section 10(a)(1)(A) permit. The anticipated impacts to Gila topminnow and desert pupfish likely to result from the proposed actions and the return to baseline conditions by participants under the Agreement have been identified in the Agreement. All management activities described in the Agreement and any Section 10(a)(1)(A) permit 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 10(a)(1)(A) and section 7(o)(2) of the Act to apply. If TNC fails to adhere to these terms and conditions, the protective coverage of the Section 10(a)(1)(A) permit and Section 7(o)(2) may lapse. However, the FWS and TNC may agree that modifications to the management activities are needed. The process for modifications in management activities to be incorporated is described within the Agreement. These new modifications will be incorporated as reasonable and prudent measures, superseding the former management activities.

### AMOUNT OR EXTENT OF TAKE

Safe Harbor Agreements are written in anticipation of "take" of the covered species at some point in the future. Take cannot occur below the established baseline for a covered site. Take is expected to occur as a result of conservation activities, otherwise legal activities, and the

potential return to baseline at the termination of the Agreement and its associated section 10(a)(1)(A) permit. Measures will be implemented to prevent or reduce levels of take; however, incidental take of both Gila topminnow and desert pupfish could result under a variety of circumstances.

The following is a list of activities that could result in incidental take:

1. Prescribed burns conducted on TNC-covered lands may cause short-term impacts such as ash flows, debris flows, increased sedimentation or nutrient flows, and loss of pool habitat. Long-term effects are expected to be positive, resulting in improved watershed quality, increased upland water infiltration, and higher base flows within covered habitats.
2. Grazing on covered lands within the watershed could result in take on TNC lands (examples include increased siltation of a stream due to potential overgrazing and erosion, cattle trampling eggs and young fry if livestock gains access to habitats occupied by Gila topminnow and/or desert pupfish through damaged fences, etc.).
3. Contamination of water due to run-off from an old two-track road could result in take; however, this road will remain closed to the public, and conditions should continue to improve. It is anticipated that contaminant run-off will be reduced over time, as the road is no longer used.
4. Light recreational activities including hiking, camping, horseback riding, and hunting, could result in take caused by trampling of habitat, or minor pollution of stream segments from soaps, detergents, trash, etc.
5. Monitoring of Gila topminnow and desert pupfish populations as agreed upon in this Agreement may result in individuals being inadvertently, harmed, harassed, or killed.
6. Management actions to remove non-native aquatic species may cause harassment and possibly a small amount of mortality through bi-catch and trampling.
7. Reestablishment of vegetation within reestablishment sites or in adjacent terrestrial sites on TNC-covered lands may result in harassment and possibly a small amount of mortality from trampling.

The first two actions listed above could result in partial to complete (100%) take of both Gila topminnow and desert pupfish from sites covered in this Agreement. The next five management actions (Items 3-7 above) are not expected to result in substantial take of either species. Isolated individuals could be subject to take during these routine activities, but care will be taken to reduce the possibility and frequency of take during these activities. The Agreement also provides for additional management activities not specifically described in the Agreement, as long as such

actions maintain the original baseline conditions and the effects of such take are not significantly different from those discussed above. The established baseline in this agreement is zero, as these two species are not currently present in this watershed.

Take of pupfish and topminnow may also occur related to the capture, transport, release, and additional monitoring of both species. The effects of this source of take will be analyzed separately under the issuance of section 10(a)(1)(A) research and recovery permits to qualified individuals and agencies conducting such work.

### **EFFECT OF THE TAKE**

In this biological opinion we determine that this level of anticipated take is not likely to result in jeopardy to the species.

### **REASONABLE AND PRUDENT MEASURES**

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize or avoid impacts of incidental take to Gila topminnow and desert pupfish.

1. The FWS shall require that the applicant (TNC) comply with and implement the issued section 10(a)(1)(A) enhancement of survival permit and the Safe Harbor Agreement.
2. Any incidental take of Gila topminnow or desert pupfish must be in compliance with all terms and conditions of the section 10(a)(1)(A) incidental take permit and shall include the Agreement's conservation measures.

### **TERMS AND CONDITIONS**

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

1. A section 10(a)(1)(A) permit, as evaluated in this Biological Opinion and assuming that all other requirements are met, will be issued by the FWS. The FWS shall include the Agreement's conservation measures in the issued permit.
2. The Agreement for the section 10(a)(1)(A) permit must be executed by the FWS and the Applicant.
3. Information obtained from pertinent monitoring operations will be reported and made available to all partners. Reports will include information from population and take monitoring, incidental take, and all other actions undertaken to implement the Agreement. Reports will be completed annually for the term of the permit. The report will include an account of incidental take, monitoring results, and management actions.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The applicant must immediately provide an explanation of the causes of the taking and review the need for possible modification of the reasonable and prudent measures with the AESO.

#### **Disposition of Dead or Injured Listed Species**

Upon locating a dead, injured, or sick Gila topminnow, desert pupfish, or and other 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.

### **CONSERVATION RECOMMENDATIONS**

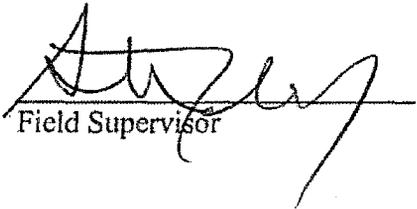
Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We believe that the action, as proposed, provides significant conservation benefit; no additional conservation recommendations are provided herein.

### **REINITIATION NOTICE**

This concludes formal consultation on the proposed issuance of a Section 10(a)(1)(A) permit to allow incidental take of Gila topminnow and desert pupfish for management activities outlined in the Agreement on property owned and managed by The Nature Conservancy within the Aravaipa Creek Watershed. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (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.

If you have questions regarding this Biological Opinion or the Safe Harbor Agreement, please contact Marty Tuegel at (520) 670-6150 (x232) or Sherry Barrett at (520) 670-6150 (x223).

Please refer to the consultation number, 2-21-03-F-0499, in future correspondence concerning this project.

  
Field Supervisor

8/30/05  
Date

**ACTING**   
Deputy Regional Director

9/13/05  
Date

Attachments

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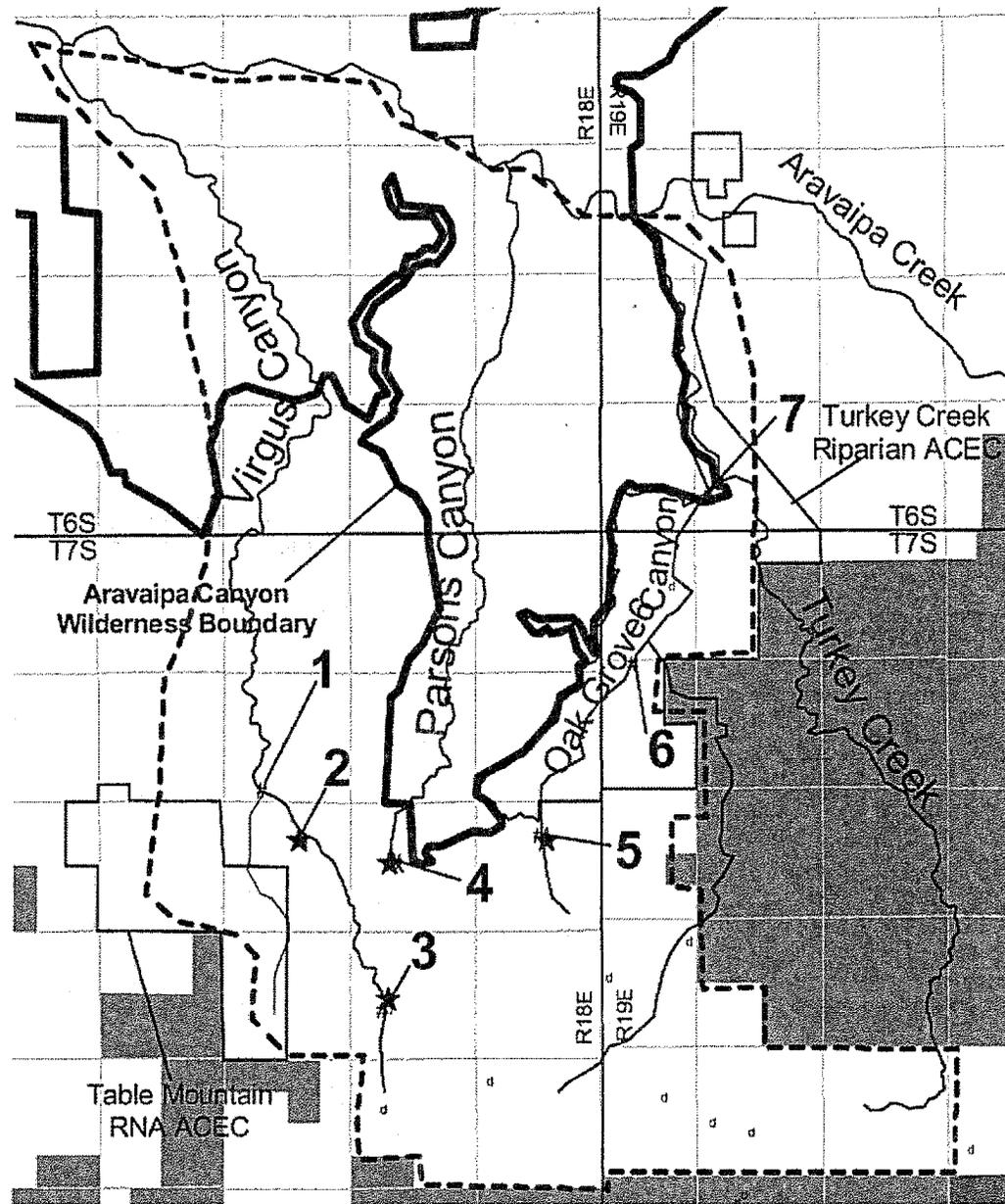
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Figure 1. Non-federal lands owned or managed by TNC that are covered within the Safe Harbor Agreement. Proposed reestablishment sites 2, 3, 4, and 5 are those sites on TNC owned land covered by the Agreement.



**Potential stocking locations**

- 1 - Virgus Canyon @ Sycamore Canyon confluence
- 2 - Bleak Spring
- 3 - Cement Tank Spring
- 4 - Parsons Grove
- 5 - Upper Oak Grove Canyon
- 6 - Middle Oak Grove Canyon
- 7 - Lower Oak Grove Canyon

Project Area boundary  
**Land Ownership**  
 BLM  
 Private  
 State

0 1 2 3 4 N  
 Kilometers

## APPENDIX A

### CONCURRENCES

This section contains our concurrence with your determination that the proposed action may affect, but is not likely to adversely affect, the loach minnow and spikedace.

#### LOACH MINNOW and SPIKEDACE

##### Loach Minnow

The FWS listed the loach minnow as a threatened species on October 28, 1986 (USFWS 1986b). The Loach Minnow Recovery Plan was completed in 1991 (USFWS 1991a). Habitat destruction and competition and predation by non-native aquatic species have severely reduced its range and abundance. Although the loach minnow is currently listed as threatened, we have found that a petition to up-list the species to endangered status contained sufficient information indicating that such a change is warranted. A reclassification proposal is pending; however, work on this reclassification is precluded due to work on other higher priority listing actions (USFWS 1994).

Loach minnow occur in small to large perennial streams. They are a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow use the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al.* 1988; Rinne 1989). They are rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Loach minnow feed exclusively on aquatic insects (Schrieber 1978, Abarca 1987). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side.

The status of loach minnow is declining rangewide. It is currently restricted to 419 miles of streams, which represents only 15 to 20 percent of its historical range (USFWS 2000). In occupied areas, loach minnow may be common to very rare. Loach minnow are common only in Aravaipa Creek, the Blue River, and limited portions of the San Francisco, Upper Gila, and the Tularosa rivers in New Mexico (USFWS 2000).

Aravaipa Creek supports the most protected loach minnow populations due to special use designations on BLM land, substantial ownership by TNC, and constructed fish barriers to prevent invasion by non-native fish species. Intensive monitoring at Aravaipa Creek has demonstrated that loach minnow numbers are currently stable. They are found from the downstream non-native fish barriers upstream to Turkey Creek and above (Peter Rienthal, U. Arizona, pers. commun. October 13, 2004).

##### Spikedace

The FWS listed the spikedace as a threatened species on July 1, 1986 (USFWS 1986c). A recovery plan was completed in 1991 (USFWS 1991b). Although the spikedace is currently listed as threatened, a petition to up-list the species to endangered status contained sufficient information indicating that such a change is warranted. A reclassification proposal is pending; however, work on it is precluded due to work on other higher priority listing actions (USFWS

1994). Habitat destruction along with competition and predation from introduced non-native species are the primary causes of the species' decline (Miller 1961, Williams et al. 1985, Douglas et al. 1994).

Spikedace live in moderate to large perennial streams with flowing water of slow to moderate velocities over sand, gravel, and cobble substrates (Propst et al. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst et al. 1986). Spikedace spawn from March through May with some yearly and geographic variation (Barber et al. 1970, Anderson 1978, Propst et al. 1986). Actual spawning has not been observed in the wild, but spawning behavior and studies of captive fish indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace live about two years with reproduction occurring primarily in one-year old fish (Barber et al. 1970, Anderson 1978, Propst et al. 1986). They feed primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh et al. 1989).

Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the Middle Gila and Upper Gila River, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973a, Anderson 1978, Marsh et al. 1990, Sublette et al. 1990, Jakle 1992, Knowles 1994, Rinne 1999). The status of spikedace is declining range wide. It is now restricted to approximately 289 miles of streams, and its present range is only 10 to 15 percent of its historical range. Within occupied areas, it is common to very rare, but is presently common only in Aravaipa Creek and some parts of the Upper Gila River in New Mexico (USFWS 2000). Aravaipa Creek supports the most protected spikedace populations due to special use designations on BLM land, substantial ownership by TNC, and construction of fish barriers to prevent invasion by non-native fish species. Intensive monitoring at Aravaipa Canyon has demonstrated that spikedace are numbers currently stable. They are found from the mid point of the canyon at Horse Camp Wash upstream to Turkey Creek and above (Peter Rienthal, U. Arizona, pers. comm. October 13, 2004). It is believed that spikedace did occur throughout the canyon at one time.

AESO of FWS determined that the proposed action was not likely to adversely affect either loach minnow or spikedace. This determination is based upon the following:

- The areas proposed for reestablishment of Gila topminnow and desert pupfish are not occupied by loach minnow or spikedace.
- There is only a small possibility of successful dispersal of Gila topminnow and desert pupfish into the portions of Aravaipa Creek occupied by loach minnow and spikedace.
- If successful dispersal occurs, long-term establishment of Gila topminnow and desert pupfish in Aravaipa Creek occupied by loach minnow and/or spikedace is improbable due to the presence of native and non-native competitors and predators and a lack of suitable habitat.

- If successful dispersal occurs, Gila topminnow and desert pupfish are generalized feeders and Loach minnow and spikedeace feed on aquatic and terrestrial insects.
- Furthermore, if successful dispersal occurs, encounters between Gila topminnow or desert pupfish and loach minnow or spikedeace would be extremely rare due to differences in habitat preferences.

Therefore, the FWS concurs with the determination that the proposed action may affect, but is not likely to adversely affect either the loach minnow or spikedeace. No critical habitat is designated for these species; therefore, none will be affected. We base this determination on the following:

- It is improbable that Gila topminnow and desert pupfish would survive a dispersal event from the reestablishment sites to Aravaipa Creek, where loach minnow and spikedeace are known to occur.
- It is improbable that Gila topminnow and desert pupfish would survive in Aravaipa Creek with the number of non-native aquatic competitors and predators present in the creek.
- It is improbable that Gila topminnow and desert pupfish would become reestablished in Aravaipa Creek, based upon the scarcity, size, and fragmented nature of suitable habitat for Gila topminnow and desert pupfish in Aravaipa Creek.
- It is improbable that adhesive eggs or larval stages of loach minnow and spikedeace in gravel-rocky riffle would be encountered by Gila topminnow or desert pupfish, much less preyed upon by either species.
- It is improbable that there would be any competition for food resources between Gila topminnow and desert pupfish, and loach minnow and spikedeace based upon the large degree of habitat partitioning and the non-limiting nature of prey items for all these species in the creek.

Therefore, any effects of the reestablishment of Gila topminnow and desert pupfish on loach minnow and spikedeace populations within the Aravaipa watershed are expected to be insignificant and discountable.

## APPENDIX B

Species listed, proposed, or candidates for listing under the Endangered Species Act for Pinal and Graham Counties that the issuance of this permit and implementation of the associated Agreement which we have determined will have No Affect on :

<sup>1</sup> Apache (Arizona) trout	<i>Oncoryhynchus apache</i>	Threatened
<sup>1</sup> Arizona cliffrose	<i>Purshia subintegra</i>	Endangered
<sup>1</sup> Arizona hedgehog cactus	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered
<sup>3</sup> bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened
<sup>3</sup> cactus ferruginous pygmy-owl	<i>Glaucidium brasilianum</i> cactorum	Endangered
<sup>1</sup> California brown pelican	<i>Pelecanus occidentalis californicus</i>	Endangered
<sup>1</sup> Chiricahua leopard frog	<i>Rana chiricaluensis</i>	Threatened
<sup>2</sup> Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuenae</i>	Endangered
<sup>1</sup> Mexican gray wolf	<i>Canis lupus baileyi</i>	Endangered
<sup>1</sup> Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
<sup>1</sup> Mount Graham red squirrel	<i>Tamiasciurus hudsonicus grahamensis</i>	Endangered
<sup>1</sup> Nichol turk's head cactus	<i>Echinocactus horizonthalonius</i> var. <i>nicholii</i>	Endangered
<sup>1</sup> Razorback sucker	<i>Xyrauchen texanus</i>	Endangered
<sup>3</sup> Southwestern willow flycatcher	<i>Empidonax trailii extimus</i>	Endangered
<sup>1</sup> Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	Endangered
<sup>1</sup> Gila chub	<i>Gila intermedia</i>	Proposed Endangered
<sup>1</sup> Acuna cactus	<i>Echinomastus erectocentrus</i> var. <i>acunensis</i>	Candidate
<sup>1</sup> Wet Canyon talussnail	<i>Sonorella macrophallus</i>	Conservation Agreement
<sup>3</sup> Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate

<sup>1</sup> Species not found within project area.

<sup>2</sup> Non-riparian or aquatic species

<sup>3</sup> Habitat around the project sites not sufficient to be used by the species

## APPENDIX C

### Legal description of TNC Lands Covered by the Agreement:

#### Parcel No. 20:

Lots 1,2,3, and the Southwest Quarter and the North half of Lot 4; the North half of the Northeast Quarter; the Southwest Quarter of the Northeast Quarter; the Northwest Quarter of the Southeast Quarter; and the North half of the Southwest Quarter of the Southeast Quarter of Section 18, Township 7 South, Range 19 East of the Gila and Salt River Base and Meridian, Graham County Arizona.

EXCEPT all the coal and other minerals as reserved in Patent from United States of America.

#### Parcel No. 21:

The West Half of Lots 1 and 2, Section 19, Township 7 South, Range 19 East of the Gila and Salt River Base and Meridian, Graham County Arizona.

EXCEPT all the coal and other minerals as reserved in Patent from United States of America.

#### Parcel No. 25:

The East half and the Southwest quarter of Section 13. Township 7 South, Range 18 East, Gila and Salt River Base and Meridian, Pinal County, Arizona.

EXCEPTING THERE FROM all coal, oil, gas and other mineral deposits as reserved in Patent from United States of America.

#### Parcel No. 26:

The Northwest quarter of Section 14, Township 7 South, Range 18 East, Gila and Salt River Base and Meridian, Pinal County, Arizona.

EXCEPTING THERE FROM all coal, oil, gas and other mineral deposits as reserved in Patent from United States of America.

#### Parcel No. 27:

The South half of the Southeast quarter and the Southwest quarter of Section 23, Township 7 South, Range 18 East, Gila and Salt River Base and Meridian, Pinal County, Arizona.

EXCEPTING THERE FROM all coal, oil, gas and other mineral deposits as reserved in Patent from United States of America.

#### Parcel No 28:

The West half of the Northwest quarter of Section 25, Township 7 South, Range 18 East, Gila and Salt River Base and Meridian, Pinal County, Arizona.

EXCEPTING THERE FROM all coal, oil, gas and other mineral deposits as reserved in Patent from United States of America.

**PARCEL NO. 29:**

The North half of Section 26, Township 7 South, Range 18 East, Gila and Salt River Base and Meridian, Pinal County, Arizona.

EXCEPTING THERE FROM all coal, oil, gas and other mineral deposits as reserved in Patent from United States of America.

**Parcel No. 31:**

Lots 1, 2, 3, 4, and 5; the North half of the Northeast quarter and the Southeast quarter of the Northeast quarter; and the Northwest quarter of Section 15, Township 7 South, Range 18 East, Gila and Salt River Base and Meridian, Pinal County, Arizona.

EXCEPT any part lying within the boundaries of Louisville and Grand Duke Patented Mining Claims, as revealed by Mineral Survey No. 3313;

EXCEPTING AND RESERVING all the coal and other minerals as reserved in Patent from United States of America.