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AESO/SE
02-21-04-F-0454 April 19, 2005

Memorandum

To: Safford Field Office Manager, Bureau of Land Management, Safford, Arizona (Attn: Heidi Blasius)

From: Field Supervisor

Subject: Request for Formal Consultation and Formal Conference for the Proposed Reestablishment of Spikedace, Loach Minnow, Gila Topminnow, Desert Pupfish, and Augmentation of Gila Chub into Multiple Springs and Streams within the Muleshoe Cooperative Management Area

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 was dated September 13, 2004, and received in this office on September 15, 2004. At issue are impacts that may result from the proposed stocking of various native fish species in the Muleshoe Cooperative Management Area (CMA) in Cochise County, Arizona. The proposed action may affect the listed spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), desert pupfish (*Cyprinodon macularius macularius*), and the proposed Gila chub (*Gila intermedia*).

This biological opinion and conference opinion is based on information provided in the September 13, 2004, biological evaluation (BE), the draft environmental assessment (DEA), various telephone conversations and e-mails between our staff, field investigations, team meetings, and other sources of information. Literature cited in this biological and conference opinion is not a complete bibliography of all literature available on the species of concern, species augmentations and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

CONSULTATION HISTORY

- The proposed action is one of the outcomes of the Central Arizona Project (CAP). A final biological opinion (2-21-90-F-119) for the CAP, dated April 15, 1994, analyzed the effects of the transportation and delivery of CAP water to the Gila River Basin and its potential to introduce and spread nonnative aquatic species. This initial biological opinion determined that the proposed CAP action was likely to jeopardize the existence of spikedace, loach minnow, Gila topminnow, and razorback sucker, and was likely to adversely modify the critical habitat of spikedace, loach minnow, and razorback sucker, but would not jeopardize the continued existence of desert pupfish, Colorado pikeminnow (then called Colorado squawfish), or bald eagle.

- Following legal challenges to the initial biological opinion, a subsequent biological opinion (2-21-90-F-119a) was completed on April 17, 2001, and included conservation measures within the proposed action that would offset the adverse effects of the action on native fish species.

- The Bureau of Reclamation (Reclamation) included conservation measures which committed funding for the conservation of native fishes, commonly known as the CAP Fund Transfer Program, in the amount of $250,000 annually for 21 years. The proposed action in this biological opinion is one of the actions included within the CAP Fund Transfer Program, and Reclamation allocated $5,000 for this individual project.

- The Bureau of Land Management (BLM) completed the Muleshoe Ecosystem Management Plan and Environmental Assessment in 1998 (Consultation 02-21-94-I-0213) and an implementation level plan for the Safford District Resource Management Plan (Consultation 02-21-88-F-0114) which identified management actions to evaluate habitat conditions in order to assess the feasibility of reestablishment, extending the range of, or supplementing populations of wildlife species.

- In order to accomplish the project, a team was convened, and a first meeting held on September 3, 2003. Subsequent meetings and field trips were held throughout 2003 and 2004.

- The BE for this project was received on September 15, 2004, and a 30-day letter was provided in response on October 14, 2004.

- We sent an additional letter on January 14, 2005, requesting a 60-day extension on the consultation, with a new due date of March 30, 2005.

- A draft biological opinion was submitted to your office on March 25, 2005.

- We received your comments on the draft biological opinion on April 14, 2005. All comments have been incorporated.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Bureau of Land Management (BLM), Safford and Tucson Field Offices, in coordination with the FWS, Reclamation, U.S. Forest Service (Forest Service), Arizona Game and Fish Department (AGFD), Arizona State Land Department (ASLD), Arizona Chapter of The Nature Conservancy (TNC), and Arizona State University (ASU), have formed the Muleshoe Native Fishes Planning Team (MNFPT). The MNFPT proposes to stock spikedace, loach minnow, Gila topminnow, and desert pupfish, and to augment existing populations of Gila chub into suitable habitat within Redfield, Cherry Springs, and Hot Springs canyons, collectively referred to as the Muleshoe CMA. While the proposal has been developed cooperatively between the agencies participating in the MNFPT, the BLM Safford Field Office will serve as lead agency for the project.

Proposed Action Area

The Nature Conservancy purchased the Muleshoe in 1982, and entered into a cooperative agreement with the Bureau of Land Management and the U.S. Forest Service to form the Muleshoe CMA in 1988. The Muleshoe CMA encompasses 49,120 acres. This cooperative agreement developed in 1988 enabled the partners to make decisions across property boundaries and manage the area as one unit. An ecosystem management plan was drafted with a planning team that consisted of Conservancy scientists and site managers, as well as staff from many state and Federal agencies, conservation organizations, ranchers and neighbors. This plan focuses on managing for ecological processes and restoration of these processes (TNC 2005).

The Muleshoe CMA is located in Cochise County in southeastern Arizona. The Muleshoe CMA is comprised of two major and one minor watersheds. The major watersheds include Redfield Canyon, which drains 10.1 miles, and Hot Springs Canyon, which drains 12.5 miles. The minor watershed is Cherry Springs Canyon, which drains 0.7 mile. Collectively, the three watersheds support seven perennial streams and are largely isolated from the major downstream San Pedro River by long stretches of dry stream channels. Land ownership in the proposed action area consists of BLM, Forest Service, and TNC owned and managed lands. Private lands occur in downstream portions of channel drainages (Figure 1, Appendix A).

Proposed Action

<u>Fish Stocking</u>

Augmentation

Agencies participating in the MNFPT will work cooperatively in collecting, transporting, and stocking fishes. All of the fish capture, transport, and release efforts will follow the appropriate protocols and respective recovery plans for each species, and will comply with the provisions of existing permits authorizing fish stockings. Consultation is not required for the effects of the actual collection and transport of fishes for this project, but instead for the effects that occur as a

result of the stocking. BLM will continue to coordinate stocking efforts with the FWS, Reclamation, Forest Service, AGFD, ASLD, TNC, and ASU before stocking the sites. Initial stocking of fishes would occur from Spring 2005 onward, and will consist of as many individuals as are available, up to 500 individuals, per effort from source populations of spikedace, loach minnow, Gila topminnow, desert pupfish, and Gila chub. To ensure genetic integrity, a minimum of 500 fish per species is optimal; however, the determining factor will be the availability of individuals from source populations.

Augmentation efforts will continue at least once per year for a minimum of five years. At that time, the success of the effort will be evaluated for each species. If any problems occur, management actions will be adjusted to correct or eliminate them. If, at any time during that period, the MNFPT determines that a situation exists which will preclude successful establishment of a species at a given area, augmentation efforts will be stopped for that species at that location until corrective action can be taken, as appropriate. If no corrective action is feasible, augmentation efforts will be discontinued at that site for that species.

Several potential stocking sites have been identified on both private and public lands through previous monitoring efforts and site visits by the Muleshoe Native Fish Planning Team. Potential stocking sites on private lands include all suitable aquatic habitats on lands owned and managed by the TNC. Potential stocking sites on public lands include all suitable habitats on lands owned and managed by BLM and Forest Service. These sites are generally located along Redfield, Cherry Springs, or Hot Springs canyons, as well as isolated ponds within the Muleshoe CMA. For Redfield Canyon, the MNFPT has identified suitable areas at approximately 0.25 to 1.00 mile upstream from the Swamp Springs confluence. For Hot Springs Canyon, the MNFPT has identified as suitable for loach minnow and spikedace that stretch of the river between the Double R Canyon and Wildcat Canyon confluences. Potential reintroduction sites for Gila topminnow, Gila chub, and desert pupfish were identified at Hooker Hot Springs at Township 13 South, Range 20 East, section 1; an unnamed spring just north of Cherry Spring along Cherry Springs Canyon in Township 12 South, Range 20 East, section 4; an unnamed spring in Township 12 South, Range 20 East, section 1 near Double R Canyon; and an unnamed spring near Swamp Springs at Township 11 South, Range 20 East, section 27.

It should be noted that not all of these areas may be used, and that additional areas could be identified. However, any effects to the species should be the same, regardless of the location chosen, as all landowners affected (BLM, Forest Service, TNC) are members of the MNFPT, and are cooperators in the stocking effort. The dispersed nature of potential impact activities, as described below, are dispersed throughout the area, so that any one location is generally accessible to the same types of effects as any other area chose

Source Populations

Source populations will vary for different species. Because population levels fluctuate from year to year, it is not possible to determine in advance the exact source for each species. However, all augmentations will be made using the most appropriate genetic lineages. Aravaipa Creek will serve as the source population for spikedace and loach minnow, which is consistent with the genetic lineage and origin in both the loach minnow (USFWS 1991a) and spikedace recovery plans (USFWS 1991b). The most appropriate genetic lineages of Gila topminnow and desert

pupfish will be selected, according to the recovery plans for these species (Weedman 1999, USFWS 1993). The source populations for Gila topminnow will likely be from stock maintained at ASU, and may include any of the four genetic lineages from Bylas, Cienega Creek, Sharp Spring, and Monkey Spring. The above mentioned Gila topminnow lineages may be stocked separately into suitable habitats within the project areas to replicate multiple populations while maximizing separate genetic lineages. Desert pupfish will likely be collected from Cienega de Santa Clara, Mexico or Cibola National Wildlife Refuge, and may be supplemented with stock from established refuge habitats in Arizona and/or Dexter National Fish Hatchery, New Mexico.

Gila chub will be collected from within the Muleshoe CMA for augmentation within Hot Springs and Redfield canyons and re-establishment to Cherry Springs Canyon. These species will only be stocked in fishless sites within the selected drainages where collected. The project will be implemented in this way as it is assumed genetic differences may exist between these species from one aquatic system to the next. This will also eliminate the inadvertent transfer of any invasive plants, diseases, or parasites from one stream system to another on the CMA.

While consultation is not necessary for these species, it is worth nothing that the proposed action would also include collecting longfin dace, speckled dace, Sonora sucker, desert sucker, and lowland leopard frog on-site and augmenting existing populations on the Muleshoe CMA. As with Gila chub, these species would be stocked into fishless or frogless sites within the drainages where collected.

Health Assessments

Members of the MNFPT will collect a sample of fish from source populations approximately six weeks before moving stocking begins. This will allow time for the FWS' National Wild Fish Health Survey Program to test the fish submitted, provide results, and offer options upon detections of pathogens. Most external parasites are not considered pathogens of concern because they are present in all aquatic systems to some degree. If parasites appear to be a problem, the fish can be treated with a formalin bath, administered at the time of capture, or later. If a virus or certain species of bacteria are detected, the fish will be held in captivity and treated. Most bacterial treatments require a 14-day therapy of antibiotics. One specific concern is Asian tapeworm, which can affect all species considered in this project except for Sonoran and desert sucker. Asian tapeworm could present a problem if the receiving population does not already have the parasite or if the infestation is severe enough to impact the health of the infected fish. All fish collected for possible augmentation will be evaluated for Asian tapeworm. Any fish with Asian tapeworm would not be used for stocking.

Transport

Members of the MNFPT will transport fish to the proposed augmentation sites from a variety of sources. In addition, the terrain at the various augmentation sites can be rugged. For these reasons, a variety of transport methods will likely be used, and may include transport by helicopter, truck, mule, or backpack. Appropriate methodologies will be used, regardless of the type of transport provided.

Monitoring and Adaptive Management

The MNFPT will evaluate reestablishment efforts for success for each species. The MNFPT will consider stocking efforts successful if, after five years, monitoring reveals that recruitment and survival are occurring such that the population becomes self-sustaining without need of further augmentations. The MNFPT will monitor each year for the five years in which augmentations take place to determine the success of the project. If success cannot be determined within five years, monitoring may continue, but not for more than five years after stocking has been discontinued. Monitoring of stocking efforts will include, at a minimum, a determination of persistence of fish in the area, age classes present, and their relative percentages of the population at that site. Monitoring should continue as long as the species are present.

Where self-sustaining populations do not develop over the course of the augmentation efforts, the MNFPT will determine, based on monitoring information collected, if further augmentation is required to meet the success criteria beyond the initial five-year period, or if a particular site or species should no longer be stocked. The determination as to whether or not stocking efforts should be discontinued will be reached through agreement of MNFPT members, and may require additional coordination or consultation.

Monitoring for the project will include the following:

1) Monitor Gila topminnow, desert pupfish, loach minnow, spikedace, Gila chub, longfin dace, speckled dace, Sonora sucker, desert sucker, and lowland leopard frog populations, appropriate aquatic habitat variables, riparian vegetation, and streambanks at least annually, using accepted BLM standards and methodologies. (The BLM committed to this monitoring effort as one of their conservation measures, as listed below).

2) Monitor for fish kill immediately following the first runoff event following prescribed fires in the watershed. A report with monitoring results and observations will be submitted to the FWS annually.

Conservation Measures

The BLM has included within the description of the proposed action the following conservation measures:

- In coordination and cooperation with the FWS, TNC, and AGFD, monitor all stocked populations of spikedace, loach minnow, Gila topminnow, desert pupfish, and Gila Chub at least annually;

- Take no action that would result in increased grazing pressure at the proposed project sites;

- Monitor grazing activities at all locations stocked with these species;

- Monitor utilization limits for upland and riparian vegetation, and streambank alteration and ensure that livestock are moved prior to exceeding these limits;

- Evaluate, monitor, and modify as needed any activities that may result in take of these species or destruction of their habitat in order to reduce potential adverse effects to these species;

- Salt only greater than 0.25 mile from water, riparian areas, stream channels, or areas of high erosion potential;

- Ensure that negative watershed effects to these species' habitat do not increase; and

- Conduct informational and educational programs that detail the plight of Arizona's native fishes and their habitats.

Livestock Grazing

The three allotments within the Muleshoe CMA include the Muleshoe, Soza Mesa, and Soza Wash allotments. The Muleshoe Allotment includes the Hot Springs Area of Critical Concern (ACEC) and the majority of the Redfield Canyon Wilderness. The Hot Springs ACEC was designated as such to protect riparian, cultural, fish and wildlife species including threatened and endangered species, and scenic values. The Redfield Canyon Wilderness was designated by Congress as part of the Arizona Desert Wilderness Act of 1990. BLM and the TNC suspended livestock grazing at the time of the wilderness designation, and it remains suspended. The purpose of the suspension was to enhance important wildlife habitat and watershed conditions. In addition, the Forest Service retired livestock grazing on the adjacent Galiuro Wilderness, encompassing 76,317 acres, in 1986 (USBLM 2004).

BLM permits the Soza Wash Allotment, recently renamed the C-Spear Allotment, for five cattle for year-long grazing, but no grazing currently occurs. This allotment is located at the western edge of the Redfield Canyon Wilderness, near the confluence of Redfield and Swamp Spring canyons. An estate settlement willed the allotment to the BLM, and it is likely that grazing will be cancelled on this allotment when this transaction is complete (White 2005).

The Soza Mesa Allotment is located is west of the Muleshoe Allotment, and continues to be grazed at 44 head of cattle year-long, dispersed over 5,620 acres. Cattle were removed from the allotment in 2003 in response to the drought, but BLM anticipates that grazing will resume here in the future (White 2005).

Off-Highway Vehicle Use

Off-highway vehicle use occurs for recreational purposes in the proposed action area. Management allows for motorized vehicles use on existing roads and trails within the Muleshoe CMA. The amount of use is limited due to rugged terrain and remoteness of the area. Additionally, BLM and TNC have closed the riparian area of Hot Springs Canyon (approximately 140 acres) to off-highway vehicle use.

Recreation

Outdoor enthusiasts use the Muleshoe CMA throughout the year for hunting, hiking, horseback riding, birding, wildlife observation, and primitive camping. Recreational activity is dispersed, although hiking, birding, and wildlife viewing is often concentrated near TNC headquarters due to developed sites that include a campground, casitas, and nature and hiking trails.

Prescribed Burning

Prescribed burning occurs in the proposed action area, in compliance with the Muleshoe Ecosystem Management Plan (EMP) Prescribed Burn Plan and associated environmental assessment, EA # AZ-060-98-004 approved in 1998. In addition, section 7 consultation #2-21-03-F-0210 on the BLM's Statewide Programmatic Land Use Plan Amendment for Fire, Fuels, and Air Management added further protection for these species (USFWS 2004).

The proposed action includes burning within riparian zones only if fuel loads indicate a possibility of loss due to catastrophic fire. The fire prescription is expected to be a cool-season, low-burning ground fire, with very short flame length (one to one and one-half feet), and strip burning techniques to reduce the risk of uncontrolled burning at the stream edge. Any fire, natural or prescribed, that burns out of prescription would be immediately suppressed. Fire would be carefully administered and not allowed to run parallel to watercourses. Prescribed fires include using prescribed fire units (both natural and ignited) on an experimental basis in riparian areas. BLM and TNC will conduct pre- and post-burn monitoring. BLM and TNC have and will continue to delineate and maintain buffer zones in order to stabilize soils and decrease stream sedimentation during prescribed burns. Prescribed burning is expected to be repeated over the life of the project.

STATUS OF THE SPECIES (RANGEWIDE AND/OR RECOVERY UNIT)

Spikedace

The FWS listed spikedace as a threatened species on July 1, 1986, (USFWS 1986b) and designated critical habitat on April 25, 2000 (USFWS 2000). A subsequent court order vacated critical habitat on August 31, 2004. Spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the middle, and upper Gila River, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh *et al*. 1990, Sublette *et al*. 1990, Jakle 1992, Knowles 1994, Rinne 1999). The species also occurs in the upper Verde River, but appears to be declining in numbers. Surveys have not documented spikedace in the Verde River since 1999, and additional survey work is needed to determine its current status. Habitat destruction along with competition and predation from introduced nonnative species are the primary causes of the species decline (Miller 1961, Williams *et al*. 1985, Douglas *et al*. 1994).

Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst *et al*. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of

mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst *et al*. 1986). Spikedace spawns 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 captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace lives about two years with reproduction occurring primarily in one-year old fish (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). It feeds primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh *et al*. 1989).

The physiological, behavioral, and ecological needs for spikedace include permanent, flowing, unpolluted water; living areas for adult spikedace with slow to swift flow velocities in shallow water with 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 downstream riffle edges; living areas for juvenile spikedace with slow to moderate flow velocities in shallow water with moderate amounts of instream cover; living areas for larval spikedace with slow to moderate flow velocities in shallow water with abundant instream cover; sand, gravel, and cobble substrates with low to moderate amounts of fine sediment and substrate embeddedness; pool, riffle, run, and backwater components present in the aquatic habitat; low stream gradient; water temperatures in the approximate range of 35 to 65 degrees Fahrenheit (F); abundant aquatic insect food base; periodic natural flooding; a natural, unregulated hydrograph or, if the flows are modified or regulated, then a hydrograph that demonstrates an ability to support a native fish community; and habitat devoid of nonnative aquatic species detrimental to spikedace or habitat in which detrimental nonnative species are at levels that allow the persistence of spikedace. These are generalized descriptions and ranges of selected habitat factors that are critical for the conservation of spikedace.

Recent taxonomic and genetic work on spikedace indicates there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations occupy isolated fragments of the Gila basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek are morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992, Tibbets 1993).

Suitable habitat areas for spikedace can be divided into seven individual complexes for discussion purposes. Spikedace likely occupy Complex 1, the Verde River Complex, but at reduced numbers. Recent surveys have failed to locate spikedace, but have been less than thorough. The last known records are two fish found in 1999 by the Arizona Game and Fish Department. The tributary streams to the Verde are believed to be unoccupied at this time. Spikedace are not known to occur either historically or currently in Complex 2, the Black River Complex. It is not known if they can exist at the higher elevations found within this complex. Currently, elevation data are not definitive. Additionally, the Salt River Subbasin within this Complex occurs at lower elevations, and is a significant portion of spikedace historical range. This subbasin currently has no existing populations of spikedace. Large areas of the subbasin are unsuitable, either because of topography or because of reservoirs, stream channel alteration by humans, or overwhelming nonnative species populations.

Within Complex 3, the Tonto Creek Complex, spikedace are known to have occupied Tonto Creek. Suitable habitat still exists, although degradation has occurred due to watershed uses, water diversion, agriculture, roads, and nonnative species introduction. Complex 4, the Middle Gila/Lower San Pedro/Aravaipa Creek Complex, is occupied by spikedace with its population status ranging from rare to common. Aravaipa Creek supports some of the best and most protected spikedace populations due to special use designations on BLM land, substantial ownership by TNC, and planned construction of fish barriers to prevent invasion of nonnative fish species.

Complex 5, the Middle-Upper San Pedro River Complex, is currently unoccupied by spikedace. However, the San Pedro River is the type locality of spikedace, and this complex contains important restoration areas. The Muleshoe CMA occurs within this complex. Complex 6 is the Gila Box/San Francisco River Complex. The only spikedace population remaining in the complex is in Eagle Creek. However, substantial restoration potential for spikedace exists in the remainder of the complex. This complex has the largest area of habitat suitable for spikedace restoration.

Complex 7, the Upper Gila River Complex in Grant, Catron, and Hidalgo counties, New Mexico, is occupied throughout by spikedace, and contains the largest remaining population of spikedace. Because of its remoteness, there is a relatively low degree of habitat threats in this complex.

Our information indicates that, rangewide, more than 250 consultations have been completed or are underway for actions affecting spikedace and loach minnow. Approximately 30% of these opinions concerned the effects of grazing, approximately 15% were roads and bridges, and approximately 15% agency planning. The remaining consultations dealt with timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues.

The status of spikedace is declining rangewide. 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). Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending; however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994).

Loach Minnow

Loach minnow was listed as a threatened species on October 28, 1986, (USFWS 1986c). Critical habitat was designated for loach minnow on April 25, 2000, (USFWS 2000) but was subsequently vacated by court order on August 31, 2004.

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Historical range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al.* 1990). Habitat destruction plus competition and predation by nonnative species have reduced the range of the species by

about 85 percent (Miller 1961, Williams *et al*. 1985, Marsh *et al*. 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White rivers and Aravaipa, Turkey, Deer, Eagle, Campbell Blue, Dry Blue, Pace, Frieborn, Negrito, Whitewater and Coyote creeks in Arizona and New Mexico (Barber and Minckley 1966, Silvey and Thompson 1978, Propst *et al*. 1985, Propst *et al*. 1988, Marsh *et al*. 1990, Bagley *et al*. 1995, USBLM 1995, Bagley *et al*. 1996).

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al*. 1988, Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feeds exclusively on aquatic insects (Schreiber 1978, Abarca 1987). Loach minnow live two to three years with reproduction occurring primarily in the second summer of life (Minckley 1973, Sublette *et al*. 1990). Spawning occurs March through May (Britt 1982, Propst *et al*. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). 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. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al*. 1988, Vives and Minckley 1990).

Suitable habitat for loach minnow includes permanent, flowing, unpolluted water; living areas for loach minnow adults, juveniles, and larvae with appropriate flow regimes and substrates; spawning areas; low amounts of fine sediment and substrate embeddedness; riffle, run, and backwater components; low to moderate stream gradients; appropriate water temperatures; periodic natural flooding; an unregulated hydrograph, or, if flows are modified, a hydrograph that demonstrates an ability to support a native fish community; and habitat devoid of nonnative aquatic species detrimental to loach minnow, or habitat where such nonnative species are at levels which allow persistence of loach minnow. These are generalized descriptions and ranges of selected habitat factors that are critical for the conservation of loach minnow. The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of these factors must include consideration of the season of concern and the characteristics of the specific location. These factors are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, these factors need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Recent biochemical genetic work on loach minnow indicates that there are substantial differences in genetic makeup between remnant loach minnow populations (Tibbets 1993). Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Based upon her work, Tibbets (1992, 1993) recommended that the genetically distinctive units of loach minnow should be managed as separate units to preserve the existing genetic variation.

The status of loach minnow is declining rangewide. As noted in the Final Rule formally designating critical habitat, loach minnow are restricted to 419 miles of streams, and their current range represents only 15 to 20 percent of their historical range. 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 Tularosa rivers in New Mexico (USFWS 2000). Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending; however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994).

Gila Topminnow

Gila topminnow (*Poeciliopsis occidentalis occidentalis*) belong to a group of live-bearing fishes within the family Poeciliidae. Males are smaller than females, rarely greater than one inch, while females are larger, reaching two inches. Body coloration is tan to olivaceous, darker above, lighter below, often white on the belly. Breeding males are usually blackened, with some golden coloration of the midline, and with orange or yellow at the base of the dorsal fin.

Fertilization is internal, and females store sperm packets that may fertilize subsequent broods. The brood development time is 24 to 28 days. Two to three broods in different stages develop simultaneously in a process known as superfetation. Gila topminnow are live-bearers that give birth to one to 31 young per brood (Schoenherr 1974), with larger females producing more offspring (Minckley 1973). Gila topminnow mature a few weeks to many months after birth, depending on when they are born. They breed primarily from March to August, but some pregnant females occur throughout the year (Schoenherr 1974). Some young are produced in the winter months.

Gila topminnow and many other poeciliids can tolerate a variety of physical and chemical conditions. They are good colonizers in part because of this tolerance and in part because a single gravid female can start a population (Meffe and Snelson 1989). Minckley (1969, 1973) described their habitat as edges of shallow aquatic habitats, especially where abundant aquatic vegetation exists. Simms and Simms (1992) found the densities of Gila topminnow in Cienega Creek, Pima County, Arizona, to be greater in pool, glide, and backwater habitats and less dense in marsh, riffle, chute, cascade, and fall habitats. They occurred more frequently over sand substrates than over other categories of substrates. Although Gila topminnow may occupy pools and ponds that are up to six feet deep, they are normally found in the upper one-third of the water column (Forrest 1992). Minckley (1973) and Constantz (1980) reported that Gila topminnow are opportunistic feeders which eat bottom debris, vegetation, amphipods, and insect larvae when available.

Gila topminnow are known to occur in streams fluctuating from 51-99^{o} F, with a pH ranging from 6.6 to 8.9, and dissolved oxygen levels between 2.2-11 parts per million. They can tolerate salinities approaching those of sea-water (Meffe *et al*. 1983). Topminnow can burrow under mud or aquatic vegetation when water levels decline (Deacon and Minckley 1974, Meffe *et al*. 1983). Sonoran topminnow (including both Gila and Yaqui (*P. o. sonoriensis*) subspecies) regularly inhabit springheads with high loads of dissolved carbonates and low pH (Minckley *et al*. 1977, Meffe 1983, Meffe and Snelson 1989). This factor has helped protect small

populations of topminnow from mosquitofish (*Gambusia affinis*) that are usually rare or absent under these conditions (Meffe 1983).

The FWS listed the Gila topminnow as endangered in 1967 without critical habitat (USFWS 1967). The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, is collectively known as the Sonoran topminnow. Both subspecies are protected under the Act. The entity listed under the Act includes only Gila topminnow populations in the United States, and not those in Mexico.

The reasons for the decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonnative fishes (Miller 1961, Minckley 1985). In addition, Gila topminnow are highly vulnerable to adverse effects from nonnative aquatic species (Johnson and Hubbs 1989). Predation and competition from nonnative fishes have been major factors 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 in general, was naturally depauperate and contained few fish that were predatory on or competitive with Gila topminnow (Carlson and Muth 1989). In the riverine backwater and side-channel habitats that formed the bulk of Gila topminnow natural habitat, predation and competition from other fishes was essentially absent. Thus Gila topminnow did not evolve mechanisms for protection against predation or competition and is predator- and competitor-naive. With the introduction of large numbers of predatory and competitive nonnative 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) nonnative fish cause problems for Gila topminnow as can nonnative crayfish (Fernandez and Rosen 1996) and bullfrogs.

Historically, the Gila topminnow was abundant in the Gila River drainage and was one of the most common fishes of the Colorado River Basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). This distribution has been reduced to only 15 naturally occurring populations. Presently, only 12 of the 15 recent natural Gila topminnow populations are considered extant (see Table 1) (Weedman and Young 1997). Only three (Cienega Creek, Monkey Spring, Cottonwood Spring) have no nonnative fish present and therefore can be considered secure from nonnative fish threats. Table 1 provides additional information on natural Gila topminnow populations.

There have been at least 175 wild sites stocked with Gila topminnow; however, topminnow persist at only 18 of these localities. Of the 18, one site is outside topminnow historical range and four now contain nonnative fish (Weedman and Young 1997). Further, only five of these stocked populations would count toward recovery under the draft revised Gila topminnow recovery plan (Abarca *et al*. 1994). The Sonoran Topminnow Recovery Plan (USFWS 1984) established criteria for down- and de-listing. Criteria for down-listing were met for a short period. However, due to concerns regarding the status of several populations, down-listing was

delayed. Subsequently, the number of reintroduced populations dropped below that required for down-listing, where it has remained.

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 not more than 30 localities (12 natural and 18 stocked). Many of these localities are small and highly threatened. The theory of island biogeography can be applied to these isolated habitat remnants, as they function similarly (Meffe 1983, Laurenson and Hocutt 1985). Species on islands are more prone to extinctions than continental areas that are similar in size (MacArthur and Wilson 1967). Meffe (1983) considered extinction of Gila topminnow populations almost as critical as recognized species extinctions and Moyle and Williams (1990) noted that fish in California that are in trouble tend to be endemic, restricted to a small area, part of fish communities with fewer than five species, and found in isolated springs or streams. Gila topminnow has most of these characteristics.

The highest priority actions in the draft revised Gila topminnow recovery plan are ones that are absolutely essential to prevent extinction in the foreseeable future (Abarca *et al*. 1994). Federal actions requiring section 7 consultations affecting Redrock Canyon, Cienega Creek, and Sonoita Creek in the Santa Cruz River subbasin and others in the Gila River Basin have contributed to the lowered baseline for the Gila topminnow. An indication of the poor status of the species of the Gila topminnow is that two formal consultations have resulted in jeopardy biological opinions. Although the reasonable and prudent alternatives removed jeopardy, other adverse effects are not removed by the reasonable and prudent alternatives. Other Federal actions, as well as non-Federal actions that have not undergone section 7 consultation, also have unmitigated adverse effects that contribute to the degraded baseline. On going recobery efforts have had limited success.

Desert Pupfish

In Arizona, the genus Cyprinodon is comprised of three 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). The FWS listed desert pupfish and Quitobaquito pupfish as endangered species with critical habitat on April 30, 1986 (USFWS 1986a). Critical habitat for the Quitobaquito pupfish was designated in Arizona at Quitobaquito Springs, Organ Pipe Cactus National Monument, Pima County. The Mexican government has also listed the species as endangered (SEDUE 1991).

A small fish, the desert pupfish is less than three inches long (Minckley 1973). The body is thickened, chubby or strongly laterally compressed in males; coloration is a silvery background with narrow dark vertical bars on the sides. Males are larger than females and become bright blue during the breeding season. The life span of an individual is one to three years (Minckley 1973). The desert pupfish feeds on invertebrates, algae, and organic debris (Minckley 1973, Naiman 1979).

Spawning occurs from spring through autumn, but reproduction may occur year-round depending on conditions (Constanz 1981). Females lay eggs loose over soft substrates. Under limited breeding habitat and high population densities, males are highly territorial and patrol and

defend territories (Barlow 1961). Females lay only one egg at a time but one female produces 50-800 eggs per season (Constantz 1981).

The desert pupfish appears to go through cycles of expansion and contraction in response to natural climatological variation (USFWS 1986a, 1993; Weedman and Young 1997). In very wet years, populations can rapidly expand into new habitats (Hendrickson and Varela-Romero 1989). In historical times, this scenario would have led to panmixia among populations over a very large geographic area (USFWS 1993).

Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Agua Fria rivers, although collections are lacking for the latter three drainages. The desert pupfish is also found in the lower Colorado River, 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 1973, 1980; Black 1980; Turner 1983; Hendrickson and Varela 1989; Echelle *et al*. 2000). Historical collections occurred in Baja California and Sonora, Mexico, and in the United States in California and Arizona.

Since the 19th century, desert pupfish habitat has been steadily destroyed by streambank erosion, the construction of water impoundments that dewatered downstream habitat, excessive groundwater pumping, the application of pesticides to nearby agricultural areas, and the introduction of nonnative fish species (Matsui 1981, Hendrickson and Minckley 1985, Minckley 1985, Schoenherr 1988). The nonnative bullfrog may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet that includes fish (Frost 1935, Cohen and Howard 1958, Brooks 1964, McCoy 1967, Clarkson and deVos 1986). There is also a concern that introduced salt cedar (*Tamarisk* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990; R. Bransfield, U.S. Fish and Wildlife Service, pers. comm., 1999). Evapotranspiration by luxuriant growths of this plant may especially impact smaller habitats where water supply is limited. The remaining populations continue to face these threats.

Naturally occurring populations of desert pupfish are now restricted in the United States to California in two streams tributary to, and in shoreline pools and irrigation drains of, the Salton Sea (Lau and Boehm 1991). The species is found in Mexico at scattered localities along the Colorado River Delta and in the Laguna Salada Basin (Hendrickson and Varela-Romero 1989, Minckley 2000). About 20 transplanted populations exist in the wild (USFWS 1993). The range-wide status of desert pupfish is poor but stable. The future of the species depends heavily upon future developments in water management of the Salton Sea and Santa Clara Cienega in Mexico. Additional life history information can be found in the recovery plan (USFWS 1993) and other references cited there.

PROPOSED SPECIES AND CRITICAL HABITAT

Gila Chub

The FWS proposed listing Gila chub as endangered with critical habitat on August 9, 2002 (USFWS 2002). Historically, Gila chub have been recorded from rivers, streams, and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona, and northern Sonora, Mexico (Miller and Lowe 1967, Rinne and Minckley 1970, Minckley 1973, Rinne 1976, DeMarais 1986, and Propst 1999, Weedman *et al.* 1996). Today the Gila chub is restricted to small, isolated populations scattered throughout its historical range.

Decline of Gila chub is due to habitat loss, invasion of nonnative fish species; and past and current dewatering of rivers, springs, and cienegas, diversion of water channels, impoundments, regulation of flow, and land management practices. All of these activities have promoted erosion and arroyo formation and the introduction of predacious and competing nonnative fish species (Miller 1961, Minckley 1985). Life history information can be found in the status review (Weedman *et al.* 1996), the proposed rule (USFWS 2002), and references cited there.

The Gila chub is a member of the minnow family Cyprinidae. The Gila chub is small-finned, deep-bodied, chubby (chunky), and darkly colored (sometimes lighter on belly; diffuse lateral band(s) are rarely present). Adult males average about six inches in total length; females can exceed eight inches. They commonly inhabit pools in smaller streams, springs, and cienegas, and can survive in small artificial impoundments (Miller 1946, Minckley 1973, Rinne 1975). Gila chub are highly secretive, preferring quiet, deeper waters, especially pools, or remaining near cover like terrestrial vegetation, boulders, and fallen logs (Rinne and Minckley 1991).

Undercut banks created by overhanging terrestrial vegetation with dense roots growing into pool edges provide ideal cover (Nelson 1993). Gila chub can survive in larger stream habitat such as the San Carlos River, and artificial habitats, like the Buckeye Canal (Stout *et al.* 1970, Rinne 1976). The Gila chub interacts with spring and small stream fishes regularly (Meffe 1985), but are usually restricted to deeper waters (Minckley 1973). Adults often are found in deep pools and eddies below areas with swift current, as in the Gila chub habitats found in Bass Canyon and Hot Springs in the Muleshoe CMA. Young-of-the-year inhabit shallow water among plants or eddies, while older juveniles use higher velocity stream areas (Minckley 1973, Minckley and Deacon 1991). The biological needs of the Gila chub include but are not limited to, the following: space for individual and population growth, and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species.

In New Mexico, Gila chub occur only in Turkey Creek where they were last documented in the summer of 2001. In Arizona, small remnant populations remain in several tributaries of the upper Verde River, San Pedro River, San Carlos River, Blue River, San Francisco River, Agua Fria River, and the Gila River. In the Verde River basin, Walker and Spring Creek populations (Yavapai County) are considered stable-threatened populations, and the status of the Williamson Valley Wash population is unknown.

The Santa Cruz River has three tributaries with extant populations of Gila chub: Sabino Canyon (Pima County) and Sheehy Spring (Santa Cruz county), which have unstable-threatened populations; and Cienega Creek (Pima and Santa Cruz counties), which has the only known stable-secure population of Gila chub in existence. The San Pedro River basin has three extant, stable-threatened populations in Redfield Canyon (Graham and Pima counties), O'Donnell Creek (Santa Cruz County), and Bass Canyon (Graham and Cochise counties). The status of the Gila chub in the Babocomari River (Santa Cruz and Cochise counties) is unknown. The San Carlos River and the Blue River (Gila and Graham counties) on the San Carlos Apache Indian Reservation are tributary to the Gila River. They are believed to have extant populations of Gila chub but information is not available to us on the status of Gila chub in those drainages.

Two extant populations occur in Harden Cienega Creek and Dix Creek, both tributaries of the San Francisco River (Greenlee County). The status of these two populations is unknown, but both are thought to be small. Six populations occur in tributaries to the Agua Fria River (Yavapai County). These include two stable-threatened populations in Silver and Sycamore creeks; two unstable-threatened populations in Little Sycamore Creek and Indian Creek; and two populations with unknown status in Larry Creek and Lousy Canyon. Two tributaries of the Gila River in Arizona have extant populations of Gila chub. Eagle Creek (Graham and Greenlee counties), has an unstable-threatened population and Bonita Creek (Graham County), has a stable-threatened population.

The current known distribution of Gila chub in Mexico has been reduced to two small spring areas at Cienega los Fresnos and Cienega la Cienegita, adjacent to the Arroyo los Fresnos (tributary to the San Pedro River), within one mile of the Arizona-Mexico border (Varela-Romero *et al.* 1992). No Gila chub remain in the Mexican portion of the Santa Cruz River (Weedman *et al.* 1996).

Reestablishment of Gila chub has been attempted in three Arizona sites. Two of these sites at Lousy Canyon and Larry Creek are believed to be extant. Both were stocked with 200 Gila chub from Silver Creek in July 1995. Both sites will require monitoring to document success of the stockings. The third site, Gardner Canyon (Cochise County), was stocked from Turkey Creek (Santa Cruz County) with 150 Gila chub in July 1988. In May 1995, no Gila chub or any other fish were captured during surveys.

Baird and Girard (1854) published a description of the Gila chub, as *Gila gibbosa*, based on the type specimen collected in 1851 from the Santa Cruz River. For nomenclature reasons, the name was changed by Girard to *Tigoma intermedia* in 1856, working with specimens from the San Pedro River. Despite that and other name changes, the Gila chub has been recognized as a distinct species since the 1850's, with the exception of a short period in the mid-1900's when it was placed as a subspecies of *Gila robusta* (Miller 1946). For the past 30 years, *Gila intermedia* has been recognized as a full monotypic species, separate from the polytypic species *Gila robusta*, both currently accepted as valid (Robbins *et al.* 1991, Mayden *et al.* 1992). Problematic populations nonetheless exist, variously assigned to one or the other taxa and leading to continued confusion. Minckley and DeMarais (2000) describe a new subspecies within the Gila River Basin, *Gila nigra*. It is of hybrid origin derived from *Gila robusta* and *Gila intermedia*.

Its range is similar to that of *Gila intermedia* and is another headwater type chub, whereas, *Gila robusta* is found in the mainstem of the major rivers within the Gila River Basin.

Proposed critical habitat for Gila chub includes approximately 207.8 miles of stream reaches in Arizona and New Mexico, organized into seven river units. The stream segments within each of these units are defined longitudinally by upstream and downstream limits (USFWS 2002) and laterally by the area of bankfull width of the particular stream, plus 300 feet on either side of the stream's edge at bankfull (see Rosgen 1996 for a discussion of bankfull). Briefly, the seven units are: 1) the Upper Gila River Unit, including Turkey Creek in Grant County New Mexico and Dix, Harden Cienega, Eagle, and East Eagle creeks in Graham and Greenlee counties, Arizona; 2) the Middle Gila River Area including Mineral Creek, Blue River and Bonita Creek in Gila and Maricopa counties, Arizona; 3) the Babocomari River Area including O'Donnell Canyon, and Turkey Creek/Post Canyon Creek in Cochise County, Arizona; 4) the Lower San Pedro River Area including Bass, Hot Springs, and Redfield canyons in Cochise, Graham, and Pima counties, Arizona; 5) the Lower Santa Cruz River Area including Cienega Creek, Mattie Canyon, Empire Gulch, and Sabino Canyon in Pima County, Arizona; 6) the Upper Verde River Area including Walker Creek, Red Tank Draw, Spring Creek, and Williamson Valley Wash in Yavapai County, Arizona; and 7) the Agua Fria River Area including Little Sycamore, Sycamore, Indian, Silver, and Larry creeks and Lousy Canyon in Yavapai County, Arizona.

Primary constituent elements are the biological needs of the species upon which a critical habitat designation is based. For Gila chub, constituent elements can be summarized as: 1) perennial pools, eddies, and higher velocity areas in headwaters, springs, and cienegas of smaller tributaries; 2) suitable water quality for spawning, including temperatures ranging from 68 to 79.7° F; 3) suitable water quality, including low levels of contaminants and sedimentation, for all other aspects of Gila chub life history; 4) adequate food base; 5) sufficient cover for sheltering; 6) a low enough level of nonnative species such that Gila chub are able to survive and reproduce; and 7) streams that maintain a natural flow pattern sufficient to support Gila chub.

The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel morphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure. These considerations are needed to ensure the conservation of the species.

Threats to Gila chub include predation by, and competition with, nonnative organisms, including fish in the family Centrarchidae (Micropterus *spp*., Lepomis *spp*.), other fish species, bullfrogs (*Rana catesbeiana*), and crayfish (*Orconectes virilis*); disease; and habitat alteration, destruction, and fragmentation resulting from water diversions, dredging, recreation, roads, livestock grazing, changes in the natural flow pattern, mining, degraded water quality (including contaminants from mining activities and excessive sedimentation), and groundwater pumping (USFWS 2002). The impacts of nonnative species has been well documented (Hubbs 1955, Miller 1961, Minckley and Deacon 1968, Meffe 1985, Moyle *et al.* 1986, Williams and Sada 1985, Minckley and

Deacon 1991, Ruppert *et al.* 1993). Dudley and Matter (2000) correlated green sunfish presence with Gila chub decline and found that even small green sunfish readily consume young-of-year Gila chub. Unmack *et al.* (2003) found that green sunfish presence was correlated with the absence of young-of-year Gila chub. Riparian and aquatic communities across the southwest have been degraded or destroyed by human activities (Hastings 1959, Hastings and Turner 1965, Hendrickson and Minckley 1984). Humans have affected southwestern riparian systems over a period of several hundred years. Eighty-five to ninety percent of the Gila chub's habitat has been degraded or destroyed, and much of it is unrecoverable. Only 29 extant populations of Gila chub remain; all but one is small, isolated, and threatened. The current status of the Gila chub is poor and declining.

We have completed five conferences on Gila chub in Arizona, four formal, three of which anticipated take, and one informal. One formal and one informal conference have been completed on the species in New Mexico. These are summarized in Table 2, Appendix B. This conference opinion does not rely on the regulatory definition of "destruction of adverse modification" of critical habitat at 50 CFR 402.02. instead, we have relied upon the statutory provisions of the Act to complete the analysis with respect to critical habitat.

For additional information about the Gila chub see Desert Fishes Team (2003), Minckley and DeMarais (2000), Propst (1999), Weedman *et al.* (1996), Rinne and Minckley (1991), DeMarais (1986), and Minckley (1985, 1973).

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.

Grazing historically occurred within the project vicinity; however, TNC has not grazed the Muleshoe Allotment since they acquired it in 1982. BLM and TNC suspended grazing on the Soza Wash Allotment, and do not expect it to resume. BLM temporarily suspended grazing on the Soza Mesa Allotment as well, but expects it to resume once drought conditions have discontinued. Grazing in the past has been at 44 head of cattle year-long, and is expected to continue at this level.

Other uses occurring on the Muleshoe CMA include recreation and prescribed fire. Recreationists use the Muleshoe CMA year-round for hunting, hiking, horseback riding, birding, wildlife observation, and primitive camping. Some activities are concentrated around the TNC headquarters, due to developed campsites, casitas, and nature and hiking trails. Other activities are dispersed. Riparian areas around Hot Springs Canyon have been closed to off-highway vehicle use, but motorized vehicles are allowed on existing roads within the Muleshoe CMA.

Prescribed fire includes burning within riparian zones only if fuel loads indicate a possibility of loss due to catastrophic fire. Any fires (natural or prescribed) that burn out of prescription would be immediately suppressed.

A. STATUS OF THE SPECIES AND PROPOSED CRITICAL HABITAT WITHIN THE ACTION AREA

There are currently no spikedace, loach minnow, Gila topminnow, or desert pupfish within the action area. Field evaluations by members of the MNFPT, which includes individuals familiar with the needs of these species, as well as field work by the Refuge Manager, indicate that suitable habitat for these species is present. Specifically, both Redfield Canyon and Hot Springs Canyon provide perennially flowing streams with riffle, run, and pool complexes. The structure of the riffle and run areas appears consistent with that currently occupied by spikedace and loach minnow in other stream systems. The presence of longfin and speckled dace in Redfield Canyon and Hot Springs lends further support to their suitability for spikedace and loach minnow, as these species are commonly found together in other streams. In addition, stream habitat within the proposed action area would be suitable for Gila topminnow. The MNFPT visited springs and/or ponds during site assessments, and concluded that they would provide suitable habitat for Gila topminnow and desert pupfish.

Gila Chub

Within the proposed action area, Redfield and Bass canyons house two of the three extant, stable-threatened populations of Gila chub in the San Pedro Basin. Additionally, proposed critical habitat within the proposed action area includes Bass, Hot Springs, and Redfield canyons. These three canyons are located, at least in part, within the proposed action area. Maintaining the integrity of this critical habitat segment is essential to the conservation role of the San Pedro complex of Gila chub. Johnson (1983) found Gila chub in Bass and Redfield canyons. Jakle (1987) found Gila chub in Bass Canyon in riffle and pool habitats. Matter and Hill (1988) found Gila chub in approximately 3.7 miles of Bass Canyon, where they made up approximately one to two percent of the fish in pools and riffles. Matter and Hill (1988) note that Gila chub constituted 7 – 27% of the fish in pools and 1 – 19% of the fish in riffles in Redfield Canyon. Gori (1993) noted that Gila chub were the secondmost common species found in Bass Creek, and found that Gila chub were extremely rare in Hot Springs Canyon, with just two juvenile individuals captured. Gori suggests that suitable pool habitat is present for this species in Hot Springs Canyon. Gori notes that Gila chub were the most abundant species in Redfield Canyon, and were caught at all monitoring stations. Additional field notes on file at this office indicate that Gila chub was the fourth most commonly captured species, representing approximately two percent of all fish captured. For Bass Canyon, Gila chub were captured annually between 1991 and 1996.

B. FACTORS AFFECTING SPECIES ENVIRONMENT AND CRITICAL HABITAT WITHIN THE ACTION AREA

Spikedace, loach minnow, Gila topminnow, and desert pupfish do not currently occur in the proposed action area; therefore, there are no Federal, State, Tribal, local, or private actions

already affecting these species in the project area. However, some uses will occur contemporaneously with the project, and these are summarized below. Gila chub are present in the proposed action area in Bass and Redfield Canyons. We would anticipate that on-going or contemporaneous actions may affect this species as well.

As noted previously, grazing occurred in this area in the past, but has been suspended on the Muleshoe and Soza Wash allotments. It should be noted that grazing at current use levels hs resulted in the development and/or retention of suitable habitat for those species to be stocked. Recreation by private individuals on either the Federal or private lands within the proposed action area includes picnicking, hiking, camping, off-highway vehicle use, hunting, and birdwatching. These uses have occurred in the past, and are on-going. Impacts have been minor. Concentrated recreation activities along project sites, such as wading, splashing, and walking up and down wetted portions of occupied creeks could have injured fish if contact is made, or could have displaced or stressed fishes such as Gila chub. However, these impacts are believed to have been minor.

Motorized vehicle use through the wetted sections of the project area have the potential to disrupt normal behavior of and injure fish and macroinvertebrates, increase turbidity, and destroy eggs and fish. Mechanical action of vehicles can cause damage to existing vegetation and prevent the establishment or re-establishment of vegetation, which affects habitat quality for the fish.

Small quantities of motor fluids (fuel, engine oil, brake system fluid, transmission fluid, or antifreeze) may leak from motorized vehicles crossing the stream, which may enter project areas and degrade the water quality and negatively impact Gila chub. Wear and damage to vehicles has been a common problem, but the level of contamination of surface water has likely been minor as the majority of parking occurs away from surface water.

Prescribed burning occurs in the proposed action area. Burning in riparian areas has been used only when necessary and during higher soil and vegetative moisture conditions to minimize soil heating and organic matter loss, and to aid vegetative recovery. Buffer zones have been and will continue to be delineated and maintained to stabilize soils and decrease stream sedimentation during prescribed burns. The impacts of prescribed burns have been evaluated by the BLM in their EA-AZ-060-98-004. In addition, consultation 2-21-02-F-0210 on the BLM's Statewide Programmatic Land Use Plan Amendment for Fire, Fuels, and Air Management add further protection for these species.

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, which 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. Factors affecting the species are noted above. Because these

activities occurred in the past, are on-going, and will continue to occur in the future, the effects of the action are similar to the factors affecting the species environment.

We anticipate that the overall effect of the proposed action, if successful, would be beneficial to the survival and recovery of spikedace, loach minnow, Gila topminnow, desert pupfish, and Gila chub and its critical habitat. As noted above, spikedace currently occupy only 10 to 15 percent of their historical range, with only three populations remaining in Arizona, two of which are tenuous. Loach minnow currently occupy only 15 to 20 percent of their historical range. Similarly, there are only 12 extant populations of Gila topminnow, and two naturally occurring populations of desert pupfish in the United States, along with approximately 20 transplanted populations. For Gila chub, only small remnant populations remain in several tributaries of the upper Verde River, San Pedro River, San Carlos River, Blue River, San Francisco River, Agua Fria River, and the Gila Rivers. Establishment of new populations for each of these species would assist in recovery, and provide an added measure of security of their various genetic lineages, as identified in recovery plans and other documents guiding their recovery (USFWS 1991a, 1991b, 1993, 1995, Weedman 1999). We anticipate no effects to proposed critical habitat, as the action only involves the stocking of fish, and no habitat alteration or renovation.

All of the species to be stocked in the proposed action area have the ability to disperse. Their ability to move into and persist in an area is limited by flow and suitable habitat characteristics. While it is possible that individuals could be washed to downstream areas during high flow events, we believe that existing literature indicates this is unlikely. For example, Minckley and Meffe (1987) determined that, while nonnatives are unable to resist flooding events and so are washed downstream, native fishes show little if any response to flooding events. In comparing discharge patterns of Arizona streams versus streams in Florida and Georgia, they concluded that, in Arizona, native fishes resist floods by maintaining position in or adjacent to channel habitats, persisting in microrefugia, or rapidly recolonizing if displaced. By comparison, nonnative fishes were displaced or destroyed. Similarly, routine sampling at the confluence of Bonita Creek and the Gila River does not yield any Gila chub, Sonora sucker, desert sucker, or speckled dace, even though these fish occur in Bonita Creek, periodic flooding occurs, and there are connected flows between the two systems. We believe fish would not persist in downstream areas because habitat conditions there are unsuitable (H. Blasius, BLM, pers. comm. 2004).

Habitat downstream of the proposed action area is unsuitable, either because there is no water or because of the type of habitat present. Limited documentation exists for establishing the extent of perennial flows in the proposed action area. The downstream extent of perennial streams will also vary from year to year depending on climatic conditions. Perennial flows in Redfield Canyon begin in the vicinity of Sycamore Canyon. They end on ASLD lands at approximately Township 11 South, Range 20 East, section 31 or Township 11 South, Range 19 East, section 36 (Gori 1993, Clarkson 2004). Redfield Canyon, on private lands below this point, is described as “perennially intermittent”, meaning perennial pools, but no connecting flow (H. Blasius, BLM, pers. comm. 2004).

For Hot Springs, perennial flows begin at its confluence with Bass Canyon, continuing downstream to approximately the BLM/ASLD boundary at Township 13 South, Range 20 East, section 6 (unpubl. data, BLM, USFS 1994). A second source determined the end point of flows to be located 0.25 mile downstream of the Preserve Boundary, which is 4.35 miles above its

confluence with the San Pedro River (Matter 1988). Stefferud (2000) noted that flows ended at Township 13 South, Range 20 East, section 6, with the first fish (longfin dace and a sucker species) beginning an additional 0.25 miles upstream. These areas are on ASLD lands.

Because flows do not regularly continue onto private lands downstream of the Muleshoe CMA, and because habitat at the lower portions is generally not suitable for the species to be stocked, we believe fish will not migrate to or persist in these areas. We therefore anticipate effects of the action to be tied to existing land management practices by agencies participating in the Muleshoe CMA.

Capture and Relocation

It should be noted that take of any of the stocked species due to mortality or injury that occurs through capture, handling, and transport stress is covered by the State of Arizona's permit, and will not be addressed in this consultation. Regardless, all fish will be handled using the best practices devised for hauling native warmwater fishes, including the addition of salt and the additive Stresscoat®[1], a water conditioner, as a precautionary measure. This treatment helps to prevent the loss of electrolytes and to protect and heal any damaged tissue against disease-causing organisms. Fish will be transported to stocking sites and acclimated to water conditions at the stocking sites prior to being released. These measures will help to ensure that injury and mortality are kept to a minimum. Wildlife personnel from the various agencies with stocking expertise will be on hand at all phases of the stocking effort.

Livestock Grazing

As noted above, the proposed action area includes the Muleshoe, Soza Mesa, and Soza Wash allotments. As noted under the Description of the Proposed Action, the BLM, TNC, and USFS placed the Muleshoe Allotment in suspension beginning in 1988. The Soza Mesa Allotment is located west of the Muleshoe Allotment, while the Soza Wash Allotment is located at the western edge of the Redfield Canyon Wilderness, near the confluence of Redfield and Swamp Spring canyons. No grazing takes place on the Soza Wash Allotment at this time, and BLM anticipates that grazing will be cancelled following the completion of the land transfer for this area to BLM. Grazing on the Soza Mesa Allotment is for 44 cattle, year-long. It has not been grazed since 2003 due to drought, but grazing is expected to begin when drought conditions desist.

Livestock grazing may cause long-term changes to the watershed and its functions, and the relationship between livestock grazing in a watershed and effects to river systems is widely recognized and documented (Leopold 1946, Blackburn 1984, Skovlin 1984, Chaney *et al*. 1990, Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994, Myers and Swanson 1995). Livestock grazing may:

- alter the vegetative composition of the watershed (Savory 1988, Vallentine 1990, Popolizio *et al.* 1994);

[1] Use of trade names does not imply endorsement by the FWS.

- cause soil compaction and erosion, alter soil chemistry, and cause loss of cryptobiotic soil crusts (Harper and Marble 1988, Marrs *et al*. 1989, Orodho *et al.* 1990, Bahre 1991);

- contribute to changes in infiltration and runoff patterns, thus increasing the volume of flood flows while decreasing their duration and decreasing the volume of low flows while increasing their duration (Brown *et al*. 1974, Gifford and Hawkins 1978, Johnson 1992)

- cause shearing or sloughing of streambank soils, elimination of streambank vegetation and erosion of streambanks (Marlow and Pogacnik 1985, Platts 1990); alter channel morphology and altered sediment transport processes (Platts 1990);

- modify pools, riffles, runs, and the distribution of backwater areas, a reduction in cover for fishes, elevated water temperatures, changes in nutrient levels, and increased sedimentation (Platts 1990, Belsky *et al*. 1999);

- change riparian plant species composition (Platts 1990, Fleischner 1994);

- cause excessive amounts of sediment, if generated through degraded conditions or removal of protective vegetation and, as Leopold (1997) notes, "...the channel is adjusted in width, depth, and slope to handle the sediment that is received from the upstream river system;"

However, grazing at proper, established utilization levels reduces or eliminates these factors and is consistent with the needs of riverine fishes. We believe that will be the case for this project, as grazing will not occur on the Muleshoe Allotment, and is not likely to occur on the Soza Wash Allotment. Grazing on the Soza Mesa Allotment, once resumed following the drought, would include only 44 head of cattle. These cattle would be dispersed over 5,620 acres. In addition, because Hot Springs is confined to a canyon in the vicinity of this allotment, we would anticipate that cattle are not likely to access those areas supporting stocked fishes. It should be noted that grazing at current use levels has resulted in the development and/or retention of suitable habitat for those species to be stocked, and this is expected to continue into the future.

The BLM has committed to monitoring grazing activities and to taking corrective actions if the aquatic habitat within the proposed action area is adversely impacted by on-going grazing actions. Additionally, they have developed conservation measures that will:

- allow no increased grazing pressure at proposed project sites;

- require monitoring of utilization limits for upland vegetation, riparian vegetation, and streambank alteration to ensure that livestock are moved prior to exceeding utilization limits;

- allow placement of salt only greater than 0.25 mile from water, riparian areas, stream channels, or areas of high erosion potential; and

- require evaluation, monitoring, and modification, as needed, of any activities that may result in take of these species or destruction of their habitat.

Recreation

Hunters, hikers, horseback riders, birders, wildlife observers, and campers use the Muleshoe CMA throughout the year. Recreational activity will likely continue to be dispersed, although hiking, birding, and wildlife viewing are often concentrated near TNC headquarters due to developed sites there that include a campground, casitas, a visitor's center, and nature and hiking trails. It is possible that some of these activities, such as wading, splashing, and walking up and down the creek could injure fish if contact is made, or displace and stress fishes which are sensitive to frequent disturbance. It is possible that streambanks and spawning areas may be damaged by excessive use from hikers and sightseers. However, the activity levels from these types of activities in the area at this time is so light that trampling damage is largely undetectable. No changes in use are anticipated. This is likely due in part to the remoteness and rugged terrain of the area.

Recreation-Motorized Travel

Motorized vehicles driving through wetted portions of the project area have the potential to disrupt normal behavior of and injure or kill fish and macroinvertebrates, increase turbidity, and destroy fish eggs and larvae. In addition, mechanical action of vehicles can cause damage to existing vegetation and prevent the establishment of vegetation, which affects habitat quality. In addition, small quantities of motor fluids (such as fuel, engine oil, brake system or transmission fluid, or antifreeze) may leak from motorized vehicles crossing wetted sections, which may enter project areas and degrade the water quality and negatively impact the desert pupfish.

The riparian area of Hot Springs Canyon (140 acres) has been closed to off-highway vehicle use. Motorized vehicles are allowed on existing roads and trails within the Muleshoe CMA, but the amount of use is limited due to rugged terrain and the general remoteness of the area. BLM anticipates the level of contamination of surface water to be minor as parking generally occurs away from the surface water and is favored where parking space is more abundant. Because of these factors, and the generally light use in the area, we do not anticipate that recreational motorized travel will result in significant adverse effects to the species or Gila chub critical habitat.

Prescribed Fires

BLM will take precautions to minimize the potential effects of prescribed burning on stream habitat for fish species as part of their fire program. For example, BLM will delineate and maintain buffer zones along riparian areas to decrease stream sedimentation during prescribed burns, and burning within riparian areas would only be prescribed if fuel loads indicate a possibility of loss due to catastrophic fire. Any fires that burn out of prescription would be immediately suppressed. Additionally, the BLM will carefully administer fire and will not allow it to run parallel to watercourses.

In the Southwest, the fire season begins around March and ends in June. The summer monsoon season follows fire season from July to August. Prescribed burns may result in short-term influxes of sediments, should heavy rains fall immediately after burning. To minimize the potential for influxes of sediment or ash, all efforts will be taken to burn before the start of monsoonal rains. Long-term effects of prescribed burns should improve watershed function by producing more ground cover to protect the soils and facilitate groundwater infiltration. In addition, BLM has included as a conservation measure monitoring for fish kills immediately following the first runoff event following prescribed fires in the watershed. A report with monitoring results and observations will be submitted to the FWS annually.

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.

Nonnative Species

There is the potential for nonnative species to be reintroduced within the proposed project site at any time. Individuals of the public occasionally make illegal introductions of nonnative fishes, crayfish, and frogs. The spread of nonnative fish by the public has been a major factor in the current widespread distribution of these species (Moyle 1976a, 1976b). The public may transport fish to use for bait and sporting purposes (Moyle 1976a, 1976b) or mosquito control (Meffe *et al*. 1983), or to dispose of pets (Deacon *et al*. 1964). There is no way at this time to determine the likelihood of surreptitious releases and little opportunity to prevent them. The action agencies involved in this effort will not be stocking nonnative fish and, therefore, any such introduction would not be part of the proposed action.

State lands in the proposed action area are managed by the ASLD. Both private and State lands are currently used for livestock grazing, and we anticipate that this will continue. Private landowners in this general area also manage a retreat facility and a private cabin for recreationists. General use by the public is generally light, in part due to the rugged terrain and remote location of the area.

CONCLUSION

After reviewing the current status of spikedace, loach minnow, Gila topminnow, and desert pupfish, the environmental baseline for the Muleshoe CMA, the effects of the proposed stocking and translocation of native fish species and the cumulative effects, it is the FWS' biological opinion that the proposed action is not likely to jeopardize the continued existence of the spikedace, loach minnow, Gila topminnow, and desert pupfish. No critical habitat has been designated for spikedace, loach minnow, and Gila topminnow; therefore, none will be affected. Critical habitat for desert pupfish has been designated at Quitobaquito Spring, a pond in Pima County, and along portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash in Imperial County, California; however, this action does not affect those areas and no destruction or adverse modification of that critical habitat is anticipated.

For Gila chub, a species currently proposed for listing, we conclude that the proposed action is not likely to jeopardize its continued existence, or adversely modify its critical habitat.

We present these conclusions for the following reasons:

- The impacts of the proposed action are limited to on-going actions or concerns within the Muleshoe CMA, including grazing, recreation, off-road vehicle use, prescribed fire, and nonnative fish.

- The impacts of these on-going actions appear to be occurring at acceptable levels:
    - BLM and TNC have discontinued grazing in some areas, and continued grazing in other areas at a rate that is already allowing for suitable habitat to re-establish or persist for these species;

    - Recreationists use the area in a dispersed fashion that is currently having no discernible impact on riparian vegetation within the proposed action area;

    - BLM and TNC have excluded off-road vehicle use from 140 acres of riparian areas, and limited use elsewhere to existing roadways;

    - BLM and TNC have been using and will continue to use prescribed fire in such a way as to protect riparian health;

    - BLM and TNC use prescribed fire to improve upland health, which will assist in the maintenance of riparian areas;

    - The remoteness and ruggedness of the terrain in the Muleshoe CMA has limited the amount of visitor use.

- The BLM is and will continue to work cooperatively with other members of the MNFPT to determine if project modifications are required.

- The BLM has committed to several conservation measures, including:

    - taking no action that would result in increased grazing pressure;

    - monitoring grazing activities at all location stocked with listed species;

    - monitoring utilization limits for upland and riparian vegetation, and monitoring streambank alteration to ensure that livestock do not exceed limits;

    - evaluating, monitoring, and modifying as needed any activities that may result in take of listed species or destruction of their habitat in order to reduce potential adverse effects to thee species;and

    - ensuring that negative watershed effects to the species' habitat do not increase.

- The TNC, a landowner in the area, has been an active member of the MNFPT. In addition, the stated goal for the TNC's stated goal for the Muleshoe CMA is "…to protect the riparian habitat and fish populations that 5 perennial streams support."

- The current status of each of spikedace, loach minnow, Gila topminnow, and desert pupfish is poor and declining, as discussed in the status of the species and effects of the action sections. The proposed action will enhance the likelihood of survival and recovery for these species.

- The proposed action is consistent with the recovery plans and guiding documents for spikedace, loach minnow, Gila topminnow, and desert pupfish.

- Additional negative impacts to stocked species could occur in downstream locations; however, existing literature and field experience with these species indicate that immigration to downstream areas is unlikely due to unsuitable habitat and lack of permanent water.

- Appropriate monitoring is part of the proposed action and members of the MNFPT have committed to its completion.

- We anticipate that the proposed action will result in a net gain for the species, even with potential short-term adverse effects.

- Gila chub critical habitat will remain functional to serve the conservation needs of the species.

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

The measures described below are non-discretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the BLM must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The FWS anticipates that some spikedace, loach minnow, Gila topminnow, desert pupfish, and Gila chub may be taken as a result of this proposed action. The incidental take is expected to be in the form of harm and harass. Take in the form of harm could occur from trampling of fish by recreationists, off-road vehicle use, or livestock grazing in channels. Take in the form of harass could also occur from disturbance of fish or their habitat by recreational use of channels, off-road recreational use of channels, or livestock grazing. We anticipate that any take that occurs will be at extremely low levels. The number of cattle present is low (at 44 head), and BLM has committed to not increasing grazing pressure. In addition, recreational use is very light. However, in the eventuality that take could occur, this take statement is being provided.

The FWS anticipates incidental take of spikedace, loach minnow, Gila topminnow, desert pupfish and Gila chub will be difficult to detect as these species have a small body size, finding a dead or impaired specimen is unlikely, losses may be masked by seasonal fluctuations in numbers or other causes, predation of dead animals is likely to occur, or other causes. As a surrogate measure of take, the FWS will consider incidental take to be exceeded if one of the following occurs:

1) Recreational and/or off-highway vehicle use cause streambank damage along more than 20% of occupied stream corridors, as determined through annual monitoring of fish stocked at these sites.

EFFECT OF THE TAKE

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to spikedace, loach minnow, Gila topminnow, or desert pupfish. We also conclude that the level of take is not likely to result in jeopardy or adverse modification of critical habitat for Gila chub.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the BLM 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.

The following reasonable and prudent measure(s) and terms and conditions are necessary and appropriate to minimize take of spikedace, loach minnow, Gila topminnow, and desert pupfish:

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

    a. BLM shall monitor the project area that could be affected by the proposed action to ascertain take of individuals of the species and/or streambank and channel degradation that could cause harm or harassment to the species. The monitoring will be accomplished in tandem with the annual monitoring described in the proposed action for use in determining the status of stocked populations of these species. Monitoring will include, at a minimum, an assessment of any streambank damage that has occurred over the past year along wetted portions of the channel currently supporting stocked fish species. Special emphasis should be placed at any road or trail crossings of the streams at these sites.

    b. BLM shall submit annual monitoring reports to the Arizona Ecological Services Office by March 15 of each year beginning in year two of project implementation. These reports shall briefly document for the previous calendar year the effectiveness of the terms and condition and locations of listed species observed. The report shall make recommendations for modifying or refining these terms and conditions to enhance listed species protection or reduce needless hardship on the BLM.

2. The BLM shall post a sign at the trailhead near the TNC headquarters advising recreationists of the presence of threatened and endangered fish in the streams and requesting that they cross streams only as necessary and minimize damage along stream corridors.

PROPOSED SPECIES REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

Gila Chub

The prohibitions against taking Gila chub found in section 9 of the Act do not apply until the species is listed. Ordinarily, the FWS recommends that the agency implement any reasonable and prudent measures and terms and conditions provided. In the event that the conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions would be nondiscretionary. For this project, no additional reasonable and prudent measures or terms and conditions are required for Gila chub, as those in place for the other four listed species above will provide adequate protection for this species.

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. BLM must immediately provide an explanation of the causes of the taking

and review with the AESO the need for possible modification of the reasonable and prudent measures.

This concludes the conference for Gila chub. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation if the proposed species is listed or critical habitat is designated. The request must be in writing. If 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.

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.

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 your agency consider additional private property acquisition to expand the boundaries of the Muleshoe CMA to include any additional ecologically sensitive areas.

2. We recommend that your agency, as well as other members of the MNFPT, keep accurate records as to the successes and complications encountered with the stocking effort. These records will assist others in future stocking efforts, particularly for spikedace and loach minnow, as little stocking work has been completed for these species to date.

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

REINITIATION NOTICE

After listing as threatened or endangered and any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation is: 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.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the proposed species has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the proposed species may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation. Although not required, we recommend that the Federal agency implement the reasonable and prudent measures and terms and conditions herein prior to our final listing decision. If the species is subsequently listed, implementation of reasonable prudent measures and terms and conditions in any conference opinion adopted as a biological opinion, is mandatory.

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The FWS appreciates the BLM's efforts to identify and minimize effects to listed species from this project. We also appreciate that BLM has taken lead agency status for completion of this stocking effort, volunteered to provide National Environmental Policy Act documentation and review, and has worked in cooperation with other members of the MNFPT to accomplish this recovery effort for spikedace, loach minnow, Gila topminnow, desert pupfish, and Gila chub. For further information please contact Mary Richardson (x242) or Debra Bills (x239). Please refer to the consultation number 02-21-04-F-0454 in future correspondence concerning this project.

/s/ Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Southern Arizona, Fish and Wildlife Service, Tucson, AZ
(Attn: Doug Duncan)
Bureau of Land Management, Arizona Supervisor's Office, Phoenix, AZ
(Attn: Ted Cordery)

Bureau of Land Management, Tucson Field Office, Tucson, AZ (Attn: Jeff Simms)
U.S. Forest Service, Coronado National Forest, Tucson, AZ (Attn: Larry Allen)
Bureau of Reclamation, Phoenix, AZ (Attn: Rob Clarkson)
Branch Chief, Arizona Game and Fish Department, Research Branch, Phoenix, AZ (Attn: Rob Bettaso)
Supervisor, Region V, Arizona Game and Fish Department, Tucson, AZ (Attn: Don Mitchell and Dean Foster)
Arizona State Lands Department, Phoenix, AZ (Attn: Stephen Williams)
Refuge Manager, The Muleshoe Conservation Management Area, Willcox, AZ (Attn: Bob Rogers)
The Nature Conservancy, Arizona Chapter, Tucson, AZ (Attn: Ken Wiley)
Arizona State University, Department of Biology, Tempe, AZ (Attn: Paul Marsh)

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FIGURES AND TABLES

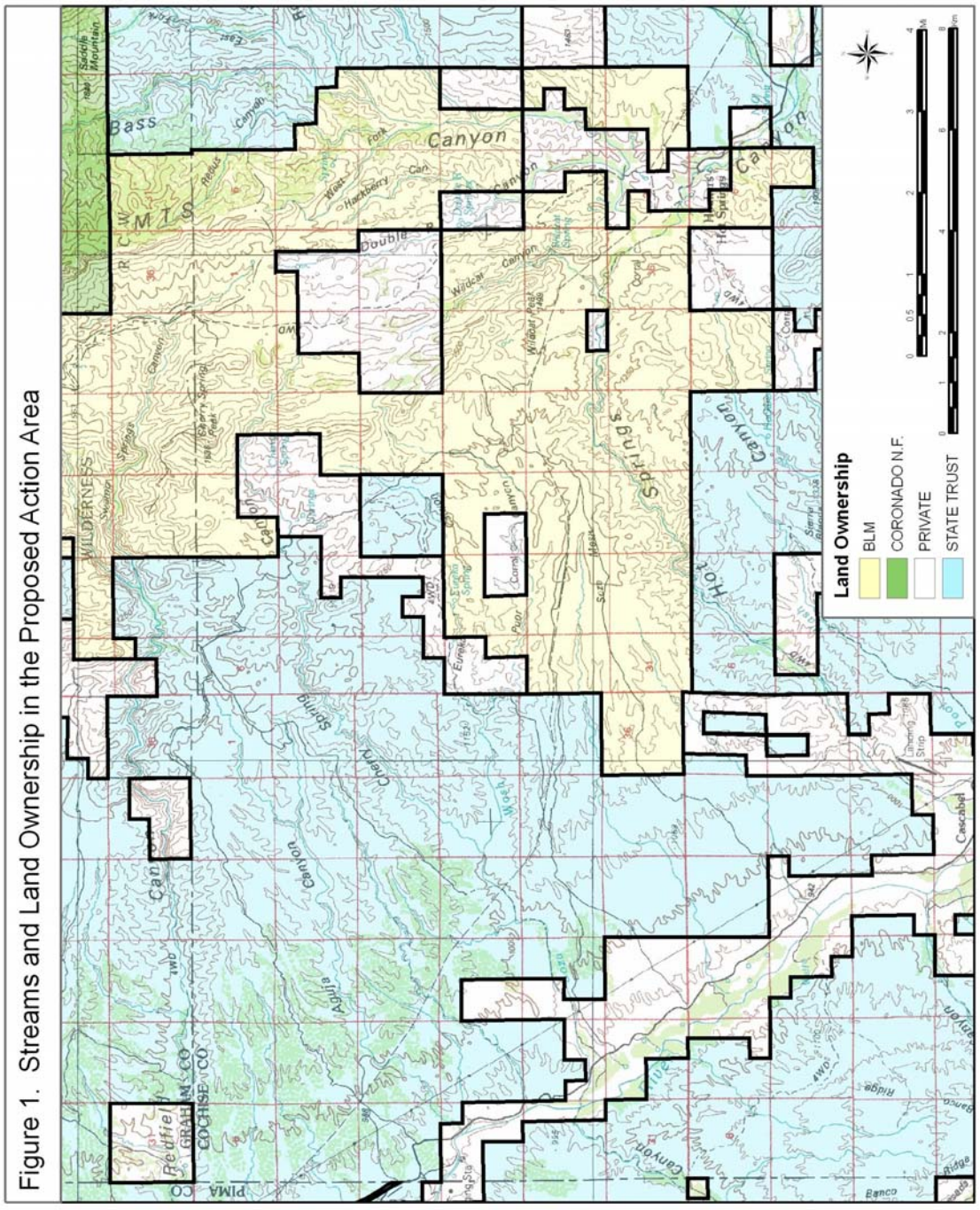

Figure 1. Streams and Land Ownership in the Proposed Action Area

Table 1. Status of Natural Gila Topminnow Populations.

Site	Ownership	Extant[1]	Nonnatives	Mosquitofish	Habitat Size[2]	Threats[3]
Bylas Spring[5]	San Carlos	YES	YES	YES	S, D	M, N, G
Cienega Creek	BLM	YES	NO	NO	L	M, R, N
Cocio Wash	BLM	NO 1982	UNKNOWN	UNKNOWN	S	H, M
Cottonwood Spring	Private	YES	NO	NO	S	M, N
Fresno Canyon	State Parks	YES	YES	NO[4]	M	H, N, G, U
Middle Spring[5]	San Carlos	YES	YES	YES	S	H, N, G
Monkey Spring	Private	YES	NO	NO	S	L, W, U
Redrock Canyon	USFS	YES	YES	YES	M, D	H, R, G, N
Sabino Canyon	USFS	NO 1943	YES	NO	M	H, R, N
Salt Creek[5]	San Carlos	YES	NO[4]	NO[4]	S	M, N, G
San Pedro River	Private	NO 1976	YES	YES	-	H, W, N, G, R
Santa Cruz River San Rafael Tumacacori Tucson	Private	YES[6] YES NO 1943	YES[4] YES	YES	L, D	H, W, N, R, G, C, U
Sharp Spring	Private	YES	YES	YES[4]	M	H, N, G, U
Sheehy Spring	Private	NO 1987	YES	YES	S	H, N, G, U
Sonoita Creek	Private, TNC, State Parks	YES	YES	YES	L, D	H, W, N, G
Tonto Creek	Private	NO 1941	YES	YES	L	H, N, R, G, W

[1] if no, last year recorded
[2] L = large, M= medium, S = small, D = disjunct
[3] Immediacy: H = high, M = moderate, L = low
Type: W = water withdrawal, C = contaminants, R = recreation, N = nonnatives, G = grazing, M = mining, U = urbanization
[4] none recently, they have been recorded
[5] recently renovated
[6] in Mexico, US in 1993

Table 2. Agency actions that have undergone formal and informal section 7 conferencing and levels of incidental take anticipated for the Gila chub in Arizona and New Mexico (CHA = Critical Habitat Area).

Action (CHU)	Year	Federal Agency	Incidental Take Anticipated	In Action Area
Coronado National Forest – Ongoing Grazing (Area 3 – Babocomari River and Area 5 – Lower Santa Cruz River	2002	USFS	Take in the form of harm due to habitat alteration, and mortality of 20 individuals	X
Las Cienegas NCA Resource Management Plan (Area 5 – Lower Santa Cruz River)	2002	BLM	Take in the form of mortality, injury, pursuit, capture, collection, trapping, or harassment of 155 individuals annually; multiple occurrence of 500 individuals; and a one time loss of 1000 individuals	X
Bull Gap Road Project, Gila Box NCA (Area 2 – Middle Gila River)	2003	BLM	None	X
Kearny Camp, Serna Cabin, and Lee Trail Road Improvements, Gila Box NCA (Area 2 – Middle Gila River)	2003	BLM	Informal conference	X
Agua Fria National Monument Plan (Area 7 – Agua Fria River)	2004	BLM	Take in the form harm, harassment and mortality (draft – should be completed by August 2004)	X
Harden Cienega Grazing Allotment (Area 1 – Upper Gila River)	2004	USFS	None	
New Mexico Department of Game and Fish - research proposal to examine population structure of *Gila robusta* complex (Area 1 – Upper Gila River)	2004	FWS	Informal conference	