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AESO/SE
02-21-98-F-403R2 June 5, 2003

Mr. Robert Hollis, Division Administrator
U.S. Department of Transportation
Federal Highway Administration
One Arizona Center-Suite 410
400 East Van Buren Street
Phoenix, Arizona 85004-2285

RE: Reinitiation #2 of Biological Opinion for State Route 260, Cottonwood Through Camp Verde, Verde River Bridge, Segment II Project in Yavapai County

Dear Mr. Hollis:

Thank you for your second request for reinitiation of formal consultation with us pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act) for the proposed State Route 260, Cottonwood through Camp Verde, Verde River Bridge, Segment II project in Yavapai County, Arizona. Your request for reinitiation, dated January 23, 2003, and received by us on January 24, 2003, concerns impacts that may adversely affect the federally endangered razorback sucker (*Xyrauchen texanus*), threatened spikedace (*Meda fulgida*) and loach minnow (*Tiaroga cobitis*) and designated critical habitat for each of these fish species. You did not request re-initiating consultation on southwestern willow flycatcher (*Empidonax trailli extimus*).

The Verde River has been stocked with non-essential experimental populations of Colorado pikeminnow (*Ptychocheilus lucius*), formerly called Colorado squawfish. For the purpose of section 7 consultation, species designated as experimental non-essential under 10 (J) of the Act are treated as proposed species for listing. You have provided a determination of non-jeopardy for this fish, pursuant to conferencing procedures 50 CFR 402.10.

This request for re-initiation of formal consultation was triggered due to a change in the project description in constructing the 260 bridge over the Verde River. Originally, drilling and construction pads were expected to occur in the floodplain and used from November through January in order to hold heavy machinery, to drill, and to install footings and piers. The material (rocks and fill) for the pads was to be removed by January 31, and all other construction work in forming the bridge was expected to occur from the already existing, adjacent bridge. The new

project description will maintain drilling and construction pads in the floodplain and work will be conducted from the floodplain through January 2004.

This biological opinion is based on information provided in new January 2003, biological assessment and project description; the July 2002 biological opinion; the April 2002, biological assessment; and the previously completed March 5, 1999, biological opinion, including the administrative record upon which those opinions were based. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

September 1998 - The Federal Highway Administration (FHWA) requested initiation of formal consultation.

October 1998 - We acknowledged receipt of formal initiation letter and concurred with FHWA's determination of "not likely to adversely affect" for the loach minnow.

March 1999 - We completed a biological opinion for razorback sucker, southwestern willow flycatcher and their designated critical habitat.

April 2000 - We designated critical habitat for the threatened spikedace and loach minnow. The proposed project occurs within the Verde River segment of critical habitat (Complex 1) that extends from Granite Creek downstream to Fossil Creek.

July 24, 2002 - We completed the first request for re-initiation of consultation to address spikedace and loach minnow and their designated critical habitat. No re-initiation of consultation occurred for razorback sucker or southwestern willow flycatcher. The project description remained the same from the previous consultation.

November 2002 - Construction activities building the 260 Bridge over the Verde River began.

December 5, 2002 - We attended a meeting with ADOT and HDR engineering in Camp Verde to discuss progress of ongoing construction of the 260 bridge and discuss changes in the proposed action.

January 23, 2003 - FHWA requests re-initiation of formal consultation in order to address changes to the project description on razorback sucker, spikedace, loach minnow and designated critical habitat for each fish.

March 21, 2003 - We sent FHWA a draft biological opinion for review.

June 2, 2003 - FHWA (Steve Thomas) asked us to finalize the biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed project is the widening of State Route (SR) 260 from Cottonwood to east of Camp Verde. The expansion will provide the capacity needed to accommodate the 2015 design year projected traffic volumes, and provide an adequate level of transportation service along the route over the next 20 years. Route 260 serves as the main commercial route between I-17 and the City of Cottonwood to the west and the Town of Camp Verde to the east. This roadway also serves as the primary route to recreational opportunities in the greater Verde Valley area and the Mogollon Rim.

The action area encompasses the Verde River and the 100-year floodplain through the Verde Valley (including the towns of Clarkdale, Cottonwood, and Camp Verde) from Tapco down to Beasley Flat (a 46 mile stretch of river). While construction is focused at the bridge, the action area encompasses a larger area due to possible upstream and downstream effects to the stream channel and the continued and possible increase in recreation and urbanization the development of the bridge is facilitating (Map 1 and 2).

As described in the original consultation and first reintiation for this project, Arizona Department of Transportation (ADOT), with funding from FHWA, is planning to build an additional bridge over the Verde River in conjunction with the widening of SR 260. The bridge is located near the southern end of the Town of Camp Verde. The existing bridge at the Verde River crossing consists of three piers, four spans, and is 650 feet long. The design of the existing bridge (post-tensioned box girder) does not permit widening. The additional bridge crossing proposed will be constructed three feet upstream of the existing bridge. The new bridge will have similar dimensions and construction to the existing bridge over the Verde River. A concrete slab in the middle of the 6- to 8-foot wide raised median will cover the space between the two structures. The three piers will be constructed outside of the active river channel in the Verde River floodplain.

Significant changes in the new project description involve the materials, construction, and length of work occurring in the Verde River floodplain, and Conservation Measures. Drill pads and fill material will persist in the floodplain for nearly a year longer than first proposed. As a result, heavy machinery will operate from within the floodplain on these pads for most of 2003. Different materials will be used to construct the drill pads. Drill pads will have a concrete barriers bordering the fill material, and it is expected that some of the concrete barriers bordering the pads will sink into the riverbed and will not be retrieved. As a result of these changes, some of the initial conservation measures (proposed by FHWA and ADOT) could not be met, and

therefore are changed. The design and placement of the bridge, amount of riparian habitat removed, and rest of the basic project are expected to occur as previously proposed.

Roads located at the bridge (existing and future structure) will be used for construction and maintenance, and also provide for existing uses in the area. During construction, the existing northeast and southeast access locations at the bridge will be used to access the Verde River floodplain for construction of the abutments and piers. To accommodate access for ADOT maintenance and inspection needs, a new access road on the northwest side of SR 260 will be provided. This access will be fenced and gated. The current access at the southeast quadrant of the Verde River Bridge will be shifted to the east to accommodate the new SR 260 westbound construction. No vehicle crossings of the Verde River will be permitted and no work will be allowed from the active Verde River channel.

Temporary roads and drill pads will be constructed with jersey barriers, a fabric liner, clean fill, and a rock topping within the Verde River floodplain. The jersey barriers outline the perimeter of the drill pads, and where required along the access road, form a basin with the fabric liner to protect the fill and reduce erosion and siltation. The fabric liner was placed on the natural ground and along the vertical internal face of the barriers to reduce the possibility of embankment materials migrating from the drill pad and access road area. Rock, approximately 1 to 3-inch minus, was placed on top of the embankment fill to further stabilize the fill and minimize potential sedimentation into the river.

Bridge construction will require activities to occur within the Verde River floodplain, both above and below the ordinary high water mark, and adjacent to the active channel. Construction activities include: constructing the access roads upstream of/contiguous with the new bridge; installing two 42-inch diameter pass through pipes west of Pier #2; constructing a temporary crane pad at each pier; excavating the bridge piers/pier foundations; placing concrete for the piers and abutments; erecting the bridge beams; constructing bridge deck with stay-in-place forms; installing pipe conduit on structure, and painting the new bridge.

The drill pads will be large enough to contain machinery and any excavated materials generated during the drilling activities. A drill rig will be positioned on the temporary drill pads, and will drill 18 shafts through the three pads to construct the pier footings. All excavated soil materials generated by the drilling operation will be temporarily placed in the floodplain outside the waters of the U.S., and then removed in a systematic manner from the site. This material may be used for highway embankment/grading outside of the waters of the U.S.

Disturbance within waters of the U.S. will be limited to the proposed limits of work. All vegetation and undesirable topography will be removed along the entire length of the access road and drill pads and as required to prepare the work area. During the concrete pours, excess water will be removed from the shafts and foundations using conventional dewatering equipment. The excess water will being pumped into a water tank truck and hauled from the site. A dewatering basin was originally excavated outside of waters of the US for storing the excess water, however, the basin has since been abandoned and backfilled. Approximately 10,000 gallons of water per

drill shaft is being removed during the concrete pours. After dewatering and completion of the bridge, the drill pad and access roads will be removed, and all disturbed areas will be re-graded to pre-construction conditions (as much as possible).

Approximately 3,595 cubic yards of on-site soil used to construct the temporary crane pads will be excavated from within the approved bridge construction limits outside of waters of the U.S. No earthen materials will be permanently excavated or deposited in waters of the U.S., since the excavation and re-grading of the basin will occur outside of the jurisdictional limits of the Verde River. No asphalt or construction waste materials of any kind will be included in the fill. Approximately 369 cubic yards of concrete will be placed in waters of the U.S. to construct the pier footings.

Less than 0.02 acres of waters of the U.S. will be permanently affected by the bridge construction; approximately 0.22 acres of temporary disturbance will occur in waters of the U.S. within the access road and drill pads. No waters of the U.S. will be permanently affected by the dewatering activities; temporary disturbance occurred outside of waters of the U.S. to create and re-grade the settling basin. Brush and slash will be removed from the disturbance area and disposed of in a legal manner. Conventional excavating equipment will be used to construct and remove the access road and drill pads, bridges and associated features, including: forklifts; loaders; water trucks; water tanks; concrete pump trucks; excavators; and up to three cranes. During the drill pad/access road development and removal, a few concrete barrier pieces are expected to enter the Verde River active channel or floodplain and sink into soft soils. Barriers (each 12 feet long, 2 feet wide, weighing 5000 pounds) are the same concrete structures used along highways to separate traffic from work areas. These pieces may be removed, but if it is determined that their removal could increase the project's disturbance area and the potential for sedimentation of the Verde River, they will be left in the river.

Construction of the bridge over the Verde River is anticipated to take approximately one year to complete. A significant change in the new project description is the persistence of the drill pads throughout this time period and amount of work occurring from the pads within the Verde River floodplain. The new proposal still intends to reduce and minimize effects within the scope of the new project description; however drill pads and construction activities are expected to persist in the floodplain continuously through January 2004. The access road/drill pads located in the floodplain and adjacent to the active Verde River channel will serve as staging/work areas until through January 2004. ADOT inspectors will make frequent inspections of the drill pads/access road while they are in place. At least two additional short-term work areas beyond the designated access road/drill pads noted above will be required during construction to erect the superstructure. These additional areas will eliminate the need for falsework in the river. Area A, approximately a 20 foot extension of the drill pad at Pier #2, will be needed to walk the crane out to point where it can place the new girders over the river. The side wall of the drill pad will be temporarily dismantled and two 5 foot by 20 foot crane mats, one for each track, will be placed on a fill base to accomplish this task. The sidewall will be returned to the typical configuration

upon setting of the over-river girders. Area B, approximately 20 feet wide by 200 feet long, will provide sufficient space to allow several cranes needed in the river bottom to maneuver around each other while placing the girders between Abutment #1 and Pier #2 . Both short-term work areas will be covered with filter fabric and filled to the necessary elevation with clean fill and rock. Each short-term area will be needed, separately, for about two weeks, and will be removed as soon as the necessary superstructure work is complete.

River bottom alterations will be temporary, and will be returned to pre-construction baseline conditions (as much as possible) when construction in the river bottom is complete. The access road/drill pads will be removed between September 15, 2003 and January 30, 2004. Removals of the pads/road will begin at the point closest to the river and work backward from the river; the removal area will be protected at the end of each shift from potential discharges into the Verde River.

The substructure (piers, pier footings, etc.) and superstructure (girders, deck slab, etc.) will be constructed from the temporary road and drill pads. Girder installation is anticipated to take approximately one month (March 2003). Protective railings, safety fencing and painting of the structure features will be completed after the deck slab has been completed. Painting will be completed according to ADOT Standard Specifications. ADOT will monitor to reduce paint over- spray; however, minor droppings/discharges are expected in the Verde River.

Conservation Measures

FHWA and ADOT will implement Best Management Practices, modified Conservation Measures from the 1999 biological opinion for razorback sucker, and specific precautionary measures to be determined by the U.S. Army Corps of Engineers and the Arizona Department of Environmental Quality 401 certification to avoid increased sedimentation or other impacts to water quality, such as preventing debris from inadvertently getting into the Verde River. The location of the new bridge minimizes impacts to vegetation. No substantial impact to water movement is anticipated with regard to the construction of the new Verde River Bridge. Water flow will be maintained during construction. The drill pads will be removed after construction is completed, and the floodplain will be returned to pre-construction contours (as much as possible).

One of the primary reasons for this re-initiation is to change the conservation measures associated with first consultation and subsequent reintitation (U.S. Fish and Wildlife Service 1999, 2002). The original proposed action provided seasonal restrictions to work in the floodplain to reduce risks of sedimentation and effects to listed fish and their designated critical habitat. Some conservation measures have been modified for clarification, while others have not changed. All are listed below.

1. FHWA and ADOT have agreed that all construction work in the upland areas immediately adjacent to the Verde River will be conducted in a manner that precludes any short- or long-

term sediment loading of the stream from this activity. Specific precautionary measures, such as progressive seeding, will be included in the construction contract's special provision in addition to standard best management practices.

2. FHWA and ADOT have agreed that water needed for construction purposes (e.g. dust palliative) will not be drawn from the Verde River. ADOT has agreed to confirm that there will be ample construction water available from the Forest Service or municipal sources.

3. FHWA and ADOT have agreed that bridge falsework will not be permitted in the low flow channel of the Verde River at any time. During the February 1 to May 31 razorback sucker breeding season, falsework will no be permitted in any portion of the riverbed. If used outside of the February 1 to May 31 razorback sucker breeding season, the installation and removal of bridge falsework landward of the low flow channel will incorporate best management practices to minimize silt loading of the live stream. No use of, or crossing by heavy machinery will occur within the live stream.

4. FHWA and ADOT have agreed that bridge substructure and superstructure work will be permitted during the razorback sucker breeding season provided that the river is adequately protected from debris falling into the Verde River from construction activities.

5. FHWA and ADOT have agreed that the construction contractor will provide a qualified fish monitor to determine if fish kills occur when construction activities occur in or adjacent (approximately 100 yards) to flowing water unless the activity has no potential to directly or indirectly result in a discharge into the stream. Monitoring activities will be conducted at a minimum distance of 0.5 miles upstream and downstream of the construction areas in the vicinity of the Verde River bridge crossing. If fish mortality reaches more than 20 specimens per event, this office shall be immediately notified (602-242-0210; 602-242-2513 FAX) to report the incident.

STATUS OF THE SPECIES

Spikedace

Spikedace was listed as a threatened species on July 1, 1986 (U.S. Fish and Wildlife Service 1986a). Critical habitat was designated for spikedace on March 8, 1994 (U.S. Fish and Wildlife Service 1994a), but was set aside by order of the Federal courts in Catron County Board of Commissioners, New Mexico v. U.S. Fish and Wildlife Service, CIV No. 93-730 HB (D.N.M., Order of October 13, 1994). It was again designated on April 25, 2000 (U.S. Fish and Wildlife Service 2000). Critical habitat includes portions of the Verde, middle Gila, San Pedro, San Francisco, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks and several tributaries of those streams.

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 recently known only from the upper Verde, middle Gila, and upper Gila rivers, 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, AGFD 1999, Rinne 1999). However, spikedace has not been detected on the Verde River since 1999 (AGFD 1999). 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 live 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).

Constituent elements of critical habitat include those habitat features required for the physiological, behavioral, and ecological needs of the species. For spikedace, these include:

1. Permanent, flowing, unpolluted water;

2. 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 and gravel bars, and eddies at downstream riffle edges;

3. Living areas for juvenile spikedace with slow to moderate flow velocities in shallow water with moderate amounts of instream cover;

4. Living areas for larval spikedace with slow to moderate flow velocities in shallow water with abundant instream cover;

5. Sand, gravel, and cobble substrates with low to moderate amounts of fine sediment and substrate embeddedness;

6. Pool, riffle, run, and backwater components present;

7. Low stream gradient;

8. Water temperatures in the approximate range of 35-85°F with natural diurnal and seasonal variation;

9. Abundant aquatic macroinvertebrate food base [prey may include the taxa Ephemeroptera, Chironomidae, and Trichoptera (Sublette *et al.*1990)];

10. Periodic natural flooding;

11. 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

12. Habitat devoid of nonnative aquatic species detrimental to spikedace, or habitat in which detrimental nonnative species are at levels which allow persistence of spikedace.

The constituent elements are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of spikedace. 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 geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Recent taxonomic and genetic work on spikedace indicate 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).

The status of spikedace is declining rangewide. Although it is currently listed as threatened, we have 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 (U.S. Fish and Wildlife Service 1994a).

Loach Minnow

Loach minnow was listed as a threatened species on October 28, 1986 (U.S. Fish and Wildlife Service 1986b). Critical habitat was designated for loach minnow on March 8, 1994 (U.S. Fish

and Wildlife Service 1994b), but was set aside by order of the Federal courts in Catron County Board of Commissioners, New Mexico v. U.S. Fish and Wildlife Service, CIV No. 93-730 HB (D.N.M., Order of October 13, 1994). It was again designated on April 25, 2000 (U.S. Fish and Wildlife Service 2000). Critical habitat includes portions of the Verde, Black, middle Gila, San Pedro, San Francisco, Tularosa, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks, and several tributaries of those streams.

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Historic 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, Miller 1998).

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 (Schrieber 1978, Abarca 1987). Spawning occurs in 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).

The primary constituent elements for loach minnow critical habitat include:

1. Permanent, flowing, unpolluted water;

2. Living areas for adult loach minnows with moderate to swift flow velocities in shallow water with gravel, cobble, and rubble substrates;

3. Living areas for juvenile loach minnows with moderate to swift flow velocities in shallow water with gravel, cobble, and rubble substrates;

4. Living areas for larval loach minnows with slow to moderate flow velocities in shallow water with sand, gravel, and cobble substrates and abundant instream cover;

5. Spawning areas for loach minnow with slow to swift flow velocities in shallow water with uncemented cobble and rubble substrate;

6. Low amounts of fine sediment and substrate embeddedness;

7. Pool, riffle, run, and backwater components present;

8. Low to moderate stream gradient;

9. Water temperatures in the approximate range of 35-85°F with natural diurnal and seasonal variation;

10. Abundant aquatic macroinvertebrate food base [prey may include chironomids, simuliids, ephemeropterans, plecopterans, and tricopterans and juvenile loach minnows generally take chironomids (Sublette *et al.* 1990)];

11. Periodic natural flooding;

12. 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

13. Habitat devoid of nonnative aquatic species detrimental to loach minnow, or habitat in which detrimental nonnative species are at levels which allow persistence of loach minnow.

These constituent elements are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of loach minnow.

As noted under spikedace, 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 geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Recent biochemical genetic work on loach minnow indicate 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. Although it is currently listed as threatened, we have 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 (U.S. Fish and Wildlife Service 1994c).

Spikedace and Loach Minnow Critical Habitat

The Verde River complex, which is comprised of the Verde River in conjunction with its main tributaries, has been segregated into six distinct geographical units based upon relative proximity to a major tributary or the Verde River itself. Critical habitat includes 106 miles of the Verde River, extending from Sullivan Dam downstream to the confluence with Fossil Creek.

Critical habitat has also been designated in 5th code watersheds, specifically in major tributaries to the Verde River. These tributaries include Fossil Creek (5 miles), West Clear Creek (7 miles), Beaver/Wet Beaver Creek (21 miles), Oak Creek (34 miles), and Granite Creek (1.4 miles). The tributary streams within the Verde River complex are believed to be unoccupied at the present time although they offer potential habitat for spikedace and loach minnow (U.S. Fish and Wildlife Service 2000).

The relatively stable hydrologic and thermal regimes of the Verde River complex are unique compared to other river systems of the arid southwestern United States (U.S. Fish and Wildlife Service 2000). The combination of these factors provides a promising prospect of future recovery efforts for these species within the unoccupied reaches in the Verde River complex.

Formal consultation has documented various effects from Federal actions to spikedace and loach minnow which contribute to the status of the species on the Verde River (Appendix 1). Some of these actions contained components that lessened adverse effects of ongoing actions or were aimed at improving watershed conditions in the context of the proposed action (livestock grazing management changes, etc.). Although take was authorized in many instances, actions to reduce and minimize take through reasonable and prudent measures were mandated.

Razorback Sucker

The razorback sucker was once abundant in the Colorado River and its major tributaries throughout the basin, occupying 3,500 miles of river in the United States and Mexico (U.S. Fish and Wildlife Service 1991). Records from the late 1800s and early 1900s indicated the species was abundant in the lower Colorado and Gila river drainages (Kirsh 1889, Gilbert and Scofield 1898, Minckley 1983, Bestgen 1990). Critical habitat was designated in 1994 (U.S. Fish and Wildlife Service 1994a).

The razorback sucker grows to over two feet in length and has a distinctive, abrupt, sharp edged dorsal ridge behind the head (Minckley 1973). Adult razorback suckers inhabit a wide variety of riverine habitats including main stem and backwater areas such as slow runs, deep eddies, pools, and sloughs (Bestgen 1990). It also inhabits reservoirs. Larval and juvenile razorback sucker habitat includes shallow, slow moving areas, backwaters, and littoral zones (Langhorst and Marsh 1986, Bestgen 1990). Razorback suckers spawn from January to May and initiation of spawning appears to be tied to water temperature (Langhorst and Marsh 1986, Tyus and Karp 1990). Spawning occurs in shallow water over large gravel, cobble, or coarse sand with little or no fine sediment, on wave-washed lakeshores, or on riverine riffles (Minckley *et al.* 1991). Razorback suckers live up to about 50 years (McCarthey 1987). It feeds on plankton, algae, and detritus in reservoirs, with riverine populations also consuming a large amount of benthic invertebrates (Bestgen 1990).

The razorback sucker was listed as an endangered species, due to declining or extirpated populations throughout the range of the species (U.S. Fish and Wildlife Service 1991). The causes of these declines are changes to biological and physical features of the habitat. The effects of these changes have been most clearly noted by the almost complete lack of natural recruitment to any population in the historic range of the species. Populations are generally small and composed of aging individuals. Recovery efforts under the Recovery Implementation Program in the upper Basin have begun, but significant recovery results have not been achieved for this species. In the Lower Basin, efforts to reintroduce the species in the Gila, Salt, and Verde rivers have not been successful in establishing self-sustaining populations. Reintroduction efforts are currently ongoing only on the Verde River. Augmentation efforts along the lower Colorado River propose to replace the aging populations in Lake Havasu and Mohave with young fish from isolated grow-our facilities. This may prevent the imminent extinction of the species in the wild, but does not appear capable of ensuring long-term survival or recovery. Overall, the status of the razorback sucker continues to decline.

Razorback Sucker Critical Habitat

Critical habitat for the razorback sucker was designated on March 21 1994 (U.S. Fish and Wildlife Service 1994d). We determined that since the habitats of the razorback sucker overlapped with those of the bonytail chub (*Gila elegans*), Colorado pikeminnow (or white salmon) *(Ptychocheilus lucius)*, and humpback chub (*Gila cypha*), and the issues facing these species were very similar, designating critical habitat for all four species would be appropriate. Critical habitat for the razorback sucker includes portions of the Colorado, Duchesne, Green, Gunnison, San Juan, White, and Yampa rivers in the Upper Basin, and the Colorado, Gila, Salt, and Verde rivers in the Lower Basin. All critical habitat reaches were considered occupied at the time of designation. On the Verde River, critical habitat was designated from the Prescott National Forest Boundary near Perkinsville at T.18N., R2E., section 31 to Horseshoe Dam in T.7N., R.6E., sec.2. The action area for this project is found within this Verde River segment.

The primary constituent elements for razorback sucker critical habitat include:

1. Quantity and quality (i.e. temperature, dissolved oxygen, lack of contaminants, etc.) of water that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage of the razorback sucker;

2. Living areas that are inhabited or potentially habitable for razorback suckers to use in spawning, nursery, feeding, and rearing or corridors between these areas. In addition ot river channels, these areas also include backwaters, oxbows, side channels, bottomlamds, and other areas in the 100-year floodplain, which when iniundated provide spawning, nursery, feeding, and rearing or access to these habitats.

3. Food supply is an important constituent element of the suckers biological environment. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the razorback sucker;

4. Predation and competition, although considered normal components of the suckers biological environment, are out of balance due to introduction of nonnative fish species;

5. Special consideration was provided for habitats required for reproduction and recruitment due to the apparent lack of recruitment of young into the adult population;

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 to provide a platform from which to assess the effects of the action now under consultation.

The Verde Valley is characterized by a wide flood basin once dominated by Fremont cottonwoods. Although mature cottonwood stands persist, dense understory is largely absent and the contiguous habitat is now fragmented (Paxton *et al.* 1997). The quality and quantity of suitable aquatic habitat for threatened and endangered fish in the Verde Valley have been affected through numerous past actions resulting in reduction of riparian habitat, altered species composition, increased presence of exotic fish, decreased surface water availability, changes in stream morphology, and other factors. A significant portion of the adverse impacts to the Verde River and its aquatic and riparian ecosystem come from the additive effect of small actions that individually may not threaten the system, but cumulatively result in continuing decline of the aquatic community.

Habitat for threatened and endangered fish in the Verde River has undergone major changes in the past 150 years, with the Verde Valley being one of the most significantly modified portions of river. The volume and pattern of flow in the river, particularly within the Verde Valley, has

been modified by water diversion, groundwater pumping, and watershed alteration. The river channel has been modified by removal or use of riparian vegetation, flood control, construction of diversion dams, roads and bridges, gravel mining, and agricultural/suburban development of the floodplain. Additionally, various non-native fish have been and continue to be introduced into the Verde River system and adversely affect threatened and endangered and other native fish through predation and competition (Marsh and Brooks 1989, Minckley *et al.* 1991, Hendrickson 1993, Rinne 1999).

Human disturbances of the watershed, floodplain, and stream channel change many of the factors determining channel configuration. Increased sediment off the watershed is a common result of human actions and sediment is a major determinant of channel shape (Leopold 1997). When the dynamic equilibrium has been disrupted, the channel begins a process of adjustment as it attempts to restore a dimension, pattern, and profile that are consistent with controlling hydraulic variables (Rosgen 1996). These adjustments may lead to dramatic changes in the stream channel width, depth, and geometry that encroach on human activities, such as has occurred on the Verde River. As human activities are affected, additional flood control and channelization measures may occur, which exacerbate the problems in adjacent areas (Pearthree and Baker 1987), and the channel will continue to become increasingly unstable.

Flood control, channelization and bank stabilization efforts usually take one of several forms: diking, riprap, soil-cement, Kellner Jacks and/or gabions parallel to the channel; check dams across the channel; removal of woody debris from the channel and floodplain; and rerouting the channel. More rudimentary forms of bank stabilization can be found when old vehicles or other large objects are found stacked along a river bank. It is unknown how many efforts such as described above have occurred along the Verde River prior to the listing of threatened and endangered species and designation of critical habitat on the Verde River.

Removing trees, logs, and other woody debris from stream channels is a common form of flood control practiced by landowners and is seldom documented. Woody debris is very important in stream function and fish habitat (Minckley and Rinne 1985, Debano *et al.* 1996). In the Verde Valley, removing riparian vegetation for this purpose continues (F. Toupal, NRCS, pers. comm.).

Critical Habitat Considerations

The relative complexity of the Verde River watershed brings difficulty in assessing potential effects to listed species or critical habitat from various land uses. The presence of non-native fish adds considerable difficulty in distinguishing which elements are limiting recovery of these species. Approximately nine nonnative fish species occur within the Verde River system, within the action area. Crayfish (*O. virilis*), another nonnative species present in the Verde River system, also pose a threat to native fish through direct predation.

Land uses, and their associated demands on water resources, water quality, stream function, and ecosystem health, should be considered when assessing or developing the baseline condition of

the natural environment of a given area. In Arizona, hydrologic connectivity between shallow aquifers and perennial (or intermittent) streams is well documented. Groundwater pumping, in excess of natural aquifer recharge potential, will reduce surface flows resulting in changes in stream channel morphology and increasing a stream's vulnerability to the effects of erosion and subsequent sedimentation. These alterations can have significant, detrimental impacts to the associated riparian and aquatic habitat. In addition to water quality and abundance, parameters such as stream gradient (velocity) and substrate are important factors in spikedace and loach minnow habitat and are specific to the ontology of the fish species themselves.

Development, another resource use in the Verde watershed, has become a considerable threat to perennial streams and their tributaries and it is exacerbated by land exchanges between public and private entities. The Verde Valley has experienced an increase in population of 146 percent from 1980 through 2000 (USFS 2001b). Increasing populations require increasing water consumption, or increased pumping of regional aquifers for domestic use.

Mining for sand and gravel is an important industry in the Verde Valley from Tapco downstream to Camp Verde (Tellman *et al.* 1997). Demand for these materials has grown as the population and development increases. Growth in the Verde Valley and Flagstaff depends largely on Verde Valley sand and gravel. For every 1,000 new Arizonans, 7,000 additional tons of sand and gravel are required (Tellman *et al.* 1997). Gravel mining erodes the river channel and causes instability, migration of the stream channel, lowering of water tables, loss of sand and gravel to the river, increased siltation, and lowered water quality (Tellman *et al.* 1997).

While it appears that agriculture is decreasing in the upper portions of the Verde Valley, agricultural development has involved not only direct clearing of riparian vegetation, but also has resulted in the re-engineering of floodplains (e.g. draining, protecting with levees), diverting water for irrigation, groundwater pumping, and herbicide and pesticide application. These factors affect the maintenance and development of riparian habitat and can influence stream function and water quality (Finch and Stoleson 2000, U.S. Fish and Wildlife Service 2001).

In the warm area of the Verde Valley, recreation is often concentrated in riparian areas of the Verde River because of the shade, water, aesthetic values, and the fishing, boating, swimming, and hiking opportunities it provides. These activities have reduced riparian vegetation due to trampling, clearing, wood cutting and soil compaction. Increased and concentrated recreation use also results in bank erosion; increased fire risk; and promotion of exotic aquatic and plant species (U.S. Fish and Wildlife Service 2001).

In the action area, livestock grazing on private lands and small pieces of U.S. Forest Service land throughout the Verde River floodplain and watershed has occurred since the 1880s, soon after settlers moved into the Valley (Tellman *et al.* 1997). By 1913, erosion, from damage to the watershed, had deepened the river channel. Beginning in the mid to late 1990s, the Prescott and

Coconino National forests began to fence livestock grazing out of the floodplain on portions of the Verde River on Forest Service lands. Concerns still persist on the effects of upland ranges on stream function.

Status of the Species and Critical Habitat in the Action Area

Spikedace
Spikedace have been recorded from the upper most reach of the Verde River (above Tapco and the Town of Clarkdale) (Rinne 1999), although since 1996 they have been very rare, with none found in 1997 and 1998, and only one found in 1999 (AGFD 1999). This dramatic fluctuation is similar to earlier population fluctuations, but better documented (U.S. Fish and Wildlife Service 2000). Spikedace numbers decrease substantially in the downstream direction, approaching Camp Verde, with historical sightings occurring in 1938 and 1950 (2001a). Comprehensive surveys for spikedace in the entire upper Verde River are lacking (R. Bettaso AGFD, pers. com.), but known population trends and historical records indicate that spikedace are either not present, or extremely rare throughout the action area and at the 260 Bridge site. Only a 1.3 mile stretch (separated into seven 980 foot sections) on the upper-most reach of the Verde River has been regularly and systematically targeted for the discovery of spikedace (USFS 2001a). Native fish biologists from both Arizona Game and Fish Department (R. Bettaso and P. Sponholtz) and the U.S. Fish and Wildlife Service (S. Leon) believe that spikedace, while rare, persist in the upper-most reach of the Verde River.

Loach minnow
Loach minnows, alternatively, are considered extirpated from the entire Verde River system, with the last confirmed observations occurring in 1938 above Camp Verde (Minckley 1993, USFS 2001a, Girmendock and Young 1997). Surveys for loach minnow in tributaries of the Verde River are underway, but none have been detected (U.S. Fish and Wildlife Service unpubl. data).

Razorback sucker
Razorback sucker was historically found in the Verde River at least as far upstream as Perkinsville (Minckley and Alger 1968). Due to habitat alterations and spread of non-native species, razorback sucker was extirpated from the Verde River, with the last record at Peck's Lake in 1954 (Wagner 1954, Minckley 1973). Beginning in 1981 and continuing through the 1990s, razorback sucker have been reintroduced into the upper Verde River. Predation from non-native species was believed to a major cause of mortality from the initial stockings. This was later managed for by placing larger fish, less susceptible to predation, in the river. From 1994 to 2002, Arizona Game and Fish Department has stocked the Verde River at Childs with 19,367 razorback suckers (D.Weedman, Arizona Game and Fish Department, pers. comm.). Monitoring studies have shown that reintroduced razorback sucker in the Verde River use pools, runs, and backwaters, with some use of eddies (Creef *et al.* 1992, Hendrickson 1993). The Verde River in the project area and throughout the Verde Valley is designated critical habitat for the razorback sucker (U.S. Fish and Wildlife Service 1994a).

Habitat in the project area
Due to the amount of private land throughout the Verde Valley in the Town of Camp Verde, there are few places where the public can access to the river. Forest Service and private land exist at the 260 Bridge and is one of the few locations in proximity to the Town where the public can recreate; however this is not a developed, nor large recreation area. Roads enter the floodplain both upstream and downstream of the existing bridge. As a result, the 260 Bridge is a relatively high use area with easy access used primarily for day use activities such as limited hiking, angling, picnicking, sightseeing, etc.

EFFECTS OF THE ACTION

Direct and Indirect Effects to Spikedace and Loach Minnow
As stated in the first reinitiation of this project, there are no anticipated direct or indirect effects to living spikedace and loach minnow associated with the construction of the new Highway 260 Bridge over the Verde River. We are unable to reasonably conclude, based upon existing knowledge, that either species is present in the action area. However, an overwhelming portion of the upper Verde River has not been systematically searched for spikedace or loach minnow, including the action area and the 260 Bridge location. Therefore, discovery of any of these two fish in the action area during construction could necessitate reinitiation of consultation due to the discovery of new information about these species in the action area.

Direct and Indirect Effects to Razorback Sucker
At the bridge construction site, drilling pads will be maintained in the floodplain immediately adjacent to the active Verde River channel for just over a year (November 2002 to January 2004), compared to original proposal of 3 months (November to January). The drilling pads will persist throughout the winter of 2003, monsoon season of 2003, and early winter 2004, when higher amounts of precipitation and runoff are expected to occur. As a result, the river will be constricted at the bridge by the drilling pads should river flows moderately increase. If river flows increase to a 2.7 to 4.7 year flood event, we can expect some, if not most of the 3,595 cubic yards of material to enter the Verde River (HDR 2003). The smaller, overflow channel is routed through a pipe conduit inside the drilling pad found on the eastern side of the floodplain. Water flow is expected to be maintained through this overflow channel, but may not be connected to the rest of the floodplain and river during smaller to moderate increases in flow. Riparian vegetation will be removed from the footprint of the bridge and immediate area adjacent to the footprint for construction activities to occur.

These changes to the floodplain, and to the stream, watershed, riparian vegetation, and hydrologic and sediment regimes can adversely affect razorback suckers. Removal of riparian vegetation, everyday construction activities, and adding over 3500 cubic yards of material in the Verde River floodplain can be expected to cause some sediment to periodically enter the river throughout the construction period. Moderate flows could dislodge a portion of the drill pads and concrete barriers causing the material to enter the Verde River. However, large flows would cause nearly all of the 3500 plus cubic yards of material and concrete barrier pieces to enter

razorback sucker habitat. While adult razorback suckers do not appear be inordinately sensitive to moderate amounts of sediment, excess sediment can fill favored pool habitat of adult suckers and preferred shallow backwater habitats needed by larval and juvenile razorback suckers. Excess sediment and concrete barrier pieces may also bury gravel habitats needed by razorback suckers for spawning and reduce reproductive success. Should the material and concrete barrier pieces used for the drill pads enter the river during a large flood event, we could expect loss of razorback sucker habitat and injury or death to adult, juvenile, or larval razorback suckers.

As addressed in the first biological opinion, toxic materials such as paint, oil, gasoline, and/or other petroleum products and materials associated with construction and operation of heavy machinery will be found in the floodplain adjacent to the active Verde River channel. If these toxic materials enter the Verde River in any significant amount, direct mortality to razorback sucker adult, juveniles, larvae, and eggs would be expected to occur. However, FHWA and ADOT's intent is to avoid, with the exception of some periodic spray or drops of paint, having any foreign toxic material enter the river or floodplain. The new proposal will maintain construction activities in the floodplain for almost a year longer than originally planned. The additional time the equipment will be in and around the Verde River floodplain increases the probability of toxic material entering the Verde River. Therefore, while measures will be taken and all effort is expected to be made to avoid allowing toxic materials enter the Verde River, maintaining construction equipment in the floodplain, adjacent, and above the river, does not eliminate the possibility. As a result, should toxic materials spill into the Verde River or its floodplain (i.e. vehicles falling into the river, gas leaks, oil spills, etc.), this would constitute new information not proposed or addressed and likely cause the need for reinitiation of consultation.

Spikedace, Loach Minnow, and Razorback Sucker Critical Habitat

As concluded in both previous biological opinions, the proposed bridge construction is expected to have short-term, and possible long-term adverse effects to critical habitat for spikedace, loach minnow, and razorback sucker. These effects are expected to appear in the form of loss of fish living space, increased sedimentation, loss of riparian habitat, possible changes in channel geomorpholgy, and loss of habitat due to increased recreation. FHWA and ADOT have provided some measures to reduce and minimize these effects.

Adverse effects of roads and road crossings on streams have been documented for many types of stream and fish species (Dobyns 1981, Meehan 1991, Megahan *et al.* 1992, Waters 1995, Young 1994). Effects include direct mortality of fish and fish eggs (addressed above), direct destruction of habitat, increased sediment and changes in sediment patterns, destruction of riparian vegetation, alteration of stream morphology, and accelerated erosion.

During construction of various human structures and facilities, drainages are frequently rerouted, channelized, or blocked. This alters the pattern by which water flows across the floodplain and enters the river. This may change (usually by increasing) the amount of sediments, materials, and pollutants which enter the river. It may also accelerate or retard the rate with which the water flows into the river thus altering channel morphology and the availability and distribution of aquatic habitats. If drainage elevations are changed, erosion is likely to occur, with consequent

erosion of the banks of the Verde River and increased sediment loading. Roads, buildings, parking lots, and other areas of impermeable surfaces change the rate and pattern in which precipitation moves through the watershed. Flood volumes become higher and flood duration shortens, while the volume of low flows decreases and their duration increases (Leopold *et al.* 1964). Sediment movement patterns are also changed. The reduction or loss of vegetation on large portions of the watershed and floodplain increases sheet erosion and decreases uptake of precipitation.

Installation of piers for the new bridge will effectively remove a small area of critical habitat for spikedace, loach minnow, and razorback sucker. Approximately 369 cubic yards of concrete will be placed in waters of the U.S. to construct the pier footings. The permanent nature of the bridge and its piers will reduce and remove a small area of living space for fish and critical habitat during higher flows and if the river moves within the floodplain. A few (5 to 10) concrete barrier pieces (surrounding the drill pads) are also expected to be left in the floodplain adjacent to the Verde River where they sink into the moist soils.

Road and bridge construction will lead to permanent removal of about an acre of riparian vegetation (U.S. Fish and Wildlife Service 1999). Loss of riparian vegetation may destabilize streambanks, reduce cover and nutrient input, increase water temperatures, and remove or deplete the filtering capacity of the riparian zone for sediment and pollutants. Road construction and activity adjacent to the stream, even though vehicles are not entering the stream, may result in changes in riparian vegetation and stream channel morphology that reduces the quality and availability of spikedace, loach minnow, and razorback sucker critical habitat.

Drilling of the piers and future maintenance of the bridge will require vehicles to operate in the floodplain, but outside of the active channel. Critical habitat for all three fish can be affected by increased sediment deposition on the stream bottom. Adverse effects of stream sedimentation to fish habitat have been extensively documented (Murphy *et al.* 1981, Wood *et al.* 1990, Newcombe and MacDonald 1991, Barrett 1992, Waters 1995). Operation of vehicles in the dry channel can result in feeding loose sediment into the stream, and compaction of the floodplain. As a result, there may be short-term increase in sediment to the stream during construction of the piers.

While effects to critical habitat have been described in previous biological opinions, additional considerations are included due to the maintenance of temporary drilling and construction pads in the Verde River floodplain over portions of two rainy seasons (November 2002 to January 2004). There is an increased likelihood of this material entering the Verde River and adversely affecting critical habitat. Different than the original proposal, this material will persist in the floodplain immediately adjacent to the flowing river and small side channel for nearly a year (compared to three months, as described in previous opinions). Therefore, if flood pulses or stream flow increase over the next year, some or all of approximately 3,595 cubic yards of rocks and sediment could be expected to enter into the live stream (plus concrete barrier pieces). No asphalt or construction waste materials of any kind will be included in the fill. Even if a large flow does not move this material into the river, some of this loose material is likely to enter into

the active stream, and generate some increase in sedimentation. The increase of fill into the stream would increase sediment and larger substrate (rocks, small boulders, concrete barrier pieces, etc.) into the stream and could result in a temporary or long-term loss of fish habitat, and change in flow patterns, and possibly channel geomorphology.

The overall goal of the additional bridge is to facilitate and accommodate urbanization and recreation of the Verde Valley and Verde River (Sverdrup 1998, U.S. Fish and Wildlife Service 1999, HDR 2002). Continued urbanization and recreation is expected to continue to degrade designated critical habitat by simplifying plant communities; increasing animal mortality; displacing and disturbing wildlife; distributing refuse (Flather and Cordell 1995); reducing water quality, amount of water, and stream function; and increasing sedimentation. Cole and Landres (1995) reported that hiking, camping, fishing, and nature study, as well as use by ATVs, bicycles, etc., causes loss of surface organic horizons, compaction of mineral soil, reduction in macro and total porosity, reduction in infiltration rates, increases in soil erosion, and loss of vegetation. Other impacts include both reductions and increases in soil moisture and increases in diurnal and, perhaps, seasonal range of soil temperature. Increasing sedimentation, decreasing riparian habitat, plus changes in river function, water quality, and temperature will all adversely affect the constituent elements of designated critical habitat. Continued urbanization will likely increase the demand for sport fishing and increase the introduction of exotic species into the Verde River. While urbanization and recreation of the Verde Valley does not rely on the existence of the additional bridge, the reason for the bridge is to help facilitate these actions based upon the expectation these activities will occur. As a result, the continued and increased use of the Verde River in the action area due to urbanization and recreation, partly as a result of this bridge, is expected to adversely effect critical habitat.

Maintenance of the bridge will require periodic unspecified visits into the floodplain. All piers will exist within the 100-year floodplain. Therefore, the piers will be in the active channel in high flows, and possibly during low flows if the channel shifts location. It is uncertain how the additional bridge and the additions of parallel piers and another set of abutments will affect sediment deposition and/or river channel geomorphology. As a result, the addition of each pier could lead to increased storage of sediment, debris, and/or vegetation. ADOT may need to regularly inspect the bridge, monitor, and remove built up material, therefore increasing vehicle use in the floodplain, which could in turn have small but expected negative effects due to compaction of soil, trampling of vegetation, and small amount of sedimentation (Cole and Landres 1995, Flather and Cordell 1995). The developed road will be closed and gated, thus preventing other users from accessing the floodplain by ADOT's access road.

As stated in the first two opinions completed for this project, the addition of a parallel set of bridge piers and abutments could adversely affect channel geomorphology of the Verde River at the bridge, and upstream or downstream of the bridge. The current piers and abutments have not known to noticeably change flow pattern or channel geomorphology. The river in this area is characterized by predominately slow running water with some pooling at the edges of the main

flow channel (HDR 2002). However, an additional set of piers and abutments could begin a chain reaction of events that could lead to a variety of changes. The piers could cause the river to pool, leading to a deepening of the river, and as result, improve conditions for exotic predatory fish. Or, the addition of the piers could lead to the de-stabilization of existing banks and an increase in the width to depth ratio of the river, leading to higher river temperatures and accumulation of fine sediment. The location of the river's channel may change in the future as other anthropogenic or natural stresses occur to the river. While these instances are not expected to occur (HDR 2002), there are uncertainties when permanent structures are added to a river ecosystem that is constantly trying to adjust itself to address its dynamic nature. Those changes may, in conjunction with the permanent bridge structure, alter the geomorphology of the channel in ways that adversely affect critical habitat for spikedace, loach minnow, and/or razorback sucker.

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.

Most of the land along the Verde River in the Verde Valley through the towns of Clarkdale, Cottonwood, and Camp Verde is privately owned. Ongoing activities occurring on these private lands that would be cumulative to the proposed action include residential use and development, commercial development, gravel mining, road development, surface water diversion, stocking of non-native aquatic species, groundwater extraction, livestock grazing, and irrigated cropping. These activities are largely the cause for these species to be listed and continue to contribute to the degraded condition of the stream channel and fish habitat in Verde River.

Future residential and commercial development in Yavapai County and the Verde Valley will occur. The Arizona Department of Economic Security predicted that the year round population in Yavapai County from 1997 to 2010 would increase about 37 percent or about 2.8 percent annually (SWCA 2001). The Camp Verde Chamber of Commerce predicts that the population of their town will increase about 42 percent over the same time period (SWCA 2001). As a result, residential and commercial developments in the Verde Valley will escalate use of the Verde River's resources for water, recreation, agriculture, etc.

The future availability of surface water and groundwater to maintain river flow and other important river functions for listed species and critical habitat is threatened by groundwater pumping from the Big Chino aquifer at the headwaters of the Verde River. This aquifer provides 80 percent of the base flow of the upper Verde River (Wirt and Hjalmarsson 2000). Several cities, including Prescott, Prescott Valley, and Chino Valley have developed proposals to pump

water from this aquifer and deliver water through a pipeline to these growing communities. Future projects such as the pumping of the Big Chino aquifer are anticipated to significantly alter the hydrology and groundwater of the Verde River, and subsequently the maintenance and recovery of habitat for listed species.

The cumulative effects of development on fish habitat in the Verde Valley are significant. The expected growth, development, recreation, and reliance on the resources of the Verde River will escalate. Cooperative ecosystem management plans seem less feasible as the number of home owners increases and parcel size decreases and where there is no historical or contractual basis for shared land stewardship (Knight *et al.* 1995).

Land use practices in the Verde River, including those of the State, Tribal, private, and other lands are expected to continue to impact spikedace, loach minnow, razorback sucker and designated critical habitat for each of these fishes. Stream channelization, bank stabilization, or other instream management for water diversion are expected to impact fish and their habitat.

CONCLUSION

After reviewing the current status of the razorback sucker, spikedace, and loach minnow, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the 260 Bridge over the Verde River, as proposed, is not likely to jeopardize the continued existence of razorback sucker, spikedace or loach minnow. It is also our biological opinion that the proposed action is not likely to destroy or adversely modify critical habitat of razorback sucker, loach minnow, or spikedace. These conclusions are based on: 1) our inability to reasonably conclude that spikedace or loach minnow occur in the action area; 2) the localized area of direct impact and; 3) FHWA and ADOT's implementation of best management practices and proposed Conservation Measures to reduce and minimize adverse effects to razorback suckers and spikedace, loach minnow, and razorback sucker critical habitat. The Conservation Measures include avoiding entrance into the active water channel, and implementation of best management practices to reduce and minimize increase in sedimentation or spilling of toxic materials. These conclusions are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation 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 FHWA so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If FHWA (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, FHWA must report the progress of the action and its impact on the species to this office as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

We do not anticipate the proposed action will incidentally take any spikedace or loach minnow. We are unable to conclude with reasonable certainty that either species is present in the project area.

We anticipate that the proposed action will result in incidental take of razorback sucker through direct mortality and indirect mortality resulting from habitat loss and/or alteration. Adult, larval, or juvenile razorback sucker or eggs are expected to be injured or killed by excess sediment, rock materials, and concrete barrier pieces suddenly entering the Verde River. Take is expected to occur as a result of harassment from changes to fish habitat from construction of the new bridge and from excess sediment and materials entering the Verde River causing changes to river channel morphology and hydrologic regime, loss of breeding habitat, and watershed alteration. In the original 1999 biological opinion, we concluded that take of razorback sucker could not be directly quantified due to the lack of specific information about the abundance of razorback suckers in the action area; the time lag inherent in effects to hydrologic patterns and channel geomorphology; and the difficulty in observing and detecting mortality to larval, juvenile, and adult razorback suckers. As a result, we provided three surrogate measures to establish when incidental take is exceeded: 1) the proposed action is not implemented as planned; 2) more than 20 dead fish per event, of any species, are found within 0.5 miles of the construction area; 3) any spill of toxic materials occurs in the Verde River or its floodplain during, and as a result of, the proposed project activities.

As a result of the new project description and proposal to lengthen the time that construction equipment, materials, and actions will persist in the floodplain, the amount or extent of take will change from the original 1999 biological opinion. Spilling toxic materials (other than overspray of a few drops of paint) in the floodplain and/or Verde River and not conducting the project as

planned are considered changes to the project description not analyzed in this biological opinion. As a result, those measures will not be used as surrogate measures to determine when incidental take is exceeded. These instances should be evaluated to determine whether they should trigger reinitiation of consultation.

Similar to our 1999 opinion, we believe that take of razorback sucker can not be directly quantified due the lack of specific information about the abundance of razorback suckers in the action area, the time lag inherent in effects to hydrologic patterns and channel geomorphology, and the difficulty in observing and detecting mortality to larval, juvenile, and adult razorback suckers. As a result, we provide two additional surrogate measures (#2 and #3) to establish when incidental take is exceeded:

1. If dead razorback suckers are found within 0.5 miles of the construction area (downstream or upstream) that are believed to be caused by the construction activities associated with this project, incidental take would be exceeded; or

2. more than 3,595 cubic yards of fill material used for temporary construction and drill pads enters the Verde River over the entire construction period; or

3. At least half or 1,797 cubic yards of fill material enters the Verde River as a result of one flood event.

Effect of Take

In the accompanying biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to razorback sucker, spikedace, and loach minnow or destruction or adverse modification of razorback sucker, spikedace, and loach minnow critical habitat.

Reasonable and Prudent Measures and Term and Conditions

We believe the following reasonable and prudent measures and associated terms and conditions are necessary and appropriate to minimize take of the razorback sucker. These were given in the 1999 biological opinion and are repeated here for your convenience. Term and condition 1b. is new to this reinitiation.

1. FHWA shall conduct all proposed actions in a manner which will minimize direct mortality of razorback sucker.

    a. FHWA, ADOT and the construction contractors will use best management practices and use technical advise and biological information on ways to minimize adverse effects to razorback suckers and its habitat (e.g. protection against toxic spills into the river and floodplain, reduction of sedimentation, minimizing loss of riparian vegetation).

b. FHWA, ADOT, will ensure that the single maintenance and access road developed specifically for this project will be gated and locked when not in use following the completion of bridge construction, and that fences, boulders, or other functional barriers will prevent vehicles from bypassing the gate and entering the Verde River floodplain. These barriers and gates will be inspected and maintained at least four times per year for the life of the project. Evidence of this gate/barriers being vandalized and access to the Verde River floodplain originating from this location will trigger immediate attention in order to remedy the problem.

2. FHWA shall maintain complete and accurate records of actions which may result in take of razorback sucker.

   a. FHWA shall submit and annual report to this office each year through completion of activities related to construction within and immediately adjacent to the river corridor. This report shall include monitoring results for razorback sucker discovered at the construction site, a description and explanation of any project mitigation measures which were not implemented or which had a result not otherwise expected, and complete and accurate records of any incidental take that occurred during the course of the project.

   b. This office shall be notified immediately (602-242-0210) if more than 20 dead fish are detected during any one event within 0.5 miles upstream and 0.5 miles downstream of construction activities at the 260 bridge. Any construction actions that may be contributing to the introduction of toxic materials or other causes of fish mortalities must be immediately stopped while we are contacted and until we agree the situation is remedied. If upstream monitoring from the construction site demonstrates that the source of dead fish is not related to the construction activities, we are to be notified, but construction may proceed.

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. FHWA 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.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the our Law Enforcement Office, 2450 West Broadway Road, 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 work with Arizona Game and Fish Department and other land and wildlife management agencies to develop, fund, and implement a more thorough search for listed fish species, with an emphasis on spikedace, loach minnow, razorback sucker, and Colorado pikeminnow on the Verde River and across their range in Arizona.

2. We recommend that your agency work with Arizona Game and Fish Department and other land management agencies to develop, fund, and implement actions to help spikedace, loach minnow, razorback sucker, and Colorado pikeminnow recovery, including:

    a. renovation and repatriation efforts across the species' range;

    b. reduction in abundance and distribution of exotic fish species in key recovery areas;

    c. development of captive breeding facilities; and

    d. improvement in captive breeding techniques.

3. We recommend that your agency work with local communities to develop ordinances that would prevent future development from being at risk from natural river functions and thus the need to modify the river. Educate communities on issues such as maintaining dense riparian habitat and mesquite bosques along rivers to ensure control of erosion, slowing of flood forces, and filtering of pollutants. In conjunction, work to develop buffer zones between development and the 100-year floodplain that would protect and prevent damage to permanent structures, pavement, roads, agricultural fields, etc.

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

REINITIATION NOTICE

This concludes formal consultation on the second reinitiation of the construction of the highway 260 Bridge over the Verde River on spikedace, loach minnow, razorback sucker, and designated critical habitat for all three of these species. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate FHWA and ADOT's efforts to identify and minimize effects to listed species and designated critical habitat from this project. For further information please contact Greg Beatty (x247) or Debra Bills (x239). Please refer to the consultation number, 02-21-98-F-403R2, in future correspondence concerning this project.

Sincerely,

Steven L. Spangle
Field Supervisor

Enclosures (Tables and Maps)

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)

Rick Duarte, Arizona Department of Transportation, Phoenix, AZ
John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Rob Bettaso, Arizona Game and Fish Department, Phoenix, AZ
Bob Posey, Arizona Game and Fish Department, Kingman, AZ
Tom Bonomo, Prescott National Forest, Camp Verde, AZ
Mike Leonard, Prescott National Forest, Prescott, AZ

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Tables and Maps
(see attached)