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AESO/SE
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September 9, 2013

Karla S. Petty
Arizona Division Administrator
U.S. Department of Transportation
Federal Highway Administration
4000 North Central Avenue, Suite 1500
Phoenix, Arizona 85012-3500

RE: Replacement of the State Route 77 Bridge over Aravaipa Creek in Pinal County, Arizona [File Number 077-A(206)T, HOP-AZ]

Dear Ms. Petty:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated March 18, 2013, and received by us on March 19, 2013. At issue are impacts that may result from the proposed replacement of the State Route (SR) 77 Bridge over Aravaipa Creek in Pinal County, Arizona. The proposed action may adversely affect the loach minnow (*Tiaroga cobitis*) and its critical habitat and the spikedace (*Meda fulgida*) and its critical habitat.

In your memorandum, you requested our concurrence that the proposed action is not likely to adversely affect the Gila topminnow (*Poeciliopsis occidentalis occidentalis*), desert pupfish (*Cyprinodon macularius*), and southwestern willow flycatcher (*Empidonax traillii extimus*) and its critical habitat. We concur with those determinations and provide our rationale in Appendix A at the end of this Biological Opinion (BO).

This biological opinion is based on information provided in the February 8, 2013, biological assessment, telephone conversations, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, recreation and road management, their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

- November 7, 2012. We received your request for concurrence that the proposed action may affect, but will not adversely affect the loach minnow and its critical habitat, spikedace and its critical habitat, desert pupfish, or Gila topminnow.
- November 30, 2012. We sent you a letter stating that we could not concur with your determinations for loach minnow and its critical habitat or spikedace and its critical habitat, and encouraged you to ensure that the administrative record for the proposed action fully documents the basis for the "no effect" determination for the southwestern willow flycatcher and its critical habitat.
- March 19, 2013. We received your request for formal consultation.
- August 9, 2013. We sent you the draft BO for your review and comments.
- August 23, 2013. We received your comments on the draft BO by e-mail.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Refer to the BA for more detailed information regarding the proposed action.

You are planning a bridge replacement for the Aravaipa Creek Bridge (structure number 399) located on SR 77 at MP 123.52 (Figure 1). Additional minor roadway improvements will be conducted between MP 123.37 and MP 123.68, although the project limits will extend from MP 123.00 to MP 124.00 to account for traffic control measures during construction. The project would replace the bridge including the piers and abutments in order to maintain traffic along SR 77 across Aravaipa Creek. The scope of work consists:

- Removing the existing seven-span continuous steel girder bridge. The current bridge measures 397 feet long and 28 feet wide with an average vertical clearance of approximately 10 feet from the ground surface to the underside of the bridge deck.
- Constructing a new non-span cast-in-place concrete closed-frame structure with a concrete floor and concrete barriers across Aravaipa Creek. The new structure would measure approximately 392 feet long, 48 feet wide, and have an approximate average vertical clearance of ten feet from the finished ground surface to the underside of the new structure.
- Constructing six foot deep concrete cut-off walls on both the upstream and downstream ends of the floor's concrete slab.
- Backfilling the floor of the new structure with native material to a minimum depth of approximately three feet.
- Constructing a temporary access road west of the bridge which will be used by the contractor and a local farmer to move equipment during construction.
- Removing and replacing the guardrail on either side of the bridge.

- Constructing twenty-four linear feet of embankment curb and spillways on both sides of the roadway southeast of the bridge.
- Widening the roadway to add a twelve-foot shoulder northbound and ten-foot shoulder southbound to match the lane configuration of the new bridge.
- Widening a reinforced concrete box culvert at MP 123.43 to accommodate the new roadway width.
- Widening the access to a driveway southwest of SR 77 at MP 123.39.
- Removing the access to Tejas Street from SR 77 at MP 123.63.
- Paving PZ Ranch Road to serve as the new access to Tejas Street.
- Restriping the SR 77 roadway.
- Reseeding disturbed areas with plant species native to the project vicinity.

Because work would occur within Aravaipa Creek for approximately twelve months, a flow diversion/maintenance plan will be implemented to maintain water flow within Aravaipa Creek channel for the duration of construction. The flow diversion/maintenance plan would consist of:

- A temporary low flow channel constructed through the third span from the north end of the new bridge in order to maintain flow during the majority of the construction.
- Floor construction would occur in stages with diversion of water flow alternating between the north and south sides of the channel opposite of construction activities.
- Multiple low-flow pipes would be placed as necessary under the temporary construction access road located east of the bridge site in order to maintain water flow in the temporary channels.
- After construction is complete, temporary low flow channels, low flow pipes, and the construction access road would be removed, and pre-construction flow channel alignment would be restored.

The project would occur within the 200-foot-wide ADOT right-of-way (ROW). No new ROW, easements, or temporary construction easements would be required. Construction is expected to occur during daylight hours, and no blasting would be required.

Staging and stockpiling would occur northeast and southeast of the bridge within the ADOT ROW between the roadway and ROW fence. Excess material removed during construction would be placed at designated stockpiling locations within the existing ADOT ROW. Construction is anticipated to begin in the summer of 2013 and would take approximately twelve months. The bridge would be built in two phases allowing traffic to be maintained throughout construction. One travel lane would remain open at all times and traffic controls would facilitate alternating northbound and southbound traffic. Temporary traffic control and signage would span the entire project limits.

The project will result in approximately 3.3 acres of disturbance to unpaved surfaces between MP 123.37 and MP 123.68, with 0.36 acre of this within the active channel. Approximately 2.36 acres of vegetation would be removed due to roadway widening, bridge construction, and new access to Tejas Road, including approximately1.2 acres of riparian trees and shrubs. Disturbed ground surfaces that are to remain natural after construction will be returned to pre-construction contours, and all currently vegetated areas will be reseeded with plant species native to the project vicinity. Construction of staging and stockpiling areas, temporary access, and flow diversion will impact 0.95 acre of additional unpaved surfaces, and result in up to 0.24 acre of riparian tree and shrub removal to the east of SR 77, on both the north and south banks of Aravaipa Creek. However, these areas would remain natural ground surfaces and be reseeded with native plant species once construction is complete. In addition, cottonwood (*Populus* sp.) pole plantings will occur in the ROW east of the bridge, with ten trees planted on the south bank and five trees planted on the north bank.

The majority of vegetation removal would result from cut/fill activities associated with re-grading slopes along SR 77 and thus will remain natural ground surface and be reseeded with native species once construction is complete. Riparian species that would be removed for construction are primarily shrubby mesquite trees, with the potential for additional species including a few small tamarisk, desert broom, willow, and ash. Although the majority of the vegetation that will be removed is small and shrubby, at least one large cottonwood tree directly adjacent to the bridge will be removed for construction of the new bridge. The general area is largely undeveloped with scattered rural residences. Surrounding land use includes ranching, farming, and recreation.

Wetlands or perennial sources of water are not present in the project area. Seasonal surface water is present in Aravaipa Creek, which has a semi-permanent low flow channel, and in several irrigation ditches in the project area. Seasonal ponding occurs on the southern edge of Aravaipa Creek riparian corridor as a result of irrigation run-off from adjacent pastures and agricultural fields. Within the project area, Aravaipa Creek is a low gradient ephemeral drainage with the highest flows generally resulting from summer precipitation (mid-July to September) and steady flows occurring in late winter (mid-January to March). The riverbed and adjacent floodplain is comprised of mostly sand and gravel, with small and medium cobbles (one inch to one foot diameter) in some areas. Flow direction is from east to west. The perennial reaches of Aravaipa Creek are approximately 4.5 mile upstream (east) of the project limits, and the confluence with the San Pedro River is approximately 0.25 mile downstream (west) of the project limits. During an April 24, 2011, site visit, water was present in the low-flow channel of Aravaipa Creek. Surface water varied in width from two to twelve feet within the project area, and had an approximate depth of one to six inches.

Upland vegetation north of Aravaipa Creek in the project area, and in the general vicinity, consists of scattered Sonoran desert trees, shrubs, and cacti. Dense, multistoried, broadleaf riparian vegetation is also present in the general area along the San Pedro River approximately 0.25 mile west of the project limits. Within the project area, xeric and broadleaf riparian vegetation occurs along Aravaipa Creek and irrigation ditches, although closed canopy, multi-storied, gallery forests and aquatic emergent vegetation are not present. Due to scour, vegetation in the creeks active channel is sparse with small tamarisk and desert

broom scattered along sand and gravel bars. Riparian vegetation is also present along irrigation ditches adjacent to SR 77 and south of Aravaipa Creek. Ground cover is generally lacking except for occasional patches of annual vegetation and denser patches of perennial grasses and forbs along the irrigation ditches.

Conservation Measures

The following conservation measures will be implemented as part of the proposed action:

1. All earth-moving and hauling equipment shall be washed at the contractor's storage facility prior to entering the construction site to prevent the introduction of invasive species seeds.
2. All disturbed soils that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity.
3. All construction equipment will be inspected, and all attached plant/vegetation and soil/mud debris will be removed prior to leaving the construction site to prevent invasive species seeds from leaving the site.
4. A biologist that has the appropriate Federal and State permits to capture and relocate federally-listed fish and amphibians (permitted biologist) shall, prior to any construction-related diversion or work within the channel of Aravaipa Creek when water is flowing, erect temporary barriers/drift nets upstream and downstream of the project limits to exclude fish from entering. The area between the barriers/drift nets will be surveyed to detect native fish and frog species. Any native fish or frogs present within the barriers/drift nets and isolated pools will, under the authority of appropriate State and Federal permits, be removed and relocated on the downstream side of the downstream barrier. These barriers/drift nets will be maintained while water is flowing in the channel and work is continuing within the channel. If work in the channel is continuous while water is flowing, a permitted biologist will check within the barriers/drift nets and isolated pools at least twice per week, and remove and relocate to the downstream side of the downstream barrier any native fish or frogs within the barriers/drift nets and pools.
5. No project related activities shall occur within Aravaipa Creek when water flows within Aravaipa Creek exceed the low flow channel.
6. No work shall occur in the active low flow channel during low flow conditions unless a permitted biologist has placed barriers/drift nets at the upstream project limits and has visually inspected the project limits to ensure that no fish are present.
7. Work will stop immediately within the active channel and a permitted biologist will be notified if any fish are observed in the project area downstream of the barriers/drift nets while work is occurring in the active low channel. Any activities in the active channel will cease and will not resume until a permitted biologist ensures that fish are no longer in the area.
8. All vehicular and personnel traffic across the active low flow channel will be restricted to the approved access road when surface water is present during low flow conditions.

9. Water flow will not be impeded by construction activities. Multiple low flow pipes, no small than 36 inches in diameter, will be place in the active low flow channel to maintain flows beneath the access road.
10. No dewatering activities will occur until the approved sediment control measures are in place downstream of all dewatering activities in Aravaipa Creek. No water from dewatering activities will be returned to the active Aravaipa Creek channel without first passing through approved sediment control measures (e.g., stilling basin).The action area consists of the project area and the extent of any effects emanating from the proposed action. The action area for this proposed action is the project area, Aravaipa Creek downstream to the confluence with the San Pedro River (approximately 0.25 mile), and at the confluence of Aravaipa Creek and San Pedro River.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Loach Minnow

The loach minnow (*Tiaroga cobitis)* was reclassified as an endangered species on February 23, 2012 (77 FR 10810), and was originally listed as a threatened species on October 28, 1986 (51 FR 39468). Critical habitat has been designated (March 8, 1994 - 59 FR 10898) and redesignated (April 25, 2000 – 65 FR 24328; March 21, 2007 – 72 FR 13356) in response to legal concerns and policy changes (see summary discussion at 75 FR 66482, p. 66485). The current critical habitat designation was published simultaneously with the reclassification of loach minnow to endangered status on February 23, 2012 (77 FR 10810).

Background

The loach minnow is a small fish from the minnow family Cyprinidae. Loach minnow are olivaceous in color, and highly blotched with darker spots. Whitish spots are present at the front and back edges of the dorsal fin, and on the dorsal and ventral edges of the caudal fin. A black spot is usually present at the base of the caudal fin. Breeding males have bright red-orange coloration at the bases of the paired fins and on the adjacent body, on the base of the caudal lobe, and often on the abdomen. Breeding females are usually yellowish on the fins and lower body (Minckley 1973; USFWS 1991).

The limited taxonomic and genetic data available for the loach minnow indicate there are substantial differences in morphology and genetic makeup between remnant loach minnow populations. Tibbets (1993) concluded that results from mitochondrial DNA and allozyme surveys indicate variation for the loach minnow follows drainage patterns, suggesting little gene flow among rivers. The levels of divergence present in the data set indicated that populations within rivers are unique, and represent evolutionarily independent lineages. The main difference between the mtDNA and allozyme data was that mtDNA suggest that the San Francisco/Blue and Gila groups of loach minnow are separate, while the allozyme data places the Gila group within the San Francisco/Blue group. Tibbets (1993) concluded that the level of divergence in both allozyme and mtDNA data indicated that all three main populations (Aravaipa Creek, Blue/San Francisco Rivers, and Gila River) were historically isolated and represent evolutionarily distinct lineages.

The 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 use the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al*. 1988; Propst and Bestgen 1991; 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 feed 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).

Distribution

Loach minnow are believed to occupy approximately 15 to 20 percent of their historical range, and are now restricted to portions of the Gila River and its tributaries, the West, Middle, and East Fork Gila River (Grant, Catron, and Hidalgo Counties, New Mexico) (Paroz and Propst 2007, p. 16; Propst 2007, pp. 7–8, 10–11, 13–14; Propst et al. 2009); the San Francisco and Tularosa rivers and their tributaries Negrito and Whitewater creeks (Catron County, New Mexico) (Propst *et al.* 1988, p. 15; Arizona State University (ASU) 2002; Paroz and Propst 2007, p. 16; Propst 2007, pp. 4–5); the Blue River and its tributaries Dry Blue, Campbell Blue, Pace, and Frieborn creeks (Greenlee County, Arizona and Catron County, New Mexico) (Miller 1998, pp. 4–5; ASU 2002; Carter 2005, pp. 1–5; Carter 2008a, pers. comm.; Clarkson *et al.* 2008, pp. 3–4; Robinson 2009a, p. 3); Aravaipa Creek and its tributaries Turkey and Deer creeks (Graham and Pinal Counties, Arizona) (Stefferud and Reinthal 2005, pp. 16–21); Eagle Creek (Graham and Greenlee Counties, Arizona), (Knowles 1994, pp. 1–2, 5; Bagley and Marsh 1997; pp. 1–2; Marsh *et al.* 2003; pp. 666–668; Carter *et al.* 2007, p. 3; Bahm and Robinson 2009, p. 1); and the North Fork East Fork Black River (Apache and Greenlee Counties, Arizona) (Leon 1989, pp. 1–2; Lopez 2000, pers. comm.; Gurtin 2004, pers. comm.; Carter 2007a, p. 2; Robinson *et al.* 2009, p. 4); and possibly the White River and its tributaries, the East and North Fork White River (Apache, Gila, and Navajo Counties, Arizona).

Loach minnow have recently been placed in additional streams as part of the recovery efforts for the species. In 2007, loach minnow were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a; Orabutt 2009, pers. comm.; Robinson *et al.* 2010a; Robinson *et al.* 2010b; Robinson 2011a, pers. comm.). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Augmentation efforts have been suspended at Hot Springs Canyon to allow managers

to better evaluate if recruitment of loach minnow is occurring without further augmentation. Monitoring will continue at this site, and future augmentations may occur if needed.

In 2007, loach minnow were translocated into Fossil Creek, within the Verde River subbasin (Carter 2007b), with additional fish added in 2008 and 2011 (Carter 2007b; Carter 2008b; Robinson 2009b; Boyarski *et al.* 2010; Robinson 2011b). In 2008, loach minnow were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (Blasius 2008, pers. comm.; Robinson 2008b, pers. comm.). Augmentations at Bonita Creek have been temporarily suspended due to re-invasion of by nonnative species above the fish barrier. We anticipate that augmentations with additional fish will occur for the next several years at these sites, if adequate numbers of fish are available, and habitats remain suitable. Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will ultimately be successful and result in establishment of new populations of loach minnow in these locations.

Critical Habitat

When critical habitat was designated in 2012, the Fish and Wildlife Service determined the primary constituent elements (PCEs) for loach minnow. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see 77 FR 10810, p. 10837), which are summarized in Table 1 below.

The loach minnow critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins. Critical habitat has been designated in each of these subbasins (See 77 FR 10810 for additional detail).

Our information indicates that, rangewide, more than 390 consultations have been completed or are underway for actions affecting spikedace and loach minnow, which often co-occur. The majority of these opinions concerned the effects of road and bridge construction and maintenance, grazing, water developments, fire, species control efforts, or recreation. There are a high number of consultations for urban development and utilities, however, these projects typically do not result in adverse effects to the species but are for technical assistance only. Small numbers of projects occur for timber, land acquisition, agriculture, sportfish stocking, flooding, Habitat Conservation Planning, native fish restoration efforts, alternative energy development, and mining.

Table 1. Primary Constituent Elements (PCEs) for Loach Minnow.

PCE	Description
Abundant Aquatic Insect Food Base	mayflies, true flies, black flies, caddis flies, stoneflies, and dragonflies.
Flows	Perennial flows or interrupted stream courses that are periodically dewatered but serve as connective corridors between occupied or seasonally occupied habitats
Depth	Generally less than 3.3 feet
Velocities	Slow to swift velocities between 0.0 and 31.5 inches per second
Stream Microhabitats	Pools, runs, riffles, and rapids
Substrate	Gravel, cobble, and rubble with low or moderate amounts of fine sediment and substrate embeddedness
Gradient	Less than 2.5 percent
Elevation	8,200 feet or less
Water Temperatures	46.4 to 77 degrees Fahrenheit
Pollutants	No or low levels present
Nonnative Aquatic Species	None, or present at levels sufficiently low as to allow persistence of loach minnow
Flow Regime	Natural and unregulated, or if modified or regulated, regimes that allow for adequate river functions, such as flows capable of transporting sediments.

Spikedace

The spikedace (*Meda fulgida*) was reclassified as an endangered species on February 23, 2012 (77 FR 10810), and was originally listed as a threatened species on July 1, 1986 (51 FR 23769) and reclassified as endangered on February 23, 2012 (77 FR 10810). Critical habitat has been designated (March 8, 1994 - 59 FR 10906) and redesignated (April 25, 2000 - 65 FR 24328; March 21, 2007 - 72 FR 13356) in response to legal concerns and policy changes (see summary discussion at 75 FR 66482, p. 66485). The current critical habitat designation was published simultaneously with the reclassification of spikedace to endangered status on February 23, 2012 (77 FR 10810).

Background

The spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). 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 spawn from March through May with some yearly and geographic variation (Barber *et al*. 1970; Anderson 1978; Propst *et al*. 1986). Actual spawning has not been observed in the wild, but spawning behavior and 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). Additional details on habitat preferences are provided in the 2012 critical habitat designation (77 FR 10810).

Distribution

The spikedace was once common throughout much of the Gila River basin, including the mainstem Gila River upstream of Phoenix, and the Verde, Agua Fria, Salt, San Pedro, and San Francisco subbasins. Habitat destruction and competition and predation by nonnative aquatic species reduced its range and abundance (Miller 1961; Lachner *et al.* 1970; Ono *et al.* 1983; Moyle 1986; Moyle *et al.* 1986; Propst *et al.* 1986). Spikedace are now restricted to portions of the upper Gila River (Grant, Catron, and Hidalgo Counties, New Mexico); Aravaipa Creek (Graham and Pinal Counties, Arizona); Eagle Creek (Graham and Greenlee Counties, Arizona); and the Verde River (Yavapai County, Arizona) (Marsh *et al.* 1990; Brouder 2002; pers. comm.; Stefferud and Reinthal 2005; Paroz *et al.* 2006; Propst 2007).

In 2007, spikedace were translocated into Hot Springs Canyon, in Cochise County, Arizona, and Redfield Canyon, in Cochise and Pima Counties, Arizona, and these streams were subsequently augmented (Robinson 2008a; Robinson 2008b, pers. comm.; Orabutt 2009, pers. comm.; Robinson 2009a; Robinson *et al.* 2010a; Robinson *et al.* 2010b; Robinson 2011a, pers. comm.). Both Hot Springs and Redfield canyons are tributaries to the San Pedro River. Augmentation efforts have been suspended in Redfield Canyon due to drought and a lack of adequate flowing water. Augmentation efforts have been suspended at Hot Springs Canyon to allow managers to better evaluate if recruitment of spikedace is occurring without further augmentation. Monitoring will continue at this site, and future augmentations may occur if needed.

Spikedace were translocated into Fossil Creek, a tributary to the Verde River in Gila County, Arizona, in 2007, and were subsequently augmented in 2008 and 2011 (Carter 2007; Carter 2008; Robinson 2009b; Boyarski *et al.* 2010; Robinson 2011b).

In 2008, spikedace were translocated into Bonita Creek, a tributary to the Gila River in Graham County, Arizona (Blasius 2008, pers. comm.; Robinson *et al.* 2009), and were repatriated to the upper San Francisco River in Catron County, New Mexico (Propst 2010, pers. comm.). Augmentations at Bonita Creek have been temporarily suspended due to re-invasion by nonnative species above the fish barrier. We anticipate that augmentations with additional fish will occur for the next several years at all sites, if adequate numbers of fish are available and habitats remain suitable. Monitoring at each of these sites is ongoing; however, insufficient time has elapsed to allow us to determine if these translocation efforts will

ultimately be successful and result in establishment of new populations of spikedace in these locations.

The spikedace is now common only in Aravaipa Creek in Arizona (Arizona State University (ASU) 2002; Reinthal 2008, pers. comm., Reinthal 2011) and one section of the Gila River south of Cliff, New Mexico (NMDGF 2008; Propst *et al.* 2009). The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey (Brouder 2002, pers. comm.; AGFD 2004). Spikedace from the Eagle Creek population have not been seen for over a decade (Marsh 1996), although they are still thought to exist in numbers too low for the sampling efforts to detect (Carter *et al.* 2007; see Minckley and Marsh 2009). The Middle Fork Gila River population is thought to be very small and has not been seen since 1991 (Jakle 1992), but sampling is localized and inadequate to detect a sparse population.

Planning among several State and Federal agencies is underway for restoration of native fish species, including spikedace, in the Blue River through construction of a barrier that will exclude nonnative fish from moving upstream from the lower San Francisco River, and allow for translocation of spikedace. Barrier construction was completed in mid-2012, and plans are underway to translocate spikedace to the Blue River.

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).

Critical Habitat

When critical habitat was designated in 2012, the Fish and Wildlife Service determined the primary constituent elements (PCEs) for spikedace. PCEs include those habitat features required for the physiological, behavioral, and ecological needs of the species. The PCEs describe appropriate flow regimes, velocities, and depths; stream microhabitats; stream gradients; water temperatures; and acceptable pollutant and nonnative species levels (see 77 FR 10810, p. 10837), which are summarized in Table 2 below.

The spikedace critical habitat designation includes eight units based on river subbasins, including the Verde River, Salt River, San Pedro, Bonita Creek, Eagle Creek, San Francisco River, Blue River, and Gila River subbasins (See 77 FR 10810 for additional detail on occupancy by subbasin). Critical habitat has been designated in each of these subbasins (See 77 FR 10810 for additional detail).

Our information indicates that, rangewide, more than 390 consultations have been completed or are underway for actions affecting spikedace and loach minnow, which often co-occur.

The majority of these opinions concerned the effects of road and bridge construction and maintenance, grazing, water developments, fire, species control efforts, or recreation. There are a high number of consultations for urban development and utilities, however, these projects typically do not result in adverse effects to the species but are for technical assistance only. Small numbers of projects occur for timber, land acquisition, agriculture, sportfish stocking, flooding, Habitat Conservation Planning, native fish restoration efforts, alternative energy development, and mining.

Table 2. Primary Constituent Elements (PCEs) for Spikedace (77 FR 10810).

PCE	Description
Flows	Perennial, or interrupted stream courses that are periodically dewatered but serve as connective corridors between occupied or seasonally occupied habitats
Depth	Generally less than 3.3 feet (1 meter)
Velocities	Slow to swift, between 1.9 and 31.5 inches per second (5 and 80 centimeters/second)
Stream Microhabitats	Glides, runs, riffles, margins of pools and eddies
Substrate	Sand, gravel, and cobble, with low or moderate amounts of fine sediment and substrate embeddedness
Gradient	Less than approximately 1.0 percent
Elevation	Below 6,890 feet (2,100 meters)
Water Temperatures	Between 46.4 to 82.4 degrees Fahrenheit; 8.0 to 28.0 degrees Celsius
Pollutants	No or low levels present
Nonnative Aquatic Species	None, or present at levels sufficiently low as to allow persistence of spikedace
Flow Regime	Natural and unregulated, or if modified or regulated, regimes that allow for adequate river functions, such as flows capable of transporting sediments.

ENVIRONMENTAL BASELINE

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

Description of the Action Area

The action area consists of the project area and the extent of any effects emanating from the proposed action. The action area for this proposed action is the project area, Aravaipa Creek downstream to the confluence with the San Pedro River (approximately 0.25 mile), and at the confluence of Aravaipa Creek and San Pedro River.

A. Status of the species and critical habitat within the action area

Loach Minnow and Spikedace

Loach minnow and spikedace are unlikely to occur within the project area because Aravaipa Creek within the project area has water flows only during parts of the year dependent on local and upstream rain events (summer and winter/spring rains). Loach minnow and spikedace may occur temporarily within the project area during these events when they may be carried downstream from upper Aravaipa Creek where they are found year-round (approximately five miles upstream of the project area). We do not expect either species to be present during most of the year and likely not every year, within the project area. Habitat characteristics in the action area are present for the species if water is present, but we expect non-native predators and competitors in the project area when water is flowing, and non-natives in the confluence with the San Pedro River, that will limit or preclude the presence of these species.

Critical Habitat

In the action area, loach minnow and spikedace critical habitat has been designated in Aravaipa Creek within the project area and downstream to the confluence with the San Pedro River (within Unit 3). The action area has one or more of the PCEs that are sufficient to maintain the species, except that water does not generally flow year round within the project area. The confluence likely has all the PCEs for the species, except that non-native predators may be prevalent.

Recovery and Critical Habitat Management

The recovery plan does not specifically identify bridge construction as an action that may affect habitat for the loach minnow. The only recovery objective related to bridge construction is to manage protected lands in ways that are consistent with the perpetuation of loach minnow populations. The listing rule (77 FR 10810) identifies some actions that may affect the PCEs of critical habitat and that could trigger the need for section 7 consultation to determine if those actions could result in the destruction or adverse modification of critical habitat. These include, but are not limited to:

1. Actions that would significantly diminish flows within the active stream channel.
2. Actions that significantly alter the water chemistry of the active channel.
3. Actions that would significantly increase sediment deposition within a stream channel.

4. Actions that could result in the introduction, spread, or augmentation of aquatic species in occupied stream segments, or in stream segments that are hydrologically connected to occupied stream segments, even if those segments are occasionally intermittent, or introduction of other species that compete with or prey on spikedace or loach minnow.
5. Actions that would significantly alter channel morphology.

Critical habitat managed to maintain or improve the PCEs for loach minnow or spikedace over time will maintain or improve these characteristics.

B. Factors affecting species environment and critical habitat within the action area

The action area has been and continues to be adversely affected by natural events, such as fire, flood, or drought, and from non-native species invasions, recreation activities, water withdrawal, improper livestock grazing, and/or other land-use practices on non-Federal lands. Past and current actions in the action area are resulting in some adverse effects to the species, with the action area likely not maintaining favorable conditions for either species in lower Aravaipa Creek and in the San Pedro River.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Loach minnow and spikedace

In the unlikely event that individual loach minnows or spikedace are present in the action area, they could be killed or injured due to construction activities in the river bed. If individuals are present, the conservation measures of placing barriers/drift nets and halting construction actions in Aravaipa Creek while fish are present will minimize the likelihood of mortality or injury. Construction of the concrete slab and additional piers will likely result in temporarily leaching salts, lime, catalysts, and potentially other toxic materials into the system. Gila topminnow and desert pupfish were killed by leachates from concrete fish ponds constructed at the Phoenix Zoo (M. Demlong, AGFD, Phoenix, pers. comm. 2000), with toxicity in this closed system extending in time to nine months. The example from the Phoenix Zoo is an extreme example because the ponds were closed systems in which the substrate was curing concrete. Aravaipa Creek is an open system with continuously running water above and below the surface. We do not know specifically the distance at which effects to fish attenuate, the length of time necessary for leachates to move through or disperse from the system, or be diluted to the point where they no longer cause adverse effects. Generally, we expect leachate concentrations to decrease quickly as they move from the project site because of the seasonal water flow and because of the flash flooding that

occurs (mainly in the summer). Concentrations that result in adverse effects, including mortality to aquatic animals, will be more likely during and immediately after construction at the project site, with effects decreasing the farther in distance from the project site and in time from construction. We expect any leaching that is toxic to aquatic animals to last less than nine months (toxicity time for the Phoenix Zoo ponds) because the open, continuous flow of the river will leach and disperse the contaminants fairly quickly. The likelihood of the project resulting in mortality or injury is low because both species are likely absent or very rare within the action area.

Project construction will directly and indirectly impact the habitat in Aravaipa Creek. The temporary diversions of the creek will temporarily alter the flow regimes. Construction of the low-flow channel and access road will temporarily increase suspended soils (turbidity) in surface water flowing through and downstream of the project limits. Suspended soil transported during or after construction and re-deposited downstream could result in temporary modification of loach minnow and spikedace habitat. Some inert debris waste (e.g., concrete rubble) may enter the river, which may alter river habitats and flow regimes for aquatic wildlife, including loach minnows and spikedace. Because this debris will be removed from the river channel during and after project implementation, effects on aquatic wildlife would be temporary within the project area and insignificant downstream of the project area once the natural flow regimes return. The pre-project habitat characteristics are expected to return to pre-project conditions, except for the permanent changes at the bridge site. Water flow is expected to return to pre-project conditions after the project is completed.

Approximately 0.46 acre of habitat will be permanently altered where the concrete floor will be constructed. Sediment will be removed where the concrete floor will be constructed, but the new floor will be constructed below the grade of the existing ground surface and backfilled with native material to a minimum depth of three feet. Very large storm events (e.g., 500-year flood event) may expose the concrete floor temporarily, but most storm events would not expose the floor and substrates would be deposited at and near the bridge as occurs currently.

All other disturbance to habitat (one to two acres) will be temporary. No channel constriction would occur because the new structure will be the same width as the existing structure, so flow velocities and regime will not be altered. Riparian vegetation will be altered, but, generally, will return because these areas will be seeded or planted as part of the proposed action.

Critical Habitat

Effects to critical habitat PCEs are the same as described for habitat in the previous paragraphs. Critical habitat for the loach minnow includes 300 lateral feet beyond the bankfull stage (that level of stream discharge reached just before flows spill out onto the adjacent floodplain) where the PCEs may exist. Based on the boundary of critical habitat, this project will result in the permanent modification of approximately 0.46 acre of critical habitat (are under the new bridge). This area is unlikely to maintain most PCEs in the future. Temporary effects to PCEs in the action area may occur within and downstream of the

project area, including changes to the flow of water, amounts of fine sediment and substrate embeddedness, contaminants, and the aquatic food base. As stated above, these downstream changes are expected to be temporary during project implementation, and are expected to return to pre-project conditions after the project is complete.

Recovery and Critical Habitat Management

Permanent alteration of critical habitat is expected on 0.46 acre from the presence of the concrete. Most PCEs, except for water flow, are expected to be absent under the bridge after implementation. This loss represents a very small percentage of the critical habitat for loach minnow and spikedace, considering that there are 27.9 miles in Aravaipa Creek, 46.1 miles for loach minnow and 43.8 miles for spikedace in Complex 3, and 610 miles of loach minnow and 630 miles of spikedace designated critical habitat within their range. Because the loss of critical habitat is a very small portion of the total critical habitat in Complex 3 and throughout its range, the proposed action will not compromise the recovery potential of loach minnow or spikedace critical habitat in Complex 3 or throughout its range. Effects to PCEs within and downstream of the project site are temporary, as described in the previous paragraph, and will not compromise the recovery potential of loach minnow critical habitat.

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.

Human development, recreational site encroachment, and changes in land-use patterns on non-Federal lands around occupied and potentially-occupied reaches of Aravaipa Creek the San Pedro River that further fragment, modify, or destroy upland or riparian vegetation negatively affect water quality and quantity. Increased development and continuation of agricultural and livestock grazing practices may result in the drainage, development, or diversions of wetland and aquatic habitats that reduce water quantity and quality, and destroy spawning and other important habitats

Farming and ranching activities occur in the action are along Aravaipa Creek and the San Pedro River in the uplands, on private, federal, and state lands. Groundwater pumping, surface water diversions, agricultural return flows, flood control activities, and channelization projects could potentially alter flows through the project area, which would affect both aquatic and terrestrial species and their habitats. In addition, recreational activities including hiking, hunting, picnicking, birding, horseback riding, primitive camping, off-highway vehicle driving, geocaching, will continue and may increase. Increase in recreation may have additive impacts to the species and their habitats.

CONCLUSION

After reviewing the current status of each species and its critical habitat, the environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the loach minnow or spikedace, is not likely to destroy or adversely modify designated critical habitat for loach minnow and spikedace. We base these conclusions on the following reasons:

- We anticipate that there will be few or no direct effects to loach minnow or spikedace individuals from the proposed action because these species are either absent or rare, and conservation measures will be implemented to minimize the likelihood of harm to any individuals that may occur (e.g., barriers/drift nets, no activities when individuals are present).

- Permanent alteration of current habitat will be approximately 0.46 acre, which will not reduce the suitability of the general area for loach minnow or spikedace.

- Permanent alteration (loss) of approximately 0.46 acres of critical habitat represents a very small percentage of the critical habitat for loach minnow, considering that there are approximately 25 miles in Complex 3 and over 600 miles total of designated loach minnow and spikedace critical habitat. As a result, the proposed action will not compromise the recovery potential of loach minnow critical habitat in Complex 3 or throughout its range.
- Other effects to habitat, including critical habitat, at and downstream of the project site will be temporary, and we expect the pre-project habitat characteristics and water flow to return after the project is completed.

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

The conclusions of this biological opinion are based on full implementation of the proposed action 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

We do not anticipate that implementation of the proposed action is reasonably certain to result in the incidental take of any loach minnow or spikedace because these species are very rare or absent in the action area and, thus, are very unlikely to be directly or indirectly affected by implementation of the proposed action. In addition, effects to the habitat of the fish that may result in harm are comparatively small in extent or are temporary.

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, Resident Agent in Charge, 4901 Paseo del Norte NE, Suite D, Albuquerque, New Mexico, 87113, telephone: (505) 248-7889, within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph 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.

- Monitor the reestablishment of tamarisk and native riparian vegetation in all disturbed areas to determine the rate of recolonization and recruitment.

- Assist in the implementation of the Loach Minnow and Spikedace Recovery Plans.

- Complete regular monitoring in the action area to document fish species present. This information will aid in management of the species, as well as in consultation on any future bridge repairs or renovations.

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

This concludes formal consultation on the actions outlined in the request for the Replacement of the State Route 77 Bridge over Aravaipa Creek in Pinal County, Arizona. 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 Federal Highway Administration's efforts to identify and minimize effects to listed species from this project. For further information please contact Mark Crites (520) 670-6150 (x229) or Scott Richardson (x242). Please refer to the consultation number 02EAAZ00-2013-F-0037 in future correspondence concerning this project.

/ s / Scott Richardson for
Steven L. Spangle
Field Supervisor

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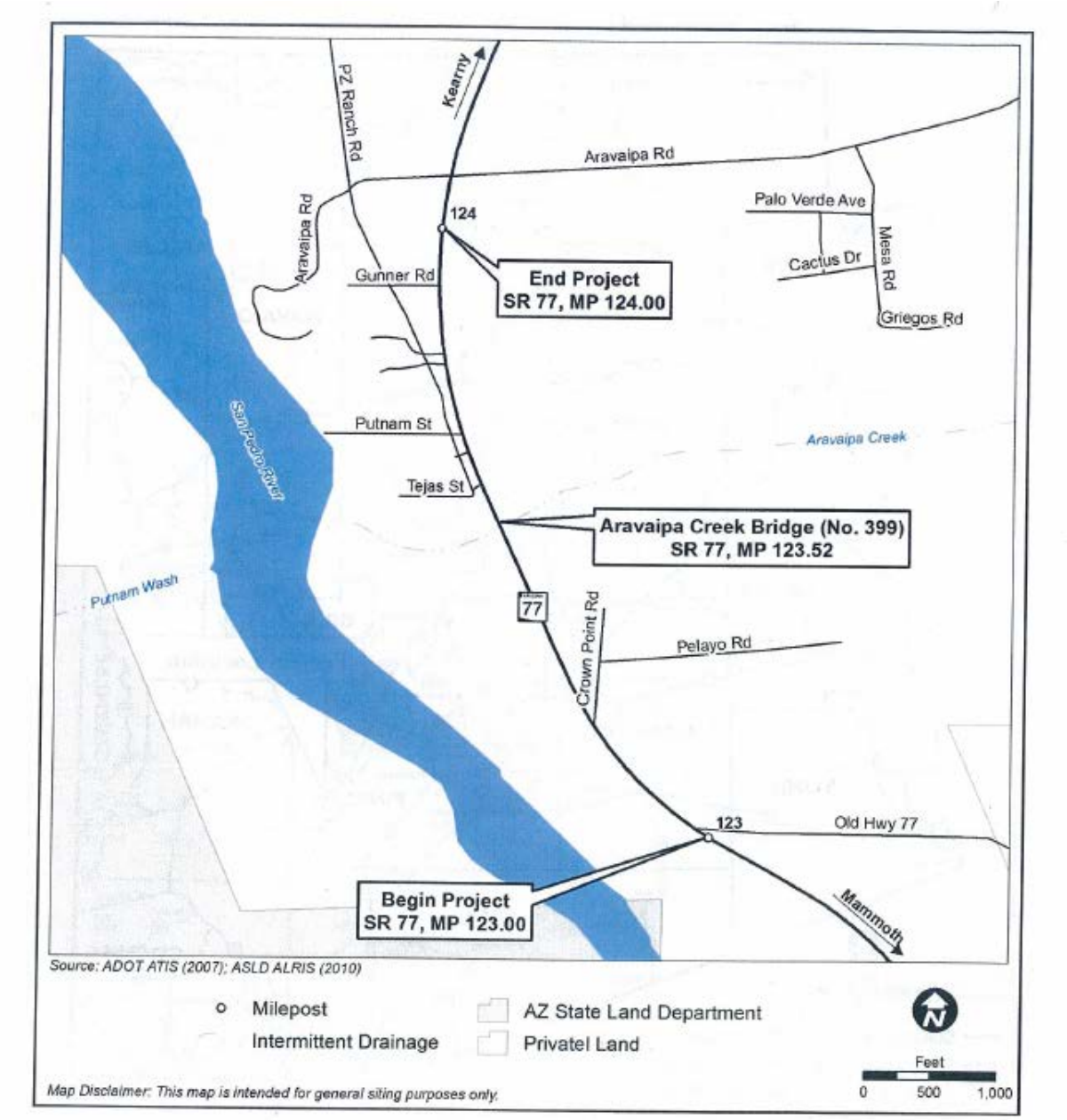
TABLES AND FIGURES

Figure 1. Aravaipa Bridge Project Area



Appendix A: Concurrences

Gila Topminnow and Desert Pupfish

Neither the Gila topminnow nor desert pupfish are not known to occur in the action area. The nearest locations are in pools along the south rim of Aravaipa Canyon, approximately thirteen miles upstream of the action area. We concur with your determination that the proposed action may affect, but is not likely to adversely affect, Gila topminnow or desert pupfish based on the following reasons:

- Effects to individuals are discountable because these species are not known to occur in the project area and, while possible, it is unlikely that individuals would be transported down Aravaipa Creek during storm flows.

- Effects to possible habitat in the action would be insignificant because they would be temporary, small, and not measurable for the species.

- Desert pupfish critical habitat will not be affected because none occurs in the project area.

Southwestern Willow Flycatcher

The action area contains southwestern willow flycatcher (flycatcher) breeding habitat and critical habitat at the confluence of Aravaipa Creek and the San Pedro River. The action area may provide migration habitat for the flycatcher during the late spring and summer months. We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the flycatcher or designated critical habitat based on the following reasons:

- Breeding flycatchers will not be affected because actions will occur approximately ¼ mile from the breeding habitat at the confluence of Aravaipa Creek and the San Pedro River.
- Effects of the proposed action to migrating flycatchers would be insignificant and discountable because:
    - The proposed action could momentarily disturb an individual flycatcher moving through the area during migration, but they would quickly return to their normal activities.
    - This disturbance is unlikely to occur because few flycatchers are likely to move through the area during migration.
- Effects of the proposed action to migrating habitat will be insignificant because:
    - Only a few acres of possible migration habitat would be affected.
    - Most of the riparian habitat that will be affected will be seeded or planted, which will likely provide migration habitat.

- The proposed action will have no effect to breeding habitat or critical habitat at the confluence of Aravaipa Creek and the San Pedro River because:
  - Any water quality effects downstream from the project area will not be sufficient to affect breeding habitat characteristics or critical habitat PCEs.
  - Any temporary changes to stream flow from actions in the project area will not alter available water to develop or maintain breeding habitat or critical habitat PCEs