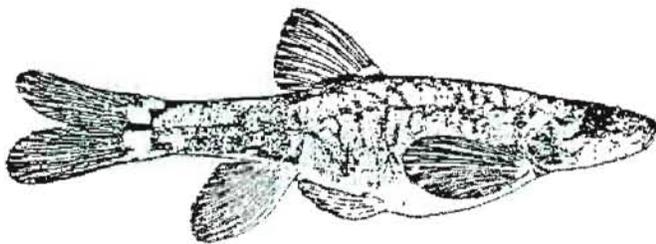
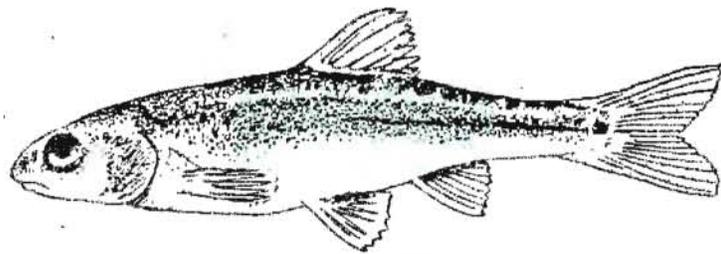


FINAL ENVIRONMENTAL ASSESSMENT

CONSTRUCTION OF FISH BARRIERS

ON

ARAVAIPA CREEK



Prepared by
U.S. Department of the Interior
Bureau of Reclamation
Phoenix Area Office
Lower Colorado Region
Phoenix, Arizona

November 1998

United States Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Phoenix Area Office

FINDING OF NO SIGNIFICANT IMPACT

Construction of Fish Barriers
on Aravaipa Creek
Pinal County, Arizona

Approved: Thomas G. Burbey
Thomas G. Burbey
Area Manager, Phoenix Area Office
Bureau of Reclamation

Date: 11/5/98

FONSI No. PXAO-98-6

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, and based upon the analysis presented within the attached environmental assessment (EA) titled "Construction of Fish Barriers on Aravaipa Creek," we have determined that construction and operation of the fish barriers will not result in a significant impact on the human environment.

BACKGROUND

Congress passed the Colorado River Basin Project Act (Act) (PL 90-537) on September 30, 1968. The Act authorized the Secretary of the Interior, through Reclamation, to construct the Central Arizona Project (CAP). The CAP, which was declared complete in 1993, delivers Colorado River water to central and southern Arizona. During the late 1980s, concern was expressed regarding potential impact of CAP operation on protected native fishes. In 1991, we requested formal consultation with the Fish and Wildlife Service (FWS), pursuant to Section 7 of the Endangered Species Act (ESA). On April 15, 1994, the FWS issued a final biological opinion on the delivery of CAP water to the Gila River Basin. The biological opinion concluded that CAP operation would jeopardize the continued existence and adversely modify critical habitat of several threatened or endangered native fishes. Removal of jeopardy is contingent upon our implementing the reasonable and prudent alternatives of the biological opinion, including the proposed action to build two concrete fish barriers on Aravaipa Creek (Creek).

The EA describes the potential impacts to the environment resulting from construction and operation of the fish barriers. One action alternative and the no-action alternative are evaluated in the EA. Numerous other alternatives and conceptual approaches were considered during ESA Section 7 consultation, but were rejected due to technical and biological infeasibility or ineffectiveness. The no-action alternative was rejected because it would fail to implement required provisions of the biological opinion.

Public involvement for the fish barrier project included a public scoping meeting and bus tour of the project area. The draft EA was mailed to 84 individuals, agencies, and organizations on August 21, 1998, for a 31-day public comment period. In addition, public notices were published in newspapers serving the communities of Winkelman and Mammoth, Arizona, concerning the availability of the draft EA. News releases were also sent to various other news media regarding the draft EA. Twelve entities provided written comments.

FINDING OF NO SIGNIFICANT IMPACT

I have determined that construction and operation of fish barriers on the Creek will not significantly impact the environment, and that preparation of an environmental impact statement is not warranted. This decision is based upon the following considerations.

1. Placement of fish barriers on the Creek will not significantly affect surface and subsurface stream flows. The project will be designed to minimize possible floodplain impacts and resultant increases in backwater flooding. Potential effects caused by project-related flooding will be mitigated through execution of various measures specified in the EA, including acquisition of flowage easements and modification of Aravaipa Road. The biological opinion requires us to

implement the fish barrier project to avoid an ESA violation; therefore, no practicable alternative exists pursuant to Executive Order 11988 (Floodplain Management).

2. Effects of the project on aquatic and terrestrial biota are not significant. Temporary and permanent loss of Sonoran desertscrub, seepwillow/burrobrush, mesquite, and riparian habitats will be mitigated through revegetation and acquisition of conservation easements or purchase of land as described in the EA. The project will have a positive effect on spikedace and loach minnow by minimizing potential encroachment of nonnative fishes on portions of the Creek. A biological assessment of the project, issued on June 19, 1998, concluded there would be "no effect" to other federally-proposed or listed species.

3. We will continue ongoing consultation with the San Carlos Apache Tribe (SCAT) to ensure avoidance of traditional cultural properties in the project area. Consultation with the State Historic Preservation Office (SHPO) will be completed prior to implementation of the proposed action, in accordance with Section 106 of the National Historic Preservation Act. Appropriate measures will be developed in consultation with the SHPO, SCAT, and the Bureau of Indian Affairs to mitigate potential effects to cultural resources.

4. Water quality impacts will be short term and minor. Temporary increases in stream turbidity attributable to the project will cease following construction. Operation of the fish barriers will not introduce measurable long-term effects to water quality. We will obtain required Clean Water Act permits and certifications prior to project implementation.

5. No significant effect to land uses and Indian Trust Assets will result from construction and operation of the fish barriers. Potential land use impacts on Indian Trust Allotment 013736 will be mitigated through acquisition of easements and implementation of measures specified in the EA. Land use patterns on properties adjoining Allotment 013736 will not change as a result of the project.

6. The mitigation measures identified in the EA will be implemented by us as an integral part of project construction and operation.

Documents related to this action are listed below.

U.S. Bureau of Reclamation. 1972. Final Environmental Statement, Central Arizona Project.

U.S. Bureau of Reclamation. 1998. Biological Assessment for Construction of Two Fish Barriers on Aravaipa Creek.

U.S. Bureau of Reclamation. 1998. Final Environmental Assessment, Construction of Fish Barriers on Aravaipa Creek. Attached.

CONSTRUCTION OF FISH BARRIERS

ON

ARAVAIPA CREEK

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I. PURPOSE AND NEED

This environment assessment (EA) has been prepared to evaluate the potential consequences of constructing two fish barriers on Aravaipa Creek, Arizona. The EA was prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations (40 CFR 1500-1508), and the Bureau of Reclamation (Reclamation) NEPA Handbook. Reclamation is the lead Federal agency, and the Bureau of Indian Affairs (BIA) and Fish and Wildlife Service (FWS) are cooperating Federal agencies pursuant to NEPA.

A. Background

Congress passed the Colorado River Basin Project Act (Act) (PL 90-537) on September 30, 1968. The Act authorized the Secretary of the Interior, through Reclamation, to construct the Central Arizona Project (CAP) to deliver Colorado River water for irrigation, industrial, and municipal uses in central and southern Arizona. The CAP, which was declared completed in 1993, conveys Colorado River water through a 355-mile long system of pumping plants, aqueducts, dams, and reservoirs.

During the late 1980s, the issue of introduction and spread of nonnative aquatic species through the CAP began to receive serious consideration. Concern was expressed that the CAP could accelerate the rate at which nonnative fish species invade habitats occupied by native fishes. Recognizing the CAP could potentially affect protected native fishes, Reclamation, in 1991, requested formal consultation with the FWS, pursuant to Section 7 of the Endangered Species Act (ESA). On April 15, 1994, the FWS issued a final biological opinion on the delivery of CAP water to the Gila River basin (Appendix A).

The biological opinion concluded that CAP operation would jeopardize the continued existence and adversely modify critical habitat of several threatened or endangered native fishes. Establishment of nonnative fishes within the CAP system, and their subsequent escape and invasion into habitats occupied by protected native fishes, were cited as contributing to these adverse effects. Irrigation canals using CAP-supplied water, and associated return flows to the rivers of the Gila River basin, were identified by FWS as principal routes by which nonnative fish species could move from the CAP to the Gila River and its tributaries. Transfer of nonnative fishes from the Colorado River and bait bucket releases help sustain populations of nonnative species within the CAP and the Gila River basin.

One of the reasonable and prudent alternatives FWS identified to minimize adverse impacts and avoid jeopardy was for Reclamation to construct a pair of concrete fish barriers on Aravaipa Creek. Aravaipa Creek, which is located in Graham and Pinal Counties, Arizona, supports self-sustaining populations of seven native fish species, comprising one of the largest and most intact native fish communities remaining in any stream in the State (Figure 1-1). Consequently, the creek is considered to be an important refuge for native

ARIZONA

ARAVAIPA CREEK LOCATION MAP



Figure 1-1

Consequently, the creek is considered to be an important refuge for native fishes. The special status of this canyon-bound riverine system partially results from the lack of extensive development and corresponding stream modification. Values of this aquatic ecosystem are acknowledged by Federal protection of the central canyon as the Aravaipa Canyon Wilderness Area and establishment of extensive reserves by The Nature Conservancy. Also, a portion of Aravaipa Creek was designated by FWS as critical habitat for the recovery of two federally-listed threatened native fishes - the spikedace (*Meda fulgida*) and loach minnow (*Tiaroga cobitis*) in 1994. However, critical habitat for spikedace and loach minnow was revoked on March 25, 1998 (FR 63(57):14378-14379).

B. Purpose and Need

Invasion of nonnative aquatic organisms is viewed as one of the more serious long-term threats to the status and recovery of native aquatic species. Threats include predation, competition, hybridization, and parasite and pathogen transmission. Introduction of nonnative fishes into southwestern aquatic habitats has historically resulted in the reduction or elimination of native fishes from those habitats. To minimize the cumulative effects of nonnative introductions via the CAP, Reclamation and the FWS believe that certain protective measures are appropriate. Construction of fish barriers on Aravaipa Creek would satisfy the need to protect threatened native fishes and comply with a key provision of the biological opinion.

Reclamation would build two concrete drop structures near the lower end of Aravaipa Creek. The drop structures would create a barrier to the upstream movement of nonnative fishes from the San Pedro River to portions of Aravaipa Creek populated with threatened native fishes. Specific purposes of these fish barriers are to: (1) prevent upstream incursion of exotic fishes during periods when Aravaipa Creek has sufficient flow to establish a direct water connection with downstream habitats (principally the San Pedro River) containing populations of nonnative fish species; (2) prevent return of nonnative fishes that periodically encroach on upper portions of the creek but are transported downstream during periods of flooding; and (3) create a management zone between the barriers for the purpose of detecting and removing nonnative fishes.

C. Summary of Required Permits

Table 1 lists permits, authorizations, and coordination required to implement the proposed action.

Table 1. List of permits and authorizations

Permitting Agency	Permit/Authorization
U.S. Bureau of Indian Affairs	Rights-of-entry and easements (allotted land)
U.S. Army Corps of Engineers	Section 404 Clean Water Act (CWA) permit
U.S. Environmental Protection Agency	National Pollutant Discharge Elimination System permit; Section 401 CWA Water Quality Certification
U.S. Fish and Wildlife Service	Section 7 Endangered Species Act consultation; Fish and Wildlife Coordination Act consultation
Arizona State Historic Preservation Office	Section 106 National Historic Preservation Act consultation

II. PROPOSED ACTION AND ALTERNATIVES

This chapter describes the proposed action, the no action alternative, and other alternatives considered but eliminated from detailed study.

A. Proposed Action Alternative

The proposed action is to build two fish barriers on the lower reach of Aravaipa Creek. Reclamation received rights-of-entry from the BIA to perform surveys of two potential fish barrier sites on Indian trust land allotted to members of the San Carlos Apache Tribe (Indian Trust Allotment 013736). The sites are located near the "throat" of Aravaipa Canyon, below which the channel widens, gradient lessens, and perennial flow ceases (Sites A1 and A2, Figure 2-1). Easements for the barriers, if built on allotted land, would be obtained from the BIA acting as trustee for tribal members with legal property interests in the allotment.

B. Project Design

Reclamation and the FWS believe a reinforced concrete drop structure is the best design for the proposed barrier sites (Figure 2-2). Each fish barrier would consist of four primary features: (1) a 4-foot high concrete wall extending across the stream channel and up one or two alluvial benches to tie into adjoining rock abutments, (2) a concrete apron extending about 25 feet downstream from the wall, (3) an upstream key that extends below the river channel to the depth of the natural river scour, and (4) a downstream key at the end of the apron that extends below the river channel to the depth of scour created by the barrier itself.

**Figure 2-1
Indian Trust Allotments**

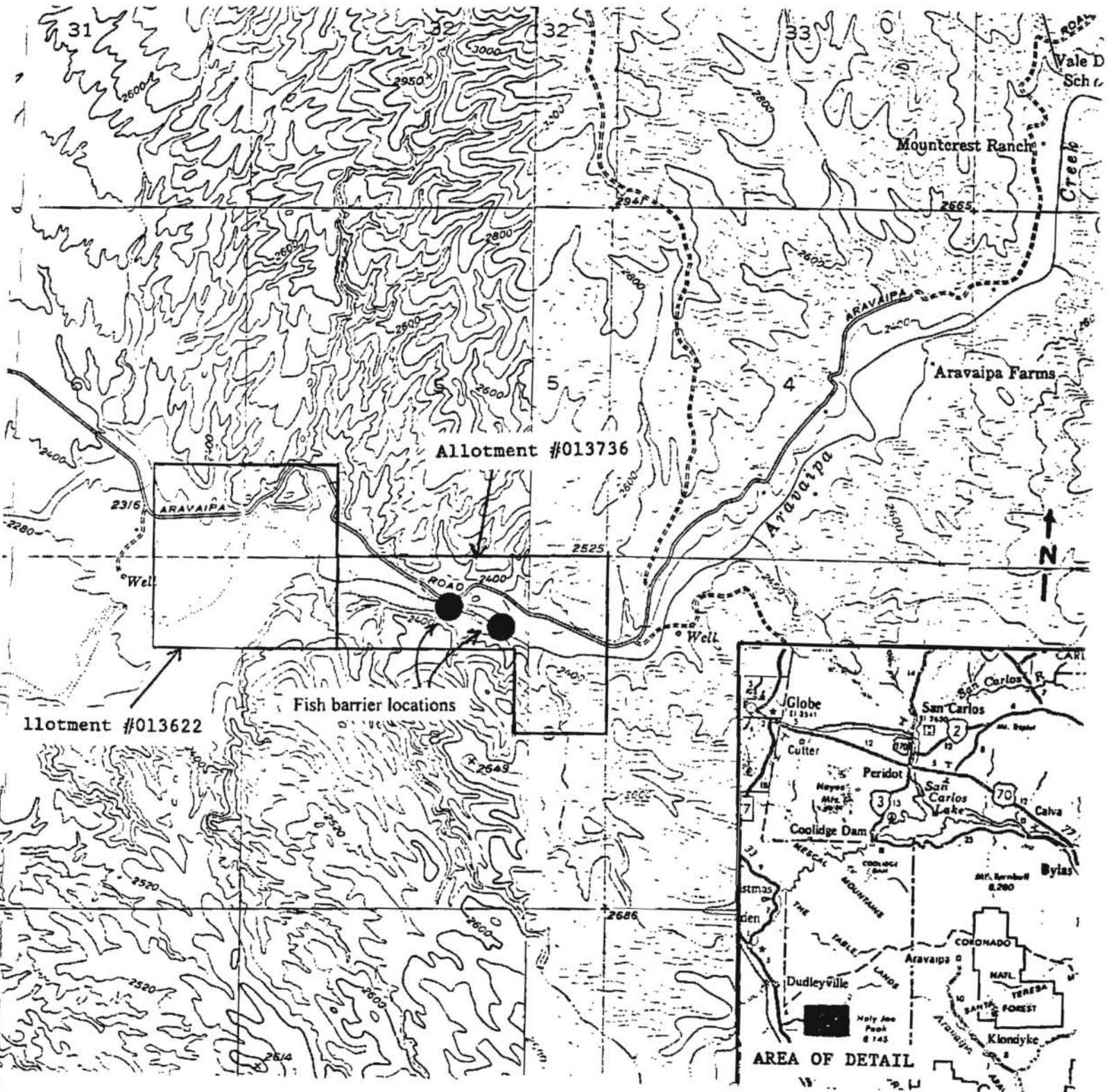
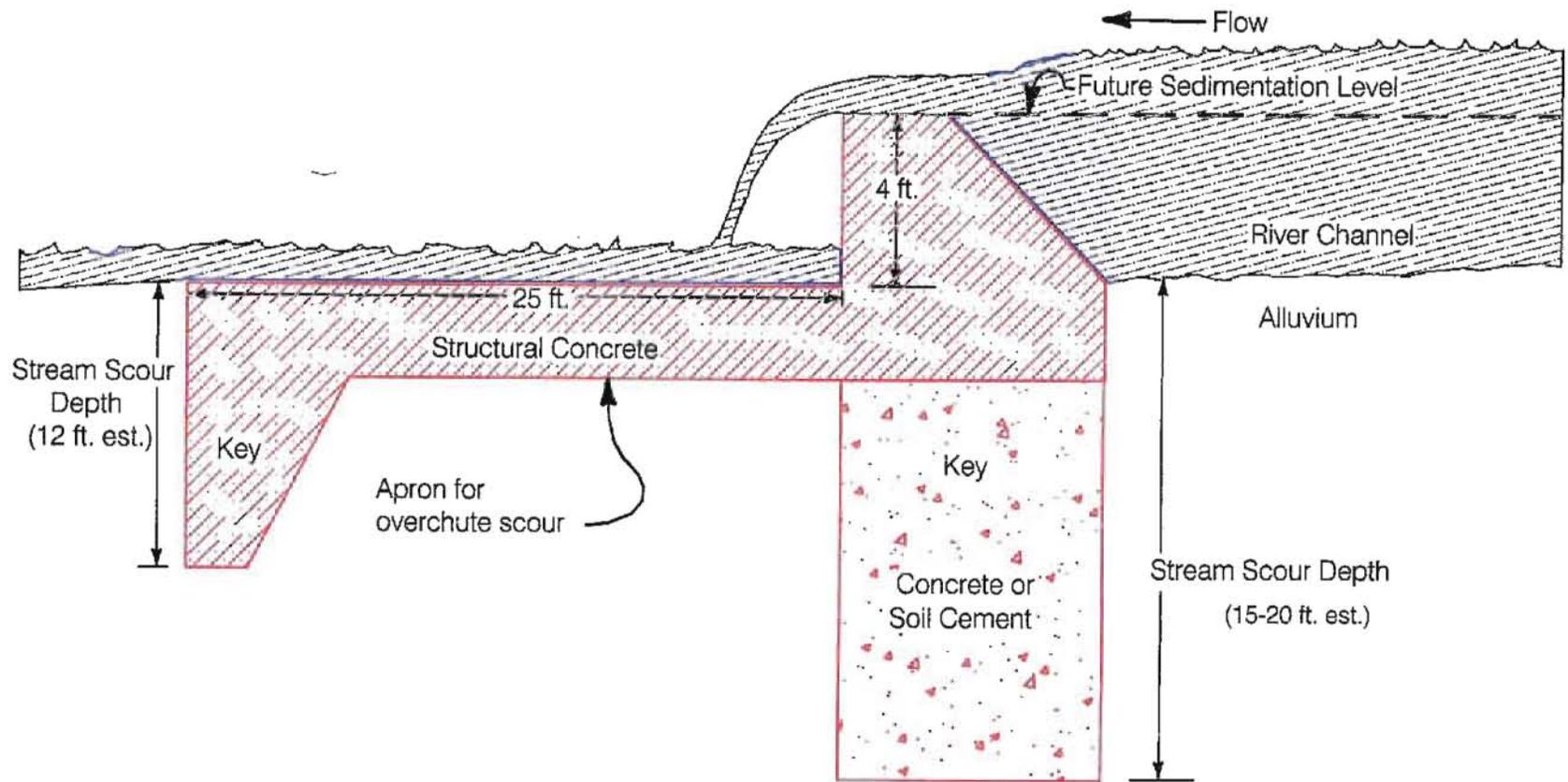


Figure 2-2



Cross Section of Conceptual Fish Barrier

The lower barrier would incorporate a water diversion feature. San Carlos Apache tribal members with property interests in allotted lands downstream of the lower barrier have requested, through the BIA, that the barrier be designed to allow for future diversion of a percentage of stream flow. The diverted water would be utilized by allottees for renewed agricultural production on previously farmed land within Indian Trust Allotments 013622 and 013736. Possible use of Aravaipa Creek water for agricultural development is not part of the proposed action for fish barrier construction and is not evaluated in this EA. Additional NEPA analysis would be completed by the BIA to evaluate the potential environmental impacts of stream water diversion, conveyance, and use prior to diverting water.

The concrete wall height of approximately 4 feet was determined by the FWS to be the minimum effective height. This height would exceed leaping abilities of fishes when combined with shallow, fast flowing water over the apron. At flow rates above 1000 cubic feet per second (cfs), the effectiveness of height is greatly reduced, but this reduction is partly compensated by higher flow velocities. Upstream movements of fishes are not expected during peak flooding because of high flow velocities and sediment loads. The wall would be designed to withstand forces experienced during a record flood (approximately 70,000 cfs) caused by flows, channel materials, and floating tree trunks.

The primary function of the apron is to prevent scouring at the base of the 4-foot wall. Scouring at the base of the wall could undercut and destabilize the structure. Secondly, scouring would create a deep pool where undesirable fish could congregate and be easily transferred upstream of the barrier by recreationists. The apron would extend beyond the severe turbulence created by the 4-foot drop, estimated to be about 25 feet downstream, and would be designed to withstand the impact of boulders and large trees falling over the wall.

An upstream key would extend through the channel alluvium to a depth where natural scour movement would not affect the integrity of the structure. This depth, which is estimated between 15 to 20 feet, will be calculated in greater detail when geologic investigations of the barrier sites are completed. A downstream key is needed to prevent undercutting of the apron caused by scour induced by the structure. This type of scour will occur as the stream flows over the lower end of the apron. The downstream key will extend at least to the calculated depth of this scour, estimated at 12 feet.

Reclamation proposes to build a second, identical fish barrier approximately 800 feet upstream of the first. The second structure would provide an additional impediment to the upstream movement of fishes and thus reduce the probability of nonnative species successfully breaching the barrier sites. The reach between the fish barriers would be monitored closely for presence of nonnative fishes. If nonnative species are found, the reach between the barriers will be either intensively sampled and undesirable fishes physically removed, or it will

be renovated with an ichthyotoxin (fish toxin). Such actions are necessary to maintain the effectiveness of the dual barrier design, and provide the greatest likelihood that the barriers will prevent the upstream invasion of nonnative fishes.

C. Project Construction

The construction phase of the project would require the use of various kinds of equipment including:

- 2 dump trucks, 35-40 tons capacity
- 2 front end loaders, 1.3-2.6 cu yd bucket capacity
- 2 backhoes, 14.5-30 ft digging depth
- 1 grader, 145-275 HP flywheel power
- miscellaneous: air compressor, generators, pneumatic hammers, dewatering equipment
- concrete trucks (concrete delivery from commercial off-site batch plants)

Construction of the barriers is expected to take about 4 months total. Site preparation would involve excavation of stream alluvium and bank rock, followed by placement of forms, reinforcing elements, and concrete.

Excavation of the alluvial materials would be performed with standard earthmoving equipment, assuming the material can be properly dewatered. Excavation at the abutments would be done either mechanically or with controlled blasting. The depth of excavation required for the keys is contingent upon depth of scour, which is estimated at 15 to 20 feet. Excavated material would be temporarily stockpiled in the stream channel. This stockpiled material would either be returned to the excavation as backfill, or disposed of within the sedimentation zone immediately upstream of each barrier.

Above ground flows would be diverted around work areas by means of berms, dikes, and ditches. These temporary diversion features would be removed or graded into the sediment zone following construction.

Below ground flows would be intercepted upstream and downstream of the key excavations using dewatering wells. The water would be pumped through temporary piping or hoses to a location within the channel downstream of the excavations. This pumped water should be clear and have the same general characteristics of the stream water. About 1 cfs of flow would be generated by dewatering measures at each barrier.

The barriers would be constructed with reinforced concrete and anchored to rock abutments on each side of the channel. Anchor bars would extend into the rock abutments to tie the barrier ends to the bank. Approximately 1,500 cubic yards of concrete would be used to construct each barrier, with the majority of the concrete (and structural mass) going into the keys. All concrete would be commercially batched off site and trucked to the project area. Waste concrete would be disposed of off site in compliance with applicable laws and regulations. The estimated cost to construct the two barriers is approximately \$2,000,000.

D. Contractor Use Area

Construction equipment and materials would be stored in a single contractor staging and use area, approximately 2.1 acres in size. Temporary fencing would be erected around this area to protect against unauthorized entry. The contractor use area would be located near the barrier sites to minimize driving distance and promote efficient use of equipment. Three alternative sites are currently under consideration for the contractor use area (Sites A, B, and C; Figure 2-3). Disturbance of native vegetation would be minimized where possible, and environmentally or culturally sensitive areas avoided. No batching or processing of materials would be conducted in the project area.

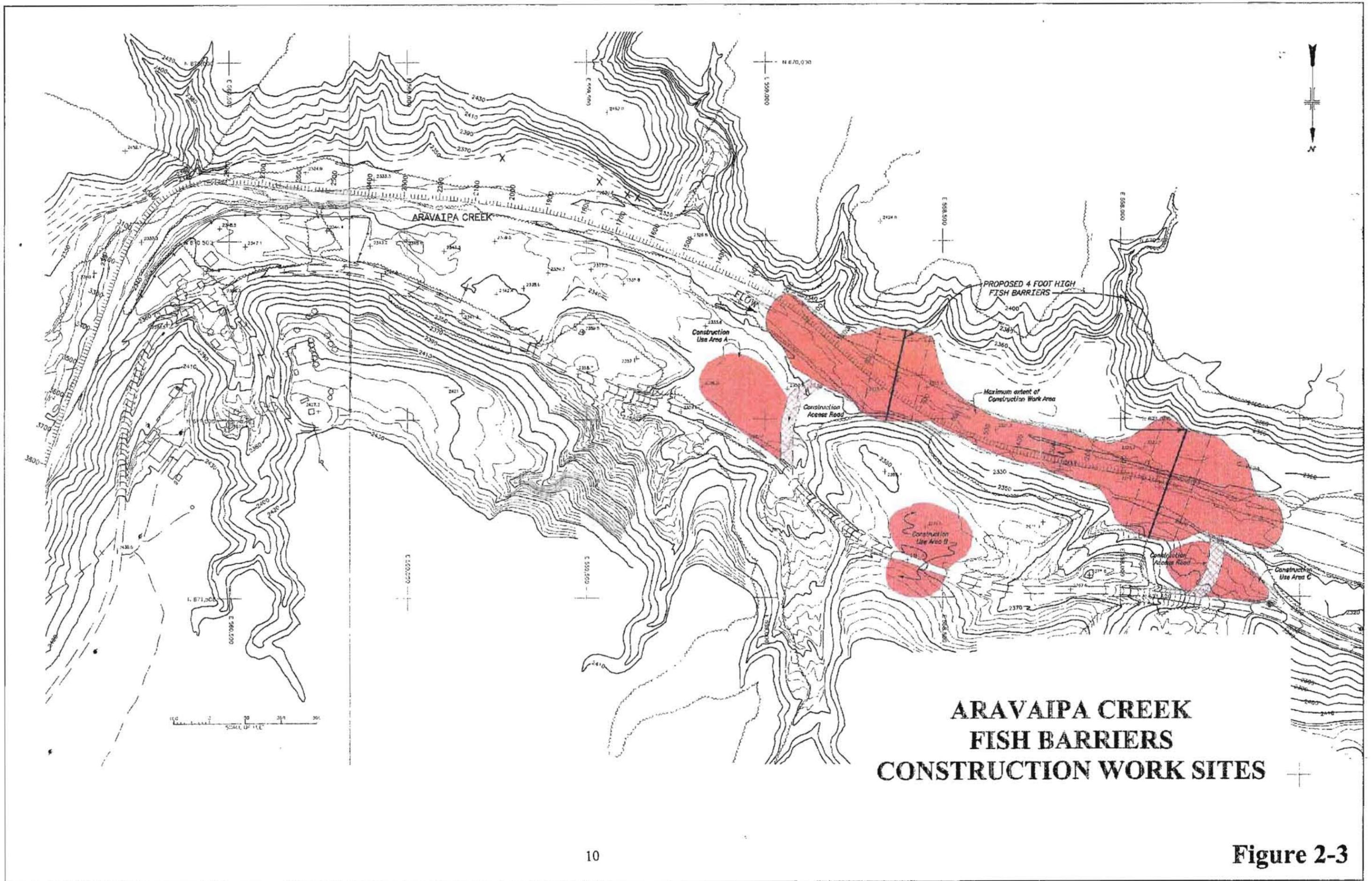
E. Construction Traffic

Construction-related traffic would use existing roads to access the project area. Improvement (minor filling, blading, and widening) of two primitive roads that connect Aravaipa Road with the stream channel would be required to accommodate construction equipment and maintain road conditions during the construction phase of the project.

Minor modification of the stream bank at two locations would be necessary to facilitate the movement of construction equipment to the stream channel and barrier sites. Construction vehicles would use existing roads and the stream channel for maneuvering between barrier sites.

F. Hazardous Materials

No hazardous waste generation would normally be expected from actions required for construction, operation, and maintenance of the fish barriers. To minimize the impact of hazardous materials (petroleum, oil, and lubricants (POLs)) used during construction, all equipment would be periodically inspected for leaks. Any significant leaks would be promptly corrected. POLs would be stored in a designated portion of the contractor use area. Lined secondary containment would be required for POL storage. The contractor would also be required to provide spill kits for equipment operating within the active stream channel.



**ARAVAIPA CREEK
FISH BARRIERS
CONSTRUCTION WORK SITES**

G. Operation and Maintenance

Once completed, the fish barriers would require periodic inspection and maintenance. Reclamation would contract with the Central Arizona Water Conservation District or other entity to perform all necessary inspections and repairs. Removal of flood debris from the structures would be the responsibility of the contractor.

H. No Action Alternative

Under the no action alternative, the fish barriers would not be built and existing conditions would persist. Nonnative fishes would continue to have unimpeded access to portions of Aravaipa Creek occupied by threatened native fishes. Reclamation would fail to implement the reasonable and prudent alternative specified for Aravaipa Creek in the biological opinion. To avoid an illegal "take" of species protected under the ESA, Reclamation would be required to reinitiate formal Section 7 consultation with the FWS.

I. Alternatives Eliminated from Consideration

During ESA Section 7 consultation, extensive discussions were held between the FWS and Reclamation regarding alternatives that would avoid or minimize possible adverse effects of continued CAP operation. Numerous conceptual approaches and alternative actions were evaluated and rejected (see Appendix A, pages 39-41 of the biological opinion, for a description of alternatives eliminated during Section 7 consultation). Many of the alternatives considered during consultation were rejected due to technical and biological infeasibility or ineffectiveness.

Following receipt of the biological opinion, Reclamation personnel investigated a total of eight potential sites for barrier placement between the lower boundary of the Aravaipa Canyon Wilderness Area and the confluence with San Pedro River. It was assumed no construction would be permitted within the Wilderness Area, thereby, establishing the upper boundary of the stream reach considered. Consideration of the lowermost reaches of Aravaipa Creek, where channel widths exceed 1/2 mile, was eliminated because of excessive impacts to visual aesthetics and the large area of channel potentially disturbed by siltation behind the barriers and construction activities. The eight potential sites evaluated within this reach are labeled A1 through F (Figure 2-4).

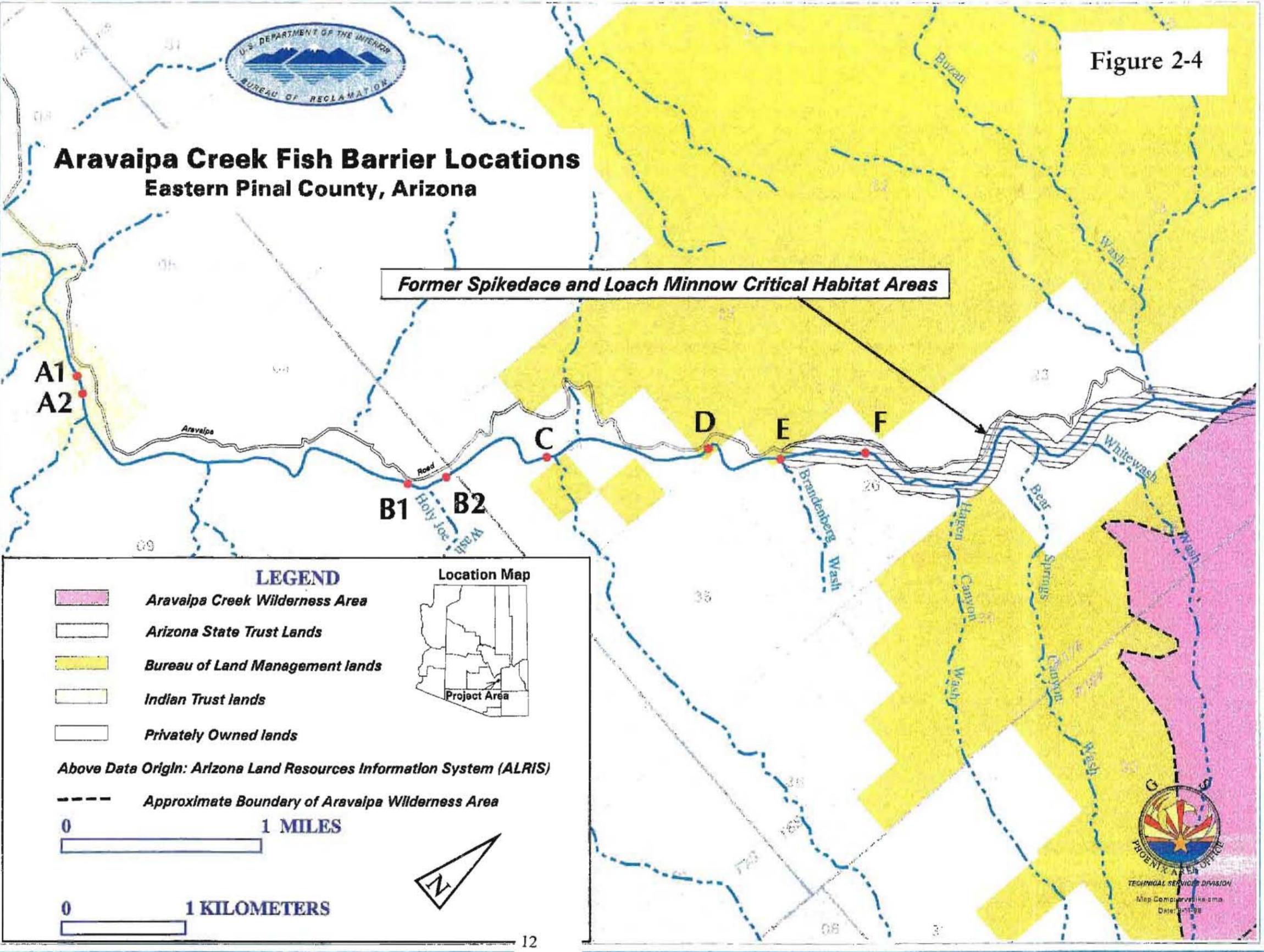
Sites E and F were dropped from further consideration because they were within the boundaries of the then designated critical habitat for spikedace and loach minnow. Construction of barriers within or near this critical habitat could fragment populations and adversely inhibit the movement of these threatened native fishes.

Figure 2-4

Aravaipa Creek Fish Barrier Locations Eastern Pinal County, Arizona



Former Spikedace and Loach Minnow Critical Habitat Areas



A1
A2

B1
B2

C

D

E

F

LEGEND

- Aravaipa Creek Wilderness Area
- Arizona State Trust Lands
- Bureau of Land Management lands
- Indian Trust lands
- Privately Owned lands

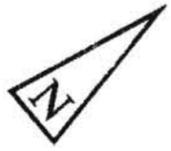


Above Data Origin: Arizona Land Resources Information System (ALRIS)

--- Approximate Boundary of Aravaipa Wilderness Area

0 1 MILES

0 1 KILOMETERS



TECHNICAL SERVICES DIVISION
Map Composed by: [Name]
Date: [Date]