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Bureau of Land Management
Safford Field Office



Draft Environmental Assessment

PROPOSED FISH BARRIER IN HOT SPRINGS CANYON

Hot Springs Area of Critical Environmental Concern Cochise County, Arizona



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CHAPTER 1 - PURPOSE AND NEED

1.1 INTRODUCTION

The Bureau of Reclamation (Reclamation), Phoenix Area Office, and the Bureau of Land Management (BLM), Safford Field Office, are proposing construction of a fish barrier in Hot Springs Canyon within the BLM-administered Hot Springs Area of Critical Environmental Concern (ACEC). The Hot Springs ACEC is part of the 57,500-acre Muleshoe Ranch Cooperative Management Area (CMA) located in Cochise County, Arizona (Figure 1). The proposed fish barrier is intended to prevent the upstream invasion of nonnative fishes into portions of Hot Springs Canyon occupied by threatened and endangered fish species.

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508), Reclamation NEPA Handbook (2000 draft edition), and BLM NEPA Handbook (H-1790-1). Reclamation and BLM are the lead Federal agencies responsible for the preparation of this EA.

This document is organized into six chapters:

- **Chapter 1 – Purpose and Need:** This chapter presents information on the history of the proposed action/project, the purpose of and need for the action, and the lead agencies' proposal for achieving that purpose and need. This section also describes public involvement in the NEPA process and key issues that are raised by the public, project proponents, and other agencies.
- **Chapter 2 – Comparison of Alternatives, including the Proposed Action:** This chapter provides a description of the lead agencies' proposed action and other alternative methods for satisfying the purpose and need, including alternatives that were considered but rejected.
- **Chapter 3 – Affected Environment and Environmental Consequences:** This chapter describes the environmental effects of implementing the proposed action and no action. Within each section, the affected environment is described first, followed by a discussion of the potential effects of the proposed action. The discussion also includes specific mitigation measures that are required to minimize potential adverse impacts.
- **Chapter 4 – Agencies and Persons Consulted:** This chapter identifies persons who contributed to the preparation of this EA, and lists agencies and persons consulted during the NEPA process.
- **Chapter 5 – Environmental Laws and Directives:** This chapter lists Federal environmental laws and directives that are relevant to the project.
- **Chapter 6 – Literature Cited:** This chapter lists documents used in preparation of this EA.
- **Appendices** – The appendices provide more detailed information to support the analysis presented in this EA.

1.2 BACKGROUND

The proposed Hot Springs Canyon fish barrier project is part of a larger program being implemented by Reclamation to assist with recovery and conservation of federally listed fish and amphibian species in the Gila River Basin. This program was initially mandated by two U.S. Fish and Wildlife Service (FWS) biological opinions on impacts of Central Arizona Project (CAP) water transfers to the Gila River Basin (FWS 1994 and 2001). These opinions were incorporated into and superseded by a third CAP biological opinion on May 15, 2008 (FWS 2008). As stated in the 2008 CAP biological opinion, the strategic placement of fish barriers is intended to “prevent or hinder upstream movements of nonindigenous fish and other aquatic organisms into high-value native fish and amphibian habitats.” Barriers required under the CAP biological opinions have been completed or are scheduled for completion on 12 high-priority stream systems.¹

Native fish populations in the Gila River Basin have deteriorated significantly over the past century and a half to the point that 11 of the 21 native fish species are now listed under the Endangered Species Act (ESA). In addition to the listed species, one species has already gone extinct, and two other species have been petitioned for listing. The remaining species have also declined, and five of them have been recommended for Federal listing (Desert Fishes Team 2004). Seven species have been extirpated from the basin, although some have been repatriated with variable success (Clarkson 2004). Only the two native trouts have exhibited noticeable population increases in recent times, and slow progress is being made with five other species (desert pupfish, Gila chub, loach minnow, spikedace, and Gila topminnow).

Recent human-mediated physical impacts to aquatic habitats of the Gila River Basin include construction of high dams for water storage, hydroelectric production, and flood control; dewatering of streams due to surface diversions and ground-water pumping for municipal, industrial, and agricultural purposes; watershed perturbations arising from overgrazing by domestic livestock, overharvesting of timber, mining of commercially valuable ores; and habitat loss due to expansion of human populations (Dobbins 1981). In addition, introductions and establishment of nonnative aquatic organisms in the region over the past century have biologically polluted native fish habitats that remain (Miller 1961, Moyle et al. 1986, Minckley 1991). This physical and biological destabilization of riverine systems has led to a typical pattern in Arizona where native species tend to be restricted to the upper reaches of drainage basins (FWS 2001).

The widespread situation in the Gila River Basin is that remaining tributary populations of native fishes (most federally listed fishes are now absent from main-stem rivers) cannot recolonize other tributaries from where their species have been extirpated because large predatory nonnative fish populations reside in the main-stem habitats connecting them (Minckley 1999). Due to the large nonnative fish predator load in main-stem rivers in the basin, these important habitats have become population sinks for native fishes that

¹ To date, barriers have been constructed on Aravaipa, Bonita, and Fossil Creeks and at Cottonwood Spring. Barriers are proposed for Redrock Canyon, Sheehy Spring or Sonoita Creek, Blue River, Hot Springs Canyon, O'Donnell Creek, Redfield Canyon, Tonto Creek drainage, and the Verde River.

enter them. Not only do nonnatives block recolonization pathways, but they also prevent exchange of genetic material among diverse tributary native populations that historically facilitated adaptation to changing environments (Dowling et al. 1996).

In an attempt to improve the status of listed species, the barrier construction program has emphasized streams with suitable habitat that can be secured to prevent extinction and stabilize rare stocks of native fishes, or that can be protected and renovated to replicate rare stocks of native fishes, especially loach minnow (*Tiaroga cobitis*) and spikedace (*Media fulgida*) that appear to be declining at a faster rate than many other species. The establishment of protected refuges for native fishes also provides benefits for native amphibians.

Reclamation recognized that each of the CAP opinion barriers will provide unique construction challenges (e.g., land ownership and use, Wild and Scenic River System eligibility, access, etc.). For that reason, Reclamation has attempted to pursue several potential barrier projects concurrently, which allow individual projects to proceed in response to the rate at which site-specific implementation issues are successfully resolved. The proposed Hot Springs Canyon project would complement similar projects planned for seven other streams.

Hot Springs Canyon presently sustains reproducing populations of five native fish species: longfin dace (*Agosia chrysogaster*), speckled dace (*Rhinichthys osculus*), Sonora sucker (*Catostomus insignis*), desert sucker (*Pantosteus clarki*), and endangered Gila chub (*Gila intermedia*). Suitable habitat also exists for threatened loach minnow, threatened spikedace, endangered desert pupfish (*Cyprinodon macularius*), and endangered Gila topminnow (*Poeciliopsis occidentalis*).

In October 2007, the BLM, working in conjunction with the FWS, Arizona Game and Fish Department (AGFD), Arizona State University, Arizona State Land Department, Reclamation, The Nature Conservancy, and Forest Service, stocked loach minnow, spikedace, desert pupfish, and Gila topminnow into three perennial streams of the Muleshoe Ranch CMA, including Hot Springs Canyon. The objective of the stocking program is to assist in the recovery of each of these species and to restore historical species diversity to the area (BLM 2004). These repatriated populations were augmented with additional individuals in September 2008.

Although Hot Springs Canyon has not been invaded by nonnative fishes at present, and is seemingly “protected” against upstream invasions by a 5.6-mile reach of ephemeral stream, Reclamation and FWS selected the stream for barrier construction to both protect existing populations and replicate other populations of imperiled native fishes. The question of whether fish will use normally dry streambed reaches for upstream movements was addressed in a recent report to Reclamation by the Native Fish Lab at Arizona State University (Stefferd and Stefferud 2007). To summarize conclusions of that report, life-history strategies of many native and nonnative fishes routinely take advantage of intermittent flows in normally dry streams to colonize new habitats. The report documented recent invasions of native or nonnative fishes to 17 streams in the Gila

River Basin that have long reaches of normally dry stream channel in their lower sections. We believe these instances are common enough to justify the conservative approach of protecting remnant native fish populations proactively through emplacement of fish barriers. Although we cannot state with certainty that Hot Springs Canyon will be invaded by nonnative fishes in the near future, the consequences of an invasion to the native fishes that reside there could be catastrophic. A significant case history demonstrates that when nonnatives become established, native fishes wane or disappear.

1.3 PURPOSE OF AND NEED FOR ACTION

The purpose of the proposed fish barrier is to preclude the threat to existing and newly reintroduced native fish populations in Hot Springs Canyon posed by nonnative fishes that inhabit the San Pedro River. Nonnative species are potentially capable of moving upstream into perennial waters of Hot Springs Canyon during periods when high seasonal flows or floods provide connectivity with the San Pedro River (Stefferdud and Stefferud 2007). Construction of the proposed barrier would preclude upstream fish movement into waters currently supporting a purely native fish assemblage.²

1.4 PROJECT LOCATION

The action area for the project includes the site of the proposed barrier, sites needed for construction staging and laydown, and any other sites affected by construction. The proposed barrier site is located on BLM land in the southern portion of the Hot Springs ACEC/Muleshoe Ranch CMA, in the southeast quarter of Section 32, Township 12 South and Range 20 East, at approximately 32°20.546' N and 110°19.209' W (Figure 2). A private airfield near the community of Cascabel has been identified by Reclamation as a possible staging area for construction materials and flight operations.

1.5 DECISIONS TO BE MADE

Reclamation and BLM must decide whether to implement the proposed action or no action. If the proposed action is implemented, Reclamation would construct the barrier and implement any required mitigation. Authority for approving construction on BLM land within the Hot Springs ACEC is held by the Field Manager of the Safford Field Office.

1.6 CONSISTENCY WITH RESOURCE MANAGEMENT PLANS

The Safford Field Office manages BLM land in the Hot Springs ACEC in accordance with the *Safford District Resource Management Plan* (RMP), Part I 1992, and Part II 1994; the *Muleshoe Ecosystem Management Plan* (EMP), 1998; and other national policies and legislation such as the ESA. The RMP prescribes management guidance,

² There are no known sources of nonnative fishes in the watershed upstream of the proposed fish barrier site that could wash downstream into Hot Springs Canyon or its perennial tributaries.

and the EMP serves as the activity plan for the ACEC. The proposed project would conform to the following management objectives of the RMP and EMP:

- Provide for protection of threatened and endangered species and their habitats (RMP, page 17)
- Maintain and enhance the diversity of native fish populations by removing threats to them (EMP, page 67)

1.7 PUBLIC INVOLVEMENT

Scope of Issues and Public Comment. The CEQ defines scoping as “...an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a proposed action” (40 CFR 1501.7). Scoping is an important underpinning of the NEPA process that encourages public input and helps focus the environmental impact analysis on relevant issues. Distribution of scoping information typically heralds the beginning of the public component of the NEPA process.

On June 10, 2008, Reclamation posted a scoping notice on its Phoenix Area Office web site (<http://www.usbr.gov/lc/phoenix>) and mailed scoping information on the proposal to 130 potentially interested individuals, organizations, and agencies (see Chapter 4). Reclamation also submitted news releases to the *Arizona Republic* and seven other news media outlets. Reclamation and BLM received three letters of comment during the 30-day scoping period which ended on July 11, 2008.

Critical Elements and Key Issues. Several environmental issues concerning the proposed project were identified by the NEPA interdisciplinary team members and from the public comments during scoping. The BLM NEPA Handbook (H-1791-1) also requires that certain critical elements of the human environment be addressed if such elements are potentially affected by the project. In total, these issues helped define the range of actions and impacts that are addressed in this EA and served as the basis for refining the project and developing mitigation.

The following critical elements were identified by the interdisciplinary team in accordance with the BLM NEPA Handbook. Critical elements that are not affected by the project are also noted below.

- Air Quality: See Section 3.6.
- Areas of Critical Environmental Concern: See Section 3.1.
- Cultural Resources: See Section 3.5.
- Executive Order 12898 (Environmental Justice): The action area encompasses mostly unpopulated and remote public lands; therefore, no disproportionate direct, indirect, or cumulative impacts on this critical element would occur.
- Executive Order 13045 (Safety Risks to Children): The action area encompasses mostly unpopulated and remote public lands and potentially an established

airfield; therefore, no disproportionate direct, indirect, or cumulative impacts on this critical element would occur.

- Farm Lands (Prime or Unique): There are no prime or unique farmlands designated within the vicinity of the project area; therefore, no direct, indirect, or cumulative impacts on this critical element would occur.
- Floodplains: See Section 3.3.
- Native American Religious Concerns: There are no Native American religious concerns identified within the vicinity of the project area; therefore, no direct, indirect, or cumulative impacts on this critical element would occur.
- Noxious Weeds: See Section 3.8.
- Threatened and Endangered Species: See Section 3.4.
- Wastes (Hazardous and Solid): See Section 3.9.
- Water Quality: See Section 3.3.
- Wetland and Riparian Zones: There are no wetlands identified in the project area; therefore, no direct, indirect, or cumulative impacts on this critical element would occur. See Section 3.4 for a discussion on riparian zone impacts.
- Wild and Scenic Rivers: There are no designated Wild and Scenic Rivers identified in the project area; therefore, no direct, indirect, or cumulative impacts on this critical element would occur.
- Wilderness: The nearest wilderness (Redfield Canyon) is approximately 5 miles north of the proposed barrier site within a separate drainage. Because there are no designated wilderness areas within the action area of the project, no direct, indirect, or cumulative impacts on this critical element would occur.

In addition to the critical elements, the following key issues were identified by the interdisciplinary team and public as being potentially affected by the project.

- Biological resource impacts: See Section 3.4.
- Geology and soil impacts including sediment transport: See Section 3.2.
- Hydrological and hydraulic impacts: See Section 3.3.

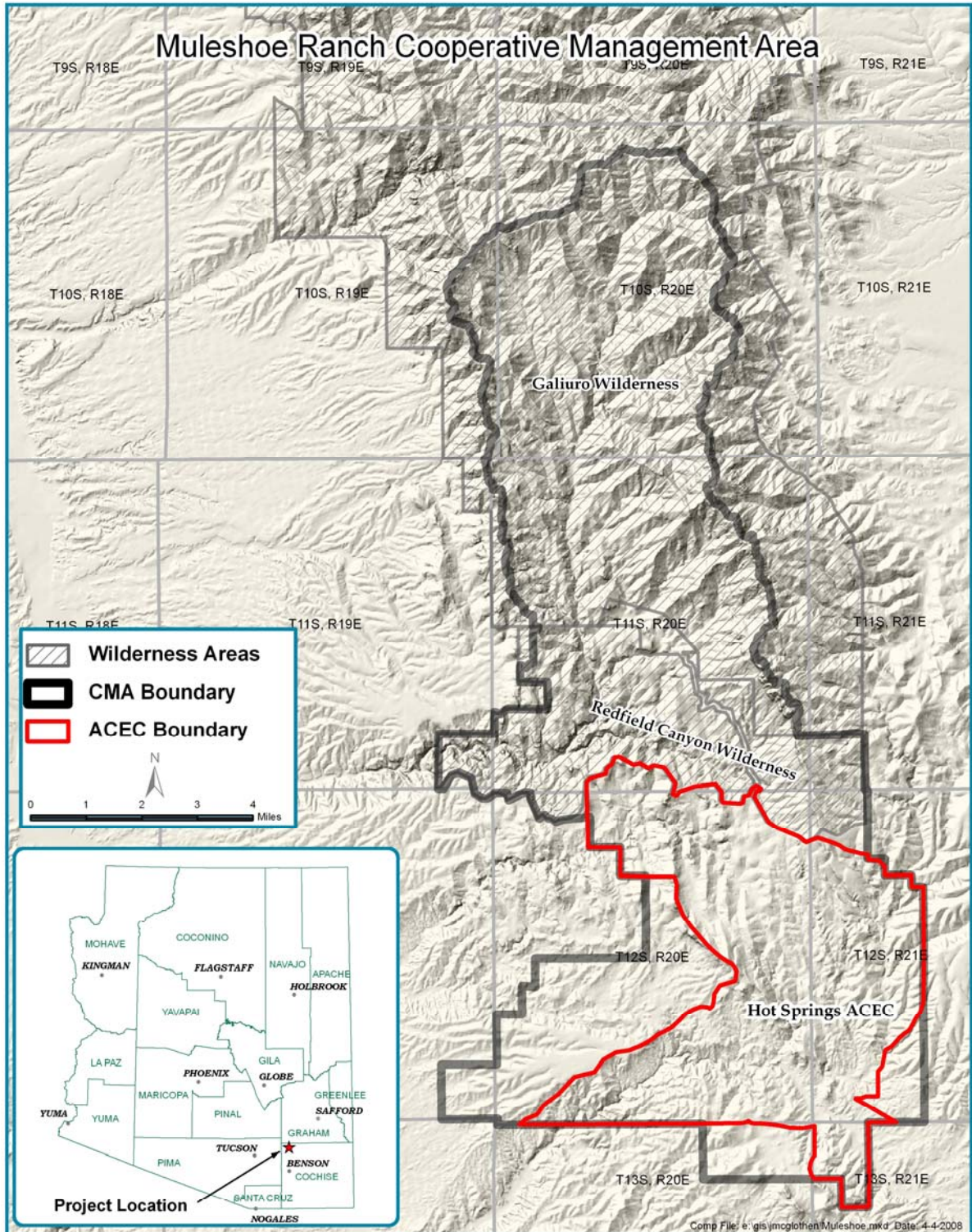


Figure 1. Muleshoe Ranch CMA

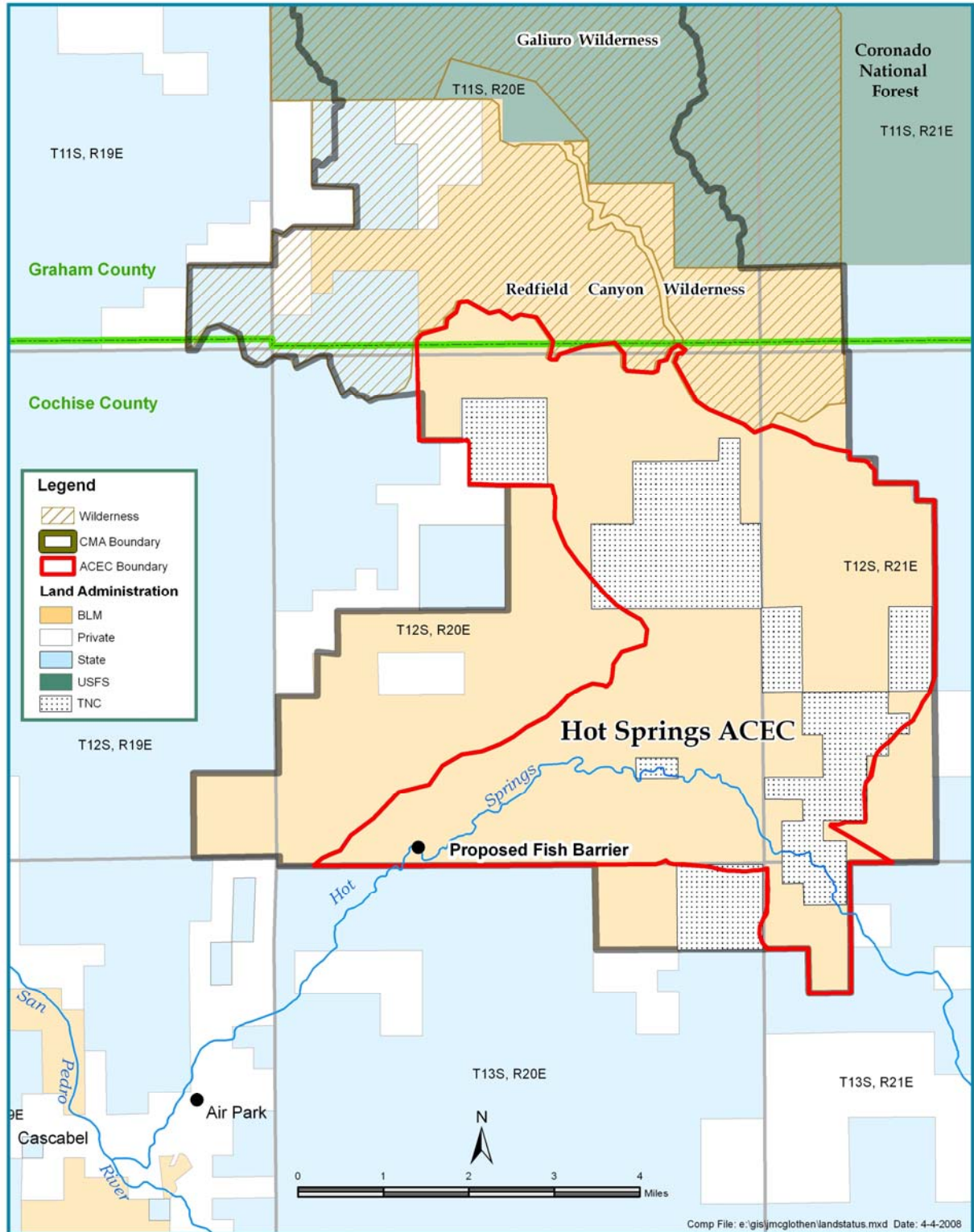


Figure 2. Fish Barrier Location

CHAPTER 2 - DESCRIPTION OF THE ALTERNATIVES

This chapter describes the alternatives considered for the restoration project in greater detail. It includes one action alternative and no action.

2.1 NO ACTION

In accordance with CEQ regulations at 40 CFR 1502.14 (d), no action must be considered as an alternative in each NEPA review. No action provides the baseline for comparison of environmental effects of the action alternatives. If no action is taken, Reclamation would not construct the proposed barrier.

2.2 PROPOSED ACTION

Site Selection. Potential sites for a constructed barrier were identified during on-the-ground surveys by a fish biologist and an engineer from Reclamation, and by other biologists knowledgeable of Hot Springs Canyon and its aquatic fauna. Only sites near the lower end of the perennial reach were considered in order to maximize the length of stream protected and minimize fragmentation of native fish populations. A 300-foot segment of stream approximately 0.75 mile upstream from the lower end of perennial flow had several sites that were considered suitable for a barrier, one of which was selected for barrier construction. The proposed barrier site is located in a 24-foot-wide bedrock constriction of the stream channel approximately 5.1 linear miles (5.6 stream miles) upstream from the confluence with the San Pedro River.

Fish Barrier Construction. The proposed barrier would be a reinforced, poured-concrete drop structure anchored to abutment bedrock and keyed into the channel alluvium. It would be designed to accommodate low and high flows, including a 100-year flood event. The 2008 CAP biological opinion ensures Reclamation or its designate will maintain the barrier over its expected 100-year life. Maximum height would be 5 feet above the channel surface with a 4-foot downstream drop from a low-flow center notch onto a sloping 1-foot-high apron. During construction, the placement of scour keys and rock gabions would require excavation of a temporary 6- to 8-foot-deep foundation trench in the channel alluvium between the bedrock abutments. Excavation of the trench would require the use of a backhoe. Stream flow would be diverted or piped around the trench and structural formwork, and the foundation alluvium would be dewatered with subsurface pumps to maintain a dry trench prior to placement of concrete.

The proposed fish barrier would consist of four primary features (see Appendix A): (1) a notched 5-foot-high, 24-foot-wide (crest height width) vertical drop structure; (2) a 6-foot-long concrete splash apron spanning the width of the streambed to prevent plunge pool development; (3) upstream and downstream keys to help anchor the barrier and prevent scour from undermining the structure; and, (4) buried gabion armoring across the entire width of the streambed along the downstream key to reduce scour at the toe of the apron. In addition, a wildlife ramp would be constructed on the downstream side of the right abutment to facilitate the movement of reptiles and small mammals past the barrier.

Fish Barrier Function. The barrier is intended to create an impediment to upstream movement of nonnative fish during stages of stream flow most likely to foster ingress of fishes from the San Pedro River, such as lower flood discharges and ascending and descending stages of higher floods. Substantial upstream movement of fish is not expected during peak flooding due to high-flow velocities and sediment loads.³

Construction Access, Staging and Vehicle Use. The roadless nature of Hot Springs Canyon is a constraint to ground-based construction access. In order to reduce impacts to the riparian corridor, construction materials and equipment would be transported to the barrier site by helicopter from a road-accessible staging area. As a logistical option, Reclamation and BLM will consider driving a backhoe (which is required for construction) up the stream channel from Canyon Road to avoid substantial additional costs associated with aerial transport of heavy equipment. Ground transport of a backhoe would entail one round trip over mostly dry, gravelly, and cobbly channel substrates and two short segments of vegetated terraces along wet portions of the stream channel. Travel distance from Canyon Road to the barrier site is approximately 3.6 miles, including 0.75 mile of normally perennial stream.

Staging activities include unloading, temporary storage of materials and equipment, and parking. The staging area would not exceed 0.2 acre in size. The backhoe and gabion rock would be power washed prior to being transported to the work area to reduce the risk of spreading weed seeds. Wet concrete would be delivered by commercial mixer trucks to a road-accessible staging area, where it would be transferred to a helicopter sling-load bucket for air transport to the work area. Concrete would be poured directly from the sling-load bucket into the barrier formwork at the construction site. A private airfield near the community of Cascabel is a possible staging site under consideration by Reclamation. The flight distance from the airfield to the proposed barrier site is 3.7 miles. Vehicle access to the airfield is by way of Cascabel and Canyon roads.

Hot Springs Canyon at the proposed barrier site is too narrow to land a helicopter. Therefore, construction workers would be airlifted from the staging area to a suitable landing site along the stream on State Trust Land approximately 700 feet south of the ACEC boundary (Figure 3). Workers would hike the remaining distance to the construction site.

Temporary laydown of construction materials would occur on a low rocky alluvial terrace along both sides of the channel just upstream of the barrier, and possibly on a smaller gravel bar located just downstream of the barrier. Construction crews would be given the option to set up a small camp on a terrace out of the flood zone at a site approved by Reclamation and BLM. There are several terraces located within 2,000 feet downstream of the proposed barrier site. On-site camping would substantially reduce the number of helicopter flights and pedestrian trips. Chemical restrooms would be transported to the project area by helicopter.

³ The extent and pattern of upstream fish movement varies widely among species and is influenced by environmental factors such as fluvial morphology, water velocity, and depth.

Construction would require approximately 1.5 months.

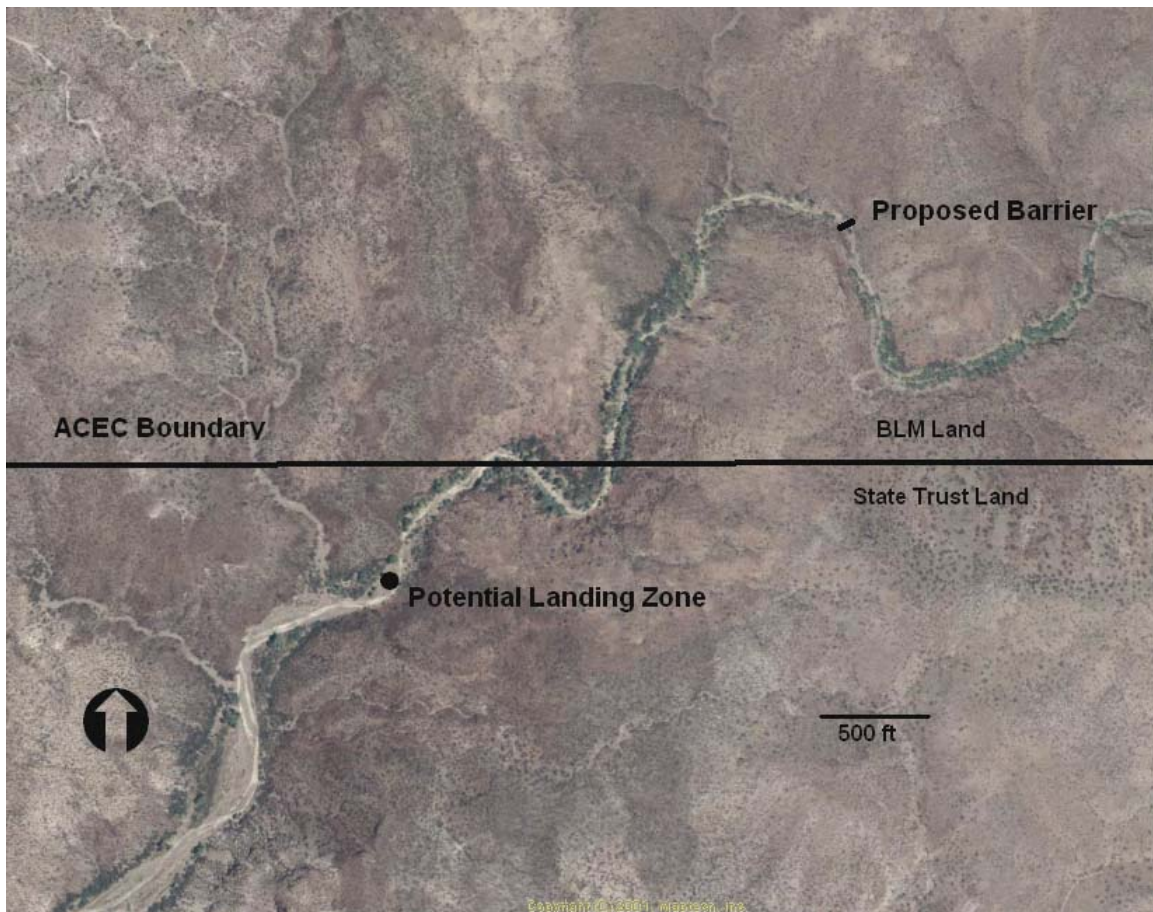


Figure 3. Proposed helicopter landing zone and fish barrier site.

Fish Barrier Operation and Maintenance. Long-term operation of the structure would require periodic inspections. Inspectors would hike (or travel on horseback) to the barrier from the nearest road accessible location. Any substantial maintenance requiring materials and equipment that could not be carried to the site would be performed using measures and techniques that are similar to the proposed action.

2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

During the planning phase, the lower 6-mile reach of Hot Springs Canyon was examined for potential fish barrier sites. Selection criteria for identifying site suitability were: (1) the presence of a narrow channel with bedrock abutments to solidly anchor the barrier and minimize site impacts, and (2) proximity to the lower end of perennial flow to maximize the length of aquatic habitat protected and minimize fragmentation of existing native fish populations. A site at the Cascabel Road crossing over Hot Springs Canyon was considered and rejected because of the presence of a wide floodplain and dirt banks that would have required a substantial amount of armoring for erosion control. Other

sites downstream of perennial flow lacked solid rock abutments on both sides of the channel and a narrow floodplain on which to build the barrier.

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This chapter presents the existing conditions in the project area and the environmental consequences that would result from no action and from implementation of the Proposed Action.

3.1 LAND USE

3.1.1 Affected Environment

The Safford District RMP designated the 16,763-acre Hot Springs ACEC to protect riparian, cultural, scenic land use, and fish and wildlife (including federally listed species) values. Livestock grazing is permitted in the Muleshoe allotment on the ACEC and the Soza Mesa allotment just north of the ACEC; however, livestock are excluded from the riparian zone of Hot Springs Canyon within the ACEC, and grazing was temporarily suspended in the Soza Mesa allotment pending improvement of drought conditions. Off-highway vehicle (OHV) use within the riparian area of Hot Springs Canyon is prohibited. Recreational opportunities on BLM-administered lands within the ACEC are constrained by rugged terrain, scarcity of roads and trails, and lack of visitor use facilities.

The airfield near Cascabel is a privately owned facility with a single runway and hangar. Airfield operations can accommodate landings and take-offs of rotary-winged and light fixed-wing aircraft. There is sufficient open space at that facility to support a small staging area.

3.1.2 Environmental Consequences

No Action

There would be no change in existing conditions. It is assumed that current land use and management practices would continue, as would Federal protections to threatened and endangered fish species and other resource values of the ACEC.

Proposed Action

The proposed barrier would provide additional protection to imperiled native fishes and help preserve the biological diversity of the native aquatic community in Hot Springs Canyon. Implementation of the project would yield benefits toward conservation and recovery of threatened and endangered fish species and would enhance the native fish value of the ACEC.

Grazing is prohibited in the project area; therefore, the proposed barrier would have no effect on livestock management.

The proposed barrier site is located in a roadless area with no direct access to public roads, trails, or recreation sites. Travel in the canyon is on foot or horseback only, and recreational use is light and dispersed. Recreation consists primarily of hiking, hunting, horseback riding, bird watching, and other nature enjoyment. Emplacement of the barrier would create an impediment to equestrian use; however, horseback riding in this portion of the canyon is infrequent, and the impact would be minor. Most hikers could easily surmount the 5-foot height of the barrier by using the wildlife ramp. The proposed project would have a negligible effect on other forms of recreation.

Helicopter operations would be consistent with the intended use of the airfield. Staging of construction materials and equipment would be coordinated with the owner of the airfield to avoid any conflicts with airfield operations or other land uses. If a different property is selected, staging activities would be coordinated with the affected property owner.

Cumulative Effects – Land Use

Project derived enhancement of the native fish land use value would be cumulative to past, present, and future fisheries management actions, such as reintroduction of fish species or augmentation of existing fish populations with translocated stock. Protection of native fish populations would complement other reasonably foreseeable future actions taken to protect the land values of the ACEC.

Mitigation

- At the end of construction, all evidence of the temporary construction camp would be removed.

3.2 GEOLOGY AND SOILS

3.2.1 Affected Environment

The project area lies within the Basin and Range physiographic province. Tertiary volcanics and conglomerates are the predominant rock types in the ACEC (BLM 1998). These include a variety of types from rhyolites to andesites and basalts. At the proposed barrier site, sedimentary rocks of the Cascabel Formation (mostly conglomerates and sandstone with some siltstone and mudstone) line the walls of the canyon. Rocks of the Willow Canyon Formation (mostly siltstones, mudstones, and conglomerates) occur along the stream a short distance downstream of the proposed barrier site.

The NRCS does not have a soil map for the project area. An “Order 3” survey prepared for the Muleshoe Ranch CMA (Norgren and Spears 1990) identified six soil types: Grey eagle cobbly loam, Bonita-Bonita Variant complex, Arizo-Brazito-Riverwash complex, Caralampi gravelly loam, Arguistolls-Haplustolls complex, and Greyeagle-Eloma

complex (BLM 1998). The majority of soils associated with canyon bottoms in the Muleshoe Ranch CMA are highly erodible.

Alluvial deposits eroded from upland areas fill the stream bottom and form the terraces and floodplain that define the Hot Springs Canyon riparian corridor. The streambed alluvium consists of fine sand, gravel, and cobbles. In the project area, bedrock walls constrict the stream channel and form the abutments to which the proposed barrier would be anchored.

3.2.2 Environmental Consequences

No Action

There would be no change in existing conditions. Floods and sedimentation from land surface and channel erosion would continue to affect the riparian corridor. It is assumed that current resource management practices would continue.

Proposed Action

Construction would directly affect approximately 0.32 acre of channel substrates at the barrier site. Excavation for the barrier foundation would displace an estimated 116 cubic yards of streambed alluvium, which would be replaced by approximately 28 cubic yards of concrete, 8 cubic yards of gabions, and 80 cubic yards of excavated alluvium re-deposited as backfill. Some of the backfill would be placed along the upstream side of the barrier to reduce temporary pool development following construction. In addition, there would be a minor disturbance to streambed alluvium (mostly gravelly, cobbly, and sandy soils) along a 3.6-mile route if a backhoe is driven to the barrier site.

Construction staging would require an area of approximately 0.2 acre. Staging would be confined to a designated area at the airfield or other road-accessible location approved by Reclamation and the affected landowner or managing agency. Post construction stabilization including erosion control and/or revegetation may be required in the staging area depending on site characteristics and existing land use.

In the short term following construction, stream-transported coarse material would be immobilized by the barrier, forming a new layer of bedload deposits over existing channel substrates immediately upstream of the barrier. Deposition of this material would be accelerated by seasonal high flows and floods. Localized effects include a reduction in gradient and aggradation of the active stream channel for approximately 1,560 feet upstream (Figure 4).

Short-term capture of bedload sediment at the barrier is expected to have minimal impact on stream balance downstream. Like other desert streams, Hot Springs Canyon carries considerable coarse sediment loads during floods, and the amount of bedload that would be immobilized at the barrier, compared to the total volume transported within the stream, is small. Nevertheless, the capture of bedload sediment could result in minor

fluvial erosion and some downcutting of the active channel downstream of the barrier for 2 to 3 years following construction. Total sediment yield downstream would be consistent with pre-project conditions once streambed aggradation at the barrier has stabilized. No long-term impact on sediment transport within the stream would occur.

Cumulative Effects – Soils and Geology

The effects of project activities on soils and sedimentation would be incremental to historic, ongoing, and future uses of the watershed. During the past century, livestock grazing, roads, and off-road vehicle use were the primary human-induced causes of soil erosion and sedimentation in the Hot Springs Canyon watershed. Wildfires have been a secondary source of sedimentation. Restriction of vehicle operation to established roads and changes in grazing practices in the ACEC have reduced sedimentation in Hot Springs Canyon, although grazing, channel instability, and roads in portions of the upper drainage continue to be a source of sedimentation. The exclusion of livestock from the riparian zone within the ACEC has stabilized stream banks and floodplain soils by eliminating trampling and damage to riparian vegetation.

The proposed project would not add substantially to the cumulative impacts of other past, present, or reasonably foreseeable future actions on soils because of the limited scope of the proposal (short implementation duration and relatively small area impacted) and use of appropriate erosion control practices to mitigate construction impacts to soils.

Mitigation

- If a backhoe is used, any tire tracks entering the streambed would be obliterated at Canyon Road to discourage any potential future use of Hot Springs Canyon by unauthorized OHVs. This would apply equally to the inbound and outbound trips.
- Erosion control measures and post-construction site stabilization would be implemented at the staging area as necessary.
- No stockpiles of material would remain following barrier construction.

3.3 WATER RESOURCES

3.3.1 Affected Environment

Average annual precipitation in the Hot Spring Canyon watershed ranges from 10 to 12 inches along the San Pedro River valley to approximately 16 to 20 inches at higher elevations of the drainage (BLM 1998). Generally, precipitation follows a bimodal pattern of winter and summer storms. Precipitation is primarily rain, but snow may occur sporadically at the higher elevations.

Hot Springs Canyon is a tributary of the San Pedro River, which drains into the Gila River near the town of Winkelman approximately 53 miles north of Cascabel. A significant portion of base flow to the lower San Pedro River is contributed by the Hot Springs Canyon watershed (Braun and Maddock 1992). The Hot Springs watershed covers 109.4 square miles and drains the southern portion of the Muleshoe Ranch CMA. Major tributaries within the watershed include Wildcat, Bass, Polecat, Rattlesnake, Redrock, and Davis Canyons.

There are 12.5 miles of perennial stream on the Hot Springs watershed (BLM 1998). The proposed barrier site is near the lower end of perennial flow. Average stream flow is estimated to be 5.4 cubic feet per second (cfs), based on data collected at upper and lower Hot Springs (BLM 1998). Stream flows are highly variable and exhibit a flashy response to major storm events. Flood flows tend to be quite turbid and carry a high sediment load because of erosion from exposed upland slopes and channel instability in tributary washes.

The Arizona Department of Environmental Quality (ADEQ) sets narrative and numeric water standards for a variety of contaminants based on the uses people and wildlife make of the water. In Hot Springs Canyon, uses are classified as warm-water fishery, full body contact, livestock watering, and fish consumption. The Draft 2006 Integrated 305(b) Assessment and 303(d) Listing Report indicates that surface water in Hot Springs Canyon is in attainment of water quality standards for all designated uses except warm-water fishery. An inconclusive finding for the fishery classification resulted from an exceedance of the dissolve copper standard in one sample during a 3-year period of monitoring.⁴

There are no streams in the project area that are designated as, or eligible for, National Wild and Scenic River (NWSR) status. Although segments of Hot Springs were considered eligible in the RMP, the Final Arizona State-wide Legislative Environmental Impact Statement determined that Hot Springs Canyon was not suitable for inclusion in the NWSR system (BLM 1994).

3.3.2 Environmental Consequences

No Action

There would be no change in existing conditions. Environmental factors, including surface and channel erosion, would continue to affect water resources in the area. It is assumed that current resource management practices would continue.

Proposed Action

The U.S. Army Corps of Engineers (COE) regulates the discharge of fill material to waters of the U.S., pursuant to Section 404 of the Clean Water Act (CWA), and issues

⁴ Monitoring information collected is insufficient to assess the surface water as “attaining,” “threatened,” or “impaired.”

permits for actions proposed within such waters. Jurisdictional, non-tidal waters of the U.S. regulated by the COE are defined in 33 CFR 328.4 (c) as those that comprise the area of a water course that extends up to the ordinary high-water mark (OHWM), in the absence of wetlands. Based on Reclamation's delineation of the OHWM, less than 0.1 acre of jurisdictional waters would be affected by the discharge of fill material during construction of the proposed barrier (see Section 3.2.2). The fill material would consist of structural concrete, gabions, and alluvial backfill from the foundation excavation. A CWA 404 permit has been issued by the COE for this construction (see Chapter 5 for additional CWA information).

Excavation of channel substrates would contribute to elevated levels of suspended sediment and turbidity during periods of active construction. Bank disturbances would be confined to solid rock at the abutments and would not contribute toward sedimentation. Stream flow would be diverted around active work sites during construction, and short-term water quality effects are expected to be minor. The project would not affect long-term changes in water quality.

After construction, bedload sediment would settle within a zone of deposition upstream of the barrier. Captured sediment would permanently aggrade (raise) the channel bed to the same height as the top of the barrier (approximately 5 feet) and diminish upstream in response to stream gradient. Channel-bed aggradation would affect about 1,560 linear feet (1.0 acre) of stream. Bedload sediment transported during flood events is expected to fill the ponded area created by the barrier within 1 to 3 years.

Cumulative Effects – Water Resources

Livestock grazing, fire (both wild and prescribed), roads, and trails have had a cumulative impact on water resources within Hot Springs Canyon. Historic use of the watershed for grazing has reduced vegetative cover, destabilized soils, and increased channel instability, which have contributed to sedimentation and adverse water quality effects. Current grazing management practices within the ACEC have improved range conditions and reduced impacts to water quality. Livestock grazing on lands within the watershed, but outside the ACEC, continues to have an impact on Hot Springs Canyon.

Widespread catastrophic fires have the potential to substantially increase sedimentation from ash and exposed soils. Under current drought conditions, the frequency and intensity of wildfire is potentially greater. In accordance with BLM policy, prescribed burn units include riparian zones only if conditions indicate a need to reduce catastrophic wildfire potential.

There are several unpaved roads in the upper watershed that have historically impacted Hot Springs Canyon. Use of unpaved roads contributes fine sediment to the watershed and can result in increased turbidity in surface water. The amount of sediment production from unpaved roads is affected by local conditions such as storm intensity and associated runoff, road gradient, surface material particle size, and traffic intensity.

Under the proposed project, short-term construction at the proposed barrier would not substantially increase erosion or sediment production within the watershed. Runoff from disturbed soils within the construction impact area would have a minor short-term cumulative effect on sedimentation and turbidity within the stream.

Mitigation

- A CWA Section 401 Water Quality Certification has been issued by ADEQ for fish barrier construction. Terms and conditions of the certification would be integrated into the project.
- Reclamation received a CWA Section 404 permit on October 28, 2003, to construct barriers required under the 2001 CAP biological opinion. Terms and conditions of the permit would be integrated into the project.
- A Water Control Plan would be prepared with measures to protect water quality and care of the stream during barrier construction.
- All construction equipment would be periodically inspected for leaks. Any significant leaks would be promptly corrected.

3.4 BIOLOGICAL RESOURCES

3.4.1 Affected Environment – Vegetation

The project area lies within the transition zone of three major vegetation communities as delineated by Brown and Lowe (1982): Sonoran Desertscrub, Chihuahuan Desertscrub, and Semidesert Grassland. Vegetation along the San Pedro River changes from Chihuahuan Desertscrub to Sonoran Desertscrub near the community of Cascabel. Semidesert Grassland habitat occurs outside of the floodplain and extends toward the foothills.

The Sonoran Desertscrub is one of the most diverse deserts in North America. The lower, hotter slopes of Hot Springs Canyon are dominated by foothill paloverde (*Parksonia microphylla*), saguaro (*Cereus giganteus*), catclaw acacia (*Acacia greggii*), ocotillo (*Fouquieria splendens*), barrel cactus (*Ferocactus acanthodes*), and cholla (*Opuntia*) species. Typical shrub species include triangle-leaf bursage (*Ambrosia deltoidea*), creosotebush (*Larrea tridentata*), and saltbush (*Atriplex* spp.).

Characterized by hot summers and cold winters, the Chihuahuan Desertscrub is dominated by shrubs and low-growing cacti. Representative plant species include desert spoon (*Dasyliirion wheeleri*), yucca (*Yucca elata*), catclaw acacia, sand dropseed (*Sporobolus cryptandrus*), big sacaton (*Sporobolus wrightii*), sixweeks grama (*Bouteloua barbata*), and various cacti species (Brown 1994). This habitat occurs at the lower end of Hot Springs Canyon near the confluence of the San Pedro River.

The Semidesert Grassland (also referred to as Chihuahuan semidesert grassland) habitat is characterized by biseasonal (summer and winter) precipitation. Representative plant species include: desert spoon, beargrass (*Nolina microcarpa*), desert hackberry (*Celtis pallida*), jojoba (*Simmondsia chinensis*), side-oats grama (*Bouteloua curtipendula*), and curly mesquite (*Hilaria belangeri*).

A fourth biotic community occurs along the stream bottom. The Sonoran Riparian Deciduous Forest and Woodland community along this portion of lower Hot Springs Canyon consists of mixed stands of Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix goodingii*), and velvet ash (*Fraxinus velutina*) with velvet mesquite (*Prosopis velutina*) on the terraces. The riparian habitat along Hot Springs Canyon varies from wide, dense stands of trees to narrow stringers of habitat. Within the immediate project area, the riparian habitat consists of a narrow stringer of trees. The riparian habitat widens out approximately 1/2 mile downstream of the proposed barrier site for less than 1/4 mile in length. A large bench covered in velvet mesquite also occurs in this reach of the stream. The most significant stand of trees occurs approximately 5 miles upstream of the barrier site near Hooker Hot Springs.

3.4.2 Environmental Consequences - Vegetation

No Action

In the absence of the proposed project, no disturbance to vegetation would occur as a result of barrier construction. The riparian plant community will continue the cycle of vegetation loss and regeneration associated with natural flood events.

Proposed Action

The use of a helicopter to transport supplies into the site would result in reduced impacts to vegetative resources. A total of approximately 1.2 acres (Table 1, Figure 4) of riparian habitat would be affected as a result of implementation of the proposed project. Approximately 0.01 acre of stream channel would be permanently impacted by the barrier footprint. Temporary impacts affecting 1.06 acres would occur in the sedimentation zone and contractor-use areas. Approximately 0.13 acre of stream channel downstream of the barrier would be utilized for excavation of the barrier site and stockpiling of the excavated material. Construction activities located upstream of the barrier would occur within the identified sedimentation zone. Barrier construction would impact a small group of four Goodding willow trees located immediately upstream of the proposed barrier location. Stream diversion and trench dewatering may result in the loss of several trees located just outside of the downstream construction zone.

Sediment would be deposited upstream of the barrier for a distance of approximately 1,560 feet, affecting 1.0 acre of streambed. Few trees would be negatively impacted by the sediment deposition. There are only scattered trees within the channel for the first 200 feet upstream of the barrier. Accumulation of up to 2 feet of sediment on the existing

trees would have no long-term impacts. Upon stabilization of the sedimentation zone, revegetation would naturally occur. Pursuant to the CWA Section 404 permit, Reclamation would mitigate all vegetative impacts (including the entire sedimentation zone) through habitat protection at a 10:1 ratio (See Mitigation Section later in this document). Aquatic habitat would re-establish after sediment loads equilibrate, which is expected to occur after the first major flood event. Three potential contractor-use areas (0.12 acre) for temporary laydown of construction materials were identified on small terraces immediately upstream and downstream of the barrier location. Approximately 1/2 of the acreage identified for contractor use within the riparian corridor occurs within the sedimentation zone (Figure 4). Downstream effects would be limited to minor erosion of barren and vegetated stream banks during the first 2 to 3 years following construction due to the temporary capture of bedload sediment at the barrier.

In addition, minor impacts may occur to approximately 0.02 acre of vegetated terraces if a backhoe is driven up the stream channel. Impacts to riparian vegetation would occur at two locations where the backhoe would be driven across low terraces to avoid obstacles in the stream channel. Potential impacts include disturbances to gravelly and sandy substrates and removal of one willow tree.

The contractor will have the option of setting up a small camp on a mesquite terrace during construction. There are several suitable sites located within 2,000 feet downstream of the barrier. Impacts would primarily be limited to trampled vegetation; no vegetation clearing will be permitted.

Table 1. Impacts (acres) to riparian habitat.

Impact	Riparian
Permanent	
Barrier	0.01
Temporary	
Construction Zone	0.13
Sedimentation Zone	1.00
Contractor-Use Areas	0.06
Backhoe Impacts	0.02
Total Acres	1.22

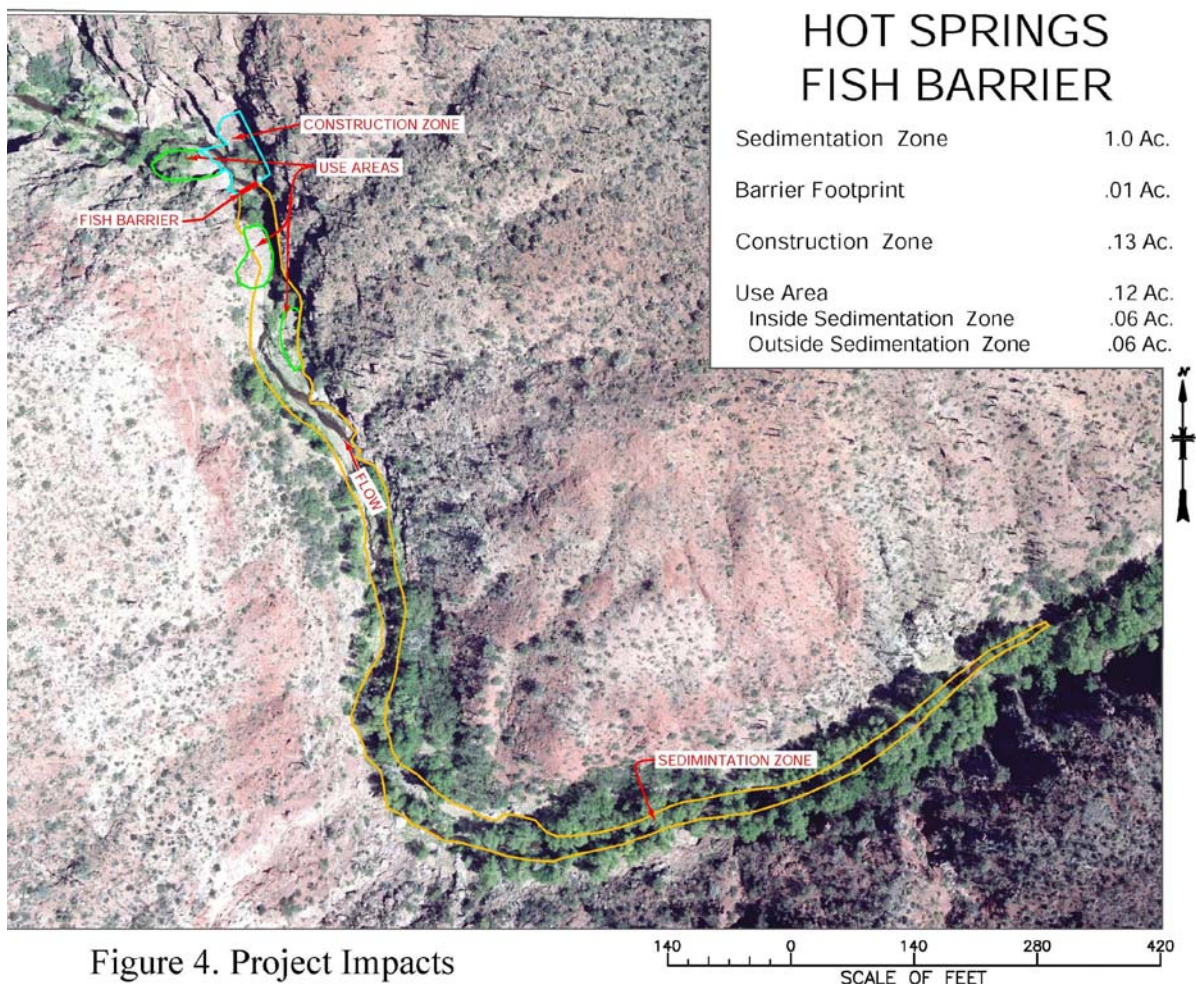


Figure 4. Project Impacts

Cumulative Effects - Vegetation

Project effects on vegetation would be incremental to past, present, and reasonably foreseeable actions. Hot Springs Canyon had historically been subject to cattle grazing; however, grazing has been suspended since 1982. There is no vehicular access to the portion of Hot Springs Canyon in the ACEC, and public use in this area is light and dispersed. The BLM's management objective for Hot Springs Canyon is to achieve or maintain proper functioning condition of the riparian habitat within 5 years of a major flood event. Current riparian habitat function is considered good. The effect of the proposed project on vegetation, when incrementally combined with other human-induced impacts, would be minor and limited in size, scope, and duration. Any long-term effect, outside of the footprint of the barrier, would be rendered largely undetectable due to natural regeneration and floods.

3.4.3 Affected Environment - Terrestrial Wildlife

Sonoran Riparian Deciduous Forest and Woodland - Riparian vegetation provides habitat for 60 to 75% of Arizona's resident wildlife (Arizona Riparian Council 1994). Wildlife use of riparian habitat is disproportionate to the amount of habitat available (Ohmart and Anderson 1986). Although 60 to 75% of Arizona's resident wildlife are dependent on riparian habitats, riparian areas occupy less than 0.5% of the State's total land area (Arizona Riparian Council 1994).

Riparian areas have been recognized as critical habitat for neotropical migrants such as the summer tanager (*Piranga rubra*), Bell's vireo (*Vireo bellii*), yellow-billed cuckoo (*Coccyzus americanus*), and yellow warbler (*Dendroica petechia*).

Large mammals such as black bear (*Ursus americanus*), collard peccary (*Tayassu tajacu*), bobcat (*Felis rufus*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), white-nosed coati (*Nasua narica*), and mule deer (*Odocoileus hemionus*) can use riparian habitat as movement corridors. Small mammals typically found in riparian habitat include white-throated woodrat (*Neotoma albigula*), Arizona cotton rat (*Sigmodon arizonii*), and desert cottontail (*Sylvilagus audubonii*).

Sonoran Desertscrub - This community is particularly noted for its rich bird life. Some characteristic species include the white-winged dove (*Zenaida macroura*), elf owl (*Micrathene whitneyi*), and pyrrhuloxia (*Cardinalis sinuatus*). Other wildlife species include: mule deer, collared peccary, white-throated woodrat, nectar-feeding bats such as the federally endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuinae*) and Mexican long-tonged bat (*Choeronycteris mexicana*), desert tortoise (*Gopherus agassizii*), regal horned lizard (*Phrynosoma solare*), western whiptail (*Apidoscelis tigris*), Gila monster (*Heloderma suspectum*), Arizona coral snake (*Micruroides euryxanthus*), and the tiger rattlesnake (*Crotalus tigris*).

Semidesert Grassland - Generally, grassland species have fared less well than their scrub-adapted competitors. Antelope, for example, are now totally absent from large areas of their former range in semidesert grassland, whereas mule deer and collared peccary have extended their ranges (Brown 1994). Wildlife characteristic of the Semidesert Grassland include: black-tailed jackrabbit (*Lepus californicus*), scaled quail (*Callipepla squamata*), Swainson's hawk (*Buteo swainsoni*), poor-will (*Phalaenoptilus nuttallii*), Scott's oriole (*Icterus parisorum*), ornate box turtle (*Terrapene ornata luteola*), desert grassland whiptail (*Apidoscelis uniparens*), and the Mexican hognose snake (*Heterodon nasicus kennealyi*).

Chihuahuan Desertscrub - Because of its "recent origin," few warm-blooded vertebrates are restricted to Chihuahuan Desertscrub (Brown 1994). Most species are representative of a southeastern extension of general desert-adapted species. Some "characteristic" species include the southern pocket gopher (*Thomomys umbrinus*),

Southern grasshopper mouse (*Onychomys torridus*), scaled quail, Chihuahuan raven (*Corvus cryptoleucus*), Texas banded gecko (*Coleonyx brevis*), roundtailed horned lizard (*Phrynosoma modestum*), whipsnakes (*Masticophis* sp.), and Chihuahuan hook-nosed snake (*Gyalopion canum*).

3.4.4 Environmental Consequences - Terrestrial Wildlife

No Action

In the absence of the proposed project, no disturbance to any wildlife species would occur.

Proposed Action

Impacts to terrestrial wildlife from construction of the fish barrier would be minor relative to the number of species along the entire reach of Hot Spring Canyon. Injury and death of smaller and less mobile animals such as rodents and reptiles could result from equipment use during construction. There would also be temporary noise-related disturbances to wildlife from construction and campsite use. Following construction, there would be a permanent loss of habitat (0.01 acre) for these species at the barrier site.

If construction occurs during the spring, there could be some disruption to nesting avian species near the barrier site. These impacts would be localized and would vary depending on the individual species' sensitivity to disturbance. For instance, Bell's vireos were observed singing throughout the 2008 breeding season adjacent to construction of the Bonita Creek fish barrier (Diane Laush, Reclamation, pers. obs.). A helicopter would be utilized to transport equipment and supplies to the construction site. In order to reduce impacts to raptors and other nesting avian species, Reclamation would require the contractor to avoid overflights of the riparian corridor when maneuvering between the staging area (near Cascabel) and the barrier site.

The barrier would create a hindrance to upstream and/or downstream movement for a limited number reptiles (primarily snakes and Gila monsters) and small mammals. These impacts would be very localized as the home ranges of species potentially affected are relatively small, and many species are capable of overland travel along the slopes of the canyon and adjoining uplands. However, as mitigation for these potential effects, a small wildlife ramp would be constructed on the downstream side of the right abutment. The barrier would have a negligible impact on large mammals. Deer and collard peccary could scale the hillside to circumvent the barrier.

Cumulative Effects – Terrestrial Wildlife

Project effects on wildlife would be incremental to the past, present, and reasonably foreseeable actions described in Section 3.4.2. The incremental effect of the proposed project on local wildlife would be predominately short term in nature and negligible.

3.4.5 Affected Environment - Fish and Aquatic Wildlife

The existing native fish community in Hot Springs Canyon consists of endangered Gila chub, speckled dace, longfin dace, Sonora sucker, and desert sucker. On October 4, 2007, 205 loach minnow and 210 spikédace were stocked into Hot Springs Canyon approximately 4 miles upstream from the proposed fish barrier site, and 500 desert pupfish and 500 Gila topminnow were stocked into Secret Springs, a warm spring near the head of perennial flow in Hot Springs Canyon. Although it is not yet known if any of the reintroduced federally listed species will establish self-sustaining populations, Reclamation and BLM consider them in the context of this EA as established and extant within the Hot Springs Canyon system.

Lowland leopard frog (*Lithobates yavapaiensis*) and Sonora mud turtle (*Kinosternon sonoriense*) are known additional obligate-aquatic vertebrates that inhabit perennial reaches of Hot Springs Canyon that could be affected by the proposed action. We also consider more common species such as canyon treefrog (*Hyla arenicolor*), spotted toad (*Bufo punctatus*), Sonoran Desert toad (*Ollotis. alvaria*), and black-necked gartersnake (*Thamnophis cyrtopsis*) to be present as well. The rarer Mexican gartersnake (*T. eques*) has been recorded from the upper San Pedro River drainage, but there are no records from Hot Springs Canyon (Rosen and Schwalbe 1988, Rosen et al. 2001). The presence of semi-aquatic beaver (*Castor canadensis*) in the Hot Springs Canyon watershed appears to be sporadic. A single beaver was seen recently in upper Hot Springs Canyon (Heidi Blasius, BLM, pers. comm). In 2006 and 2007, a single beaver was present in Bass Canyon; however, that beaver is no longer there (Heidi Blasius, BLM, pers. comm.). It is unknown whether the beaver in Hot Springs Canyon was the same one previously observed in Bass Canyon.

3.4.6 Environmental Consequences - Fish and Aquatic Wildlife

No Action

In the absence of the proposed project, the potential for upstream invasion by nonnative fishes from the San Pedro River into Hot Springs Canyon will remain a potential threat to the persistence of native fishes.

Proposed Action

The proposed barrier is expected to have substantial, positive benefits to native fish and other aquatic vertebrate populations by preventing upstream invasions of nonnative fishes and other undesirable aquatic biota into Hot Springs Canyon. These effects should also benefit leopard frog populations in that they have also been shown to be negatively impacted by presence of nonnative fishes (Rosen et al. 1995). A similar benefit resulting from control of nonnative organisms should accrue to populations of gartersnake (Rosen and Schwalbe 1988) and Sonora mud turtle (Rosen and Fernandez 1996).

Placement of a barrier would affect gene flow among native fish populations to some extent. Native fish below the barrier would not be able to move upstream of the barrier, but some individuals above the barrier are likely to go over the fish barrier during flood flows. However, some native fishes currently found in Hot Springs Canyon occur in very low densities or are absent altogether in the lower reaches of the stream. Thus, minimal genetic effects to the much larger upstream populations are anticipated. If at a future time enhanced genetic interchange is deemed desirable, it can be accomplished by periodically moving individuals from downstream areas to the segment of stream above the barrier.

At the species level, the fish barrier would prevent movements and integration of genetic materials of native fishes derived from other stream systems to Hot Springs Canyon populations. Genetic communication among diverse populations is desirable to maintain long-term (hundreds of generations) genetic health of a species by allowing influx of novel genes that may better enable a species to adapt to changing environments. However, the condition of stream systems within the Gila River Basin over the past century has deteriorated to the point that little, if any, communication among tributary fish populations occurs through connecting main-stem river corridors (such as the San Pedro River). Presence of an array of nonnative fish predators in main-stem rivers like the San Pedro River, coupled with fragmentation of river drainages via stream diversions, channelization, ground-water pumping, reservoirs, and other human-induced changes in flow patterns render long-distance movements of fishes among streams within a drainage unlikely (Fagan et al. 2002). The dire status of native fishes today makes the need to protect remaining populations more immediate than ensuring that longer-term evolutionary needs are met. If obstacles presented by the presence of nonnatives can be removed in the future, the need for the barrier would be eliminated, and it could be breached.

Downstream drift of larvae of native fishes past the barrier would result in some losses to the upstream population, as they would be unable to move back upstream past the barrier. Drift of native larval fishes in streams and rivers of the Colorado River basin is a common phenomenon, but varies greatly among species (Bestgen et al. 1985; Valdez et al. 1985; Robinson et al. 1998; Remington 2002). For example, of nearly 20,000 larval fishes collected from the drift in the Gila River, New Mexico, in March to May, 1984, only 2% were minnows (Family Cyprinidae), and the rest were suckers (Family Catostomidae; Bestgen et al. 1985). In the Bestgen et al. (1985) study, most (87 %) minnow drift occurred during daylight, and distances drifted were estimated to be short. Fish drift measured in a variety of Salt and Gila River tributaries during May 1985 exhibited similar patterns, with the large majority of drift accounted by suckers (Bestgen 1985).

Distances drifted by native fish species in Hot Springs Canyon have not been determined, but two lines of evidence suggest that drift losses over the proposed barrier would be negligible. First, drift of larval stages of these species has not been shown to be a significant feature of their life histories, and most drift that occurs is during daylight when drift distances are short (Bestgen et al. 1985). Second, a study of native fish drift in

Aravaipa Creek, Arizona, determined that drift of longfin dace, desert sucker, and Sonora sucker was relatively short (on the order of tens of meters; Remington 2002). Therefore, unless drift transport distances are relatively long (several kilometers or more), large losses from this avenue are not expected.

Downstream transport of older life stages of fishes during flood or by other avenues of dispersal would also result in some losses of fishes below the barrier, although native fishes in general are adapted to avoid the worst hydraulic conditions of flood events, and they resist downstream transport (Minckley and Meffe 1987). However, entire year classes of native fishes can be destroyed from floods that occur during larval rearing periods (Robinson et al. 1998). For reasons similar to those explained for genetic isolation impacts (above), losses of native species from flood transport are expected to be minimal and of little significance to upstream populations.

As with early life stages of native fishes, floods that occur during larval development of leopard frogs have the potential to decimate a given year's cohort. Such effects would occur with or without the presence of the fish barrier, however. In the absence of flooding during larval development, downstream losses of larvae of leopard frogs over the barriers should be minor, since sites of oviposition and larval rearing are in areas of slack water with relatively little potential for entrainment in currents that could transport larvae downstream. Significant downstream drift of amphibian larvae in streams has not been noted in the literature.

No substantial impacts to later life stages (juvenile and adult metamorphs) of leopard frogs are expected from placement of fish barriers. Because the proposed fish barrier would function similar to other natural stream structures such as debris or rock structures, the impacts would be similar. It is not expected that the Hot Springs Canyon fish barrier would form a complete barrier to upstream movements by terrestrially mobile adult frogs, gartersnakes, Sonora mud turtle, or beaver, although movements over the abutments could be challenging. Recommendations from Jarrod Underwood (AGFD, pers. comm.) and former AGFD Game Supervisor Dave Brown (per Heidi Blasius, BLM, pers. comm.) indicated that beavers were capable of maneuvering around obstacles and of traveling fair distances from the stream channel. Neither party believed construction of a ramp to aid beaver movement was necessary; however, a wildlife ramp would be constructed to facilitate the movement of other small animals. Other impacts to aquatic reptiles and amphibians would be similar to those just described for fishes.

Impacts to in-stream habitats in the sedimentation zone immediately upstream from the fish barrier would be primarily a result of lowering of the local stream gradient. Thus, certain habitat types such as steep-gradient riffles would be less likely to re-form after construction of the barrier and resulting sedimentation. Decreases in mean sediment size, and increases in channel sinuosity and braiding are other possible localized effects associated with lower gradient. Gradient of Hot Springs Canyon at the proposed barrier site is approximately 0.015%, limiting the extent of streambed aggradation to approximately 1,560 linear feet.

Cumulative Effects - Fish and Aquatic Wildlife

Cumulative effects to aquatic wildlife would be similar to those previously described for terrestrial wildlife (Section 3.4.4).

3.4.7 Affected Environment – Federally Listed Species

Table 2 presents FWS listed, proposed, and candidate species that occur in Cochise County, excluding fishes that occur only within the Yaqui River drainage. Listed species and proposed species are afforded protection under the ESA. Candidate species are those for which FWS has sufficient information to propose them as endangered or threatened, but for which listing is precluded due to other higher priority listings. Candidate species are not afforded protection under the ESA.

Table 2. Federally listed and candidate species in Cochise County, exclusive of fishes that occur only in the Yaqui River drainage.

Common Name	Scientific Name	Status
California brown pelican	<i>Pelecanus occidentalis californicus</i>	Endangered
Canelo Hills ladies tresses	<i>Spiranthes delitescens</i>	Endangered
Chiricahua leopard frog	<i>Lithobates (=Rana) chiricahuensis</i>	Threatened
Cochise pincushion cactus	<i>Coryphantha robbinsorum</i>	Threatened
Desert pupfish	<i>Cyprinodon macularius</i>	Endangered
Gila chub	<i>Gila intermedia</i>	Endangered
Gila topminnow	<i>Poeciliopsis occidentalis</i>	Endangered
Huachuca springsnail	<i>Pyrgulopsis thompsoni</i>	Candidate
Huachuca water umbel	<i>Lelaeopsis schaffneriana</i>	Endangered
Jaguar	<i>Panthera onca</i>	Endangered
Lemmon fleabane	<i>Erigeron lemmonii</i>	Candidate
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuenae</i>	Endangered
Loach minnow	<i>Tiaroga cobitis</i>	Threatened
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
New Mexico ridge-nosed rattlesnake	<i>Crotalus willardi obscurus</i>	Threatened
Northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	Endangered
Ocelot	<i>Leopardus (=Felis) pardalis</i>	Endangered
Ramsey Canyon leopard frog	<i>Lithobates (=Rana) subaquavocalis</i>	Conservation Agreement
Sonora tiger salamander	<i>Ambystoma tigrinum stebbinsi</i>	Endangered
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Endangered
Spikedace	<i>Meda fulgida</i>	Threatened
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate

Due to the lack of suitable habitat in the project area and/or because the current range for the species is outside of the project, we have determined that the following species do not occur in the project area and are not considered further: beautiful shiner, California brown pelican, Canelo Hills ladies tresses, Chiricahua leopard frog, Cochise pincushion cactus, Huachuca water umbel, jaguar, New Mexico ridge-nosed rattlesnake, ocelot,

Sonora tiger salamander, southwestern willow flycatcher, Yaqui catfish, Yaqui chub, and Yaqui topminnow.

The 1994, 2001, and 2008 CAP biological opinions addressed impacts to aquatic species for barrier construction. The FWS determined in these biological opinions that further Section 7 consultation on listed aquatic species covered under the opinions was not required for fish barrier construction (Doug Duncan, FWS, pers. comm.). Consequently, the following fish species are discussed in this EA but not considered in the Biological Assessment: Gila chub, desert pupfish, Gila topminnow, loach minnow, and spikedace. A Biological Assessment was submitted to the FWS in October 2008 and concluded “no effect” to the aplomado falcon, Mexican spotted owl, southwestern willow flycatcher, and lesser long-nosed bat. All federally protected species that may occur in the project area are discussed below.

Lesser long-nosed bat - The lesser long-nosed bat is one of three leaf-nosed bats in Arizona (Hoffmeister 1986). This species was listed as endangered on September 30, 1988 (53 FR 38456). The lesser long-nosed bat belongs to the Phyllostomidae family. It is distinguished from all non-Phyllostomids in Arizona by its elongated snout tipped with a triangular leaf-shaped flap of skin. It is distinguished from the other two Phyllostomids by greatly reduced tail membrane and lack of a tail (Arizona Game and Fish Department [AGFD] 1992). In Arizona, this species is found from the Picacho Mountains to the Agua Dulce Mountains in the southwest and the Galiuro and Chiricahua mountains in the southeast (Hinman and Snow 2003).

Lesser long-nosed bats are found in desert grassland and shrubland up to the oak transition zone. They forage in habitat that includes saguaro, ocotillo, paloverde, organ pipe cactus (*Cereus thurberi*), and later in the summer among agaves (*Agave* sp.). Lesser long-nosed bats feed on nectar and pollen from saguaros and agaves forming a mutualistic relationship with these plants (FWS 1991). They feed on ripe cactus fruits at the end of the flowering season. They cannot tolerate prolonged exposure to cold, do not hibernate, and spend winters in Mexico. Daytime and maternity roosts are located in caves and abandoned mines. Lesser long-nosed bats have been known to forage long distances from their roost sites. Bats from caves located in the Pinacate Mountains in Mexico forage at Organ Pipe Cactus National Monument, approximately 50 miles away due to the lack of foraging habitat near the roost site.

Threats to this species include disturbance of roost sites, loss of food resources through over harvesting of agaves in Mexico, spread of agriculture, and livestock grazing.

The nearest lesser long-nosed bat roost locations are located 15 miles to the south-southwest in the Little Rincon Mountains and 23 miles southwest in the Rincon Mountains (Sabra Schwartz, AGFD, pers. comm.). Foraging habitat for the lesser long-nosed bat occurs on the hillsides adjacent to Hot Springs Canyon.

Northern aplomado falcon - This species formerly inhabited southeastern Arizona and was considered fairly common prior to 1890, but there are very few published records

after 1900 (Corman 2005c). The northern aplomado falcon has not been recorded in the State since 1940 (Corman 2005c). It is speculated that heavy grazing pressure combined with severe drought in the late 1880s resulted in a reduction in the prey base, leading to the falcon's extirpation from Arizona (Corman 2005c). Most records of this species were obtained in Cochise County north to Fort Bowie (Visher 1910). Five nesting records were recorded in 1887; all detected in the vicinity of Fort Huachuca (Bendire 1892). Historically, the northern aplomado falcon inhabited open Chihuahuan grassland habitat with scattered trees and relatively low ground cover with a supply of suitable nesting sites (primarily yucca or mesquite).

In 2006, the FWS released northern aplomado falcons into New Mexico as part of a "nonessential experimental population" (70 FR 6819). Any species encountered outside of a National Park or National Wildlife Refuge System unit is treated as a "proposed species" under the ESA, and a "conference" would be conducted should any impact be expected as part of a Federal action. There have been no recent documented occurrences of the northern aplomado falcon in Arizona (Sabra Schwartz, AGFD, pers. comm.).

Mexican spotted owl - The Mexican spotted owl (MSO) was listed as threatened on March 16, 1993 (58 FR 14248), with critical habitat listed on August 31, 2004 (69 FR 53182). The MSO occupies mixed conifer and ponderosa pine (*Pinus ponderosa*) and gambel oak (*Quercus gambelii*) vegetation types, usually characterized by high-canopy closure, high-stem density, multi-layered canopies within the stand, numerous snags, and downed woody material. Much of the time, suitable nesting and roosting habitat are located on steep slopes or in canyons with rocky cliffs where dense vegetation, crevices, or caves provide cool moist microsites for nest and roosts.

The MSO historically nested in riparian gallery forests; however, they have not been documented breeding in these forests in recent times (Ganey and Dick 1995). MSOs commonly occur in canyon-bottomed riparian forests at higher elevations interspersed with other forest types (Ganey and Dick 1995). MSOs have also been documented in canyon habitat dominated by vertical-walled rocky cliffs within complex watersheds including tributary side canyons. Rock walls include caves, ledges, and other areas that provide protected nest and roost sites (69 FR 53182). While most MSOs stay on their breeding areas throughout the year, in winter some birds migrate to lower, warmer elevations and more open pinyon-juniper woodland, mountain shrub, or the interface between pinyon-juniper and desert scrub habitats (Ganey and Dick 1995).

The closest nesting record is 5 miles to the northeast (Sabra Schwartz, AGFD, pers. comm.). No MSOs have been observed since 1999 (Bob Rogers, The Nature Conservancy, pers. comm.).

Southwestern willow flycatcher - The southwestern willow flycatcher (willow flycatcher) was listed as endangered, effective March 29, 1995 (60 FR 10694). Critical habitat designation was made on July 22, 1997 (62 FR 39129), with a correction on August 20, 1997 (62 FR 44228). On May 11, 2001, the 10th Circuit Court of Appeals set aside designated critical habitat. Critical habitat was re-designated on October 19, 2005

(70 FR 60886). No critical habitat is designated on Hot Springs Canyon. However, critical habitat has been designated on the San Pedro River from the confluence with the Gila River to approximately 5 miles upstream of the Hot Springs Canyon confluence.

The willow flycatcher is a neotropical migrant that breeds in the southwestern United States and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948; Stiles and Skutch 1989; Ridgely and Tudor 1994; Howell and Webb 1995). Declines in the distribution and abundance of flycatchers in the Southwest are attributed to habitat loss and modification caused by impacts of dams and reservoirs, stream diversions and ground-water pumping, channelization and bank stabilization, phreatophyte control, livestock grazing, agricultural development, urbanization, and recreation (FWS 2002).

The willow flycatcher breeds in riparian habitats along rivers, streams, or other wetlands, where patchy to dense trees and shrubs are established, usually near or adjacent to surface water or saturated soil (FWS 2002). Plant species composition and height vary across the geographical range of this species, but occupied habitat usually consists of a mosaic of dense patches of vegetation, often interspersed with small openings, open water, or shorter/sparser vegetation. Dense vegetation usually occurs within the first 10 to 13 feet aboveground. Willow flycatchers can occupy habitat within 3 to 5 years of a flood event (Paradzick and Woodward 2003). Periodic flooding and habitat regeneration are important to the recovery of this species.

In Arizona, willow flycatchers now nest predominantly in saltcedar. Saltcedar-dominated stands mimic the riparian woodlands structure of willow in many areas where willow has declined (FWS 2002). Ninety percent of willow flycatcher nests found between 1993 and 2000 in Arizona were in saltcedar (Paradzick and Woodward 2003). Southwestern willow flycatchers arrive in Arizona in late April/early May and begin nest construction in mid-to-late May. Egg laying and incubation begins in early June. Young are reared from mid-June through early August. Fledging can occur from late June through early August with birds departing for migration between August and mid-September (Sogge et al 1997).

In Arizona, the historical range of the willow flycatcher included all major watersheds. Recent surveys have documented willow flycatchers along the Big Sandy, Bill Williams, Colorado, Gila, Hassayampa, Little Colorado, Salt, San Francisco, San Pedro, Santa Cruz, Santa Maria, Tonto Creek, and Verde Rivers (FWS 2002). Presently, the highest density of nesting willow flycatchers occurs approximately 45 miles downstream of the barrier location, near the confluence of Aravaipa Creek and the San Pedro River.

No willow flycatcher surveys were conducted by Reclamation due to the lack of suitable nesting habitat in the project area. Likewise, the BLM has not conducted any recent willow flycatcher surveys near the project area (Tim Goodman, Biologist, pers. comm.). The closest nesting territories occur approximately 10.5 miles due south at 3 Links Farm.

Gila Chub - Gila chub is federally listed as endangered because of extensive habitat loss and establishment of nonnative fishes throughout most of its range (70 FR 66664). Critical habitat was designated for 25 streams in the Gila River Basin and included Hot Springs Canyon and its tributary Bass Canyon. A recovery plan for Gila chub has not yet been developed. A Gila River Basin endemic, Gila chub is similar in many ways to the closely related roundtail chub but is smaller and thicker-bodied and characteristic of deeper pools in small streams, cienegas, and springs (Minckley 1973, Minckley 1987). The species historically was widespread and locally common in suitable habitat throughout central and southeastern Arizona, but much of that habitat has been lost, and only remnant populations restricted to tributaries persist today (DeMarais 1986). A resident population of Gila chub is extant in portions of Hot Springs Canyon.

Females achieve lengths of 250 millimeters (mm), whereas males seldom exceed 150 mm (Minckley and Rinne 1991). No information on longevity is available, but individuals up to 4 years have been estimated from scale analysis (Griffith and Tiersch 1989). Few life history data are available (Weedman et al. 1996), but the species is omnivorous with a significant component of the diet comprised of insects (Griffith and Tiersch 1989). Reproduction takes place throughout much of the year except the coldest months, and young are found from early spring through autumn (Minckley and Rinne 1991, Shultz and Bonar 2006a). Propagation techniques for Gila chub in hatchery conditions were investigated by Shultz and Bonar (2006b). Gila chub often is reclusive, hiding in deep water among roots and other cover (Minckley 1973) but may also utilize shallower and swifter waters (Shultz and Bonar 2006a).

Desert pupfish - Desert pupfish was listed as endangered on March 31, 1986, with critical habitat (51 FR 10842). The species formerly was widespread throughout lower elevations of the Gila River Basin among main-stem river backwaters, springs, cienegas, and slow-flowing streams (Minckley 1973). It was extirpated from the entire Gila River drainage but has been repatriated successfully in the wild to a handful of isolated waters from where nonnative fishes are absent (Voeltz and Bettaso 2003). It persists naturally only in the vicinity of Salton Sea, California, and in the delta region of the Colorado River in Mexico (Zengel and Glenn 1996, Varela-Romero et al. 2003). Critical habitat for the species does not include any waters in Arizona.

Individuals rarely exceed 30 mm total length and probably do not live longer than 2 years in the wild. Males of this species are brightly colored blue, black, and yellow-orange and are highly territorial. Dominant males gather on a patch of silt-free bottom and try to lure females to spawn. The males aggressively defend oviposition sites from both smaller males and other species (Loiselle 1994). They forage primarily on small invertebrates and algae picked off the substrate and occasionally their own eggs and young (Schoenherr 1988). Pupfish resist almost any natural environmental extreme known in aquatic systems of the Sonoran Desert (Minckley 1985). They are capable of withstanding temperatures between 7 and 45 C, salinities from fresh water to twice the salt content of sea water (68 parts per thousand), and oxygen levels from saturation down to 0.1-0.4 mg/L (Lowe et al. 1967).

Repatriation of the species in the Gila River Basin to protected wild sites where nonnative fishes have been removed or precluded is occurring, but at an unhurried pace. More than a half-dozen additional natural sites without nonnative fishes need to be identified and stocked, and dozens of additional quasi-natural sites need to be established in the basin before the species can be considered for downlisting (Marsh and Sada 1993). A state-wide Safe Harbor Agreement that could facilitate such activity has recently been developed. Guidelines for the genetic management of re-established populations also are now available (Echelle et al. 2007). Translocations to Secret Springs within the Hot Springs Canyon drainage occurred in 2007, but it is too soon to determine if a self-sustaining population has become established. In 2008, 290 desert pupfish were translocated into Headquarters Spring, within the Hot Springs Canyon drainage.

Gila topminnow - *Gila topminnow* was federally listed as endangered on March 11, 1967 (32 FR 4001). No critical habitat has been designated. This small (<50 mm) live-bearing fish was historically one of the most common species at lower elevations in its endemic distribution within the Gila River Basin, where it inhabited springs, streams, cienegas, and margins of mainstem rivers (Hubbs and Miller 1941, Minckley 1973). The species began to experience loss of range in the basin early in the 20th century due to lowering water tables and arroyo cutting (Hendrickson and Minckley 1984). Introduction of nonnative fishes, particularly western mosquitofish (*Gambusia affinis*), in the 1930-40s significantly accelerated decline of the species and is the primary reason for its endangerment today (Meffe 1985, Marsh and Minckley 1990). Less than one dozen natural populations remain, with all but one confined to the Santa Cruz River subbasin.

Longevity of *Gila topminnow* is usually less than 1 year (Schoenherr 1974). It feeds on a variety of small plants and macroinvertebrates. Reproduction may occur year-round when water temperatures are suitable but is typically in spring through summer. Females can store spermatozoa for several months and are capable of superfetation, where two or more groups of embryos develop simultaneously at different developmental stages at the same time, with births occurring at 21-day intervals. Broods can consist of 14-49 embryos (Schoenherr 1977). They can become sexually-mature as early as 2 months and can produce up to ten broods per year under laboratory conditions (Schultz 1961).

Hundreds of natural and artificial habitats have been stocked with this species in an attempt to recover it, but most sites have failed (Voeltz and Bettaso 2003), and repatriation efforts have slowed dramatically in recent years. A state-wide Safe Harbor Agreement that could facilitate such activity recently has been developed, but a much-needed recovery plan revision has been stalled for many years. Translocations to Secret Springs within the Hot Springs Canyon drainage occurred in 2007, but it is too soon to determine if a self-sustaining population has become established. In 2008, 275 *Gila topminnow* were translocated into Headquarters Spring, within the Hot Springs Canyon drainage.

Loach minnow - *Loach minnow* was federally listed as threatened on October 28, 1986 (51 FR 39468). Recently designated critical habitat (72 FR 13356) includes four stream complexes in the Black River, Aravaipa Creek, San Francisco River/Blue River/Eagle

Creek, and upper Gila River drainages in New Mexico. No critical habitat was proposed for Hot Springs Canyon. Loach minnow is endemic to streams of the Gila River Basin, and its historical distribution included the Salt, Verde, Gila, White, San Francisco, Blue, and San Pedro Rivers; Eagle Creek; and major tributaries of the larger streams (Minckley 1973). The species has been extirpated from most of its historic range, surviving as a relatively large population only in Aravaipa Creek and Blue River, Arizona, and in the main stem and West Fork of the Gila River in New Mexico (Marsh et al. 1990, FWS 1990, Propst 1999, Paroz and Propst 2007). It persists as relatively small populations in about one-half dozen other streams in the basin and is estimated to be lost from about 85% of its historic range (FWS 1990). The FWS has determined that uplisting to endangered status is warranted.

Loach minnow is a small-bodied, short-lived, current-loving species inhabiting interstices of gravel and rubble in shallow, well-defined, stream riffles (FWS 1990). Foods are predominantly ephemeropteran nymphs and blackfly (Family Simuliidae) larvae (Schrieber and Minckley 1981). Loach minnow is the only member of the cyprinid family known to employ egg-clumping as a mode of spawning behavior (Johnston 1999). Spawning occurs in riffles where eggs are emitted by the female, fertilized, and then retrieved and affixed in clumps to the underside of rocks by the male (Vives and Minckley 1990, Childs 2004).

The presence of nonnative fishes and other nonindigenous aquatic organisms appears to be the major factor in continued declines of this species (Desert Fishes Team 2003). Recovery activities that have been implemented to date for loach minnow are construction of fish barriers on Aravaipa Creek to protect an existing population; construction of barriers on, renovations of, and translocations to Fossil and Bonita Creeks; and translocations to Redfield and Hot Springs Canyons. It is too soon to determine if self-sustaining populations have established in any of these systems, although reproduction has been detected in Hot Springs Canyon.

Spikedace - Spikedace was federally listed as threatened on July 1, 1986 (51 FR 23769). Recently designated critical habitat includes four stream complexes in the Verde River, middle Gila River/lower San Pedro River/Aravaipa Creek, San Francisco River/Blue River/Eagle Creek, and upper Gila River drainages (72 FR 13356). No critical habitat has been proposed for Hot Springs Canyon. Spikedace is endemic to the Gila River Basin with a historical distribution that included the Agua Fria, Verde, Salt, San Francisco, Gila, and San Pedro Rivers, and many of their major tributaries (Minckley 1973). In Arizona, spikedace remains only in Aravaipa Creek, a portion of the upper Verde River, and in Eagle Creek (Marsh et al. 1990), but the species has not been detected in the two latter streams in recent years. In New Mexico, it inhabits the Gila River and its major forks, but is declining there also (Propst 1999, Paroz and Propst 2007). The FWS has determined that uplisting to endangered status is warranted.

Spikedace is a small-bodied, short-lived species that occupies flowing pools generally less than a meter deep over sand, gravel, or mud bottoms below riffles or in eddies (Minckley 1981). Spawning occurs over sand-gravel substrates with no parental care

given (Barber et al. 1970, Propst et al. 1986). Foods are primarily ephemeropteran nymphs and dipteran larvae, but substantial numbers of winged adults of these groups and caddis flies are taken (Schrieber and Minckley 1981).

This species (excluding those that are already extirpated) is perhaps the most endangered native fish in the basin due to its specialized habitat preferences and apparent need for waters with relatively high base flows that are now occupied by nonnative fishes (Desert Fishes Team 2003). Recovery activities that have been implemented to date for spikedace are construction of fish barriers on Aravaipa Creek to protect an existing population, construction of a barrier on, renovation of, and translocation to Fossil and Bonita creeks, and translocations to Redfield and Hot Springs canyons and San Francisco River. It is too soon to determine if self-sustaining populations have established in any of these systems, although reproduction has been detected in Redfield Canyon.

3.4.8 Environmental Consequences – Federally Listed Species

No Action

The potential for upstream movement of nonnative fishes from the San Pedro River would continue to threaten extant and translocated native fishes in Hot Springs Canyon. Spread of nonnative fishes into Hot Springs Canyon could result in potential loss of the existing native fish assemblage and adversely affect amphibians and aquatic reptiles within the riparian corridor.

Proposed Action

Lesser long-nosed bat - Impacts associated with this project are located within the riparian zone of Hot Springs Canyon. No impact would occur to the upland habitat (including saguaros) in the project area. All construction activities would occur during daylight hours. The nearest roost locations are approximately 15 and 23 miles away. There would be no direct, indirect, or interrelated/interdependent effects to the lesser long-nosed bat from implementation of this project.

Northern aplomado falcon - The proposed project occurs in riparian habitat. The surrounding desert is predominately Sonoran desertscrub with few elements of Chihuahuan desert grasslands present. No suitable habitat for the northern aplomado falcon occurs in the project area. There would be no direct, indirect, or interrelated/interdependent effects to the northern aplomado falcon from implementation of this project.

Mexican spotted owl - There have been no documented nesting or sighting records of MSO in Hot Springs Canyon. The nearest nesting record is located approximately 5 miles away; last recorded in 1999. There are no vertical canyon walls or dense riparian habitat in the project area to provide the shade necessary for nest or roost locations. The helicopter flight line would not cross any MSO Primary Activity Centers. There would

be no direct, indirect, or interrelated/interdependent effects to the MSO from implementation of this project

Southwestern willow flycatcher - Neither Reclamation nor BLM conducted willow flycatcher surveys in or near the project area. Riparian habitat in Hot Springs Canyon near the barrier location lacks sufficient density in the lower layers necessary to provide suitable willow flycatcher habitat. There would be no direct, indirect, or interrelated/interdependent effects to the willow flycatcher from implementation of the proposed project.

Gila chub - As Gila chub has not been recorded from Hot Springs Canyon near the proposed barrier construction site (Bob Rogers, The Nature Conservancy, pers. comm.), it is unlikely there would be direct, indirect, or interrelated/interdependent effects to Gila chub from implementation of the proposed project. If Gila chub did move into the stream reach at the barrier site during the construction period, they would either be forced to move upstream or downstream during actual construction, and some direct mortality is possible. In the longer term, however, barrier construction would prevent predation and competition impacts from nonnative species and provide added protection for Gila chub throughout the stream system.

Desert pupfish - As desert pupfish was stocked only recently, and far upstream of the proposed fish barrier construction site, it is unlikely there would be direct, indirect, or interrelated/interdependent effects to desert pupfish from implementation of the proposed project. If desert pupfish did move into the stream reach at the barrier site during the construction period, they would either be forced to move upstream or downstream during actual construction, and some direct mortality is possible. In the longer term, however, barrier construction would prevent predation and competition impacts from nonnative species and provide added protection for desert pupfish throughout the stream system.

Gila topminnow - As Gila topminnow was stocked only recently, and far upstream of the proposed fish barrier construction site, it is unlikely there would be direct, indirect, or interrelated/interdependent effects to Gila topminnow from implementation of the proposed project. If Gila topminnow did move into the stream reach at the barrier site during the construction period, they would either be forced to move upstream or downstream during actual construction, and some direct mortality is possible. In the longer term, however, barrier construction would prevent predation and competition impacts from nonnative species and provide added protection for Gila topminnow throughout the stream system.

Loach minnow - As loach minnow was stocked only recently, and far upstream of the proposed fish barrier construction site, it is unlikely there would be direct, indirect, or interrelated/interdependent effects to loach minnow from implementation of the proposed project. If loach minnow did move into the stream reach at the barrier site during the construction period, they would either be forced to move upstream or downstream during actual construction, and some direct mortality is possible. In the longer term, however,

barrier construction would prevent predation and competition impacts from nonnative species and provide added protection for loach minnow throughout the stream system.

Spikedace - As spikedace was stocked only recently, and far upstream of the proposed fish barrier construction site, it is unlikely there would be direct, indirect, or interrelated/interdependent effects to spikedace from implementation of the proposed project. If spikedace did move into the stream reach at the barrier site during the construction period, they would either be forced to move upstream or downstream during actual construction, and some direct mortality is possible. In the longer term, however, barrier construction would prevent predation and competition impacts from nonnative species and provide added protection for spikedace throughout the stream system.

3.4.9 Affected Environment – BLM Sensitive Species

BLM has identified 30 sensitive species that may occur within the 26,500-acre BLM portion of the Muleshoe Ranch CMA (Table 3). The Muleshoe Ranch CMA covers a large area with much greater habitat diversity than the small project area in lower Hot Springs Canyon. Consequently, the majority of sensitive species do not occur in the project area for a variety of reasons. The following species occur either in the Semi-desert grassland or Sonoran Desertscrub habitat (outside of the canyon corridor) and would not be impacted by the proposed project: Mexican long-tongued bat (foraging habitat), loggerhead shrike, Baird's sparrow, desert tortoise, and Texas horned lizard. There are no records of Mexican gartersnake from Hot Springs Canyon (Mike Sredl, AGFD, pers. comm.), the nearest occurrence being approximately 30-40 miles upstream in the San Pedro River watershed (Holycross et al. 2006). The yellow-nosed cotton rat occurs at higher elevations among rocky slopes near oak-woodland habitat. With respect to the bat species, there are no caves near the project area. There are no records of the following species within ≥ 16 miles from the project area (Sabra Schwartz, AGFD, pers. comm.): Townsend's big-eared bat, spotted bat, occult little brown bat, California leaf-nosed bat, and Greater western mastiff bat. The following bat species are known to forage in habitat similar to Hot Springs Canyon and have been recorded within 11 miles of the project area: western red bat, western yellow bat, and southwest cave myotis. These species along with the remainder of species that potentially occur in the project area are discussed below.

Table 3. List of BLM Safford District sensitive species for the Muleshoe Ranch CMA, excluding federally listed or proposed species - May 1998.

Common Name	Scientific Name	Status
Sensitive Mammals		
Occult little brown bat	<i>Myotis lucifugus occultus</i>	SSBLM
Southwest cave myotis	<i>Myotis velifer brevis</i>	SSBLM
Spotted bat	<i>Euderma maculatum</i>	SSBLM, WCG&F
California leaf-nosed bat	<i>Macrotus californicus</i>	SSBLM, WCG&F
Western yellow bat	<i>Lasiurus xanthinus</i>	WCG&F
Western red bat	<i>Lasiurus blossevillii</i>	WCG&F
Pale Townsend's big-eared bat	<i>Corynorhinus townsendii pallescens</i>	SSBLM
Mexican long-tonged bat	<i>Choeronycteris mexicana</i>	SSBLM, WCG&F
Greater western mastiff bat	<i>Eumops perotis californicus</i>	SSBLM, WCG&F
Yellow-nosed cotton rat	<i>Sigmodon ochrognathus</i>	SSBLM
Sensitive Birds		
Common black hawk	<i>Buteogallus anthracinus</i>	WCG&F
Northern gray hawk	<i>Buteo nitidus maximus</i>	SSBLM, WCG&F
Peregrine falcon	<i>Falco peregrinus</i>	SSBLM, WCG&F
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	SSBLM, WCG&F
Loggerhead Shrike	<i>Lanius ludovicianus</i>	SSBLM, WCG&F
Baird's sparrow	<i>Ammodramus bairdii</i>	SSBLM WCG&F
Sensitive Fish		
Desert sucker	<i>Catostomus(=Pantosteus) clarki</i>	SSBLM
Longfin dace	<i>Agosia chrysogaster</i>	SSBLM
Sonora sucker	<i>Catostomus insignis</i>	SSBLM
Speckled dace	<i>Rhinichthys osculus</i>	SSBLM
Sensitive Amphibians/Reptiles		
Lowland leopard frog	<i>Lithobates (=Rana) yavapaiensis</i>	SSFWS, WCG&F
Mexican gartersnake	<i>Thamnophis eques</i>	SSBLM, WCG&F
Canyon spotted whiptail	<i>Aspidoscelis (=Cnemidophorus) burti</i>	SSBLM
Desert tortoise	<i>Gopherus agassizii</i>	SSBLM, WCG&F
Texas horned lizard	<i>Phrynosoma cornutum</i>	SSBLM
Sensitive Plants		
Aravaipa Sage	<i>Salvia amissa</i>	SSBLM, SCFWS

SSBLM = Sensitive species, Bureau of Land Management

WCG&F = Wildlife of concern, Arizona Game and Fish Department

Sensitive Mammals

Cave myotis - The cave myotis is found at lower elevations primarily in desertscrub habitat but can also occur up to the pine-oak community (Hoffmeister 1986, Hinman and Snow 2003). The distribution of the cave myotis in Arizona covers all areas south of the Mogollon Rim except for portions of southwestern Arizona and most areas higher than 5,000 feet in elevation (Hinman and Snow 2003). Cave myotis will utilize roost sites in tunnels, mine shafts, and underneath bridges (Hoffmeister 1986, Hinman and Snow 2003). Winter roosts are located in wet mine tunnels above 6,000 feet (Hinman and Snow 2003). Cave myotis are opportunistic feeders which forage along the tops of trees (Hinman and Snow 2003). Reclamation has netted cave myotis (2004 - 2008) at 3 Links

Farm on the San Pedro River approximately 11 miles south of the proposed barrier site (Diane Laush, Reclamation, pers. obs.).

Western red bat - The western red bat ranges from southern Canada through the entire western United States south into Panama and South America. A solitary roosting species, this bat will migrate in groups and forage in close association with others (AGFD 2003). Red bats forage and roost in broad-leaf deciduous riparian forests. Western red bats have been captured along waterways among oaks, sycamores, and walnuts in the Huachuca and Graham Mountain; cottonwoods along Bright Angel Creek not far from the Colorado River; and the pine-fir forest of the Sierra Anchas Mountains (Hoffmeister 1986). They also have been documented foraging near city streetlights (AGFD 2003). Reclamation has netted red bats (2005 - 2007) at 3 Links Farm (Diane Laush, Reclamation, pers. obs.).

Western yellow bat - The western yellow bat ranges from southern Arizona, southern California, south Texas, and extreme southwest New Mexico south through Central America into Argentina and Uruguay (Hinman and Snow 2003). Western yellow bats are a solitary roosting species that are presumably year-round residents of Arizona (AGFD 2003). They have primarily been found in Phoenix and Tucson where they are associated with palm trees. Records of this species have also been recorded in Yuma, Sasabe, Bill Williams River, and in the Chiricahua Mountains (AGFD 2003). AGFD records indicate the closest record to the project area is about 5 miles away (Sabra Schwartz, AGFD, pers. comm.).

Sensitive Birds

Common black hawk - The common black hawk ranges from northwestern Peru and Guayana north through Central America into Texas, New Mexico, and Arizona (Schnell 1998). The majority of common black hawks in Arizona occur along the streams draining the Mogollon Rim (Latta et al 1999). This large raptor is a riparian obligate species nesting along perennial drainages with mature gallery forests (Corman 2005a). More than 90% of all breeding bird atlas records were reported from two main riparian habitat types: Arizona sycamore dominated drainages and Fremont cottonwood dominated drainages (Corman 2005a). Common black hawks feed on a variety of prey species including invertebrates, fish, frogs and larvae, reptiles, birds, and small mammals (Latta et al 1999). This species is dependent upon mature, relatively undisturbed habitat supported by a permanent flowing stream. They prefer to nest in large trees (primarily cottonwood and sycamore) within a grove (Latta et al. 1999). Habitat Data Management System records indicate that common black hawks were observed 3 miles east of the project area (Sabra Schwartz, AGFD, pers. comm.).

Northern gray hawk - The northern gray hawk ranges from the Amazon Basin north through Central America into southern Arizona, New Mexico, and Texas (Glinski 1998a). Within Arizona, this species nests almost exclusively along lowland riparian areas such as occurs along the San Pedro and Santa Cruz Rivers and Cienega and Sonoita Creeks (Corman 2005b). Breeding bird atlas records found the gray hawk to be locally

common from Cascabel to Winkelman along the San Pedro River (Corman 2005b). Gray hawks forage primarily on lizards of the *Sceloporus* genus, gartersnakes, small birds, and some small mammals (Glinski 1998a, AGFD 2000). The gray hawk has been recorded both upstream and downstream of the project area within 4 miles (Sabra Schwartz, AGFD, pers. comm.).

Peregrine falcon - The peregrine falcon was removed from the endangered species list on August 25, 1999 (64 FR 46542). This species is found nearly worldwide. In Arizona, both resident and winter visitors occur throughout the State in suitable habitat (Glinski 1998b). Peregrine falcons in the southwest inhabit cliffs and river gorges near water. Eyries occur on cliffs which generally exceed 61 meters (m) in height. Eyries are situated on open ledges and a preference for a southern exposure increases with latitude (FWS 1984). Peregrine falcon eyries have been found on rock ledges 17-m high, previously considered unsuitable (Laurie Ward, AGFD, pers. comm.). The greatest concentration of peregrine falcons occurs in the Grand Canyon (Burger 2005). The peregrine falcon has been recorded approximately 6.5 miles to the north (Sabra Schwartz, AGFD, pers. comm.).

Yellow-billed cuckoo - The cuckoo is an uncommon to fairly common breeder in riparian habitats in western, central, and southeastern Arizona along perennial drainages below 5,000 feet (Corman 2005d). Corman (2005d) found the highest breeding concentrations along the Agua Fria, San Pedro, upper Santa Cruz, and Verde River drainages and Cienega and Sonoita Creeks. Cuckoos are a riparian obligate species with greater than 90% of the species nests located in riparian habitat (BLM, No Date). Research (Murrelet Halterman, Southern Sierra Research Station, pers. comm.) indicates that cuckoos can successfully reproduce in smaller habitat patches consisting of narrow stringers of trees. Information on the San Pedro River indicates cuckoos utilized patches between 10 and 50 acres in size. In all sites, the cottonwood/willow patches were surrounded by mesquite and hackberry. Cuckoos on the Bill Williams River appeared to utilize larger patches. The primary threat to this species is habitat loss and fragmentation (Latta et al. 1999). Pesticide use on the wintering grounds is also suspected of resulting in direct mortality of individual birds and causing thin eggshells (Latta et al. 1999). The cuckoo is primarily an insectivore, and pesticide use may reduce the availability of insect prey (Latta et al. 1999). The western yellow-billed cuckoo has been recorded approximately 5 miles from the project area (Sabra Schwartz, AGFD, pers. comm.).

Sensitive Fish

Desert sucker, a BLM-sensitive species, tends to occupy smaller, higher-elevation streams compared with Sonora sucker, but the two species are broadly sympatric over most of their common range in the Gila and Bill Williams drainages (Minckley 1973). Desert sucker remains common in most of its range but has been extirpated from many major rivers and larger tributaries (Fagan et al. 2002, Desert Fishes Team 2004). It once was a Candidate species under the ESA.

Desert sucker is a medium-sized catostomid, attaining an adult length of about 300 mm. It is largely herbivorous, scraping algae and detritus off rock surfaces in riffles and runs with its specialized cartilaginous sheaths on the upper and lower jaws (Schreiber and Minckley 1981, Clarkson and Minckley 1988). This species also is commonly observed in pools. Spawning of desert sucker is similar to that described below for Sonora sucker, with multiple males attending a single female and gametes deposited over gravel (J.A. Stefferud, Forest Service [retired], personal communication). As with Sonora sucker, a significant life-history feature of desert sucker is its proclivity to enter the stream drift as larvae (Bestgen et al. 1985, Remington 2002).

Hot Springs Canyon supports populations of desert sucker; however, population numbers in the project area are unknown. There is potential for the species to occur in the project area, but the proposed barrier site is near the lower end of perennial flow, and therefore population numbers are expected to be low.

Longfin dace is one of the most common native fishes in lower-elevation streams of the Gila River Basin (Minckley 1973, Minckley 1999, Marsh and Kesner 2004). Its native range also includes the Bill Williams River and the closed Hualapai (Red) Lake drainages of Arizona and several Mexican drainages that discharge to the Gulf of California. Longfin dace has disappeared from many stream segments in Arizona (especially mainstem rivers), and it once was a Candidate species for listing under the ESA.

Longfin dace is a small (75 mm) and short-lived (~3 years) species. The species has the unusual habit of migrating upstream into formerly dry reaches of stream during flood events where mortality is likely the typical result, but occasionally the behavior results in establishment of new populations (Minckley and Barber 1971, Minckley 1973). Its tolerance of sandy-bottomed, shallow, hot streams allows it to persist in areas where most other species (native or nonnative) do not. Longfin dace is omnivorous in its food habits, consuming both algae and aquatic invertebrates according to availability (Schreiber and Minckley 1981; Fisher et al. 1981). Reproduction primarily occurs during spring and late summer in sandy-bottomed, slack-water areas along the margins of streams where it excavates saucer-shaped depressions into which eggs are deposited and newly hatched young remain for a brief period until their yolk sacs are absorbed. Reproduction has been recorded throughout the year but is most pronounced in spring and early summer (Minckley and Barber 1971, Kepner 1982). Longfin dace is the most common native species in the project area.

Sonora sucker is a medium-sized catostomid endemic to the Gila and Bill Williams river drainages of Arizona, New Mexico, and Sonora, Mexico (Minckley 1973). The species remains common in many tributary streams throughout its range, but has disappeared from most of the mainstem rivers it formerly inhabited. It once was a Candidate species under the ESA.

Sonora sucker is large and robust (to 800 mm and 2 kilograms), and tends to frequent larger, mid-elevation streams, where it primarily consumes a variety of benthic invertebrates from both slow- and swift-flowing habitats (Schreiber and Minckley 1981,

Clarkson and Minckley 1988). Spawning occurs in gravelly riffles in late winter or early spring, as does desert sucker with which it occasionally hybridizes (Clarkson and Minckley 1988). Spawning consists of two or more males and a larger female swimming in a tight circle until all individuals pause and emit gametes. Release of eggs and sperm is usually accompanied by agitation of the substrate by the spawners' fins, which may serve to clean the gravel and bury eggs within the substrate (Reighard 1920, Minckley 1981). Larvae of Sonora sucker comprise a major component of stream drift in Gila River Basin waters (Bestgen et al. 1985, Remington 2002). The species was used extensively as food by primitive man (Minckley and Alger 1968, Minckley 1973).

Hot Springs Canyon supports populations of Sonora sucker; however, population numbers in the project area are unknown. There is potential for the species to occur in the project area, but the proposed barrier site is near the lower end of perennial flow and therefore population numbers are expected to be low.

Speckled dace is a small-bodied and short-lived minnow, with a life span likely similar to loach minnow and spikedace (2-3 years). It typically inhabits swiftly flowing riffles and runs in habitats varying from tiny headwater creeks to main-stem rivers such as the Colorado River in the Grand Canyon. The species ranges widely across most of the western United States and is represented in all of the major drainages of Arizona (Minckley 1973, Wallace 1980). However, like the rest of Arizona's native fishes, speckled dace has suffered serious local declines in distribution and abundance in the last 75 years, especially from lower elevation streams. The species at one time was on the Candidate species list under the ESA.

Whereas the closely related loach minnow usually inhabits interstices of rubble bottoms, speckled dace typically occupies the water column immediately above those substrates. Speckled dace has been shown to spawn in response to summer rains (John 1963) and other substrate-disturbing events (Mueller 1984). Spawning occurs in gravel riffles where females deposit eggs into nests excavated by the male (John 1963, Mueller 1984). Foods are predominated by Ephemeroptera (mayflies) nymphs and Diptera (fly) larvae (Schreiber and Minckley 1981).

Hot Springs Canyon supports populations of loach minnow; however, population numbers in the project area are unknown. There is potential for the species to occur in the project area, but the proposed barrier site is near the lower end of perennial flow and therefore population numbers are expected to be low.

Sensitive Amphibians and Reptiles

Lowland leopard frog is one of the several species of leopard frog described from Arizona in recent decades that has escaped extensive population losses from the interior of Arizona, although it has been lost from the lower Colorado River, Arizona-California-Baja California, and Imperial County, California (Clarkson and Rorabaugh 1989), has declined in southeastern Arizona (Sredl et al. 1997), and is extirpated from all but one locality in New Mexico (C. Painter, NMGFD, pers. comm.). The species also ranges into

northern Sonora, Mexico, but its status there is largely unknown. Introduction of bullfrogs and nonnative predatory fishes is the most serious known threat, and invasion of the nonnative Rio Grande leopard frog (*Lithobates berlandieri*) is cause for concern to some populations (Platz et al. 1990, Rorabaugh et al. 2002). A chytrid fungus infection also is increasingly suspect in losses of populations (Bradley et al. 2002). Lowland leopard frog is not protected under provisions of the ESA.

Lowland leopard frogs inhabit a variety of aquatic habitats ranging from rivers, streams, and springs to earthen cattle tanks, canals, and ornamental backyard ponds. Breeding occurs in two distinct episodes, one in spring (March-May) and a much smaller one in autumn (September-October) (Collins and Lewis 1979, Sartorius and Rosen 2000), a pattern similar to many native fishes. Populations may hybridize with Chiricahua leopard frog where ranges overlap (Platz and Frost 1984). Lowland leopard frogs have been observed in the project area.

Canyon spotted whiptail - This is the largest of the whiptail lizards, exceeding total lengths of 17 inches. The species is found in southeastern Arizona, southwestern New Mexico, and Sonora in mountain canyons, arroyos, and mesas in arid and semi-arid regions, entering lowland desert along stream courses (Stebbins 1985). It is found in dense shrubby vegetation often among rocks near permanent and intermittent streams in riparian habitat dominated by sycamore, cottonwood, ash and various grasses and forbs, bosque thickets consisting primarily of mesquite, hillside thornscrub, and mixed chaparral-oak-upland desert (AGFD 2001, Rosen et al. 2002). Where the species occurs in desert valleys, it is associated with perennial or high-ground-water watercourses with fully developed bosque and/or true riparian gallery forests (Rosen 2003).

Canyon spotted whiptail is a slowly maturing lizard and exhibits rapid growth, large size, and long adult life (Rosen 2003). Reproduction occurs in late spring and early summer, with egg clutch sizes of three to five; the species is capable of producing more than one clutch in a reproductive season (Goldberg 1987). Diet consists mostly of insects and spiders (Paulissen and Walker 1996). The canyon spotted whiptail has been recorded in hillside thornscrub habitat within Hot Springs Canyon (Rosen et al. 2002), approximately 4 miles from the project area (Sabra Schwartz, AGFD, pers. comm.).

Sensitive Plants

Aravaipa sage - Aravaipa sage occurs on the upper floodplain terraces in shady canyon bottoms in the understory of mature sycamore, ash, walnut, and mesquite groves on sand and silt substrates (FWS, no date). The Hot Springs Canyon floodplain in the project area is very narrow, and there are no large terraces vegetated with trees. No Aravaipa sage was observed during the site visit. Potentially suitable habitat occurs approximately 1/2 mile downstream of the barrier location. The closest known plant population occurs approximately 4 miles away (Sabra Schwartz, AGFD, pers. comm.).

3.4.10 Environmental Consequences – BLM Sensitive Species

No Action

In the absence of the proposed project, no disturbance to any sensitive terrestrial species will occur. BLM-listed sensitive aquatic species would not be afforded protection from potential invasion of predatory nonnative fish.

Proposed Action

No impacts would occur to any of the bat species. A small clump of four Goodding willow trees would be removed for construction; there are sufficient trees for roosting throughout Hot Springs Canyon. No cave roosts occur within the project area. There is no suitable habitat for Aravaipa sage in the project area.

Both common black and gray hawks utilize large trees for nesting. The trees within the immediate project area are too small to support nesting raptors. The closest suitable nesting habitat occurs approximately 1/2 mile downstream of the project area. There would be localized disturbance to any raptor attempting to nest on the terrace if it was utilized by the contractor for camping. Extended disturbance during the breeding season could result in the failure of the nest. However, loss of productivity from a single nest would have a negligible effect on raptor populations within the Muleshoe Ranch CMA. Due to the small size of the construction area, sufficient foraging habitat is available both upstream and downstream of the project area for both the common black and gray hawk. There are no suitable nesting cliffs for the peregrine falcon near the project area; consequently, construction activities would not affect this species. Yellow-billed cuckoos most likely utilize the area on a transient basis due to the size of the trees in the immediate project area.

Only longfin dace, among the four fishes, is common in the vicinity of the proposed barrier construction site. This species, and the others if they move into the stream reach at the barrier site during the construction period, would either be forced to move upstream or downstream during actual construction, and some direct mortality is possible. In the longer term, however, barrier construction would prevent predation and competition impacts from nonnative species and provide added protection for native fishes throughout the stream system. Comparable impacts and benefits to lowland leopard frog would occur. Any potential impacts to canyon spotted whiptail would be similar and short-term in nature. No Aravaipa sage is present in the project area.

Cumulative Effects – BLM Sensitive Species

Project effects on sensitive species would be incremental to the past, present, and reasonably foreseeable actions identified in Section 3.4.2. The incremental effect of the proposed project on sensitive species would be predominately short-term in nature and negligible.

Summary of Impacts to Biological Resources

Project impacts are summarized in Table 4. There would be no impact to vegetation or terrestrial wildlife from the No Action alternative. There would be continued threat to native aquatic species from the potential invasion of the stream by nonnative predatory fish species.

Implementation of the proposed project would result in a permanent loss of approximately 0.1 acre of stream channel within the footprint of the barrier. Temporary impacts from sedimentation and construction activities would impact approximately 1.3 acres of riparian habitat. There may be short-term disruptions of breeding activities for local wildlife species due to noise disturbance. There would be a potential loss of slow-moving mammals and reptiles in the construction zone. The barrier would hinder movement in the canyon for Sonora mud turtle, lowland leopard frog, black-necked gartersnake, canyon spotted whiptail, Gila monster, and beaver. There would be no effect to federally listed terrestrial species. The project would provide beneficial effects to native fish and other aquatic and semi-aquatic vertebrates (lowland leopard frog, Sonora mud turtle, and black-necked gartersnake) by preventing the incursion of predatory nonnative fish into Hot Springs Canyon. The project would provide beneficial effects to black-necked gartersnake by protecting lowland leopard frogs, a potential prey species.

Table 4. Summary of impacts to biological resources.

	NO ACTION	PROPOSED ACTION
VEGETATION	No impact	Permanent loss of 0.01 acre of habitat underneath barrier. Temporary impact to approximately 1.2 acres from sedimentation accumulations and construction activities.
TERRESTRIAL WILDLIFE	No impact	There may be temporary disruption of breeding and foraging activities due to noise disturbance. There would be minor loss of slow-moving small mammals and reptiles from construction. The barrier would restrict movement of snakes and Gila monsters.
AQUATIC WILDLIFE	Potential for nonnative fish to move upstream from the San Pedro River and threaten survival of existing populations would remain.	Beneficial effects to native fishes and lowland leopard frog by excluding predatory nonnative fish and increasing potential prey for the black-necked gartersnake. The barrier would restrict

		movement of Sonora mud turtle, lowland leopard frog, and beaver, as well as prevent upstream movements of native fishes.
T&E AND SENSITIVE SPECIES	No effect to terrestrial species. Potential for nonnative fish to move upstream from the San Pedro River and threaten survival of existing populations would remain.	No effect to terrestrial species. Beneficial effects to aquatic fish and wildlife through elimination of threats from nonnative fish.

Mitigation

- Pursuant to the CWA Section 404 permit for the 12 fish barriers required under the 2001 CAP biological opinion, Reclamation agreed to mitigate impacts for all the barriers in one location prior to actual construction activities. Reclamation purchased a Conservation Easement (CE) on 1,420 acres of land encompassing 300 acres of riparian habitat, creating a "mitigation bank." The property, which is owned by The Nature Conservancy (TNC) and known as 3 Links Farm, is located along the San Pedro River approximately 15 miles north of Benson in Cochise County, Arizona (Sections 27, 28, 33, and 4, Township 14 South, Range 20 East; and Sections 3, 4, 9, and 10, Township 15 South, Range 20 East, of the Gila and Salt River Base and Meridian). As the barrier projects are completed, the mitigation required for each barrier would be determined and then subsequently subtracted from the 300 acres of riparian habitat total until all acres have been utilized.

The mitigation site lies within the transition zone of three major vegetation communities: Sonoran Desertscrub, Chihuahuan Desertscrub, and Semidesert Grassland. Consequently, elements of all three vegetation communities may be found on the mitigation property. However, the CE was purchased to preserve and protect the riparian community. Prior to acquisition of the property by TNC, the perennial reach of the San Pedro River on 3 Links Farm was only 0.5 miles long. Riparian growth and development had been restricted as a result of the continuous ground-water withdrawal to support agriculture. The riparian community consists of a band of Fremont cottonwood, Goodding willow, saltcedar, and patches of coyote willow (*Salix exigua*). The riparian community adjacent to the perennial reach was approximately 500-foot wide. The remaining riparian habitat gradually narrowed until only a linear strip of habitat remained along the banks of the channel.

TNC has subdivided 3 Links Farm into five parcels and placed identical easement restrictions on their parcels. Reclamation's easement (which includes three parcels) would preserve and protect, in perpetuity, the open space and natural features of 1,420 acres on the upper portion of the property. Reclamation,

through enforcement of the CE restrictions (1) reduced ground-water pumping by 90 %, (2) restricted development in the upland habitat to specific 10-acre parcels within each subdivided parcel, (3) designated a 300-acre riparian corridor along the San Pedro River which prohibits among other things cattle grazing, wood cutting, vehicular traffic, and development. Vegetation enhancement of the riparian corridor has begun to occur following cessation of ground-water pumping and will be ongoing throughout the construction of all of Reclamation's fish barriers (estimated to occur over 15 years). Despite long-term drought conditions, the perennial reach is slowly increasing in length.

Reclamation has conducted limited surveys on the mitigation property since acquisition of the easement. In 2004, Reclamation documented the southernmost known breeding population of southwestern willow flycatchers. Since willow flycatcher surveys began, there has been a 90% increase in adult birds and a 100% increase in the number of territories.

Impacts to terrestrial habitat along Hot Springs Canyon from project construction would be mitigated at a ratio of 10:1 at 3 Links Farm. This mitigation ratio is stipulated in the CWA 404 permit. Approximately 2 acres of habitat will be impacted at Hot Springs Canyon. Consequently, a total of 20 acres will be subtracted from the "mitigation bank."

- If any federally listed species (other than fish) are identified in the project area, construction activities would be halted until appropriate consultation with the FWS can be initiated.
- All construction areas on the ACEC not required for permanent facilities would be scarified and recontoured.
- Contractor-use areas affecting undisturbed upland habitat would be scarified, recontoured, and revegetated with native species.
- The contractor would exercise care to preserve the natural landscape and conduct operations so as to prevent unnecessary destruction, scaring, or defacing of the natural surroundings in the vicinity of the work.
- Construction personnel would be instructed not to collect, disturb, or molest wildlife species.
- Contractor would comply with the statutes of the Arizona Native Plant law.
- Contractor would avoid direct overflights of Hot Springs Canyon when transporting material from the staging area to the construction site.
- A wildlife ramp would be constructed over the right abutment to assist small animal movements.

3.5 CULTURAL RESOURCES

3.5.1 Affected Environment

The San Pedro Valley has been home to human populations from the Paleoindian era (10,500-8,500 BC) up into modern times. A number of Paleoindian hunting sites yielding now-extinct megafauna (mammoth, mastodon, camel, and horse) have been identified between Benson and the border, often located by fossil springs (Haury, Sayles, and Wasley 1959; Haynes and Huckell 2007). Projectile points and tools recovered from these sites indicate a Clovis period occupation. The best-preserved sites are covered by several feet of alluvium and associated with dark organic spring deposits (algal mats) that are exposed in the sides of actively eroding arroyos. To date, no Paleoindian sites have been identified in the Lower San Pedro valley.

Seasonally mobile groups following an Archaic (8500-1700 BC) hunting-gathering lifestyle roamed the San Pedro for many millennia (Sayles 1983). Groundstone artifacts recovered from Middle Archaic sites indicate the increased importance of plant resources. Sites representing the Middle Archaic are more common than earlier Archaic sites in the San Pedro and seem to represent short-term camps and procurement sites generally located on the bajada or up at the base of the mountain foothills. Those located on major floodplains are generally only visible in the walls of incised washes, buried under layers of sediment (Huckle 1995).

The Late Archaic/Early Agricultural period represents a hunting-gathering economy mixed with incipient agriculture along major streams such as the Santa Cruz and San Pedro. The introduction of cultivated crops such as corn, beans, and squash appears to have been integrated into the existing pattern of hunting combined with the intensive collection of wild seed crops. Investigations in several different areas of southern Arizona show an increasing trend toward a more settled way of life in pithouse communities with formal cemeteries, large storage pits, and the ditch irrigation (Gregory 1999, Huckell 1995, Mabry 1998). Late Archaic/Early Agricultural period sites have been identified on the mesas in the study area (Ferg 1977) and on the bajada overlooking the San Pedro and Hot Springs valleys (Vint et al. 2007). Sequential camps or procurement sites at the base of the Whetstone Mountains have also been noted by Whalen (1971). These appear to be hunting camp sites or procurement loci, either for lithic or plant resources, and often include San Pedro projectile points, a style typical of this era.

Although early agricultural Ceramic Period populations were undoubtedly present in the lower San Pedro Valley from an early date, solid evidence of occupation dates from the AD 800s (Clark et al, in prep). A substantial Hohokam influence, probably brought into the area by groups from the Middle Gila River Valley, is visible in the material culture and architecture of sites along the river in the later part of the pre-Classic. Up through the early 11th century, these sites appear to represent aggregated communities often

centered around a ballcourt. Intensive agriculture, probably based on small irrigation systems, supported domesticated crops while exploitation of mesquites and other wild resources were an important part of subsistence. The Gila Valley Hohokam influence receded by the mid-11th century when ballcourts were abandoned and settlements became smaller, more dispersed, and were often located in defensible locations. Farming became more extensive, including floodplains and bajada slopes where rockpile fields, terraces, and check dams increased agricultural opportunities.

Probable pre-Classic agricultural fields in the project area have rock features (rock piles, check dams, etc.) and are located on the bajada north and south of the confluence of Hot Springs and the San Pedro. Nearby artifact scatters may represent associated small farms or pithouse settlements that are typical of the late pre-Classic dispersed settlement pattern.

The dispersed settlement pattern appears to have become more aggregated in the early Classic period (ca. AD 1200-1300), and the use of above-ground structures prevailed (Clark et al., in prep). The presence of corrugated pottery on these sites, particularly in the San Manuel area, suggests the in-migration of groups with a Kayenta/Tusayan (northern Arizona) connection into the lower San Pedro Valley. The early Classic San Pedro populations appear to have absorbed the new groups without apparent segregation of ethnically different populations.

As the Classic period progressed, aggregation continued as populations came together in fewer and larger communities that again appear to have emphasized intensive cultivation (Clark et al, in prep). Changes in ideology and social structure, perhaps introduced from the Gila, are reflected in architectural changes that saw the construction of compound walls around residential structures and often included platform mounds that appear to have served a ceremonial and integrative function. The changes may have been exacerbated by the apparent influx of a second wave of immigrants from northern Arizona that entered the San Pedro via the Point of Pines and Safford areas to the northeast. These immigrant Kayenta/Tusayan populations settled in the valley primarily around the modern community of Cascabel, at the mouth of Hot Springs Canyon. Their occupation is marked by the presence of new ceramic types (Maverick Mountain Series) and Puebloan architectural forms such as kivas, slab-lined hearths, and entryways and room block construction, often with shaped masonry. In some cases, the immigrants appear to have settled with local populations but kept spatially separate within a community.

The late Classic saw a continued aggregation of populations but also a decline in population numbers, perhaps in reaction to environmental changes (Clark et al, in prep). Interaction with the communities outside the San Pedro Valley, particularly the communities in the Safford area, is indicated by the growing abundance of Roosevelt Red Wares, particularly Gila Polychrome, that was so widespread in the Late Classic period. The increased importation of obsidian, mostly from Safford area sources, also indicates increased interaction with the upper Gila Valley. Despite this increased trade, the lower San Pedro communities began to abandon the southern Cascabel and San Manuel area

sites and withdrew to the north toward the Gila River, in some cases building new communities near the confluence of the San Pedro and the Gila. By 1450, the lower San Pedro Valley was abandoned by the population that had lived, farmed, and traded there.

Classic period occupation in the immediate Hot Springs project area includes small field houses located on the bajada overlooking both valleys. These are probably associated with larger sites along the San Pedro and represent seasonal occupation to be near agricultural fields. They are typified by collapsed one-room rock structures accompanied by Gila Polychrome ceramics.

It is not really known whether the valley was totally abandoned in the 15th century or so diminished that survivors left little in the way of material remains to mark their presence. By the time the Spanish arrived in the 1690s, the San Pedro Valley was inhabited by O'odham-speaking agricultural groups that were referred to as the Sobaipuri. The Sobaipuri were primarily located in the upper San Pedro (near Sierra Vista), the lower valley, and along the Upper Santa Cruz. Recent survey and test excavation reveal a significant Sobaipuri occupation located just north of the Hot Springs confluence with the San Pedro (Vint et al. 2007). Known as the Taylor site (AZ BB:11:90(ASM)), the Sobaipuri occupation includes around 30 oval, stone foundations that anchored bent-pole structures covered by matting, brush, and dirt. Size and location of this site suggest that it may be the community Father Kino referred to as Baicatcan.

Increased Apache encroachment forced the Sobaipuri out of the San Pedro in the 1760s; most of the people from the northern communities moving down the Gila River to join with the Gila River Pima communities near Sacaton, while others moved to existing O'odham communities in the Santa Cruz Valley. Apache presence in the San Pedro, particularly in the Aravaipa area, continued into the mid-1800s and the establishment of the San Carlos Reservation. The increased influx of Mexican and, after 1854, American ranchers and farmers appears to have pushed most remaining Apache farmers out, though some allotments remain in the Aravaipa and lower Gila Valleys. While ranching and farming have dominated the lower San Pedro since that time, mining has also been established, particularly near the lower valley communities of San Manuel, Mammoth, and Winkleman.

3.5.2 Environmental Consequences

No Action

If no action is taken, there would be no change in existing conditions. Environmental factors, including surface and channel erosion, would continue to affect cultural resources in the area. It is assumed that the current protected land use and management practices would continue, as would Federal protections to cultural properties now in place.

Proposed Action

Substantial ground disturbances would be limited to construction activities and related tasks at the barrier site and staging area. Construction of the barrier, including temporary access up the streambed and a nearby laydown area, would not impact any known cultural resources or archaeological sites. Equipment and materials would be flown in by helicopter, thus precluding direct impacts to the channel downstream of the barrier site. Alternatively, a backhoe would be driven up the active flood channel of Hot Springs Canyon, thereby avoiding any impact to stable cultural resource contexts. Traces of its entry at the point of access would be erased to avoid unrelated traffic from following the tracks and potentially gaining access to cultural resource sites. Workers would be flown into the area and camp on a nearby terrace above flood levels. An indirect impact of the fish barrier would be the short-term creation of a small ponded area extending no more than 500 feet upstream of the barrier; however, this ponding and potential sediment build-up would be restricted to the active flood channel.

A review of known cultural resources in the project area indicates that no significant archaeological sites would be affected by the proposed construction or related activities. This was confirmed by a Class III (intensive) survey of the potential construction impact areas. Almost all of the area of potential effect is located within the active flood zone of Hot Springs Canyon, and those areas above the flood zone, such as the potential camp site, do not contain any significant cultural resources.

Cumulative Effects

There would be no cumulative effects on cultural resources.

Mitigation

- No mitigation is proposed.

3.6 AIR QUALITY

3.6.1 Affected Environment

Air quality is determined by the ambient concentrations of pollutants that are known to have detrimental effects on human health. The U.S. Environmental Protection Agency has promulgated National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, particulate matter (PM₁₀ and PM_{2.5}), ozone, sulfur dioxide, and lead. Areas with air quality that do not meet the standards are designated as “nonattainment areas.” Designation of nonattainment submits an area to regulatory control of pollutant emissions so that attainment of the NAAQS can be achieved within a designated time period. The ACEC is in attainment for all regulated NAAQS (<http://www.epa.gov/oar/oaqps/greenbk/anc13.html>). Ambient air quality in the area is excellent.

The Clean Air Act (CAA) provides special protection for visibility and other air quality values in specially designated Class I areas where the cleanest and most stringent protection from air quality degradation is considered important. These areas include National Parks and Wilderness Areas which have been specifically designated Class I under Section 162(a) of the CAA. The nearest Class I airshed is associated with the Galiuro Wilderness in Coronado National Forest, approximately 8.8 miles north of the project area.

Local sources of air pollutants (PM₁₀) include traffic on unpaved roads, fire (both wild and prescribed), and natural events such as windstorms. Agricultural fields along the San Pedro River are regional sources of fugitive dust that may influence air quality depending on time of year, wind direction, and speed.

3.6.2 Environmental Consequences

No Action

No change in ambient air quality would result from taking no action.

Proposed Action

Fugitive dust emissions could result from excavation and grading of alluvium within the stream channel at the barrier site. Additional dust would be generated by helicopter rotor downwash during landings and takeoffs, and during long-line delivery of material and equipment while the helicopter is hovering near the ground. Dust emissions would vary depending on the specific operation and soil characteristics in the impact area. The short-term and highly localized emission of dust from construction would have a negligible effect on ambient air quality.

Use of a helicopter to deliver construction material and equipment and the operation of construction equipment would generate minor amounts of engine combustion products such as nitrogen oxides, carbon monoxide, and reactive organic gases. These emissions would not produce measurable changes in ambient concentrations of regulated pollutants or result in a change in attainment status for the air quality region.

Cumulative Effects – Air Quality

Sources of atmospheric emissions from the proposed project include vehicle traffic and equipment operation, both of which would release particulates and gaseous exhaust emissions to the atmosphere. The very small quantities of pollutants released would have negligible cumulative effect on local air quality for a very short period of time.

Mitigation

- No mitigation is proposed.

3.7 VISUAL RESOURCES

3.7.1 Affected Environment

The diverse patterns, shapes, and dominant colors of vegetation, rock strata, and alluvial deposits of the canyon define the landscape character at the proposed barrier site. Scenic quality is considered above average because of the diversity and variety of visual elements. Pristine conditions generally prevail with little evidence of prior human disturbances.

Visual Resource Management (VRM) is a system used by BLM to categorize public land based on scenic quality, sensitivity level, and distance zones. The visual rating system consists of four VRM classes. These classes define the different degrees of modification allowed to the basic elements of the landscape (Table 5). Hot Springs Canyon has a Class II designation.

Table 5. Visual Resource Management Classes.

VRM Class	Visual Objective
I	To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
II	To retain the existing character of the landscape but allow some modification. The level of change to the character of the landscape should be low. Contrasts are seen but should not attract attention.
III	To partially retain the existing character of the landscape. The level of change to the character of the landscape should be moderate. Contrasts are evident but should remain subordinate to the existing landscape.
IV	To provide for management activities which require major modification of the existing characteristic of the landscape. The level of change can be high.

3.7.2 Environmental Consequences

No Action

Existing scenic conditions would prevail into the foreseeable future if no action is taken.

Proposed Action

The proposed barrier would result in a minor, site-specific modification to the landscape character. Visual impacts would be greatest within the channel prism immediately downstream of the barrier. When viewed from downstream, the basic shape of the vertical drop structure would contrast with irregular and random patterns of native substrates within the canyon bottom. This contrast would be less obvious from an

upstream viewpoint once the upstream face of the barrier is covered by sediment. Intervening canyon terrain and riparian vegetation would conceal the barrier from distant viewpoints. The barrier site is not visible from public use areas such as roads, trails, and recreation sites.

To obviate adverse visual effects, all concrete would be colored to blend in with surrounding rock and alluvial substrates. In addition, the barrier crest would be designed with a rounded surface to avoid lines and sharp angles that would contrast more substantially with dominant patterns of the canyon floor.

Cumulative Effects – Visual Resources

There are no other existing or planned man-made features within the viewscape of the proposed barrier site. Prior anthropogenic impacts caused from off-road vehicle use and livestock grazing have been obscured through improved riparian conditions and natural geomorphic processes. Consequently, there would be no cumulative effects to visual resources.

Mitigation

- The barrier would be colored to reduce undesirable contrasts with the prevailing landscape.

3.8 NOXIOUS WEEDS

3.8.1 Affected Environment

Under Executive Order 13112, dated February 3, 1999, projects which occur on Federal land or receive Federal funding must use relevant programs and authorities to: (1) prevent the introduction of invasive plant species, (2) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, (3) monitor invasive plant species populations accurately and reliably, and (4) provide for restoration of native plant species and habitat conditions in ecosystems that have been invaded.

Noxious weeds are species of invasive plants identified by governmental agencies as exerting substantial negative environmental or economic impact. The term “noxious weed” is a legal classification, not an ecological term. Infestations of noxious weeds are most likely to occur in disturbed areas such as construction sites, road shoulders, and fallow agricultural fields.

The project area is not located in a designated Weed Management Area or areas of known noxious weed populations.

3.8.2 Environmental Consequences

No Action

Existing conditions would prevail into the foreseeable future if no action is taken.

Proposed Action

Construction of the proposed barrier introduces low risk for noxious weed spread. Preventative measures would be employed to prevent importation of noxious weeds into the project area.

Cumulative Effects - Noxious Weeds

There would be no cumulative effects of the project on noxious weed populations.

Mitigation

- Heavy construction vehicles and equipment would be power washed before entering the project area.
- Weed-free erosion control material (hay bales, ground matting, etc.) would be used.

3.9 HAZARDOUS MATERIAL AND SOLID WASTE

3.8.1 Affected Environment

The action area consists of a pristine stream and riparian corridor surrounded by undeveloped upland desert and grasslands. No sites contaminated with hazardous or non-hazardous solid wastes are known to occur within the area potentially affected by the project (<http://www.epa.gov/enviro/wme/>). Use, storage, and disposal of hazardous materials and solid waste associated with construction have the potential to adversely affect the environment if these materials are improperly managed. In general, most potential impacts are associated with the release of these materials to the environment. Direct impacts of such releases would include contamination of soil, water, and vegetation, which could result in indirect impacts to wildlife, aquatic life, and humans.

3.9.2 Environmental Consequences

No Action

Existing conditions would prevail if no action is taken.

Proposed Action

The project would require the short-term use of limited quantities of fuels, lubricants, and other fluids that would be used to power and operate construction equipment. These materials would be managed in accordance with Federal and state regulations. Any spills or leaks of hazardous material would require immediate corrective action and cleanup to minimize the impact on sensitive resources.

If storage occurs at the staging area, lubricants and fuel would be placed in temporary, clearly marked, above-ground containers which would be provided with secondary containment. Construction equipment would be maintained and inspected regularly. Any soil contaminated by fuel or oil would be removed and disposed of by the contractor to an appropriately permitted disposal facility.

Any solid waste generated by construction would be removed by the contractor and disposed of in accordance with Federal and state regulations. Excess or unused quantities of hazardous materials would be removed upon project completion. Although hazardous waste generation is not anticipated, any such wastes produced by the project would be properly containerized, labeled, and transported to an appropriately permitted hazardous waste disposal facility in accordance with Federal and state regulations.

Cumulative Effects - Hazardous Material and Solid Waste

Appropriate hazardous material management and waste disposal would obviate any impacts on the environment.

Mitigation

- Lined secondary containment would be required for any fuels stored within the project area.

3.10 ENVIRONMENTAL JUSTICE

3.10.1 Affected Environment

Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” was issued by the President of the United States on February 11, 1994. This order established requirements to address Environmental Justice concerns within the context of agency operations. As part of the NEPA process, agencies are required to identify and address disproportionately high and adverse human health or environmental effects on minority or low-income communities. Federal agencies are directed to ensure that Federal programs or activities do not result, either directly or indirectly, in discrimination on the basis of race, color, or national origin.

The action area for the proposed project consists of unpopulated Federal land, State Trust Land, and potentially a privately owned airfield near Cascabel. There are no residential properties within 3 miles of the proposed barrier site. Private lands bordering the airfield and other potential staging areas near Cascabel are sparsely populated with single-family dwellings and ranch properties. No populations defined under EO 12898 occur in the action area.

3.10.2 Environmental Consequences

No Action

Existing conditions would prevail into the foreseeable future.

Proposed Action

The action area encompasses unpopulated and remote public lands and an established airfield. Helicopter flight operations would avoid noise-sensitive areas such as the Cascabel Hermitage Association Retreat. There would be no disproportionate direct or indirect effects on communities described under EO 12898.

Cumulative Effects – Environmental Justice

No cumulative effects to EO 12898 communities would occur.

Mitigation

- No mitigation is proposed.

CHAPTER 4 – CONSULATATION AND COORDINATION

List of Agencies and Persons Contacted

Reclamation and BLM submitted information on the project proposal to the following entities during development of the EA.

Indian Communities:

Ak-Chin Indian Community
Fort Sill Apache Tribe
Gila River Indian Community
Mescalero Apache Tribe
Pueblo of Zuni
Salt River Pima-Maricopa Indian Community
San Carlos Apache Tribe
The Hopi Tribe
Tohono O’odham Nation
White Mountain Apache Tribe

Congressional Delegation

Senator John McCain
Senator Jon Kyl
Representative Raul Grijalva

County Agencies:

Cochise County Board of Supervisors
Cochise County Flood Control District

State Agencies and Universities:

Arizona Department of Environmental Quality
Arizona Department of Water Resources
Arizona Game and Fish Department
Arizona State Historic Preservation Office
Arizona State Land Department
Arizona State University
University of Arizona

Federal Agencies:

Natural Resources Conservation Service
USDA Forest Service (Coronado National Forest)

U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers

Conservation, Environmental and Recreation Organizations:

American Rivers
Arizona Desert Bighorn Society, Inc.
Arizona Riparian Council
Arizona Trail Association
Audubon Society
Center for Biological Diversity
Desert Fishes Council
Forest Guardians
Friends of Arizona Rivers
Friends of Pronatura
Great Western Trail Association, Inc.
Huachuca Hiking Club
Sierra Club
Sky Island Alliance
Southern Arizona Hiking Club
The Nature Conservancy
The Wildlife Society
Tucson Conservation Center

Libraries

Eastern Arizona College Library
Safford City/Graham County Library

Grazing Organizations:

Arizona Cattle Growers Association

Other Organizations and Individuals

BLM Resource Advisory Council (16 Members)
C-Spear L.L.C.
Saguaro Juniper Corporation

CHAPTER 5 - LIST OF PREPARERS

List of Preparers

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Other Contributors

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CHAPTER 6 - RELATED ENVIRONMENTAL LAWS/DIRECTIVES

The CEQ regulations encourage agencies to “integrate the requirements of NEPA with other planning and environmental review procedures required by law.” Coordinating NEPA procedures with those of other Federal environmental statutes and executive orders facilitates NEPA objectives by promoting efficiencies in environmental planning and development of relevant information on which to base agency decisions. This integrative approach to NEPA ensures planning, review, and compliance processes run concurrently rather consecutively with procedures required by other environmental laws.

The following is a list of Federal laws, Executive Orders, and other directives that apply to the action alternatives discussed in this EA:

The National Environmental Policy Act (NEPA) of 1969, as amended, requires Federal agencies to evaluate the potential environmental consequences of major Federal actions. An action becomes “federalized” when it is implemented, wholly or partially funded, or requires authorization by a Federal agency. The intent of NEPA is to promote consideration of environmental impacts in the planning and decision-making process prior to project implementation. NEPA also encourages full public disclosure of the proposed action, accompanying alternatives, potential environmental effects, and mitigation.

Scoping information was posted on Reclamation’s Phoenix Area Office web site and distributed to more than 130 individuals, organizations, and agencies on June 10, 2008. Public comments were considered during preparation of the EA and helped guide the development of the proposed project.

The Fish and Wildlife Coordination Act (FWCA) of 1958, as amended, provides a procedural framework for the consideration of fish and wildlife conservation measures in Federal water resource development projects. Coordination with the FWS and State wildlife management agencies are required on all Federal water development projects.

The fish barrier element of the proposed project is the result of ESA Section 7(a)(2) consultation between Reclamation and FWS. Coordination among Reclamation, FWS, and AGFD has been ongoing since the project’s inception. The FWS concluded that the current level of coordination among the agencies is sufficient to meet any regulatory needs required by the FWCA.

The Endangered Species Act (ESA) of 1973, as amended, provides protection for plants and animals that are currently in danger of extinction (endangered) and those that may become so in the foreseeable future (threatened). Section 7 of this law requires Federal agencies to ensure that their activities do not jeopardize the continued existence of threatened or endangered species or adversely modify designated critical habitat.

Construction of the proposed fish barrier is a conservation measure specified by the FWS in the 2001 and 2008 CAP biological opinions. FWS determined in these biological

opinions that further Section 7 consultation on listed aquatic species covered under the opinions was not required for fish barrier construction. Possible effects to non-aquatic listed species resulting from project implementation were examined in a Biological Assessment prepared by Reclamation and submitted to the FWS on October 28, 2008. The Biological Assessment concluded "no effect" to the lesser long-nosed bat, southwestern willow flycatcher, northern aplomado, falcon, and Mexican spotted owl from barrier construction.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. The MBTA prohibits the take, possession, import, export, transport, selling, or purchase of any migratory bird, their eggs, parts, or nests.

Implementation of the proposed project during the breeding season could result in noise-related disturbance to some species attempting to nest near the project area. Efforts would be undertaken to minimize the impact of helicopter noise by avoiding overflights of Hot Springs Canyon.

The Clean Air Act (CAA) of 1963, as amended, requires any Federal entity engaged in an activity that may result in the discharge of air pollutants must comply with all applicable air pollution control laws and regulations (Federal, State, or local). It also directs the attainment and maintenance of National Ambient Air Quality Standards (NAAQS) for six different criteria pollutants including carbon monoxide, ozone, particulate matter, sulfur oxides, oxides of nitrogen, and lead. Air quality in the project area is in attainment of NAAQS.

Short-term construction emissions (particulate matter) associated with the proposed project would have localized and minor effects on air quality in Hot Springs Canyon. The project is not located in a nonattainment area or Class I airshed.

The Clean Water Act (CWA) of 1977, as amended, strives to restore and maintain the chemical, physical, and biological integrity of the nation's waters by controlling discharge of pollutants. The basic means to achieve the goals of the CWA is through a system of water quality standards, discharge limitations, and permits. Section 404 of the CWA identifies conditions under which a permit is required for actions that result in placement of fill or dredged material into waters of the United States. In addition, a 401 water quality certification and 402 National Pollutant Discharge Elimination System (NPDES) permit are required for activities that discharge pollutants to waters of the U.S. The EPA has delegated responsibility to administer water quality certification and NPDES programs in Arizona to ADEQ.

The discharge of dredged and fill material resulting from construction of the cutoff wall or fish barrier requires a CWA Section 404 permit from the COE. Reclamation submitted an application to the COE for 404 permit coverage of all barriers that would be constructed pursuant to the 2001 CAP biological opinion, including Hot Springs Canyon.

Reclamation received a conditional 401 water quality certification and a 404 permit for these barriers on June 24 and October 30, 2003, respectively. All special conditions of the 401 certification and 404 permit would be implemented. Coverage under the Section 402 Arizona Pollutant Discharge Elimination System General Permit for construction activities would be obtained prior to construction.

The National Historic Preservation Act (NHPA) of 1966, as amended, mandates all federally funded undertakings that have the potential to affect historic properties are subject to Section 106 of the NHPA. Federal agencies are responsible for the identification, management, and nomination to the National Register of Historic Places of cultural resources that could be affected by Federal actions. Consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office (SHPO) is required when a Federal action may affect cultural resources on, or eligible for inclusion on, the National Register.

Archaeologists from Reclamation and BLM conducted a Class III Survey of the areas that would undergo ground-disturbing activities, including the proposed barrier site, temporary laydown areas, and staging area. No cultural resources were identified within the impact area of the proposed project. A finding of no historic properties affected was determined by Reclamation following the survey. The BLM indicated concurrence with this finding in a letter dated April 18, 2008. The SHPO concurred with the “no effect” determination on July 8, 2008.

The Resource Conservation and Recovery Act (RCRA), as amended, establishes thresholds and protocols for managing and disposing of solid waste. Solid wastes that exhibit the characteristic of hazardous waste, or are listed by regulation as hazardous waste, are subject to strict accumulation, treatment, storage, and disposal controls.

The proposed project is not expected to generate hazardous waste as defined and regulated under RCRA. To minimize the possible impact of hazardous materials (petroleum, oil, and lubricants) used during construction, all equipment would be periodically inspected for leaks. Any significant leaks would be promptly corrected. Nonhazardous solid waste would be disposed of in accordance with State and Federal regulations at an approved landfill. Spills and disposal of contaminated media would be managed in accordance with State and Federal requirements.

Executive Order 11988 (Floodplain Management) requires Federal agencies to avoid, where practicable alternatives exist, the short- and long-term adverse impacts associated with floodplain development. Federal agencies are required to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility.

The proposed project is necessary for the protection of the existing native fish community and potential recovery of listed species. Because the nature of the project requires minor construction on a floodplain, no practicable alternative exists. Floodplain effects would

be highly localized and minor. The project would not increase the flood risk to private property or human safety.

Executive Order 11990 (Wetlands) requires Federal agencies, in carrying out their land management responsibilities, to take action that would minimize the destruction, loss, or degradation of wetlands and take action to preserve and enhance the natural and beneficial values of wetlands.

The proposed project would not affect wetlands.

Executive Order 12898 (Environmental Justice) requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations.

The proposed action area encompasses uninhabited BLM land, State Trust Land, and private land. No impact on low-income or minority populations as defined by Executive Order 12898 would result from the proposed project.

Secretarial Order 3175 (incorporated into Departmental Manual at 512 DM 2) requires that if any Department of the Interior agency actions impact Indian trust assets, the agency must explicitly address those impacts in planning and decisionmaking, and the agency must consult with the tribal government whose trust resources are potentially affected by the Federal action.

The proposed project would affect public lands (administered by BLM and the Arizona State Land Department) and private land. No Indian trust assets would be affected.

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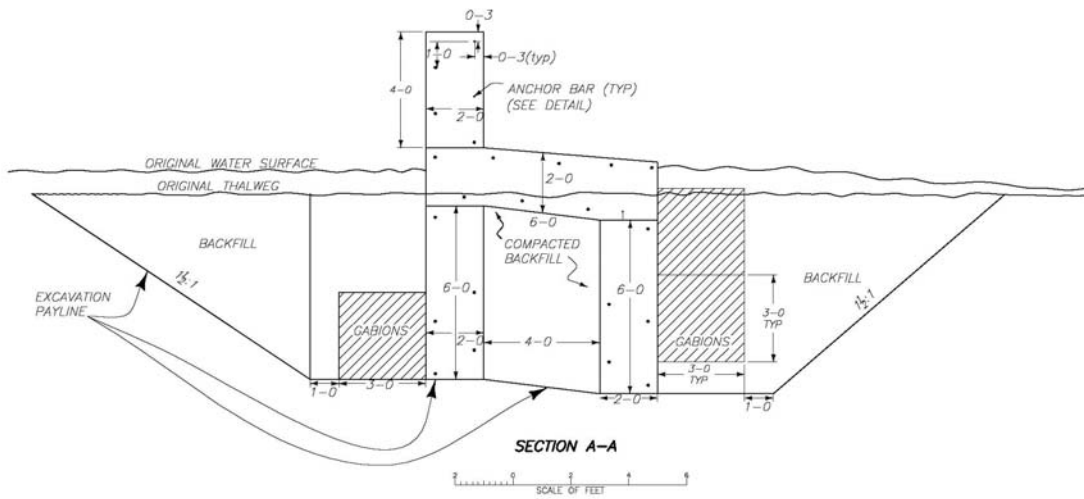
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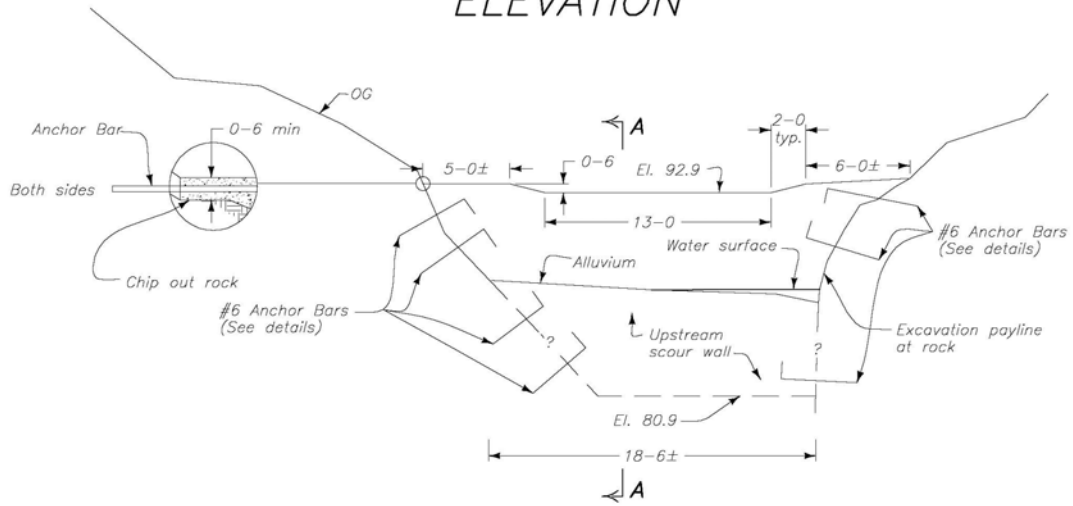
APPENDIX A

Fish Barrier Design



HOT SPRINGS CANYON FISH BARRIER SECTION A-A

HOT SPRINGS CANYON FISH BARRIER ELEVATION



ELEVATION FISH BARRIER – LOOKING DOWNSTREAM

HOT SPRINGS CANYON FISH BARRIER PLAN

