RECLAMATION
Managing Water in the West

Draft Environmental Assessment

Spring Creek (Oak)
Aquatic Resources Protection Project

Coconino National Forest
Yavapai County, Arizona

U. S. Department of the Interior
Bureau of Reclamation
Phoenix Area Office

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Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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ACRONYMS AND ABBREVIATIONS

AAC	Arizona Administrative Code
AD	Anno Domini
ADEQ	Arizona Department of Environmental Quality
AZGFD	Arizona Game and Fish Department
AZPDES	Arizona Pollutant Discharge Elimination System
BA	Biological Assessment
CAA	Clean Air Act
CAP	Central Arizona Project
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CNF	Coconino National Forest
CWA	Clean Water Act
DM	Departmental Manual
DOI	Department of the Interior
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FSM	Forest Service Manual
GHG	Greenhouse Gas
LRMP	Land and Resource Management Plan (also Forest Plan)
MIS	Management Indicator Species
MOU	Memorandum of Understanding
NAAQ	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
OHWM	Ordinary High Water Mark
PL	Public Law
$PM_{2.5}$	Particulate matter with a diameter of 2.5 microns or less
PM_{10}	Particulate matter with a diameter less than 10 microns
Reclamation	Bureau of Reclamation
SHPO	State Historic Preservation Office
SIO	Scenic Integrity Objective
SMS	Scenic Management System
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
VMS	Visual Management System
VQO	Visual Quality Objective

CHAPTER 1 – PURPOSE AND NEED

1.1 INTRODUCTION

The Bureau of Reclamation (Reclamation) and the cooperating agencies listed below have prepared this environmental assessment (EA) to analyze the potential effects of the proposed aquatic resources protection project on physical, biological, and cultural resources. The proposed project includes construction of a fish barrier and stocking federally-endangered spikedace, Gila topminnow, and possibly other native species in Spring Creek (Oak Creek drainage), Coconino National Forest (CNF), Yavapai County, Arizona. The project would be implemented pursuant to sections 7(a)(1) and 7(a)(2) of the Endangered Species Act (ESA) and the Colorado River Basin Project Act.

The EA was prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), and Department of the Interior (DOI) NEPA regulations (43 CFR 46). Reclamation is the lead Federal agency and the U.S. Forest Service (USFS), the U.S. Fish and Wildlife Service (USFWS), and the Arizona Game and Fish Department (AZGFD) are cooperating agencies as defined in 43 CFR 46.225-46.230.

1.2 BACKGROUND

The proposed Spring Creek aquatic resources protection project complements other conservation measures being implemented by Reclamation to assist with the recovery and conservation of federally-listed fish and amphibian species in the Gila River Basin. These measures are mandated by biological opinions issued by the USFWS in 1994, 2001, and 2008 on impacts of Central Arizona Project (CAP) water transfers to the Gila River Basin.[1] Spring Creek is a tributary to Oak Creek within the Verde River watershed. The Verde River watershed forms part of the middle Gila River Basin.

Human induced changes in aquatic habitat and interaction with nonnative species have had a profound impact on native fishes in Arizona. Habitat destruction and alteration were the principal causes for declines of native fishes in the American southwest prior to the mid-1900s; however, in the past several decades, it has become apparent that the presence of nonnative fishes precludes or negates benefits from habitat protection and restoration (e.g., Marks et al. 2010). Avenues of impact to native fishes include predation, competitive exclusion, niche displacement, hybridization, and pathogen transmission (Mooney and Cleland 2001, Strauss et al. 2006). Introduction and spread of nonnative fishes now are considered the most consequential factors preventing sustenance and recovery of imperiled native fishes in the Gila River Basin and other drainages of the southwest (Moyle et al. 1986, Minckley 1991, Minckley and Marsh 2009, Clarkson et al. 2012). The cumulative impact of physical and biological stressors to aquatic habitats, especially in mainstem rivers, has fostered a pattern where native

[1] The 1994, 2001, and 2008 biological opinions on CAP water transfers to the Gila River Basin are available at http://www.fws.gov/southwest/es/arizona/biological.htm.

species now persist primarily in the upper reaches of tributary drainages. Consequently, the segregation of native and nonnative fishes in these tributary systems (or isolation management; Novinger and Rahel 2003) via the emplacement of fish barriers has become a primary management tool to assist with recovery of native fishes.

Spring Creek is considered by the agencies to be a high-value stream for conservation of several aquatic and semi-aquatic species. The lower 3.9-mile perennial reach currently supports lowland leopard frog (*Rana yavapaiensis*) and five species of native warm-water fishes, including federally-endangered Gila chub (*Gila intermedia*). Habitat conditions appear suitable for other federally-endangered fishes such as spikedace (*Meda fulgida*), Gila topminnow (*Poeciliopsis occidentalis)*, and possibly loach minnow (*Tiaroga cobitis*), and either northern Mexican gartersnake (*Thamnophis eques*) or narrow-headed gartersnake (*Thamnophis rufipunctatus*).

Very recent (May-June 2014) captures of nonnative green sunfish (*Lepomis cyanellus*) from upper Spring Creek (upstream from a low-head diversion dam located approximately 0.6 miles above the mouth) have complicated the native fish restoration aspect of the proposed project. Green sunfish is a particularly problematic fish for native species in the Gila River basin due to its natural and human-assisted colonizing abilities, its tolerance of a wide variety of environments including headwater streams occupied by native fishes, and its piscivorous habits (it is the most piscivorous member of its genus) (Carlander 1977, Werner 1977, Lemly 1985, Fausch and Bramblett 1991, Lohr and Fausch 1996, Dudley and Matter 2000). The most recent previous record of a nonnative fish in upper Spring Creek was from 1995; no nonnatives were detected in surveys conducted in 1996, 2007, and 2011. Nonnative northern crayfish (*Orconectes virilus*), however, is present throughout the perennial reach of Spring Creek.

Active suppression of green sunfish via mechanical removal is currently being implemented, and may be necessary for the foreseeable future if the population cannot be eliminated. Chemical renovation of the stream to eliminate green sunfish may become warranted in the future, at which time a separate NEPA analysis would be developed. A dedicated barrier specifically designed to prevent movements of fishes is needed to assure the stream remains free of other nonnative fish invasions from downstream sources. The presence of northern crayfish in Spring Creek is not expected to seriously detract from the success of the project. These issues are discussed further in section 3.3.6 below.

1.3 PURPOSE AND NEED

The purpose of the proposed action is to protect the existing Spring Creek population of Gila chub and other native aquatic species against possible future upstream incursion of nonnative fishes from Oak Creek and the Verde River. Additional benefits would accrue from securing habitat for stocking spikedace, Gila topminnow, and possibly loach minnow, and either northern Mexican gartersnake or narrow-headed gartersnake.

Implementation of the proposed action is needed to meet one of the key conservation measures of the CAP biological opinions to strategically locate and construct fish barriers

to "prevent or hinder upstream movements of nonindigenous fish and other aquatic organisms into high-value native fish and amphibian habitats" and to "protect existing populations of listed fishes or facilitate the repatriation and stocking of native fishes upstream of the barriers." The project is also needed to benefit or promote the recovery of Federally-listed species that are included as an integral part of the proposed action.

1.4 PROJECT LOCATION

The proposed project includes the emplacement of a concrete fish barrier to protect the existing native fish assemblage in Spring Creek. The barrier would be constructed upstream of an existing concrete water diversion structure in the lowermost reach of Spring Creek on National Forest System (NFS) land administered by CNF, north of the community of Cornville in Section 27 of Township 16 North, Range 4 East of the Gila and Salt River Baseline and Meridian (Figures 1 and 2). Native fish stocking operations would occur upstream of the fish barrier following construction.

1.5 DECISION FRAMEWORK

The Responsible Official for Reclamation (Area Manager of the Phoenix Area Office) must make a determination regarding the environmental effects of the proposed project. If the EA demonstrates that there are no significant environmental effects, the Area Manager would record this determination in a Finding of No Significant Impact (FONSI) and approve the expenditure of funds to implement the project.

The Responsible Official for the CNF (Red Rock District Ranger) must make a determination regarding the environmental effects associated with implementation of the proposed action. If the EA demonstrates that there are no significant effects, the District Ranger would record this determination in a FONSI/Decision Notice and issue a Special Use Permit authorizing the use of CNF land for construction, access, and long-term maintenance.

If the District Ranger authorizes the project, Reclamation would construct the proposed fish barrier, and AZGFD, in cooperation with the CNF, USFWS, and Reclamation, would take the lead in stocking spikedace, Gila topminnow, and potentially other native species.

1.6 CONSISTENCY WITH RESOURCE MANAGEMENT PLANS AND POLICY

The CNF manages NFS land in the Spring Creek watershed in accordance with the Coconino National Forest Land and Resource Management Plan (LRMP; USFS 1987, as amended) and other national policy and direction, including the Endangered Species Act. The LRMP is presently undergoing revision. The revised Draft LRMP was released for public comment in October 2013. Until a new LRMP is approved the current LRMO is the valid Forest Plan.

The proposed action was determined to be consistent with the following management direction, standards, and guidelines of the current LRMP:

- Manage habitat to maintain viable populations of wildlife and fish species and improve habitat for selected species (LRMP page 22-1).

- Improve habitat for threatened, endangered, or sensitive species of plants and animals and other species as they become threatened or endangered. Work toward recovery and delisting threatened and endangered species (LRMP page 23).

- Identify and protect areas that contain threatened, endangered, and sensitive species of plants and animals (LRMP page 23).

- Verde Valley (Management Area 11) - Management emphasis on watershed condition, range management, wildlife habitat for upland game birds, and dispersed recreation (LRMP page 166).

- Riparian and Open Water (Management Area 12) – Avoid impacts to nesting habitat that harass nesting birds, such as activities that are noisy or would damage nests or nesting habitat from May 1 to July 15 (LRMP page 173). Manage lakes and streams to improve fisheries habitat by constructing structures and barriers as appropriate based on environmental analysis and on professional judgment of the Responsible Official and resource specialist (LRMP page 175).

Commensurate with the management direction of the LRMP, USFS policy is to recover threatened and endangered species so that special protection measures provided under the ESA are no longer necessary and to ensure, through appropriate management practices, that non-listed native species do not become threatened or endangered because of USFS actions (FSM 2602, 2670). Policy also is to encourage or initiate translocation of listed species onto suitable unoccupied habitat when such actions promote recovery of the species (FSM 2674). The National Forest Management Act of 1976 requires the USFS to provide for the biological diversity of national forests consistent with overall multiple-use objectives of the planning area and to maintain viable populations in the planning area.

The proposed aquatic resources protection project is consistent with the USFWS Recovery Plans for spikedace (USFWS 1991) and Gila Chub (in preparation). These plans are the primary guiding documents for recovery activities for these species. Both recovery plans call for construction of fish barriers to protect existing populations and unoccupied potential recovery areas suitable for repatriations.

1.7 PUBLIC INVOLVEMENT

Scoping. The Council on Environmental Quality 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 analysis on relevant issues. Distribution of scoping information typically heralds the beginning of the public component of the NEPA process.

A scoping notice soliciting public comment on the proposed project was distributed on October 24, 2013. Reclamation posted the scoping notice on its Phoenix Area Office web site at www.usbr.gov/lc/phoenix/ and submitted news releases regarding the proposal to 6 news media outlets including the *Arizona Republic*. The proposal was also listed on the CNF Schedule of Proposed Actions at www.fs.usda.gov/coconino. On October 15, 2013, the AZGFD hosted a scoping meeting in the Oak Creek Valley subdivision of Cornville with members of the Oak Creek Valley Property Owners Association (POA). Oak Creek Valley is a planned area development immediately south of the project area with approximately 150 residences represented by the POA. Reclamation received 4 public comment letters during scoping.

Scope of Issues. The lead agency is ultimately responsible for determining the scope of issues considered in an environmental document (36 CFR 46.235). During internal and external (public) scoping, environmental issues identified by program specialists and input from the public helped Reclamation define the range of resource topics that are addressed in this EA and served as the basis for selecting the proposed action.

The following environmental issues were identified as a result of internal and public scoping:

- Effects of the project on soils. See section 3.1.
- Effects of the project on stream balance, water quantity and quality. See section 3.2.
- Effects of the project on biological resources, including federally listed species. See section 3.3.
- Effects of the project on cultural resources. See section 3.4.
- Effects of the project on visual resources. See section 3.5.

No issues identified within the scope of the project were of sufficient concern to drive the development of other action alternatives.

Draft EA. The draft EA will be distributed to the public for a 30-day comment period. A Notice of Availability (NOA) of the draft EA will be submitted to individuals who commented on the proposed project during scoping and to agencies and organizations. The NOA and draft EA also will be available at www.usbr.gov/lc/phoenix/.

Figure 1. Project location.

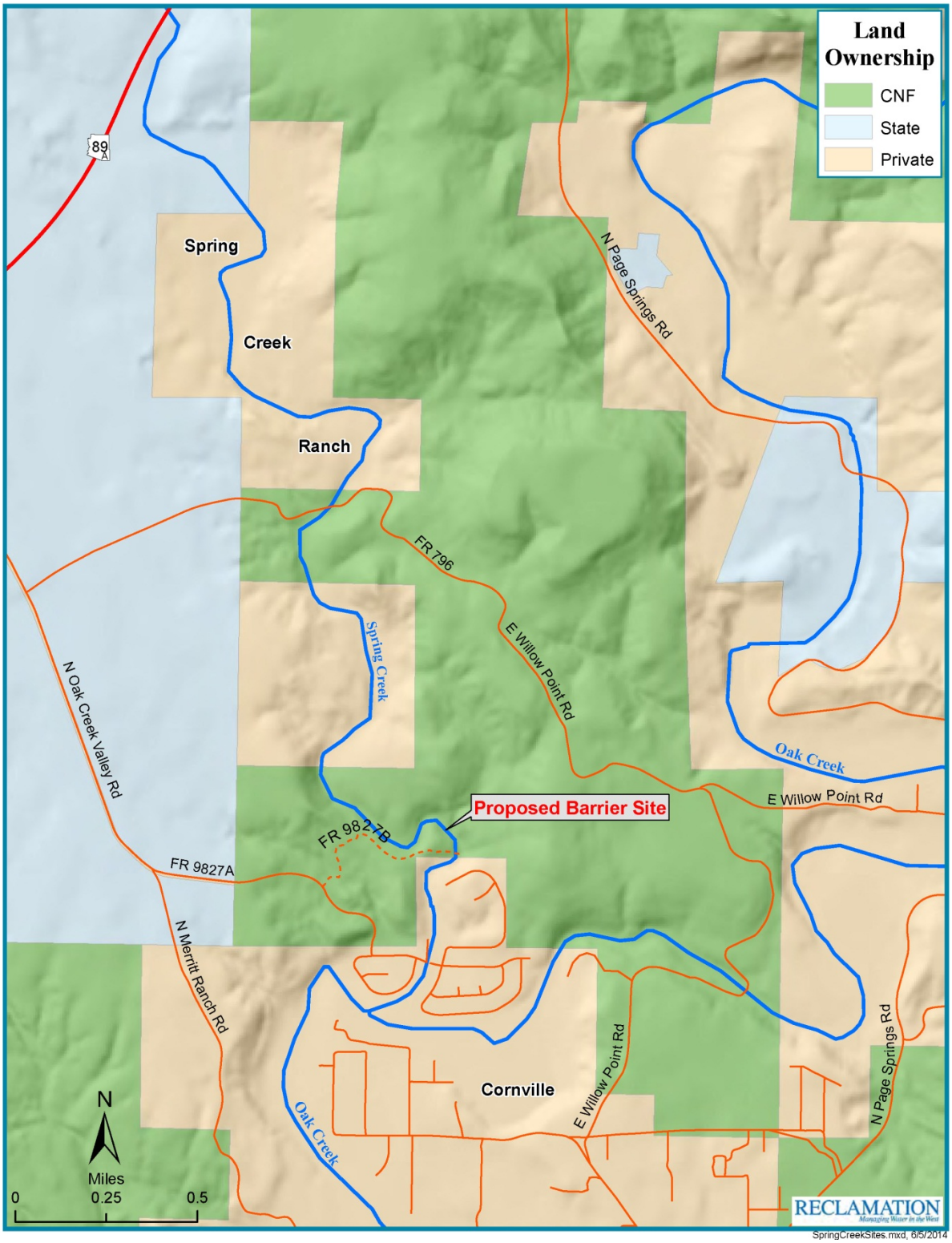

Figure 2. General location of proposed fish barrier.

CHAPTER 2 – DESCRIPTION OF THE ALTERNATIVES

This chapter describes in detail the alternatives considered for the proposed Spring Creek aquatic resources protection project. These consist of the proposed action and no action, which are analyzed in Chapter 3. Also described are planning alternatives that were considered but eliminated from detailed evaluation.

2.1 NO ACTION

Section 102(2)(E) of NEPA requires that no action must be considered as an alternative in an environmental review whenever there are unresolved conflicts about the proposed action with respect to alternative uses of available resources. A description of no action is also customarily used in an EA to provide the baseline for comparison of environmental effects of the action alternatives against reasonably foreseeable conditions that are representative of the status quo. As considered in this EA, if no action is taken, Reclamation would not construct the proposed fish barrier. The AZGFD could augment native fish populations pursuant to the fish and wildlife management authority conferred to it by the State of Arizona, and pursuant to a 2010 Memorandum of Understanding between the USFS Southwestern Region and the Arizona Game and Fish Commission and Department; however, this action may not be sustainable without the fish barrier because of uncertainty of future nonnative invasions from Oak Creek and the Verde River.

2.2 PROPOSED ACTION

The following action would be implemented by Reclamation, in cooperation with the AZGFD, the USFS, and the USFWS, to meet the purpose and need stated in section 1.3. The proposed action includes Best Management Practices (BMPs) included in Appendix B.

2.2.1 Fish Barrier Construction

Fish Barrier Site Selection. Consideration of potential fish barrier sites was limited to the lowermost perennial reach of Spring Creek on CNF. Potential fish barrier sites on private land south of the CNF boundary were not investigated because of the close proximity of residential properties to the stream and increased probably of "baitbucket" transfer of nonnative fish over the barrier. Because the proposed barrier is intended, in part, to mitigate effects of the CAP on threatened or endangered native fishes, biological considerations such as fragmentation of the existing Gila chub population was a concern in the site-selection process. Therefore, only sites in the lower stream reach near the CNF boundary were considered for emplacement of a barrier. The proposed site is approximately 320 feet upstream of an existing concrete water diversion structure and 400 feet upstream of the forest boundary. The proposed site also has favorable site characteristics for construction, such as a narrow floodplain and surficial and shallow bedrock along the entire axis of the proposed fish barrier.

Fish Barrier Construction. The reinforced, concrete fish barrier would be constructed between the canyon wall on the west side of Spring Creek and a high terrace on the east immediately downstream of an unnamed wash (Appendix A, Figures A-1 and A-2). The barrier would have a 4-foot drop onto a sloped, concrete apron, and would be designed to withstand forces associated with a 100-year frequency flood. The barrier would be anchored directly to bedrock at the abutments and through the stream channel.

Forest Road (FR) 9827B provides access to the proposed fish barrier site from N. Oak Creek Valley Road (FR 9827A) (Figure 3). FR 9827B is opend for administrative use only. Access is controlled by a locked gate. This road would require minor grading and spot placement of gravel-sized rock in problematic areas to accommodate temporary access by concrete mixer trucks and other construction vehicles. In order to match soils in this area, fill material would be harvested from an old, existing mineral pit located east of Rimrock off of FR 9292F. Adequate stockpiles of the appropriate size and color of material are present and piled so new excavation of native material would not occur. A dozer and dump truck would be needed to remove approximately 22 cubic yards of material from this site. The road access is classified as closed to public, but open for administrative use under Travel Management Rule. The road is closed to the public via several boulders. The contractor can temporarily move these boulders to gain access, but would reset the boulders immediately after the material is harvested.

Construction materials and equipment would be staged on an existing compacted dirt area used as a parking lot adjacent to N. Oak Creek Valley Road and at two streamside locations (Figure 3). Batched concrete would be delivered by commercial mixer trucks to the contractor use area at the terminus of FR 9827B, where it would be pumped to the construction area in a pipe. The route along the west side of the stream would be used only by a small excavator or backhoe to access the construction zone. After construction, FR 9827B would be seeded with a CNF-approved native grass and forb seed mix. Use of this road would be permitted in the future as necessary for maintenance of the fish barrier.

The sequence of construction would consist of: (1) *mobilization* - deliver equipment and setup contractor use areas; (2) *site preparation* – repair problematic sections of FR 9827B, divert stream flow, dewater work site, excavate alluvium along axis of the barrier as necessary to expose bedrock; (3) *construction* - install formwork and steel reinforcement bar, place wet concrete, remove formwork, place backfill; and (4) *demobilization* – remove excess/unused construction material, restore site, and remove equipment.

Work site dewatering would be accomplished with pumps and a small cofferdam. Stream flow would be piped around the construction zone. Approximately 4-5 workers would be present onsite during construction. A 1-2 person camp would be established in the contractor use area adjacent to the construction zone to provide for overnight security. The camp would be equipped with a chemical toilet. Best management practices (BMPs) would be implemented during and after construction, as appropriate (see Appendix B). At the end of construction, the cofferdam and pipeline would be removed, and any

surplus stockpiles of excavated alluvium would be applied as backfill to re-establish pre-construction contours of the ground surface. Assuming no unforeseen delays in implementation, construction would commence in late September or early October and require approximately 45 to 60 days.

The proposed project would comply with USFS Industrial Fire Plan Guidelines (see Appendix C).

Fish Barrier Operation and Maintenance. The fish barrier would become a feature of the CAP. Inspection and maintenance would be performed by the Central Arizona Water Conservation District. Operation of the structure would require annual inspections and inspections after major flood events (5-year frequency or greater). Inspectors would hike to the fish barrier from N. Oak Creek Valley Road. Any substantial maintenance or repair requiring materials and equipment that could not be carried to the site would be performed using measures and techniques that are similar to those described in the above section for barrier construction and occur only within the footprint of the areas cleared of cultural resources in this EA.

Fish Barrier Function. The fish barrier is intended to preclude upstream movement of fishes during periods of base flow and the portions of ascending and descending stages of floods that do not completely inundate the drop structure. At flows associated with peak floods that may submerge the fish barrier's crest, high water velocity would be the primary hindrance to the upstream movement of nonnative fishes.

The 4-foot height of the drop structure from crest to apron is greater than the leaping abilities of warm-water fishes. One of the key purposes of the sloped apron is to ensure that flow velocities are swift and shallow, thereby minimizing opportunities for fishes to attempt leaps over the vertical drop. The optimum barrier design was determined through prior Reclamation experience with construction of similar barriers and criteria developed by the National Marine Fisheries Service.

2.2.2 Native Fish Stocking

Following construction, spikedace and Gila topminnow would be stocked in Spring Creek upstream of the fish barrier. Consideration would also be given to stocking loach minnow and either narrow-headed gartersnake or Mexican gartersnake. The fish transplants would include one or more annual augmentations of individuals following the initial stocking events to ensure species establishment and that the established populations adequately reflect genetic variability inherent within the donor populations. Potential future stockings of loach minnow and gartersnakes would be under the purview of USFWS and AZGFD. Post-stocking monitoring (see Fish Community Monitoring section) would determine the success of the stocking program.

2.2.3 Fish Community Monitoring and Mechanical Removal of Nonnative Fishes

A 5-year monitoring program would be established after the fish barrier is constructed to continue to suppress the newly-detected population of green sunfish, detect any incursion of new nonnative fishes, and to monitor success of prior native fish repatriations. This monitoring would be funded by Reclamation and developed in cooperation with AZGFD, USFWS, and CNF. Monitoring by the cooperating agencies would likely continue for the foreseeable future under the auspices of various Fish and Wildlife Service recovery plans.

Active suppression and attempted elimination of green sunfish would occur via frequent and intense mechanical removal efforts into the foreseeable future, or until the population is eliminated. These would occur throughout the perennial reach of stream on all lands to which management agencies can gain legal access. Mechanical removal methods would include standard fishing gears such as electrofishing, seining, spearing, angling, and netting.

2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Planning alternatives that were considered but eliminated from detailed analysis are stated below.

Fish Barrier Locations other than the Proposed Action. Reconnaissance-level field investigations of possible barrier sites in Spring Creek were conducted by fish biologists from Reclamation, CNF, USFWS, and AZGFD. Selection criteria for identifying viable barrier sites 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 lowermost CNF boundary to maximize the length of stream protected and minimize fragmentation of existing native fish populations. The following alternative sites on Spring Creek were considered but eliminated from detailed analysis for reasons stated below:

- ***Existing concrete water diversion structure near the lower CNF boundary.*** Spring Creek water diverted by this structure is conveyed downstream through Jack's Ditch to the Oak Creek Valley POA and other water rights claimants. The diversion structure lacks adequate height to effectively function as a fish barrier and would need to be completely rebuilt. Modification of the diversion structure was rejected because of opposition from the Oak Creek Valley POA.

- ***Sites between CNF boundary and Oak Creek.*** The lowermost 0.6-mile reach of Spring Creek passes through the Oak Creek Valley subdivision of Cornville. This reach of stream is abutted by residential properties and public streets. A fish barrier emplaced anywhere on this reach would be easily accessible to the public, substantially increasing the risk of inadvertent or intentional "bait bucket" transfer of nonnative fishes over the barrier.

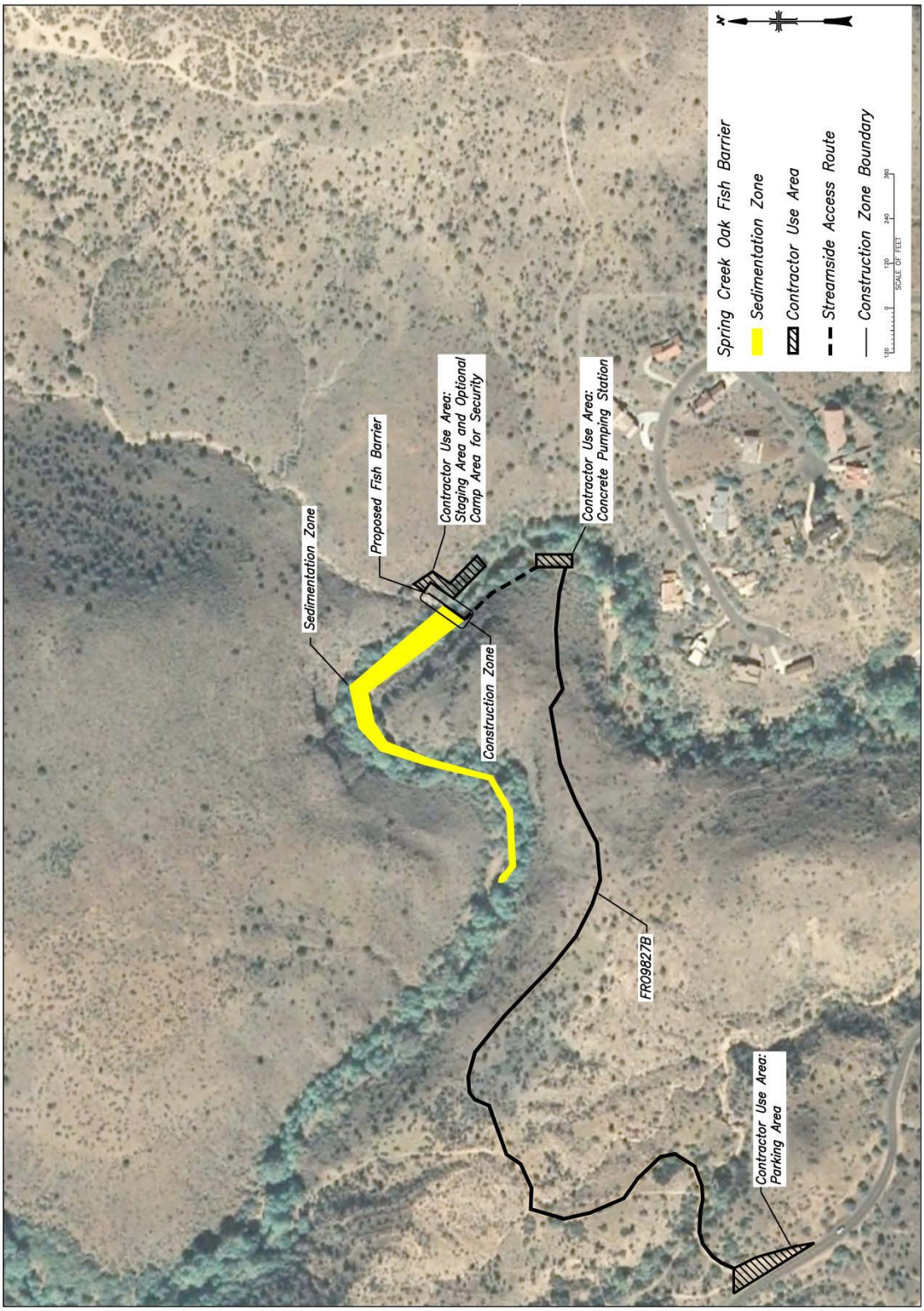

Figure 3. Aerial view of the proposed project area, showing the construction site, vehicular access, contractor use areas, and post-construction streambed aggradation.

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

Based on internal and public scoping, resource areas of primary concern during project implementation include the following: water quality, stream degradation, biological resources, and cultural resources. This chapter describes the existing conditions of these and other resources within the project area and the potential environmental consequences resulting from the construction and operation of the proposed fish barrier and augmentation of native fishes. The consequences of no action also are described for each of the resources identified above, as a basis for comparing the potential effects of the proposed project. Land use and socioeconomic resources are not expected to be affected and are not discussed in this EA.

The study area for the proposed Spring Creek aquatic resources protection project consists of the geographic footprint where direct, indirect, and cumulative impacts could result from implementation activities. Included is the perennial reach of lower Spring Creek and sites affected by construction, post-construction channel aggradation and degradation, and sedimentation.

3.1 SOILS

3.1.1 Affected Environment

Spring Creek is situated in a transition zone between the Basin and Range and Colorado Plateau physiographic provinces. This transition zone is delineated by an escarpment of rugged mountains and valleys that extends from northwestern to east-central Arizona and into New Mexico. Known locally as the Mogollon Rim, this escarpment represents the eroded edge of the Colorado Plateau. The Verde Valley is a prominent physiographic feature of the Transition Zone.

Upper Spring Creek cuts through the Paleozoic sedimentary rocks of the Mogollon Rim. The Paleozoic sedimentary sequence of limestone includes the Kaibab and Red Wall Formations, and sandstones including the Coconino Formation. The Coconino Sandstone is the source of many springs that contribute to perennial stream reaches including Spring Creek. Lower Spring Creek flows through a broad valley that is cut into the Miocene Verde Formation. These sediments were deposited in lakes in the ancestral middle Verde River valley.

Soils in the Spring Creek basin were mapped and classified by the CNF Terrestrial Ecosystem Survey (TES). Upstream reaches of Spring Creek have soils that are located on TES mapping units 45 and 46. Map unit 45 is located on higher lying stream terraces with coarse-textured soils. Downstream and at lower elevations, Spring Creek soils are located on TES mapping units 33 and 34. Map unit 33 is located on floodplains and lower lying stream terraces and has deep soils (greater than 40 inches to bedrock) and extremely cobbly sandy textures throughout. These soils are subject to frequent flooding. Map unit 34 is located on higher lying stream terraces and has deep, sandy soils with

little surface rock fragments and is rarely to occasionally subject to flooding. These soils are formed in recent, mixed alluvium derived from limestone, sandstone, and basalt.

Within the study area, rock abutments and steeply sloping canyon terrain confine the floodplain. Floodplain substrates consist of exposed or shallow bedrock, fine to coarse fluvial deposits, and boulders eroded from the surrounding highlands. Along the axis of the proposed barrier, bedrock is surficial in the streambed and right abutment, and buried under alluvial material to a maximum depth of approximately 2.5 feet near the left abutment. Soils on the floodplain are stable with a robust grass and forb ground cover.

Soils on the hillside adjacent to the proposed fish barrier site are entirely within the "Graham very stony clay loam, 5 to 35 percent slopes" soil map unit. These soils consist of very stony clay loam underlaid by cobbly clay. Bedrock typically occurs 12 to 60 inches below the ground surface, although surficial bedrock is often present along ridges and canyon walls. Upland soils along the canyon slopes are formed in residuum weathered from Tertiary basalt. Outcroppings of limestone intersect FR 9827B near N. Oak Creek Valley Road.

3.1.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact to soils within the study area because no project would be implemented. Existing impacts are limited chiefly to dispersed recreational use such as hiking, hunting, and sightseeing. Use of FR 9827B for hiking access to the stream has had a trampling effect on road surface soils and prevented plant growth. Destabilization of soils from this foot traffic probably contributes to sediment discharges from the road surface during storm events.

Proposed Action

During construction, soil disturbances would result from the following activities: (1) spot-placement of gravel and blading rough segments of FR 9827B to improve access for commercial concrete mixer trucks; (2) repeated movement of construction vehicles over FR 9827B; (3) limited movement of a backhoe or excavator over the streamside access route; (4) use of a public parking area along N. Oak Creek Valley Road; (5) material/equipment staging on contractor use areas; and (5) activities within the construction zone including excavation, emplacement of a temporary cofferdam to divert stream flow, and installation of formwork, reinforcement bar, and anchor bars. The effects of construction include soil compaction and increased susceptibility of soils to wind and water erosion. Erosion would be most pronounced on steeply sloping terrain where project activities result in soil disturbances, such as on FR 9827B. Earth-moving activities within the construction zone, material/equipment staging on contractor use areas, and access would affect approximately 0.93 acre (Table 1). In addition, post-construction streambed aggradation would affect 0.84 acre. The permanent footprint of

the fish barrier is 0.01 acre. Best management practices (see Appendix B) would be implemented to reduce soil erosion.

Table 1. Soil impacts (acres).

Impact Type	Acres
Permanent	
Fish Barrier Footprint	0.01
Temporary	
Construction Zone	0.15
Contractor Use Areas	0.12
FR 9827B	0.58
Contractor Use Parking	0.04
Excavator/Backhoe Access	0.04
Total Acres (Temporary)	0.93

Cumulative Effects -- Soils

Ongoing activities that affect soil stability in the study area include dispersed recreation. Livestock and motorized vehicles historically had access to the area but are now excluded from the perennial reach of stream on CNF. The primary land uses within the Spring Creek watershed upstream of the study area are livestock ranching and recreation. These activities likely contribute to sedimentation in the perennial reach of stream. The proposed project would not add substantially to the cumulative impacts of other past, present, or reasonably foreseeable future actions on soil and erosion and sedimentation in the project area because of the limited scope of the proposal (short implementation duration and relatively small area affected) and application of appropriate erosion control on construction impact areas.

3.2 WATER RESOURCES

3.2.1 Affected Environment

Spring Creek flows generally south approximately 22 miles before converging with Oak Creek within the northern periphery of Cornville. Encompassing 72 square miles, Spring Creek's watershed crosses a patchwork of private, State, and Federal lands. Drainage area elevations vary from 6,900 feet along Buck Ridge in the Red Rock/Secret Mountain Wilderness to 3,340 feet at the Oak Creek confluence. Spring Creek's watershed is relatively long and narrow. Coffee Creek is its largest tributary; other tributaries include Loy Canyon, Red Canyon, Hart Well Canyon and Lincoln Canyon. Small, low-order ephemeral channels enter the stream throughout the watershed. These small, steep channels have the potential to contribute surface water during periods of snowmelt or rainfall.

The distribution of precipitation in the watershed is bimodal with peaks in winter/early spring, and in mid to late summer, with an average water-year precipitation of 16.8 inches. Runoff from storms and snowmelt contribute to flows in excess of base flow in the lower 3.9-mile perennial reach. The primary source of perennial flow through Spring

Creek is from artesian springs that support a continuous riparian broadleaf forest and is a principal source of water discharged to Oak Creek. Two short segments of this perennial reach (totaling 0.9 mile) are situated on CNF (Figure 2). The remaining portion is on private land (2.6 miles) and State land (0.4 mile). The lowermost 0.6-mile reach between the CNF boundary and Oak Creek adjoins residential properties in the Oak Creek Valley subdivision of Cornville.

The CNF collected monthly instantaneous flow measurements at Spring Creek during a 5-year period beginning in June 1998 (CNF 2008). Measurements were taken from a site on the lower perennial reach. Median monthly flow rates ranged from a low of 3.61 cubic feet per second (cfs) in January to a high of 4.64 cfs in March, producing approximately 2,949 acre-feet of water annually. Within the study area, bankfull mean depth of the channel is 2 feet (maximum is 2.5 feet) and bankfull discharge is 665 cfs.

Depending on the severity of runoff from winter and summer storms, flows can be highly variable across seasons and exhibit flashy responses to moderate and major storm events. Flood flows in excess of a 2-year event carry a high sediment load because of erosion from exposed upland slopes and entrainment of sediment from channel scour. Peak flood flows in Table 2 were estimated by Reclamation using the regression equations from the Arizona Department of Transportation "Methods for Estimating Magnitude and Frequency Floods in Arizona" (Roeske 1978). In the project area, the lateral extent of the 100-year flood zone as designated by Federal Emergency Management Agency (Flood Insurance Rate Map 04025C1420G) is limited by the canyon walls.

Table 2. Estimated peak flood flows at the fish barrier site.

Recurrence Interval	Instantaneous Peak Flow (cfs)
2 year	495
5 year	1,746
10 year	3,068
25 year	5,453
50 year	7,970
100 year	10,969

Arizona sets narrative and numeric surface water standards for water quality based on the uses people and wildlife make of the water. The Arizona Department of Environmental Quality (ADEQ) reported in the 2010 Arizona Integrated 305 (b) Assessment and 303 (d) Listing Report that Spring Creek attained surface water quality standards for the designated uses of fish consumption, agricultural livestock watering, agricultural crop irrigation, and warm-water aquatic community (ADEQ 2012a). However, Spring Creek is listed by ADEQ (2012a) as "not attaining" for full body contact (swimming) because of exceedances of the standard for *E. coli* bacteria. Multiple sources in the watershed likely contribute to *E. coli* concentrations in Spring Creek including septic systems, wildlife, and livestock. *E. coli* levels in stream water also can be affected by sedimentation. Stream sediment can act as a bacteriological reservoir[2], and when that

[2] Sediment in portions of Oak Creek supports 10 to 17,000 times more *E. coli* than creek water (ADEQ 2012b).

sediment is disturbed, either by human-induced causes or by turbulent, higher-velocity storm flows, the sediment is lifted into the water column where increased contact between sediment particles and water causes entrainment of *E. coli* in the water, thereby increasing aqueous *E. coli* concentrations (ADEQ 2012b).

Natural sources of sediment production in the Spring Creek drainage include unstable slope deposits and stored channel sediment. Human caused sources include past range management, land development, and unpaved road maintenance and/or construction.

Spring Creek is a headwater source to the Verde River. Water rights to flow within Spring Creek are held by several claimants. The points of diversion for at least 6 claims totaling approximately 147 acre-feet per annum are located downstream of the proposed fish barrier site.[3] In addition, CNF has applied for an instream water right of 2,171.9 acre-feet per annum for fish and wildlife. The CNF water right applies to several instream places of use including the proposed fish barrier site. Numerous other claimants exist for water within the Verde River drainage, including the Salt River Project, the Fort McDowell Indian Tribe, agricultural interests, and several communities.

Spring Creek and the segment of Oak Creek south of Sedona are not listed by the USFS as eligible for inclusion in the Wild and Scenic River System. The closest Outstanding Arizona Waters as listed under AAC R18-11-112 is Oak Creek. Spring Creek converges with Oak Creek approximately 0.65 mile downstream of the proposed fish barrier site.

3.2.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact to water resources because no project would be implemented. Existing environmental factors, including natural and human sources of sedimentation and water use, would continue to affect water resources in the project area into the foreseeable future.

There would be no effect to water resources resulting from native fish stocking and monitoring, if those actions are undertaken by AZGFD in lieu of the proposed project.

Proposed Action

Direct and indirect impacts to water resources may result during barrier construction and operation. Stocking and monitoring of native species would not affect water resources.

Waters of the United States. The U.S. Army Corps of Engineers (USACE) regulates discharges of fill material to waters of the United States, pursuant to Section 404 of the Clean Water Act (CWA), and issues permits for actions proposed within such waters.

[3] The Oak Creek Valley POA has a water right claim for 121 acre-feet per annum of Spring Creek water that is diverted by a concrete diversion structure into Jack's Ditch approximately 320 feet downstream of the propose fish barrier site.

Jurisdictional, non-tidal waters of the United States regulated by the USACE 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). Based on a delineation of the OHWM, approximately 0.03 acre of jurisdictional waters would be directly affected by the placement of temporary and permanent fill (i.e., earthen material for the temporary cofferdam, reinforced concrete for the fish barrier, and excavated alluvium redeposited as backfill) during construction of the fish barrier. Reclamation received CWA 404 permit coverage from the USACE under Nationwide Permit 27. The ADEQ issued a waiver of CWA 401 individual water quality certification.

Hydrology and Fluvial Geomorphology. It is anticipated that during the first 1-5 years following construction, immobilized bedload material would permanently aggrade the channel upstream of the barrier and displace any pooled water. The rate of aggradation would be dependent upon the frequency and intensity of flood flows that mobilize sediments. Aggradation would reduce the average channel gradient from 2.2% to 1.7% percent and permanently raise the water surface profile on approximately 1,100 feet of stream, affecting approximately 0.84 acre of base flow channel and adjacent floodplain. The altered stream profile would be most noticeable where water overtops the barrier, resulting in a 4-foot change in elevation, and then diminish upstream to zero. The raised water profile is expected to have a minimal erosive effect on the channel banks, which consists of varying percentages of bedrock, boulders, cobbles, and fine alluvium. Effects of channel aggradation would be limited to the canyon-bounded segment of the stream on CNF. No private land would be affected.

Spring Creek drains a large watershed that is capable of producing high sediment loads during floods; consequently, the amount of bedload material that would be immobilized at the barrier relative to the total volume transported within the stream would be small. Total sediment yield downstream would be consistent with pre-project conditions once streambed aggradation stabilizes.

Patterns of scour and channel degradation downstream would be influenced by hydraulic changes and sediment capture at the fish barrier. Degradation would be limited by the presence of surficial and shallow bedrock in the channel, and by grade control exerted by the existing concrete water diversion structure. If downstream erosion of banks from scour becomes evident, an adaptive management approach utilizing bioengineering methods to stabilize problematic areas could be employed. No measurable hydrological impact downstream of the diversion structure is anticipated.

Water Quality and Quantity. Dewatering the construction site would result in artificially elevated levels of suspended sediment and turbidity in the stream. These transient effects would be most pronounced during emplacement of the cofferdam and persist intermittently at low levels until construction is complete. Bank disturbances at the barrier would be confined mostly to bedrock in the streambed and right abutment, and surficial alluvium and buried bedrock at the left abutment. Temporary impact to 0.93 acre associated with the use of FR 9827B and construction and staging areas may lead to short-term increases (1-5 years after construction) in sedimentation after storm events.

Excavation of channel substrates and other construction related activity would contribute to temporary elevated levels of suspended sediment. Disturbances in the stream would temporarily increase turbidity for a short distance downstream of the construction area. These effects are expected to be minor as bank disturbances would be confined rock outcrops, reducing soil erosion and sediment discharge into the stream. Best Management Practices such as diverting stream flow around the construction zone also would minimize short-term turbidity increases in Spring Creek. Project implementation activities would create localized soil disturbances that would have a short-term effect on stream conditions within the project area. These effects are expected to be minor and would attenuate as vegetation recovers on project-impacted soils. In the long-term, water quality is not expected to be impacted by the barrier.

To ensure that the project complies with CWA sections 401 and 404, all applicable terms and conditions of required permits would be implemented. As with past restoration projects on USFS lands, USACE would be involved in the review of construction plans to determine CWA 404 permitting requirements and subsequent CWA 401 certification by ADEQ.

The proposed fish barrier would have a negligible effect on the volume of stream flow that passes downstream. Water that is initially pooled at the fish barrier (approximately 0.26 acre-feet) would eventually cycle over the top of the structure. Short-term pooling of flow is considered non-consumptive, because water is not removed from the stream system. However, hydraulic changes induced by the barrier would result in a slight increase in evaporative water loss. Those water losses are estimated to be 89 acre-feet over the 100-year life of the project.[4] Project-related evaporative water loss would not be expected to affect the quantity of water diverted by downstream claimants on Spring Creek. However, an increase in evaporative water loss would slightly reduce the amount of water that is available for storage on the Verde River by the Salt River Project. Reclamation would compensate the Salt River Project for those losses with water acquired from the CAP Excess Pool.

Cumulative Effects – Water Resources

The cumulative effects of the proposed project on water resources would be negligible compared to historic, ongoing, and reasonably foreseeable future natural and human-induced events in the watershed that have affected water quality, quantity, and/or stream geomorphology in the perennial reach of Spring Creek. Production of sediment during and following construction would have a short-term and minor cumulative effect on water quality downstream of the construction zone. Changes in fluvial morphology induced by operation of the barrier would be cumulative to other human and natural influences in the watershed that affect sediment production and channel aggradation or degradation, such as natural slope erosion, natural channel scour, sediment runoff from unpaved roads, and livestock grazing. Major land development, such as the proposed 246-acre Spring Creek Ranch residential area approximately 1.5 miles upstream of the

[4] The project lifespan is the period of time the barrier could reasonably be expected to hold up to forces of stream flow and weather.

fish barrier site, could generate quantities of sediment that affect water quality and increase sediment load in the stream. It is uncertain whether the Spring Creek Ranch development would have an effect on water quantity.[5] Minor increases in evaporative water loss attributable to hydraulic changes induced by the fish barrier would be cumulative to drought, water diversions, and other uses that contribute to a reduction in natural stream flow.

3.3 BIOLOGICAL RESOURCES

3.3.1 Affected Environment – Vegetation

The upland portion of the project area falls within the broad Semidesert Grassland biotic community described in Brown (1994). The Semidesert Grassland habitat is characterized by biseasonal (summer and winter) precipitation. Representative plant species include: desert spoon (*Dasylirion wheeleri*), beargrass (*Nolina microcarpa*), desert hackberry (*Celtis pallida*), jojoba (*Simmondsia chinensis*), side-oats grama (*Bouteloua curtipendula*), and curly mesquite (*Hilaria belangeri*). Creosote (*Larrea tridentate*), juniper (*Juniperus* spp.), and desert broom (*Baccharis sarothroides*) are also present in the project area.

The canyon-bottom portion of the project area along Spring Creek falls within the Sonoran Riparian Deciduous Forest and Woodland biotic community (Brown 1994). This biotic community consists of mixed stands of Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), and velvet ash (*Fraxinus velutina*) with velvet mesquite (*Prosopis velutina*) on terraces and canyon slopes. In the project area, Spring Creek is mostly a steep sided, narrow canyon that restricts the riparian habitat to a narrow band. Goodding willow and velvet ash are the most abundant riparian tree species in areas of the project most likely to be directly affected by construction. Various grasses and forbs are the dominant ground cover within this narrow riparian corridor.

A CWA Section 404 jurisdictional determination field survey was conducted by Reclamation in June 2013. The field survey focused on delineating waters of the U.S. and identifying jurisdictional wetlands in and adjacent to areas that may be directly or indirectly affected by project activities. Herbaceous wetland vegetation was identified along the edges of the baseflow (wet) channel upstream and downstream of the construction zone but not in areas subject to construction-fill activity. The wetland most proximal to the construction zone occurs as a continuous but narrow strand of vegetation along both banks of the baseflow channel more than 210 feet upstream of the proposed fish barrier site. Isolated patches of wetland vegetation are present more than 300 feet downstream.

[5] A City of Cottowood owned well and 250,000 gallon storage tank would provide water for the entire Spring Creek Ranch development.

3.3.2 Environmental Consequences – Vegetation

No Action

Under the no action alternative, there would be no direct impact to vegetation, since no project would be implemented. Major disturbances at the site of the proposed barrier primarily would be the result of flood-induced damage to vegetation and scour.

Proposed Action

Approximately 1.08 acres of base flow channel and adjacent riparian habitat would be affected by fish barrier construction and post-construction streambed aggradation (Table 3). At the fish barrier site, construction would directly impact a mixed stand of riparian trees (mostly Goodding willow and velvet ash) within a 0.15 acre area. Less than 0.01 acre of habitat would be permanently impacted within the barrier footprint. Access for an excavator or backhoe along the west side of the stream would require trimming or removal of one willow, one mesquite, and three ash trees on approximately 220 feet of floodplain between the terminus of FR 9827B and the barrier site, affecting 0.04 acre.[6] If possible, tree stumps would be protected along this route to encourage regeneration after construction. Contractor use of a 0.05-acre site along the south side of the stream at the terminus of the existing road would affect mostly open ground with sparse ground cover. Effects of contractor use at the north end of the construction zone would be limited to trampling of ground cover resulting from material storage and camping activity on approximately 0.07 acre of scrub semidesert grassland. Use of the public parking area along N. Oak Creek Valley Road would affect bare ground.

The entire aggradation zone would extend approximately 1,100 feet upstream from the fish barrier, affecting 0.84 acre of open channel and adjoining riparian habitat. Accumulation of less than 1.5 feet of sediment would have no long-term impacts on mature riparian trees; consequently, impacts to large trees within the aggradation zone would be limited to the initial 400-foot reach upstream where sediment depths outside the baseflow channel would exceed one foot, affecting approximately 0.41 acre of riparian habitat. Recovery of riparian vegetation on these deposits would occur once aggradation stabilizes. Between 400 and 600 feet upstream sediment depths outside the baseflow channel would diminish to zero. Aggradation in the remaining 500 feet of stream would be confined to the base flow channel.

There would be no direct impact to wetlands during construction. Post-construction aggradation would displace wetland vegetation that occurs along the stream banks between approximately 210 and 300 feet upstream of the fish barrier. Impacts of aggradation on wetland vegetation would substantially disappear between 300 and 600 feet upstream. An estimated 0.06 acre of wetland vegetation would be affected, most of which would likely become re-established after aggradation has stabilized.

[6] In order to facilitate backhoe or excavator access, the following trees would be removed: one multi-stem willow (stem diameter at breast height [DBH] is 5 inches and 6 inches), one mequite (stem DBH is 1.25 inches), and three multi-stem ash trees (stem DBH ranging from 0.5 inch to 3.5 inches).

Table 3. Vegetation impacts (acres)

Impact Type	Riparian Habitat/Open Channel	Upland Habitat
Permanent		
Fish Barrier Footprint	0.01	
Temporary		
Construction Zone	0.15	
Contractor Use Areas	0.05	0.07
Contractor Use Parking	0	0
Excavator/Backhoe Access	0.04	
Aggradation Zone	0.84*	
Total Acres (Temporary)	1.08	0.07

*****Includes 0.06 acre of wetland vegetation.

Cumulative Effects – Vegetation

The permanent loss of riparian vegetation within the footprint of the fish barrier would be cumulative to land development, grazing, and other human influences that have reduced the extent of the riparian habitat along Spring Creek. Outside of the footprint of the barrier, any long-term effect of the project would be rendered largely undetectable due to natural regeneration of riparian vegetation.

3.3.3 Affected Environment – Terrestrial Wildlife

Sonoran Riparian Deciduous Forest and Woodland – Wildlife use of riparian habitat is disproportionate to the amount of habitat actually available (Ohmart and Anderson 1986). Riparian areas occupy less than 0.5% of the Arizona's total land area vegetation but they provide habitat for 60-75 percent of the State's resident wildlife (Arizona Riparian Council 1994). Riparian areas have been recognized as important 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*), collared peccary (*Tayassu tajacu*), bobcat (*Felis rufus*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), coati (*Nasua nasua*), and mule deer (*Odocoileus hemionus*) may utilize riparian habitat as movement corridors. Small mammals typically found in low elevation riparian areas include white-throated woodrat (*Neotoma albigula*), striped skunk (*Mephitis mephitis*), and spotted skunk (*Spilogale gracilis*).

Semidesert Grassland - Generally, grassland species have fared less well than their scrub-adapted competitors. Pronghorn, 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*), Northern harrier (*Circus cyaneus*), poor-will (*Phalaenoptilus nuttallii*), Scott's oriole (*Icterus parisorum*), and desert grassland whiptail (*Apidoscelis uniparens*).

3.3.4 Environmental Consequences – Terrestrial Wildlife

No Action

Under the no action alternative, there would be no direct effect to terrestrial wildlife because no project would be implemented. Ongoing use of the project area for hiking, horseback riding, and hunting could disturb sensitive wildlife. Increasing urban growth associated within the community of Cornville and potential residential development on Spring Creek Ranch could disrupt wildlife travel corridors and fragment habitat near the project area.

Proposed Action

The area of potential effect to wildlife during construction would be limited to the access route from Oak Creek Valley Road, and the contractor use areas and construction zone along Spring Creek. Operation of heavy equipment and vehicles in the project area could injure or kill smaller and less mobile mammals and reptiles. There would also be temporary noise-related disturbances and visual impacts associated with human activity that could interfere with movement patterns and cause displacement of sensitive wildlife during the 45 to 60 days of anticipated construction activities. A fall and/or winter construction schedule is anticipated, thereby avoiding direct impacts to breeding birds in accordance with CNF management direction specified for Management Area 12. Indirect effects include displacement of wildlife because of short-term loss of foraging, nesting, or cover habitat, but this is limited to 1.08 acres of riparian habitat and 0.07 acre of upland habitat.

Cumulative Effects – Terrestrial Wildlife

The effects of the proposed project on riparian habitat and wildlife would be cumulative to land development, livestock grazing, water diversions, and other disturbances affecting the riparian corridor along Spring Creek.

3.3.5 Affected Environment - Fish and Aquatic Wildlife

The existing native fish community in Spring Creek consists of speckled dace (*Rhinichthys osculus*), longfin dace (*Agosia chrysogaster*), Sonora sucker (*Catostomus insignis*), desert sucker (*Pantosteus clarki*), and the Federally-endangered Gila chub. Native amphibians and semi-aquatic reptiles present within Spring Creek include Sonora mud turtle (*Kinosternom sonoriense*), lowland leopard frog and potentially northern Mexican gartersnake (*Thamnophis eques megalops*) (historically present). Nonnative crayfish is present throughout the perennial reaches of Spring Creek. Semi-aquatic mammals include beaver (*Castor canadensis*) and river otter (*Lontra canadensis*).

3.3.6 Environmental Consequences - Fish and Aquatic Wildlife

No Action

Under the no action alternative, there would be no direct impact to fish and aquatic wildlife because no project would be constructed. Without emplacement of a fish barrier, the existing green sunfish population might expand and suppress native Gila chub and other native fishes (e.g., Dudley and Matter 2000) and other nonnative fishes could potentially move into upper Spring Creek and further suppress native populations of fish, amphibians, and semi-aquatic reptiles. In the long term, the opportunity to establish new populations of species proposed for translocation into Spring Creek would substantially diminish. The no action alternative would allow ongoing and increasing adverse impacts that could contribute to an increased need for Federal listing of unlisted species and increase the likelihood of continued decline of listed species.

Proposed Action

The proposed fish barrier is expected to have substantial, positive benefits to native fish and other aquatic and semi-aquatic vertebrate populations by preventing upstream invasions of nonnative fishes and other undesirable nonindigenous aquatic biota into Spring Creek (Miller 1961, Moyle et al. 1986, Minckley 1991, Minckley and Marsh 2009, Rosen and Fernandez 1996, Rosen et al. 1995, Rosen and Schwalbe 2002).

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, the 0.6-mile reach of Spring Creek below the diversion structure is heavily impacted by nonnative fishes that occupy Oak Creek. Native fish populations are already low in lowermost Spring Creek (and much lower in Oak Creek) due to influences of nonnatives, and thus only minor genetic effects to the much larger upstream populations are anticipated.

At the species level, the fish barrier would prevent integration of genetic variability of native fishes derived from other nearby stream systems to Spring Creek populations upstream of the barrier. Genetic communication among diverse populations is desirable to maintain long-term (100s 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 communication among tributary fish populations occurs through connecting mainstem river corridors (Minckley 1999, Fagan et al. 2002). Presence of an array of nonnative fish predators near tributary mouths and especially in mainstem stream systems like Oak Creek and the Verde River, coupled with fragmentation of river drainages via stream diversions, channelization, groundwater pumping, reservoirs, etc., 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 fish 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-May, 1984, only two percent were minnows (Family Cyprinidae), and the rest were suckers (Family Catostomidae; Bestgen et al. 1985). In the Bestgen et al. (1985) study, more than 79% of larval drift occurred during daylight, and daytime drift distances were estimated to be short.

Distances drifted by native fish species in Spring Creek have not been determined, but two lines of evidence suggest that drift losses over the fish barrier would be negligible under the proposed project. 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 10s of meters; Remington 2002). Therefore, unless drift transport distances are relatively long (several kilometers or more), substantial population losses from downstream drift 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, however, would occur with or without the presence of the fish barrier. In the absence of flooding during larval development, downstream losses of larvae of leopard frogs over the barriers should be minor, because 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 the fish barrier. In a steep-walled canyon reach such as the site proposed for Spring Creek, a fish barrier may hinder upstream

movements by terrestrially-mobile adult frogs, garter snakes, Sonora mud turtles, beavers, and river otters, but overland access would be available to those species by means of a terrace along the left abutment.

Impacts to in-stream habitats in the sedimentation zone immediately upstream from the fish barrier primarily would be 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. This impact would reduce the suitability of habitat for fishes that utilize rocky bottoms for feeding or reproduction, but the impact would be localized, affecting approximately 6% of the perennial reach of Spring Creek upstream of the proposed fish barrier site.

Nonnative green sunfish has very recently been detected in Spring Creek upstream from the proposed fish barrier location. Intensive mechanical removal efforts against the species are ongoing, but it is possible and perhaps likely that the species will establish a reproducing population. Published (Dudley and Matter 2000) and anecdotal evidence demonstrate that green sunfish can actively suppress and even eliminate native fish populations primarily via predation on younger life stages. Mechanical removals, when practiced frequently and intensively, can suppress populations sufficiently to minimize negative impacts to natives and allow native populations to persist if not thrive (H. Blasius, BLM, personal communication; Meronek et al. 1996; Propst et al. 2014). If mechanical removal proves incapable of eliminating green sunfish from upstream of the constructed fish barrier within a several year period of effort, alternatives such as chemical renovation may be considered and proposed in a new NEPA analysis. Chemical renovation is not being considered at this time.

Nonnative northern crayfish has invaded and established in Spring Creek. Northern crayfish function as primary consumers, carnivores, and decomposers, and therefore does not fit within a single trophic level (Childs 1999a). The species can modify instream habitats through removal of aquatic vegetation, as well as prey upon macroinvertebrates and smaller individuals of native aquatic and semi-aquatic vertebrates (Rosen and Schwalbe 2002). Northern crayfish can suppress Sonora mud turtle, leopard frog, and garter snake populations by limiting recruitment of young via predation (Fernandez and Rosen 1996), but effects on native fish populations are equivocal (White 1995, Carpenter 2000). Laboratory studies demonstrate that crayfish are strong competitors with native fishes for food (Carpenter 2000) and space (White 1995, Childs 1999b), and laboratory predation by northern crayfish on speckled dace (Childs 1999b) and little Colorado spinedace (Bryan et al. 2002) was documented. The study by Childs, however, questioned whether similar predation would occur in the wild. Predation by northern crayfish on eggs of another native minnow, the Little Colorado spinedace (*Lepidomeda vittata*), was demonstrated in the wild (White 1995). Although poorly documented in Arizona, studies showing crayfish predation on fishes in other regions are relatively common, and it is clear that crayfish introductions minimally have potential to destabilize and restructure native communities (reviewed by Childs 1999a).

Although it is desirable to eliminate northern crayfish from Spring Creek, their continued presence is not expected to obviate the success of the proposed repatriation of spikedace and Gila topminnow. With the possible exception of impacts to loach minnow, which is a benthic-dwelling species that might be expected to interact strongly with northern crayfish that occupies similar habitats (Thomas and Taylor 2013), crayfish have not been shown to interfere with native fishes to the point where fishes cannot successfully complete their life cycles and sustain populations. Presence of northern crayfish is a substantial detraction from restoration of a native aquatic community in Spring Creek, however, and investigations are ongoing to develop methods to eliminate them from stream systems. No existing methods, including mechanical removal, are considered effective. If a method is developed, application of the technique to Spring Creek would be proposed in a separate NEPA analysis.

The proposed project would have a positive long-term effect by preventing potential future invasions of nonnative fishes and suppression of the native fish community in Spring Creek. Such benefits would also accrue to native amphibians and semi-aquatic reptiles.

Cumulative Effects – Fish and Aquatic Wildlife

Adverse effects to aquatic species could occur from a number of possible events in the watershed that might affect water quality and quantity such as unpaved road maintenance and/or construction, land development, livestock grazing in riparian bottoms, and wildfire. These events can singularly or cumulatively affect aquatic species through alterations in aquatic habitat characteristics. Potential adverse cumulative effects of the proposed project on native aquatic species would be offset by the benefits of precluding upstream invasion of nonnative fishes. On a Forest-wide scale, the benefits of the proposed project on aquatic species would be incremental to the benefits achieved on other native warmwater fish and aquatic wildlife conservation projects such as Fossil Creek.

3.3.7 Affected Environment – Federally Listed and Candidate Species

Table 4 lists those species that are proposed for translocation to Spring Creek. Table 5 identifies the USFWS listed, proposed, and candidate species that occur within three miles of the project area as determined by the AZGFD Online Environmental Review Tool.

Table 4. Federally-listed species proposed for translocation into Spring Creek.

Common Name	Scientific Name	Status
Gila topminnow	*Poeciliopsis occidentalis*	Endangered
Loach minnow	*Tiaroga cobitis*	Endangered
Narrow-headed gartersnake	*Thamnophis rufipunctatus*	Proposed Threatened
Spikedace	*Meda fulgida*	Endangered

Table 5. Federally-listed and candidate species extant within three miles of the project area.

Common Name	Scientific Name	Status
Gila chub*	*Gila intermedia*	Endangered
Gila topminnow	*Poeciliopsis occidentalis*	Endangered
Northern Mexican gartersnake**	*Thamnophis eques megalops*	Proposed Threatened
Page springsnail*	*Pyrgulopsis morrisoni*	Candidate
Roundtail chub	*Gila robusta*	Candidate
Yellow-billed cuckoo	*Coccyzus americanus*	Proposed Threatened

*Presently occur in Spring Creek.
**Historically occurred in Spring Creek.

On the following pages, Table 6 presents the Federally-listed and candidate species and USFS special status species that were considered for this analysis. Table 6 lists those species that are known to occur, have the potential to occur, or likely do not occur in the project area for reasons stated. Federally-listed and candidate species are discussed in sections 3.3.7 to 3.3.8. USFS special status species are discussed in sections 3.3.9 to 3.3.12.

Table 6. Federally threatened, endangered, proposed, and candidate species, and CNF sensitive species considered for analysis.

Species Name	Species Status			No Suitable Habitat/ Outside Historic Range	Suitable Habitat Present	Suitable Habitat Occupied
	Federal	State	Forest Service			
Mammals						
Western red bat (*Lasiurus blossevillii)*	--	1B	Sen			X
Spotted bat (*Euderma maculatum)*	--	1B	Sen		X	
Allen's lappet-browed bat (*Idionycteris phyllotis)*	--	1B	Sen		F, R	
Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens)*	--	1B	Sen	R	F	
Birds						
Southwestern willow flycatcher (*Empidonax traillii extimus)*	E	1A	--	X		
Mexican spotted owl (*Strix occidentalis lucida)*	T	1A	--	X		
Yuma clapper rail (*Rallus longirostris yumanensis)*	E	1A	--	X		
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis)*	PT	1A	Sen			X
Bald eagle (*Haliaeetus leucocephalus)*	--	1A	Sen	X		
American peregrine falcon (*Falco peregrinus anatum)*	--	1A	Sen	N	F	
Northern goshawk (*Accipiter gentilis)*	--	1B	Sen	X		
Burrowing owl (*Athene cunicularia)*	--	1B	Sen	X		
Reptiles and Amphibians						
Chiricahua leopard frog (*Rana chiricauhuensis)*	T	1A	--	X		
Narrow-headed gartersnake (*Thamnophis rufipunctatus)*	PT	1A	Sen		X	
Northern Mexican gartersnake (*Thamnophis eques megalops)*	PT	1A	Sen			H
Lowland leopard frog (*Rana yavapaiensis)*	--	1A	Sen			X
Northern leopard frog (*Rana pipiens)*	--	1A	Sen	X		

Species Name	Species Status			No Suitable Habitat	Suitable Habitat Present	Suitable Habitat Occupied
	Federal	State	Forest Service			
Fish						
Colorado pikeminnow (*Ptychocheilus Lucius)*	E	1A	--	X		
Razorback sucker (*Xyrauchen texanus)*	E	1A	--	X		
Gila chub (*Gila intermedia)*	E	1A	--			X
Gila trout (*Oncorhynchus gilae gilae)*	T	1A	--	X		
Gila topminnow (*Poeciliopsis occidentalis)*	E	1A	--		X	
Headwater chub (*Gila nigra)*	C	1A	Sen	X		
Loach minnow (*Tiaroga cobitis*)	E	1A	--		X	
Spikedace (*Meda fulgida*)	E	1A	--		X	
Roundtail chub (*Gila robusta)*	C	1A	Sen	X		
Sonora sucker (*Catostomus insignis)*	--	1B	Sen			X
Desert sucker (*Catostomus clarki)*	--	1B	Sen			X
Invertebrates						
A Mayfly (*Moribaetis mimbresaurus)*	--	--	Sen		X	
A Caddisfly (*Lepidostoma knulli)*	--	--	Sen		X	
Balmorhea saddle-case caddisfly (*Protoptila balmorhea)*	--	--	Sen		X	
A Caddisfly (*Wormaldia planae)*	--	--	Sen		X	
Snails						
Fossil springsnail (*Pyrgulopsis simplex)*	--	1A	Sen	X		
Page springsnail (*Pyrgulopsis morrisoni)*	C	1A	Sen			X
Clams						
California floater (*Anodonta californiensis)*	--	1A	Sen		X	

Species Name	Species Status			No Suitable Habitat	Suitable Habitat Present	Suitable Habitat Occupied
	Federal	State	Forest Service			
Plants						
Arizona cliffrose (*Purshia subintegra)*	T	--	--	X		
Tonto basin agave (*Agave delamateri)*	--	--	Sen		X	
Phillips' agave (*Agave phillipsiana)*	--	--	Sen	X		
Sacred mountain agave (*Agave verdensis)*	--	--	Sen	X		
Page springs agave (*Agave yavapaiensis)*	--	--	Sen		X	
Mt. Dellenbaugh sandwort (*Arenaria aberrans)*	--	--	Sen	X		
Arizona bugbane (*Cimicifuga arizonica)*	--	--	Sen	X		
Metcalfe's tick-trefoil (*Desmodium metcalfei)*	--	--	Sen		X	
Rock fleabane (*Erigeron saxatilis)*	--	--	Sen	X		
Heathleaf wild buckwheat (*Eriogonum ericifolium var. ericifolium)*	--	--	Sen	X		
Ripley wild buckwheat (*Eriogonum ripleyi)*	--	--	Sen	X		
Flagstaff pennyroyal (*Hedeoma diffusum)*	--	--	Sen	X		
Eastwood alum root (*Heuchera eastwoodiae)*	--	--	Sen		X	
Verde breadroot (*Pediomelum verdiensis)*	--	--	Sen		X	
Lyngholm's brakefern (*Pellaea lyngholmii)*	--	--	Sen	X		
Arizona phlox (*Phlox amabilis)*	--	--	Sen		X	
Alcove bog orchid (*Platanthera zothecina)*	--	--	Sen	X		
Hualapai milkwort (*Polygala rusbyi)*	--	--	Sen		X	
Ertter's rose (*Rosa woodsii var. ertterae)*	--	--	Sen	X		
Mearns Sage (*Salvia dorrii spp. Mearnsii)*	--	--	Sen	X		

Table Legend:
E = Federally Endangered **T** = Federally Threatened **C** = Federal Candidate **PT** = Proposed Threatened **Tier 1A** = State Species of Greatest Conservation Need **Tier 1B** = State Species of Greatest Conservation Need **Sen** = Forest Service Sensitive

F = Foraging **N** = Nesting **H** = Historic **S** = Spawning **M** = Migration **CR**= Critical Habitat
R = Roosting **W** = Wintering **O** = Occupied **X** = Suitable Habitat Not Present/Present

Gila topminnow **-** Gila topminnow was federally-listed as endangered on March 11, 1967 (USFWS 1967). No critical habitat has been designated. This small (<50 mm) livebearing fish historically was one of the most common species at lower elevations in its 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 is also found in the Río de la Concepcíon and Río Sonora in northern Sonora, Mexico. The species began to experience loss of range in the Gila 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 1930-40's 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 can develop simultaneously at different developmental stages at the same time, with births occurring at approximate 3-week intervals. Broods can consist of 14-49 embryos (Schoenherr 1977). They can become sexually-mature as early as two months, and can produce up to 10 broods per year under laboratory conditions (Schultz 1961). Gila topminnow is proposed for translocation into Spring Creek.

Loach minnow **-** Loach minnow was federally listed as threatened on October 28, 1986 (USFWS 1986b), and the species was uplisted to endangered status on February 23, 2012 with critical habitat (USFWS 2012). Critical habitat includes eight subbasin units in the Verde, Salt (Black), San Pedro, Bonita, Eagle, San Francisco, Blue, and upper Gila River drainages. Loach minnow is endemic to streams of the Gila River Basin, and its historical distribution included most of the major subbasins except the Santa Cruz (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 mainstem Gila River and some of its forks in New Mexico (Marsh et al. 1990, Propst 1999, USFWS 2012). It persists as relatively small populations in a handful of other streams in the basin, and is estimated to be lost from about 80-85% of its historic range; the presence of nonnative fishes and other nonindigenous aquatic organisms is the major factor in continued declines of this species (Clarkson et al. 2012, USFWS 2012).

Loach minnow is a small-bodied, short-lived, current-loving species, primarily inhabiting interstices of gravel and rubble in shallow, well-defined, stream riffles (USFWS 2012). 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). Loach minnow is proposed for possible translocation into Spring Creek.

Narrow-headed gartersnake – This snake was proposed for listing as a threatened species on July 10, 2013 (USFWS2013a), with proposed critical habitat in six stream complexes below the Mogollon Rim in central and eastern Arizona and southwestern New Mexico, which encompasses the bulk of its historic range (USFWS 2013b). Widespread introductions of nonnative fishes with spiny rays (e.g., basses and sunfishes) or true spines (e.g., catfishes) are considered one of the primary threats to conserving the species (USFWS 2013a). Nonnative fishes not only displace the mostly soft-rayed native fish prey base, but they also typically are immune to consumption due to the presence of spines or spiny rays on the fins that prevent swallowing (Rosen et al. 2001, USFWS 2013a). Many introduced fishes also directly consume gartersnakes. Introduction of nonnative crayfish and bullfrog also may have negative impacts on the species (Rosen and Schwalbe 2002, USFWS 2013a).

Narrow-headed gartersnake is a highly aquatic riparian-obligate species found in clear, rocky streams at elevations ranging from 2,300 to 8,200 feet. The species is absent from or likely not viable in up to 76% of 38 known historically-occupied localities. Foods are almost exclusively fish, although it rarely may also take frogs, tadpoles, and salamanders (Stebbins 1985). Considered an ambush predator, the species forages along stream bottoms and is heavily dependent upon visual cues for foraging (Fleharty 1967). The species is surface-active between the months of March and November, and hibernates in rocky ledges above the floodplain (Nowak 2006). Sexual maturity is reached at 2-2.5 years of age, and between 4-17 live young are born in late July and early August (Rosen and Schwalbe 1988). Narrow-headed gartersnake is proposed for possible translocation into Spring Creek.

Northern Mexican gartersnake **-** This subspecies was proposed for listing as threatened on July 10, 2013 (USFWS 2013a), with proposed critical habitat in 14 subunits in central and southern Arizona and southwestern New Mexico, including Spring Creek from its confluence with Oak Creek upstream 22.5 miles to its headwaters (USFWS 2013b). Seventy to eighty percent of its range is in Mexico in the Sierra Madre Occidental and Mexican Plateau south to Oaxaca. Northern Mexican gartersnake typically is found along well-vegetated margins of cienegas, springs, streams, rivers, lakes, and ponds at elevations ranging from 130 to 6,150 feet. Presently, more than 80% of the known localities in the U.S. are considered extirpated or likely not viable due to low population densities (USFWS 2013a). As with narrow-headed gartersnake, the primary cause of decline of northern Mexican gartersnake appears to be replacement of soft-rayed native fish prey with spiny-rayed nonnative fishes that create a choking hazard (USFWS 2013a). The introduced bullfrog also is a major predator on Mexican gartersnake, and has been suspected to be the primary cause for its extirpation from some areas (Rosen and Schwalbe 1988).

Northern Mexican gartersnake is diurnally-active, and feeds mostly on native amphibians (especially leopard frogs) and fishes, but also toads, treefrogs, earthworms, deer mice, lizards, and leeches (summarized in USFWS 2013a). Onset of sexual maturity of this viviparous (live-bearing) species occurs at 2-3 years (Rosen and Schwalbe 1988); longevity is unknown. Mating usually occurs in late spring, with birth of between 7 and 38 newborns in July and August (Rosen and Schwalbe 1988, Nowak and Boyarski 2012). Spring Creek is considered occupied by northern Mexican gartersnake (USFWS 2013b); however, recent surveys for this species have been negative.

Page springsnail – This endemic hydrobiid snail was described to science in 1988 (Hershler and Landye 1988), and was petitioned for federal listing in 2002. Listing is considered warranted but precluded due to higher listing priorities (USFWS 2013d). Page springsnail historically occupied several spring complexes along the Verde River, Oak Creek and Spring Creek near the town of Cottonwood, Arizona. The population along the Verde River near Tavasci Marsh is likely extirpated (Hershler and Landye 1988), and many of the extant populations persist in human-modified springheads and their outflows. Modification and flow diminishment of spring habitats are the likely causes of population reductions and extirpations (USFWS 2013d).

Page springsnail most commonly inhabits rheocrenes, limnocrenes, and spring outflow channels in general order of abundance, on cobble, gravel, woody debris, and aquatic vegetation substrates (Martinez and Thome 2006). The species (as typical of most hydrobiid snails) tends to occupy relatively shallow, swiftly-flowing waters that exhibit relatively stable temperature and chemical profiles characteristic of springhead environments (Hershler 1984, Martinez and Thome 2006). The species occupies two spring complexes located near the headwaters of perennial flow of Spring Creek approximately 2.5-2.8 miles upstream of the proposed fish barrier site. Suitable habitat for this species is absent in the project area.

Spikedace **-** Spikedace was federally listed as threatened on July 1, 1986 (USFWS 1986a) and the species was uplisted to endangered status on February 23, 2012 with critical habitat (USFWS 2012). Critical habitat includes eight stream complexes in the Verde, Tonto, San Pedro, Bonita, Eagle, San Francisco, Blue, and upper Gila River drainages. Spikedace is endemic to the Gila River basin with a historical distribution that included most of the major subbasins except the Santa Cruz (Minckley 1973). Remnant populations are known to persist only in Aravaipa Creek, Arizona, and the Gila River mainstem in New Mexico, although illusory populations may also remain in the upper Verde River, Eagle Creek, and West Fork Gila River (Marsh et al. 1990, D.L. Propst, personal communication). This species (excluding those populations 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. These waters are now occupied by nonnative fishes that are considered the primary cause of its endangerment (Clarkson et al. 2012, USFWS 2012). Spikedace is estimated to be lost from ≥90% of its historic range (USFWS 2012).

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). Spikedace is proposed for translocation into Spring Creek.

Gila chub **-** Gila chub was formally listed as endangered with critical habitat (including Spring Creek) on November 2, 2005 (USFWS 2005). Endemic to the Gila River basin, the species is currently found in fewer than 30 mostly isolated waters (Weedman et al. 1996, Clarkson et al. 2012), a loss of approximately 85-90% of its former range (USFWS 2005). Only remnant populations restricted to tributaries persist today (DeMarais 1986, Clarkson et al. 2012). A recovery plan for Gila chub has not yet been finalized.

The species primarily inhabits deep pools in small to middle-sized streams, springs, and cienegas at intermediate elevations (Minckley and DeMarais 2000). Gila chub is highly secretive, typically found in association with woody debris, undercut banks, or scoured pools near obstructions. Larvae are found in shallow, quiet, nearshore areas. Juveniles enter swifter waters before returning to pools when large (Minckley 1973). Females achieve lengths of 250 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 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). Gila chub is omnivorous with a significant component of the diet comprised of aquatic insects (Griffith and Tiersch 1989).

Primary threats to the species' existence include effects from nonnative fishes (Dudley and Matter 2000, Clarkson et al. 2012) and other aquatic organisms, fire, residential water development, and grazing (USFWS 2005). A few populations have recently been protected from nonnative threats by construction of barriers and/or chemical renovations (e.g., Sabino Canyon, Bonita Creek, O'Donnell Canyon), and several new populations have been established (Larry Creek, Lousy Canyon, Romero Canyon). However, remnant populations continue to dwindle in number, and the overall outlook for the future status of the species is tentative without continued active conservation management. The species is extant within Spring Creek.

Yellow-billed cuckoo – The western distinct population segment (DPS) of yellow-billed cuckoo was proposed for listing as threatened on October 3, 2013 (USFWS 2013c). Proposed critical habitat was not included in the listing proposal. This Neotropical migrant bird winters in South American and breeds in North America. It is an uncommon to fairly common breeder in riparian habitats in western, central and southeastern Arizona along perennial drainages below 5000 feet (Corman 2005). The primary threat to this species is riparian habitat destruction, modification, and degradation resulting from dams and diversions, streamflow alterations, channelization, land use conversion, and wildfire, which leads to habitat fragmentation and population

decline (USFWS 2013c). Pesticide use on the wintering grounds also may result in direct mortality of individual birds and cause eggshell thinning (Latta et al. 1999). The cuckoo is primarily an insectivore, and pesticide use may reduce the availability of insect prey (Latta et al. 1999).

As most of the literature on this DPS is unpublished, the following life history information has been summarized from USFWS (2013c); see that publication for original literature. Most birds arrive on breeding grounds in June, and begin their southward migration near the end of August. They are able to produce up to three broods a season if the prey base is adequate, and clutch size ranges from 2-5 eggs. Breeding site fidelity is variable. Western yellow-billed cuckoo require large patches of dense riparian habitat for breeding, typically in excess of 50 acres in size. Home ranges typically are in excess of 100 acres. Little is known of their wintering habitat usage.

Cuckoo surveys were conducted by Reclamation and CNF biologists on Spring Creek within the project area four times between late June and mid-August in 2013 with no evidence of occupation. Riparian habitat appears generally suitable although perhaps too narrow.

3.3.8 Environmental Consequences – Federally Listed and Candidate Species

Gila topminnow – The species is now absent from the stream but is proposed to be translocated to lower Spring Creek as part of the project description. Construction would not directly affect the species. Activities associated with translocation may affect, but are not likely to adversely affect, Gila topminnow. Long-term effects are expected to be solely beneficial.

Loach minnow – The species is now absent from the stream but is proposed to be translocated to lower Spring Creek as part of the project description. Construction would not directly affect the species. Activities associated with translocation may affect, but are not likely to adversely affect, loach minnow. Long-term effects are expected to be solely beneficial.

Narrow-headed gartersnake – The species is now absent from the stream but is proposed to be translocated to lower Spring Creek as part of the project description. Construction would not directly affect the species. Activities associated with translocation may affect, but are not likely to adversely affect, narrow-headed gartersnake. Long-term effects of the project to narrow-headed gartersnake are expected to be solely beneficial.

Northern Mexican gartersnake – The species is highly mobile so that it would be expected to move away from construction activities if disturbed within the floodplain. There would be a remote chance of impacting hibernaculae, which would be expected to be located outside the 100-year floodplain (as documented for narrow-headed gartersnake). Temporary increases in turbidity that may result from the barrier construction would have a local and temporary effect on foraging success of the

gartersnake downstream from the construction area. During the course of construction, if northern Mexican gartersnake is detected in the immediate project area, work would cease at the site until the individual(s) were captured and transported upstream. If the species is present, construction activities may affect, and are likely to adversely affect, northern Mexican gartersnake because of possible lethal contact with construction equipment and/or other disturbances from project activities. After construction, the long-term effects of the project to northern Mexican gartersnake are expected to be beneficial.

Page springsnail – The project area is outside of suitable habitat for this species. The proposed project is expected to have no effect on Page springsnail.

Spikedace – The species is now absent from the stream but is proposed to be translocated to lower Spring Creek as part of the project following construction. Construction would not directly affect the species. Activities associated with translocation may affect, but are not likely to adversely affect, spikedace. Long-term effects are expected to be solely beneficial.

Gila chub - The proposed project is expected to have substantial, positive long-term benefits to Gila chub and its critical habitat by preventing upstream invasions of nonnative fishes and other undesirable aquatic biota into perennial reaches of Spring Creek. There would be short-term impacts to Gila chub as a result of temporary disturbance to stream habitats in the construction area. Gila chub would either be forced to move upstream or downstream from the construction site during actual construction, and some direct mortality is possible. Permanent loss of habitat would occur within the footprint of the fish barrier. Any Gila chub population that might be maintained downstream of the fish barrier would be confined to a very short reach of stream upstream of Oak Creek and would be negatively impacted by presence of nonnative fishes. We anticipate that Gila chub numbers below the barrier would remain small and maintained primarily by fish that pass over the barrier from upstream.

Yellow-billed cuckoo – The species has been detected along Spring Creek on private land upstream of the project area. Surveys conducted in the study area in 2013 yielded negative results. Yellow-billed cuckoo would not be expected to be present during an autumn/winter construction period. However, approximately 1.08 acres of riparian habitat is anticipated to be impacted by the project. The proposed project may affect, but is not likely to adversely affect, yellow-billed cuckoo.

Cumulative Effects – Federally Listed and Candidate Species

The project would provide substantial benefit toward recovery of Federally listed fishes and gartersnakes that are extant in, or proposed for translocation into, Spring Creek. Preclusion of nonnative fishes would help promote a balanced and purely native fish community in the reach of Spring Creek upstream of the proposed fish barrier. Adverse effects to Federally listed aquatic species could occur from a number of possible events in the watershed that might affect water quality and quantity such as unpaved road maintenance and/or construction, land development, livestock grazing in riparian

bottoms, and wildfire. These events can singularly or cumulatively affect aquatic species through alterations in aquatic habitat characteristics. Existing populations of crayfish are not expected to suppress species that are translocated into Spring Creek.

3.3.9 Affected Environment – CNF Sensitive Species

Table 6 presents USFS special status species that are known to occur or have a potential to occur in the project area. Forest sensitive species are those species identified by the Regional Forester for which there is a concern for population viability because of substantial current or predicted downward trends in population numbers or density and downward trends in habitat capability that would reduce a species' distribution (FSM 2670.5). Sensitive plant and animal species must receive special management emphasis to ensure their viability and preclude trends toward endangerment that would result in the need for Federal listing. Only those forest sensitive species which have the potential to occur in the project area and be impacted by the proposed project are discussed below.

Western red bat **-** The western red bat ranges from southern Canada through the entire western United States south into Panama and South America. In Arizona, the western red bat is thought to be a summer resident only, migrating to the southern part of their range to hibernate. It occurs statewide, roosting primarily in broad-leaf deciduous riparian forests and foraging in adjacent uplands. Western red bats have been captured along waterways among oaks, sycamores, walnuts, and cottonwoods at mid-elevations (1,900 to 7,200 feet). A solitary tree-roosting species, this bat will migrate in groups and forage in close association with other bats (AZGFD 2011). They also have been documented in suitable habitat along Spring Creek.

Allen's lappet-browed bat and spotted bat **-** The habitat requirements for these bats are similar; therefore they are analyzed together in this EA. The roosting habitat for these bats includes the use of crevices in canyon cliff faces which are often associated with water. Both bats are habitat generalists, foraging in canyons, meadows, and grasslands. There have been no recorded occurrences of these species in the project area; however suitable roosting habitat is associated with the canyon walls. The canyon and adjacent semi-desert grasslands also would afford opportunities for foraging.

Pale Townsend's big-eared bat **–** Pale Townsend's big-eared bat is found statewide and throughout the western U.S. and south into Mexico. The bat roosts in caves, lava tubes, mines, and abandoned buildings. Preferred foraging habitat consists of forested areas, particularly ponderosa pine in Arizona, where the bat gleans insects off plant leaves or in flight. Riparian habitat in the project area affords potential foraging habitat for Pale Townsend's big-eared bat.

American 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 statewide in suitable habitat (Glinski 1998). Peregrine falcons in the southwest inhabit cliffs and river gorges near water. Eyries occur on cliffs which generally exceed 200 feet in height. Eyries are situated on open ledges and a preference for a southern exposure increases with latitude. The narrow

canyon encompassing Spring Creek in the project area is not suitable for peregrine falcon nesting. The canyon and adjoining semi-desert grasslands provide suitable foraging habitat.

Lowland leopard frog - Although the conservation status of lowland leopard frog is relatively good in comparison to other species of leopard frog described from Arizona in recent decades, it has been lost from the lower Colorado and Gila rivers and likely southeastern California (Clarkson and Rorabaugh 1989, Jennings and Hayes 1994). In addition, it has declined in southeastern Arizona (Sredl et al. 1997), and it is extirpated from most of its range in southwestern New Mexico (Sredl 2005). It remains largely intact in central Arizona. Lowland leopard frog inhabits a variety of aquatic habitats ranging from rivers, streams, and springs to earthen stock 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. Lowland leopard frogs have been observed in the project area.

Moribaetis mimbresaurus, Lepidostoma knulli, Protoptila balmorhea, and Wormaldia planae - Oak Creek has one of the highest diversities of aquatic insects in Arizona (Blinn and Ruiter 2009). The four sensitive species considered in this EA are rare, with *M. mimbresaurus* and *W. planae* only recently being recorded in the State. In the Oak Creek drainage, *M. mimbresaurus* was described from a single record at Pumphouse Wash in Coconino County (McCafferty 2007). Blinn and Ruiter (2009) did not find *W. planae* in Oak Creek, although Munoz-Quesada and Holzenthal (2008) reported finding it in Beaver Creek below the outlet of Montezuma Well in Yavapai County. *Protoptilla balmorhea* was reported only in the Page Springs locale of Oak Creek by Blinn and Ruiter (2009). *Lepidostoma knulli* was reported only in the Pumphouse Wash and Indian Gardens locales of Oak Creek in Coconino County by Blinn and Ruiter (2009). Habitat in Spring Creek is considered suitable for these four species.

California floater – The preferred habitat of this freshwater mussel is shallow reservoirs, lakes, and streams. Adult mussels live in mud or sand and juveniles in loose sand. The species is nearly extinct in Arizona. It is found in Arizona only in the upper Black River of Apache-Sitgreaves National Forests in Apache County (AZGFD Heritage Data System).

Tonto Basin agave – This species is usually found on cobbly and gravelly, deep and well-drained soils atop benches (often high benches), at edges of slopes, and on open hilly slopes in desert scrub, overlooking major drainages and perennial streams, ranging in elevation from 2,350 - 5,100 feet; it is occasionally found in chaparral or juniper-grassland. Tonto Basin agave frequently occurs in association with archaeological sites in several areas of the state and represents feral domesticated crops that have persisted without human care for hundreds of years. It is reported from Young to San Carlos Reservoir, the foothills of Mazatzal and Sierra Ancha mountains, Gila County, the Mazatzal Mountains near Sunflower, Maricopa County, and in the Verde Valley area,

Yavapai County (AZGFD Heritage Data System). The Tonto Basin agave has not been reported in the project area.

Page Springs agave – This uncommon agave is found on dry, exposed ridges overlooking Oak Creek, Verde River, West Clear Creek, and Dry Beaver Creek, usually on basalt soils, ranging in elevation from 2,900 - 4,000 feet. Plants are noticeably small with a rosette less than 20 inches tall (Hodgson 2006). The Page Springs agave has not been reported in the project area.

Cochise sedge – Cochise sedge is found on moist alluvial soil, sand, and gravel near perennially wet springs and streams. This species is the largest sedge in southern Arizona, growing up to 6.6 feet tall and having the appearance of bulrush. The distribution of Cochise sedge in Arizona encompasses six counties including the Hieroglyphic and Mazatzal mountains in Yavapai County (AZGFD Heritage Data System). Cochise sedge has not been reported in the project area.

Metcalf's tick-trefoil - Metcalf's tick trefoil is a perennial herb that occurs in New Mexico (Grant and Sierra counties) in Arizona in Cochise, Gila, Pinal, and Santa Cruz counties. Suitable habitat is restricted to rocky slopes, canyons, and ditches in grasslands and oak/pinyon-juniper woodlands, ranging in elevation from 4,000 - 6,500 feet. Documented locations of Metcalf's tick trefoil on the CNF include the Huckaby Trail area and Fossil Creek (Crisp 2008).

Eastwood alum root - Eastwood alum root is endemic to central Arizona where it occurs on the Mogollon Rim near Telephone Ride, in Oak Creek Canyon, and West Fork of Oak Creek Canyon (AZGFD Heritage Data System). Habitat for Eastwood alum root includes moist slopes in ponderosa pine forests and canyons where it typically grows on slopes or cliffs (Crisp 2008).

Verde breadroot – This species occurs in Sonoran desertscrub or scattered juniper communities on substrate derived from the Tertiary Verde limestone formation in the Verde Valley, Yavapai County.

Arizona phlox - Arizona phlox is a perennial subshrub, shrub or forb/herb that occurs mainly in southern Coconino, Mohave, Navajo and Yavapai counties, but also locally in Gila and Graham counties. Suitable habitat consists of open exposed limestone-rocky slopes within pinyon-juniper woodlands and ponderosa pine-gambel oak communities, ranging in elevation from 3,500 – 7,800 feet (AZGFD Heritage Data System).

Hualapai milkwort - Hualapai milkwort is a perennial sub-shrub, endemic to northern and central Arizona, ranging in elevations from 3,150 – 5,000 feet. The total range of the species is from the Peach Springs area southeastward to the Verde Valley area. This milkwort is found on sandy flats and limestone bedrock, rock, gravel, and silt in desert grassland and juniper woodland (AZGFD Heritage Data System).

3.3.10 Environmental Consequences – CNF Sensitive Species

Western red bat **-** The reduction in density of mature broad-leaf riparian trees on areas disturbed directly by construction and indirectly by post-construction streambed aggradation would affect suitable western red bat roosting habitat. Tree removal resulting from construction would directly affect 0.19 acre of riparian habitat at the fish barrier site and along the stream. Gradual buildup of sediment and associated loss of large trees in the aggradation zone would occur over an approximate 1-5 year period after construction, affecting approximately 0.41 acre of potential roosting habitat. Regrowth of riparian vegetation on disturbed areas would obviate any long-term effect. Impact to the species would be negligible because of the availability of other suitable roosting habitat on Spring Creek and nearby Oak Creek. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of western red bat.

Allen's lappet-browed bat, spotted bat, and pale Townsend's big-eared bat **-** Potential tree loss on 0.60 acre would have only a minor effect on foraging bats because of the abundance of suitable foraging habitat in surrounding areas and long-term regeneration of riparian vegetation on areas directly or indirectly affected by the project. There would be no effect on potential roosting habitat. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of these species.

American peregrine falcon **–** No impact to peregrine falcon is anticipated because there is no suitable nesting habitat nearby and there is an abundance of other suitable foraging habitat in surrounding areas. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of peregrine falcon.

Lowland leopard frog **–** During construction, leopard frogs if present would be forced to move upstream or downstream from the fish barrier site, and it is possible some mortality could occur. Leopard frog populations have been shown to be negatively impacted by presence of nonnative fishes, consequently, the fish barrier should have beneficial long-term effects on lowland leopard frog. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of lowland leopard frog.

Moribaetis mimbresaurus, Lepidostoma knulli, Protoptila balmorhea, and Wormaldia planae - Earth-moving activities associated with dewatering at the construction site would have the potential to crush or bury aquatic insects. Following construction, the affected area could be recolonized by immigration from unimpacted upstream and downstream population sources. Post-construction changes in stream geomorphology resulting from aggradation and reduction in gradient could influence aquatic insect abundance and diversity. Aggradation would affect only 6% of the perennial reach upstream of the fish barrier; consequently the impact to aquatic insects is not considered substantial. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of *M. mimbresaurus, L. knulli, P. balmorhea,* and *W. planae*, if present.

California floater – The project area is outside the present range of the species. The proposed project is expected to have no impact on California floater.

Tonto Basin agave and Page Springs agave - Upland impacts would be limited to FR 9827B, a public parking area, and the contractor use area located adjacent to the proposed barrier site. Suitable habitat for these species would not be affected. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of Tonto Basin agave or Page Springs agave.

Cochise sedge - Suitable streamside habitat for Cochise sedge occurs along perennial segments of Spring Creek. This species has not been identified in areas directly affected by construction. Following construction, there would be a short-term adverse effect on suitable habitat along the first 600 feet of channel upstream of the fish barrier where sediment deposits would impinge on the stream banks and portions of the floodplain. Habitat conditions would improve once aggradation stabilizes. The proposed project may impact but is not likely to cause a trend toward listing or loss of viability of the Cochise sedge.

Metcalf's tick-trefoil, Eastwood alum root, Verde breadroot, Arizona phlox, and Hualapai milkwort - Upland impacts would be limited to an existing access road and public parking area, and a small site next to the proposed barrier. Suitable habitat for these species would not be affected. The project would not impact these species.

3.3.11 Affected Environment – CNF Management Indicator Species

Management Indicator Species (MIS) are plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent (FSM 2620.5) The presence (and relative abundance) of a MIS indicates that the habitat type is present and of suitable quality to support associated wildlife species. Changes in the population of MIS are believed to indicate the effect of forest management activities. The riparian and aquatic habitats associated with Spring Creek represent key indicator habitats for the proposed project. Only those MIS which have the potential to occur in the project area and be impacted by the proposed project are discussed below.

Lucy's warbler - Lucy's warbler is a secondary cavity nester, and as such depends on the presence of primary cavity nesters and/or flaking bark on suitable sized nest trees in low elevation riparian habitats. The Forest-wide population trend for Lucy's warbler is inconclusive. Limited locale information may indicate a stable trend while information for Arizona indicates a possible decline (Thompson et. al 2011). The Forest-wide habitat trend is improving because low elevation riparian habitat is increasing. Overall, the condition of low elevation riparian habitat on the CNF has improved, but conditions in some reaches and at many springs have not (Thompson et. al 2011).

Yellow-breasted chat -The yellow-breasted chat requires habitat with dense understory in low elevation riparian forests. It prefers riparian areas with small trees and dense shrubs. The Forest-wide trend for yellow-breasted chat is inconclusive. Limited local information may indicate a slightly declining population trend while information for Arizona indicates a possible slight increase (Thompson et. al 2011). The Forest-wide habitat trend is improving because low elevation riparian habitat is increasing (Thompson et. al 2011).

Pronghorn – On CNF, pronghorn is a management indicator species for early and late seral grassland type, which includes semidesert grassland. The Forest-wide population trend for pronghorn is declining. Soil condition impairment in many areas has made these grasslands vulnerable to degradation. Habitat trend is stable to declining due to tree encroachment, fire suppression, long-term climatic changes, short-term drought, and ungulate grazing (Thompson et. al 2011).

Aquatic macroinvertebrates -The USFS lists aquatic macroinvertebrates under MIS as a group. This group includes all invertebrate species that complete a part of their life cycle within aquatic environments and are visible without the aid of a microscope. Aquatic macroinvertebrates are extreme in both diversity of taxa and life history patterns. Most live on or within the sediments, but many are free-swimming. Some of the most conspicuous taxa within this group in stream environments include: (1) insects including mayflies (Order Ephemeroptera), dragonflies and damselflies (Order Zygoptera), stoneflies (Order Plecoptera), true bugs (Order Hemiptera), dobsonflies (Order Megaloptera), caddisflies (Order Trichoptera), moths (Order Lepidoptera), beetles (Order Coleoptera), and flies (Order Diptera); (2) flatworms (Class Turbellaria); (3) roundworms (Phylum Nematoda); (4) aquatic earthworms, leaches, etc. (Phylum Annelida); (5) crustaceans (Class Crustacea); snails (Order Gastropoda); and (6) clams and mussels (Order Pelecypoda). The diversity of this assemblage is often used as an indicator of water quality.

3.3.12 Environmental Consequences – CNF Management Indicator Species

No Action

Under the no action alternative, no project would be constructed and there would be no impact to MIS.

Proposed Action

Lucy's warbler **-** The proposed action would have no direct effect on nesting habitat. Tree trimming and removal would affect riparian trees with stem diameters that are too small for cavity nests. Potential displacement of individual birds could result from loss of suitable nest trees that are killed by streambed aggradation. The effects of aggradation on suitable nest trees would be limited mostly to the initial 400 feet of aggraded streambed where sediment depths would exceed 1.5 feet, affecting approximately 0.41 acre of indicator habitat. Regeneration of riparian vegetation over time would obviate the

adverse effect on indicator habitat. Implementation of the proposed action would not change the population trend of the species.

Yellow-breasted chat – The proposed action would have no direct effect on nesting habitat. Tree trimming and removal would affect a narrow stinger of scattered willows and ash with an open understory, which is generally unsuitable for yellow-breasted chat. Potential displacement of individual birds could result from habitat that is affected by streambed aggradation (see discussion for Lucy's warbler). Regeneration of riparian vegetation over time would obviate the adverse effect on indicator habitat. Implementation of the proposed action would not change the population trend of the species.

Pronghorn – Off-road impacts to semidesert grassland would be limited to contractor use of a 0.07 acre site on a high terrace along the northeast periphery of the construction zone. Impacts to habitat would include crushing and trampling of ground cover. Habitat quality on this is less than desirable due to encroachment by mesquite trees. The site is also proximal to a residential area. Short-term use of this site would not change Forest-wide habitat or population trends for pronghorn.

Aquatic macroinvertebrates -Impacts to aquatic macroinvertebrate MIS from the proposed project would include substantial localized losses in the fish barrier construction zone resulting from compaction and movement of streambed materials by earth-moving equipment, desiccation of habitats during dewatering activities, and alteration of habitats post-construction. The area would be recolonized quickly by most taxa from unimpacted upstream and downstream population sources, rendering impacts to most taxa to a duration of weeks to months (Bruns and Minckley 1980, Gray 1981, Gray and Fisher 1981, Grimm and Fisher 1989). As stream gradient immediately upstream of the barrier would be lessened, it is possible that riffle-dwelling species would not be able to recolonize the immediate area, but they would be unimpacted in areas outside of this small footprint. In total, long-term impacts resulting from construction of the barrier to this group would not be substantial relative to the amount of unimpacted habitat upstream and downstream.

Cumulative Effects – CNF Sensitive Species and MIS

There a number of possible events in the watershed that might affect indicator riparian and upland habitat for sensitive species and MIS such as unpaved road maintenance and/or construction, land development, livestock grazing, and wildfire. These events can singularly or cumulatively affect sensitive species and MIS through alterations in habitat characteristics. Cumulative impacts to sensitive species and MIS resulting from actions discussed above would not be substantial and would not result in a trend toward Federal listing or loss of viability.

3.4 CULTURAL RESOURCES

3.4.1 Affected Environment

The following information was excerpted from the revised Draft LRMP:

> "The Verde Valley Management Area has a continuous history of human occupation, beginning with Clovis Paleoindian mammoth hunters of 12,000 years ago. The Verde Valley comprised the southern Sinagua culture area until A.D. 1400. About A.D. 1250, the northeastern Yavapai (Wipuhk'abah) entered the Verde Valley, and later, the Tonto Apache (Dil'zhe'e). Both groups continue to live in the Verde Valley as the Yavapai-Apache Nation. Euroamerican miners, farmers, and ranchers spread into the Verde Valley starting in the 1860s, and several of those pioneering families still live and work in the Camp Verde and Sedona areas."

The CNF has some of the highest archaeological site densities in the Southwest, with an average site density of 15 sites per square mile. Several tribes, particularly the Hopi and Zuni, recognize many of the prehistoric sites on the CNF as ancestral villages, where many of the ceremonies and traditions of their cultures originated (revised Draft LRMP). Preservation of prehistoric and historic sites, including American Indian tradition cultural properties, is an integral part of forest management on the CNF.

Reclamation conducted a Class III (intensive) survey of potential construction impact areas, including the construction zone, access route, and contractor use areas, on April 4, 2014. No National Register eligible cultural resources were noted during the survey. The proposed barrier site is within a narrow canyon subject to recurrent floods that impact a major portion of the canyon-bottom and terraces in the project area. It provides a less than optimal setting for cultural resources because of flood exposure and the poor preservation of any possible *in situ* deposits. The proposed access route (FR 9827B) between N. Oak Creek Valley Road and the stream has been historically subject to recurrent vehicular use and currently serves as a *de facto* hiking trail by local residents. This route was also determined to be devoid of cultural material.

The following federally recognized Indian tribes have been consulted regarding the proposed project: Navajo Nation, Hopi Tribe, Fort McDowell Yavapai Nation, Yavapai-Apache Nation, Yavapai Prescott Indian Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, and San Carlos Apache Tribe. These tribes were identified by CNF as having traditional territories and/or other cultural resource interests in the project area.

3.4.2 Environmental Consequences

No Action

If no action is taken, there would be no change in existing conditions. Environmental and human-caused factors, such as trampling by recreational users, artifact collection, and

ground surface erosion, would continue to affect cultural resources in or near the project area.

Proposed Action

Activities associated with construction and contractor use would not impact any known cultural resources or archaeological sites. Post-construction impacts would include sediment build-up behind the barrier, but this sedimentation would not reach levels that affect areas outside the active flood and scour zone. In accordance with Section 106 of the National Historic Preservation Act, a finding of *no historic properties affected* was determined by Reclamation for the project's area of potential effect and submitted to the CNF and the State Historic Preservation Office (SHPO) on May 13, 2014. The SHPO concurred with Reclamation's determination on May 28, 2014.

No areas of traditional cultural importance or areas of specific tribal concern have been identified.

Cumulative Effects

The proposed project would not have a direct, indirect, or cumulative effect on cultural resources.

3.5 SCENIC RESOURCES

3.5.1 Affected Environment

Methodology

This evaluation applies current National Forest Scenery Management methodology in conjunction with existing CNF LRMP direction. The analysis relies on field studies and photography from the project area, as well as coordination with project interdisciplinary team members, and consideration of public preferences for scenery. Integration of this scenery analysis assures the proposed project is consistent with scenery-related LRMP direction, USFS policies, and applicable elements of USFS Visual Management and Scenery Management systems.[7]

Visual Management System (VMS)

The VMS was adopted by the USFS in 1974. The culmination of the VMS were Visual Quality Objectives (VQOs) prescribed in the LRMP for all lands within CNF. The VQO classifications range from Preservation, Retention, Partial Retention, Modification, to Maximum Modification. For a full synopsis of each VQO see *National Forest Landscape Management: Volume 2, Chapter 1, The Visual Management System* (USFS 1975).

[7] A complete list of references requiring USFS management of scenery and aesthetics can be found in Appendix B of the Scenery Management System Handbook #701 (USFS 2000).

The CNF LRMP is currently being revised and will be transitioning to the Scenery Management System (see next section). For this project, the updated SMS inventory for the CNF would be incorporated and integrated at a project scale until LRMP Revision is completed. This action conforms to the LRMP direction which requires a review of the VQO inventory and necessary corrections/refinements following field checking as a part of project planning (USFS 2000). It also follows USFS direction to begin using the concepts and terms contained in this Handbook (Landscape Aesthetics, A Handbook for Scenery Management) when new projects or forest plan revisions are initiated (USFS 2000).

Scenery Management System (SMS)

The VMS process has been updated in the SMS. Handbook direction outlining the inventory and transition process from VMS to SMS may be found in Landscape Aesthetics: A Handbook for Scenery Management (USFS 2000). Full adoption of the SMS is to occur as each National Forest revises its LRMP. For Forests not currently undergoing the LRMP revision process, or for those requiring extensive time for revision, application of the SMS would occur at the project level. This is the case for the CNF.

Scenic Integrity Objectives (SIOs) are used in the SMS in much the same way as VQOs are used in VMS. The Scenic Integrity or "intactness" of national forest lands is the means by which proposed alterations to the land are evaluated. Scenic integrity is produced from the combined inventory of scenic attractiveness, viewing distance from the observer, and concern level of forest visitors. SIOs are established for the forest and can be applied at the forest, management area or treatment area (USFS 2000). SIOs range from Very High, meaning the landscape character is unaltered, to Very Low, meaning the landscape character is highly altered. Intermediate levels include High (landscape character appears unaltered), Moderate (landscape character is slightly altered), and Low (landscape character is moderately altered). Table 7 compares the VMS rankings and terminology with the SMS.

Table 7. Scenic integrity-visual quality and perception crosswalk (USFS 2000).

Scenic Integrity Objective (both existing and desired)	Visual Quality Objective	Scenic Integrity (as people perceive it)
Very High	Preservation	Unaltered; landscape character is intact
High	Retention	Appears unaltered; deviations to landscape character are not evident
Moderate	Partial Retention	Slightly altered; deviations are subordinate to landscape character being viewed
Low	Modification	Moderately altered; deviations begin to dominate the valued landscape character being viewed
Very Low	Maximum Modification	Appears heavily altered; deviations may strongly dominate the valued landscape character.
Unacceptably Low	Unacceptable Modification	Appears extremely altered; this level is only used to inventory existing scenic integrity. It is never an objective on National Forest System lands.

Another basic premise of the SMS is landscape character, which gives a geographic area its visual and cultural image. It consists of a combination of physical, biological and cultural attributes that make each landscape identifiable and unique. Landscape character embodies distinct landscape attributes that exist throughout an area (USFS 2000).

Scenic Integrity

"Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be 'complete.' The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued by constituents for its aesthetic appeal. Human alterations can sometimes raise or maintain integrity. More often it is lowered depending on the degree of deviation from the character valued for its aesthetic appeal" (USFS 2000).

Analysis of the scenic environment requires an evaluation of a project area and its ability to absorb the effects of site-specific modification to the characteristic landscape. Deviations from the aesthetic appeal and desired landscape character are disclosed as direct and indirect effects. A primary goal of the USFS is to manage national forest lands to attain the highest possible quality of landscape aesthetics and scenery commensurate with other appropriate goals, objectives, and uses.

The proposed fish barrier for this aquatic resources protection project falls on the threshold between two Scenic Integrity Objectives: High and Moderate. An existing power line is northeast of the proposed barrier location. The presence of the power line results in lowered scenic integrity, when viewed. At the coarse scale of the SIO inventory, a buffer of was applied to all existing power lines to denote the sphere of influence of that constructed feature on the landscape. This triggers an analysis of the influence of the power line at the project scale. The power line is visible from the barrier location, but has a negligible influence on the project site, especially during "leaf on" vegetation. The proposed streamside access route and staging areas fall within areas with High SIOs.

Existing Landscape Character

The project area is located in the northwestern portion of Management Area 11(Verde Valley). In the LRMP, the riparian and open water component is classified as Management Area 12 with a Scenic Integrity Objective of High. Upland terrain along Spring Creek is characterized by rounded hills and plains supporting scrub semidesert grasslands. This biotic community is transected by riparian corridors formed by washes and streams. Spring Creek is encompassed by a diverse and narrow mixed broadleaf lined canyon, constituting the existing landscape character. As a riparian area in the arid southwest, Spring Creek has a high attractiveness/uniqueness value (Class A – distinctive), and is noted as a concern level one stream.

Deviations in the near vicinity of the project area include a power transmission line (previously noted), a concrete water diversion structure, private residences, and FR

9827B. These landscape features may be notable to casual forest visitors and collectively may lower the aesthetic value of the scenery to those recreating in the project area

Desired Landscape Character

The landscape character relevant to the proposed project's scenery analysis is the extent to which the fish barrier would affect the inherent aesthetic qualities of the area landscape. The desired landscape character is generally that of a natural appearing riparian landscape that results from predominately natural processes, where human intervention may be present but mimic the form, line, color and texture to such an extent that they are not evident.

Visitor Use within the Project Landscape

There are no key public-use features such as public roads, recreational trails, and recreation sites within the viewshed of the fish barrier site. However, FR 9827B, a non-system route, is used by local residents as a hiking path to the stream. The proposed contractor use area along N. Oak Creek Valley Road is currently a parking area for those that access the stream from this route. The terminus of FR 9827B connects with an informal trail that traverses private land along the stream and enters the nearby residential subdivision. Additionally, local residents use the wash northeast of the proposed barrier location for stream access. No evidence of equestrian or bike use has been noted on field visits for this project.

3.5.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact to visual resources because no project would be constructed. No other reasonably foreseeable future actions have been identified that would substantially affect scenic quality within the viewshed of the proposed barrier site.

Proposed Action

The closer the viewer is to a viewed object, the more detail can be seen, and there is a greater potential influence of the object on visual quality. For this assessment, four viewing distances were considered: (1) immediate foreground (between 0 and 300 feet from a viewpoint), (2) foreground (between 300 feet and 0.5 mile), (3) middleground (between 0.5 and 4 miles), and (4) background (4 miles to horizon).

During the 45 to 60 days of barrier construction, equipment and vehicles would be visible along access routes and contractor use areas, with the greatest concentration of activity occurring in the 0.15-acre construction zone (see Figure 3). Formwork erected for placement of concrete, emplacement of a small earthen cofferdam and stream bypass pipe, and laydown of construction material within and adjacent to the construction zone

would lower the scenic integrity of the site during construction. Equipment operation and associated noise would detract from the naturalness of the project area and diminish the visitor' experience. Removal of shrubs and trees along the streamside access route and within the construction zone would have visual impacts that would be noticeable from the terminus of FR 9827B and proximal segments of the informal trail on adjacent private land. Recovery of riparian vegetation along the access route after construction would restore the scenic integrity of streamside elements of the landscape when viewed from the road terminus and other informal access routes to the stream.

After construction, changes in the landscape character at the fish barrier would be discernible to the casual observer. As viewed from downstream locations in the immediate foreground zone, the outline and shear vertical face of the 4-foot tall, 80-foot wide fish barrier would deviate from the irregular and random patterns of the landscape. Those deviations would be most noticeable at the abutments were the vertical face of the drop structure intercepts bedrock or soil. To create a structure that is less uniform and visually more compatible with the dominant surficial bedrock onsite, all visible concrete would be given a rough texture and an appropriate basalt-like color, and sharp angles would be rounded. In addition, the width of the drop structure would be flared at the right abutment to match the width of connecting bedrock, and the crest of the drop structure would be constructed with an undulant surface to create a more random pattern while maintaining the requisite minimum 4-foot vertical drop. However, deviations from a purely natural condition would be evident at distances up to approximately 160 feet downstream due to the monolithic nature of the structure and the plunge effect of water spilling onto the apron. The sight and sound of the water cascading over a 12-foot section of the barrier during normal flows would likely be perceived as a positive visual attribute, while the remaining 68 feet of exposed drop structure would be a notable deviation from the desired landscape character when seen. In general, these contrasts would be less obvious once riparian vegetation sufficiently recovers to provide a visual buffer. Also, water staining and general weathering of the concrete over time would help to blend the structure more completely with surrounding rock substrates. The fish barrier would not be visible from FR 9827B and informal stream access routes from private land. Intervening canyon terrain and riparian vegetation would screen the fish barrier from all but one downstream foreground viewpoint (a hilltop residence).

Ponding of water and sediment deposition upstream of the barrier would reduce riparian tree and shrub densities for approximately 400 feet upstream, affecting the landscape character on 0.41 acre of the riparian zone within this reach of stream. Regeneration of riparian vegetation would occur once aggradation has stabilized and ponded water has been displaced by sediment. In the long term (5 to 10 years after construction), contrasts would be less noticeable from viewpoints within the immediate foreground upstream once channel aggradation has stabilized and riparian vegetation on aggraded soils becomes re-established. Contrasts would still be noticeable at or near the abutments where the upstream face of the drop structure would extend above the sediment deposits by several inches to 3 feet, representing the portion of the fish barrier that would be visible from upstream viewpoints within the immediate foreground. Intervening canyon

terrain and riparian vegetation would screen the fish barrier from all upstream foreground viewpoints.

The riparian corridor is a potential travel way for dispersed recreational use between the FR 9827B terminus and the fish barrier site. Despite attempts to visually enhance compatibility of the structure with surrounding substrates, the fish barrier would still be discernable to pedestrians using this travel way, thereby lowering the SIO of the riparian component of the project area from High to Moderate when viewed from immediate foreground locations. The current LRMP (revised page 60) allows one classification movement downward to meet specific resource management objectives.

The proposed fish barrier would create a 4-foot tall impediment to hiking along Spring Creek. Hikers could climb over the barrier, scramble over bedrock at the right abutment to navigate past the structure, or use the upper terraces along the north side (left abutment) of the stream to avoid the fish barrier.

Cumulative Effects – Scenic Resources

Past, present and reasonably foreseeable projects that have a potential cumulative effect on scenic resources include the overhead transmission line, FR 9827B, water diversion structure, and further housing development on private land just beyond the forest boundary. These events can singularly or cumulatively affect landscape character and scenic integrity. Cumulative impacts to scenic resources resulting from actions discussed above would lower the SIO of the riparian component of the project area from High to Moderate.

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 public health and the environment. In accordance with Section 109 of the Clean Air Act (CAA), the U.S. Environmental Protection Agency has promulgated National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, particulate matter (PM_{10} 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 area encompassing lower Spring Creek is in attainment for all regulated NAAQS.

The CAA provides special protection for visibility and other air quality related values in specially designated Class 1 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 1 under Section 162(a) of the CAA. Class 1 designation allows almost no degradation in air quality. The closest

Class 1 airshed is associated with the Sycamore Canyon Wilderness approximately 12 miles northwest of the project area.

The LRMP includes language to treat other wildernesses in the same manner as Class I Airsheds (LRMP page 111). Other nearby Wilderness areas include Munds Mountain Wilderness (8.8 miles from the project area and Red Rock Secret Mountain Wilderness (10 miles from the project area).

Climate change refers to significant change in measures of climate (particularly temperature and precipitation) that occur over long periods of time. Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs). The CEQ (2010) defines GHGs as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Globally, sources of human-induced emissions of GHGs include mainly burning of fossil fuels for power generation and transportation, with significant contributions from clearing of forests, agricultural practices, and other similar activities. In the study area, principal local sources of GHGs include combustion emissions from light vehicles used in farming, construction, and personal and commercial transportation. Short-term increases in GHG emissions also coincide with wildfires and resultant loss of plant cover.

The potential for adverse air quality impacts on sensitive receptors is correlated to the intensity and duration of exposure. Air quality impacts typically associated with construction activities are transient; therefore, an adverse impact is most likely to occur when a sensitive receptor is acutely exposed to emissions. Acute exposure may result from a single high emission source or the additive emissions of multiple sources. Receptors that are particularly sensitive to poor air quality include children, the elderly, and people with illnesses or chronic diseases. Sensitive receptor locations include hospitals, schools, convalescent facilities, and residential areas such as the one that abuts the project area.

3.6.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact to air quality because no project would be constructed or implemented. Existing ambient air quality would persist into the foreseeable future.

Proposed Action

The release of fugitive dust from construction would have a minor transient effect on ambient air quality in the project area. Minor amounts of fugitive dust would be emitted from excavation at the barrier site and vehicular travel at slow speeds on the unpaved access route between N. Oak Creek Valley Road and the stream. These emissions would be highly localized and sporadic, persisting in low levels only during periods of active earth moving and vehicle operation. There would be no impact on sensitive receptors to

airborne dust associated with nearby residential areas and there would be no noticeable affects to air quality in nearby wilderness areas.

The operation of equipment to construct the fish barrier and the operation of vehicles to deliver construction material, equipment, and crews would generate minor amounts of engine combustion products such as nitrogen and nitrous oxides, carbon dioxide, 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. Emission of GHGs from project implementation actions would be below levels considered relevant to global processes that affect climate change.

Cumulative Effects – Air Quality

Particulate and gaseous exhaust emissions (including GHGs) from the proposed project would be cumulative to pollutants emitted from other human and natural sources into the atmosphere. The small quantities of pollutants released during construction would have a negligible, short-term cumulative effect on local air quality or global processes that lead to climate change. There would be no measurable direct, indirect, or cumulative effect on Class 1 airsheds or nonattainment areas.

3.7 HAZARDOUS MATERIAL AND SOLID WASTE

3.7.1 Affected Environment

No sites contaminated with hazardous or non-hazardous solid wastes are known to occur within the area potentially affected by construction (www.epa.gov/enviro). 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.

3.7.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact regarding use of hazardous materials because no project would be constructed or implemented. Existing conditions would prevail on the site of the proposed fish barrier.

Proposed Action

The proposed project would require the short-term use of fuels, lubricants, and other fluids that would be used to power and operate equipment during construction of the fish barrier. Chemical toilets also would be present at the worksite. Hazardous materials and

other chemical media associated with these uses would be managed in accordance with Federal and State regulations. Spills of hazardous material would require immediate corrective action and cleanup to minimize any potential adverse effect on sensitive resources. Equipment for minor spills would be available at the construction site.

Only small quantities of lubricants and fuel may be stored in the project area to operate power generators and other ancillary light-duty equipment. Those materials would be stored in contractor use areas outside of the floodplain. All lubricants and fuel would be placed in clearly marked containers. Fueling of vehicles would be done on a designated protected, upland site. Construction equipment would be maintained and inspected regularly. Any soil contaminated by fuel or oil would be removed and transported 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.

Cumulative Effects - Hazardous Material and Solid Waste

Appropriate hazardous material management and waste disposal would obviate any cumulative impact of the project on the environment.

3.8 ENVIRONMENTAL JUSTICE

3.8.1 Affected Environment

Executive Order 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 project area encompasses unpopulated NFS land. The adjoining Oak Creek Valley subdivision does not constitute a low income or minority population for the purposes of EO 12898.

3.8.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact to populations or communities described in EO 12898 because no project would be implemented.

Proposed Action

The proposed project would not result in disproportionately high and adverse health, safety, or environmental effects to communities and populations described in EO 12898 because there are no such populations in the project area.

Cumulative Effects – Environmental Justice

There would be no direct, indirect, or cumulative impacts on EO 12898 communities.

3.9 INDIAN TRUST ASSETS

3.9.1 Affected Environment

Indian trust assets are legal interests in property held in trust by the United States through the Department of the Interior for federally recognized Indian tribes or individual tribal members. Examples of things that may be trust assets are lands, mineral rights, hunting, fishing, or traditional gathering rights and water rights. The United States, including all of its bureaus and agencies, has a fiduciary responsibility to protect and maintain rights reserved by or granted to Indian tribes or individual tribal members by treaties, statutes, and Executive Orders. This trust responsibility requires that all Federal agencies, including Reclamation, ensure their actions protect trust assets. Secretarial Order 3175 (incorporated into the Departmental Manual at 512 DM 2) requires that when proposed actions of a DOI agency might affect trust assets, the agency must address those potential impacts in planning and decision documents and the agency consult with the tribal government whose trust assets are potentially affected.

The project area is situated entirely on USFS land. No Indian trust assets have been identified in this area.

No Action

Under the no action alternative, there would be no impact to Indian trust assets because no project would be implemented.

3.9.2 Environmental Consequences

Proposed Action

The absence of Indian trust assets in the project area would preclude any direct or indirect effect of the proposed project on such assets.

Cumulative Effects – Indian Trust Assets

The proposed project would have no cumulative impact on Indian trust assets.

CHAPTER 4 – CONSULTATION AND COORDINATION

List of Agencies and Persons Contacted

Reclamation submitted information on the project proposal to the following entities during development of the EA. The names of individuals are retained in the administrative record.

Cooperating Agencies:

Arizona Game and Fish Department
U.S. Fish and Wildlife Service
U.S. Forest Service (CNF)

Indian Communities:

Fort McDowell Yavapai Nation
San Carlos Apache Tribe
The Hopi Tribe
The Navajo Nation
Tonto Apache Tribe
The Yavapai-Apache Nation
Yavapai-Prescott Indian Tribe
White Mountain Apache Tribe

County Agencies:

Yavapai County Environmental Services Division
Yavapai County Flood Control District

Other State Agencies:

Arizona Department of Environmental Quality
Arizona Department of Water Resources
Arizona State Land Department
Arizona State Historic Preservation Office

Other Federal Agencies:

U.S. Army Corps of Engineers
Bureau of Indian Affairs

Conservation, Environmental, and Recreation Organizations:

Center for Biological Diversity
Sierra Club

Grazing Organizations:

Arizona Cattle Growers Association

Other Organizations

Oak Creek Valley Property Owners Association
Spring Creek Ranch LLC
Central Arizona Water Conservation District
Salt River Project

CHAPTER 5 – LIST OF PREPARERS

List of Preparers

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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 than consecutively with procedures required by other environmental laws.

The following is a list of Federal laws, Executive Orders (EOs), and other directives that apply to the proposed project discussed in this EA:

The National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90), 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. The DOI NEPA regulations are found at 43 CFR 46; USFS NEPA regulations are found at 36 CFR 220.

Scoping information on the proposed action was posted on Reclamation's Phoenix Area Office web site and distributed to the public on October 24, 2013. Public comments were considered during preparation of the EA and helped guide the development of the project and mitigation. The draft EA was distributed for a 30-day public comment period.

The Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (Public Law 85-624), provides a procedural framework for the consideration of fish and wildlife conservation measures in Federal water resource development projects. Coordination with the USFWS and State wildlife management agencies are required on all Federal water development projects.

The proposed project is the result of ESA section 7(a)(2) consultation between Reclamation and USFWS. Coordination among Reclamation, USFWS, USFS, and AZGFD has been ongoing since the project's inception. The USFWS 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 (Public Law 93-205), 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.

The 2008 CAP biological opinion addressed impacts to listed fishes for fish barrier construction and determined that further Section 7 consultation on federally-listed fishes was not required. In addition, the 2008 CAP biological opinion concluded: "… it is the Service's opinion that the delivery of CAP water in the Gila River basin, with the implementation of the proposed conservation measures [including fish barriers], is neither likely to jeopardize the continued existence of spikedace, loach minnow, Gila topminnow, razorback sucker, Gila chub, or Chiricahua leopard frog nor likely to adversely modify the critical habitats of those species." The USFWS determined that Reclamation is not required to make any decision on the effects of these barriers within newly proposed critical habitat (e.g., northern Mexican and narrow-headed gartersnakes) for streams until the rule is finalized. At that time, Reclamation would reinitiate consultation so USFWS can document that they considered the effects of our fish barriers to new critical habitats (Doug Duncan, USFWS, pers. comm.).

ESA Section 7 consultation on the proposed project was initiated when Reclamation submitted a Biological Assessment to the USFWS on May 14, 2014. The Biological Assessment determined that proposed translocations after the fish barrier is constructed may affect, but are not likely to adversely affect, narrow-headed gartersnake, loach minnow, spikedace, and Gila topminnow. Construction of the fish barrier may affect, but is not likely to adversely affect, yellow-billed cuckoo; would have no effect on Page springsnail; and may affect, likely to adversely affect, northern Mexican gartersnake. In the long term, the project is expected to have a beneficial effect on all of these species.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (Public Law 86-732, 90-578, 91-135, 93-300, 95-616, 99-645, 105-312), 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.

The 45 to 60 day construction process would commence in late September or early October to avoid the breeding seasons of most avian species. A fall and/or winter construction schedule is anticipated, thereby avoiding direct impacts to breeding birds including migratory birds. Indirect effects include slight displacement of migratory birds returning in subsequent years due to slight loss of foraging, nesting, or cover habitat. This loss of habitat is limited to 1.08 acres of riparian habitat and 0.07 acre of upland habitat.

The Bald and Golden Eagle Protection Act (Eagle Act) of 1940, as amended (Public Law 86-70, 87-884, 92-535, and 95-616, prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export, or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16U.S.C

668(a);50CFR 22). “Take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb” a bald or golden eagle. The term “disturb” under the Eagle Act was recently defined via a final rule published in the Federal Register on June 5, 2007 (72 Fed. Reg. 31332). “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Although bald eagles and golden eagles could potentially use the project area for foraging and wintering, the proposed project would not result in take as defined by the Eagle Act. Effects to bald eagles and golden eagles are discountable and would not cause (1) injury to an eagle, (2) a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

The Clean Air Act (CAA) of 1963, as amended (Public Law 95-95), 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 and greenhouse gasses) associated with the project would have localized and minor effects on air quality in the project area. The project is not located in a nonattainment area or Class I airshed.

The Clean Water Act (CWA) of 1977, as amended (Public Law 92-500), 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.

Reclamation received CWA 404 permit coverage from the USACE under Nationwide Permit 27. The ADEQ issued a waiver of CWA 401 individual certification. The proposed project would comply with all applicable 401 general conditions and 404 general and regional conditions.

The National Historic Preservation Act (NHPA) of 1966, as amended (Public Law 96-515), 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 SHPO is required when a Federal action may affect cultural resources on, or eligible for inclusion on, the National Register.

Archaeologists from Reclamation conducted Class III surveys of the area of potential effect for the proposed project. No National Register eligible cultural resources were identified within the area potentially affected by construction of the fish barrier, including contractor use areas and access routes. A finding of "no historic properties affected" was determined by Reclamation following the survey and submitted to the CNF and SHPO on May 13, 2014. The SHPO concurred with Reclamation's determination on May 28, 2014.

The Resource Conservation and Recovery Act (RCRA), as amended (Public Law 94-580), 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 substantial 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.

EO 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, including listed fish species and their habitat. Because the project by its very nature requires construction on a floodplain, no practicable alternative exists. Floodplain effects would be restricted to undeveloped and uninhabited NFS lands administered by the CNF. The project would not increase the flood risk to private property or human safety and welfare.

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 be expected to result in a net loss of wetland habitat.

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.

Construction would affect uninhabited public lands administered by the CNF; consequently, no low-income or minority populations as defined by Executive Order 12898 would be affected.

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 (ITAs), the agency must explicitly address those impacts in planning and decision-making, and the agency must consult with the tribal government whose trust resources are potentially affected by the Federal action. Reclamation is committed to carrying out its activities in a manner which avoids adverse impacts to ITAs when possible, and to mitigate or compensate for such impacts when it cannot.

The project area encompasses public lands administered by the CNF. No Indian trust assets have been identified in the project area; consequently, no effects to trust assets are anticipated.

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APPENDIX A
FISH BARRIER DESIGN

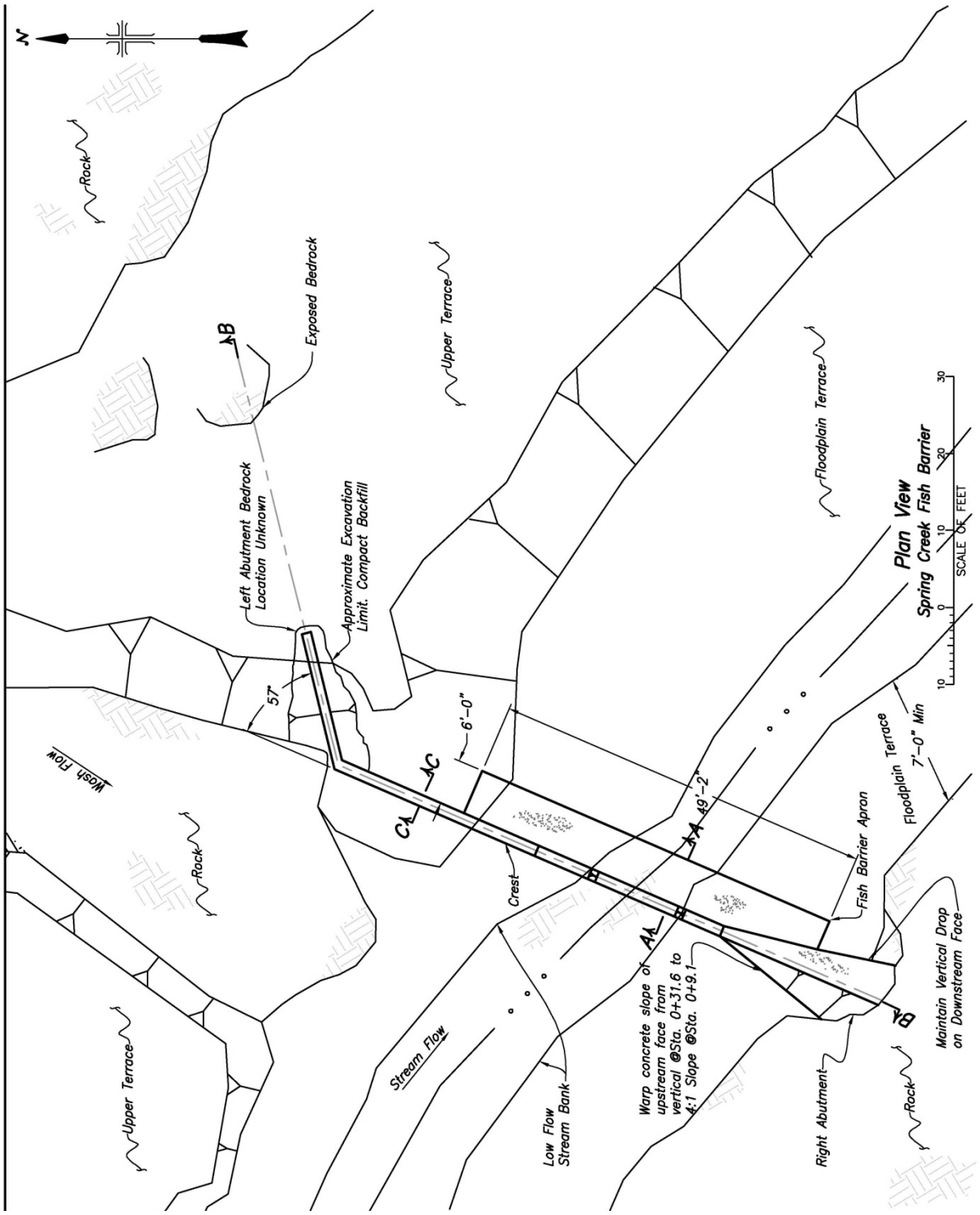

Figure A-1. Plan view of proposed fish barrier.

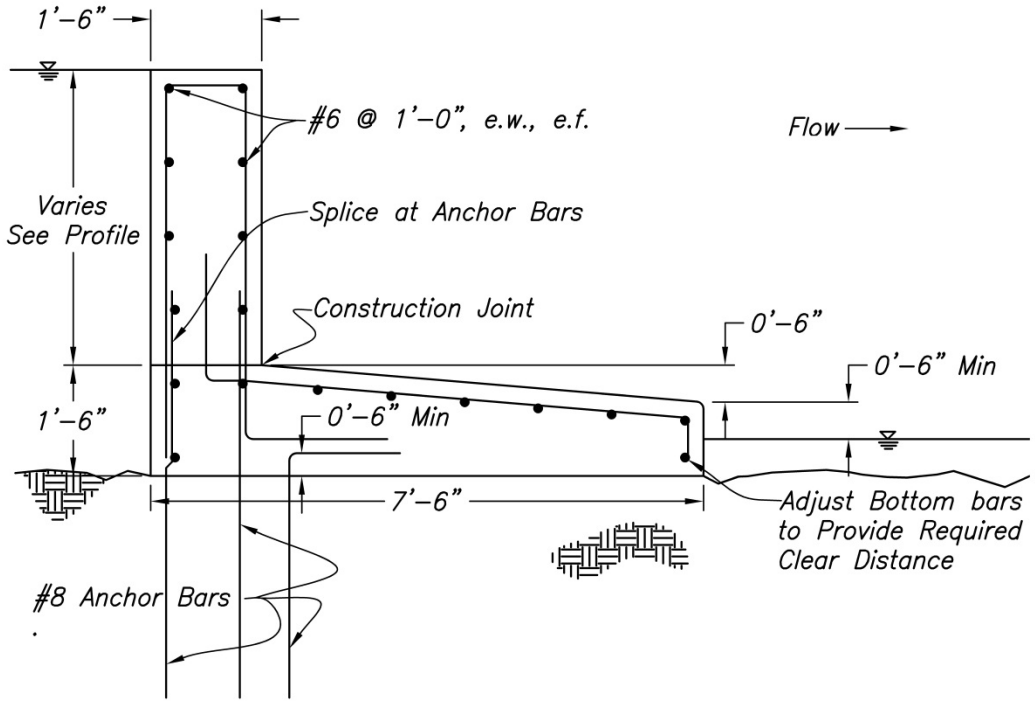

Figure A-2. Cross-section view of fish barrier.

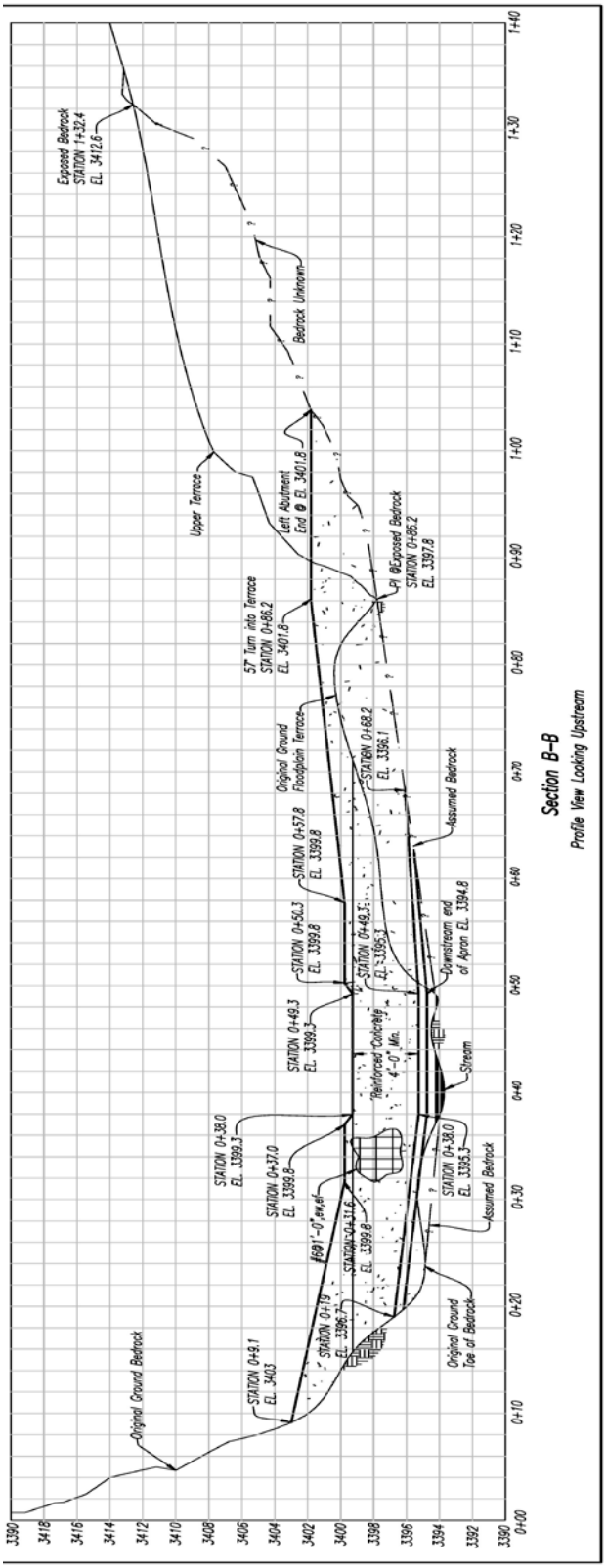

Figure A-3. Profile view of fish barrier looking upstream.

APPENDIX B
BEST MANAGEMENT PRACTICES

Table B-1. Resource protection best management practices.

BMP #	Mitigation
BMP #1	Onsite fueling of vehicles would be conducted on a designated protected, upland site. Only small quantities of fuel may be stored in the project area. Fuel storage would be restricted to areas above the 100-year floodplain of Spring Creek.
BMP #2	Minimize noxious weed introduction and spread. Prior to moving off-road equipment onto a project area, contractor would clean such equipment of seeds, soil, vegetative matter, and other debris that could contain or hold seeds.
BMP #3	If construction crews are to live on-site, then an approved camp and suitable sanitation facilities must be provided. Sanitation facilities must be removed with three days of project completion and camp removal.
BMP #4	Obtain CWA 404 permit and 401 Water Quality Certification. Terms and conditions of the permit and certification would be incorporated into the project.
BMP #5	No debris, rubbish, or petroleum products, or washings would be allowed to enter or be placed where they may be washed by rainfall or runoff into the stream. When project operations are completed, any and all excess construction materials and debris shall be removed to an appropriate off-site location.
BMP #6	Hay bales, silt fences, or other appropriate erosion controls would be placed immediately down slope of exposed soils or fill to prevent the transport of sediment. Siltation and turbidity control measures (e.g., silt fences, hay bales, etc.) shall be implemented in all areas where disturbed soils may potentially wash into the stream via storm runoff. Such measures would remain in place until the project is complete and exposed soils are stabilized.
BMP #7	Any potential user-created tracks would be closed and restored to natural conditions. Allow for natural regeneration of native tree and herbaceous revegetation or where native species are scarce, use native, certified weed-free seed. To comply with State and Federal water quality regulations and standards by minimizing soil erosion through the stabilizing influence of vegetation ground cover. Site-specific measures such as native grass/forb seeding and/or mulching would be implemented on disturbed areas in the construction zone and contractor use ares to promote revegetation. Seed at 5 pounds/acre with native, certified weed free seed mix. Potential vegetation for individual sites should utilize the CNF Terrestrial Ecosystem Survey to identify species to be utilized. All seed lots would be certified weed free with documented laboratory results. Prior to contractor's seed purchase, the seed company would furnish to the USFS for their review and approval the following information: (1) Current lab tests from an approved State Agricultural Laboratory; (2) Each species within the approved seed mix must have a current lab test for germination and purity (that includes amount of inert material and weed seeds) provided; (3) Each test certificate must be certified "weed-free" by the State lab meeting seed requirements for all State's Noxious Weed Laws and Lists, including the CNF's list.
BMP #8	Provide site protection on newly disturbed soils (e.g. silt fence, erosion mat, etc.) in channel restoration and road reconstruction sites on all sites as needed and where feasible.
BMP #9	Do not borrow road fill from the stream channel or meadow surface. End-load all material hauled on-site and compact fill.

BMP #	Mitigation
BMP #10	Use of heavy equipment (e.g., backhoe or excavator) in flowing water would be minimized to the extent practicable.
BMP #11	Construction would be scheduled during periods when probabilities of rain, runoff and stream flow are expected to be low (late September to November) and when soil is dry (locations above floodplain) to minimize unacceptable soil compaction and displacement and sediment delivery.
BMP #12	Stream flow would be piped around the work area to reduce potential release of sediment to the stream.
BMP #13	All construction equipment would be periodically inspected for leaks. Any substantial leaks would be promptly corrected.
BMP #14	Concrete truck wash out would be containerized and removed from the site.
BMP #15	Equipment for minor spills such as a 20 gallon or more sized spill kit or other materials (shovels, construction bags, and cat litter for impervious surfaces) would be available at the construction site.
BMP #16	Standard dust abatement practices would be used to minimize generation of airborne particulates.
BMP #17	Any trails that develop incidental to construction would be obliterated.
BMP #18	The concrete barrier and would be colored and textured to blend with surrounding rock.

APPENDIX C
INDUSTRIAL FIRE PLAN GUIDELINES

SOUTHWEST INTERAGENCY FIRE RESTRICTION AND CLOSURE
MASTER OPERATING PLAN

INDUSTRIAL FIRE PLAN GUIDELINES
For
AUTHORIZED USERS

PURPOSE

The purpose of fire restrictions is to reduce the risk of human-caused fires during periods of high fire danger and/or burning conditions. The intent of these guidelines is to provide authorized users with the information they need to ensure their operations conform to the Industrial Fire Precaution Plan in the likely event that fire restrictions are implemented during critical fire season. For the purpose of these guidelines, authorized users include any permit holder, leasee, contractor, subcontractor and other user, engaged in permitted operations on National Forest Lands.

When operating on National Forest Lands, it is incumbent on the permitted user to know the current Industrial Fire Precaution Plan and to take the appropriate actions to meet the mitigation measures in these guidelines. In addition, it is also incumbent on the authorized user to inform any and all of their subordinates (contractors, subcontrators, etc…) of these precautions and to ensure that all requirements are being met.

GENERAL FIRE PRECAUTIONARY MEASURES

COMMUNICATIONS

Authorized users shall ensure a serviceable telephone, radio-telephone or radio communication system is available to provide prompt and reliable communications between the authorized user's operations and the Forest Service in the the event of a wildland fire ignition.

FIRE TOOLS

Authorized users shall furnish and maintain, in good working order, fires tools to be used only for suppressing wildland fires. Each operation shall be provided with one firefighting tool per person to equip all personnel engaged in authorized user's operations. Approved firefighting tools may include the following: pulaski; McLeod tool; long handled shovel.

FIRE TOOLS ON EQUIPMENT

Passenger carrying vehicles, including light pickup trucks and all terrain vehicles, shall be equipped with one (1) long-handled round pointed shovel and one (1) ABC dry chemical fire extinguisher not less than 2 1/2 pounds capacity. Each internal combustion fuel carrying piece of equipment (dumptruck, dozer, excavator, backhoe, etc…) shall be equipped with one long-handled round-pointed shovel, and one 5-pound capacity ABC dry chemical fire extinguisher. Shovels and fire extinguishers shall be so mounted as to be readily reached from the ground.

SPARK ARRESTERS AND MUFFLERS

Authorized user will ensure that each internal combustion engine shall be equipped with a spark arrester qualified and rated under USDA Forest Service Standard (Spark Arrester Guide) 5100-1a or the latest revision of Society of Automotive Engineers "medium size engine, SAE recommended practice J350" unless it is:

(a) Equipped with a turbine-driven exhaust supercharger such as the turbocharger. There shall be no exhaust bypass.

(b) A multi-position engine, such as on power saws purchased after 6/30/77 which must meet the performance levels set forth in the Society of Automotive Engineers "multi-positioned small engine exhaust fire ignition standard, SAE recommended practice J335B" as now or hereafter amended. Those purchased prior to the above date shall be equipped with an approved spark arrester/muffler containing a 0.023 inch mesh screen in good condition.

(c) A passenger carrying vehicle or light truck, or medium truck up to 40,000 GVW, used on roads and equipped with a factory designed muffler and an exhaust system in good working condition.

(d) A heavy duty truck, such as a dump truck, or other vehicle used for commercial hauling, used only on roads and equipped with a factory designed muffler and with a vertical stack exhaust system extending above the cab.

Exhaust equipment described in this Subsection, including spark arresters and mufflers, shall be properly installed and constantly maintained in serviceable condition.

POWERED HANDTOOLS

During periods of use, each powered handtool operator shall have readily available for use, one long-handled round-pointed shovel and one chemical-pressurized ABC dry chemical fire extinguisher of not less than 8-ounce capacity by weight. Muffler, extinguisher, and shovel shall be maintained in good working order at all times. Fueling or refueling of a powered handtool shall be done in an area which has been completely cleared of material which will carry fire.

Powered handtools shall be moved at least 10 feet from the place of fueling or refueling before starting.

GAS AND OIL STORAGE AND SERVICE AREAS

The location of equipment service areas and gas and oil storage areas shall be approved in writing by the permit adminstrator. All areas shall be cleared of brush, litter, grass or other flammable debris for a radius of 50 feet.

BURNING OF REFUSE

No slash or other debris, such as that resulting from clearing on right-of-way, shall be burned without the written consent of the Forest Service.

BLASTING

Use of fuses in blasting shall not be permitted. A long-handled round-pointed shovel and at least five gallons of water for fire fighting purposes shall be available at all times. A fire guard must remain on the blasting site for a minimum of one hour after blasting operations have concluded.

WELDING

An area of sufficient size but not less than a 10 foot radius shall be cleared down to mineral soil before welding operations are started. Prior to welding, authorized user shall have available a round-pointed long-handled shovel, at least 5-gallons of water, and a 5-pound fire ABC dry chemical extinguisher at each welding site. A fire guard must remain on the welding site for a minimum of one hour after welding operations have concluded.

SPECIFIC FIRE PRECAUTIONARY MEASURES

EMERGENCY FIRE PRECAUTION SCHEDULE

EMERGENCY FIRE PRECAUTION SCHEDULE	
FIRE RESTRICTION/CLOSURE "STAGE"	
"STAGED" RESTRICTION LEVELS	**INDUSTRIAL FIRE PRECAUTION PLAN**
NO RESTRICTIONS	**A**
STAGE I	**B**
STAGE II	**C**
PARTIAL/FOREST CLOSURE **	**D**
RED FLAG WARNING **(Issued by National Weather Service)**	**D**

**** Partial Forest Closure:**

Project areas which are outside the boundaries of the partial forest closure may continue to operate under Industrial Fire Precaution Plan **"C"** operating criteria as agreed upon between the Permit Administrator and Purchaser in writing.

Project areas within the boundaries of the proclaimed partial forest closure area are to operate under Industrial Fire Precaution Plan "**D".**

Staged restriction levels are determined by the appropriate Forest Line Officer in consultation with the Forest Fire Management Officer and Permit Administrator. The

appropriate Forest Line Officer may adjust the predicted Industrial Fire Precaution Plan for local weather conditions within a Project Area. Changes in the predicted Industrial Fire Precaution Plan shall be agreed to in writing.

INDUSTRIAL FIRE PRECAUTION PLAN – DESCRIPTION

Authorized user will restrict operations in accordance with the attached Emergency Fire Precaution Schedule:

A - Normal Fire Precautions - No fire guard required except for welding and blasting operations.

B - Normal Fire Precautions – Authorized user will provide fire guard.

C - All power equipment use as well as blasting and welding operations will shut down from 9:00 am until 8:00 pm Mountain Standard Time (10:00 am to 9:00 pm MDT). Operations on mineral soil involving activities such as road excavation, watering, grading, surfacing, rock crushing, and/or other equipment maintenance may continue. Authorized user will provide fire guard.

D - Shutdown all operations; except operations on mineral soil involving road excavation, watering, grading, gravel surfacing, and rock crushing may continue with special Forest Service permit. Blasting and welding are prohibited. Authorized user will provide fire guard.

FIRE GUARDS

To prevent, detect, and suppress wildland fire, authorized users shall provide a fire guard at each operating area where power-driven equipment and tools have been operated during the day. The fire guards shall constantly perform their duties during operating hours and for three (3) hours after the work stops for the day, when the Fire Precaution Plan is Plan **"B", "C", or "D".**

A fire guard on one operating area shall satisfy the requirements on adjacent areas if the travel time with available transportation is not in excess of ten (10) minutes to any of the other areas requiring such service and provided the fire fuard patrols all area where authorized user's activities occurred.

Each fire guard shall be vigilant, able and prepared to actions to prevent, detect, and report any wildland fires and to promptly and efficiently take suppression action with available required firefighting equipment and personnel on any wildland fire that starts on project area. Each fire guard shall be equipped with a vehicle and a fire tool cache consisting of a cache box with a complement of fire tools maintained in serviceable condition. Approved firefighting tools may include the following: Pulaski; McLeod: long handles round pointed shovel. The fire guard will also carry at least 25 gallons of water for firefighting purposes.

RED FLAG WARNING

A red flag warning is issued when the combination of dry fuels and weather conditions support extreme fire danger. Red flag warnings are issued by the National Weather Service for land and fire managers to highlight the increased fire danger.

- RED FLAG WARNING is issued if conditions are occurring or will occur within the next 24 hours that would support extreme fire danger.

When a Red Flag Warning is issued by the National Weather Service, all authorized user operations will adhere to Industrial Fire Precaution Plan "**D**" and will shut down operations until the Red Flag Warning is rescinded.