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In Reply Refer To:  
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October 2, 2014

Memorandum

To: Area Manager, Bureau of Reclamation, Lower Colorado Region, Phoenix Area Office

From: Field Supervisor, Arizona Ecological Services Office, U.S. Fish and Wildlife Service

Subject: Biological Opinion for Spring Creek (Oak) Fish Barrier

Thank you for your May 13, 2014 memorandum, received May 16, 2014, requesting initiation of formal consultation under section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). This consultation concerns the possible effects of construction of a fish barrier on Spring Creek, Yavapai County, Arizona on the threatened northern Mexican gartersnake (*Thamnophis eques megalops*) and its proposed critical habitat.

Your memorandum also requested our concurrence that the proposed action may affect, but is not likely to adversely affect the endangered Gila topminnow (*Poeciliopsis occidentalis*), endangered loach minnow (*Tiaroga cobitis*), endangered spikedace (*Meda fulgida*), threatened narrow-headed gartersnake (*Thamnophis rufipunctatus*), and the threatened yellow-billed cuckoo (*Coccyzus americanus*). We concur with your determinations. The basis for our concurrences is found in Appendix A.

The BA does not consider project effects to Gila chub (*Gila intermedia*) and its designated critical habitat in Spring Creek, because effects of fish barrier construction for the species and its critical habitat were considered in the 2008 reinitiated biological opinion (BO) on “Transportation and Delivery of Central Arizona Project water to the Gila River Basin in Arizona and New Mexico and its Potential to Introduce and Spread Nonindigenous Aquatic Species” (#22410-2007-F-0081) (USFWS 2008). The proposed Spring Creek barrier is consistent with the proposed actions analyzed in the 2008 BO.

This biological and conference opinion is based on information provided in the May 2014, biological assessment (BA), conversations and electronic correspondence with your staff, and

other sources of information found in the administrative record supporting this BO. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

### Consultation History

Details of the consultation history are summarized in Table 1.

**Table 1.** Summary of Consultation History.

<b>Date</b>	<b>Event</b>
May 15, 2008	We issued the reinitiated 2008 BO on the Transportation and Delivery of Central Arizona Project water to the Gila River Basin in Arizona and New Mexico and its Potential to Introduce and Spread Nonindigenous Aquatic Species (#22410-2007-F-0081).
January 23, 2013	We attended a meeting with the Bureau of Reclamation (BOR), Forest Service, and Arizona Game and Fish Department to discuss the project.
February 27, 2013	We received your February 25, 2013, letter requesting our participation as cooperating agency on the project.
April 19, 2013	We accepted your request to be a cooperating agency on the project.
May 14, 2013	We attended a meeting with BOR, Forest Service, and AGFD to discuss the project planning.
May 24, 2013	We attended a field trip to look at the proposed barrier location.
October 28, 2013	We received a copy of the October 24, 2013, public scoping letter.
May 16, 2014	We received your May 13, 2014, request for formal consultation and the BA.
June 17, 2014	We issued a thirty-day letter initiating formal consultation.
June 30, 2014	We received an electronic copy of the Draft Environmental Assessment (EA) for the project.
September 18, 2014	We provided a draft BO for your review.
September 18, 2013	We received your comments and incorporated your edits into the BO.

## BIOLOGICAL OPINION

### DESCRIPTION OF THE PROPOSED ACTION

#### Background

The proposed Spring Creek fish barrier project complements similar native fish restoration projects being implemented by the BOR and other agencies to assist in the conservation and recovery of federally-listed fish and amphibian species in the Gila River Basin. BOR's native fish conservation program is mandated by a May 15, 2008, FWS BO on the delivery of water through the Central Arizona Project (CAP) and its potential to introduce and spread nonnative aquatic species in the Gila River Basin. A key conservation measure of the BO requires the construction of fish barriers to prevent or hinder upstream movements of nonindigenous fish and other [nonnative] aquatic organisms into high-value native fish and amphibian habitats of the Gila River Basin during the 100-year life of the CAP. Potential fish barrier sites were selected primarily to protect existing populations of listed fishes or facilitate the repatriation and stocking of native fishes into suitable habitat to achieve enhanced status toward recovery (USFWS 2008).

The proposed action is needed to meet a key conservation measure of the 2008 BO, which requires BOR to construct 12 fish barriers to assist with recovery of federally-listed fishes. The 2008 BO identified 13 possible streams for siting of fish barriers, but since then several proposed barrier sites have been abandoned or are now considered unlikely to be constructed for various reasons. Beginning in 2011, BOR evaluated approximately 50 new streams in the Gila River basin in Arizona and New Mexico, but fewer than one dozen had habitats supportive of more than one or two listed fishes in combination with acceptable channel morphologies for fish barriers. A fish barrier on Spring Creek meets those criteria and would protect existing populations of Gila chub, other unlisted native fishes extant in the stream, the threatened northern Mexican gartersnake, and the extant lowland leopard frog (*Lithobates yavapaiensis*), all of which are threatened by the presence of nonnative fishes. The barrier would also facilitate translocations of spikedace and Gila topminnow, and possibly loach minnow, into Spring Creek. Construction of the proposed barrier would protect the resident and repatriated populations of these species against potential future upstream invasion of nonnative aquatic organisms from lower Spring Creek and nearby Oak Creek. Sustaining viable populations of these species in Spring Creek would be an important step toward their conservation and recovery.

#### Proposed Action

The reinforced, concrete fish barrier would be constructed upstream of an existing concrete water diversion structure in the lowermost reach of Spring Creek in Section 27 of Township 16 North, Range 4 East. There is no piscicide application included as part of this project, just barrier construction. The proposed site is approximately 0.7 stream mile upstream of the confluence with Oak Creek and is located on National Forest System (NFS) lands managed by the Coconino National Forest, north of Cornville, Arizona. Approximately 3.2 miles of perennial water would be protected from upstream movement of fish by the barrier. Construction would occur January

through March of 2015. Native fish stocking operations would occur upstream of the fish barrier following construction. The barrier would have a four-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.

Potential staging areas for delivery of construction materials have been identified along a closed two-track road that exists east off of North Oak Creek Valley Road (Figure 1, Appendix B). Access to these staging areas would require use of this road by construction personnel. This road would require minor grading or placement of materials in problematic areas to accommodate temporary access by concrete mixer trucks and other construction vehicles. After construction, the road would be stabilized for non-motorized use. A temporary access road would also be constructed to access the barrier site at the end of the existing road to allow access of a backhoe and other construction equipment to the barrier site. Small construction staging areas have been identified along these roads and at the barrier site (Figure 1, Appendix B).

Construction materials and equipment would be staged on an existing parking lot adjacent to Oak Creek Valley Road and at two streamside locations (Figure 1, Appendix B). Batched concrete would be delivered by commercial mixer trucks to the contractor use area at the terminus of the access road, where it would be pumped to the work 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.

The sequence of construction would consist of: (1) *mobilization* - deliver equipment and setup contractor use areas; (2) *site preparation* – repair access road, 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.

Approximately 1.08 acres of base flow channel and adjacent riparian habitat would be affected by the barrier construction and post-construction streambed aggradation. At the barrier site, construction would directly impact a mixed stand of riparian trees (mostly Gooding 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 terrace between the end of the access road and the barrier site, affecting 0.04 acre.<sup>1</sup> Efforts will be made to protect tree stumps 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 semi-desert grassland.

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<sup>1</sup> 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 mesquite (stem DBH is 1.25 inches), and three multi-stem ash trees (stem DBH ranging from 0.5 inch to 3.5 inches).

The entire aggradation zone would extend approximately 1,100 feet upstream from the constructed barrier, affecting 0.84 acre of open channel and riparian habitat. Accumulation of up to two 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 300-foot reach upstream where sediment depths on the floodplain would exceed 1.5 feet, affecting approximately 0.41 acre of riparian habitat. Recovery of riparian vegetation on these deposits would occur once aggradation stabilizes. Between 300 and 600 feet upstream, sediment depths on the floodplain 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 resulting from construction. Aggradation would initially 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.

The sedimentation zone will be partially backfilled during the construction process in order to minimize water retention upstream of the barrier until natural sedimentation further minimizes impacts to downstream water rights holders. The fill material will be obtained from materials displaced by the fish barrier or by dredged materials that already exist at the end of the access road within the contractor use area shown on Figure 2. Re-vegetation of the sedimentation zone will occur naturally upon stabilization of the stream system. Pursuant to BOR's Clean Water Act Section 404 Permit, all vegetative impacts would be mitigated (including the entire sedimentation zone) through habitat acquisition and protection at a 10:1 ratio. Aquatic habitat would re-establish after completion of the construction project.

Work site dewatering would be accomplished with pumps and a small cofferdam. Stream flow would be piped around the construction zone. Standard excavation methods would be used to expose bedrock for tying of the barrier to bedrock. Any fluvial material extracted during this process would be temporarily stockpiled for reuse as backfill. Any excess backfill resulting from excavation would be placed along the upstream side of the barrier to minimize impoundment of water.

Approximately four to five workers would be present onsite during construction. A one to two 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 C for the list of BMPs). 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. Construction would require approximately six weeks.

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 of 5-year frequency or greater. Inspectors would hike to the barrier from 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. Use of NFS lands to access the fish barrier would require a Special Use Permit from the Coconino National Forest for the anticipated life of the project, which is expected to be 100 years.

As part of the project, BOR also proposes to stock spikedace, Gila topminnow, and possibly loach minnow into Spring Creek, above the barrier. A 5-year monitoring program would be established after the fish barrier is constructed to detect any incursion of new nonnative fishes and to monitor success of prior native fish repatriations. This monitoring would be funded by BOR and developed in cooperation with AGFD, FWS, and the Forest Service. Monitoring by the cooperating agencies would likely continue for the foreseeable future.

## **STATUS OF THE SPECIES AND CRITICAL HABITAT**

The Federal Register notice listing the northern Mexican gartersnake as threatened under the Act was published on July 8, 2014 (USFWS 2014). Critical habitat was proposed on July 10, 2013 (USFWS 2013) and has not yet been designated. Please refer to these rules for more in-depth information on the ecology and threats to the species and critical habitat, including references. The final listing and proposed critical habitat rules are incorporated herein by reference.

The northern Mexican gartersnake ranges in color from olive to olive-brown or olive-gray with three lighter-colored stripes that run the length of the body, the middle of which darkens towards the tail. It may occur with other native gartersnake species and can be difficult for people without specific expertise to identify because of its similar appearance to sympatric gartersnake species. The snake may reach a maximum length of 44 in (112 cm).

Throughout its rangewide distribution, the northern Mexican gartersnake occurs at elevations from 130 to 8,497 feet (ft.) (Rossman et al. 1996) and is considered a “terrestrial-aquatic generalist” by Drummond and Marcías-García (1983). The northern Mexican gartersnake is a riparian obligate (restricted to riparian areas when not dispersing) and occurs chiefly in the following habitat types: 1) source-area wetlands (e.g., cienegas or stock tanks); 2) large-river riparian woodlands and forests; and 3) streamside gallery forests (Hendrickson and Minckley 1984, Rosen and Schwalbe 1988). Emmons and Nowak (2013), when surveying in the upper Verde River region, found this subspecies most commonly in protected backwaters, braided side channels and beaver ponds, isolated pools near the river mainstem, and edges of dense emergent vegetation that offered cover and foraging opportunities. In the northern-most part of its range, the northern Mexican gartersnake appears to be most active during July and August, followed by June and September.

The northern Mexican gartersnake is an active predator and is thought to heavily depend upon a native prey base (Rosen and Schwalbe 1988). Northern Mexican gartersnakes forage along vegetated streambanks, searching for prey in water and on land, using different strategies (Alfaro 2002). Generally, its diet consists of amphibians and fishes, such as adult and larval (tadpoles) native leopard frogs, as well as juvenile and adult native fish (Rosen and Schwalbe 1988). In situations where native prey species are rare or absent, this snake's diet may include nonnative species, including larval and juvenile bullfrogs, western mosquitofish (Holycross et al. 2006, Emmons and Nowak 2013), or other soft-rayed fishes.

Native predators of the northern Mexican gartersnake include birds of prey, other snakes, wading birds, mergansers, belted kingfishers, raccoons, skunks, and coyotes (Rosen and Schwalbe 1988, Brennan et al. 2009). Historically, large, highly predatory native fish species such as Colorado pikeminnow may have preyed upon northern Mexican gartersnake where they co-occurred. Native chubs may also prey on neonatal gartersnakes.

Sexual maturity in northern Mexican gartersnakes occurs at two years of age in males and at two to three years of age in females (Rosen and Schwalbe 1988). Northern Mexican gartersnakes are viviparous (bringing forth living young rather than eggs). Mating has been documented in April and May followed by the live birth of between 7 and 38 newborns in July and August (Rosen and Schwalbe 1988, Nowak and Boyarski 2012).

The northern Mexican gartersnake historically occurred in every county and nearly every subbasin within Arizona, from several perennial or intermittent creeks, streams, and rivers as well as lentic wetlands such as cienegas, ponds, or stock tanks (Brennan and Holycross 2006, Cotton et al. 2013). In New Mexico, the gartersnake had a limited distribution that consisted of scattered locations throughout the Upper Gila River watershed in Grant and western Hidalgo Counties (Price 1980, Fitzgerald 1986, Degenhardt et al. 1996, Holycross et al. 2006). Within Mexico, northern Mexican gartersnakes historically occurred within the Sierra Madre Occidental and the Mexican Plateau, comprising approximately 85 percent of the total rangewide distribution of the subspecies (Rossman et al. 1996).

The only viable northern Mexican gartersnake populations in the United States where the subspecies remains reliably detected are all in Arizona: 1) The Page Springs and Bubbling Ponds State Fish Hatcheries along Oak Creek; 2) lower Tonto Creek; 3) the upper Santa Cruz River in the San Rafael Valley; 4) the Bill Williams River; and, 5) the middle/upper Verde River. In New Mexico, the northern Mexican gartersnake may occur in extremely low population densities within its historical distribution; limited survey effort is inconclusive to determine extirpation. The status of the northern Mexican gartersnake on tribal lands, such as those owned by the White Mountain or San Carlos Apache Tribes, is poorly known. Less is known about the current distribution of the northern Mexican gartersnake in Mexico due to limited surveys and limited access to information on survey efforts and field data from Mexico.

We have concluded that in as many as 26 of 31 known localities in the United States (84 percent), the northern Mexican gartersnake population is likely not viable and may exist at low population densities that could be threatened with extirpation or may already be extirpated. Only

five populations of northern Mexican gartersnakes in the United States are considered likely viable where the species remains reliably detected. Harmful nonnative species are a concern in almost every northern Mexican gartersnake locality in the United States and the most significant reason for their decline. Harmful nonnative species can contribute to starvation of gartersnake populations through competitive mechanisms, and may reduce or eliminate recruitment of young gartersnakes through predation. Other threats include alteration of rivers and streams from dams, diversions, flood-control projects, and groundwater pumping that change flow regimes, reduce or eliminate habitat, and favor harmful nonnative species; and effects from climate change and drought (USFWS 2014).

### *Proposed critical habitat*

Critical habitat for northern Mexican gartersnake was proposed in 14 subbasin and national wildlife refuge units in Arizona and New Mexico on July 10, 2013 (USFWS 2013). In Arizona, proposed critical habitat is located in portions of the Verde, Agua Fria, Bill Williams, Upper Salt, San Pedro, Babocomari, Upper Santa Cruz and Upper Gila rivers, Tonto and Cienega Creeks, Redrock Canyon, and Buenos Aires and San Bernardino National Wildlife Refuges. In New Mexico, proposed critical habitat is located in portions of Mule Creek and the Upper Gila River.

The following are the PCEs proposed for northern Mexican gartersnake critical habitat:

1. Aquatic or riparian habitat that includes:
  - a. Perennial or spatially intermittent streams of low to moderate gradient that possess appropriate amounts of in-channel pools, off-channel pools, or backwater habitat, and that possess a natural, unregulated flow regime that allows for periodic flooding or, if flows are modified or regulated, a flow regime that allows for adequate river functions, such as flows capable of processing sediment loads; or
  - b. Lentic wetlands such as livestock tanks, springs, and cienegas; and
  - c. Shoreline habitat with adequate organic and inorganic structural complexity to allow for thermoregulation, gestation, shelter, protection from predators, and foraging opportunities (e.g., boulders, rocks, organic debris such as downed trees or logs, debris jams, small mammal burrows, or leaf litter); and
  - d. Aquatic habitat with characteristics that support a native amphibian prey base, such as salinities less than 5 parts per thousand, pH greater than or equal to 5.6, and pollutants absent or minimally present at levels that do not affect survival of any age class of the northern Mexican gartersnake or the maintenance of prey populations.
2. Adequate terrestrial space (600 ft. lateral extent to either side of bankfull stage) adjacent to designated stream systems with sufficient structural characteristics to support life-history functions such as gestation, immigration, emigration, and brumation (extended inactivity).



3. A prey base consisting of viable populations of native amphibian and native fish species.
4. An absence of nonnative fish species of the families Centrarchidae and Ictaluridae, bullfrogs, and/or crayfish (*O. virilis*, *P. clarki*, etc.), or occurrence of these nonnative species at low enough levels such that recruitment of northern Mexican gartersnakes and maintenance of viable native fish or soft-rayed, nonnative fish populations (prey) is still occurring.

## **ENVIRONMENTAL BASELINE**

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

### **Description of the action area**

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR section 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. The action area for this biological opinion is defined as all areas impacted by or used to construct the fish barrier, the sedimentation zone above the barrier, and all contractor use areas. In addition, it includes the entirety of Spring Creek above the barrier, as this is where fish not previously known from this creek (spikedace, Gila topminnow, and loach minnow) would be stocked.

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

Northern Mexican gartersnakes are present in Spring Creek, but likely occur in low numbers. Prior to June 24, 2014, the last documented detection of northern Mexican gartersnakes in Spring Creek was 1986 (USFWS 2014). However, while conducting fish surveys in Spring Creek, fisheries biologists captured a northern Mexican gartersnake in a submerged hoop net, and the snake drowned in the net. The gartersnake was captured on private property, upstream of the proposed fish barrier. The FWS, AGFD, and Northern Arizona University (NAU) conducted gartersnake surveys in Spring Creek in late May and did not capture any northern Mexican gartersnakes. Ambient air and water temperatures were still relatively cool and it is possible that we were too early or did not put sufficient effort into the best potential habitat. Additional surveys are needed in order to determine the status of the existing population.

There is northern Mexican gartersnake habitat (some on private lands) and sufficient prey species (native lowland leopard frogs and native fish) for gartersnakes in Spring Creek. It is likely that in the near future we will find more of these gartersnakes in the creek. Additionally, one of the most viable northern Mexican gartersnake populations in Arizona, located at the Page

Springs and Bubbling Ponds State Fish Hatcheries, is less than one mile from Spring Creek (straight-line, overland distance) and approximately 4.75 miles stream distance from the mouth of Spring Creek, up Oak Creek to the hatchery location. Therefore, there is a fairly large source population of northern Mexican gartersnakes located nearby that likely contributes to snake numbers in Spring Creek.

The FWS proposed to designate 3,131 acres (1,267 ha) of critical habitat along 22.5 stream miles (36.2 km) of Spring Creek, from its confluence with Oak Creek upstream to its origin southwest of Buck Ridge, in Yavapai County, Arizona (USFWS 2013). However, the perennial portion of Spring Creek is limited to approximately 3.9 miles in length. The area of perennial stream includes lands managed by the Coconino National Forest and lands owned by several different private landowners. As stated above, Spring Creek contains populations of lowland leopard frogs and several species of native fish that serve as a prey base for northern Mexican gartersnakes. However, crayfish are also present in this unit as well as a recent introduction of green sunfish (*Lepomis cyanellus*). Otherwise, this proposed critical habitat subunit contains sufficient physical or biological features, including PCEs 1 (aquatic habitat characteristics), 2 (terrestrial habitat characteristics), and 3 (prey base). Although, PCE 4 (absence or low level of harmful nonnative species) is not entirely met right now, the level of crayfish in the stream is not currently impacting the viability of the native aquatic species, so it is difficult to speculate how crayfish may or may not be affecting the persistence of northern Mexican gartersnakes here. Special management may be required to maintain or develop the physical or biological features, including the elimination or reduction of crayfish and the green sunfish.

## **B. Factors affecting species' environment within the action area**

The main factors affecting the northern Mexican gartersnake in Spring Creek are unknown. We know that Spring Creek contains crayfish and, since June 2014, some number of green sunfish. However, there is little evidence that the crayfish have had much of an impact on the existing native fish and lowland leopard frog populations due to the numbers of these fishes and frogs detected during surveys and the abundance of all age classes over a long period of time (S. Hedwall, pers. comm.). Spring Creek has both private and public land managers. Based upon aquatic species surveys (conducted with permission) on private lands, the riparian vegetation and aquatic habitat appear to be intact and functioning and there is a strong commitment from the landowners to protect the riparian buffer and support the conservation of native aquatic species within the creek. The Forest Service is also committed to managing their section of Spring Creek to promote native species, reduce invasive vegetation, and maintain flows.

Beavers have recently colonized Spring Creek and have been busy cutting down the riparian trees along the creek. Although beavers can have many beneficial effects in stream systems, the loss of riparian vegetation, particularly trees, along Spring Creek could result in mixed effects to the aquatic community, including: 1) elevated stream temperatures that could negatively affect the native fishes by reducing dissolved oxygen levels, but accelerate larval development and metamorphosis of lowland leopard frogs; 2) expanded pool habitats that could benefit nonnative warm water fishes; 3) expanded breeding habitat for lowland leopard frogs (a prey species of northern Mexican gartersnakes); and 4) an increased amount of high-quality foraging habitat for

northern Mexican gartersnakes. Continued monitoring of the site will allow us to track how beavers modify the system over time.

## **EFFECTS OF THE ACTION**

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

Native aquatic species protection projects, such as the barrier construction on Spring Creek, are expected to benefit the northern Mexican gartersnake in the long-term; however, they could also result in short-term adverse effects. The project footprint overlaps occupied suitable northern Mexican gartersnake habitat, and individual gartersnakes occur within the project limits. The project may have localized, short-term adverse effects to the species from barrier construction such as streamflow alteration, sedimentation, temporary impacts to riparian vegetation, and potential injury or death to individual gartersnakes. The project implementation would follow appropriate standards and guidelines to minimize impacts to the species and aquatic habitat. This project is expected to have long-term benefits by reducing the potential for nonnative fishes to access habitat for the snake.

The direct and indirect effects of the proposed action include potential adverse effects, and even fatality, to individual snakes. At a minimum, direct impacts through displacement will occur as snakes are driven underground or undercover (rocky piles, coarse woody debris, etc.) where they are likely to stay. This behavior could increase risk to snakes as they would not be visible. Individual gartersnakes not observed or that cannot be captured may be injured or killed as a result of construction activities associated with the barrier construction.

Depending upon weather conditions, northern Mexican gartersnakes may be attempting to aestivate within the project area in November (or sooner if ambient air temperatures drop sooner). However, information from northern Mexican gartersnake work conducted in the Verde watershed indicates that these snakes do not remain inactive throughout the winter, but will move between hibernaculæ sites (I. Emmons, Northern Arizona University, pers. comm.). We would expect that activity levels of snakes would be lowest in January and February, then begin to increase as air temperatures increase in late February through March.

Northern Mexican gartersnakes tended to be inactive on days when nighttime temperatures fall to freezing or below. When nighttime temperatures are above freezing for consecutive nights, it is likely that substrates could warm to the point that snakes become active (I. Emmons, Northern Arizona University, pers. comm.). Therefore, there is a high likelihood of construction activities impacting hibernaculæ during the proposed construction period. Winter telemetry work conducted in the Verde River, downstream of the action area, found northern Mexican

gartersnakes using rodent burrows and talus/rock piles for hibernacula (I. Emmons, Northern Arizona University, pers. comm.). Two individuals used sites  $\leq 2$  meters from the edge of water, which means that snakes could occur well within the project footprint, and not just outside the 100-year floodplain.

As part of the project, BOR will conduct a survey of the stream reach potentially affected by construction immediately prior to construction initiation and move any snakes encountered upstream of the project area. If, during the course of the action, a 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.

Temporary increases in turbidity that may result from the barrier construction would have a local and temporary indirect effect on foraging success of the gartersnake downstream from the project area. However, based upon the project time frame (January through March), we expect that any northern Mexican gartersnakes in the area are likely to have limited foraging activity in January and February (particularly if these months are cold), and activity in March, although likely greater than in January and February, is also likely to be reduced due to cooler nighttime temperatures that typically result in reduced activity levels.

#### *Proposed Critical habitat*

Direct effects to the primary constituent elements of northern Mexican gartersnake critical habitat resulting from the barrier construction project are expected to be similar to the indirect effects to the species through habitat modification as described above. The project would have localized, short-term adverse effects to PCEs related to aquatic and riparian habitat from barrier construction and maintenance such as streamflow alteration, sedimentation, and disturbance to the gartersnake's prey base. Project implementation would follow BMPs and other conservation measures, as described above, to minimize impacts to the primary constituent elements of critical habitat. The project is expected to have long-term benefits to gartersnake critical habitat by improving existing habitat by attempting to control the upstream movement of nonnative fishes, and potentially providing increased prey availability. We do not anticipate that this project will diminish the ability of critical habitat to contribute to the conservation and recovery of the species.

### **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions are subject to the consultation requirements established under section 7, and therefore are not considered cumulative to the proposed action.

Future actions within the action area that are reasonably certain to affect the northern Mexican gartersnake and proposed critical habitat include residential home and commercial development on private lands, which could result in negative impacts to watershed integrity. Currently, private landowners along Spring Creek have successfully managed their lands to protect the

riparian buffer and the creek. However, the continued use of ground and surface water in the area could also result in altered hydrologic regimes and increased sedimentation and pollutants to the stream.

Demand for outdoor recreation is also expected to grow concurrently with increasing population in Spring Creek. Aquatic and riparian resources are major attractants for recreational activities, and increased recreation in these areas is likely to result in impacts that remove or alter some stream-side habitat. Increased access by people may also lead to unwanted introductions of nonnative aquatic species.

## CONCLUSION

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.<sup>2</sup> After reviewing the current status of the northern Mexican gartersnake, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that the proposed fish barrier construction project in Spring Creek will not likely jeopardize the continued existence of the gartersnake, and will not destroy or adversely modify its proposed critical habitat. We base our conclusion on the following:

- Spring Creek is occupied by northern Mexican gartersnakes. However, the proposed action will occur within a very small portion of the habitat (1.08 acres). Although a small number of individual gartersnakes may be affected by the proposed action, this project will not result in population level impacts to northern Mexican gartersnakes within the Spring Creek and adjacent Oak Creek Watersheds.
- The project will not affect the long-term suitability of northern Mexican gartersnake habitat or the gartersnake’s ability to use this habitat in the future. In fact, in the long-term this project should benefit gartersnakes in Spring Creek by reducing the threat of nonnative fishes establishing above the barrier.

## INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which

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<sup>2</sup> See December 27, 2004, memo from Acting Director Fish and Wildlife Service. This analysis is also consistent with our proposed definition of “destruction or adverse modification of critical habitat” published in the *Federal Register* on May 12, 2014 (79 FR 27060).

include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the BOR so that they become binding conditions of any grant or permit issued to an applicant/permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The BOR has a continuing duty to regulate the activity covered by this incidental take statement. If the BOR (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the BOR must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [see 50 CFR 402.14(i)(3)].

### **Amount or Extent of Take Anticipated**

We anticipate that the proposed action is reasonably certain to result in incidental take of northern Mexican gartersnakes. We anticipate that the total number of northern Mexican gartersnakes taken as a result of this action will be difficult to predict because finding a dead or impaired specimen will be difficult. However the level of incidental take can be anticipated by the information we have regarding the potential for northern Mexican gartersnakes to be harassed as snakes are captured and moved to new locations, or are injured or killed as a result of the proposed action.

We anticipate the incidental take of up to two northern Mexican gartersnakes in the form of short-term harassment as snakes are captured and moved out of the project footprint; and two northern Mexican gartersnakes in the form of direct fatality or injury as a result of the construction activities in and adjacent to occupied habitat. If more than four northern Mexican gartersnakes are moved or more than two northern Mexican gartersnakes are injured or killed as a result of the project, then as provided in 50 CFR Section 402.16, reinitiation of formal consultation would be required as the amount or extent of incidental take would be exceeded.

### **Effect of the Take**

In this biological opinion we determine that this level of anticipated take is not likely to result in jeopardy to the northern Mexican gartersnake.

### **Reasonable and Prudent Measures with Terms and Conditions**

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize the effects of take of northern Mexican gartersnakes.

1. Protect northern Mexican gartersnakes within the project area.
2. Monitor the impacts of the projects on the northern Mexican gartersnake.

## **TERMS AND CONDITIONS**

In order to be exempt from the prohibitions of section 9 of the ESA, the BOR must comply with the following terms and conditions, which implement the reasonable and prudent measures listed above and outline reporting/monitoring requirements. These terms and conditions are non-discretionary. The FWS may approve deviation from these terms and conditions through site-specific project consultation. Examples warranting deviation from these terms and conditions may include, but are not limited to instances where site-specific conditions dictate that full compliance with the condition is not necessary to avoid incidental take; the BOR lacks discretionary authority to implement the condition; or, deviation from the condition is needed to meet the purpose and need of a project.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Prior to initiation of construction, the BOR will arrange for a qualified biologist with a FWS Recovery Permit for handling northern Mexican gartersnakes to be present onsite to monitor environmental effects during activities within Spring Creek, as needed. We will work with BOR to determine the specific conditions or activities that would result in the need for a monitor during the construction activities.
- 1.2 The biology monitors will follow an established protocol when handling, relocating and processing any northern Mexican gartersnakes located within the project area.
- 1.3 Prior to construction, including ground-disturbing activities, the BOR will arrange for a biologist to present an environmental awareness program to all personnel who will be on-site, including, but not limited to, contactors, contractor's employees, supervisors, inspectors, and subcontractors working at the barrier construction site. This program will provide information concerning the biology and distribution of the northern Mexican gartersnake, legal status and occurrence in the project area, measures to avoid impacts to northern Mexican gartersnakes, and procedures to be implemented in case of gartersnake encounters. No construction work, including ground-disturbing activities, will begin prior to presentation of the environmental awareness program.
- 1.4 Prior to the start of construction, the BOR will arrange for a qualified biologist with the necessary scientific collecting permit(s) to conduct a preconstruction survey for northern Mexican gartersnakes. The survey will take place no more than 24 hours prior to the start of construction and will include all areas of potential ground disturbance within the barrier footprint, upstream and downstream of the barrier site, and the riparian and hibernaculae habitat adjacent

to the stream. This intensive survey prior to the start of construction should focus efforts along the banks where habitat will be impacted by the work. Northern Mexican gartersnakes are known to use rodent burrows and talus/rock piles for hibernacula, so these areas should be carefully surveyed and should include the area immediately adjacent to the creek edge and into the affected floodplain area.

- 1.5 If injured northern Mexican gartersnakes are located within the project area, they will be captured and transported to a location determined in advance by the FWS and AGFD for potential rehabilitation. If these snakes require long-term care, BOR may need to provide funding to the holding facility to provide for this care. Final decisions regarding the fate of these gartersnakes will be determined by the FWS and AGFD.
- 1.6 No products that contain netting with an opening of ¼ inch or greater will be used for erosion control.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Any northern Mexican gartersnake fatalities related to project activities will be thoroughly documented. In addition to reporting a fatality to the FWS Law Enforcement Office (see below), any fatalities will be immediately reported to US Fish and Wildlife Service Supervisory Fish and Wildlife Biologist Shaula Hedwall (928-556-2118).
- 2.2 The BOR shall submit a summary report to our Flagstaff Office within 12 weeks of project completion that documents implementation of the reasonable and prudent measures and terms and conditions.

### **Disposition of Dead or Injured Listed Species**

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling dead specimens to preserve the biological material in the best possible state.

Certain project activities may also affect species that are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA). The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the FWS. BGEPA prohibits anyone, without a permit issued by the FWS, from taking (including



disturbing) eagles, and including their parts, nests, or eggs. If you believe migratory birds will be affected by the project, we recommend you contact our Migratory Bird Permit Office, P.O. Box 709, Albuquerque, NM 87103, (505) 248-7882, or [orpermitsR2mb@fws.gov](mailto:orpermitsR2mb@fws.gov). For more information regarding the MBTA, please visit the following websites: <http://www.fws.gov/migratorybirds> and <http://www.fws.gov/migratorybirds/mbpermits.html>. For information on protections for bald eagles under the BGEPA, please refer to the FWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) that were published in the Federal Register on June 5, 2007. Existing take authorizations for bald eagles issued under the ESA became covered under the BGEPA via a final rule published in the Federal Register on May 20, 2008 (73 FR 29075). Our office is also available to provide technical assistance to help you with compliance.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend the BOR work with us and AGFD to study the effects of stocking spikedace, Gila topminnow, and loach minnow on the existing native fish community.
2. We recommend the BOR work with us and AGFD to continue mechanical removal/suppression actions for the green sunfish that are now present upstream of the proposed barrier site.
3. We recommend the BOR work with us and AGFD to identify additional opportunities to remove harmful nonnative species within the Verde River sub-basin to improve the status of native aquatic species.

### **REINITIATION - CLOSING STATEMENT**

This concludes formal consultation on the action outlined in your request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

This also concludes the conference for proposed critical habitat for the northern Mexican gartersnake. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation when critical habitat is designated for the gartersnake. The request must be in writing. If the FWS reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during the conference, the FWS will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

After listing as threatened or endangered and any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to continue to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this biological opinion, are notifying affected Tribes of its completion. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

We appreciate the BOR's efforts to identify and minimize effects to the northern Mexican gartersnake and its proposed critical habitat. For further information, please contact Shaula Hedwall at (928) 556-2118 or Brenda Smith at (928) 556-2157. Please refer to the consultation number, 02EAAZ00-2013-F-0153, in future correspondence concerning this project.

/s/ Brenda Smith for

Steven L. Spangle

cc (electronic):

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ  
 Regional Supervisor, Arizona Game and Fish Department, Flagstaff, AZ  
 Fish and Wildlife Biologist, Tucson, AZ (Attn: Jeff Servoss)  
 Fish and Wildlife Biologist, Phoenix, AZ (Attn: Mary Richardson)  
 Director, Hopi Cultural Preservation Office, Kykotsmovi, AZ  
 Director, Cultural Resources Department, Hualapai Tribe, Peach Springs, AZ  
 Assistant Attorney General, Pascua Yaqui Tribe, Tucson, AZ  
 Director, Apache Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ  
 Director, Yavapai Cultural Program, Yavapai-Apache Nation, Camp Verde, AZ  
 Director, Cultural Research Program, Yavapai-Prescott Indian Tribe, Prescott, AZ

Fisheries Biologist, Bureau of Reclamation, Phoenix, AZ  
Environmental Protection Specialist, Bureau of Reclamation, Phoenix, AZ  
District Ranger, Coconino National Forest, Red Rock Ranger District, Sedona, AZ  
Fisheries Biologist, Coconino National Forest, Red Rock Ranger District, Sedona, AZ  
District Biologist, Coconino National Forest, Red Rock Ranger District, Sedona, AZ  
Environmental Specialist, Environmental Services, Western Regional Office, Bureau of  
Indian Affairs, Phoenix, AZ

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## APPENDIX A – CONCURRENCE

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for the threatened narrow-headed gartersnake, the endangered loach minnow, the endangered spikedace, the endangered Gila topminnow, and the proposed threatened yellow-billed cuckoo.

### Narrow-headed gartersnake

We concur with your determination that the proposed action may affect, but will not likely adversely affect, the narrow-headed gartersnake. We base this concurrence on the following:

- The narrow-headed gartersnake does not occur in Spring Creek, so there will be no effects to the species from the proposed action.
- Although the proposed action includes the potential to introduce narrow-headed gartersnakes here, we do not consider this action appropriate because northern Mexican gartersnakes currently inhabit the area. Therefore, the decision of where narrow-headed gartersnakes could be introduced in the future will be made by FWS, in cooperation with AGFD, and is not considered to be part of this action.

### Loach minnow, spikedace, Gila topminnow

We concur with your determination that the proposed action may affect, but will not likely adversely affect, spikedace, Gila topminnow, and loach minnow. We base our concurrence on the following:

- Currently, spikedace, Gila topminnow, and loach minnow do not occur in Spring Creek, so barrier construction will have no effect on these species.
- Introducing spikedace, Gila topminnow, and loach minnow to Spring Creek may aid in the conservation and recovery of these species.

### Yellow-billed cuckoo

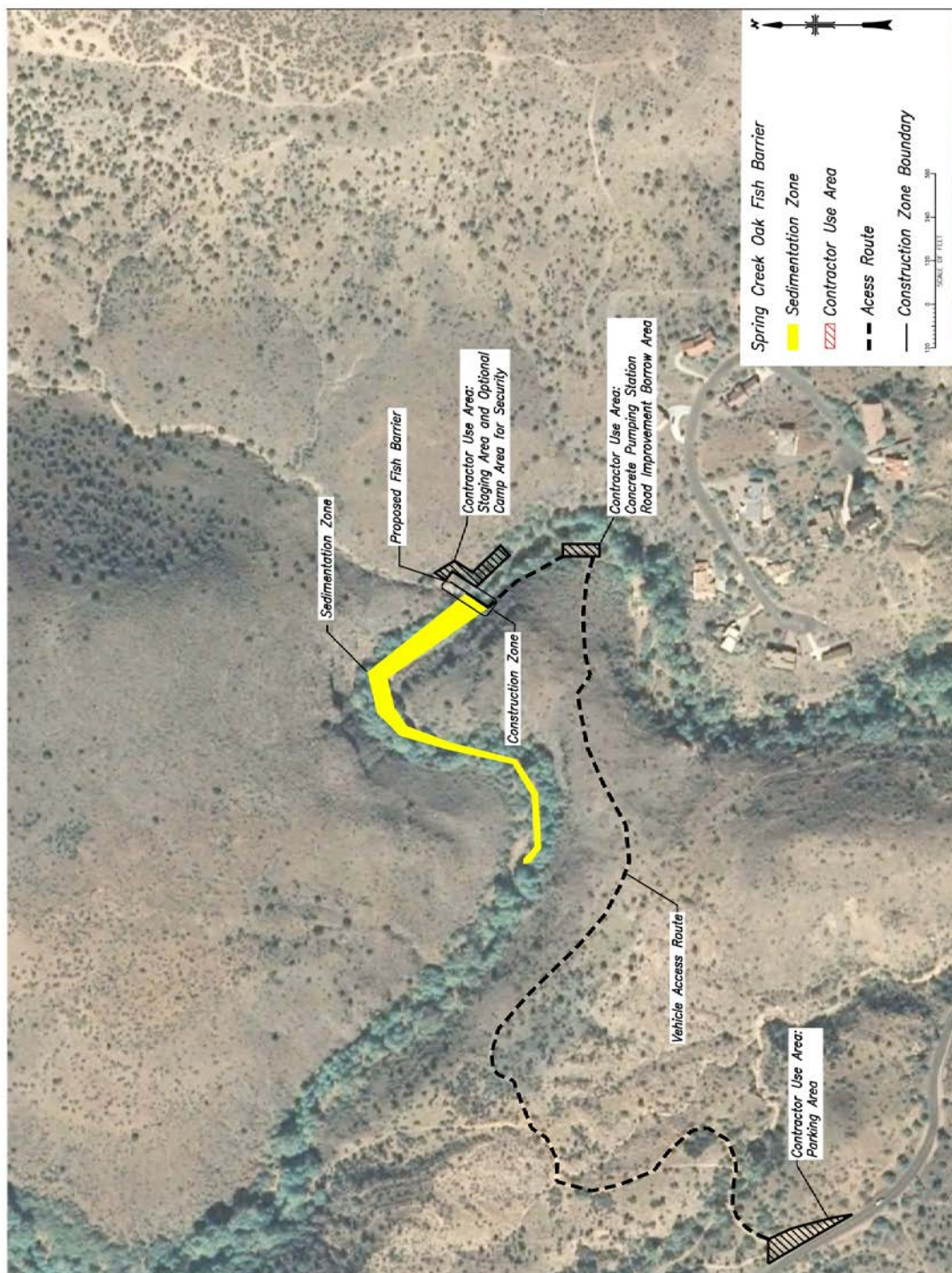
We concur with your determination that the proposed action may affect, but is not likely to adversely affect the yellow-billed cuckoo. We base this concurrence on the following:

- Yellow-billed cuckoos have been documented occurring upstream of the project area. Cuckoos begin arriving in Arizona in late May and early June, with the majority arriving in mid- to late-June. Nesting activities usually occur between late June and early July, but can begin as early as late May and continue through late September. The barrier will be constructed in the winter, outside the cuckoo breeding season. Since the project will be implemented outside of the cuckoo breeding season, even if cuckoos are present in the

surrounding area, any disturbance to cuckoos from this project would be insignificant and discountable.

- At the barrier site, construction would directly impact a mixed stand of riparian trees (mostly Gooding 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 terrace between the end of the access road and the barrier site, affecting 0.04 acre. Efforts would be made to protect tree stumps along this route to encourage regeneration after construction. These effects to the riparian habitat are expected to be temporary and would result in insignificant and discountable effects to cuckoo foraging habitat.

## APPENDIX B – FIGURES



**Figure 1.** Detailed aerial view of the Spring Creek fish barrier construction project, showing access, contractor use areas, and the upstream sedimentation zone.



### APPENDIX C – BEST MANAGEMENT PRACTICES

BMP #	Mitigation
BMP #1	Onsite fueling of vehicles would be done on a designated protected, upland site. Only small quantities of fuel may be stored in the project. Fuel storage would be restricted to areas above the 100-year floodplain of Spring Creek.
BMP #2	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.
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 thereof, 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 will remain in place until the project is complete and exposed soils are stabilized.
BMP #7	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 areas to promote revegetation. Seed at 5 pounds/acre with native, certified weed free seed mix. Potential vegetation for individual sites should utilize the Kaibab and CNF Terrestrial Ecosystem Survey to identify species to be utilized.
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 #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 the period when stream flow is expected to be low (October and November).
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 significant leaks would be promptly corrected.