



# United States Department of the Interior



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AESO/SE  
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## Memorandum

**To:** Program Manager, Lower Colorado River Multi-Species Conservation Program,  
Bureau of Reclamation, Boulder City, Nevada

**From:** Field Supervisor

**Subject:** Final Biological Opinion for the Maintenance Activities within the Beal Lake  
Conservation Area, Mohave County, Arizona

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (ESA). Your request, dated October 23, 2015, was received in our office on October 26, 2015, with supplemental information received in early consultation as described in the Consultation History section of this document. At issue are impacts that may result from the ongoing maintenance activities within the BLCA, Mohave County, Arizona. The Bureau of Reclamation (Reclamation) concluded that the proposed action "may affect, and is likely to adversely affect" the threatened northern Mexican gartersnake (*Thamnophis eques megalops*).

This Opinion is based on information provided in Reclamation's Biological Assessment (BA), telephone conversations and meetings between our staff, and other sources of information found in the administrative record supporting this Opinion. All other aspects of the proposed action remain the same as described in the BA. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern. A complete administrative record of this consultation is on file at this office.

## Consultation history

1997

Biological and Conference Opinion on the Lower Colorado River Operations and Maintenance rendered. Improvements to Beal Lake (now part of the BLCA)

- 2002 were originally completed to partially fulfill the Reasonable and Prudent Alternative Number 3.
- 2005 Consultation of the 1997 BO was reinitiated, and a BO was provided which included maintenance of Beal Lake, currently included in the BLCA.
- 2005 The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) was created. The riparian development work near Beal Lake and maintenance on the lake would become the BLCA.
- August 6, 2015 Reclamation met with the Service to discuss early planning and consultation processes for BLCA regarding the northern Mexican gartersnake.
- September 28, 2015 The Service provided comments to Reclamation regarding the Draft BA.
- October 26, 2015 Memorandum requesting Formal Consultation and Final BA was received by the Service.
- October 27, 2015 Reclamation hosted a BLCA site visit to Service personnel.
- November 1, 2015 The Service sent a thirty-day letter to Reclamation, stating that all information needed to render a BO was received.
- November 16, 2015 Draft BO was provided to Reclamation for review.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

The BLCA contains both backwater and riparian components. To enhance Beal Lake's value for native fish and other wildlife species, site maintenance is required under the conservation measures listed in the LCR MSCP Habitat Conservation Program (HCP), including a number of infrastructure improvements. Monitoring, maintenance, and infrastructure activities are expected for the life of the LCR MSCP (expires March 4, 2055). Maintenance activities include actions focused in aquatic and riparian areas and are explained in detail in the BA, and are summarized as such;

1. Site monitoring and species surveys.
2. Vegetation management and removal. Most vegetation removal will be accomplished by mechanical means. Pesticide and herbicide use is not anticipated, however, if these means are deemed necessary, Reclamation will use herbicides approved under Havasu National Wildlife Refuge's approved Pesticide Use Proposal.
3. Future aquatic area maintenance activities will include; flushing pipes/culverts; replacing and cleaning inlet gates, screens, or trash racks; contouring and grading; and excavation and dredging activities (stockpiling dredge material (i.e. sandy soils) in the backwater, canal, and ditches. Excess materials will be deposited in the upland area northeast of the backwater. The location of proposed maintenance activities include the Topock Marsh-Beal ditch inlet, Beal ditch, Beal ditch rock structure (semi-permeable barrier), the backwater, and other areas, as needed, within the BLCA. These activities may include ground disturbance; however, these areas have experienced historic surface disturbance from the creation of the conservation area. Ground disturbing activities occurring in and along Beal Ditch will be accessed from the non-vegetated south side of the ditch.
4. Future riparian area maintenance activities include; operation and maintenance of pumps and irrigation valves, road grading and maintenance, temporary road base (3/4 inch or smaller size gravel) stockpiling, vegetation management, and invasive plant species removal using hand pulling or mechanical removal. The location of maintenance activities include all areas identified as requiring maintenance or treatment within BLCA. These activities may include ground disturbance or vegetation removal however, these areas have experienced historic surface disturbance from the creation of the conservation area.

Maintenance activities may be completed using a variety of methods including hand tools, vehicles, and heavy equipment from land or water. Work will be completed by Reclamation or other entities acting on their behalf. Biological monitors will be present during ground moving activities. Biological monitors that may handle gartersnakes will be properly permitted and covered under the LCR MSCP section 10(a)1(A) recovery permit. All take of northern Mexican gartersnakes in the form of harassment, harm, or death will be covered under the included incidental take permit (see Amount or Extent of Take section below) and are subject to reinitiation if thresholds are exceeded. Maintenance and infrastructure improvements are anticipated for the life of the LCR MSCP. Depending on the location of the activity, work may be completed at all times of the year but may be adjusted to avoid sensitive areas during the breeding bird season or based on other MSCP covered species needs in addition to the suggested measures listed in Section 6 *Effects Determination* of the BA and Conservation Measures and Conservation Recommendations listed below.

### ***Conservation Measures***

In addition to measures identified in the 2005 Biological and Conference Opinion on the Lower Colorado River Multi-Species Conservation Program, Reclamation LCR MSCP proposes the following measures common to all activities within the BLCA:

1. A maximum speed limit of 10 miles per hour will be required during the most-active season for northern Mexican gartersnakes (March 1st to October 31st) and a maximum speed limit of 25 mph will be required during the less-active season (November 1<sup>st</sup> to February 28/29<sup>th</sup>) to avoid the snakes while traveling within the conservation area.
2. Prior to ground disturbing activities, Reclamation will arrange for a biologist to present an environmental awareness program to all personnel who will be on-site. Reclamation may coordinate with the Service to develop guidance for the education program including information concerning the biology and distribution of the northern Mexican gartersnake, legal status, and occurrence in the BLCA, measures to avoid impacts to the species, and procedures to be implemented in case of gartersnake encounters. No ground disturbing activities will begin prior to presentation of the environmental awareness program and handling of snakes will be avoided unless absolutely necessary, as determined by Reclamation.
3. Work will stop if a gartersnake is found within the immediate area to be disturbed and the gartersnake will be allowed to leave the site on its own volition. Gartersnakes may not travel far distances away once disturbed, rather individuals may seek cover in the vicinity of the disturbance, possibly making removal necessary. If the gartersnake requires removal from the location, a biological monitor will follow an established protocol when handling, relocating, and processing any northern Mexican gartersnakes located within the project area.
4. If minnow traps are utilized to capture small life stage fishes the traps will be closely monitored and checked at least twice daily to allow any unintended non-target species opportunities to escape. Air gaps will be used if traps are placed near the shoreline.

Proposed measures for activities involving ground disturbance and/or more extensive efforts:

5. Prior to initiation of maintenance activities within the ditch, backwater, or other areas with high potential habitat, Reclamation will arrange for a qualified biologist to perform a habitat assessment and monitor environmental effects, as needed. The need for a biological monitor will be coordinated with the Service. The anticipated active season for the gartersnake overlaps with the breeding bird nesting season. Routine, ongoing monitoring and maintenance activities would not require a monitor.
6. When possible, ground disturbing activities should be avoided when snakes are least likely to be active on the surface and more likely to be in underground hibernacula, in order to avoid injury to snakes in torpor. MSCP biologists will determine the appropriate time and location of ground disturbing activities to minimize the danger of harming snakes during winter months, which may include choosing the warmest days and hours within the day during this period.
7. Work will stop if gartersnakes are found within the immediate area to be disturbed and the gartersnake will be allowed to leave the site on its own volition. If the gartersnake requires removal from the location, a biological monitor will follow an established

protocol when handling, relocating, and processing any northern Mexican gartersnakes located within the project area.

- a. If injured, northern Mexican gartersnakes will be captured and transported to a location determined in advance by the Service and AGFD for potential rehabilitation.
  - b. Any northern Mexican gartersnake fatalities related to project activities will be thoroughly documented and reported to the Service.
8. Northern Mexican gartersnakes are known to utilize talus/rock piles, rip/rap, or any organic or inorganic debris pile. These areas should be avoided and not altered unless determined absolutely necessary to maintain the conservation area's benefit to covered species. Reclamation will coordinate with the Service if rip/rap or rock piles need to be altered during the life of the project.
9. Trenches should be back filled prior to night fall. If trenches are to remain open overnight, the trenches will be covered to avoid wildlife entrapment and cleared of any wildlife prior to continuing work. Trenches will be checked regularly and frequently throughout the day by a biological monitor and immediately prior to back filling. Regular checks of the trench and removal of trapped wildlife will minimize the risk of harm from exposure during the day or unintentional prolonged entrapment.

### **Action Area**

The action area for this proposed action is the BLCA consisting of 341 acres and is located on the Havasu National Wildlife Refuge within the 100-year historic floodplain of the Lower Colorado River, adjacent to River Mile 237 on the Arizona side. Havasu National Wildlife Refuge is located approximately 10 miles southeast of Needles, California, and approximately 30 miles northwest of Lake Havasu City, Arizona.

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

#### **Northern Mexican gartersnake**

The Federal Register notice listing the northern Mexican gartersnake as threatened under the Act was published on July 8, 2014 (79 FR 38678). Please refer to this rule for more in-depth information on the ecology and threats to the species, including references. Critical habitat was proposed on July 10, 2013 (78 FR 41500) and has not yet been designated. Details on critical habitat are provided below. The final listing and proposed critical habitat rules are incorporated herein by reference.

The northern Mexican gartersnake, which reaches up to 44 inches total length, 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 similarity of appearance to other native gartersnake species.

Throughout its rangewide distribution, the northern Mexican gartersnake occurs at elevations from 130 to 8,497 ft (Rossman et al. 1996) and is considered a “terrestrial-aquatic generalist” by Drummond and Marcías-García (1983). The northern Mexican gartersnake is often found in riparian habitat, but has also been found hiding under cover in grassland habitat up to a mile away from any surface water (Cogan 2015). The subspecies has historically been associated with three general habitat types: 1) source-area wetlands (e.g., ciénegas 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) 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). Primarily, 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), but earthworms, leeches, lizards, and small mammals are also taken. 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 nonnative fishes. In northern Mexican gartersnake populations where the prey base is skewed heavily towards harmful nonnative species, recruitment of gartersnakes is often diminished or nearly absent.

Natural 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 gartersnakes where they co-occurred. Native chubs in their largest size class may also prey on neonatal gartersnakes, but has not been confirmed in the literature or through field observation.

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 ciénegas, ponds, or stock tanks (Rosen and Schwalbe 1988, Rosen et al. 2001; Holycross et al. 2006; see Figure 1). 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 and elsewhere in Arizona, the northern Mexican gartersnake may occur in extremely low population densities within its historical distribution; limited survey effort is inconclusive to determine extirpation of this highly secretive species. 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 understood. 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 23 of 33 known localities in the United States (70 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 significant 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 (79 FR 38678).

**Current population status of the northern Mexican gartersnake in the United States**

Row	Location	Last Record	Suitable Physical Habitat Present	Native Prey Species Present	Harmful Nonnative Species Present	Predicted Population Status
1	Gila River (NM, AZ)	2013	Yes	Yes	Yes	Likely low density
2	Spring Canyon (NM)	1937	Yes	Possible	Likely	Likely extirpated
3	Mule Creek (NM)	1983	Yes	Yes	Yes	Likely low density
4	Mimbres River (NM)	Likely early 1900s	Yes	Yes	Yes	Likely extirpated
5	Lower Colorado River (AZ)	2015	Yes	Yes	Yes	Likely low density
6	Bill Williams River (AZ)	2012	Yes	Yes	Yes	Likely viable
7	Big Sandy River (AZ)	2015	Yes	Yes	Likely	Likely low density
8	Santa Maria River (AZ)	2015	Yes	Yes	Likely	Likely low density
9	Agua Fria River (AZ)	1986	Yes	Yes	Yes	Likely low density
10	Little Ash Creek (AZ)	1992	Yes	Yes	Yes	Likely low density
11	Lower Salt River (AZ)	1964	Yes	Yes	Yes	Likely extirpated
12	Black River (AZ)	1982	Yes	Yes	Yes	Likely low density
13	Big Bonito Creek (AZ)	1986	Yes	Yes	Yes	Likely low density
14	Tonto Creek (AZ)	2005	Yes	Yes	Yes	Likely viable
15	Upper /Middle Verde River (AZ)	2012	Yes	Yes	Yes	Likely viable
16	Oak Creek (AZ) (Page Springs and Bubbling Ponds State Fish Hatcheries)	2015	Yes	Yes	Yes	Likely viable
17	Spring Creek (AZ)	2014	Yes	Yes	Yes	Likely low density
18	Sycamore Creek	1954	Yes	Possible	Yes	Likely

	(Yavapai/Coconino Co., AZ)			e		extirpated
19	Upper Santa Cruz River/San Rafael Valley (AZ)	2015	Yes	Yes	Yes	Likely viable
20	Redrock Canyon/Cott Drainage (AZ)	2008	Yes	Yes	Yes	Likely low density
21	Sonoita Creek (AZ)	2013	Yes	Possible	Yes	Likely low density
22	Scotia Canyon (AZ)	2009	Yes	Yes	No	Likely low density
23	Parker Canyon (AZ)	1986	Yes	Possible	Yes	Likely low density
24	Las Ciénegas National Conservation Area and Ciénega Creek Natural Preserve (AZ)	2015	Yes	Yes	No	Likely low density
25	Lower Santa Cruz River (AZ)	1956	Yes	Yes	Yes	Likely extirpated
26	Buenos Aires National Wildlife Refuge (AZ)	2000	Yes	Yes	Yes	Likely low density
27	Brown Canyon (AZ)	2014	Yes	Yes	No	Likely low density
28	Fort Huachuca (AZ)	1994	Yes	Yes	Yes	Likely low density
29	Bear Creek (AZ)	1987	Yes	Yes	Yes	Likely low density
30	San Pedro River (AZ)	1996	Yes	Yes	Yes	Likely low density
31	Babocomari River and Ciénega (AZ)	1986	Yes	Possible	Yes	Likely low density
32	Canelo Hills-Sonoita Grasslands Area (AZ)	2015	Yes	Yes	Yes	Likely low density
33	San Bernardino National Wildlife Refuge (AZ)	1997	Yes	Yes	Yes	Likely low density

Notes: "Possible" means there were no conclusive data found. "Likely extirpated" means the last record for an area pre-dated 1980, and existing threats suggest the species is likely extirpated. "Likely low density" means there is a post-1980 record for the species, it is not reliably found with minimal to moderate survey effort, and threats exist which suggest the population may be low density or could be extirpated, but there is insufficient evidence to support extirpation. "Likely viable" means that the species is reliably found with minimal to moderate survey effort, and the population is generally considered to be somewhat resilient.

Figure 1: Current, predicted population status of the northern Mexican gartersnake in the United States.

### *Critical Habitat*

Critical habitat for the northern Mexican gartersnake has been proposed in 14 units in portions of Arizona and New Mexico totaling 421,423 acres. Within these areas, the primary constituent elements (PCEs) of the physical and biological features essential to northern Mexican gartersnake conservation are:

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 Ciénegas; 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 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.
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 in the action area to provide a platform to assess the effects of the action now under consultation.

## A. STATUS OF THE SPECIES AND POTENTIAL HABITAT WITHIN THE ACTION AREA

*Lower Colorado River*—Three records from the late 1800s-early 1900s and a fourth from 2015 document northern Mexican gartersnakes from the Colorado River where they were likely broadly distributed along its course prior to area settlement. We are aware of no surveys specifically conducted for northern Mexican gartersnakes along the lower Colorado River in modern history, largely because they were considered likely extirpated there for decades due to significant habitat alteration, channelization, and the introduction of harmful nonnative species (Vitt and Ohmart 1978, Ohmart *et al.* 1988, Rosen and Schwalbe 1988). Vitt and Ohmart (1978) conducted a general reptile and amphibian inventory along the lower Colorado River that consisted of visual searches on foot and by vehicle and found no northern Mexican gartersnakes; no trapping was performed. Bullfrogs are considered abundant throughout the lower Colorado River which likely led to the suspected extirpation of native leopard frogs that were once widespread there (Vitt and Ohmart 1978, Clarkson and DeVos 1986, Ohmart *et al.* 1988). Crayfish are also abundant along the lower Colorado River (Ohmart *et al.* 1988, Inman *et al.* 1998) and are commonly found in the stomachs of bullfrogs (Clarkson and DeVos 1986). Forty-four species of nonnative fish are known from the Colorado River in high abundance and native fish species have declined precipitously (Ohmart *et al.* 1988, Hendrickson and Varela-Romero 1989, Minckley *et al.* 2003). Northern Mexican gartersnakes may immigrate to the lower Colorado River from occupied habitat in the Bill Williams River, but fisheries management policies in the mainstem Colorado, the abundance of harmful nonnative species, and significant habitat alteration along the lower Colorado River would likely prohibit the reestablishment of a robust northern Mexican gartersnake population in the lower Colorado River. We consider this population as likely low density.

<b>Colorado River Subbasin: Lower Colorado River (Arizona)</b>			
<b>Record Year</b>	<b>Locality Descriptor</b>	<b>Reference</b>	<b>Notes</b>
1889	Yuma	Rosen and Schwalbe 1988, Appendix I; Holycross <i>et al.</i> 2006, Appendix A	140 ft elevation – low elevation record for Arizona (possibly rangewide)
1890	Yuma		
1904	ca. Fort Mohave		
2015	Havasu NWR	Cotten 2015	BLCA; single adult. Potentially, same individual observed on two occasions in the same area.
<b>Predicted Population Status: Likely low density</b>			

Table 2. Colorado River detections.

*Bill Williams River*—Prior to 2012, there were no records of northern Mexican gartersnakes from the Bill Williams River. In 2012, a total of ten records were obtained; the first, an incidental capture during another research project. We are aware of no targeted surveys for northern Mexican gartersnakes that have occurred in this system. Blair (2012, pers. comm.) provided a cumulative list of fish species known to occur in the Bill Williams River that includes many species of native and nonnative fishes. Our knowledge of the aquatic community in Bill

Williams River suggests that it once supported an almost wholly native fish community that collapsed due to the increased presence of nonnative fish after the construction of the Alamo Lake Dam, which stabilized flows and provided an advantage to nonnative species (Pool and Olden 2014 *In press*). Eleven nonnative fish species have been reported from the Bill Williams River (Pool and Olden 2014 *In press*). Upstream, in Alamo Lake, the fish community is largely made-up by predatory nonnative fish, with largemouth bass comprising the highest numbers, followed by yellow bullhead, channel catfish, and black crappie in no specific order (USFWS 2011b). Crayfish are known as abundant in the Bill Williams River and nonnative, predatory fish predominate currently, but bullfrogs curiously appear to be absent. Lowland leopard frogs are present in various densities and likely serve as the primary prey species for northern Mexican gartersnakes in the Bill Williams River. As of 2008, Anderson and Shafroth (2012) estimated that 92 beaver dams were present on the river, adding that an estimated 3–4 percent of the river is converted from lotic (flowing water) to lentic (still water) habitat annually when significant flooding does not occur. The creation of pool habitat from beaver dam activity, combined with the existing dense cover found in the riparian corridor, and abundant backwaters along the Bill Williams River, likely benefits the northern Mexican gartersnake by providing excellent foraging conditions and protective cover from nonnative predation. However, beaver dams also provide suitable habitat for harmful nonnative species. The 2012 records and the relative ease of acquiring them suggest the northern Mexican gartersnake is likely viable in the Bill Williams River.

<b>Colorado River Subbasin: Bill Williams River (Arizona)</b>			
<b>Record Year</b>	<b>Locality Descriptor</b>	<b>Reference</b>	<b>Notes</b>
2012	ca. 14 mi E of Hwy 95 crossing of Bill Williams River	Jones 2012a, pers. comm.; Cotton <i>et al.</i> 2013, p. 111	Adult female captured and drowned in a funnel trap used in leopard frog survey. First record for this drainage.
2012	ca. 14 mi E of Hwy 95 crossing of Bill Williams River	Jones 2012b, pers. comm.	Additional nine individuals captured and released alive.
<b>Predicted Population Status: Likely viable</b>			

Table 3. Bill Williams River detections.

In the spring of 2015, the LCR MSCP was notified by Great Basin Bird Observatory that they may have sighted a northern Mexican gartersnake at BLCA on the Havasu National Wildlife Refuge in Arizona during riparian bird monitoring. Arizona Game and Fish Department, the Service, and U.S. Geological Survey were notified and five photographs were provided for identification. A gartersnake was observed on May 4, 2015, in the same area and two additional photographs were taken for identification. The Service notified the LCR MSCP on June 1, 2015, that the species was confirmed as a northern Mexican gartersnake by Taylor Cotten and Tom Jones of AGFD and Jeff Servoss of the Service.

Northern Mexican gartersnake distribution and abundance within the BLCA is not well known at this time, nor is its distribution on other portions of the Havasu National Wildlife Refuge known.

The snake may have come from Topock Marsh as it was found on a road about 275 meters from Topock Marsh to the north and well over 800 meters from open water of the backwater to the south. In their biological assessment, the LCR MSCP reviewed the existing literature and coordinated with biologists knowledgeable of the species to predict the potential for encountering gartersnakes on the BLCA based on the habitat type and species preferences. That site specific information is provided with the more general species data in the following sections.

### Sheltering Habitat

Northern Mexican gartersnakes take shelter or cover in dense herbaceous vegetation, dense emergent vegetation, holes, root crevices, submergent vegetation, debris dams, downed logs or trees, rocky areas or rock piles, and man-made cover such as riprap or other debris (Conant 2003, Emmons and Nowak 2013, Nowak et al. 2011, Rosen and Schwalbe 1988, Taylor Cotton Pers comm. 2015). The presence of small diameter trees provides additional habitat complexity, thermoregulatory opportunities, and cover for the northern Mexican gartersnake (USFWS 2014).

Potential sheltering habitat within the BLCA:

1. The dense emergent vegetation surrounding and within the islands of the backwater and on the edges of the ditch, rock structure, and inlet/outlet.
2. The dense emergent vegetation that comprises the entire created willow marsh.
3. The rocks/rock piles/rip-rap (rocks) surrounding the rock structure, ditch, inlet/outlet, and head gates.
4. Debris piles or downed trees within the conservation area. Individuals are more likely to be in debris piles close to the permanent water sources but they could potentially inhabit debris piles farther away from the permanent water.
5. Thick stands of arrowweed and baccharis that are ~3 m tall within the created riparian habitat, existing riparian habitat, habitat islands within the backwater, emergent vegetation around the ditch, rock structure, and inlet/outlet.
6. Root crevices and numerous holes within the created riparian habitat, existing riparian habitat and habitat islands of the backwater, surrounding the emergent vegetation around the ditch, rock structure, and inlet/outlet.

### Habitat Used During Prolonged Inactivity

The northern Mexican gartersnake will use areas of cover with optimal thermal requirements for cover during periods of prolonged inactivity (Taylor Cotton per comm 2015). Steep hills, river banks, upland burrows, and cliffs adjacent to riparian areas near permanent water sources can provide such areas for the species (Nowak et al. 2011). Individuals will also use small mammal burrows, packrat middens, debris piles, flood debris drifts, rock piles, and retaining wall rip-rap (Taylor Cotton per comm. 2015).

Potential habitat as cover during prolonged inactivity within the BLCA:

1. Small mammal burrows or packrat middens within the created riparian habitat, existing riparian habitat, emergent vegetation around the ditch, rock structure, and inlet/outlet.

- a. Small mammal burrows have been observed throughout the created riparian habitat and they seem to be more abundant near the bases of trees and on the edges of the cell where there is a slope.
2. Debris piles or downed trees within the created riparian habitat, existing riparian habitat within backwater, surrounding emergent vegetation around the ditch, rock structure, and inlet/outlet.
3. The rock piles, rip/rap and bare dirt surrounding the ditch, rock structure, and inlet/outlet.
4. The rock piles surrounding the head gates for each cell.

### Food Availability within BLCA

Potential prey at the BLCA are native amphibians such as the Woodhouse's toad (*Anaxyrus woodhousii*), Great Plains toad (*Anaxyrus cognatus*), and Pacific tree frog (*Hylla regilla*) (Cotten 2011, Cotten and Grandmaison 2012, Rorabaugh et al. 2004). The northern Mexican gartersnake will also prey on non-native American bullfrog metamorphosed juveniles and tadpoles (*Lithobates catesbeianus*) and juvenile non-native fish; both are abundant at BLCA (Emmons and Nowak 2013, Holm and Lowe 1996). The northern Mexican gartersnake will also prey upon invertebrates, lizards (*Sceloporus* and *Apsidoscelis spp.*), and small mammals all of which are present at BLCA (Holm and Lowe 1995, Rosen and Schwalbe 1988). The following species of small mammals have been detected at BLCA: cactus mouse (*Peromysus eremicus*), deer mouse (*Peromyscus maniculatus*), desert pocket mouse (*Chaetodipus penicillatus*), house mouse (*Mus musculus*), southern grasshopper mouse (*Onychomys torridus*), Merriam's kangaroo rat (*Dipodomys merriami*), white-throated wood rat (*Neotoma albigula*), and the Colorado River cotton rat (*Sigmodon arizonae*).

Potential habitat harboring prey species within the BLCA:

1. The dense emergent vegetation within the islands of the backwater, created willow marsh, ditch, rock structure, and inlet/outlet.
2. The rock/rip-rap and vegetation around the head gates of each cell that has an intermittent source of water.
3. Created riparian habitat and existing riparian habitat, emergent vegetation around the ditch, rock structure, and inlet/outlet as gartersnakes will occasionally prey upon lizards and small mammals.

### Breeding Season and Habitat

Nowak et al. (2011) thought that open shallow water adjacent to dense emergent and/or submergent vegetation may be important for breeding activities. Female northern Mexican gartersnakes bear young in warm microenvironments that meet thermoregulatory needs, including rock walls, the ground, and sun-warmed sacaton tussocks (Rosen and Schwalbe 1988). The breeding season in this area is estimated to occur between March and July (March-May mating; May-August live birth).

Potential concerns for breeding season within the BLCA:

Due to the mild winter temperatures in the BLCA and surrounding area (rarely below freezing for long periods of time) that are warmer than in much of the other occupied areas, the northern Mexican gartersnakes may exhibit more surface activity than previously suspected and may be more active in the winter months compared to other locations. Supporting evidence for differences in activity related to temperature comes from preliminary findings from telemetry research along the Verde River.

#### Overall Habitat Potential Determination

Based on the information provided above, the MSCP has estimated the habitat areas with a high potential for occurrences of northern Mexican gartersnakes during the active season include the created marsh, 30 meter buffer at the water's edge (15 m in water and 15 m into riparian), and the emergent vegetation. Areas with a moderate potential for occurrences of gartersnakes year-long include the existing riparian habitat and the created riparian habitat. Areas with a low potential for occurrences of gartersnakes include the sparsely vegetated upland habitat with dry, sandy soils.

### **B. FACTORS AFFECTING SPECIES' ENVIRONMENT WITHIN THE ACTION AREA**

#### **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.

Since BLCA was included in the LCR MSCP, impacts as a result of maintenance activities to all currently listed species that may occur at the site have been previously analyzed. This consultation is only for the northern Mexican gartersnake.

Maintenance associated with habitat restoration as part of the LCR MSCP is expected to benefit the northern Mexican gartersnake in addition to other covered species that utilize the sites in the long-term; however, activities could also result in short-term adverse effects. Maintenance activities that can result in localized, short-term adverse effects to individuals of the species include any ground-disturbing activities including bank alteration, sediment removal, and vegetation management. Project maintenance activities will follow appropriate guidelines to avoid or minimize impacts to the species and aquatic habitat.

The potential direct effects of the proposed action include possible injury or killing of individual snakes from heavy equipment operation and vehicle traffic, if not avoided, during maintenance

activities. Maintenance will be needed on the pipes and other infrastructure within the rip/rap and rock pile but the rocks will be left in place. Dredging or excavation activities may also result in stockpiling of sandy materials in low quality habitat areas (i.e. upland area north east of the backwater). The majority of direct impacts to individuals may be avoided as a result of their ability to retreat from the work area. Ground disturbing activities inside the backwater, such as dredging, that occur during the coolest time of year most likely do not pose a danger to inactive snakes because snakes are not expected to be in the water. However, ground disturbing activities in terrestrial habitat may pose a threat to inactive snakes. Habitat characteristics and therefore habitat suitability for gartersnakes varies on the landscape, with some areas possessing features that could be attractive to gartersnakes while others do not. Gartersnakes can also be displaced as a result of human presence and noise from vehicle and equipment travel and operation.

Areas that require vegetation maintenance may result in a temporary loss of very poor quality habitat. Invasive species removal and replanting or soil treatments to increase the potential health of the vegetation will result in short term displacement and habitat loss but long-term increased potential habitat for foraging, cover, prey base, etc.

Gartersnakes may become entrapped in trenches or holes created by excavation equipment or in minnow traps used during fisheries management and monitoring activities. The gartersnakes may be 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 escape may be trapped and adversely affected as a result of maintenance activities associated with the conservation area.

Depending upon weather conditions, northern Mexican gartersnakes may be attempting to aestivate within the project area in the winter months or sooner if ambient air temperatures drop. However, given the low elevation of the action area, gartersnakes are expected to be active on the ground surface more regularly in the winter months as compared to higher elevation habitat, and may be moving between shelter sites as a result of mild winter temperatures. It is anticipated that activity levels of snakes would be lowest in the colder winter months; activity will begin to increase as air temperatures increase in late February through March.

Indirect impacts, including temporary displacement as a result of human interaction, noise and vehicle travel, may occur during the breeding season, which might impact breeding behavior. However, adjacent habitat provides opportunities for any displaced individuals to take cover and quickly return to their normal routine. Prey base may also be temporarily impacted by increased noise levels and move away from areas of human activity. Increases in turbidity may result from maintenance activities taking place in the backwater and ditch which could result in localized and temporary indirect effects on foraging success of the gartersnake if they are foraging in the water. However, temporary water drawdowns for maintenance or irrigation activities may result in increasing foraging habitat along the riparian/water's edge and congregate potential prey base.

All of the LCR MSCP maintenance and monitoring actions at the BLCA are for the benefit of covered species and are expected to continue to provide suitable habitat into the future.

## **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The BLCA is within the Havasu National Wildlife Refuge. A separate consultation on the effects of management actions by the Service on the Refuge is under development. Activities related to agriculture, rural and suburban development, or commercial enterprises on Tribal, Bureau of Land Management, and private lands outside of the boundaries of the Refuge are unlikely to have an impact on northern Mexican gartersnake habitat in the action area. This is in part due to the buffering effect provided by the Refuge lands surrounding the BLCA. The goal of the site maintenance activities of the conservation area and the refuge is to contribute to habitat creation and management for the benefit of the species.

## **CONCLUSION**

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 opinion that the maintenance and monitoring activities within the BLCA are not likely to jeopardize the continued existence of northern Mexican gartersnake. Although a relatively small number of individual gartersnakes may be adversely affected by maintenance activities, these activities are not anticipated to result in population level impacts to the northern Mexican gartersnake. Additionally, maintenance activities are not anticipated to negatively affect the long-term suitability of habitat in the future.

## **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 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 ESA 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 Reclamation so that they become binding conditions of any grant or permit issued, as appropriate, for the

exemption in section 7(o)(2) to apply. Reclamation has a continuing duty to regulate the activity covered by this incidental take statement. If Reclamation (1) fails to assume and implement the terms and conditions or (2) fails to require any 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 Reclamation must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

### **AMOUNT OR EXTENT OF TAKE**

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, given the history of records and suspected population status in the action area.

We anticipate the incidental take of up to 20 northern Mexican gartersnakes in the form of short-term harassment as snakes are captured and moved out of the project footprint; and 10 northern Mexican gartersnakes in the form of direct fatality or injury as a result of the proposed activities within the action area. If more than 20 northern Mexican gartersnakes are moved or more than 10 northern Mexican gartersnakes are injured or killed as a result of the project, and within the 40 year life of the program, 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, the Service determines that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

### **REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS**

We determine that the proposed action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of northern Mexican gartersnakes. All reasonable measures to minimize take have been incorporated into the project description. Thus, no reasonable and prudent measures are included in this incidental take statement.

### **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, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the

Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA 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. Remain an active participant in the Gartersnake Conservation Working Group through recovery planning and implementation on your administered lands.
2. In order to further our knowledge and understanding of northern Mexican gartersnake biology, behavior, and geographic range, we recommend all detections of the northern Mexican gartersnake in the BLCA be reported to the Arizona Ecological Services Office. Please report detections to the geographic lead for this area (Jessica Gwinn, 602-242-0210 ext. 249) and the species lead (Jeff Servoss, 520-670-6150 ext. 231).

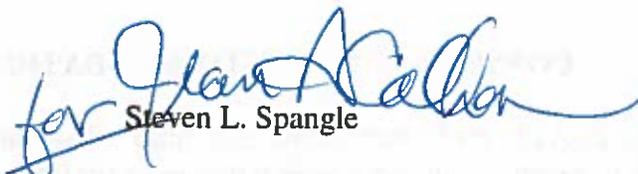
### **REINITIATION NOTICE**

This concludes formal consultation on the action outlined in the Project Description of this Opinion. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of Reclamation's 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.

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 the following Tribes of its completion: Ft. Mohave Tribe, Colorado River Indian Tribes, Hopi Tribe, Hualapai Tribe, and Chemehuevi Tribe. We also encourage you to continue to coordinate with the Arizona Game and Fish Department.

We appreciate the Bureau of Reclamation's efforts to identify and minimize effects to listed species from this project. For further information please contact Jessica Gwinn (ext. 249) or Steve Spangle (ext. 244).

Please refer to the consultation number 02EAAZ00-F-0581, in future correspondence concerning this project.

  
for Steven L. Spangle

cc: Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ  
(pep@azgfd.gov)  
Ft. Mohave Tribe, Needles, CA  
Colorado River Indian Tribes, Parker, AZ  
Hopi Tribe, Kykotsmovi, AZ  
Hualapai Tribe, Peach Springs, AZ  
Chemehuevi Tribe, Havasu Lake, CA  
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ  
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ  
Jeff Servoss, Fish and Wildlife Service, Tucson, AZ  
John Nystedt, Fish and Wildlife Service, Flagstaff, AZ

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