Lower Colorado River Multi-Species Conservation Program
Addition of New Covered Species – Northern Mexican Gartersnake
PDD 17-001 (r)

Draft Steering Committee Motion

The Steering Committee approves adding the northern Mexican gartersnake as a covered species to the Lower Colorado River Multi-Species Conservation Program using PDD 17-001 and option 3 in Attachment 2 as a starting point to initiate discussions with the U.S. Fish and Wildlife Service regarding consultation.

Background:

The northern Mexican gartersnake (Thamnophis eques megalops) was not considered for coverage during the 2005 development of the LCR MSCP Habitat Conservation Plan (HCP), because it was believed to be extirpated within the planning area. However based on a number of events, as described below, the LCR MSCP is now seeking to add the northern Mexican gartersnake to the list of covered species under the program.

- On July 10, 2013 the U. S. Fish and Wildlife Service (USFWS) published in the *Federal Register* a proposed rule to list the northern Mexican gartersnake as Threatened under the Endangered Species Act and a proposed rule for critical habitat designation (USFWS 2013a; USFWS 2013b). The final rule listing the northern Mexican gartersnake as Threatened under the Endangered Species Act was published on July 8, 2014 (USFWS 2014). Habitat identified for critical habitat was proposed on the Bill Williams River in Arizona (the proposed Bill Williams River Unit) within the LCR MSCP implementation area between Alamo Dam and the confluence of the Colorado River and Bill Williams River. However, now that the northern Mexican gartersnake has been found on the mainstem of the Lower Colorado River, it is likely that the critical habitat proposed rule will be reevaluated.

- In 2011 and 2012, personnel of the Arizona Game and Fish Department discovered northern Mexican gartersnakes on the Bill Williams River in Arizona between Planet Ranch and Alamo Dam while conducting amphibian surveys. This portion of the Bill Williams River is within the LCR MSCP implementation area (Reach 3). In December 2015, the Planet Ranch Conservation Area was included in the program. The conservation area includes existing agricultural fields and a portion of the Bill Williams River where flows are subsurface. LCR MSCP habitat creation at Planet Ranch may result in creation of habitat that will be colonized by lowland leopard frogs and Colorado River toads, and now, northern Mexican gartersnakes.

- In 2015, a northern Mexican gartersnake was confirmed at the LCR MSCP's Beal Lake Conservation Area in the riparian field next to Willow Marsh on Havasu National Wildlife Refuge near Needles, California in LCR Reach 3. The Bureau of Reclamation (Reclamation) initiated a consultation with the USFWS for maintenance and infrastructure improvements at the Beal Lake Conservation Area and received a Biological Opinion in November 2015.

- In addition to being listed as threatened under the federal endangered species act, the northern Mexican gartersnake is also designated as an Arizona Wildlife of Special Concern. There is no special regulatory designation for the species in California or Nevada. It is considered extirpated in California.

Species Habitat Model

Covered species habitats had not been directly field delineated in the LCR MSCP planning area. Rather, species habitats were defined in the HCP by application of species habitat models based on the likelihood for each land cover type to support species habitat. For these species, the analysis of the extent of their habitat began with a definition of the land cover types used for the species models. The land cover type classification system used in the LCR MSCP was derived from previous classifications developed by Anderson and Ohmart (1976, 1984) and Younker and Anderson (1986). For riparian species, land cover types were classified by plant community and structural type. For marsh species, land cover types were classified by plant community and characteristics.

Attachment 1 provides a summary of the habitat used by the northern Mexican gartersnake. The land cover types that this species can use as habitat are marsh (Marsh Types 1-7) and adjacent riparian habitat. Riparian habitat associated with marsh that was assessed to be impacted in the 2005 HCP is CW I-IV.

The buffer distance to define the riparian habitat for northern Mexican gartersnake is proposed at 600 feet from the edge of the marsh. This is based on the main area of activity observed in radio tracking studies and trapping studies which range from 50 feet to 528 feet from the water's edge (Emmons 2014; Nowak et al 2011; Emmon and Nowak 2016; Rosen and Schwalbe 1988; USFWS 2013b). Activities included foraging, seeking mates, gestation, and dispersal. Additionally, the current draft proposed critical habitat (USFWS 2013b) uses a 600-foot buffer.

It is recognized that the northern Mexican gartersnake may be found, though less frequently, in additional upland areas up to 2 miles from known water sources. In these situations it is hypothesized that they are foraging, moving between habitat patches and possibly using upland burrows. (Audubon 2015; Gloyd 1937; Rosen and Schwalbe 1988). However, the majority of activities that may result in incidental take and the areas where most of the northern Mexican gartersnake activity will be is within marshes and within 600 feet of open water aquatic habitat.

Analysis of Impacts and Level of Take

Since the covered activities are not changing with the addition of the northern Mexican gartersnake, the conservation plan as outlined in the HCP will not change. A portion of the habitat already planned to be created will be managed for the gartersnake. Attachment 2 shows the amount of northern Mexican gartersnake habitat that will be impacted by the covered activities for reaches of the river. Three options are included for coverage; reaches 1- 3, reaches 1-5 and reaches 1-7. Since the covered actions have not changed, the impacts to Marsh 1-7 are the same as in the HCP.

To calculate the impacts for the riparian buffer, the LCR vegetation layer, from the 1997 vegetation mapping from the original impact analysis, was used. A 600 foot buffer was generated around each marsh expected to be affected by covered activities in Reaches 3, 4 and 5. These buffers were then intersected with all cottonwood-willow vegetation polygons in the vegetation layers. Whole cottonwood-willow polygons were not included, just the resultant intersecting area between the 600 foot marsh buffers and the cottonwood-willow polygons.

Attachment 3 describes the effects of the flow-related covered activities, the non-flow related covered activities, and the effects of LCR MSCP implementation on northern Mexican gartersnake habitat. For the reach 1-7 option, 243 acres of marsh and 1,081 acres of adjacent cottonwood-willow habitat could be impacted by implementation of covered activities. As noted in Table 3 – Effects of Flow Related Activities, periodic loss of ephemeral marshes and adjacent cottonwood-willow habitat in Lake Mead (Reach 1) could result in a low level of take.

Conservation Measures

Attachment 4 outlines the conservation measures for the reach 1-7 option. To mitigate the effects of the covered activities, conservation measure NMGS1 states that 512 acres of marsh will be created to provide northern Mexican gartersnake habitat. This created habitat will also be habitat for the Yuma clapper rail (HCP conservation measure CLRA1). Of the 5,940 acres of LCR MSCP-created cottonwood-willow I-IV, 1,081 acres will be created and managed near marshes to provide northern Mexican gartersnake habitat. Conservation measure NMGS2 provides for implementation of measures to avoid or minimize take of the northern Mexican gartersnake as provided through LCR MSCP best management practices. These practices will be developed in coordination with the USFWS and may include measures addressing worker education programs, speed limits, seasonal restrictions, backfilling or covering trenches overnight, and effects of non-natives species. Attachment 5 shows the avoidance and minimization measures (AMM) outlined in the HCP that would also apply to the gartersnake (AMM1, AMM2, AMM4, AMM5, AMM6) and monitoring and research measure MRM2. Since the amount of habitat being created for the HCP is not increasing, including the northern Mexican gartersnake for coverage would not substantially increase program costs. Implementation of some of the avoidance and minimization measures may result in unquantifiable additional costs at conservation areas.

Process Considerations

Section 10.3 of the LCR MSCP Implementation Agreement states that "In the event the Permittees desire to add additional species to the list of Covered Species, the Permittees shall propose an amendment of the HCP and request an amendment to the Permit". Both the current and proposed USFWS Habitat Conservation Planning Handbook (Chapter 6 Section G and Section 17.4.1 respectively) indicate that the addition of a new species would normally require an amendment to the permit and a reinitiation of consultation for Section 7. Because the National Environmental Protection Act (NEPA) analysis was done on implementation of the HCP and the addition of the northern Mexican gartersnake does not change the effect of conservation measures in the HCP, NEPA on the amendment may be accomplished through a Categorical Exclusion (CE). This would allow the USFWS to use the low-effect HCP process to amend the existing HCP, which has an expeditious review and processing timeline. If the amendment does not meet the screening criteria for a low-effect HCP determination, an Environmental Assessment (EA) would be prepared.

Figures 1 and 2 show the processing for a Section 10(a)(1)(B) Incidental Take Permit Application for both a low-effect permit application and for a permit application requiring an EA. The formal application process begins with the submittal of a complete permit application package to the USFWS Phoenix Ecological Services Office (Phoenix ES Office). This package would consist of the following: draft amendments to the HCP and BA; a Federal Fish and Wildlife License/Permit Application (Form 3-200), signed by the Steering Committee Chair, with the application fee; a letter from Reclamation to the Phoenix ES Office reinitiating Section 7 consultation; a draft CE or EA for NEPA, and an updated LCR MSCP Implementation Agreement if required.

Once the Phoenix ES Office has reviewed the permit application package, they prepare a certification memo to the USFWS Southwest Regional Office (Southwest Regional Office) stating that the associated documents are statutorily complete. They also prepare a draft Notice of Receipt of an Incidental Take Permit Application for publication in the *Federal Register*. After the Southwest Regional Office reviews the application package, they sign the Federal Register Notice and it is published in the *Federal Register* for a 30 day public comment period.

During this time, the Phoenix ES Office prepares a draft amendment to the Biological Opinion (BO), an Environmental Action Memo if it is determined that a CE applies or a draft Finding Of No Significant Impact (FONSI) if an EA determines no significant impacts, and a draft Section 10 Permit (Form 3-201) with terms and conditions. If required by the Regional Director, a Set of Findings, documenting how the HCP meets statutory issuance criteria and responses to public comments, is also prepared. If new signatures are needed for the LCR MSCP Implementation Agreement, they would be obtained during this time.

These documents are submitted by the Phoenix ES office to the Southwest Regional Office for finalization. After the public comment period is completed, the BA, HCP and BO amendments are finalized. The Southwest Regional Office then prepares a package, with a recommendation to issue the final permit amendment, to the Regional Director for signature. The process for a permit amendment for a low-effect HCP is approximately 3 months. The process for a permit amendment for a HCP with an EA is approximately 3-5 months.

Attachment 1

HCP Table 3-9. LCR MSCP Habitat Models for Selected Species)

Covered Species	Assumed Distribution by River Reach							Summary Habitat Description	LCR MSCP Land Cover Types Assumed to Support Species Habitat
	1	2	3	4	5	6	7		
Selected Threatened and Endangered Species									
Northern Mexican gartersnake	X		X	X	X	X	X	Associated with: l. Aquatic or riparian habitat that includes: · 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 preferred natural, unregulated flow regime · Lentic wetlands such as livestock tanks, springs, and cienegas; and · 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 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.	Marsh types 1-7 and adjacent cottonwood willow I-IV

Attachment 2

HCP Table 4-5 Summary of Estimated Extent of Covered Species Habitat Affected with Implementation of the Covered Activities, Including Reduction in Annual Flow of 0.860 Million Acre-Feet in Reach 3 and of 1.574 Million Acre-Feet in Reaches 4 and 5 (acres)

Covered Species	Impacts of Non-Federal Covered Activities on Species Habitat				
	Removed (Non-Flow Releated	Degraded (Flow Related)	Total Impacts of Implementation on Species Habitat	Impacts of Federal Non-Flow Related Covered Activities	Total Impacts on Species Habitat
Option #1 - Reach 1-3					
Northern Mexican gartersnake					
- Marsh Types 1-7	2*	24	26	2	28
- Adjacent CW I-IV	2*	107	109	22***	131
Total	**4**	**131**	**135**	**24**	**159**
Option #2 - Reaches 1-5					
Northern Mexican gartersnake					
- Marsh Types 1-7	8* + 15**	133	156	13	169
- Adjacent CW I-IV	5*	948	953	52***	1,005
Total	**28**	**1,081**	**1,109**	**65**	**1,174**
Option #3 – Reaches 1-7					
Northern Mexican gartersnake					
- Marsh Types 1-7	10* + 30**	133	173	70	243
- Adjacent CW I-IV	10*	948	958	123***	1,081
Total	**50**	**1,081**	**1,131**	**193**	**1,324**

From HCP

*Removal of habitat due to restoration of habitat for other species by nonfederal agencies
Marsh Impact 10 acres (5 acres reaches 3-4 and 5 acres reaches 5-6). Assumed (2 acres Reach 3, 3 acres Reach 4, 3 acres Reach 5, 2 acres reach 6)
CW-W Impact 10 acres (5 acres reaches 6-7). Assumed (2 acres reach 3, 3 acres reaches 4-5, 5 acres reaches 6-7
**Removal of habitat due to drain maintenance - Impact 30 acres Assumed 15 acres in reach 4 and 15 acres in reach 6
***Is all CW-W impacted by Federal Non-Flow Related Covered Activities. This is the maximum amount and may be less.

Attachment 3

4.5.28 Northern Mexican Gartersnake

The potential effects of implementing covered activities and LCR MSCP conservation measures on the rangewide distribution and status of the northern Mexican gartersnake are expected to be minor, affecting a relatively small number of individuals and proportion of its habitat throughout its range over the term of the LCR MSCP. The LCR MSCP Conservation plan includes conservation measures to avoid and minimize direct effects of implementing covered activities and the LCR MSCP on the northern Mexican gartersnake, and the potential effects of habitat loss expected to be minimized with the creation of replacement habitat.

4.5.28.1 Effects of Flow-Related Covered Activities

Flow-related activities may result in take of the northern Mexican gartersnake. Changes in points of diversion in Reaches 3-5 will lower groundwater levels sufficiently in these reaches to reduce the extent of 1,081 acres of habitat (see HCP Table 4-5) provided by marshes associated with backwaters and adjacent cottonwood-willow. Reservoir elevations in Reaches 3-5 would not be affected by lower river stage elevations. Consequently, flow-related activities are not expected to affect habitat associated with marshes maintained by reservoirs ((e.g. Bill Williams Delta (Reach 3) or that are managed to support marsh vegetation (e.g. Imperial NWR (Reach 5)). Through implementation of AMM2, the LCR MSCP will avoid potential effects of lowering groundwater elevations on an additional 149 (16 acres of marsh and a maximum of 133 acres of cottonwood willow) acres of habitat at Topock Marsh by maintaining water deliveries to Topock Marsh for maintenance of water levels and existing habitat conditions (see HCP Table 4-3). Lowering groundwater elevations could cause direct loss of these habitats through desiccation, fragmentation, or reduction in the extent of habitat patches.

As described in HCP Section 4.2.3.3, implementation of flow-related covered activities may affect marsh vegetation and adjacent cottonwood-willow that provides northern Mexican gartersnake habitat that periodically establish at inflow points of Lake Mead (e.g., Colorado River delta, Virgin River delta, Muddy River delta) when Lake Mead water surface elevations are below full pool. Marsh habitat below the full pool elevation will be created and lost based on water surface elevations. For example, marsh vegetation established at a certain elevation may be lost if the water surface elevation declines so that groundwater elevations drop below the rooting depths of emergent vegetation. Alternatively, established marsh vegetation would be inundated and lost during wetter periods, when Lake Mead reservoir elevations rise. The frequency, extent, and value of habitat and attendant species benefits that could be periodically created and subsequently lost as a result of changes in reservoir elevations over the term of the LCR MSCP cannot be predicted based on the available information. The periodic loss of these ephemeral marshes, however, could result in a low level of take of the northern Mexican gartersnake over the term of the LCR MSCP.

As described in HCP Section 4.2.2.3, effects of ongoing flow-related covered activities could contribute to a minimal and unquantifiable level of degradation of marshes that provide habitat over the term of the LCR MSCP.

4.5.28.2 Effects of Non-Flow-Related Covered Activities

Proposed activities related to habitat restoration and maintenance projects, facilities and infrastructure maintenance, and operation of watercraft for law enforcement along the LCR may result in take of the northern Mexican gartersnake. The likelihood for take is expected to increase over the term of the LCR MSCP if the abundance of the northern Mexican gartersnake increases in the LCR MSCP planning area as a result of implementing LCR MSCP conservation measures for this species. Restoration-related activities, such as operation of equipment to remove vegetation, could result in temporary or permanent loss of habitat and harassment or mortality of individuals. These activities, however, would be conducted, to the extent practicable, when brumating adults and young are not present or during the times of year the snakes are active and can move out of harm's way. Effects on habitat would be temporary for restoration projects that restore or improve existing northern Mexican gartersnake habitat. The probability for permanent loss of habitat is considered minimal because restoration projects undertaken in existing northern Mexican gartersnake habitat will be designed to maintain or improve its habitat, and it is unlikely that state fish and wildlife agencies would remove northern Mexican gartersnake habitat to restore habitat for other species. However, because habitat restoration sites have not yet been identified, it is assumed that up to 10 acres of degraded or former marsh and up to 10 acres of degraded cotton-wood willow land cover that provides low-value habitat could be removed over the term of the LCR MSCP to restore habitat for other species (see HCP Table 4-5).

Activities associated with maintaining facilities and infrastructure may result in the periodic removal of emergent vegetation growing in canals and drains that may provide northern Mexican gartersnake habitat. Up to 557 miles of canals and drains that could support some patches of emergent vegetation could be subject to periodic maintenance activities that would remove emergent vegetation over the term of the LCR MSCP. As described in HCP Section 44.2.3.1, it is unlikely that maintenance of canals would measurably affect the extent of species habitat. Periodic maintenance of the 244 miles of drains in the LCR MSCP planning area, however, could result in the removal of up to 30 acres of emergent vegetation that could provide habitat. Implementation of Federal non-flow-related covered activities addressed in the LCR MSCP BA could result in the loss of an additional 193 acres of species habitat (see HCP Table 4-5).

Operation of law enforcement patrol boats to enforce no-wake zone regulations that protect habitat (e.g., the Bill Williams Delta) will also generate boat wakes in the no- wake zones for short periods when other watercraft are being pursued. During the spring and summer, boat wakes could swamp shorelines, potentially resulting in mortality of gartersnakes in burrows near the shore. Because the frequency with which such incidents occur (AGFD estimates 150–200 person-days are expended annually enforcing no-wake zone regulations and NDOW estimates 25-30 person-days are annually expended operating watercraft in sensitive off-channel areas that could support habitat in the LCR MSCP planning area) and the duration with which patrol boats generate boat wakes in protected habitat (i.e., the period required to stop a boat) are likely low and, therefore, a low level of take is expected.

As described in HCP Section 4.2.2.3, implementation of ongoing non-flow-related covered activities are not expected to result in indirect effects on the northern Mexican gartersnake.

4.5.28.3 Effects of LCR MSCP Implementation

Activities associated with creating and maintaining created covered species may result in take of the northern Mexican gartersnake. LCR MSCP habitat creation-related activities could result in temporary disturbance of habitat and harassment of individuals if they are present at the time activities are implemented, but these activities will avoid removal of primary habitat to establish habitat for other covered species. Up to 512 acres of existing degraded or former marsh that may provide low-value habitat could be converted to fully functioning marsh that provides high-value northern Mexican gartersnake habitat. Some additional limited and low-value (e.g., dry patches of herbaceous vegetation near marsh edges) could be converted to habitat to benefit other covered species; however, with implementation of the AMM's described in Section 5.6.1, "Avoidance and Minimization Measures," removal of these low-quality habitats is not expected to result in harm (i.e., injury or mortality of individuals) and, therefore, is not expected to result in take of the northern Mexican gartersnake.

Habitat management-related activities, such as operation of equipment to remove vegetation and maintain open water in backwaters, burning decadent marsh vegetation to stimulate vegetation growth, periodic removal of trees in patches of created habitat to encourage stand regeneration, and operation of equipment to maintain roads, could result in temporary loss of habitat and harassment, injury, or mortality of individuals. The maximum extent of habitat that could be affected by habitat management activities is estimated to be 1,593 acres (i.e., the extent of marsh and cottonwood-willow land cover to be created as habitat for associated covered species) over the term of the LCR MSCP. The likelihood for take is expected to increase over the term of the LCR MSCP if the abundance of the northern Mexican gartersnake increases in the LCR MSCP planning area as a result of implementing LCR MSCP conservation measures for this species. The level of adverse effects on habitats and individuals will depend on the type and extent of LCR MSCP habitat management activities that are undertaken in species habitat.

Attachment 4

5.7 Species-Specific Conservation Measures

5.7.28 Northern Mexican Gartersnake

5.7.28.1 Summary of Effects

Implementation of covered activities and LCR MSCP conservation measures could result in the loss of up to 1,131 (1,081 Nonfederal Flow + 50 Nonfederal Nonflow) acres of Northern Mexican gartersnake habitat and take of individuals. Implementation of Federal non-flow related covered activities addressed in the supplemental LCR MSCP BA could result in the loss of an additional 193 (Federal Non-flow) acres of habitat. Some additional limited and low value habitat (e.g. dry patches of herbaceous vegetation near marsh edges) could be affected by habitat creation and maintenance activities; however, the level of take is assumed to be low because of the limited value of the potentially affected habitat.

5.7.28.2 Conservation Measures

NMGS1— Create 1,593 acres of northern Mexican gartersnake habitat. Create and manage 512 acres of marsh to provide northern Mexican gartersnake habitat. This created habitat will also be habitat for the Yuma clapper rail (conservation measure CLRA1). Of the 5,940 acres of LCR MSCP-created cottonwood-willow I-IV, 1,081 acres will be created and managed near to marshes to provide northern Mexican gartersnake habitat. Additional northern Mexican gartersnake habitat may be provided by marsh vegetation that becomes established along margins of the 360 acres of backwaters that will be created. These small patches of habitat may provide linkages between existing habitat and may facilitate the colonization of created habitats. The design and management criteria described in the conservation measures for Yuma clapper rail (HCP Section 5.7.1), California black rail (HCP Section 5.7.13), southwestern willow flycatcher (HCP Section 5.7.2) and yellow-billed cuckoo (HCP Section 5.7.14) will ensure that created cottonwood-willow and marsh areas will also provide other habitat requirements for this species.

NMGS2—Implement conservation measures to avoid or minimize take of northern Mexican gartersnakes. Implement measures to avoid or minimize take of northern Mexican gartersnakes. These measures could include worker education programs and other practices in accordance with LCR MSCP best management practices.

5.7.28.3 Expected Outcomes with Implementation of Conservation Measures

Implementation of the LCR MSCP conservation measures, including creation of 1,593 (512 marsh + 1,081 cottonwood-willow) acres of habitat, achieves the LCR MSCP goal to avoid, minimize, and fully mitigate adverse effects of covered activities and LCR MSCP implementation on the northern Mexican gartersnake, and to contribute to its recovery. Implementation of these measures will help ensure that the existing abundance of the species in the LCR MSCP planning area is maintained as a result of fully replacing affected habitat and maintaining existing habitat that otherwise could decline in function or be lost without management intervention. In addition, implementation of the conservation measures will benefit the northern Mexican gartersnake by increasing the amount of new habitat in the LCR MSCP planning area by 269 (1,593 - 1,324) acres, in addition to replacing the extent of affected habitat.

Attachment 5

5.6 General Species Conservation Measures

General species conservation measures include impact Avoidance And Minimization Measures (AMMs) and monitoring and research measures (MRMs) that apply to more than one covered or evaluation species. These general measures are not repeated in the species-specific conservation measures described in HCP Section 5.7, "Species-Specific Conservation Measures."

5.6.1 Avoidance and Minimization Measures

This section describes the LCR MSCP conservation measures that will be implemented to avoid and minimize the effects of implementing covered activities and the LCR MSCP on covered species. Each avoidance and minimization conservation measure is provided with a unique four-character alphanumeric code that will assist with monitoring of LCR MSCP Conservation Plan implementation. The three-letter portion of the code designates the conservation measure as an avoidance and minimization measure, and the numeral in the code designates the conservation measure number. In addition to these conservation measures, the Best Management Practices (BMPs) of the state in which a covered activity is implemented will be used to control sedimentation in the vicinity of water bodies during ground-disturbing activities.

AMM1—To the extent practicable, avoid and minimize impacts of implementing the LCR MSCP on existing covered species habitats. To the extent practicable, establishment and management of LCR MSCP–created habitats will avoid removal of existing cottonwood-willow stands, honey mesquite bosques, marsh, and backwaters to avoid and minimize impacts on habitat they provide for covered species. Temporary disturbance of covered species habitats, however, may be associated with habitat creation and subsequent maintenance activities (e.g., controlled burning in marshes and removal of trees to maintain succession objectives). LCR MSCP conservation measures that could result in such temporary disturbances will, to the extent practicable, be designed and implemented to avoid or minimize the potential for disturbance. In addition to implementing AMM3 and AMM4 below, these measures could include conducting pre- construction surveys to determine if covered species are present and, if present, implementing habitat establishment and management activities during periods when the species would be least sensitive to those activities; or redesigning the activities to avoid the need to disturb sensitive habitat use areas; staging construction activities away from sensitive habitat use areas; and implementing BMPs to control erosion when implementing ground disturbing activities.

AMM2—Avoid impacts of flow-related covered activities on covered species habitats at Topock Marsh. Impacts on groundwater levels that support covered species habitat at Topock Marsh will be avoided by maintaining water deliveries for maintenance of water levels and existing conditions. At times, flow-related activities could lower river elevations to levels that could disrupt diversion of water from the river to the marsh. Improvements to intake structures that allow water to continue to be diverted or other measures to maintain the water surface elevation will avoid effects on groundwater elevation. Avoidance of effects could be accomplished with the purchase, installation, and operation of two electric pumps sized to the current inflow at the Topock Marsh diversion inlet. The pumps would most likely need to be operated during summer to make up for the lower flow periods.

Implementation of this conservation measure would maintain existing habitat at Topock Marsh for the Yuma clapper rail, southwestern willow flycatcher, northern Mexican gartersnake, Colorado River cotton rat, western least bittern, California black rail, yellow-billed cuckoo, gilded flicker, vermilion flycatcher, Arizona Bell's vireo, and Sonoran yellow warbler. The extent of covered species habitat impacts that will be avoided by maintaining water deliveries to Topock Marsh are presented in HCP Table 4-2. Maintaining water deliveries to Topock Marsh will also maintain razorback sucker and bonytail habitat associated with disconnected backwaters managed for these species.

AMM4—Minimize contaminant loads in runoff and return irrigation flows from LCR MSCP–created habitats to the LCR. LCR MSCP–created habitats that require irrigation to establish and maintain vegetation to provide habitat will be designed and managed to minimize contaminant loads that could return to the LCR as runoff or return- flow. Measures will include vegetation establishment methods that minimize the need for application of herbicides, pesticides, and fertilizers and designing irrigation methods and new irrigation infrastructure to reduce runoff and return-flows to the extent practicable. Use of pesticides is not a covered activity. Pesticides used to establish and maintain LCR MSCP habitats, however, will be applied in accordance with EPA restrictions and, as needed, authorization for their use will be sought under separate permits.

AMM5—Avoid impacts of operation, maintenance, and replacement of hydroelectric generation and transmission facilities on covered species in the LCR MSCP planning area. To the extent practicable, before implementing activities associated with OM&R of hydroelectric generation and transmission facilities, measures will be identified and implemented that are necessary to avoid take of covered species where such activities could otherwise result in take. These measures could include conducting surveys to determine if covered species are present and, if so, deferring the implementation of activities to avoid disturbance during the breeding season; redesigning the activities to avoid the need to disturb covered species habitat use areas; staging of equipment outside of covered species habitats; delineating the limits of vegetation control activities to ensure that only the vegetation that needs to be removed to maintain infrastructure is removed; stockpiling and disposing of removed vegetation in a manner that minimizes the risk of fire; and implementing BMPs to control erosion when implementing ground disturbing activities.

AMM6—Avoid or minimize impacts on covered species habitats during dredging, bank stabilization activities, and other river management activities. To the extent practicable, before initiating activities involved with river maintenance projects, measures will be identified and implemented that avoid or minimize take of covered species where such activities could otherwise result in take. Such measures could include alternative methods to achieve project goals, timing of activities, pre-activity surveys, and minimizing the area of effect, including offsite direct and indirect effects (e.g., avoiding or minimizing the need to place dredge spoil and discharge lines in covered species habitats; placing dredge spoils in a manner that will not affect covered species habitats).

5.6.2 Monitoring and Research Measures

This section describes the LCR MSCP Monitoring and Research Measures (MRMs) hat will be implemented to help guide the design and management of created habitats over the term of the LCR MSCP. These MRMs are designed to provide information necessary to adaptively manage implementation of the LCR MSCP Conservation Plan (see HCP Sections 5.11, "Monitoring and Research"). Each monitoring and research conservation measure is provided with a unique four-character alpha-numeric code that will assist with monitoring of LCR MSCP Conservation Plan implementation. The three-letter portion of the code designates the conservation measure as a monitoring and research measure, and the numeral in the code designates the conservation measure number.

MRM2—Monitor and adaptively manage created covered and evaluation species habitats. Created species habitats will be managed to maintain their functions as species habitat over the term of the LCR MSCP. Created habitat will be monitored and adaptively managed over time to determine the types and frequency of management activities that may be required to maintain created cottonwood-willow, honey mesquite, marsh, and backwater land cover as habitat for covered species. This conservation measure applies to those species for which comparable measures are not subsumed under species-specific conservation measures (HCP Section 5.7). They are not applicable to species for which habitat would not be created under the LCR MSCP Conservation Plan, such as the desert tortoise, relict leopard frog, humpback chub, and threecorner milkvetch.

This conservation measure applies to the following species:

Yuma clapper rail	Western least bittern	Arizona Bell's vireo
Southwestern willow flycatcher	California black rail	Sonoran yellow warbler
Western red bat	Yellow-billed cuckoo	Summer tanager
Western yellow bat	Elf owl	Flannelmouth sucker
Desert pocket mouse	Gilded flicker	MacNeill's sootywing skipper
Colorado River cotton rat	Gila woodpecker	California leaf-nosed bat
Yuma hispid cotton rat	Vermilion flycatcher	Pale Townsend's big-eared bat
Northern Mexican gartersnake		

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