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AESO/SE
02EAAZ00-2015-F-0465

August 25, 2016

Memorandum

To: Jess Newton, Project Leader, AZFWCO

From: Field Supervisor

Subject: Final Biological Opinion for the Intra-Service New Water Supply and Commensurate Rainbow Trout Stocking from Willow Beach National Fish Hatchery

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 June 6, 2016, was received in our office on June 7, 2016. At issue are impacts that may result from the new water intake replacement pipeline construction at Willow Beach National Fish Hatchery (Willow Beach NFH) and rainbow trout stocking in Lake Mohave, the Colorado River downstream from Davis Dam, and five additional waters located on three Tribal lands. The proposed trout stocking is essentially a reestablishment and continuation of the trout stocking program that has been in place for the last 20 years, in accordance with the 1994 Biological Opinion (see consultation history). In 2012, it was decided that reinitiation of consultation was necessary because razorback suckers were discovered to be spawning within the action area; the Biological Evaluation (BE) and this Biological Opinion (BO) serves to fulfill that decision (2012 memorandums). The Arizona Fish and Wildlife Conservation Office (AZFWCO) has concluded the proposed action "may affect, and is likely to adversely affect" the endangered razorback sucker (*Xyrauchen texanus*), and critical habitat. In addition, AZFWCO has concluded the proposed action will have "no effect" to bonytail chub (*Gila elegans*), and not result in adverse modification of critical habitat for bonytail chub; as such, bonytail chub and associated critical habitat will not be addressed further in this BO.

This BO is based on information provided in the AZFWCO Intra-Service Section (BE), telephone conversations and meetings between staff, and other sources of information found in the administrative record supporting this BO. All other aspects of the proposed action remain the same as described in the BE. Literature cited in this BO 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

1994	Biological Opinion for stocking of sportfish species into the Lower Colorado River; rainbow trout and channel catfish (22410-1994-F-0244)
2009	Concurrence letter: Arizona Department of Environmental Quality Willow Beach redevelopment plan (22410-2009-TA-0257)
2012	Memo sent to Regional Office concerning reconsultation due to discovery of razorback sucker spawning in area (02EAAZ00-2012-E-00307 and 02EAAZ000 2012-E000274)
September 26, 2013	Information received regarding water pipeline replacement project (02EAAZ00-2013-I-0002)
May 27, 2014	Information received regarding Colorado River rainbow trout stocking (02EAZ00-2014-I-0187)
August 26, 2015	Our office received a draft BE regarding the new water supply pipeline for Willow Beach NFH (02EAZZ00-2015-I-0465)
June 6, 2016	Current BE received by this office.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

A full description of the proposed action is in the BE, and is summarized below.

Pipeline replacement

Willow Beach NFH uses an allocated 35 cfs of Colorado River water to maintain the function of the hatchery. This water is delivered through two pipes; one of which is only functional when river elevation is high, and the other is currently nonfunctional due to structural failure. Replacement of the nonfunctional pipeline is necessary to deliver water to the hatchery during low river water elevation. The new pipeline will consist of a floating platform (12ft by 12ft), pump, and pipe from the river to the hatchery. All preassembly and construction will occur above the high water line of the Colorado River, with only placement of the floating platform onto the river, which will then be tethered to a concrete block on the river bed.

The pipeline is a result of a five-year Cooperative Agreement outlining coast sharing between the Service and the AGFD in order to replace the pipe and bring the hatchery to a functioning status. As part of the agreement, the service will rear and stock trout as described in the section below.

Trout stocking

As outlined in the Cooperative Agreement, 150,000 rainbow trout may be reared and stocked annually. However, the number listed in the agreement is a theoretical maximum and based on maximum possible hatchery production levels under ideal conditions. Probable production of trout is projected to be 100,000 fish annually, given low Lake Mead elevations, resulting warm water releases from reservoir, and drying and heating climatic conditions. In coordination with AZFWCO staff, we are evaluating a project timeframe of ten years. Using the probable maximum projection of trout production, 100,000 catchable sized trout (average 20-35 cm total length) will be stocked among three general areas; Lake Mohave, the Colorado River downstream of Davis Dam, and Tribal waters. To allow for flexibility, the Service will take an adaptive management approach; trout numbers stocked into each location will fluctuate year to year and season to season (for example; stocking may occur weekly over a 12 month period), in order to meet angling and management needs. However, target ranges have been established for each area under both the probable production and the theoretical maximum production scenarios, and are outlined as such:

Probable Production Maximum Scenario (100,000 trout per year)

- Tribal lands – 10,000 trout per year
- Below Davis Dam – 24,000 to 45,000 trout per year
- Upper Lake Mohave – 45,000 to 66,000 trout per year

For the below Davis Dam range, the lower limit is based on the recent historical management practice for this program and equates to a stocking ratio of 1:2.8 (i.e., 24,000 below Davis:66,000 upper Lake Mohave) for the non-tribal locations. The upper limit of the range for below Davis Dam is based on a 1:1 stocking ratio (i.e., 45,000:45,000). Under the proposed action, the Service's Fish and Aquatic Conservation Program may choose to shift the recent stocking ratio of 1:2.8 toward a 1:1 ratio depending on fishery objectives and staff, equipment, and budget resources. Note that annual numbers of trout stocked below Davis Dam and Upper Lake Mohave are inversely related and interdependent.

Theoretical Production Maximum Scenario (150,000 trout per year)

- Tribal lands – 10,000 to 13,500 trout per year
- Below Davis Dam – 24,000 to 50,000 trout per year
- Upper Lake Mohave – 90,000 to 116,000 trout per year

For the below Davis Dam range, the lower limit is based on the recent historical stocking of 24,000 and the upper limit is based on the maximum staff and equipment capacity of Willow Beach NFH. Note that annual numbers of trout stocked below Davis Dam, Upper Lake Mohave, and Tribal sites are inversely related and interdependent. Although this scenario is based on an

unlikely theoretical maximum production and stocking capacity, we include it under this BO to ensure we include the possible high range of impact of the proposed action on razorback suckers.

Locations of stocking

Tribal Lands (See Table 1 and 2 in BA for detailed description)

- Colorado River Indian Tribes (CRIT) – up to 4,000 trout per site per year; Deer Island Lake, 12 Mile Lake, and No Name Lake
- Fort Mohave Indian Tribe – up to 1,500 trout per year; Long Lake
- Fort Yuma Indian Tribe – up to 4,000 trout per year; Four Bay Lake

Below Davis Dam

- Davis Camp
- Rotary Park
- Bullhead City Park (alternate site for stocking during razorback spawning season)

Upper Lake Mohave

- *Lake Mohave stockings will occur at truck-accessible areas immediately downstream of Willow Beach NFH (see BA figure 1)*

Also noted in the proposed action; in the unlikely case of a Willow Beach NFH water supply emergency, a water quality emergency, or some stocking sites become unavailable, up to 100% of annual trout production may be stocked into upper Lake Mohave. In such an emergency event, the Arizona Ecological Service Office (AESO) will be contacted in order to coordinate on the best management practices that will minimize effects to razorback sucker.

Conservation Measures

The following conservation measures are part of the proposed action and are designed to minimize adverse affects:

1) Conversion to stocking only triploid rainbow trout (non-reproductive);

2) Move rainbow trout stocking from Rotary Park upstream to Bullhead City Park or Davis Camp, several miles away from razorback sucker spawning areas during spawning season January–March. If this alternative location prevents achievement of rainbow trout management objectives, and does not appreciably result in minimizing disruption of fish community structure, stocking at Rotary Park may be reinstated during January-March. Stocking of rainbow trout at the Rotary Park location during the razorback spawning season will be coordinated with the AESO prior to the action.

3) Stock 20-40 sonic/radio tagged and several hundred (depending on availability) PIT-tagged (ave. size = 300mm) razorback suckers into Topock Marsh and assess habitat use and survival in this high value recovery area in Reach 3 in coordination with the Lower

Colorado River Multi-Species Conservation Program (LCR MSCP), the same river reach where most stocking and potential impacts to razorback suckers larvae may occur;

4) The restoration of water capacity to the hatchery, which provides a benefit of additional and backup water capacity for culture and rearing of both bonytail chub and razorback suckers.

We agree these measures would provide a net benefit to the species potentially affected by more than offsetting potential impacts. The proposed action and resulting conservation measures are designed to provide rainbow trout recreational opportunity and conservation benefit to razorback suckers through this proposed action.

ACTION AREA

The proposed action area is:

- Willow Beach NFH;
- Lake Mohave;
- Colorado River below Davis dam; and
- Five Tribal Waters (Deer Island Lake, 12 Mile Lake, No Name Lake, Long Lake and Four Bay Lake) on three Tribal Lands (CRIT, Fort Mohave Indian Tribe, and Fort Yuma Indian Tribe).

The expected area of possible affect is:

- Lake Mohave – the area ~4km immediately above and below Willow Beach NFH;
- Below Davis – the area from ~RM 274 – RM250;
- CRIT – Deer Island, the area from ~RM174 – RM166, 12 Mile Lake connected via CRIT drain canal, the area from ~RM163 – RM154, No Name Lake, from ~ RM169 – RM161;
- Fort Mohave, Long Lake, is an isolated water;
- Fort Yuma, Four Bay Lake, is an isolated water.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Razorback Suckers

Razorback suckers was first proposed for listing under the ESA on April 24, 1978 (43 FR 17375), as a threatened species. The proposed rule was withdrawn on May 27, 1980 (45 FR 35410), due to changes to the listing process included in the 1978 amendments to the ESA. In March 1989, the Service was petitioned by a consortium of environmental groups to list the razorback sucker as an endangered species. A positive 90-day finding on the petition was published in the Federal Register on August 15, 1989 (54 FR 33586). The finding stated that a status review was in progress and provided for submission of additional information through December 15, 1989. The proposed rule to list the species as endangered was published on May 22, 1990 (55 FR 21154), and the final rule published on October 23, 1991, 56 FR 54957), with

an effective date of November 22, 1991. The Razorback Sucker Recovery Plan was released in 1998 (USFWS 1998). Recovery Goals were approved in 2002 (USFWS 2002).

Critical Habitat

Critical habitat was designated in 15 river reaches in the historical range of the razorback sucker on March 21, 1994 (59 FR 13374), with an effective date of April 20, 1994 (USFWS 1994). Critical habitat included portions of the Colorado, Duchesne, Green, Gunnison, San Juan, White, and Yampa rivers in the Upper Colorado River Basin, and the Colorado, Gila, Salt, and Verde rivers in the Lower Colorado River Basin. The primary constituent elements of critical habitat include water, physical habitat, and biological environment.

Life history, habitat use, current distribution, threats, and conservation actions

The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the razorback sucker. This information was taken from the 2002 Recovery Goals (USFWS 2002), and the LCR MSCP Species Status documents (LCR MSCP 2005). Information in these documents is incorporated by reference.

The razorback sucker is the only representative of the genus *Xyrauchen* and was described from specimens taken from the "Colorado and New Rivers" (Abbott 1861) and Gila River (Kirsch 1889) in Arizona. This native sucker is distinguished from all others by the sharp-edged, bony keel that rises abruptly behind the head. The body is robust with a short and deep caudal peduncle (Bestgen 1990). The razorback sucker may reach lengths of 3.3 feet (1.0 m) and weigh 11 to 13 pounds (5.0 to 5.9 kilograms [km]) (Minckley 1973). Adult fish in Lake Mohave reached about half this maximum size and weight (Minckley 1991). Razorback suckers are long-lived, reaching the age of at least 40 years (Minckley et al. 1991). Adult razorback suckers use most of the available riverine habitats, although there may be an avoidance of whitewater type habitats. Main channel habitats used tend to be low velocity ones such as pools, eddies, nearshore runs, and channels associated with sand or gravel bars (Bestgen 1990). Adjacent to the main channel, backwaters, oxbows, sloughs, and flooded bottomlands are also used by this species. From studies conducted in the upper Colorado River basin, habitat selection by adult razorback suckers changes seasonally. They move into pools and slow eddies from November through April, runs and pools from July through October, runs and backwaters during May, and backwaters, eddies, and flooded gravel pits during June. In early spring, adults move into flooded bottomlands. They use relatively shallow water (ca. three feet [0.9 m]) during spring and deeper water (five to six feet [1.5-1.8 m]) during winter (USFWS 2002).

Razorback suckers also use reservoir habitat, where the adults may survive for many years. In reservoirs, they use all habitat types, but prefer backwaters and the main impoundment (USFWS 1998). Much of the information on spawning behavior and habitat comes from fishes in reservoirs where observations can readily be made. Habitat needs of larval and juvenile razorback suckers are reasonably well known. In reservoirs, larvae are found in shallow backwater coves or inlets (USFWS 1998). In riverine habitats, captures have occurred in backwaters, creek mouths, and wetlands. These environments provide quiet, warm water where there is a potential for increased food availability. During higher flows, flooded bottomland and

tributary mouths may provide these types of habitats. Razorback suckers are somewhat sedentary; however, considerable movement over a year has been noted in several studies (USFWS 1998). Spawning migrations have been observed or inferred in several locales (Jordan 1891, Minckley 1973, Osmundson and Kaeding 1989, Bestgen 1990, Tyus and Karp 1990). During the spring spawning season, razorback suckers may travel long distances in both lacustrine and riverine environments, and exhibit some fidelity to specific spawning areas (USFWS 1998). Since 1997, significant new information on recruitment to the wild razorback sucker population in Lake Mead has been developed (Albrecht et al. 2008, Kegerries and Albrecht 2011) that indicates some degree of reproduction is occurring at three locations in Lake Mead, and another spawning group was documented in 2010 at the Colorado River inflow area of the lake (Albrecht et al. 2010, Kegerries and Albrecht 2011, 2012).

The range and abundance of razorback suckers has been severely impacted by water manipulations, habitat degradation, and importation and invasion of non-native species. Construction of dams, reservoirs, and diversions destroyed, altered, and fragmented habitats needed by the sucker. Channel modifications reduced habitat diversity, and degradation of riparian and upland areas altered stream morphology and hydrology. Finally, invasion of these degraded habitats by a host of non-native predacious and competitive species has created a hostile environment for the razorback sucker larvae and juveniles. Although the sucker produce large spawns each year and produce viable young, the larvae are preyed on by non-native fish species (Minckley et al. 1991).

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.

Status of the species and potential habitat within the action area

Razorback Suckers

The historic range of the razorback sucker included the main stem Colorado River and its tributaries from northern Mexico through Arizona and Utah into Wyoming, Colorado, and New Mexico. Distribution and abundance of razorback suckers declined during the last century throughout this known range, and the species now exists naturally only in a few small populations. The razorback sucker in the large reservoirs of the Lower Colorado River maintained populations long after the dams closed and the river became a string of impoundments. The populations existed almost solely by virtue of the species' longevity, not by documented recruitment to reproductive age into existing populations. In Lake Mohave, the species was represented by a large population for decades, and was thought to constitute a stronghold of a large, but aging population.

In reservoirs such as Mohave, adults are pelagic at varying depths, except in breeding season, when they congregate in shallower, nearshore areas. Spawning begins as early as November in Lake Mohave, peaking in January through March, and with only a few individuals in spawning condition as late as May. Larval fish are present for a short period of time in nearshore habitats following emergence. Habitat selected by larvae and juveniles following the first few weeks is unknown. Although spawning has been documented, no razorback sucker recruitment to reproductive age has been documented in the lower basin outside of Lake Mead. However, a spawning aggregation is located at the proposed Rotary Park stocking location.

The fish assemblage in this area includes a community structure of native species, such as razorback suckers and flannelmouth suckers (*Catostomus latipinnis*); and nonnative species recently collected from the area include green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), redear sunfish (*L. microlophus)*, channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), striped bass (*Morone saxatilis*; BE), smallmouth bass (*M. dolomieu*), and yellow bullhead (*Ameiurus natalis*; BE). Most of these species are predators on eggs, larvae and larger size classes of razorback suckers. A principal predator of both rainbow trout and razorback suckers is striped bass, which has been documented to consume razorback suckers up to 50cm in length (Karam and Marsh 2010). It is unclear at this time if the community structure and foodweb is driven by top down vs. bottom up processes or a combination of the interplay between the two. However, it is possible the addition or removal of one species has the opportunity to disrupt the community structure of the area, and thus affect razorback suckers.

Larval razorback suckers collected from Lake Mead are the source population for the captive production efforts by Willow Beach NFH. This captive growth program is largely supported by the LCR MSCP and AZFWCO; and the success of that program can be measured in the action area where there are still adult razorback suckers that are spawning. Larvae are captured each year and raised at the hatchery for reintroduction to the river. These efforts have been aimed at avoiding the vulnerability of smaller, younger razorback suckers to predacious nonnative fish.

Razorback Sucker Critical Habitat

Critical habitat has been designated for the razorback sucker and bonytail chub (Service 1998) and includes all of Lake Mohave in the segment described as the Colorado River and its 100-year flood plain from Hoover Dam in T.30N., R.23W., sec.1 (Gila and Salt River Meridian) to Davis Dam in T.21N., R.21W., sec 18 (Gila and Salt River Meridian) including Lake Mohave to the full pool elevation. The primary constituent elements are water (a quantity of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage), physical habitat (areas of the Colorado River system that are inhabited or potentially habitable by the sucker for use in spawning, nursery, feeding, and rearing, or corridors between these areas), and biological environment (food supply, predation, and competition) that influence all life stages. In addition, areas and habitats considered essential for reproduction and recruitment were specifically included. Thus, all of Lake Mohave offers the primary constituent elements for the razorback sucker and bonytail chub in all life stages.

Factors affecting species' environment within the action area

The lower Colorado River has been subject to the effects of Federal, state, and private activities for over 120 years. The greatest changes have come in the last 80 years, with the construction of large dams. Impacts of these human activities along the river have had profound effects on the river, associated riparian and floodplain areas, and the aquatic fauna. Significant changes to seasonal flow and water quality resulted from the storage of water behind Hoover, Davis, and Parker dams. Water diversions and return flows, flood control projects that stabilized river banks and prevented natural meandering by the river, agricultural and urban development, recreational activities, along with changes in seasonal flows have impaired the ability of aquatic habitats to support native fish. In addition to the physical changes to the river system, introductions of fish species not native to the Colorado River Basin were made for commercial and recreational purposes. An assemblage of nonnative fish species exist along nearly all sections of the Colorado River.

For the most part, early Federal activities along the Colorado River did not undergo section 7 consultation due to lack of listed fish at the time. Earlier section 7 consultations focused mainly focused on sport fish enhancement programs. Currently, in the lower Colorado River, the LCR MSCP addresses effects of water management and provides conservation to offset effects of water operations; and is largely responsible for the current existence of razorback suckers in the lower basin. Several statewide consultations have occurred including the Land and Resource Management Program with the Forest Service and the intra-Service consultation on Sport Fish Restoration Funding which evaluated the sport fish stocking program funded by the Service (UFSWS 2011). Smaller sitespecific consultations addressing channelization, recreational development, and implementing recovery actions have also occurred. All prior consultations have reached non-jeopardy and nonadverse modification conclusions. Biological opinions on actions potentially affecting razorback suckers in Arizona may be found at our website www.fws.gov/southwest/es/arizona in the Section 7 Biological Opinion page of the Document Library.

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.

Effects to Razorback Sucker

Water intake structure

Work is proposed to occur in coordination with the Bureau of Reclamation's water management plans to draw down Lake Mohave to its lowest annual elevation, sometime during 2016. The

proposed action would impact terrestrial areas (approximately 60 feet of existing rip rapped bank of Lake Mohave between the water's edge and the hatchery) where the additional intake pipeline would come off the floating walkway and be connected to delivery lines; this area would also be impacted as the walkway is tied into the bank. The aquatic habitat and bed of the Lake Mohave reservoir on the Colorado River will be impacted by the placement and presence of the platform and its anchor(s). The razorback sucker will be minimally affected by the physical platform or the pumping of water from the river to the hatchery, because razorback suckers are anticipated to at very low densities in the area and the disturbance of physical placement of the platform will be brief.

Trout stocking

Harassment of adults by rainbow trout and some direct predation on larval razorback suckers is anticipated. It is anticipated that predation of razorback suckers is without significant consequence at the population level under the current fish community structure, in which larval razorback suckers are preyed upon by other nonnative fish species. We do not have documented evidence of recruitment of razorback suckers to reproductive age in the action area, likely due to this ongoing predation. Additionally, disruption of the fish community structure has the potential to occur, as is the case when any one species is introduced or removed from an aquatic system.

Rainbow trout are originally native to western North America, primarily from the coastal streams of the Northwest. It is one of the most intensively cultured fish throughout the world and is one of the most economical trout to produce, making it a substantial component of cold water sport fishing programs. They were first introduced into Arizona in 1899, and few self-reproducing populations exist in the wild. Rainbow trout inhabit cool clear lakes and cool-water streams with larger substrates (gravel/boulder). In New Mexico, rainbow trout are found in steams with pool-to-riffle ratios of 1:1 (Sublette et al. 1990.). Deep, low velocity pools are important overwintering habitat and instream cover (overhanging banks, submerged vegetation, log jams, and boulders) is an essential habitat component for escape and resting cover (Sublette et al. 1990).

The species is tolerant of a range of stream conditions including water temperatures from 0^{o}C to the upper incipient lethal temperature for adults of 25^{o}C (Embody 1934, Carlander 1969, Piper et al.1982, Raleigh et al. 1984) and a ph range of 5.8-9.6. However, the optimal conditions for growth are $13 – 21^{o}$C, slightly alkaline waters (ph of 7-8), and $\geq$ 7 ppm dissolved oxygen concentrations at temperatures $\leq 15^{o}$C, and $\geq$ 9 ppm dissolved oxygen at temperatures $\geq 15^{o}$ C (Raleigh et al. 1984). May (1973) observed that adults in Lake Powell will avoid water temperatures of 18^{o}C. Expected increases in water temperature in the action area are expected due to low reservoir levels and increased atmospheric temperature. This increase in temperature is expected to hinder the rainbow trout that are stocked in this area. Habitats and water temperatures immediately below Davis and Hoover dams may be suitable for rainbow trout reproduction, however reproduction has not been detected at either site and only non-reproductive triploid trout will be stocked.

Rainbow trout can be territorial, and will aggressively defend feeding areas (Sublette et al. 1990). They are primarily stream spawners and require tributary stream with gravel substrate in

riffle areas for successful reproduction. Trout that spawn in lakes with inlet and outlet streams may spawn as much as one month earlier in the outlet than the inlet due to temperature differences. However, the proposed action specifies that only non-reproductive triploid rainbow trout will be stocked, and as such, there is little concern about trout spawning in the action area.

Downstream movement may vary by habitat type (lentic versus lotic systems) and by strain (Moring 1993). Moring (1993) suggested a sizable portion of stocked populations (approximately 22%) frequently move >12 km and average 1.1 – 1.7 km a day. However, few fish (<1%) had moved > 35 km downstream over four years, and most moved < 15 km. Stocked rainbow trout are expected to move away from areas in which they are stocked. Their behavior in streams show a combination of behaviors in any given population; with some individuals making long-range movements. Individual fish will also show signs of switching these behaviors. Furthermore, these behavior combinations are presumably adaptive when conditions are often unpredictable and changeable. These movements demonstrate the possibility of trout moving into areas where razorback suckers are spawning, and potentially resulting in disruption of razorback suckers spawning behavior or predation on small, larval razorback suckers. Stocked trout movement from the locations proposed for stockings has not been studied, but is expected to be downstream in lentic environments based on the literature.

The survival and persistence of catchable-sized trout (8-14 inches) stocked for sport fishing has been evaluated in several studies. Fifty-percent of hatchery-raised brown trout stocked into Norway streams were caught within 15 days, and 90% within 67 days (Skurdal et al. 1989). Hatchery-raised Apache trout stocked into the East Fork White River had a 34% survival rate three months after stocking (stocked May-August) and a 3% survival rate nine months after stocking (Meyer 1995). Approximately 11% were captured in the fishery and it was suggested that natural mortality was most likely the primary cause of mortality for the stocked trout. This is also a typical finding from other studies, that stocked trout are generally either angled or experience natural mortality soon after stocking (Bachman 1984; Skurdal et al. 1989).

In general, the high natural mortality rate observed in stocked trout is suggested to result from a combination of the following: stocked trout are poorly adapted to stream environments, competition with resident trout populations, high stocking densities, warming water temperatures, foraging techniques and natural feed, appropriate energy expenditures, and seasonal dominance hierarchies associated with drift feeding and territory establishment (Bachman 1984). Stand alone or combined, these adaptations may result in malnutrition and subsequent mortality of stocked trout. Warm water temperatures have also been implicated as the primary cause of mortality of stocked trout (Runge et al. 2008).

Rainbow trout are opportunistic feeders and the primary food items depend in part on the life history stage as well as the habitat being utilized. Juveniles and adults feed on terrestrial and aquatic insects and other aquatic invertebrates such as nematodes, leeches, annelids, gastropods and other mollusks, benthic and planktonic crustaceans (cladocerans, isopods, amphipods, shrimp, and crayfish), small ray-finned fishes fish eggs and larvae, detritus, benthic algae, and occasionally lizards, mice, and bats (Montgomery and Bernstein 2008).Young fish feed on immature and emergent aquatic insects and will continue to take insects but become piscivorous when larger (Raleigh et al. 1984, Sublette et al. 1990). In streams, rainbow trout feed primarily

on drift organisms. In lakes, they prefer benthic invertebrates and zooplankton (Sublette et al. 1990). During extended periods of low food availability, trout will often exhibit hyperphagia and considerable compensatory growth following these stressful periods (Jobling and Koskela 1996). Sweetser et al. (2002) found this species was least piscivorous of the three trout species (brown, brook, rainbow) they examined in the Little Colorado River in Arizona. Bryan et al. (2000) noted that rainbow trout can adversely affect native fish populations through aggressive displacement through interference competition, using resources more quickly and efficiently through exploitative competition, increasing stress hormones, or by opportunistic piscivory. Bonar et al. (2004) considered rainbow trout to be a less significant piscivore in the Verde River with less than 4% of fish in their diet in spite of their statement that continued stocking has the "potential to impact abundance and distribution of native fish due to their stocking overlaps with the peak of spawning activities by native fishes." Competitive interactions of rainbow trout with various fish may be weakened in warm waters (Montgomery and Bernstein 2008). However, evidence of piscivory in rainbow trout has been documented at varying levels and piscivory is demonstrated more frequently in lacustrine habitats compared with fluvial habitats. For example, Hubert et al. (1994) found evidence of piscivory in 1.5% of stocked rainbow trout from Lake DeSmet, Wyoming. Stocked rainbow trout in Flaming Gorge Reservoir, Utah, primarily consumed macroinvertebrates and only switched to limited piscivory at large sizes that accounted for 2.5 - 8% of trout diets (Haddix and Budy 2005). Elser et al (1995) documented piscivory in 1% of rainbow trout (n = 4/400) in Castle Lake, California. In contrast, evidence of piscivory in native populations of cutthroat trout in Lake Washington, Washington, was found in 22.5% of trout less than 200 mm and in 95% of trout greater than 400 mm (Nowak et al. 2004).

Rainbow trout in stream systems may exhibit rare piscivory. For example, rainbow trout in the Green River, Utah, were primarily insectivorous and piscivory was rarely documented (0.004%; n = 2/478; Filbert and Hawkins 1995). Documentation of piscivory in rainbow trout in Arizona and New Mexico streams has ranged between 4-9%, with diets primarily consisting of invertebrates (Propst et al. 1998; Robinson et al. 2000; Bonar et al. 2004). Blinn et al. (1993) documented high rates of piscivory by resident rainbow trout feeding on Little Colorado spinedace (*Lepidomeda vittata)*, a threatened native cyprinid, when trout and spinedace were monitored in 2 m x 3 m sections of Nutrioso Creek isolated with nets. The high piscivory rate exhibited may mimic the response of rainbow trout feeding behavior during periods of isolation due to drought, with a high number of smaller bodied fishes in the same isolated habitat. Accordingly, some amount of predation of small, larval razorback suckers by rainbow trout is anticipated.

Razorback Sucker Critical Habitat

Direct impacts of the proposed action to razorback suckers critical habitat are anticipated to be the presence of the floating platform on the surface of the water, which would provide shade and perhaps cover for the fish and other aquatic species, and the disturbance and occupation of the river bottom by the placement and presence of the anchor block to hold the platform in place within the buoyed area of the river. Placing the anchor block or blocks onto the river bed to tether the floating platform will put sediment and vegetation into re-suspension in the reservoir temporarily. The timing of the proposed action has been specifically set to take advantage of the normally low pool elevation during the Bureau of Reclamation's annual drawdown of the

reservoir. Razorback suckers have evolved within the Colorado River system that, prior to impoundments, ran heavy with sediments during runoff periods and in response to isolated precipitation events affecting small drainages or entire watersheds. It is anticipated that the temporary elevation of suspended sediments in the body of the reservoir as the blocks are placed on the bottom of Lake Mohave will not appreciably diminish the conservation value of critical habitat for the razorback suckers.

Stocking of non-native rainbow trout inherently impact one of the Primary Constituent Elements (PCE's) outlined as critical habitat for razorback suckers: biological environment. Under the factors listed for the biological environment, areas that are nonnative fish-free are required. The additions of nonnative rainbow trout are expected to impact this PCE and critical habitat, consistent with the analysis provided above. However, given the current nonnative fish assemblage that is present in the area, we anticipate that proposed stocking of rainbow trout will not appreciably diminish the conservation value of critical habitat for the razorback sucker.

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 BO. 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. Although there are activities affecting razorback suckers in this area, some of which are studies examining razorback suckers, little to none of these activities are without coordination and Federal participation. As such, there are no cumulative effects identified at this time.

CONCLUSION

After reviewing the current status of the razorback sucker, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our opinion the proposed construction of the water intake structure for Willow Beach NFH and rainbow trout stocking is not likely to jeopardize the continued existence of razorback suckers. The construction of the water intake structure is not anticipated to negatively affect the long-term suitability of habitat in the future. Although a number of individual razorback suckers may be adversely affected by harassment of adults, predation on larvae by rainbow trout, and possible fish community structure disruption, this is not anticipated to result in population level impacts to the razorback sucker in this area at this time. We base this opinion on environmental factors that are currently prohibiting larval razorback suckers recruitment to adulthood and reproductive age. Rainbow trout are likely to prey on larval razorback suckers, however, rainbow trout are less piscivorous than other nonnative species that are abundant in the areas to be stocked; specifically below Davis Dam. It is understood that predation by rainbow trout will result in impacts at the individual level, but is not likely to result in quantifiable impacts at the population level under the current nonnative fish assemblage. Additionally, rainbow trout survival is expected to be relatively low due to; stocking stress, poor foraging behavior of hatchery raised fish, high angling pressure, and expected high temperatures of waters to be stocked.

The proposed conservation measures will reduce the effects of stocking to the maximum amount possible. Stocking only non-reproductive rainbow trout will ensure that a self-sustaining population of trout will not be created. Moving rainbow trout stocking locations away from known razorback suckers spawning locations lessen the likelihood of rainbow trout predation on larval and juvenile razorback suckers. The stocking of sonic/radio tagged razorback suckers into Topock Marsh will provide much needed information about razorback suckers behavior, movement, and survival; which will benefit the species over all. Lastly, restoration of water delivery to the hatchery will enable the continued rearing of wild caught larval razorback suckers; which benefits the razorback sucker recovery goals; including stocking and genetic management of the Lake Mead population.

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 the Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Service (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 Bureau of Reclamation must report the progress of the action and its impact on the species to the Service (AESO) as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

We anticipate the proposed action is reasonably certain to result in incidental take of razorback suckers, in particular larval or small individuals. We anticipate the total number of razorback suckers taken as a result of this action will be difficult, if not impossible, to quantify and predict at this time because finding dead or impaired individuals will be unlikely. Take may be in the form of harassment of adults, disruption of fish community structure, and predation on larvae by

rainbow trout. In lieu of being able to quantify take directly, we will consider incidental take to have been exceeded if evidence of a link between rainbow trout stocking and a significant shift in fish community structure becomes apparent, in both the native and nonnative fish assemblage.

EFFECT OF THE TAKE

In this BO, 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 conservation measures that reasonably and prudently minimize the effects of incidental take of razorback suckers. 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 Service'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 (AESO). 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. The following recommendations are dependent on funding, staffing availability and participation among cooperating agencies and partners;

1) Assist AGFD in assessing fate of stocked rainbow trout;
2) assist AGFD in assessing angler use and return to creel (=cost benefit) generated by rainbow trout stocked below Davis Dam to better understand fate of stocked rainbow trout;
3) assess rainbow trout movement and spatial overlap via use of sonic tags, PIT tags, or other appropriate methods;
4) assess the fish community structure and its possible affect to razorback suckers in the action areas, especially for the locations near Davis Dam.

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 Service'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 BO, are notifying the following Tribes of its completion: Colorado River Indian Tribes, Ft. Mohave Tribe, and Chemehuevi Tribe. We also encourage you to continue to coordinate with the AGFD.

We appreciate the Service's efforts to identify and minimize effects to listed species from this project. For further information please contact me, Jessica Gwinn, or Mike Martinez. Please refer to the consultation number 02EAAZ00-2015-F-0465, in future correspondence concerning this project.

/s/ Steven L. Spangle

cc:

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