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In Reply Refer To:
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22410-2008-F-0421

December 18, 2008

Memorandum

To: Field Office Manager, Arizona Strip Field Office, Bureau of Land Management, St. George, Utah (Attn: Tom Denniston)

From: Field Supervisor

Subject: Final Biological Opinion on Virgin River Gorge Fish Barrier, Mohave County, Arizona

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated October 6, 2008, and received by us on October 10, 2008. At issue are impacts that may result from the proposed Virgin River Gorge Fish Barrier located in Mohave County, Arizona. The proposed action may affect the endangered Virgin River chub (*Gila seminuda*) and woundfin (*Plagopterus argentissimus*). Although designated critical habitat for these two species is in the project area, you determined the proposed action would not affect the primary constituent elements. Therefore, this consultation will not address critical habitat.

This biological opinion (BO) is based on information provided in the September 19, 2008 biological assessment (BA) (BLM 2008), telephone conversations, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, in-river barrier construction and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Planning for a fish barrier in the Virgin River Gorge began in 2007 with discussions between the Virgin River Fishes Recovery Team (Recovery Team) and the Virgin River Resource Management and Recovery Program (Program) on initiating chemical renovations to remove non-native fish species from the Virgin River in Arizona and Nevada. The success of removing non-native fish from the river in Utah allowed for planning to expand the program downstream. Locations for an in-river fish barrier to prevent upstream migration of non-native fish into a new

renovation area below the existing Stateline fish barrier near the Arizona-Utah state line were evaluated. The FWS, Bureau of Land Management (BLM), Arizona Department of Transportation (ADOT), and representatives of the Recovery Team and the Program met several times between October 2007 and the present to discuss the proposed action. Designation of a lead agency (BLM) for the National Environmental Policy Act (NEPA) and section 7 compliance under the Act was completed, and the Arizona Ecological Services Office (AESO) was designated as the FWS office to complete the section 7 consultation.

- October 10, 2008: Formal consultation initiated
- November 14, 2008: FWS sent draft BO to action agency
- November 28, 2008: FWS received comments on the draft BO from BLM

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the construction of a concrete fish barrier in the Virgin River at a site in the Virgin River Gorge (Gorge) approximately 15 miles below the Arizona-Utah state line. The proposed action is entirely on lands managed by BLM in the northern portion of Mohave County between the town of Littlefield, Arizona and the city of St. George, Utah (Figure 1). Access to the construction site is via Interstate 15, which runs parallel to the Virgin River through the Gorge. A complete description of the proposed action is found in the September 19, 2008 BA (BLM 2008).

The fish barrier would be constructed between the existing Interstate 15 embankment and the wall of the Gorge using steel reinforced concrete anchored by steel pipes driven five feet into the bedrock and on the sides by concrete placed in the embankment and into the rock wall of the Gorge. The barrier would be 70 feet wide and range between five and 6.29 feet high. A 10-inch thick concrete splash pad would be constructed at the toe of the barrier and extend 20 feet downstream to an additional 20-foot section of grouted rock rip-rap placed on the riverbed. A portage around the barrier would be provided for recreational river-runners to safely by-pass the structure. A permanent access road would be maintained from the highway embankment down to the barrier site. After construction is completed, this road would be closed to public access using a gate and extended fence along the top of the embankment. The area within the riverbed permanently disturbed is 0.09 acres. Construction would take place during the period of normal low flows in the river. The fish barrier is expected to remain in place for the foreseeable future.

The proposed action also includes commitments to avoid spread of noxious weeds, proper handling of hazardous materials (including concrete, grout, cement mortar and petroleum products), and protection of water quality in the river through placement of sediment fences. These measures are described in detail in the BA (BLM 2008) and are incorporated herein by reference.

Construction on the fish barrier, including all instream work, will occur during periods of low flow in the river. Any flow present within the river at the time will be bypassed through the project area through the use of temporary culverts and/or cofferdams. As a result, a portion of the existing wetted river channel approximately 137 feet long may be dewatered during construction. Prior to dewatering, or any instream work, all native fish will be removed from the site by qualified Utah Division of Wildlife Resources (UDWR) and/or Arizona Game and Fish Department (AGFD) personnel. The clearance effort will be conducted in accordance with the provisions of a permit issued under authority of section 10(a)(1)(A) of the Act and will comply with the any terms and conditions contained in the Incidental Take Statement included with this BO. As there is no practical means to retain all captured fish in holding tanks at the project site or other locations throughout the construction period, native fish will be relocated into suitable habitat downstream of the project area.

STATUS OF THE SPECIES AND CRITICAL HABITAT (rangewide and/or recovery unit)

Virgin River chub

The Virgin River chub was proposed for listing as endangered, with critical habitat, on August 23, 1978 (43 FR 37668). On September 30, 1980, the proposal was withdrawn because the 1978 amendments to the Act required that all proposals pending for more than two years be withdrawn (45 FR 64853). The Virgin River chub was re-proposed as endangered, with critical habitat, on June 24, 1986 (51 FR 22949). On August 24, 1989, the Virgin River chub was listed as endangered (54 FR 35305) throughout its entire range (50 CFR 17.11) but critical habitat was not designated at that time. When the Virgin River chub was listed it was considered a subspecies of roundtail chub (*Gila robusta*) and its taxonomic classification was *Gila robusta seminuda*. DeMarais et al. (1992) asserted that full species status was warranted for the Virgin River chub and reclassified it as *Gila seminuda*. On July 24, 1995, a proposed rule was published in the Federal Register (60 FR 37866) proposing a change in rank from subspecies to species for the Virgin River chub, and proposing a change in the status of the Virgin River population of Virgin River chub from a subspecies to a vertebrate population segment. The latter action was necessary because DeMarais' work concluded that the Muddy (=Moapa) River chub was the same species as the chub in the Virgin River, and only the Virgin River population was included for listing in the final rule. That proposed rule has not been finalized.

Critical habitat was designated on January 26, 2000 (65 FR 4140). Designated critical habitat includes 87.5 miles of the Virgin River and its associated 100-year flood plain, extending from the confluence of La Verkin Creek, Utah, to Halfway Wash, Nevada. The primary constituent elements of critical habitat determined necessary for the survival and recovery of the Virgin River chub are water, physical habitat, and biological environment.

Virgin River chub is most often associated with deep runs or pool habitats of slow to moderate velocities with large boulders or instream cover, such as root snags. Adults and juveniles are often associated together within these habitats; however, the larger adults are collected most often in the deeper pool habitats within the river. Hardy et al. (1989) determined that Virgin River chubs were most often collected in depths ranging from 0.6 feet to 3.0 feet in velocities ranging from 0.0 to 2.5 feet/sec and associated over sand substrates with boulders or instream cover. Schumann (1978) and Deacon et al. (1987) found that the final adult thermal preference was approximately 75 °F. Virgin River chub is omnivorous, showing considerable dietary shifts

with age. Young fish feed almost entirely on macro-invertebrates while adults feed almost exclusively on algae and debris. Spawning is known to occur in the spring, and ripe females have been reported during the months of April, May, and June (Hickman 1987). Hickman (1987) also noted that good spawning years coincided with good spawning years for woundfin. It is likely that Virgin River chub live for many years, perhaps for decades, but they mature rapidly and probably spawn in their second or third year of life (Williams and Deacon 1998).

The historical range of the listed population of Virgin River chub encompassed the Virgin River in Arizona, Nevada, and Utah. The species remains extant throughout its historical range albeit in reduced numbers.

Woundfin

The woundfin was listed as endangered on October 13, 1970 (35 FR 16047). Subsequent to listing, critical habitat was originally proposed on November 2, 1977 (42 FR 57329). The proposal was withdrawn because the 1978 amendments to the Act required that all proposals pending for more than two years be withdrawn (45 FR 64853). Critical habitat was proposed, finalized, and designated at the same time as for Virgin River chub. Designated critical habitat and the primary constituent elements of critical habitat are identical to Virgin River chub. A Woundfin Recovery Plan was developed and approved in July 1979 and later revised and updated in March 1984. In 1995, this plan was superseded by the Virgin River Fishes Recovery Plan, which included both the woundfin and the Virgin River chub (USFWS 1995).

Adult woundfin are often collected from runs and quiet waters adjacent to riffles. Larvae are found in backwaters or slowly moving water along the stream margin, and often are associated with dense growths of filamentous algae. Juveniles use habitats that are slower and deeper than those characteristic of adults. Woundfin greater than 1.6 inches total length are collected most frequently at depths between 0.48 and 1.4 feet, in current velocities ranging from 0.78 to 1.6 feet per second, over sand and sand-gravel substrate (Hardy et al. 1989). There is some indication that when water clarity is high, adult woundfin move into deeper water. The critical thermal maximum temperature for woundfin in the Virgin River is about 102 °F with mean preferred temperatures of about 52 to 75 °F, depending on the overall stream temperature (Deacon et al. 1987). Woundfin feed on a variety of items, including filamentous algae, detrital material, seeds, and aquatic insects; displaying a seasonal shift in food selectivity. Dietary overlap with introduced red shiners is greatest when food is most abundant. During periods of lower food abundance, woundfin and red shiners may experience greater competition for food, leading to a more pronounced partitioning of the food niche. Spawning has been documented from April to August (Hickman 1987; Hardy et al. 1989).

The historical range of the woundfin included rivers in Arizona, Nevada, and Utah, extending from near the junction of the Salt and Verde Rivers at Tempe, Arizona, to the mouth of the Gila River at Yuma, Arizona, and the Colorado River from Yuma, Arizona upstream to the Virgin River in Nevada, Arizona, and Utah, and into La Verkin Creek in Utah. Woundfin are extirpated from much of their former range, and are now confined primarily to the mainstem Virgin River from Pah Tempe Springs in Utah to Lake Mead in Nevada.

Primary Constituent Elements

The primary constituent elements of critical habitat determined necessary for the survival and recovery of the Virgin River chub and woundfin are water, physical habitat, and biological environment. The desired conditions for each of these elements are further discussed below:

Water:

A sufficient quantity and quality of water (i.e., temperature, dissolved oxygen, contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrological regime that is identified for the particular life stage for each species. This includes the following:

- 1 Water quality characterized by naturally seasonally variable temperature, turbidity and conductivity;
- 2 Hydrologic regime characterized by the duration, magnitude, and frequency of flow events capable of forming and maintaining channel and instream habitat necessary for particular life stages at certain times of the year; and
- 3 Flood events inundating the floodplain necessary to provide the organic matter that provides or supports the nutrient and food sources of the listed fishes.

Physical habitat:

Areas of the Virgin River that are inhabited or potentially habitable by a particular life stage for each species, for use in spawning, nursing, feeding, and rearing, or corridors between such areas.

For woundfin:

- 1 River channels, side channels, secondary channels, backwaters, and springs, and other areas which provide access to these habitats;
- 2 Areas inhabited by adult and juvenile woundfin include runs and pools adjacent to riffles that have sand and sand/gravel substrates;
- 3 Areas inhabited by juvenile woundfin are generally deeper and slower. When turbidity is low, adults also tend to occupy deeper and slower habitats; and
- 4 Areas inhabited by woundfin larvae include shoreline margins and backwater habitats associated with growths of filamentous algae.

For Virgin River chub:

- 1 River channels, side channels, secondary channels, backwaters, and springs, and other areas which provide access to these habitats; and
- 2 Areas with slow to moderate velocities, within deep runs or pools, with predominantly sand substrates, particularly habitats which contain boulders or other instream cover.

Biological environment:

Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage. Predation and competition, although considered normal components of this environment are out of balance due to non-native fish species in many areas.

- 1 Seasonally flooded areas that contribute to the biological productivity of the river system by producing allochthonous (humus, silt, organic detritus, colloidal matter, and plants and animals produced outside the river and brought into the river) organic matter which provides and supports much of the food base of the listed fishes; and
- 2 Few or no predatory or competitive non-native species in occupied Virgin River fishes' habitats or potential reintroduction sites.

Threats and Current Status

Virgin River chub

The abundance and distribution of Virgin River chub has declined significantly due to impacts from water diversions and the introduction of non-native species, particularly red shiner. The section of Virgin River hardest hit by the invasion of red shiner is from Lake Mead in Nevada upstream to the Washington Fields Diversion in Utah. Prior to invasion by red shiner, the fish population in this reach was composed almost exclusively of native fish. For example, at one of the Virgin River Recovery Team sites within this reach, Atkinville Wash, fish composition in September 1984, just prior to discovery of the first red shiner, was woundfin (57%), desert sucker (27%), speckled dace (10%), Virgin River chub (4%), and flannelmouth sucker (2%). Since 1999, Virgin River chub have been nearly absent from samples taken at this and other sample sites between the Gorge and the Washington Fields Diversion. In 1988, attempts to chemically eradicate red shiner from the reach of the river between the Gorge and the Washington Fields Diversion began with the treatment of the reach between the Washington Fields and Johnson diversions. Successive treatments have focused on treating additional reaches in each year. Prior to all treatments, an extensive salvage operation is conducted, with native fish moved to habitat above the Washington Fields Diversion.

As a result of the treatments, the number of red shiner at the Atkinville Wash and Twin Bridges sites has been reduced. However, the numbers of Virgin River chub are also low due to the salvage efforts and inadvertent mortality during treatment. Above the Washington Fields Diversion, populations of Virgin River chub have not been impacted by red shiner (red shiner were noted in 2002 within the reach, but not since) and the fish community is composed primarily of native fish (Fridell and Morvilius 2005). Virgin River chub populations in this reach declined in 2002 and 2003 due to low flow, low turbidity, and high temperatures. Populations rebounded dramatically in 2005 due to higher flow levels and lower water temperatures. A return to persistent long-term drought conditions in 2006 and 2007 lowered all native fish populations, including Virgin River chub, back to critical levels. Lethal dissolved oxygen levels were noted throughout most of the upper portion of critical habitat for Virgin

River chub (above Washington Fields Diversion) during two back-to-back flood events in late July and early August 2007 (Rehm and Golden 2008). Close to 90% of the remaining native fish population, including Virgin River chub was lost from this portion of the river. Sampling from within this reach by UDWR in autumn 2007 and spring 2008 indicates that the populations of native fish within this reach are likely at, or near, their lowest recorded levels (Golden 2008). Recently, Virgin River chub and other native species have been reintroduced from upstream and off channel areas, as well as hatcheries in the hopes of reestablishing a larger, more stable native fish population in this reach

Woundfin

Similar to Virgin River chub, woundfin abundance has declined significantly due to the introduction of red shiner. Within the reach between the Stateline fish barrier and the Washington Fields Diversion, woundfin have only been present in very low numbers since the introduction of red shiner. Prior to 2007, the only viable populations of woundfin were found above the Washington Fields Diversion (Fridell and Morvilius 2005). In 2005, woundfin and Virgin River chub were the most common species in this reach. However, the 2007 flood events discussed for Virgin River chub functionally extirpated woundfin from this portion of the river. Nearly 10,000 woundfin from Dexter National Fish Hatchery and Technology Center were stocked back into this area in autumn 2007 and spring 2008. Very few woundfin are found in the reach of the Virgin River in Arizona and Nevada.

Previous Consultations

The Virgin River chub and woundfin are found in three states; Arizona, Nevada, and Utah. Consultations on effects to these species are completed by three FWS Ecological Services Field Offices based on the location of the proposed action. In Utah, consultations address water resource issues and implementation of recovery actions under the Program and are not considered here. In Arizona and Nevada, land management, flood control, and recovery actions sponsored by the Recovery Team are generally the topics for consultation. A list of recent (post-2000) formal consultations addressing these species is found in Appendix A.

ENVIRONMENTAL BASELINE [in the action area]

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.

Description of the Action Area

The action area for the proposed action is the reach of the Virgin River including the 100-year floodplain from the Stateline fish barrier (located just above the Arizona-Utah line) to one mile below the proposed barrier site. The action area was determined by the area of Virgin River chub and woundfin habitat that would be physically affected by the construction of the barrier and the area upstream of the new barrier that could no longer be accessed by individual fish

moving up the Gorge. Such movement is already halted at the existing Stateline barrier, which therefore forms the upper limit of the action area.

The action area covers approximately 408 acres within the Gorge and is composed entirely of BLM-administered public land. Approximately 335 acres are within Arizona, with approximately 73 acres within Utah. The Gorge is a long canyon carved out by the Virgin River. The climate is typical of the Mojave Desert, with hot summers and cool winters characterized by low precipitation and humidity. Average rainfall is approximately 7 inches per year, the majority of which occurs in late summer and during winter months. Similar to other desert rivers, the Virgin River is characterized by large flow fluctuations (0 to 20,000 cubic feet per second) and high salinity, temperature, and turbidity (BLM 2000). Flows are generally highest during the winter and spring months, particularly during spring runoff. Summertime base flows are typically much lower, although large flood events may occur following intense summer thunderstorms. The flow regime of the Virgin River and its tributaries has been modified by developments and diversions designed to capture and deliver water for municipal and agricultural use. As a result, stream flow is altered relative to natural levels. Within the Gorge, the Virgin River experiences periods of extremely low flow and at times may be intermittent during summer months (May – September). This is not likely due to the flow diversions, as historical data indicates the Virgin River within the Gorge was historically intermittent (Addley and Hardy 1998).

Based on data from 1995 and 1996 (Addley and Hardy 1998), the section of river that goes intermittent with greatest frequency is from the Cedar Pockets Campground downstream to Littlefield Springs, approximately 0.5 miles below the proposed barrier site. Flows in this section may dry up during the day, then re-wet during cool nighttime hours, or they may dry up entirely for longer periods of time. Mean daily discharge data is available from the U.S. Geological Survey (USGS) stream gage located just downstream of the project, and upstream from the Littlefield Spring inflows. Data from the past 10 years (July 1, 1998 – July 1, 2008) indicates that although flow is present at the gage on most dates, periods in which flow is extremely low or dries up completely do occur in most years. The longest period without flow at the gage during the past 10 years was 46 days, during June and July of 2003.

In general, the Virgin River is a low gradient (0.3%) river with a wide channel and a sandy substrate. However, the gradient is steeper (0.55%) within the Gorge and the habitat more varied (Addley and Hardy 1998). According to aquatic habitat mapping done by Addley and Hardy (1998), habitat from the Stateline barrier down to the Cedar Pockets Campground is dominated by shallow runs. From the Cedar Pockets Campground down, habitat is more complex, with a mix of runs, riffles, and pools. These types of habitat are present at the proposed project site.

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

Sampling efforts for Virgin River chub and woundfin have been less extensive within the Gorge than in the upstream or downstream reaches. The primary sampling has been the biannual sampling at the Recovery Team's Cedar Pockets site located near the Cedar Pockets Campground (approximately 5 miles upstream of the project). This site has been sampled since 1992 and the data is presented in Table 1. The data from the Cedar Pockets Site shows that until recent years (2007), fish distribution at the site was composed primarily of red shiner, with relatively few native species. The lower number of red shiner in recent years is likely the result

of the upstream treatments that removed red shiner from significant portions of the Virgin River in Utah so there is a reduced drift of red shiner into the Gorge from the upstream areas. With the decline in red shiner there was a slight increase in the number of Virgin River chub. However, the data shows that in general there are relatively few native species at the Cedar Pockets site.

Table 1 Number of each species at the Cedar Pockets site from 1992 – 2007

Date	Desert sucker	Flannelmouth sucker	Speckled dace	Virgin River chub	Woundfin	Red shiner
April 1992	1	3	0	2	0	1688
September 1992	1	0	0	1	0	742
July 1993	0	154	0	4	0	134
September 1993	10	10	0	0	7	414
May 1994	4	4	0	1	11	201
September 1994	0	1	0	0	0	4142
April 1995	1	4	0	0	0	192
October 1995	2	2	0	0	0	594
April 1996	0	1	0	1	2	283
October 1996	0	44	0	0	0	722
June 1997	80	127	0	16	0	119
June 1998	3	132	0	1	0	86
September 1998	0	22	0	1	0	117
April 1999	0	0	0	0	0	15
October 1999	28	85	0	2	0	382
April 2000	3	5	0	1	0	74
October 2000	6	57	0	1	0	786
April 2001	6	5	2	0	2	188
October 2001	0	4	1	2	0	6360
May 2002	0	1878	0	0	0	596
September 2002	0	50	0	0	0	6
April 2003	4	11	1	2	0	6
September 2003	0	2	1	3	0	29
July 2005	4	39	3	6	0	1
October 2005	5	12	3	5	1	864
May 2006	2	5	1	3	0	51
October 2006	1	15	5	3	0	370
April 2007	2	1	9	0	0	2
October 2007	1	13	0	15	0	3
May 2008	3	34	1	13	0	2

In 2007 and 2008, UDWR and AZGFD did a more comprehensive sampling of the Virgin River within the upper portion of the Gorge (from the Stateline fish barrier down to the project area). Table 2 shows the total number of each species from 21 comparable sites in each year, separated out by age class. The data, however, cannot be compared to the Cedar Pockets data due to differences in sample methodology. The data show that the number of native fish present was lower in 2008 than in 2007. However, the more intensive sampling indicated that young of the year (YOY) Virgin River chub compose a large percentage of the total fish population. In 2008, YOY Virgin River chub were the most abundant species at the 21 sites sampled in the upper Gorge. It is unclear if the YOY are the result of spawning within the Gorge or if they drift into the reach from upstream areas. Further, sampling has not been done in the fall to determine how the fish population changes. As can be seen in the Cedar Pockets data, fish population numbers are generally lower in the fall and it is thought that the YOY fish likely experience high mortality

during the summer months due to low flows and resultant high water temperatures. The adults present have been observed to persist within suitable microhabitats (i.e., deep pools with spring inflows) during periods of low flow.

Table 2 Fish species captured in the Virgin River Gorge during 2007 and 2008

Species	2007		2008	
	YOY	Age 1+	YOY	Age 1+
Desert sucker	248	0	7	0
Flannelmouth sucker	675	9	18	2
Speckled dace	3	1	2	0
Virgin River chub	406	0	188	3
Virgin spinedace	1	0	0	0
Woundfin	4	0	0	0
Black bullhead	5	7	0	0
Largemouth bass	1	0	0	0
Mosquitofish	1	0	0	0
Red shiner	563	25	2	0
Unidentified	0	0	0	29
TOTAL	1907	42	217	34

Source: Chris Cantrell, AGFD

At times, particularly during the summer months, flows through the Gorge in the action area may be extremely low and may go intermittent, from at least the Cedar Pockets Campground down to the start of the inflows from Littlefield Springs. This situation may have existed at some level prior to human development in the basin. Addley and Hardy (1998) observed that if this reach went dry gradually, fish species appeared to emigrate out of the drying reaches prior to becoming stranded by a lack of flow. If the river dried more rapidly, most fish became stranded and died. However, this is probably rare, as most fish would move into deep pools or upstream and downstream areas to escape high temperature prior to the river drying out completely. From the observations of Addley and Hardy (1998), it is unclear if Virgin River chub migrate downstream to escape being stranded, or if they migrate upstream. However, at the upstream end of the Gorge, the Stateline fish barrier restricts further upstream movement.

B. Factors affecting species environment and critical habitat within the action area

The current status of the Virgin River chub and woundfin and their habitats in the action area is a result of changes to the natural hydrograph from water development and use upstream and the spread of non-native fish species through the Virgin River Basin. The action area has itself been impacted by the construction of Interstate 15; however, the free flow of water through the river channel is not impeded by the highway. The importance of the Gorge as historical habitat for both species is uncertain. Likely the Gorge acted as a connecting reach between the upstream and downstream habitat areas, with perennial pools providing seasonal habitats during dry periods. Those features are currently maintained in the Gorge.

The action area is entirely owned by the BLM, with a ROW granted for Interstate 15. Actions that could affect the Virgin River chub and woundfin are significantly limited to those proposed under Land Management Plans prepared by BLM. The Arizona Strip District Land Management Plan underwent section 7 consultation in 2007. BLM is not proposing activities within the action area that would adversely affect the listed species or their critical habitat.

Implementation of the proposed action is part of the ongoing efforts to recover the Virgin River chub and woundfin by the Program and the Recovery Team. Placement of the fish barrier will create an additional river reach where renovation to remove non-native fish species would not be compromised by later upstream movements of those species. Continuation of barrier placement and subsequent removals of non-native fish downstream of the Gorge are the focus for future recovery actions.

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.

Virgin River chub

Direct effects

The intent is to construct the fish barrier during a period in which the river is dry or nearly so to avoid most direct impacts to Virgin River chub. However, based on the USGS data, it is likely that a minimal amount of flow will be present during construction. Any flow present will be diverted around the construction site through the use of temporary culverts and/or cofferdams. This will temporarily dry up a section of the normally wetted river channel that will be approximately 137 feet long. The diverted flow would return to the normally wetted channel below the construction site. Once the barrier is completed and the pool area upstream of the barrier fills, all flows will be restored to the normally wetted area. Prior to dewatering, or any instream work, fish will be removed from the site by qualified UDWR and/or AGFD personnel. Native fish will be relocated into suitable habitat downstream of the project area. Due to the difficulty in identifying some larval and juvenile fish, it is possible that some juvenile red shiner may be relocated along with the native fish. However, since they will be relocated below the barrier, in a reach already containing red shiner, the relocation will not compromise the purpose and need of the proposed fish barrier.

During the clearance and dewatering process, it is possible that a very small number of Virgin River chub may not be captured and some fish may be killed by the dewatering or stranded in any remaining pools of water. The remaining pools will likely experience large daytime spikes in water temperature due to diurnal heating. Also, dissolved oxygen would drop due to warm water temperatures, lack of inflow, and high biological demand due to overcrowding by stranded fish. As a result, mortality would be high among any fish stranded in pools. Pools will be

monitored during any dewatering activities to minimize impacts from stranding. In addition, fish mortality may occur if individual fish are struck by equipment or debris during placement of the temporary culverts or cofferdams. Once the fish barrier is complete, and the temporary culverts or cofferdams are removed, water will back up 1700 – 1800 feet behind the fish barrier. This will dry up flow below the fish barrier for a short period of time. UDWR and AGFD will conduct clearances to remove any fish likely to be affected by the downstream drying; however, as mentioned above, some fish may be missed and a very small amount of fish mortality could occur if fish are stranded by drying of the riverbed. Once the water rises to the top of the fish barrier, it will no longer obstruct streamflow. Given the overall low height of the fish barrier, the water will not likely be retained long enough to result in long-term crowding within remaining pools below the fish barrier and the associated impacts as described below. During operation of the barrier in the future, there may be some reduction in flow below the barrier if flows are very low and evaporation decreases the size of the pool above the barrier.

Movement of the fish captured during clearance will increase fish densities in downstream habitat. During periods of low flow and high water clarity, Virgin River chub concentrate in deep pools that serve as habitat refugia (Addley and Hardy 1998). Adding additional fish to pools that may already have high fish densities, may increase susceptibility to disease, increase both intra- and inter-specific competition, and increase predation. For example, Addley and Hardy (1998) observed adult Virgin River chub exhibiting predatory behavior towards YOY fish in pools with high density. However, any flows moving through the culverts during construction would maintain existing flows and provide refreshment to any pools below the project area. After construction of the barrier, any fish that naturally move downstream during low flow will not be able to move back upstream when suitable flow returns. This could lead to a long-term increase in fish densities below the new barrier, rather than a short-term increase under natural conditions. However, given the uncertainty in how many fish are moving downstream and the low number of native fish present both within the Gorge and in the reaches below the Gorge, these mechanisms will not likely result in an overall decrease in native populations below the barrier, particularly as those fish move through the Gorge into the larger permanent habitats below. There is also the potential for sediment to be introduced into the aquatic system during construction. However, given the Environmental Protection Measures included in the proposed action, and the fact that Virgin River chub are adapted to high turbidity conditions, sediment introduction will not impact Virgin River chub.

Indirect Effects

Once the fish barrier is completed, it will fragment the stretch of habitat from the Mesquite Diversion to the Stateline diversion. This will prevent all upstream fish movement from downstream reaches of the Virgin River into the Gorge (habitat from the Gorge up is already fragmented by the Stateline fish barrier). Presently, habitat within the Gorge is also fragmented on a seasonal basis due to low or intermittent flows and adult fish of several species (flannelmouth sucker, desert sucker) have been observed to move downstream into the Littlefield Springs section during these periods. Construction of the proposed barrier will make it impossible for any fish that move downstream to move back upstream into the Gorge. There are three sources of Virgin River chub YOY found in the Gorge. The first source is from spawning adults above the Stateline barrier where the YOY are moved down river by normal flows. The abundance of YOY in the Gorge would not change if this is the sources. If the abundance of Virgin River chub YOY within the Gorge is a result of spawning adults moving upriver from

below the Gorge, then YOY abundance could be reduced if adult fish cannot move back into the Gorge. If the YOY fish within the Gorge are not supported by spawning fish migrating upstream from below the proposed barrier, but are the result of spawning by adult fish that persist within suitable microhabitats above the site of the proposed barrier, then the proposed barrier would have little effect on fish populations within the Gorge. There is limited evidence indicates that Virgin River chub may migrate upstream within the Gorge during periods of intermittent flow. Addley and Hardy (1998) noted that the highest densities of Virgin River chub within the Gorge were immediately below the Stateline fish barrier, where adequate perennial flows persisted even when lower reaches of the Gorge had extremely low flow or were dry. If this observation is correct, the YOY within the Gorge may not be negatively affected, as fish that dispersed upstream during low flow would be able to return once flows reestablish. Given the uncertainty, it is reasonable to assume that at least some reduction in upstream movement would occur, but that the overall impact to fish populations within the Gorge will be minor. Impacts may be mitigated if fish are translocated into the reach from other areas of the river by UDWR and AGFD. The proposed barrier is not intended to be permanent, rather it may be removed or breached once red shiner are eradicated from the Virgin River. However, it is unknown exactly how long the barrier will be in place and for the purpose of this analysis it is assumed that the indirect effects described above could be short or long term.

Woundfin

Direct effects

The direct effects to woundfin will be the same as described for Virgin River chub. However, the potential for these impacts is greatly reduced for woundfin as they are not present, or are present in extremely low numbers within the Gorge. Given this, and the precautions included as part of the proposed action, minimal mortality is expected and the impacts to populations of these species will be negligible and short term.

Indirect Effects

The potential indirect effects due to habitat fragmentation from construction of the barrier will be the same as described for Virgin River chub. However, the impacts will be reduced relative to Virgin River chub, as woundfin are smaller and shorter lived. Therefore, it is less likely that a barrier preventing upstream migration by adults would impact populations within the Gorge. Very few woundfin are found within the Gorge, and most of these are likely fish that have originated from upstream. As a result, overall indirect impacts to woundfin will be negligible.

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 Act.

The action area is entirely within BLM-administered land and is entirely within the Virgin River Corridor ACEC. In addition, much of the action area is within the Beaver Dam Mountains Wilderness. As a result, non-federal activities within the action area are mostly limited to use

and maintenance of Interstate 15 (which often also has a federal nexus and would be subject to NEPA), recreation, and future red shiner eradication efforts. Future red shiner eradication efforts would be conducted by state agencies, but would likely be overseen by the Recovery Team or the Program, both of which includes the FWS and receives federal funding, and thus would undergo future NEPA and ESA analysis.

Interstate 15 is the predominant link between southern Utah and Nevada. Use and maintenance of Interstate 15 is ongoing and would likely increase in the foreseeable future due to continued population growth in both Utah and Nevada. The types of maintenance activities include spot patching, bridge repair, seal coating, ditch cleaning, etc. All maintenance activities described would occur primarily in areas of existing disturbance and would likely not result in significant surface disturbance. Recreational use is likely to continue both at the Cedar Pockets Campground (i.e., camping, picnicking, etc) and throughout the Gorge (i.e., recreational kayaking and rafting). These activities would not impact any of the species considered in this BA and, as a result, there will be no cumulative effects from state or private activities.

CONCLUSION

After reviewing the current status of the Virgin River chub and woundfin, the environmental baseline for the action area, the effects of the proposed construction of the Virgin River Gorge fish barrier and the cumulative effects, it is the FWS's biological opinion that the construction of the fish barrier, as proposed, is not likely to jeopardize the continued existence of the Virgin River chub or woundfin.

We present this conclusion for the following reasons:

- The proposed action would not significantly effect the existing populations of these species in the action area.
- The proposed action will benefit these two species by providing additional habitat that can be managed free of non-native fish species that are the significant cause of decline for both species.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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 Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM (1) fails to assume and implement the terms and conditions or (2) fails to require the Recovery Program 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 BLM or Recovery Program 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

The FWS anticipates 80 YOY and two sub-adult or adult Virgin River chub and 10 YOY woundfin will be taken as a result of this proposed action. The incidental take is expected to be in the form individual fish killed because they were not removed from the work site and placed in safe areas downstream during salvage operations. Individuals may be killed due to high temperatures in isolated pools, placement of culverts or cofferdams, and use of equipment in the river bed. The level of take is based on 20 percent of the YOY Virgin River chub reported in 2007 that may be missed by the qualified surveyors during salvage. The larger sub-adults or adults are easy to see and the survey crews are experienced in handling these fish, so the likelihood of mortality is low. For the woundfin, the estimate is greater than the number of YOY found due to the increased population of woundfin upstream in 2008 and 2009 that will likely produce more YOY that may drift through the Gorge. No adult woundfin are likely to be present in the Gorge. While these YOY fish are small, qualified surveyors are able to locate and remove them from the river and enumerate them. They would be visible in drying pools and the river channel once the flow was diverted into the culverts or cofferdams, so small dead fish could be detected.

EFFECT OF THE TAKE

In this biological opinion, the FWS 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 for the reasons stated in the Conclusions section.

REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS

Reasonable and prudent measures and terms and conditions should minimize the effects of take, and provide monitoring and reporting requirements [50 CFR 402.14(i)(3)]. All handling of Virgin River chub and woundfin would be by experienced personnel holding section 10(a)(1)(A) permits for scientific research. This level of experience and the provisions to move and monitor fish included in the proposed action is sufficient to reduce the amount of incidental take. We

only include one additional Reasonable and Prudent Measure relating to reporting of the amount of take.

Virgin River chub and woundfin

The following reasonable and prudent measure is necessary and appropriate to minimize take:

1. The BLM or an entity of its choosing shall report to the FWS the findings of monitoring for the two fish species conducted during and after construction of the proposed fish barrier.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the BLM must comply with the following term and condition, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. This term and condition is non-discretionary.

Virgin River chub and woundfin

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

- 1.1 The BLM shall submit or cause to be submitted to the AESO a report of all monitoring for Virgin River chub and woundfin conducted as part of the implementation of this proposed action. The report is due within 90-days of the time that flows begin to pass normally over the new fish barrier. The report will contain a listing of all species found, the numbers of such species and their disposition and the number of dead Virgin River chub or woundfin documented.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. BLM must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

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

We have not identified any additional conservation recommendations for this proposed action.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. 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 the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The FWS appreciates BLM's willingness to step forward and be the lead agency for this consultation. Implementation of this project will benefit the Virgin River chub and woundfin and contribute to recovery of these two native fish. For further information please contact Lesley Fitzpatrick at (602) 242-0210 (x236) or me at (x244). Please refer to the consultation number, 22410-2008-F-0421 in future correspondence concerning this project.

/s/ Steven L. Spangle

cc (email): Field Supervisor, Utah Field Office, Fish and Wildlife Service, UT
 Assistant Field Supervisor, Las Vegas Field Office, Fish and Wildlife Service,
 Las Vegas, NV

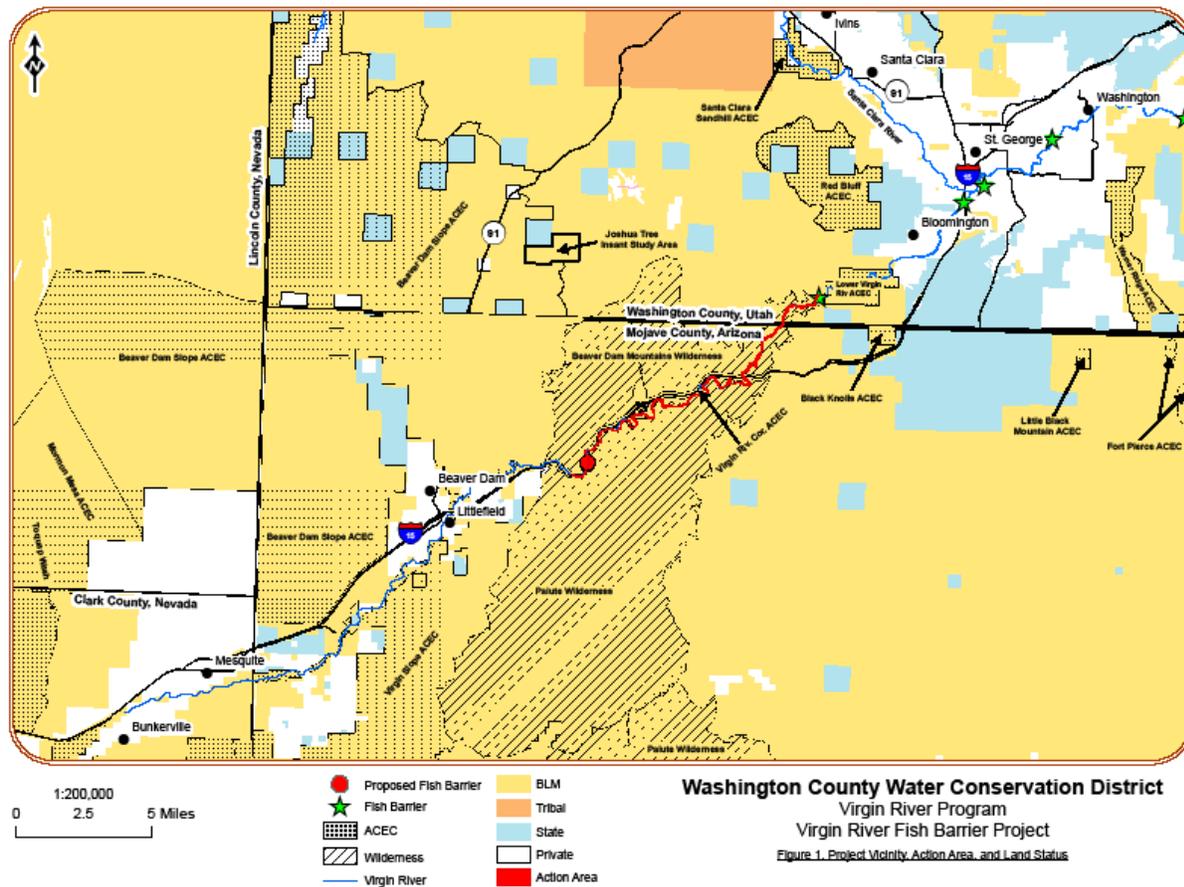
cc(hard copy): Steve Meismer, Virgin River Recovery Program, St. George, UT
 Josh Avey, Arizona Game and Fish Department, Phoenix, AZ
 Chuck Benedict, Arizona Game and Fish Department, Flagstaff, AZ

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TABLES AND FIGURES

Figure 1. Action Area



Appendix A

Formal Consultations for the Virgin River chub and Woundfin
2000-2008

Arizona

Title	Agency	Date	Finding
Arizona Strip Resource Management Plan	BLM	11/07/07	Not likely to jeopardize Not likely to destroy or adversely modify
Beaver Dam Wash Bridge over Highway 91	FHA	12/21/06	Not likely to jeopardize Virgin River chub Not likely to adversely affect woundfin No effect to critical habitat
Reinitiation of Tilapia Removal Program on Virgin River, Clark County, Nevada	FWS	03/09/05	Not likely to jeopardize Not likely to destroy or adversely modify
Approval of State of Arizona Revisions to Water Quality Standards for Surface Water	EPA	06/21/04	Not likely to jeopardize Not likely to destroy or adversely modify
Tilapia Removal Program on Virgin River, Clark County, Nevada	FWS	10/04/02	Not likely to jeopardize Not likely to destroy or adversely modify

Nevada

Title	Agency	Date	Finding
Short-Term Flood Control Actions, City of Mesquite	COE	04/06/05	Not likely to jeopardize Not likely to destroy or adversely modify
Post-Flood Actions and 2005 Runoff Season Flood Control Measures	COE	04/21/05	Not likely to jeopardize Not likely to destroy or adversely modify
New State Route 170 Bridge	FHA	12/20/05	Not likely to jeopardize Not likely to destroy or adversely modify
Replacement of Mesquite Bridge	FHA	07/15/08	Not likely to jeopardize Not likely to destroy or adversely modify