

**United States Department of the Interior**  
**U.S. Fish and Wildlife Service**  
**Arizona Ecological Services Office**  
**2321 West Royal Palm Road, Suite 103**  
**Phoenix, Arizona 85021-4951**  
**Telephone: (602) 242-0210 FAX: (602) 242-2513**

In Reply Refer To:  
AESO/SE  
22410-2010-F-0567R3

April 4, 2014

Memorandum

To: Field Supervisor, Utah Ecological Services Office, Fish and Wildlife Service, West Valley City, Utah

From: Field Supervisor

Subject: Third Revision to Final Biological Opinion on the Virgin River Gorge (Gorge) Rotenone Treatment between the Stateline Fish Barrier in Washington County, Utah, and the Virgin River Gorge Fish Barrier, Mohave County, Arizona and Washington County, Utah

The Arizona Ecological Services Office (AESO) provided the Utah Ecological Services Field Office (UESFO) with the final biological opinion (BO) for this project on October 8, 2010. The BO covered rotenone treatments in the Virgin River Gorge for a ten-year period (2010-2019) while specifically describing the treatment proposed for fall of 2010.

The 2010 treatment did not occur as planned. Because the BO was, in a way, specific to treatment dates, a first revision to provide for a treatment in fall 2011 was completed on March 8, 2011. The 2011 treatment did not occur due to unresolved issues on the use of the fish toxicant rotenone in Arizona. The second revision to the BO on August 17, 2012, addressed a proposed treatment in the fall of 2012 that also was not implemented.

The AESO, UESFO, the Arizona Game and Fish Department (AGFD), the Utah Division of Wildlife Resources (UDWR), and the Virgin River Resource Management and Recovery Program (Program) have been meeting since 2012 to discuss the implementation of rotenone treatments for the Virgin River Gorge under the new Arizona protocol for using rotenone within the state. Unlike previous revisions, this revision is intended to cover rotenone treatments in the project area for the period 2014-2019, with one or more applications of rotenone during a single treatment period (generally applications are spaced one to two weeks apart) possible in any one year with treatment windows between May 1 and November 30 of any year. In addition, there are some changes to the treatment plans and salvage actions included as part of the proposed action. Because this is a change to how previous revisions were done that were based on the treatment information in the final Environmental Assessment (FEA), we will also evaluate the

changes in the proposed action for 2014-2019 to confirm that the FEA and the 2010 BO adequately addressed these effects.

Additionally, UDWR has recently completed improvements to the Stateline Fish Barrier to make it more effective at preventing the upstream movement of fish out of the treatment reach. The effects to Virgin River chub and woundfin movements are also addressed in this revision.

Due to changes in the scope of the action and incidental take statement from that contained in the original BO dated October 8, 2010, the information and analysis in this third revision will supersede those portions of the original BO.

### **Changes to the Proposed Action as Relates to FEA**

The FEA was developed by UESFO with Bureau of Land Management- Arizona Strip District (BLM) as a cooperating agency. For the UESFO, the purpose of the FEA was to provide NEPA coverage for the effects to listed species due to rotenone treatments over the 10-year period (2010-2019) to support the incidental take statement in the BO. For BLM, the purpose was to address effects to BLM lands, wilderness areas, and authorization of the treatment including the Pesticide Use Permit (PUP).

The FEA described the proposed action specifically in terms of a fall, 2010, treatment with time periods for pre-treatment surveys, salvage, and rotenone applications focused on the needs for a fall treatment. While future treatments were envisioned under the FEA, the specifics for when and how those treatments would be conducted was left to the action agencies planning for each event. There were no details provided on coverage for treatments outside of the fall, minimum/maximum flows suitable for treatments, or other consideration of changes in the treatment protocols.

The FEA describes, in fairly specific but also general ways how rotenone treatments are implemented. Because the new Arizona protocol differs in some respects from that described in the FEA and used in the BO to analyze effects, we will in this revision to the BO compare the treatment language to determine if any differences could have differing effects to the resources. Exceptions to this are primarily related to effects of earlier-season salvage operations on fish, changes to where salvaged fish may be held during the treatment, recovery of aquatic invertebrate populations post-treatment, and the use of the Gorge by southwestern willow flycatchers and yellow-billed cuckoos during the spring and summer months. These will be addressed in this revision.

### Treatment Plans

In section 2.1, the FEA described a treatment scenario for the proposed action and contained additional information in Appendix B; the actual treatment plan. In Section 2.1, the text describes the basic, standard format and considerations that are part of a rotenone treatment plan. These are the standards used within the United States (Finlayson *et al.* 2000) that are still in effect as of 2014 and would guide development of future treatments in the Gorge. Appendix B was the specific treatment plan for the 2010 proposed treatment and was based off the 2000 protocol. As noted previously, future treatments under the FEA would have their own specific plan (as in Appendix B) that would also follow the 2000 protocol or subsequent updates.

Finlayson *et al.* (2000) is the basis for the new Arizona rotenone protocol, so we believe that the intent in the FEA for future rotenone treatments to be done in accordance with the standard protocols is maintained and no additional evaluation is needed in the revised BO.

One specific question that did arise in discussions among the action agencies is whether or not the FEA or the BO specified a particular range of flows within which rotenone treatments could be implemented. Our examination of the FEA (and Appendix B) and the BO indicate that desired flows were mentioned; however, no limitations were specified. Further analysis of this is not needed in this revision.

### Seasonal Differences Analysis

The FEA discussed the effects to aquatic species (primarily fish and invertebrates) from implementation of pre-treatment surveys in the early and mid-summer, salvage of native fish in the fall, and mortality to fish and invertebrates in the Virgin River at the time of the rotenone applications. Owing to certain requirements for area closures incorporated into the Arizona protocol, the option of implementing treatments prior to September was investigated and determined to be a valid option. The advantage of the May-June period is that the flows can be very low with some portions of the treatment area (particularly in the downstream portion) being dry or nearly so. This reduces the area needed for the access closure and, with a smaller treatment area and low water conditions, simplifies some aspects of the treatment. With the change to allow rotenone treatments as early as May 1, we review these topics for any change or additions to the analysis resulting from these changes.

### *Timing of Pre-treatment and Salvage Operations*

The FEA discussed the potential effects to native fish from handling stress during the summer (July-September) from the pre-treatment surveys (FEA, section 1.2.1) with a focus on temperature stress. It included measures to reduce that stress through limited handling and avoidance of highly stressful capture techniques when water temperatures are over 31°C (88°F). Salvage was, under the discussed scenario, presumed for October and November to be immediately prior to the treatment. With the treatment period adjusted to include May 1-November 30, pre-treatment surveys could be initiated prior to May 1, with salvage for a June or July treatment taking place in late May-early June. A May-early July treatment is a feasible option as the spring runoff has generally subsided and this is before the summer monsoon period, resulting in low flows in the river that are similar to those seen in the fall. Planning treatments during the monsoon season (generally July through early September) is logistically unwise since flow levels (which drive the amount of rotenone delivered to the water) are highly uncertain during this rainy season and successful treatments are unlikely if the correct level of rotenone cannot be maintained over the desired length of the treatment.

The U.S. Geological Survey (USGS) maintains a streamflow gage in the Virgin River Gorge above the site of the Virgin River Gorge Fish Barrier, within the lower mile of the proposed treatment area. Water temperature data from this site is available for 1998-2013; however, only a few months each year have a record. Table 1 below contains those records as relevant to the likely pre-survey and salvage periods for a late spring or fall treatment and the assessment of temperature risk due to capture, handling, and transport of Virgin River chub, woundfin, and other native fish during these two periods.

As shown in the table, April and October temperatures are similar with September showing generally lower temperatures than May through August. The FEA was concerned about temperatures over 31°C (88°F) in July through September, so we may assume that those temperatures or those close to that level would not, despite the records in Table 1, be unexpected in the spring/summer period (May-July). Doing pre-treatment surveys in May or June would then not likely have any significantly different risks from capture and handling than later in the summer.

What is different is the risk during salvage of native fishes during May and June over October and November. In our 2010 BO, we evaluated the risk of take to Virgin River chub and woundfin from all facets of the proposed action.

Temperature loggers were placed at the Stateline Barrier by UDWR in 2010 and show seasonal peaks over 28° (82°F) and 31°C (88°F) in July (UDWR 2014). June temperatures do regularly fall into the mid to high 20's C (mid 70's to low 80's F), so there is increased risk over the cooler fall temperatures.

Flow rates also affect water temperatures. At low flows where velocity and depth are reduced, air temperatures are more effectively transmitted to the water due to the larger surface area/volume ratio than when flows are deeper and faster. One of the advantages of a treatment in May-July is that the spring runoff period is over and there is little to no rain, resulting in very low flows that actually dry up a portion of the treatment reach. In late June 2013, only the upper 13.1 miles of the 17-mile treatment reach contained water. By mid-July 2013, there was only 10.3 miles of wet stream channel in the upper end of that reach (Schijf 2013).

As shown by the temperature data, a treatment in the May1-July 30 period, would pose an increased risk of handling stress that could lead to mortality of Virgin River chub and woundfin during salvage, but not during pre-treatment surveys as those would have occurred during this period to allow for treatments in the fall. Unlike pre-treatment surveys where captured fish are quickly returned to the water, salvage requires the fish to be removed from the water and held in some kind of containers for eventual transport to trucks containing the larger holding tanks where water conditions (temperature, dissolved oxygen, and pH) may be more safely controlled to reduce risk of mortality. Air temperature is also a factor that can increase water temperatures in holding containers, such that extended holding in these small containers creates additional stress. The salvage plan will, to the extent practicable and feasible, attempt to minimize the risks to individual fish from capture and short-term holding; however, given the circumstances, mortality levels are likely to be higher than normally anticipated from these types of actions.

Salvaged fish are important in that they contain a part of the local genome and having as many as possible present for the first breeding seasons after the treatment can help protect genetic diversity. It is desirable to attempt to remove as many individuals as possible for restocking, with the understanding that not all individuals can be captured.

The number of Virgin River chub and woundfin in the treatment reach will vary over years due to local water conditions and the effect of predators and competitors. Table 2 contains survey data from the Cedar Pocket survey site from 1992 to 2013. These are standardized surveys and allow for some comparison between years. Tables 3 and 4 represent summer only surveys.

In the 2010 BO, we estimated that the intensive salvage efforts in October-November would remove up to 80 percent of fish present, and that perhaps 10 percent of those could die during handling or transport. For salvage in May-June during the low-flow period, we believe that an estimated removal of 80 percent is still valid; however, mortality from capture, handling and transport could be significantly higher than 10 percent and could approach 100 percent as a worst case scenario.

While the loss of up to all salvaged Virgin River chub and woundfin would be very unfortunate, the loss of the numbers of individuals expected to be present in the treatment reach compared to the total population size does not present a significant decrease in overall status of the species. The normal physical conditions of low flows and high temperatures in the Gorge and the presence of red shiner significantly restrict the value of the treatment area to maintain a large resident population of either species.

### *Holding of Salvaged Fish*

The BO states:

“Virgin River chubs (and woundfin) will be captured according to the protocols in the treatment plan, held for up to 72 hours in hatchery trucks for treatment for Asian tapeworm, then transported to Utah and released into the river at several locations below the Johnson Diversion. All captured Virgin River chub will be carefully monitored for health and optimum survival and maintained in water with proper water quality and dissolved oxygen parameters. Capture and handling does result in stress to individual fish; this stress can be ameliorated by safe holding conditions and appropriate care. Under these controlled conditions, the level of handling-related mortality is likely to be very low.”

The proposed action in the FEA and BO indicated that salvaged fish would be loaded into trucks and released upstream in the Virgin River in Utah. In the FEA and BO, salvaged Virgin River chub and woundfin were to be held in hatchery or fish transport tanks for a few days for treatments for Asian tapeworms, then transported to the Virgin River upstream of St George, but below Quail Creek Reservoir for release. It was assumed that the distance from the release site and the treatment site would be sufficient that the salvaged fish would not move downstream to re-enter the treatment reach before the treatment was complete. The revised proposed action provides an additional option, where salvaged fish would be immediately transported to designated sites along the Virgin River in Arizona, below the Virgin River Gorge Barrier, and placed in large net pens within existing pool habitat in the river. Fish would be held there until the treatment is completed and then released into the river at that location. These fish would not be moved back into the treatment reach due to concerns about incidentally moving invasive New Zealand mudsnails (found in Beaver Dam Wash) with the salvaged fish. If this option was used, the stress of being in the truck-mounted tanks for a few hours would be reduced since they would be released to open water sooner (although still confined in a net pen, the pens would allow for more movement and exchange of fresh water). No additional capture, holding, or transport process would be needed to release the individuals back into the river. In the event of a May-June salvage operation, this additional stress compounds the risks from high temperature

discussed previously. At the conclusion of the treatment, salvaged native fish held below the Virgin River Gorge Fish Barrier will be released into the river near Beaver Dam Wash. The treatment reach will be repopulated with native fish moving downstream from the Stateline Barrier with flushing flows from Quail Creek Reservoir within a week post-treatment and anticipated higher river flows from summer monsoons in 2014.

*Southwestern willow flycatcher/Yellow-billed cuckoo*

The 2010 BO determined there would be no adverse effects to southwestern willow flycatcher from a fall rotenone treatment because no individuals would be present in the action area and the aquatic insect population in the river that provides a part of the forage base for flycatchers would have recovered by the next year when individuals would be present.

Inclusion of treatments during May-July results in treatments being implemented during the breeding season for flycatchers. The 2014 current proposed treatment is scheduled to occur in late June or early July during the breeding season for flycatchers. However, the proposed treatments will occur >5 linear miles from any potential breeding habitat. The nearest recently occupied flycatcher habitat is located on Beaver Dam Wash, >0.5 mile away from the Virgin River. This site has not been occupied since a flood in December 2010 scoured portions of the vegetation and altered the hydrology sufficiently to move the active stream channel outside of the historical habitat. Currently the former breeding habitat at Beaver Dam Wash is too dry and too sparse to resemble typical occupied flycatcher habitat (McLeod and Pellegrini 2013, 2014). The nearest breeding flycatcher habitat that was occupied in years after 2010 is in Mesquite NV, >15 miles (straight-line distance) from the Treatment Area (McLeod and Pellegrini 2013, 2014). The nearest recently occupied flycatcher breeding site upstream of the treatment area is >7 miles away in St. George, Utah (UDWR 2012). All areas of potential flycatcher habitat on the Virgin River downstream of Littlefield, Arizona are surveyed annually, with survey areas selected based on previous years' survey results, aerial overflights, reconnaissance on foot, and examination of recent high-resolution aerial photographs (McLeod and Pellegrini 2014). Given these distances, no effect to nests is anticipated. The Virgin River Gorge is not surveyed because no potential flycatcher habitat exists within the Gorge; however, flycatchers are likely to move through the Gorge during spring migrations and may sporadically and briefly occur in parts of the Gorge while on foraging or dispersal movements. With limited areas of dense riparian vegetation in the Gorge, we would not expect much flycatcher use of the area. The likelihood of any significant disturbance to flycatchers in the Gorge is very low and discountable.

Critical habitat for the flycatcher was designated in 2013 and included the Virgin River from Berry Springs, Utah to its confluence with the Colorado River in Lake Mead. Two physical and biological features (one relating to riparian habitat conditions and the other to the insect forage base) were identified. The proposed action would not affect the riparian habitat conditions of critical habitat; however, a temporary affect to the insect forage base is anticipated. The immature aquatic insects in the treatment area would all be killed by the rotenone application, thus reducing the availability of this portion of the prey base in the Gorge until the populations are restored through downstream movement of immature insects in the flows and breeding of adults that dispersed from those upstream locations post-hatching. The 2010 BO evaluated the effects of a fall rotenone treatment on the aquatic portion of this forage base and determined it would be recovered before the next spring/summer breeding period for the flycatcher.

With a May-June treatment, the aquatic insect populations in the Gorge would be eliminated and full restoration prior to the end of the flycatcher breeding season in that same year is unlikely but would be complete prior to the next flycatcher breeding season. The treatment would temporarily affect the aquatic insect forage base in 17 miles of the 94.4 miles of critical habitat. As noted in the preceding paragraph, there are no breeding sites in the Gorge itself, although the area may have flycatchers moving through it that may forage as they go. The flycatcher is an opportunistic hunter and other sources of insects will still be present along the river in the Gorge. The number of flycatchers likely to be using the Gorge treatment area is low and few individuals are likely to be affected. The effects to the physical and biological features of the insect forage base would be temporary and not significant.

The yellow-billed cuckoo was proposed for listing as threatened in 2013. Critical habitat has not yet been proposed. There are records of cuckoos above and below the Gorge along the Virgin River (Table 5). There is no suitable nesting habitat in the treatment area. As with the flycatcher, cuckoos may move through the treatment area during the summer and may forage while present. Cuckoos rely less on small aquatic insects than flycatchers, so the temporary loss of the aquatic insect forage base would have even less impact.

#### Effects of the Improved Stateline Barrier

In 2014, UDWR and the Program completed the re-construction of the existing Stateline Barrier to make it more effective at preventing upstream movement of fish during high flows. While this reduces the risk of red shiner moving upstream out of the Gorge during those events, it also reduces the opportunity for woundfin and Virgin River chub that have moved out of the Virgin River reach above the barrier to return to that area. Woundfin and Virgin River chub in the Gorge can now only stay in the Gorge or move downstream over the Virgin Gorge Barrier to the river areas below. This effectively eliminates the value of individual woundfin and Virgin River chub in the Gorge to contribute to the populations of both species upstream of the Stateline Barrier.

As a primary threat to woundfin populations (USFWS 1995), the presence of red shiners in the Gorge effectively prevents recruitment of young-of-the-year (YOY) woundfin to adult status. Any adult or YOY woundfin that move into the Gorge from upstream will not be reproductively successful due to this predation, and no population in the Gorge can be established. Adult woundfin that move downstream of the Virgin Gorge Barrier face the same conditions of high red shiner numbers that preclude successful recruitment. However, with the completion of the proposed treatments to eliminate red shiner from the Gorge, woundfin that do move into the Gorge from upstream could survive and recruit to establish a population in the treatment reach. Adults or young moving downstream of the Virgin Gorge Barrier, would, under current and short-term conditions, continue to be unlikely to establish populations in that portion of the river. The net effect of the implementation of the proposed action is thus two-fold; protection for woundfin populations upstream of the Stateline Barrier from red shiner invasion, and potential for re-establishment of a recruiting population of woundfin in the Gorge.

The effects to Virgin River chub are similar; however, adults in the Gorge may be able to have some level of contribution to the downstream populations through recruitment of young born in the Gorge that move downstream. Virgin River chub are adversely affected by red shiner but the effect is not as dramatically complete. Virgin River chub in the reach of the river below the

Gorge have maintained populations (albeit at reduced levels) in the presence of red shiner since the latter was documented in the river in the 1970s (USFWS 1995). The current level of red shiner presence in the Gorge, combined with the limited habitat (particularly during summer dry-up periods) likely reduces the potential for survival of YOY chub born in the Gorge or that wash downstream from above the Stateline Barrier and thus to contribute to the downstream population. As with woundfin, the net effect of implementation of the proposed action is two-fold. Because the downstream population of Virgin River chub has been successful with its own recruitment, the amount of potential benefit to this species is perhaps less than that for woundfin, but does contribute to recovery.

## **Summary**

Based on our analysis, we do not believe that the changes to the proposed action result in any significant new effects or significant increases to effects considered in the 2010 FEA and BO. There is an additional degree of risk to individual Virgin River chub and woundfin that requires we amend our Incidental Take Statement to account for increased mortality during salvage operations.

## **Conclusion**

Our conclusions for jeopardy and destruction/adverse modification of designated critical habitat in the October 8, 2010, biological opinion and the March 8, 2011 and August 17, 2012 revisions for Virgin River chub and woundfin do not change as a result of these changes to the proposed action. Based on our expanded analysis for the southwestern willow flycatcher and its designated critical habitat, we concur with a finding of “may affect, not likely to adversely affect” and “unlikely to destroy or adversely modify critical habitat.” For the proposed threatened yellow billed cuckoo, our analysis indicates the proposed action is not likely to jeopardize the continued existence of the species.

## **Incidental take statement**

As described in the October 8, 2010 BO, there are three instances where Virgin River chub and woundfin may be harmed or harassed during the planning and implementation of a rotenone treatment. The first is during pre-treatment surveys where an assessment of the number of fish in the treatment reach is made; the second is during salvage operations to remove as many fish as possible from the treatment reach; and the third is during the rotenone treatment when any fish remaining in the treatment reach would be killed by the rotenone.

Actions taken under pre-treatment surveys is covered by the section 10(a)(1)(A) recovery permits of the agencies or entities involved in the field work. Purposeful take in the form of capture and handling of individual Virgin River chub and woundfin would occur with safeguards in place to reduce the risk of injury or mortality to the fish. There is generally no limit on purposeful take on section 10(a)(1)(A) permits; however, there may be limitations on the number of fish that can be removed from the river either as specimens or accidental mortalities. Based on the methods to be used, including concerns for high water temperatures, we believe that the risk of mortality to individual fish from these operations are low and are unlikely to exceed any limits contained in the permits for AGFD, UDWR, BLM, NDOW, or the FWS.



Salvage operations include capture, handling, transport, and release components. In our October 8, 2010 BO, we indicated that the salvage operation was, at a minimum, likely to remove 80% of the Virgin River chub and woundfin in the treatment reach, and of that number, 10% might die due to injuries acquired during capture or handling stress. Since the salvage would be in the fall, we assumed that most of the salvaged native fish would be several months old YOY and those over one year old, as those are of a size that are more easily detected and captured. Because the biological opinion and the two revisions were for one treatment cycle in years where water conditions that could affect the number of woundfin or Virgin River chub present in the treatment area were generally known, and planning for that level of salvage was feasible, we felt comfortable in making those assumptions. However, with the inclusion of salvage operations in May-July for an early summer rotenone treatment, and that under this revision additional review under the BO will not be needed each year for proposed treatments, we believe it is appropriate to change the incidental take statement to better reflect the uncertainty in incidental salvage mortality as well as that for the numbers of fish present in treatment years.

Treatments implemented in 2014-2019 may occur during drought, normal, or high water years where the specific timing of flows can have effects on the spring/summer reproductive success of the Virgin River chub and woundfin in the river upstream and within the Gorge. In addition, the clarification of the treatment window from the fall of the year to anytime in the period of May 1 through November 30 also affects the ability to salvage fish since water levels vary seasonally within that period in addition to the overall variability in annual water conditions.

The habitat preferences of the two species significantly contribute to the ability of fisheries management tools to capture individuals. Woundfin are generally found in shallow waters (Hardy et al. 1989) where seining and electroshocking are effective capture tools, and while success rates (based on percentage of the total individuals present that are captured) vary with flows, salvage operations done by experienced personnel are very effective in capturing a significant percentage of the fish in these habitats. While Virgin River chub are also encountered in these shallow waters, the largest fish are more likely to be found in deep pools (Hardy et al. 1989) where electroshocking and seines do not work well due to the depths and lack of visibility. Baited hoop nets are effective capture tools in these situations, but it is more uncertain that the nets have removed a significant percentage of the individuals present. Multiple nights/days of setting nets increases this percentage and would be part of salvage operations under this revised BO. The confounding factor of flows is that under higher flow conditions, finding and effectively setting nets in the deep pools is more difficult, and individual chub can more easily leave the pool to another through the runs and riffle areas. Under very low flow conditions where pools are more isolated from flowing water, identification of and access to the pools for placement of nets is enhanced, and individual fish are more restricted to the pools and susceptible to capture.

The other change from the BO is that the treatment window has been expanded outside of the fall of the year to include late spring and summer. The reason for this is to enhance treatment effectiveness by allowing treatments to occur during the very low flow season of the year (post-spring runoff and before the monsoon season) when large portions of the treatment area are dry. This reduces the amount of area to be treated (reducing logistical issues), and enhances salvage success. However, as with pre-treatment surveys, salvage operations in the late-spring and summer have a higher degree of risk of mortality to individual fish due to higher air and water temperature that add stress beyond that of the capture (Stickney 1983). Therefore, unlike fall

treatments where air and water temperatures are lower and a 10 percent risk of mortality to captured individuals is reasonable, this is not the case for summer or spring treatments.

As with pre-treatment surveys, salvage operations are covered under the section 10(a)(1)(A) permits of the agencies or entities performing the field work. The methods to be used to remove Virgin River chub and woundfin from the treatment reach to the net pens in the mainstem Virgin River near Beaver Dam Wash are well tested and effective standard methods for these purposes. The purposeful take here is the result of the salvage operations to remove live fish and return them alive to the net pens downstream. Mortalities during this process are not intended to occur; however, as discussed previously, optimal conditions for the salvage in terms of air and water temperatures may not be present and the risks of higher mortality than would normally be expected are increased. This increased risk of mortality could result in more fish dying than is allowed under the terms of the section 10(a)(1)(A) permits currently in effect.<sup>1</sup> Because the purpose of the salvage operations is to remove fish alive and transport them alive back to the river, mortality of individual fish during this process is, we believe, incidental to the purpose of the action and should be covered under this incidental take statement until such time as agency section 10(a)(1)(A) permits are amended to provide coverage for salvage losses.

As in the October 8, 2010, BO, any individuals of either species in the treatment reach at the time of the treatment will be killed by rotenone. This includes individuals that enter the treatment reach from upstream during the period between the end of the salvage operations and commencement of rotenone application. Salvage of affected fish during the treatment is not feasible due to the lack of safe locations to hold them along the treatment reach.

#### Extent of the Take

- All Virgin River chub and woundfin of any size class in the river at the time of the treatments will be incidentally taken due to mortality from rotenone poisoning.
- Up to 100 percent of salvaged Virgin River chub and woundfin may be incidentally taken due to post-capture stress related mortality during handling, transport, and placement in the river outside of the treatment reach.

#### CONCLUSIONS

This level of incidental take is not likely to jeopardize the continued existence of the Virgin River chub or woundfin due to the following reasons:

- The number of adult woundfin likely to be in the Gorge at the time of salvage or treatment is, based on recent surveys (Tables 2-4), very low. Adult woundfin in the Gorge are largely unable to successfully recruit due to the abundance of red shiner that is the primary nonnative cause of lack of recruitment for this species. Given the short lifespan of the woundfin and the lack of recruitment, any woundfin present in the Gorge is already non-contributing to downstream reaches and the loss of these individuals is not significant.

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<sup>1</sup> Modifications to AGFD's permit to provide for unlimited incidental loss of fish during salvage operations are included in their upcoming permit but are not in their current permit. AESO's permit has no such limitations.

- Any larval or juvenile woundfin likely to be in Gorge at the time of salvage or treatment are similarly unlikely to survive to provide recruitment to the downstream population and their loss is not significant to the population.
- Adult Virgin River chub populations in the Gorge are supported by dispersal from upstream populations now that upstream movement from below the Gorge is blocked by the Virgin Gorge Barrier and can vary significantly (Tables 2-4), but does not represent a significant portion of the total adult population. Virgin River chub of any age in the treatment reach can move downstream when flows in the reach are continuous. Recruitment by adult Virgin River chub in the treatment reach is also compromised by the presence of red shiner, so while they are present they are not significant contributors to the extant population downstream of the Virgin Gorge Barrier.
- The anticipated take is outweighed by the long-term benefits of the project.

## 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 MEASURE and TERM AND CONDITION

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 should be sufficient to reduce the amount of incidental take resulting from salvage and treatment under the proposed action. We include only a reporting requirement on the results of the salvage operation, activities related to handling and transport, and visual estimates of the number of dead Virgin River chub and woundfin found in the river post-treatment as the 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 UESFO, or an entity of its choosing, shall document the amount of incidental take occurring for the two fish species through monitoring to be conducted before, during, and after the treatment.

## TERM AND CONDITION

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

## Virgin River chub and woundfin

The following term and condition implements reasonable and prudent measure #1:

- 1.1 The UESFO 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 completion of the rotenone treatment and return of all surviving fish to the river. 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 and whether the death was related to rotenone or handling stress.

Review requirement: The reasonable and prudent measure, with its implementing term and condition, is 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 measure provided. UESO 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 measure.

The AESO appreciates the efforts of all partners to contribute to the implementation of this important recovery project. Implementation of this project will benefit the Virgin River chub and woundfin through protecting upstream habitats from reinvasion by nonnative fish species and providing additional habitat for recruitment by these native species. For further information please contact Lesley Fitzpatrick at (602) 242-0210 (x236) or me at x244. Please refer to consultation number 22410-2010-F-0567R3 in future correspondence concerning this project.

/s/ Steven L. Spangle

cc (electronic):

Area Manager, St. George Area Office, Bureau of Land Management, St. George, UT  
 Area Manager, Arizona Strip Area, Bureau of Land Management, St. George, UT  
 Assistant Field Supervisor, Las Vegas Field Office, Fish and Wildlife Service, Las Vegas, NV  
 Regional Director, Southwest Region, Fish and Wildlife Service, Albuquerque, NM  
 (Attn: ES Permits)

Steve Meismer, Virgin River Resource Management and Recovery Program, St. George, UT  
 Larry Voyles, Director, Arizona Game and Fish Department, Phoenix, AZ  
 (Attn: Mike Rabe, Nongame Wildlife Branch Chief)

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## Tables

Table 1: Seasonal temperature data for Virgin River Gorge

### USGS Virgin River Narrows Gage (09413700) Temperature Data (°C)

YEAR	April	May	June	July	August	September+	October	November
1998			23.5		24.0			
1999	14.0	22.5		25.5		15.0		
2000		26.0	32.0	19.0		19.5	14.5	5.0
2001		19.0		22.5		22.0	19.0	
2002	14.0					17.4		
2003						17.0		
2004	14.0					14.0		
2005		18.3		25.3				
2006			27.8					3.7
2007			22.5		22.4			
2008			22.4		22.4			
2009			22.9	30.1		28.6/18.2		10.6
2010			21.3		28.6	20.5/19.8		
2011			25.0		27.0			
2012		22.3				18.4		

+ There were two records for September (one early in the month and one late in the month) in 2009 and 2010. The later records can be considered as indicative of October temperatures.

Table 2 Number of each species at the Cedar Pocket site from 1992 – 2009

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
October 2008	8	38	6	36	0	176
October 2009	2	14	1	2	0	1153

Table 3 Fish species captured in the Virgin River Gorge Treatment Area/AGFD

Species	2007		2008	
	YOY	Age 1+	YOY	Age 1+
Desert sucker	248	0	7	0
Flannemouth 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
<b>TOTAL</b>	<b>1907</b>	<b>42</b>	<b>217</b>	<b>34</b>

Source: Chris Cantrell, AGFD

Table 4 Fish species captured in the Virgin River Gorge Treatment Area/UDWR

Species	2011		2012	
	YOY	Age 1+	YOY	Age 1+
Desert sucker	79	1	139	14
Flannemouth sucker	167	2	814	668
Speckled dace	10	0	22	83
Virgin River chub	86	0	86	14
Virgin spinedace	2	0	0	0
Woundfin	1	0	100	148
Black bullhead	0	0	27	16
Largemouth bass	2	0	2	0
Fathead minnow	0	8	0	1
Mosquitofish	0	0	1070	2005
Red shiner	94	102	218	1643
Goldfish	0	0	9	4
<b>TOTAL</b>	<b>431</b>	<b>113</b>	<b>2487</b>	<b>4596</b>

Source: UDWR data

Table 5 Yellow-billed cuckoo records

<b>YEAR</b>	<b>Number Birds</b>	<b>Location of Sighting</b>
2000	2	Virgin River in St. George
2001	1	Beaver Dam Wash near Lytle Ranch
2002	1	Santa Clara River near Santa Clara
2003	1	St. George Golf Course
2004	1	St. George Golf Course
2005	1	Virgin River in St. George
2011	1	Virgin River in St. George
2012	1	Virgin River in St. George
2013	1	Virgin River in St. George
2013	1	Beaver Dam Wash near Lytle Ranch