I. Project Title: **Retrieval of fish from the Grand Valley Irrigation Company and Grand Valley Water Users canals**

II. Bureau of Reclamation Agreement Number(s): R15PG00083

Project/Grant Period: Start date (Mo/Day/Yr): 10/1/2014
End date: (Mo/Day/Yr): 9/30/2019
Reporting period end date: 9/30/2015
Is this the final report? Yes _____ No __X__

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IV. Abstract: Fish screens (3/32-inch wedge wire) were constructed on the Grand Valley Irrigation Company (GVIC) and Grand Valley Water Users (GVWU's) canals (in 2002 and 2005, respectively). When debris overloads the screens and not enough flow can pass through them to provide water to their users, the irrigation companies have the option of lifting their screens. This action allows fish to become stranded in the canals when they are dewatered each fall, after irrigation season. When in place, fish screens are intended to prevent entrainment of larger juvenile and adult fish. However larval fish entering canals from the river can even pass through the 3/32-inch screen and become entrained. In November 2014, 876 fish were salvaged from these canals and returned to the Colorado River.

V. Study Schedule:
Initial year: 2002
Final year: Ongoing

VI. Relationship to RIPRAP: Colorado River Action Plan: Colorado River; II.B.1.b. Screen GVIC diversion canal to prevent endangered fish entrainment; II.B.3.b. Screen Government Highline diversion canal to prevent endangered fish entrainment

VII. Accomplishment of FY 2015 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings: :

A. FY-2015 Tasks and Deliverables:

Task 1. Sample GVIC and GVWU canals; remove native fish and re-locate to the Colorado River.

This task was completed to the best of our ability in FY-2015.

B. Findings (FY-2015 Highlights)

Irrigation water diverted from the Colorado River during the spring and summer months for irrigation and power generation are usually halted in early November. After water diversion into these two canals has ceased for the year, it takes about 5-7 days for the water in the canals to drain down to a level where we can safely and effectively sample it to remove fish. This allows sufficient time for ground water and water from lateral canals to drain back into the main canals and for overall water depths to recede. Fish salvage is then conducted by driving along the canal banks, looking for sections of the canal that retain water and fish as the canals are draining. These areas are sampled with truck-mounted electrofishing units and/or seines. All native fish collected are identified and loaded into a hatchery truck, transported to, and ultimately released alive back into the Colorado River. Total numbers of native fish collected and transported are recorded. Nonnative fish encountered are left in the canal. Endangered fish encountered are measured, weighed, checked for the presence of a PIT tag (if none is present, one is implanted prior to release) and stocked along with the other native fishes. Fish salvage operations usually cease immediately prior to Thanksgiving or when ice on the canals becomes too thick to effectively collect fish through.

In November 2014, GVWU ran water in their canal for a week longer than in previous Years. So to start with, we concentrated our salvage efforts in the GVIC canal. Unfortunately, an early cold snap caused both canals to freeze solid (with ice several inches thick) just a few days after our salvage efforts started. This prevented us from completing planned salvage efforts on either canal. Once this cold snap hit, our salvage efforts were restricted to smaller, shallower pools (usually less than a couple hundred yards in length) where the ice could be chopped through with axes and breaker bars and fish could be successfully corralled due to the smaller size of the pools. Fish in longer, deeper, straight-away sections (some of which are as much as a mile long) of the canals were able to easily see and avoid biologists who were forced to walk on top of the ice and try to bust through it to deploy electrofishing gear or seines. Having to limit our salvage efforts to the smaller inundated areas resulted in our capture numbers being greatly limited. The canals stayed frozen over until February 2015, by which time, it was too late to go back in and do additional salvage efforts, in part due to very muddy canal roads, which can cause our trucks to slide sideways into the canals.

Grand Valley Irrigation Company

Parts of the canal were sampled from the diversion dam head works in the Colorado River to 22 Road in the fall (early- to mid- November of 2014). Sampling was limited to areas where the roads were dry enough to avoid damaging the road surface or sliding sideways sliding by our heavy vehicles. Crews traveled the canal road and sampled all inundated areas that could reasonably be accessed and that could hold fish.

A total of 845 fish were collected in the GVIC canal. This included 657 flannelmouth

sucker, 139 roundtail chub, 12 bluehead sucker, 26 speckled dace, 1 endangered razorback sucker, 9 endangered bonytail, and 1 mountain whitefish . The razorback sucker had a total length of 423 mm and was captured in the GVIC canal close to 25 Road. This fish was stocked in the Colorado River on 10/13/2011 with a total length of 336 mm and had not been previously captured in the river. All of the bonytail that were salvaged were previously untagged fish. The bonytail ranged in size from 175 to 226 mm and were tagged on site before being stocked in the Colorado River.

A running total of all native fishes collected in the GVIC canal from 2002-2014 is provided in Appendix; Table 1. However, effort varied considerably among these ten years and, therefore, direct comparison of individual fish species collected and the total number collected among years is not advisable.

Grand Valley Water User's (Highline Canal)

The Highline Canal was sampled from the point at which the canal enters the Grand Valley East of Palisade to about 21 Road when the roads were dry enough to travel in the fall (early- to mid- November of 2014). As with the GVIC canal, sampling crews traveled the canal roads searching for pools of water that might hold fish. As described above, our efforts in this canal were greatly restricted due to a later starting time and an early cold snap. Capture numbers for native fish in this canal were minimal.

A total of only 31 fish were collected. This included 19 flannelmouth sucker, 2 bluehead sucker, 2 roundtail chub, and 8 speckled dace. All of these fish were collected from the "Hotspot" site in Palisade, CO, immediately upstream of 35-3/10 Road. In years past this location has produced our greatest numbers of fish. However even at this location the unusually thick ice restricted our sampling and had a significant detrimental effect on our salvage numbers.

A running total of all native fishes collected in the GVWU (Highline) canal from 2002-2014 is provided in Appendix; Table 2. However, effort varied considerably among these ten years and, therefore, direct comparison of individual fish species collected and the total number collected among years is not advisable.

VIII. Additional noteworthy observations: While fish salvage efforts in FY-2105 were overall very difficult and frustrating, it does seem to be worth noting that out of just 845 total fish collected in the GVIC canal, 10 of those were endangered fish. This equals 1.18% of our total catch in that canal. This is the highest number of endangered fish ever collected in the GVIC canal during our salvage operations. While the relative percentage sounds fairly low, the endangered fish we did encounter were all fairly far down the GVIC canal, meaning that had we been able to sample the entirety of this canal, the likelihood that we would have encountered more endangered fish seems relatively high. It also reinforces that recently stocked fish, such as the 9 bonytail we encountered are fairly vulnerable to entrainment as they drift downstream soon after stocking.

IX. Recommendations:

A. Continue operating the fish screens.

B. Continue late-fall salvage operations to re-locate native fish that either are entrained into the canal system when the screens are not operational or pass between the 3/32-inch wedge wire screen spacing (e.g., larval fish).

While our overall salvage numbers in FY-15 were low, we feel that the continued presence of multiple species of endangered fish in the irrigation canals each fall coupled with our ability to successfully collect and repatriate these fish to the mainstem Colorado River points to the success of this relatively low-cost management effort.

X. Project Status: "On track and ongoing"

XI. FY 2015 Budget Status

A. Funds Provided: $30,799
B. Funds Expended: $30,799
C. Difference: N/A
D. Percent of the FY 2015 work completed, and projected costs to complete: 100%
E. Recovery Program funds spent for publication charges: $0

XII. Status of Data Submission (Where applicable): All data for this project through FY-15 has been submitted to UCRRP database.

XIII. Signed: Brendan Crowley 11/9/2015
Principal Investigator Date

APPENDIX: Tables

**Table 1.** Total numbers of native fish collected by species and by year from 2002-2014 in the Grand Valley Irrigation Company (GVIC) canal.

| YEAR | FM | BH | FM X BH | RT | SD | MF | MS | RZ | BT | CS | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2014** | **657** | **12** | **0** | **139** | **26** | **1** | **0** | **1** | **9** | **0** | **845** |
| **2013** | **467** | **34** | **0** | **1,669** | **153** | **0** | **0** | **1** | **3** | **0** | **2,327** |
| **2012** | **2,386** | **451** | **0** | **2,453** | **450** | **0** | **0** | **2** | **2** | **0** | **5,744** |
| **2011** | **428** | **17** | **1** | **258** | **6** | **1** | **0** | **2** | **0** | **0** | **713** |
| **2010** | **571** | **4** | **0** | **478** | **80** | **0** | **0** | **0** | **0** | **0** | **1,061** |
| **2009** | **877** | **48** | **0** | **79** | **232** | **4** | **0** | **0** | **0** | **0** | **1,240** |
| **2008** | **892** | **59** | **0** | **150** | **0** | **0** | **0** | **1** | **0** | **0** | **1,102** |
| **2007** | **128** | **3** | **0** | **35** | **0** | **0** | **0** | **0** | **0** | **0** | **166** |
| **2006** | **2,252** | **123** | **0** | **1,322** | **0** | **0** | **0** | **1** | **0** | **0** | **3,698** |
| **2005** | **897** | **80** | **0** | **730** | **0** | **0** | **0** | **0** | **0** | **0** | **1,707** |
| **2004** | **1,783** | **22** | **0** | **588** | **26** | **0** | **0** | **0** | **0** | **0** | **2,419** |
| **2003** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2,908** |
| **2002** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3,371** |

Fish species codes: FM - flannelmouth sucker, BH - bluehead sucker, RT - roundtail chub, SD - speckled dace, MF - mountain whitefish, MS - mottled sculpin, RZ - razorback sucker, CS - Colorado pikeminnow, BT- bonytail

**Table 2.** Total numbers of native fish collected by species and by year from 2002-2014 in the Grand Valley Water User's (GVWU) canal (aka Highline Canal)

| YEAR | FM | BH | FM X BH | RT | SD | MF | MS | RZ | CS | BT | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2014** | **19** | **2** | **0** | **2** | **8** | **0** | **0** | **0** | **0** | **0** | **31** |
| **2013** | **337** | **37** | **0** | **3,230** | **566** | **0** | **0** | **2** | **0** | **8** | **7,410** |
| **2012** | **1,574** | **632** | **0** | **5,924** | **3,942** | **0** | **0** | **1** | **0** | **2** | **12,075** |
| **2011** | **808** | **77** | **1** | **16,813** | **328** | **3** | **19** | **3** | **0** | **0** | **18,052** |
| **2010** | **1,517** | **88** | **0** | **23,299** | **1,043** | **30** | **0** | **0** | **0** | **0** | **25,977** |
| **2009** | **6,255** | **797** | **0** | **26,527** | **5,135** | **7** | **1** | **0** | **0** | **0** | **38,722** |
| **2008** | **738** | **77** | **0** | **754** | **23** | **6** | **0** | **0** | **0** | **0** | **1,598** |
| **2007** | **433** | **93** | **0** | **6,543** | **70** | **0** | **0** | **1** | **0** | **0** | **7,140** |
| **2006** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **2005** | **722** | **173** | **0** | **3,815** | **48** | **0** | **0** | **0** | **1** | **0** | **4,759** |
| **2004** | **893** | **118** | **0** | **5,166** | **140** | **0** | **1** | **0** | **24** | **0** | **6,343** |
| **2003** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **~ 3,000** |
| **2002** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **~ 1,100** |

Fish species codes: FM - flannelmouth sucker, BH - bluehead sucker, RT - roundtail chub, SD - speckled dace, MF - mountain whitefish, MS - mottled sculpin, RZ - razorback sucker, CS - Colorado pikeminnow, BT- bonytail