

COLORADO RIVER RECOVERY PROGRAM
FY 2016 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: C4b-GVP

I. Project Title: **Annual Operation and Maintenance of the Fish Passage Structure at the Government Highline Diversion Dam on the Upper Colorado River**

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: 9/30/2016
Is this the final report? Yes _____ No X

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IV. Abstract:

The purpose of this project is to collect and summarize annual data on the number of large-bodied fish, different fish species, and seasonal distribution of fish that use the fish passageway at the Government Highline diversion dam (aka Grand Valley Water Users [GVWU] dam) on the upper Colorado River in Debeque Canyon. This fish passage structure has been operated during 10 of the last 12 years (construction was completed in August 2004).

A total of 15,889 fish used this fish passage, over a 136-day period, in 2016. This is the third highest total ever documented for this fish passage facility. Thirty six endangered razorback sucker (*Xyrauchen texanus*) and forty four bonytail (*Gila elegans* {the highest number ever documented at this facility}) were collected in 2016. This was also the third consecutive year that a Colorado pikeminnow (*Ptychocheilus lucius*) was documented using this fish passage.

V. Study Schedule: 2004-Ongoing

VI. Relationship to RIPRAP:
Colorado River Action Plan
Colorado River

II.B.3.a (4). Operate, monitor, and evaluate the success of fish passage at Government Highline Diversion Dam.

VII. Accomplishment of FY 2016 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Fish Passage

1. In 2016, 36 razorback sucker were collected in the Government Highline fish trap (Appendix; Tables 1, 2 and 3). These fish ranged in total length from 374 to 492 mm with a mean of 430 mm. Six of these fish have become frequent users of this facility making passage in prior years from one to three times.
2. Forty four bonytail made passage in 2016 (Appendix; Tables 1, 2 and 3). These fish ranged in total length from 279 to 383 mm with a mean of 315 mm. Most notable of these fish was an individual stocked in 2014 that had survived in the wild for two over-winter periods. Another bonytail stocked in 2015 had survived for one over-winter periods.
3. The third ever Colorado pikeminnow made passage at Government Highline Dam in 2016 (Appendix; Tables 1, 2 and 3). This fish had a total length of 578 mm and was originally PIT tagged in 2014 on the Colorado River twenty miles upstream of the Green River confluence in Canyonlands National Park. However, this fish is the same individual that made passage at GVWU in 2015.
4. A total of 15,889 fish were collected in the trap of the Government Highline Diversion Dam fish passage from 25 April through the 14 October 2016. This is the third highest total ever collected at this fish passage; the highest total in the trap was in 2014 (24,670) and the second highest total was in 2010{(18,390) (Appendix; Table 4)}. This is the tenth year of operation since the structure was completed. This facility has been operated for different lengths of time during various times of year, since 2004, and we would suggest that making specific year-to-year comparisons about yearly catch totals and species composition should be discouraged.

Native fishes (and their hybrid forms) accounted for 86.6% (13,754) of the total catch in 2016 (Appendix; Table 4). Nonnative fishes (and their hybrid forms) accounted for 13.4% (2,135) of the total catch in 2016. Bluehead sucker accounted for 41.6% (6,604) of the total catch and flannelmouth sucker accounted for 30.6% (4,859) of the total catch during 2016 (Appendix; Table 1). These two native species dominated the total catch since the ladder began operation. Roundtail chub accounted for 12.1% (n = 1,917) of the total catch during 2016. The most prevalent nonnative fish found in the fish trap from 2013 to 2016 was white sucker (4.8% of total catch, n = 756 in 2016; 7.5% of total catch, n = 1,075 in 2015; 22.9% of total catch, n = 5,637 in 2014; 14.9% of total catch, n = 1,999 in 2013). Channel catfish, which were not found between Government Highline and Price-Stubb dams prior to completion of fish passage at Price-Stubb dam in April 2008, were once again collected in the Government Highline fish passage during 2016 (n = 178).

3. Four gizzard shad, 4 largemouth bass, and 4 smallmouth bass were also collected and removed in 2016. One northern pike was collected and removed that was 738 mm TL.

The otoliths from this fish were collected for potential future natal origin isotopic signature work.

4. All fish found in the fish trap were counted and sorted by species. All native fish, as well as nonnative rainbow and brown trout were released upstream of Government Highline diversion dam. All channel catfish were returned alive immediately downstream from the dam. All other nonnative fish, including native X nonnative hybrid suckers were removed.

Operation and Maintenance

1. In 2015, BOR and GVWU employees used a trackhoe to remove a portion of the river left bank and sediment bar that had deposited over numerous years in front of the upstream fish ladder entrance and fish return tube. However, a prolonged spring runoff combined with multiple spring rainstorm spikes in 2015 re-deposited large amounts of sediment and the upstream sediment bar returned, causing the fish return tube to become unusable during low summer and fall flow periods. In spring 2016, GVWU opened the roller closest to the fish passage for several weeks during high spring flows to help sluice away the sediment bar. This worked well for about a month after 2016 base flows were reached. Unfortunately, multiple rainstorm spikes in summer 2016 once again re-deposited large amounts of sediment and by late summer 2016, the upstream sediment bar had returned. This once again caused the fish return tube to become unusable during low summer flow periods, due to fish stranding and or impingement issues. Therefore, our employee's moved common native fishes (in a stocking truck) approximately 30 yards downstream, releasing them near the opening for the attraction flow gate (downstream of the terminal end of the sediment bar, but closer to the roller dam) for safe release back to the river for most of the 2015 and 2016 field season. This was feasible because the attraction flow gate had been completely shut down during summer low flows in order to allow GVWU to divert their full allotment of water through their canal headgates, which lie directly across the river from the fish passage.

Endangered fishes were transported upstream several hundred yards (again in a stocking truck) where they were released upstream of the sediment bar. This required transferring endangered fish from the stocking truck to the river in hand-held nets through fairly thick vegetation, one at a time, to the river's edge where they could be safely released.

2. Weeds were sprayed and removed from the property throughout 2016.
3. Accumulated debris and trash were manually removed from the Price-Stubb non-selective fish passage facility 5 miles downstream of the Government Highline Fish Passage in early July 2016.

VIII. Additional noteworthy observations: See above.

IX. Recommendations:

A. Biological:

1. Continue to collect information on the number of fish, by species, in the fish trap of the Government Highline fish passageway in 2017 starting about 15 April and running through mid-October. These tentative dates may need to be adjusted, based upon the ability of the adjacent Grand Valley Water Users canal, as well as the ability of downstream diversions structures to get sufficient quantities of water to fill their canals.

B. Operation and Maintenance:

1. In past years it has been stated in this section of our annual report that “to maintain optimum performance of the fish passageway, sediment maintenance should be performed on as needed basis to remove sediment and debris from the forebay of the fishway and attraction flow intakes to prevent buildup and compaction of sediment.”

It is our opinion that the large, heavily-vegetated portion of the riverbank on river left immediately upstream of and adjacent to the upstream fish ladder openings should at some point be further removed (a larger section than the 2015 removal effort) during early spring 2017, just prior to high flows. This heavily-vegetated portion of the river bank now redirects a significant amount of the river flow away from the upstream fish ladder openings and leads to heavy sedimentation in front of the upstream portions of the fish passage. The upstream fish return tube (a 12-inch pipe, immediately adjacent to the entrance of the fish ladder) has become almost impossible to use (even after trackhoe removal in 2015) during low flow periods due to the large sediment peninsula that keeps rebuilding in front of it.

During low flow periods in 2016, native and endangered fish being returned upstream had to be loaded by hand from the concrete fish sorting tanks at the fish ladder into a stock tank in the back of a pickup truck, then driven downstream (to the attraction flow head gate) in order to prevent the fish stranding and/or impingement resulting in probable death that would have resulted had the fish return tube been used on those occasions. Unfortunately, this release site is ~30 yards closer to the dam, increasing the likelihood of fish being swept back downstream. This was stressful on both the fish and the biologists, especially on several days when total numbers of fish being handled in the ladder exceeded 1,000 individuals.

Having been on-site when similar (smaller volume) sediment removal work was done in 2015 leads us to believe that further vegetation and sediment removal along the heavily-vegetated riverbank could be done

from the river left shoreline using a long-reach trackhoe. It's our opinion that such a maintenance activity would help assuage the sediment problems which occur annually in front of the upstream fish passage opening, fish return tube, and attraction flow opening. Unfortunately, even if this maintenance action is done, the vegetated bank on river left will eventually reform (as it did in one year), as the fish ladder is located on the inside bend of the river, across the river from the GVWU canal headgates, which means that this location will naturally sediment in over time and manual sediment removal will have to be repeated at some point.

During the spring 2014 and 2016 high flow periods, GVWU opened the roller closest to the fish passage. The natural sluicing action that this action causes is very effective at removing large amounts of sediment from in front of the fish passage in a very short period of time. Unfortunately, the length of time that the fish passage realizes the benefits from this action can be highly variable, depending upon 1) how low summer base flows are, and 2) how many summer rainstorm events we have, which quickly help redeposit the sediment bar in front of the fish ladder entrance and return tube. At a bare minimum though, we feel that having GVWU continue to sluice during spring high flow periods by raising the roller closest to the fish passage is critical.

Because of its physical location, on the inside bend of a very wide and slow section of the Colorado River, the area directly in front of the Government Highline fish passage is very susceptible to sedimentation. It is our recommendation that some combination of the two actions specified above take place every spring to help control sedimentation issues. But at the very minimum, we believe the sluicing operations are vital to our ability to continue to successfully operate this structure from mid-April through mid-October each year.

X. Project Status: On track and ongoing

XI. FY 2016 Budget Status

- A. Funds Provided: \$63,182
- B. Funds Expended: \$63,182
- C. Difference: -0-
- D. Percent of the FY 2016 work completed, and projected costs to complete: 100%
- E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission (Where applicable): Data will be submitted to UCRRP database manager January 2017.

XIII. Signed: Travis Francis 11/01/2016
Principal Investigator Date

APPENDIX:

Table 1. Total number of juvenile and adult fish captured in the fish trap of the passageway at the Government Highline Diversion Dam during 2016.

<u>Common Name</u>	<u>Number of Fish</u>	<u>Percent of Total Fish</u>
NATIVE FISH		
bluehead sucker	6,604	41.56
bonytail	44	0.28
Colorado pikeminnow	1	0.01
Colorado cutthroat	1	0.01
flannelmouth sucker	4,859	30.58
mountain whitefish	15	0.09
razorback sucker	36	0.23
roundtail chub	1,917	12.06
speckled dace	258	1.62
TOTAL	13,735	86.44
NONNATIVE FISH		
black bullhead	26	0.16
black crappie	0	0.00
blue gill	11	0.07
brook trout	0	0.00
brown trout	126	0.79
channel catfish	178	1.12
common carp	65	0.41
fathead minnow	0	0.00
green sunfish	3	0.02
gizzard shad	4	0.03
largemouth bass	4	0.03
longnose sucker	84	0.53
northern pike	1	0.01
rainbow trout	30	0.19
red shiner	0	0.00
smallmouth bass	4	0.03
splake	0	0.00
white sucker	756	4.76
TOTAL	1292	8.13
HYBRID FISHES		
<u>Native X Native Hybrids:</u>		
razorback X flannelmouth sucker	0	0.00
bluehead X flannelmouth sucker	19	0.12
<u>Native X Nonnative Hybrids:</u>		
bluehead X white sucker	177	1.11
Colorado cutthroat X rainbow trout	2	0.01
flannelmouth X white sucker	663	4.17
bluehead X longnose sucker	0	0.00
flannelmouth X longnose sucker	1	0.01
white X longnose sucker	0	0.00
ALL TOTALS	15,889	100.00

Table 2. 2016 PIT tagged fish histories.

Month of Passage	Species	PIT Tag Histories
Jun-16	Razorback sucker (<i>Xyrauchen texanus</i>) N=1	N=1 stocked 10/18/2011 at Hoagland Conservation Easement near Rulison at CO RMI 227.6, made passage at GVWU 8/4/2014, 5/15/2015 and 7/6/2015
Jul-16	Bonytail (<i>Gila elegans</i>) N=9	N=3 stocked 6/30/2016 at Riverbend Park in Palisade at CO RMI 183.6 N=6 stocked 7/6/2016 at Riverbend Park in Palisade at CO RMI 183.6
	Colorado Pikeminnow (<i>Ptychocheilus lucius</i>) N=1	N=1 tagged by FWS GJ at CO RMI 20 in Canyonlands on 6/18/2014, made passage at GVWU 8/10/2015
	Razorback sucker (<i>Xyrauchen texanus</i>) N=21	N=3 tagged at GVWU passage in 2016 N=2 PIT tag reader malfunction - no histories N=1 tag distributed to FWS GJ on 3/11/2014 no fish data in Program database N=1 stocked 10/3/2001 at Hoagland Conservation Easement near Rulison at CO RMI 227.6, made passage at GVWU 8/11/2008 and 6/23/2014 N=1 stocked 10/13/2011 at Hoagland Conservation Easement near Rulison at CO RMI 227.6, made passage at GVWU 7/17/2014 N=1 stocked 10/18/2011 at Hoagland Conservation Easement near Rulison at CO RMI 227.6 N=1 stocked 8/29/2013 in Rifle at CO RMI 240.7, made passage at GVWU 7/14/2014 and 7/1/2015 N=2 stocked 9/11/2013 in Rifle at CO RMI 240.7, one was recaptured by FWS GJ at CO RMI 183.1 in the Grand Valley on 7/1/2014 N=5 stocked 10/16/2014 in Rifle at CO RMI 240.7, one was recaptured by FWS GJ at CO RMI 158.3 near Fruita on 4/21/2015 N=1 stocked 4/28/2015 in Rifle at CO RMI 240.7 N=3 stocked 4/27/2016 or 4/29/2016 or 6/16/2016 at the top end of Debeque Canyon at CO RMI 204.5
	Bonytail (<i>Gila elegans</i>) N=19	N=1 tag distributed to ONFH GV 3/11/2016 no stock data in program database N=1 stocked 7/9/2014 in Rifle at CO RMI 240.7 N=4 stocked 6/30/2016 at Riverbend Park in Palisade at CO RMI 183.6 N=7 stocked 7/6/2016 at Riverbend Park in Palisade at CO RMI 183.6 N=6 stocked 7/7/2016 at Riverbend Park in Palisade at CO RMI 183.6
	Razorback sucker (<i>Xyrauchen texanus</i>) N=14	N=1 tagged at GVWU passage 2016 N=1 tag distributed to FWS GJ 7/1/2015 no fish data in Program database N=1 stocked 9/27/2012 in Rifle at CO RMI 240.7 N=1 stocked 9/11/2013 in Rifle at CO RMI 240.7, made passage at GVWU 9/9/2015 N=9 stocked 10/16/2014 in Rifle at CO RMI 240.7, one made passage at GVWU 7/20/2015, one was recaptured by FWS GJ at CO RMI 185.9 in the Grand Valley on 7/2/2015 N=1 missing stock data in Program database, recaptured by FWS GJ at CO RMI 191.2 in the bottom end of Debeque Canyon on 7/5/2016
Sep-16	Bonytail (<i>Gila elegans</i>) N=14	N=1 stocked 7/23/2015 near Fruita at CO RMI 157 N=3 stocked 6/30/2016 at Riverbend Park in Palisade at CO RMI 183.6 N=2 stocked 7/6/2016 at Riverbend Park in Palisade at CO RMI 183.6 N=8 stocked 7/7/2016 at Riverbend Park in Palisade at CO RMI 183.6
Oct-16	Bonytail (<i>Gila elegans</i>) N=2	N=1 stocked 7/6/2016 at Riverbend Park in Palisade at CO RMI 183.6 N=1 stocked 7/7/2016 at Riverbend Park in Palisade at CO RMI 183.6

Table 3. Number of Colorado pikeminnow, razorback sucker, bonytail and humpback chub captured in the fish trap of the Grand Valley Water User’s passageway between 2005 and 2016.

Year	Colorado pikeminnow	razorback sucker	bonytail	humpback chub
2005	0	1	0	3
2006	0	0	0	0
2007	Fish Passage not operated due to insufficient flows			
2008	0	1	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	22	3
2012	Fish Passage not operated due to insufficient flows			
2013	0	2	0	0
2014	1	25	14	0
2015	1	52	10	0
2016	1	36	44	0
Totals	3	117	90	6

Table 4. Comparison of the total number of fish, total native vs. nonnative fishes, and percent composition of native and nonnative fish captured in the fish trap of the Grand Valley Water User’s passageway between 2005 and 2016.

Year	Total Number of Fish	Total Native	Total Nonnative	Percent Composition	
				Native Fishes	Nonnative Fishes
2004	fish passageway & fish trap not run due to insufficient flows				
2005	4,638 ^a	2,867	1,771	61.8	38.2
2006	11,978 ^b	10,747	1,231	89.7	10.3
2007	fish passageway run for sediment maintenance only (fish trap not run)				
2008	10,788 ^c	9,663	1,125	89.6	10.4
2009	12,402 ^d	11,286	1,116	91.0	9.0
2010	18,390 ^e	16,358	2,032	89.0	11.0
2011	8,875 ^f	6,870	2,005	77.4	22.6
2012	fish passageway & fish trap not run due to insufficient flows				
2013	13,401 ^g	10,702	2,699	79.9	20.1
2014	24,670 ^h	17,253	7,417	69.9	30.1
2015	14,248 ⁱ	12,094	2,154	84.9	15.1
2016	15,889 ^j	13,754	2,135	86.6	13.4
Totals	135,279	111,594	23,685	82.5	17.5

^a Fish trap operated for 12 days (June and September).

^b Fish trap operated for 41 days (five, 2-week periods).

^c Fish trap operated continuously from 2 May to 15 October.

^d Fish trap operated continuously from 20 April to 15 October.

^e Fish trap operated continuously from 16 April to 15 October.

^f Fish trap operated continuously from 19 April 19 to 14 October.

^g Fish trap operated for 49 days (continuously from 17 May to 5 July).

^h Fish trap operated for 177 days (continuously from 22 April to 16 October).

ⁱ Fish Trap operated 140 days (continuously from 1 May to 12 August, and again from 9 September to 16 October)

^j Fish Trap operated 136 days (continuously from 25 April to 13 May, again from 16 May to 8 June, again from 9 June to 28 July, and again from 11 August to 14 October)