

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): R13PG40018

Project/Grant Period: Start date (Mo/Day/Yr): 6/3/2013
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Reporting period end date: 9/30/2014
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 on the upper Colorado River in Debeque Canyon. This fish passage structure has been operated in 8 of the last 11 years (it was completed in August 2004).

A total of 24,670 fish were documented using the fish ladder in 2014. This is the highest total ever documented for this fish passage facility. Twenty five endangered razorback sucker and fourteen bonytail were handled in 2014, along with the first ever Colorado pikeminnow to use this fish passage facility.

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 2014 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Fish Passage

1. In 2014, a record setting 25 razorback sucker were collected in the Government Highline fish trap (Appendix; Tables 1, 2 and 3). These fish ranged in total length from 363 to 485 mm with a mean of 414 mm.
2. Fourteen bonytail made passage in 2014 (Appendix; Tables 1, 2 and 3). These fish ranged in total length from 245 to 367 mm with a mean of 297 mm.
3. The first Colorado pikeminnow made passage at Government Highline Dam (Appendix; Tables 1, 2 and 3). This fish had a total length of 582 mm and was PIT tagged and then released upstream of the dam.
4. A total of 24,670 fish were handled and counted in the trap of the Government Highline Diversion Dam fish passage 23 April and 16th October 2014. This is the largest number of fish ever collected at this fish passage, a 25.5% increase over the second largest total collected in 2010 {(18,390) (Appendix; Table 4)}. This is the eighth year of operation since the structure was completed. However, since this facility has been run for differing lengths of time and for different time periods in several years, we would suggest that making specific year-to-year comparisons about yearly catch totals and species composition should generally be discouraged.

Native fishes (and their hybrid forms) accounted for 69.9% (17,253) of the total catch in 2014 (Appendix; Table 4). Nonnative fishes (and their hybrid forms) accounted for 30.1% (7,417) of the total catch in 2014. Bluehead sucker accounted for 17.4% (4,297) of the total catch and flannelmouth sucker accounted for 41.3% (10,183) of the total catch during 2014 (Appendix; Table 1). These two native species dominated the total catch in 2013 (35.5% bluehead, 32.3% flannelmouth), 2011 (24.6% bluehead, 33.1% flannelmouth), 2010 (42% bluehead, 32% flannelmouth sucker), and 2009 (54% bluehead, 26% flannelmouth sucker). Roundtail chub accounted for 11% (n = 2,718) of the total catch during 2014. The most prevalent nonnative fish found in the fish trap during 2013 and 2014 was white sucker (22.9% of total catch, n = 5,637 in 2014 and 14.9% of total catch, n = 1,999 in 2013) followed by white sucker X flannelmouth sucker hybrids (3.3% of total catch, n = 802), channel catfish (2.3% of total catch, n = 577), and white sucker X bluehead sucker hybrids (0.5% of total catch, n = 134). Channel catfish, not found between Government Highline and Price Stubb dams prior to completion of fish passage at Price Stubb Dam in April 2008, were again collected during 2014 in the fish trap.

3. Ten gizzard shad, 8 largemouth bass, and 8 smallmouth bass were also collected in 2014.
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. Two brass lift nuts that assist lifting and lowering the gates for the passageway and attraction flow gates became stripped and unusable due to use over time. Both of these brass lift nuts were replaced in 2014.
2. The hose clamp mount for the sump pump located in the concrete manhole broke in Fall 2013, as the ladder was being winterized. Due to high water levels in the sump pump manhole during much of 2014, repair work had to be put off until the end of the field season. A concrete cutter was hired and the plumbing and concrete was repaired in Fall 2014.
3. During the increasing spring hydrograph, GVWU employees opened the roller dam nearest the ladder, which allowed the river to sluice away a huge amount of sediment directly in front of the upstream fish ladder opening, fish return tube, and attraction flow openings. This led to the area in front of these openings being cleaner for most of the 2014 field season than they'd been in many years. The subsequent increased and reliable flows through the fish ladder may have been at least partly responsible for the increase in fish use of this structure in 2014. Unfortunately, high flow spikes associated with storm events in 2014 re-deposited a large sandbar in front of the upstream fish ladder opening and fish return tube on two occasions, necessitating manual removal (shovels and swimsuits) of sand to allow continued operation of the fish passage.
4. Weeds were sprayed and removed from the property throughout 2014.
5. Accumulated debris and trash were manually removed from the Price-Stubbs non-selective fish passage facility 5 miles downstream of the Government Highline Fish Passage in early July 2014.

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 2015 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 be removed during winter 2014-

2015. 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 this structure. The upstream fish return tube (a 12-inch pipe, immediately adjacent to the forebay of the fish ladder) has become almost impossible to use (even after the sluicing done in 2014) due to a large vegetated peninsula that is building in front of it.

During low flow periods in 2014, native and endangered fish being returned upstream had to be loaded by hand from the concrete fish sorting tanks at the fish ladder into live wells in the back of a pickup truck, then driven several hundred yards upstream and carried in dip nets through a tangle of brush to be returned to a flowing part of the river in order to prevent the fish stranding and probable death that would have resulted had the fish return tube been used on those occasions. 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.

On-site examination and discussions of this issue with Kevin Conrad of GVWU have led us to believe that the removal of this portion of 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 (likely over many years), 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.

X. Project Status: On track and ongoing

XI. FY 2014 Budget Status

A. Funds Provided: 53,685

B. Funds Expended: 53,385

C. Difference: -0-

D. Percent of the FY 2014 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 2015.

XIII. Signed: Travis Francis 11/13/2014
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 2014.

Common Name	Number of Fish	Percent of Total Fish
NATIVE FISH		
bluehead sucker	4,297	17.4
bonytail	14	< 0.1
Colorado pikeminnow	1	< 0.1
flannelmouth sucker	10,183	41.3
mountain whitefish	1	< 0.1
razorback sucker	25	0.1
roundtail chub	2,718	11.0
speckled dace	0	0
TOTAL	17,239	69.9
NONNATIVE FISH		
black bullhead	22	< 0.1
black crappie	0	0
blue gill	8	< 0.1
brown trout	51	0.2
channel catfish	577	2.3
common carp	80	0.3
green sunfish	3	< 0.1
gizzard shad	10	< 0.1
largemouth bass	8	< 0.1
longnose sucker	54	0.2
northern pike	1	< 0.1
rainbow trout	21	< 0.1
smallmouth bass	8	< 0.1
splake	1	< 0.1
white sucker	5,637	22.9
TOTAL	6,481	26.3
HYBRID FISHES		
<u>Native X Native Hybrids:</u>		
razorback sucker X		
flannelmouth sucker	0	0
bluehead sucker X		
flannelmouth sucker	14	< 0.1
<u>Native x Nonnative Hybrids:</u>		
bluehead sucker X		
white sucker	134	0.5
flannelmouth sucker X		
white sucker	802	3.3
TOTAL	950	3.9
ALL TOTALS	24,670	100.0

Table 2. 2014 PIT tagged fish histories.

Month of Passage	Species	PIT Tag Histories
May 2014	Bonytail (<i>Gila elegans</i>)	N=1 no PIT tag data recorded N=3 stocked 8/13/2013 in Debeque Canyon @ CO RMI 195.0
June 2014	Razorback sucker (<i>Xyrauchen texanus</i>)	N=1 stocked 10/5/2012 near Rifle @ CO RMI 240.7 N=1 stocked 10/03/2001 near Battlement Mesa @ CO RMI 226.5, recaptured in GVP fish trap 8/11/2008
July 2014	Roundtail chub (<i>Gila robusta</i>)	N=1 tagged 9/23/2008 in Westwater
	Razorback sucker (<i>Xyrauchen texanus</i>)	N=1 tagged at GVP passage in 2014 N=2 recently stocked by ONFH-GJ data incoming N=1 stocked 8/29/2013 near Rifle @ CO RMI 240.7 N=1 stocked 9/10/2012 near Rifle @ CO RMI 240.7 N=2 stocked 10/13/2011 and 10/18/2011 near Battlement Mesa @ CO RMI 227.6, one fish was detected at Price Stubb antenna 6/10/2013
August 2014	Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	N=1 tagged at GVP passage in 2014
	Roundtail chub (<i>Gila robusta</i>)	N=1 tagged in Black Rocks 2011 or 2012, fish data missing
	Razorback sucker (<i>Xyrauchen texanus</i>)	N=1 tagged at GVP passage in 2014 N=2 recently stocked by ONFH-GJ data incoming N=1 stocked 9/12/2013 near Rifle @ CO RMI 240.7 N=5 stocked 9/10/2012 or 9/27/2012 near Rifle @ CO RMI 240.7 N=3 stocked 10/12/2011 or 10/18/2011 near Battlement Mesa @ CO RMI 227.6
September 2014	Bonytail (<i>Gila elegans</i>)	N=9 recently stocked by ONFH-GJ or CPW Native Fish Hatchery data incoming
	Razorback sucker (<i>Xyrauchen texanus</i>)	N=1 most likely tagged during spring CS estimate work, data not submitted N=2 stocked 9/10/2012 near Rifle @ CO RMI 240.7 N=1 stocked 10/18/2011 near Battlement Mesa @ CO RMI 227.6

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 2014.

Year	No. of Colorado pikeminnow	No. of Razorback sucker	No. of Bonytail	No. of Humpback Chub
2004	fish passageway & fish trap not run due to insufficient flows			
2005	0	1	0	3
2006	0	0	0	0
2007	fish passageway run for sediment maintenance only (fish trap not run)			
2008	0	1	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	22	3
2012	fish passageway & fish trap not run due to insufficient flows			
2013	0	2	0	0
2014	1	25	14	0
Totals	1	29	36	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 2014.

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
Totals	105,142	85,746	19,396	81.6	18.4

^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 23 April to 16 October).