

I. Project Title: **Annual Operation and Maintenance of the Fish Passage Structure at the Redlands Diversion Dam on the Gunnison River**

II. Bureau of Reclamation Agreement Number: R15PG00083

Project/Grant Period: Start date: 10/1/2014
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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 overall number of large-bodied fish, number of different fish species, and seasonal distribution of fish use at the fish passageway at the Redlands Water and Power diversion dam on the Gunnison River. In 2019, the Redlands fish passageway was operational from 6 May to 24 September. This is the twenty-fourth year that the Redlands fish passageway has been operated since it was completed in late June of 1996.

V. Study Schedule: 1996-Ongoing

VI. Relationship to RIPRAP:
Gunnison River Action Plan
II.B. Restore native fish passage at instream barriers
II.B.1. Restore passage at Redlands
II.B.1.c. Operate and maintain fish ladder

VII. Accomplishment of FY 2019 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Fish Passage

1. No Colorado pikeminnow (*Ptychocheilus lucius*) were captured at Redlands fish passage in 2019. This follows an annual record that was set for this facility, when 39 Colorado pikeminnow were captured in the Redlands fish passage during 2018 (Table 1 & 2). The total number of Colorado pikeminnow capture events recorded at the Redlands fish passage from 1996 through 2019 is 226 (Table 3).
2. Six razorback sucker (*Xyrauchen texanus*) were captured in the Redlands fish passage during 2019 (Table 1 & 2). The total length of these fish ranged from 340 to 490 mm with a mean total length of 436 mm. Three fish were stocked near Delta, Colorado at Gunnison RMI 57.1 in 2016 or 2017. One of these fish made passage at Redlands in July 2017. Three fish were stocked in 2019; one near Grand Junction at Colorado RMI 187.7, and the other two near Fruita at Colorado RMI 157.1. The total number of razorback sucker capture events recorded at the Redlands fish passage from 1996 through 2019 is 44 (Table 3).
3. Eight bonytail (*Gila elegans*) were captured in the Redlands fish passage during 2019 (Table 1 & 2). The total lengths of these fish ranged from 251 to 331 mm with a mean total length of 284 mm. Seven of these fish were stocked this year; five near Fruita at Colorado RMI 157.1 and two near Grand Junction at Colorado RMI 187.7. One was stocked in 2018 at Colorado RMI 240.7 (Rifle, Colorado).
4. Two roundtail chub (*Gila robusta*) (of the 438 found in the fish trap) were recaptured (previously PIT tagged in 2017) from Black Rocks at Colorado RMI 136 (Table 1 & 2).
5. A total of 3,438 fish of all species were handled at the Redlands fish passage between 6 May and 24 September 2019. Native fishes composed 58.7% of the total catch in 2019 (the lowest value for any year of operation; Table 4). The total number of all fishes collected in the 24-year operation of the fish trap is 201,843. Overall, native fish account for about 81% of all fish processed during this 24-year period.

The three species that composed the majority of our catch were bluehead sucker (*Catostomus discobolus*; 31.6%), flannelmouth sucker (*Catostomus latipinnis*; 13.4%) and roundtail chub (12.7%). White sucker (*Catostomus commersoni*) and white sucker hybrids combined made up 18.4% of our total catch (Table 1).

The number of channel catfish (*Ictalurus punctatus*) collected in 2019 was 283. The three most abundant years for this species were 2006 (n=432), 2013 (n=995), and 2014 (n=1,029). Six smallmouth bass (*Micropterus dolomieu*) were collected and euthanized at the Redlands fish passage in 2019.

One adult gizzard shad (*Dorosoma cepedianum*; ≥ 180 mm TL) was collected and euthanized in 2019, the most abundant catch year for this species was 2007 (n=43).

6. All fish found in the fish trap were counted and sorted by species. All native fish, as well as nonnative rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*), were released upstream of Redlands Diversion Dam. All channel catfish were returned alive to the river immediately downstream from the dam. All other nonnative fish including native X nonnative sucker hybrids were euthanized and disposed of according to protocols specified in our state collecting permit.

Operation and Maintenance

Redlands Fish Passage:

1. Some manual effort (shovels and high pressure hose) and closing the attraction flow head gate (for a rather long period of time) was necessary to remove sediment and debris in the upstream forebay of the Redlands fish passage. In some years (not in 2019), during mid-June immediately following runoff, sediment removal is necessary with the assistance of the Redlands Water and Power Companies backhoe.
2. Annual weed control was continued throughout 2019.

VIII. Additional noteworthy observations:

- A. After 24 years of operation there have been 226 capture events with 201 individual Colorado pikeminnow. Twenty-five (12%) of those fish are repeat users of the facility, 19 were re-encountered in a future year and 6 were re-encountered during the same year. We began translocating Colorado pikeminnow further upstream in 2015, to hopefully aid in long term retention of fish in the Gunnison River. Prior to this operational change, only one Colorado pikeminnow was re-encountered in the Gunnison River above Redlands Dam in a future year (after making passage). This fish made passage in 1998, was collected at Gunnison RMI 8.2 in 1999, and was collected again in the Gunnison River at RMI 25.3 in 2000. This same fish was collected in 2001 in the Green River only to return and be re-encountered in the Colorado River in each year from 2003-2005. Even after implementing translocation of fish in 2015, only the previously mentioned fish has been re-encountered in the Gunnison River above the Dam during a future year. However, 135 (67%) of the fish that have made passage have not been re-encountered, and some of these fish may have retained for some period of time in the Gunnison River above Redlands Dam evading detection. Only two electrofishing passes occur each year for project 163 (Gunnison River Fish Community Monitoring) since 2011, and only one antenna array (deployed and managed by Kevin Thompson, Colorado Parks and Wildlife) is in the system in Roubideau Creek. Therefore, evading detection or capture is possible. It is also possible these fish have left the Gunnison River after some period in the system and passed over the diversion dam without being encountered since. Additional future encounter data for Colorado pikeminnow that made passage at

Redlands Fish Passage can be found in Figure 1. All the above is data from STReaMS collected 04 November, 2019.

IX. Recommendations:

A. Biological: Continue to collect information on the number of fish, by species, in the fish trap of the Redlands Dam fish passageway in 2020 starting about 15 April and running through mid-October. Consider FLOY-tagging some of the native three species of concern (roundtail chub, flannelmouth sucker, and bluehead sucker) to determine the number of fish that are re-using the ladder per annum and are being counted more than once in the annual tally.

Continue translocation of Colorado pikeminnow collected in the Redlands fish passage to release points farther upstream in the Gunnison River, in an effort to encourage long-term retention of these fish in the main stem Gunnison River.

B. Operation and Maintenance: Continue with annual grounds and facility maintenance in 2020.

X. Project Status: "On track and ongoing".

XI. FY 2019 Budget Status

A. Funds Provided: \$83,891

B. Funds Expended: \$83,891

C. Difference: -0-

D. Percent of the FY 2019 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 uploaded into STReaMS by the end of November, 2019.

XIII. Signed: Travis Francis
Principal Investigator

11/04/2019
Date

Table 1. Total number of juvenile and adult fish captured in the fish trap of the passageway at the Redlands Diversion Dam from 6 May to 24 September 2019.

Common Name	Number of Fish	Percent of Total Fish
NATIVE FISH		
bluehead sucker	1,087	31.62
bonytail	8	0.23
Colorado pikeminnow	0	0.00
Colorado cutthroat	0	0.00
flannelmouth sucker	459	13.35
<i>Gila</i> both roundtail and humpback traits	0	0.00
Young of year <i>Gila</i>	1	0.03
humpback chub	0	0.00
mountain whitefish	0	0.00
razorback sucker	6	0.17
roundtail chub	438	12.74
speckled dace	18	0.52
TOTAL	2,017	58.67
NONNATIVE FISH		
black bullhead	194	5.64
black crappie	0	0.00
bluegill	18	0.52
brook trout	0	0.00
brown trout	27	0.79
channel catfish	283	8.23
common carp	126	3.66
fathead minnow	0	0.00
green sunfish	78	2.27
gizzard shad	1	0.03
largemouth bass	5	0.15
longnose sucker	11	0.32
northern pike	0	0.00
rainbow trout	1	0.03
red shiner	34	0.99
smallmouth bass	6	0.17
sand shiner	1	0.03
splake	0	0.00
striped bass	0	0.00
white sucker	491	14.28
yellow bullhead	0	0.00
TOTAL	1276	37.11
HYBRID FISHES		
<u>Native X Native Hybrids:</u>		
razorback X flannelmouth sucker	0	0.00
bluehead X flannelmouth sucker	1	0.03
<u>Native X Nonnative Hybrids:</u>		
bluegill X green sunfish	1	0.03
bluehead X white sucker	41	1.19
flannelmouth X white sucker	102	2.97
flannelmouth X bluehead X white sucker	0	0.00
bluehead X longnose sucker	0	0.00
flannelmouth X longnose sucker	0	0.00
white X longnose sucker	0	0.00
ALL TOTALS	3,438	100.00

Table 2. 2019 PIT-tagged fish histories.

Month of Passage	Species	PIT Tag Histories
Jul-19	bonytail (<i>Gila elegans</i>) N=2	N=1 stocked 6/12/2018 in Rifle at CO RMI 240.7; detected 4/24/2019 at Price Stubb CO RMI 188.3 N=1 stocked 7/11/2019 in Fruita at CO RMI 157.1
	razorback sucker (<i>Xyrauchen texanus</i>) N=1	N=1 stocked 8/30/2017 in Delta at GU RMI 57.1
	roundtail chub (<i>Gila robusta</i>) N=1	N=1 tagged October 2017 at Black Rocks (CO RMI 136); made passage 5/10/2018 at Redlands Ladder
Aug-19	bonytail (<i>Gila elegans</i>) N=3	N=2 stocked July 2019 in Fruita at CO RMI 157.1 N=1 stocked 7/16/2019 in Grand Junction at CO RMI 187.7
	razorback sucker (<i>Xyrauchen texanus</i>) N=2	N=1 stocked 9/13/2016 in Delta at GU RMI 57.1; made passage 7/5/2017 at Redlands Ladder N=1 stocked 8/31/2017 in Delta at GU RMI 57.1
	roundtail chub (<i>Gila robusta</i>) N=6	N=1 tagged October 2017 at Black Rocks (CO RMI 136); detected 7/18/2018 at Redlands Ladder PIA N=5 tagged August 2019 at Redlands Ladder as tour demonstrations
Sep-19	bonytail (<i>Gila elegans</i>) N=3	N=2 stocked July 2019 in Fruita at CO RMI 157.1 N=1 stocked 7/16/2019 in Grand Junction at CO RMI 187.7
	razorback sucker (<i>Xyrauchen texanus</i>) N=3	N=3 stocked August-September in Delta at GU RMI 57.1
	roundtail chub (<i>Gila robusta</i>) N=3	N=3 tagged September 2019 at Redlands Ladder as tour demonstrations

Table 3. Number of Colorado pikeminnow, razorback sucker, and bonytail capture events (not individuals) in the fish trap of the Redlands passageway between 1996 and 2019.

Year	Colorado pikeminnow	razorback sucker	bonytail ^a	humpback chub
1996	1	0	0	0
1997	18	0	0	0
1998	23	0	0	0
1999	5	0	0	0
2000	4	0	0	0
2001	1	5	0	0
2002	7	1	0	0
2003	3	0	1	0
2004	5	3	0	0
2005	4	6	0	0
2006	10	5	0	0
2007	21	4	0	0
2008	0	1	0	0
2009	2	1	0	0
2010	4	1	0	1 ^b
2011	2	1	7	0
2012	12	0	0	0
2013	2	1	0	0
2014	17	2	5	0
2015	6	3	44	0
2016	33	1	33	0
2017	7	1	2	2 ^c
2018	39	2	8	0
2019	0	6	8	0
Totals	226	44	108	3

^a all bonytail captured in the fish trap were from fish originally stocked in the Colorado and Gunnison rivers.

^b wild fish originally PIT-tagged at the head end of Westwater Canyon on the Colorado River (rivermile 123.4), 10/07/2008 by Utah DWR.

^c one fish was identified as *Gila* having traits of both humpback and roundtail chub

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 Redlands passageway between 1996 and 2019.

Year	Total Number of Fish	Total Native	Total Nonnative	Percent Composition	
				Native Fishes	Nonnative Fishes
1996	8,375	7,885	490	93.9	6.1
1997	12,233	11,547	686	94.4	5.6
1998	7,589	7,060	529	92.8	7.2
1999	8,264	7,654	610	92.6	7.7
2000	6,662	6,157	505	92.3	7.7
2001	6,317	5,221	1,096	82.6	17.4
2002	4,454	2,956	1,498	66.3	33.7
2003	7,259	4,909	2,350	67.6	32.4
2004	11,720	9,011	2,709	76.9	23.1
2005	11,403	8,414	2,989	73.8	26.2
2006	11,095	9,384	1,711	84.5	15.5
2007	6,963	5,801	1,162	83.4	16.6
2008	3,699	2,818	881	76.2	23.8
2009	3,580	3,066	514	85.6	13.5
2010	6,708	5,805	903	86.5	13.5
2011	8,705	7,087	1,618	81.1	18.9
2012	11,570	10,249	1,321	88.6	11.4
2013	16,687	13,810	2,877	82.8	17.2
2014	13,331	9,046	4,285	67.8	32.2
2015	7,467	5,429	2,038	72.7	27.3
2016	10,347	7,486	2,861	72.4	27.6
2017	7,342	5,251	2,091	71.5	28.5
2018	6,635	5,492	1,143	82.8	17.2
2019	3,438	2,018	1,420	58.7	41.3
Totals	201,843	163,556	38,287	81	19

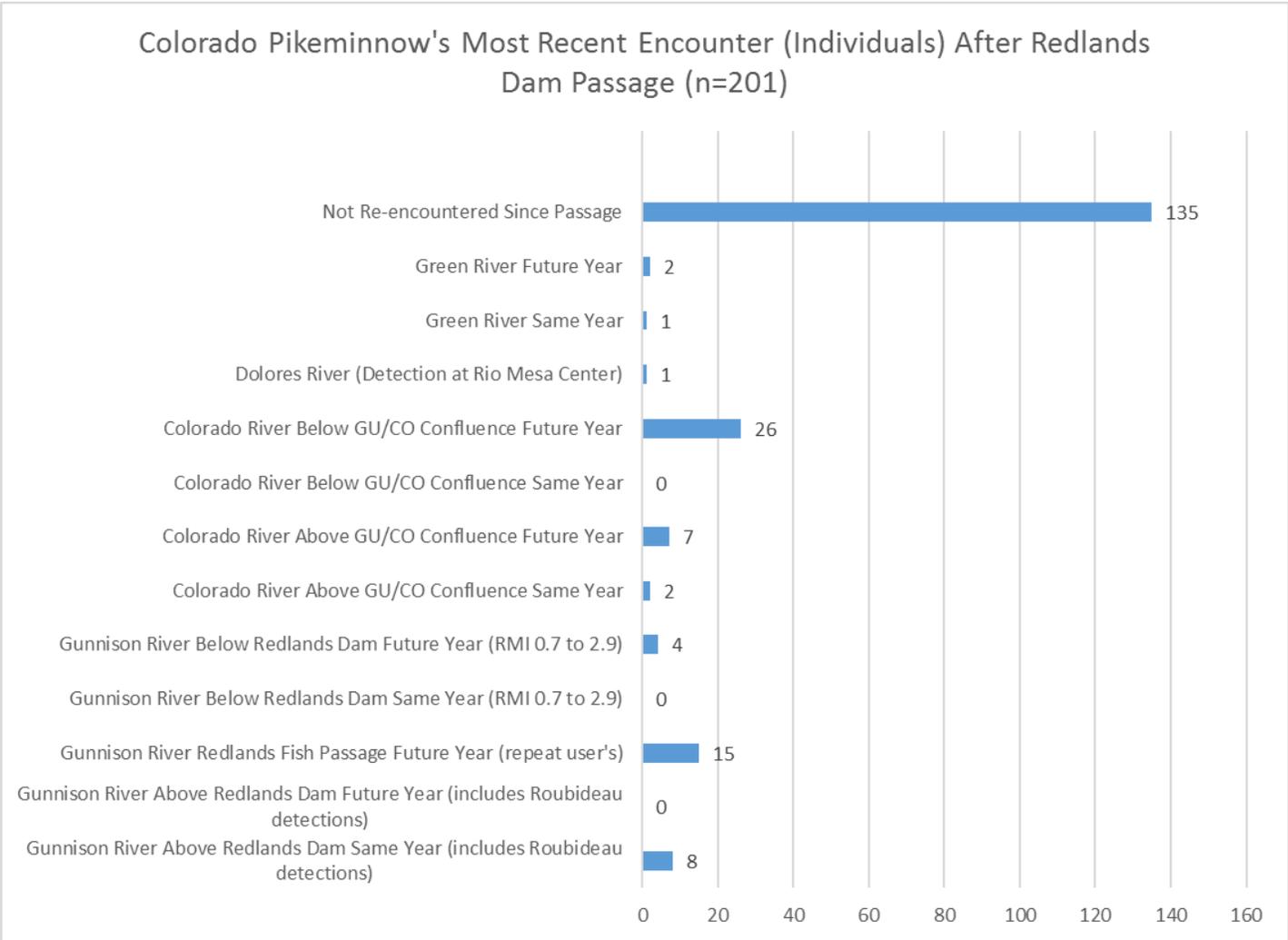


Figure 1. Most Recent Encounter Locations of Colorado Pikeminnow after Passage at Redlands Fish Ladder 1996-2019. Data from STReAMS 20191104.