COLORADO RIVER RECOVERY PROGRAM
FY 2017 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: C4-b-RED

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(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: 9/30/2017
Is this the final report? Yes _____ No _X__

III. Principal Investigator(s):

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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 Redlands Water and Power diversion dam on the Gunnison River. In 2017, the Redlands fish passageway was operational from 19 April to 20 October. This is the twenty second year that the Redlands fish passageway has been operated since it was completed in late-June 1996.

V. Study Schedule: 1996-Ongoing

VI. Relationship to RIPRAP:
Colorado River Action Plan
Gunnison River
II.B.1.c. Operate and maintain fish ladder.
II.B.1.d. Monitor and evaluate success.

VII. Accomplishment of FY 2017 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Fish Passage

1. Seven Colorado pikeminnow (*Ptychocheilus lucius*) were captured in the Redlands fish passage during 2017 (Appendix; Table 1 & 2). These 7 fish had total lengths ranging from 469 to 593 mm with a mean of 531 mm. Two were new fish that had 134 khz PIT tags implanted at the Redlands fish passage. The other five were recaptures from previous studies. One Colorado pikeminnow was tagged in 2014 near Cisco and was most recently recaptured in 2015 near Moab, one was tagged in 2015 near Moab and was resighted in the Dolores River later in 2015 and was recaptured twice near Moab in 2016, one was tagged in 2015 in Canyonlands and recaptured there that same year, another was tagged in 2015 in Canyonlands, and the final one's tag has not yet been entered into STReaMS. All 7 Colorado pikeminnow were translocated to Escalante at river mile (RMI) 42.7 on the Gunnison River. The total number of Colorado pikeminnow capture events recorded at the Redlands fish passage from 1996 through 2017 is 187 (Appendix; Table 3).

2. One razorback sucker (*Xyrauchen texanus*) was captured in the Redlands fish passage during 2017 (Appendix; Table 1 & 2). The total length of this fish was 387 mm. This fish was stocked near Delta, Colorado at Gunnison RMI 57.1 in 2016. The total number of razorback sucker capture events recorded at the Redlands fish passage from 1996 through 2017 is 36 (Appendix; Table 3).

3. Two bonytail (*Gila elegans*) were captured in the Redlands fish passage during 2017 (Appendix; Table 1 & 2). The total lengths of these fish were 330 and 332 mm. These two fish were most likely stocked this year as the data is not in STReaMS, yet.

4. One humpback chub (*Gila cypha*) and one identified just as *Gila* (having phenotypic traits of both humpback and roundtail chub) were captured in the Redlands fish passage during 2017 (Appendix; Table 1 & 2). Both fish were tagged on this encounter. Their total lengths were identical at 168 mm.

5. A total of 7,342 fish of all species were handled at the Redlands fish passage between 19 April and 20 October 2017. Native fishes composed 71.5% of the total catch in 2017 (the fourth lowest relative percentage of native fishes ever observed; Appendix; Table 4). The total number of all fishes collected in the 20-year operation of the fish trap is 191,770. Overall, native fish account for about 81% of all fish processed during this 22-year period.

   The three species that composed the majority of our catch include bluehead sucker (37.7%), flannelmouth sucker (20.8%) and roundtail chub (11.8%). White sucker and white sucker hybrids combined made up 14.2% of our total catch (Appendix; Table 1).

   Channel catfish numbers in 2017 were 404. The three most abundant years for this species were 2006 (432), 2013 (995), and 2014 (1,029). Only two smallmouth bass were collected and euthanized at the Redlands fish passage in 2017.

5. Sixteen adult gizzard shad (≥ 180 mm TL) were collected and euthanized in 2017, the two most abundant years for this species were 2012 (22) and 2007 (43).

6. All fish found in the fish trap were counted and sorted by species. All native fish, as well as nonnative rainbow trout and brown trout, 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 plus hybrid suckers 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 fore bay of the Redlands fish passage. In some years, during mid-June immediately following runoff, sediment removal is necessary with the assistance of the Redlands Water and Power Company's backhoe.
2. Annual weed control was continued throughout 2017.

VIII. Additional noteworthy observations:

For the last few years all Colorado pikeminnow collected at the Redlands fish passage have been translocated 39.8 miles upstream to Escalante Canyon, then released into the Gunnison River. Unfortunately ongoing Gunnison River fish community monitoring efforts (Project 163) have, as yet, been unable to recapture any of these translocated fish. Therefore the fate of these fish following translocation was previously unknown. However, in 2016 two Colorado pikeminnow that had been translocated from the Redlands fish passage were contacted. The first was a Colorado pikeminnow that had been implanted with a PIT tag at the fish passage on 2 September 2014 (403 mm TL). It was contacted by Kevin Thompson of CPW on a submersible PIT tag antenna in Roubideau Creek (at RM 51.0, near Delta, CO) five different times -- twice on 13 August 2016 and three times on 18 August 2016. This fish had remained in the Gunnison River almost two full years between translocation and being detected via the submersible antenna.

The second was a Colorado pikeminnow (481 mm TL) that was collected in the Redlands fish passage, implanted with a PIT tag, and translocated upstream on 1 August 2016. This fish was recaptured in the Colorado River on 16 August 2016 at river mile 181.5, near Palisade, CO during a nonnative fish removal trip. This fish had come down the Gunnison River 42.7 miles and then made a right-hand turn and gone 10.5 miles up the Colorado River, traveling 53.2 miles in 15 days between translocation and recapture via electrofishing.

In 2017, two more Colorado pikeminnow that had been handled in the Redlands fish

passage in July 2017 and had subsequently been translocated upstream were encountered by Kevin Thompson of CPW on a submersible PIT tag antenna in Roubideau Creek. The first Colorado pikeminnow was collected in Redlands fish passage on 18 July 2017 (493 mm TL). After being translocated to Escalante Canyon (RM 42.7) that same day, it was contacted four days later on the submersible PIT tag antenna in Roubideau Creek (RM 51.0). On 22 July 2017, it was contacted five separate times over 52-minute period, from 6:22-7:17 PM. This fish had originally been captured and tagged in the Colorado River at RM 66.8 on 10 April 2015 (301 mm TL). It was later contacted on the remote PIT tag antenna array located at the Rio Mesa Center in the Dolores River (the confluence of Dolores is at Colorado RM 96.4) on 12 November 2015. In 2016 it was recaptured twice at RM 63.4 on 12 April and again at RM 55.4 on 22 June.

The second Colorado pikeminnow was collected in Redlands fish passage on 20 July 2017 (542 mm TL). After being translocated to Escalante Canyon (RM 42.7) that same day, it was contacted 24 and again 25 days later on the submersible PIT tag antenna in Roubideau Creek (RM 51.0). On 13 August, it was contacted three times over a 4-minute period, from 8:53-8:57 AM. On 14 August, it was contacted three times over a 2-minute period, from 2:36-2:38 AM. This fish had originally been captured and tagged in the Colorado River at RM 21.8 on 28 May 2015 (397 mm TL). It was later recaptured at RM 26.1 on 9 June 2015. It hadn't been encountered again until it was collected in the Redlands fish passage in July 2017.

The two PIA resight events in 2017 demonstrate at least some short-term retention (i.e., 2 out of 7 {28.6%} translocated Colorado pikeminnow), as well as upstream movement, among Colorado pikeminnow in the Gunnison River following translocation. The one Colorado pikeminnow from 2016 that remained in the Gunnison River for almost two years when it was contacted on the Roubideau Creek PIA also demonstrates some longer-term retention among translocated fish. However, the other 2016 recapture of a previously-translocated Colorado pikeminnow in the Colorado River near Palisade shows that some amount of loss among translocated fish from the Gunnison River back into the Colorado River also occurring.

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 2018 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 2018.

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

XI. FY 2017 Budget Status

A. Funds Provided: $82,252
B. Funds Expended: $82,252
C. Difference: -0-
D. Percent of the FY 2017 work completed, and projected costs to complete: 100%
E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission (Where applicable): Will be submitted to UCRRP database by January 2018.

XIII. Signed: Travis Francis 11/13/2017
Principal Investigator Date

APPENDIX:

Table 1. Total number of juvenile and adult fish captured in the fish trap of the passageway at the Redlands Diversion Dam from 19 April to 20 October 2017.

Common Name	Number of Fish	Percent of Total Fish
NATIVE FISH		
bluehead sucker	2,764	37.65
bonytail	2	0.03
Colorado pikeminnow	7	0.10
Colorado cutthroat	0	0.00
flannelmouth sucker	1,527	20.80
Gila both roundtail and humpback traits	1	0.01
humpback chub	1	0.01
mountain whitefish	0	0.00
razorback sucker	1	0.01
roundtail chub	863	11.75
speckled dace	68	0.93
TOTAL	**5,234**	**71.29**
NONNATIVE FISH		
black bullhead	162	2.21
black crappie	0	0.00
blue gill	2	0.03
brook trout	0	0.00
brown trout	132	1.80
channel catfish	404	5.50
common carp	57	0.78
fathead minnow	0	0.00
green sunfish	129	1.76
gizzard shad	16	0.22
largemouth bass	2	0.03
longnose sucker	11	0.15
northern pike	0	0.00
rainbow trout	4	0.05
red shiner	127	1.73
smallmouth bass	2	0.03
sand shiner	0	0.00
splake	0	0.00
white sucker	354	4.82
yellow bullhead	2	0.03
TOTAL	**1404**	**19.12**
HYBRID FISHES		
Native X Native Hybrids:		
razorback X flannelmouth sucker	0	0.00
bluehead X flannelmouth sucker	17	0.23
Native X Nonnative Hybrids:		
bluehead X white sucker	259	3.53
flannelmouth X white sucker	428	5.83
bluehead X longnose sucker	0	0.00
flannelmouth X longnose sucker	0	0.00
white X longnose sucker	0	0.00
ALL TOTALS	**7,342**	**100.00**

Table 2. 2017 PIT tagged fish histories.

Month of Passage	Species	PIT Tag Histories
Jun-17	Roundtail chub (*Gila robusta*) N=1	N=1 tagged 10/10/2012 at Black Rocks (CO RMI 136), Detected at Price Stubb 8/1/2014 (CO RMI 188.3), Made passage at Redlands Fish Trap 5/7/2015
Jul-17	Bonytail (Gila elegans) N=1	N=1 Data not in STReaMS, yet.
	Colorado Pikeminnow (*Ptychocheilus lucius*) N=6	N=1 Data not in STReaMS, yet. N=2 tagged at Redlands passage in 2017 N=1 tagged 10/3/2014 at CO RMI 101.1, recaptured 9/22/2015 at CO RMI 56.3 N=1 tagged 4/10/2015 at CO RMI 66.8, Detected at Rio Mesa Center PIT antenna (Dolores River) 11/12/2015, recaptured 4/12/2016 at CO RMI 63.4 and 6/22/2016 at CO RMI 55.4 N=1 tagged 5/28/2015 at CO RMI 21.8, recaptured 6/9/2015 at CO RMI 26.1
	Razorback sucker (*Xyrauchen texanus*) N=1	N=1 stocked 9/13/2016 at GU RMI 57.1
	Roundtail chub (*Gila robusta*) N=1	N=1 tagged 10/14/2016 at Westwater (CO RMI 121.7)
Aug-17	Colorado Pikeminnow (*Ptychocheilus lucius*) N=1	N=1 tagged 3/31/2015 at CO RMI 29
	Gila having both traits of a roundtail and humpack chub N=1 most likely a humpback chub	N=1 tagged at Redlands passage in 2017
	Roundtail chub (*Gila robusta*) N=1	N=1 tagged 10/4/2016 at Black Rocks (CO RMI 136)
Sep-17	Bonytail (*Gila elegans*) N=1	N=1 Data not in STReaMS, yet.
	Humpback chub (*Gila cypha*) N=1	N=1 tagged at Redlands passage in 2017

Table 3. Number of Colorado pikeminnow, razorback sucker, and bonytail capture events in the fish trap of the Redlands passageway between 1996 and 2017.

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]
Totals	187	36	92	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 (river mile 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 2017.

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	7.4
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	14.4
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
Totals	191,770	156,046	35,724	81.4	18.6