FY 2020 ANNUAL REPORT PROJECT: C4-b-RED

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

Bureau of Reclamation Agreement Number:
R20PG00024

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Is this the final report? Yes _____ No X

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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 2020, the Redlands fish passageway was operational from 18 May to 7 October. This is the twenty-fifth year that the Redlands fish passageway has been operated since it was completed in late June of 1996.

Study Schedule:
1996-Ongoing

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.

Accomplishment of FY 2020 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Fish Passage
For reference, the Colorado River confluence with the Gunnison River is found at Colorado river mile (RMI) 170.9. Thirty-two Colorado pikeminnow (*Ptychocheilus lucius*) were captured at Redlands fish passage in 2020 (Tables 1 & 2). This is the third highest annual total ever collected for this species at

this facility. The total length of these fish ranged from 440 to 610 mm with a mean total length of 492 mm. Twenty-four were new fish implanted with 134 khz PIT tags at the Redlands fish passage in 2020. The remaining eight were recaptures from previous studies tagged between 2014 and 2020. Two of those recaptured Colorado pikeminnow were tagged in the Colorado River. Six recaptured Colorado pikeminnow have not had their initial tagging data uploaded into STReaMS and were most likely tagged spring (2020) after capture during the Colorado River, Colorado pikeminnow population estimate field work. All 32 Colorado pikeminnow were translocated to the Gunnison River at Escalante at river mile (RMI) 42.7 (n=23), Delta RMI 57.0 (n=2), or Whitewater RMI 15.3 (n=7). The total number of Colorado pikeminnow capture events recorded at the Redlands fish passage from 1996 through 2020 is 258 (Table 3).

One razorback sucker (*Xyrauchen texanus*) was captured in the Redlands fish passage during 2020 (Tables 1 & 2). The total length of this fish was 503 mm. This fish was stocked near Delta, Colorado at Gunnison RMI 57.1 in 2015. This fish was later detected on a submersible PIT tag antenna, in Butch Craig Wetland adjacent to the Gunnison RMI 12.9, in 2016. The total number of razorback sucker capture events recorded at the Redlands fish passage from 1996 through 2020 is 45 (Table 3).

Five bonytail (*Gila elegans*) were captured in the Redlands fish passage during 2020 (Tables 1 & 2). The total lengths of these fish ranged from 189 to 349 mm with a mean total length of 237 mm. All five of these fish were stocked this year; one near Fruita at Colorado RMI 157.1, two near Grand Junction at Colorado RMI 187.7 and one near Grand Junction at Colorado RMI 166.7.

One humpback chub (*Gila cypha*) was captured in the Redlands fish passage during 2020. This fish was not previously tagged and had a 134 khz PIT tag implanted on this occasion. The total length of this fish was 236 mm. The total number of humpback chub capture events recorded at the Redlands fish passage from 1996 through 2020 is four (Table 3).

One roundtail chub (*Gila robusta*; of the 2,160 collected in the fish trap) was recaptured (previously PIT tagged in 2017) from Black Rocks at Colorado RMI 136 and was subsequently detected by a submersible PIT tag antenna at the Redlands fish trap in 2018 (Tables 1 & 2).

A total of 5,241 fish of all species were handled at the Redlands fish passage between 18 May and 07 October 2020. Native fishes composed 84.1% of the total catch in 2020 (Table 4). The total number of all fishes collected in the 25-year operation of the fish trap is 207,084. Overall, native fish account for about 81% of all fish processed during this 25-year period.

The three species that composed the majority of our catch were bluehead sucker (*Catastomus discobolus*; 32.8%), flannelmouth sucker (*Catastomus latipinnis*; 8.8%) and roundtail chub (41.21%). White sucker (*Catostomus commersoni*) and white sucker hybrids combined made up 7.7% of our total catch (Table 1).

The number of channel catfish (*Ictalurus punctatus*) collected in 2020 was 166. The three most abundant years for this species were 2006 (n=432), 2013 (n=995), and 2014 (n=1,029). Four smallmouth bass (*Micropterus dolomieu)* were collected and euthanized at the Redlands fish passage in 2020.

Nine adult gizzard shad (*Dorosoma cepedianum*; ≥ 180 mm TL) were collected and euthanized in 2020, the most abundant catch year for this species was 2007 (n=43).

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

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 and return tube. In some years (not in 2020), during mid-June immediately following runoff, sediment removal is necessary with the assistance of the Redlands Water and Power Company's backhoe. Redlands Water and Power did contact us about springtime backhoe work (2020) but scheduling conflicts made it not possible. The stochastic nature of the hydrograph, in 2020, from the Gunnison River has grown the sediment bar near the fish return tube by depositing more sediment during higher releases from the Aspinall Unit and vegetative bank/bar cementation during the low flow periods. Backhoe work is recommended for 2021.

Annual weed control was continued throughout 2020.

Additional noteworthy observations:

After 25 years of operation there have been 258 capture events with 233 individual Colorado pikeminnow. Twenty-five (11%) 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, 166 (71%) of the fish that have made passage have not been re-encountered and some of these fish may have retained 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. 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 16 November 2020.

Recommendations:

Biological:

Continue to collect information on the number of fish, by species, in the fish trap of the Redlands Dam fish passageway in 2021 starting about 15 April and running through mid-October.

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.

Operation and Maintenance:
Continue with annual grounds and facility maintenance in 2021. We recommend backhoe work, in 2021, to remove the vegetated bank/bar cemented in upstream of the ladder fore-bay and right in front of the fish-return-tube.

Project Status:
On track and ongoing

FY 2020 Budget Status
Funds Provided: $85,081
Funds Expended: $85,081
Difference: -0-
Percent of the FY 2020 work completed, and projected costs to complete: 100%
Recovery Program funds spent for publication charges: -0-

Status of Data Submission
Data will be uploaded into STReaMS by the end of November, 2020.

Signed:
Travis Francis
Principal Investigator
11/16/2020

Table 1.
Total number of juvenile and adult fish captured in the fish trap of the passageway at the Redlands Diversion Dam from 18 May to 7 October 2020.

Common Name	Number of Fish	Percent of Total Fish
NATIVE FISH		
bluehead sucker	1,721	32.84
bonytail	5	0.10
Colorado pikeminnow	32	0.61
flannelmouth sucker	462	8.82
Gila both roundtail and humpback traits	0	0.00
Young of year *Gila*	0	0.00
humpback chub	1	0.02
mountain whitefish	0	0.00
razorback sucker	1	0.02
roundtail chub	2,160	41.21
speckled dace	28	0.53
TOTAL	**4,410**	**84.14**
NONNATIVE FISH		
black bullhead	80	1.53
bluegill	13	0.25
brown trout	45	0.86
channel catfish	166	3.17
common carp	73	1.39
green sunfish	20	0.38
gizzard shad	9	0.17
largemouth bass	1	0.02
longnose sucker	11	0.21
northern pike	0	0.00
rainbow trout	3	0.06
red shiner	5	0.10
smallmouth bass	4	0.08
white sucker	191	3.64
TOTAL	**621**	**11.85**
HYBRID FISHES		
Native X Nonnative Hybrids:		
bluehead X white sucker	57	1.09
flannelmouth X white sucker	153	2.92
ALL TOTALS	**5,241**	100.00

Table 2.
2020 PIT-tagged fish histories

Month of Passage	Species	PIT Tag Histories
Jun-20	Colorado pikeminnow (*Ptychocheilus lucius*) N=1	N=1 tagged June 2020 at Redlands Ladder
	roundtail chub (*Gila robusta*) N=1	N=1 tagged October 2017 at Black Rocks (CO RMI 136); detected on PIT antenna at Redlands Ladder July and August 2018
Jul-20	Colorado pikeminnow (*Ptychocheilus lucius*) N=22	N=1 tagged 5/13/2014 in Canyonlands at CO RMI 28.5 N=1 tagged 6/12/2018 near Moab at CO RMI 67.2 N=5 tagged and data hasn't been uploaded into STReaMS N=15 tagged July 2020 at Redlands Ladder
Aug-20	bonytail (*Gila elegans*) N=1	N=1 stocked 7/16/2019 in Grand Junction at CO RMI 166.7
	Colorado pikeminnow (*Ptychocheilus lucius*) N=9	N=1 tagged and data hasn't been uploaded into STReaMS N=8 tagged August 2020 at Redlands Ladder
Sep-20	bonytail (*Gila elegans*) N=4	N=4 stocked July 2020 in Grand Valley
	humpback chub (*Gila cypha*) N=1	N=1 tagged September 2020 at Redlands Ladder
	razorback sucker (*Xyrauchen texanus*) N=1	N=1 stocked 4/27/2015 in Delta at GU RMI 57.1; detected on PIT antenna in Butch Craig Wetland GU RMI 12.9 on 08/09/2016

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 2020.

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
2020	32	1	5	1
Totals	258	45	113	4

[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 2020.

Year	Total Number of Fish	Total Native Fishes	Total Nonnative Fishes	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	2,305	67.6	32.4
2004	11,270	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
2018	6,635	5,492	1,143	82.8	17.2
2019	3,438	2,018	1,420	58.7	41.3
2020	5,241	4,410	831	84.1	15.9
Totals	**207,084**	**167,966**	**39,118**	**81.1**	**18.9**

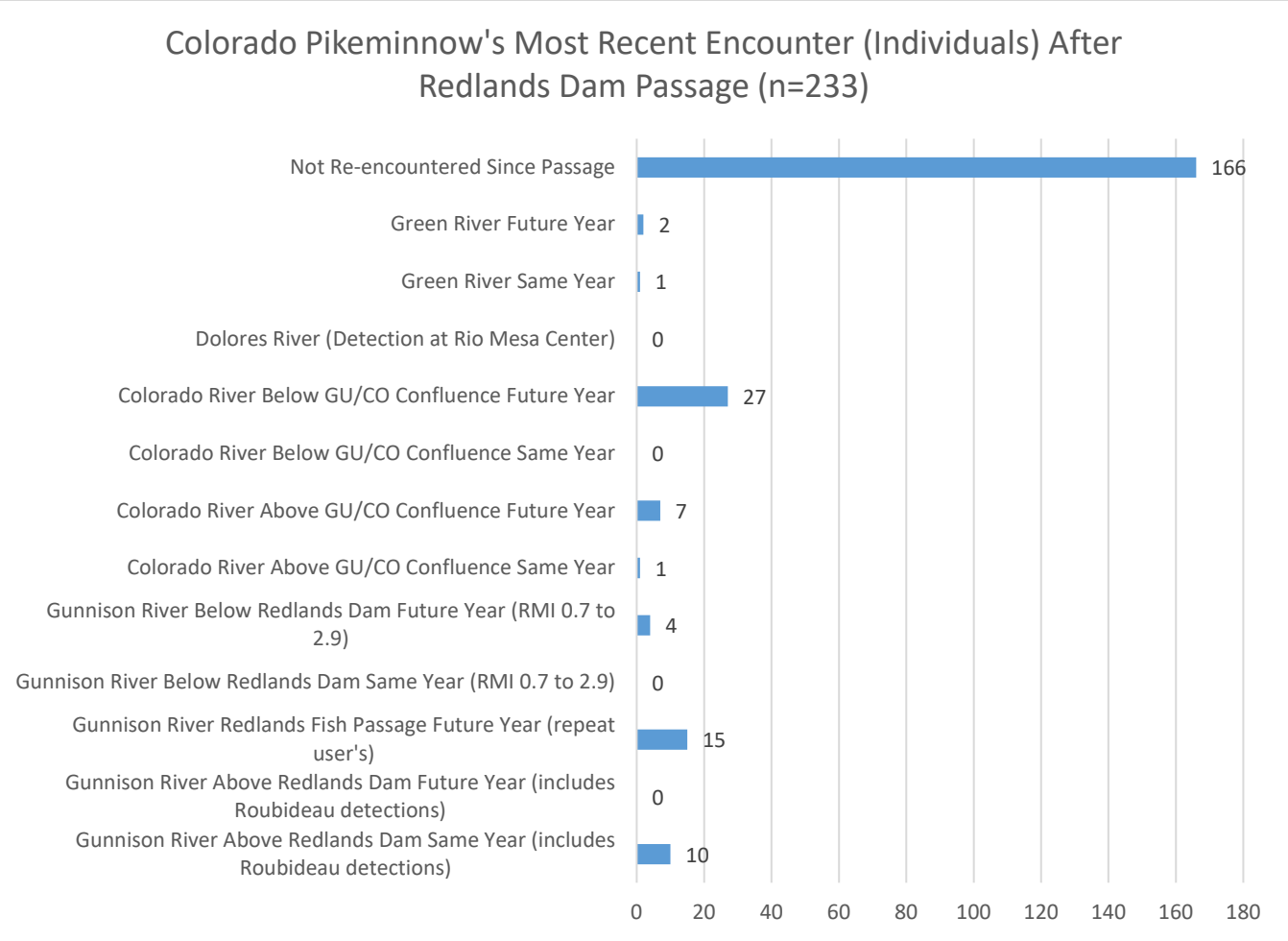

Figure 1.
Most Recent Encounter Locations of Colorado Pikeminnow after Passage at Redlands Fish Ladder 1996-2019. Data from STReaMS, 16 November 2020.