

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: C4b-GVP

Project Title

Annual Operation and Maintenance of the Fish Passage Structure at the Government Highline Diversion Dam on the Upper Colorado River and Price-Stubb Fish Passage

Bureau of Reclamation Agreement Number:

R20PG00024

Project/Grant Period:

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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 Government Highline diversion dam (aka Grand Valley Water Users [GVWU] dam) on the upper Colorado River in De Beque Canyon. This fish passage structure has been operated during 14 of the last 16 years, since construction was completed in August 2004.

In 2020, GVWU Fish Passage was operational from 19 May through 16 July. The early shutdown was due to low summer and fall base flows, which did not supply adequate water to operate the passage. A total of 6,920 fish used the fish passage over a 58-day period in 2020. Three endangered bonytail (*Gila elegans*) and six endangered razorback sucker (*Xyrauchen texanus*) made passage.

Study Schedule:

2004-Ongoing

Relationship to RIPRAP:

Colorado River Action Plan

II.B. Restore native fish passage at instream barriers.

II.B.2. Restore fish passage at Price-Stubb

II.B.2.a.(4) Operate and maintain

II.B.2.a.(5) Monitor and evaluate success

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- II.B.3. Restore fish passage at Government Highline (aka Grand Valley Water Users).
II.B.3.a.(3). Operate and maintain

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

GVWU Fish Passage

In 2020, three bonytail were collected in the GVWU fish trap (Tables 1, 2, and 3). The fish ranged in total length from 250 to 297 mm. One bonytail had an incorrect PIT tag recorded on the datasheet. Therefore, we do not know its capture/stock history. The remaining two bonytail were both stocked in July 2019.

In 2020, no Colorado pikeminnow made passage at the GVWU passage. Six Colorado pikeminnow have made passage at this facility in previous years (Table 3).

Likewise, no humpback chub (*Gila cypha*) made passage at GVWU passage in 2020. Eleven humpback chub have made passage at this facility in previous years (Tables 3).

In 2020, six razorback sucker were collected in the GVWU fish trap (Tables 1, 2 and 3). These fish ranged in total length from 365 to 550 mm with a mean of 443 mm. One of these fish has become a frequent user of this facility, having made passage in prior years.

A total of 6,920 fish were collected in the trap of the GVWU Dam fish passage from 19 May through the 16 July 2020. The highest total ever collected in the trap was in 2014 (24,670) and the second highest total (18,390) was in 2010 (Table 4). This is the fourteenth 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, thus making specific year-to-year comparisons about yearly catch totals and species composition discouraged.

Native fishes (and their hybrid forms) accounted for 84.0% (n = 5,815) of the total catch in 2020 (Table 4). Nonnative fishes (and native by nonnative hybrid fish) accounted for 16.0% (n = 1,105) of the total catch in 2020. Flannelmouth sucker (*Catostomus latipinnis*) accounted for 18.4% (n = 1,276) of the total catch, and bluehead sucker (*Catostomus discobolus*) accounted for 46.5% (n = 3,219) of the total catch during 2020 (Table 1). These two native species have dominated the total catch since the ladder began operation. Roundtail chub (*Gila robusta*) accounted for 6.2% (n = 426) of the total catch during 2020. The most prevalent nonnative fish found in the fish trap from 2013 to 2020 was white sucker (*Catostomus commersonii*; 9.26% of total catch, n = 641 in 2020; 13.8% of total catch, n = 1,641 in 2019; 4.8% of total catch, n = 479 in 2018; 4.8% of total catch, n = 657 in 2017; 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 (*Ictalurus punctatus*), which were not found between GVWU and Price-Stubb dams prior to completion of the non-selective fish passage at Price-Stubb dam in April 2008, were once again collected in the GVWU fish passage during 2020 (n = 19; Table 1).

Four largemouth bass (*Micropterus salmoides*; total lengths ranged from 195 to 413 mm with a mean of 309 mm) and 10 smallmouth bass (*Micropterus dolomieu*; second largest annual catch; total lengths

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ranged from 210 to 313 mm with a mean of 241 mm) were also collected and removed in 2020. Two adult gizzard shad (*Dorosoma cepedianum*) were collected and removed in 2020 (Table 1).

All fish found in the fish trap were counted and sorted by species. All native fish, as well as nonnative rainbow (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) were released upstream of GVWU 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.

Price-Stubb Antenna

The Price-Stubb PIT tag antennas (5 miles downstream of GVWU) produced multiple hits on 889 unique PIT tags (FY record) during FY 2020 (Table 5); many of these tags were detected on multiple days. In 2020, because the original cell modem was getting outdated and not functioning properly, Peter MacKinnon (Biomark) replaced the old modem. In addition to the new modem, Loggernet was replaced by BioLogic web portal for remote data acquisition. We reported in 2010 (first year of operation) that the close placement of these four antennas in relation to one another (~10 inches apart) complicated determining directionality of fish movements (upstream vs. downstream). In late June of 2011, Audrey Hopkins of Biomark adjusted some of the settings at the unit. She changed the antenna sequence (AS) from 1,2,3,4,0,0,0,0,0,0,0 to 1,3,1,3,1,3,2,4,2,4,2,4 and adjusted the delay time from 100mS to 45mS. These adjustments have provided more resolution for determining directionality of fish movements from detections. Some unknown directions of fish passage still remain, however not as many as were previously encountered. In FY 2020 there were 1,100 daily detections, and 64% (n=703) of those fish passed the antenna heading upstream, 14% (n=151) in an undetermined direction, and 22% (n=245) in a downstream direction. We have reported in past years that recurring and problematic issue is that data on many PIT-tagged fish were not being submitted to STReaMS: however, this has improved in FY 2020 with only 2% (n=19) of the individual tags detected on this antenna array were unknown fish. Bluehead sucker (n=99, *Catostomus discobolus*), bonytail (n=98, *Gila elegans*), chub with indistinguishable traits (n=1; *Gila* spp.), flannelmouth sucker (n=474, *Catostomus latipinnis*), razorback sucker (n=142, *Xyrauchen texanus*), roundtail chub (n=58, *Gila robusta*), and flannelmouth sucker X bluehead sucker hybrids (n=3) make up the individual PIT tag detections that could be found in STReaMS (many were detected on multiple dates) during FY 2020. Table 5 gives a detailed breakdown of the fish that were detected by the antenna by month, and Table 6 gives annual individual totals by species.

Operation and Maintenance

In 2019, GVWU employees used a trackhoe to remove approximately 25 dump-truck loads of river-borne sediment in front of the attraction flow, fish ladder entrances, and fish return tube on 9-10 July. The sediment was hauled to an upland terrestrial site within the fish-way project area for disposal and/or storage. This 'cleanout' was very much needed, and 2019 was the first year since 2015 that the facility operated as it was designed to. Spring runoff, in 2020, was moderate in magnitude and duration and redeposited only a small amount of sediment which allowed the facility to again operate properly. In spring 2016 through 2020, GVWU opened the roller closest to the fish passage for several weeks during high spring flows to help sluice away the sediment bar. This has helped tremendously with sediment management. It is our recommendation that this action be continued into future years, as the natural

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sluicing provided during high flows can move considerably more sediment than can physical removal via trackhoe.

Weeds were sprayed and removed from the property throughout 2020.

At the Price-Stubb non-selective fish passage facility (5 miles downstream of the GVWU Fish Passage), accumulated debris and trash were removed, using a trackhoe and manual labor, on 28 July, 2020.

Additional noteworthy observations:

Similar to previous years, we deployed submersible PIT antennas (PIA) to detect fish that may enter the GVWU passage but not the fish trap. In 2020, low base flows and a delayed spring run-off postponed the opening of Government Highline Fish Ladder. COVID-19 also caused a shortage of personnel; therefore, only the bottom PIA was kept operational during FY 2020. Continual operation of the bottom PIA allowed us to identify fish that could potentially use the fish ladder had the fish ladder been in operation; however, we lost the ability to compare the efficiency of the ladder to years where multiple PIA were used longitudinally throughout the ladder.

With just the one operational PIA deployed in 2020, there were 9,362 detections of 558 individual tags. Of the 558 tags, 548 were identified to species. Five tags had prior detections but data of tag deployment had not been uploaded into STReAMS. Another 5 tags were first detected on the PIA that had no historical data of any kind in STReAMS. The 548 tags that we were able to identify to species totaled as follows: 220 bonytail, 174 razorback sucker, 80 flannelmouth sucker, 48 roundtail chub, 23 bluehead sucker, 1 unknown chub with characteristics of humpback chub and roundtail chub, 1 bluehead x flannelmouth sucker, and 1 Colorado pikeminnow.

Captures of PIT tagged fish in the fish ladder's trap in FY 2020 totaled 10 fish. One bonytail collected had an incorrect PIT tag recorded on the datasheet. Of the remaining 9 PIT tagged fish, 5 were razorback sucker, of which only 1 was picked up on the lower PIA. The 3 remaining PIT tagged fish handled in the fish ladder's trap (2 bonytail and 1 roundtail chub) were all detected on the lower PIA.

PIT tags and their associated individual species, detected by the lower PIA, can be found in Table 7 by month. Duplicate PIT tag detections within each month have been removed; however, individual fish can be represented in multiple months. Tag detections were greatest in the months of October 2019 (due to a large influx of stocked bonytail) and May through July 2020; the latter three months correlate with operation of the Government Highline fish ladder and high water (i.e., when fish passage through both of the downstream, non-selective fish passages at the Grand Valley Irrigation Company and Price-Stubb diversion dams was still possible in 2020). Razorback suckers were detected every month in this location regardless of ladder operations, as were roundtail chub. Bluehead and flannelmouth sucker are not tagged by the USFWS; however, Colorado Parks and Wildlife PIT tags these fish in an effort to monitor these state listed species alongside roundtail chub. Bluehead and flannelmouth sucker are not scanned for a PIT tag after collection from the fish-trap because thousands make passage every year which is both time and resource limiting. Thus, PIA detected PIT tagged bluehead and flannelmouth sucker are not documented making passage through the entire fish ladder. Histories of all detected fish can be found in STReAMS.

Recommendations:

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Biological:

Continue to collect information on the number of fish, by species, in the fish trap of the GVWU fish passageway in 2021 starting about mid-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.

Continue collecting data from Price-Stubb antenna.

Operation and Maintenance:

After successful trackhoe sediment removal in 2019 and little sediment accumulation in 2020, a similar effort may not be needed in 2021. Unfortunately, the vegetated bank on river left will eventually reform (as it did in one year following the 2015 sediment removal), as the fish ladder is located on the inside bend of the river, across the river from the GVWU canal head gates, 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 high flow periods of 2014-2020, 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. Both circumstances quickly act to re-deposit 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 highly beneficial.

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 GVWU fish passage is very susceptible to sedimentation. It is our recommendation that some combination of the two actions specified above be available 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.

Project Status:

On track and ongoing

FY 2020 Budget Status

Funds Provided: \$67,547

Funds Expended: \$67,547

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.

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Signed:

Travis Francis
Principal Investigator
11/18/2020

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Table 1.

Total number of juvenile and adult fish captured in the fish trap of the passageway at the Grand Valley Water Users Diversion Dam during 2020.

Common Name	Number of Fish	Percent of Total Fish
NATIVE FISH		
bluehead sucker	3,219	46.52
bonytail	3	0.04
Colorado pikeminnow	0	0.00
Colorado cutthroat	1	0.01
flannelmouth sucker	1,276	18.44
humpback chub	0	0.00
mottled sculpin	0	0.00
mountain whitefish	67	0.97
razorback sucker	6	0.09
roundtail chub	426	6.16
speckled dace	811	11.72
TOTAL	5,809	83.95
NONNATIVE FISH		
black bullhead	1	0.01
brown trout	53	0.77
channel catfish	19	0.27
common carp	24	0.35
green sunfish	8	0.12
gizzard shad	2	0.03
largemouth bass	4	0.06
longnose sucker	29	0.42
northern pike	0	0.00
rainbow trout	25	0.36
smallmouth bass	10	0.14
white sucker	641	9.26
TOTAL	816	11.79
HYBRID FISHES		
<u>Native X Native Hybrids:</u>		
razorback X flannelmouth sucker	0	0.00
bluehead X flannelmouth sucker	6	0.09
<u>Native X Nonnative Hybrids:</u>		
bluehead X white sucker	93	1.34
bluehead X flannelmouth X white sucker	0	0.00
flannelmouth X white sucker	196	2.83
bluehead X longnose sucker	0	0.00
flannelmouth X longnose sucker	0	0.00
white X longnose sucker	0	0.00
ALL TOTALS	6,920	100.00

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Table 2. 2020 GVWU PIT tagged fish histories.

Month of Passage	Species	PIT Tag Histories
May-20	razorback sucker (<i>Xyrauchen texanus</i>) N=1	N=1 stocked 8/31/2016 in Rifle at CO RMI 240.7
June-20	bonytail (<i>Gila elegans</i>) N=3	N=2 stocked July 2019 in Rifle at CO RMI 240.7 N=1 had incorrect tag data collected at ladder
	razorback sucker (<i>Xyrauchen texanus</i>) N=3	N=1 stocked 10/03/2001 near Rullison at CO RMI 227.6; made passage 2008,2014 and 2016 at GVWU ladder N=1 stocked 9/8/2016 in Rifle at CO RMI 240.7; detected at GVWU Ladder August and September 2019 N=1 stocked 9/19/2019 in Rifle at CO RMI 240.7
July-20	razorback sucker (<i>Xyrauchen texanus</i>) N=2	N=1 stocked 08/31/2016 near Rifle at CO RMI 240.7; detected at Price Stubb 7/24/2017 and detected at GVWU Ladder August and September 2019 N=1 stocked 9/12/2018 near Rifle at CO RMI 240.7
	roundtail chub (<i>Gila robusta</i>) N=1	N=1 tagged 11/15/2019 after collection in GVWU canal and translocated to Palisade CO RMI 185.8; detected May and June 2020 at Price Stubb

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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 from 2005 through 2020.

Year	Colorado pikeminnow	razorback sucker	bonytail	humpback chub
2005	0	1	0	1
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	2
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
2017	2	130	12	2
2018	0	4	0	2
2019	1	29	16	4
2020	0	6	3	0
Totals	6	286	121	11

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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 2020.

Year	Total Number of Fish	Total Native Fishes	Total Nonnative Fishes	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 & fish trap not run due to insufficient flows				
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
2017	13,581 ^k	11,352	2,229	83.6	16.4
2018	10,210 ^l	9,058	1,152	88.7	11.3
2019	11,862 ^m	9,339	2,523	78.7	21.3
2020	6,920 ⁿ	5,815	1,105	84.0	16.0
Totals	177,852	147,158	30,694	82.7	17.3

^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)

^k Fish Trap operated continuously from 20 April to 20 October

^l Fish Trap operated for 58 days (continuously from 1 May to 28 June)

^m Fish Trap operated for 146 days (continuously from 30 April to 8 July, and again 10 July to 25 September)

ⁿ Fish Trap operated for 58 days (continuously from 19 May to 16 July)

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Table 5.
Price-Stubb PIT Antenna Detections

Month of Detection	Direction	Species	Number of Fish	History
October 2019	Upstream	BH	1	N=4 tagged by CPW for 3 Spp. work in October 2017 or 2018 many were detected multiple times 2017-2019
	Unknown		0	
	Downstream		3	
	Upstream	BT	29	N=6 stocked July 2019 at CO RMI 240.7 N=35 stocked July 2019 at CO RMI 187.7; one went upstream and four days later went downstream through the ladder; one detected August 2019 at Price-Stubb N=10 stocked July 2019 at CO RMI 157.1
	Unknown		9	
	Downstream		13	
	Downstream			
	Upstream	RT	0	N=1 tagged October 2017 in Black Rocks CO RMI 136, detected April 2019 at Price-Stubb
	Unknown		0	
	Downstream		1	
	Upstream	RZ	1	N=1 stocked August 2016 at CO RMI 240.7, captured July 2017 at CO RMI 193.7 and detected June-July 2018 at Price-Stubb N=46 stocked September 2019 at CO RMI 240.7
	Unknown		8	
	Downstream		38	
	Upstream	Unidentified	2	N=4 Distributed to ONFH-GJ 2019
	Unknown		2	
Downstream	0			

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
November 2019	Upstream	BH	0	N=1 tagged by CPW for 3 Spp. work in October 2018
	Unknown		0	
	Downstream		1	
	Upstream	FM	0	N=1 tagged by CPW for 3 Spp. work in October 2018, detected May 2019 at Price-Stubb
	Unknown		0	
	Downstream		1	
	Upstream	BT	1	N=2 stocked July 2019 at CO RMI 240.7 N=1 stocked July 2019 at CO RMI 188.3, detected Aug. 2019 at Price-Stubb N=6 stocked Nov. 2019 at CO RMI 208.5
	Unknown		3	
	Downstream		5	
	Upstream	RZ	0	N=24 stocked September 2019 at CO RMI 240.7
	Unknown		5	
	Downstream		19	
December 2019 through February 2020	Upstream	BT	0	N=1 stocked July 2019 at CO RMI 187.7, detected Aug. 2019 at Price-Stubb N=14 stocked Nov. 2019 at CO RMI 208.5; one detected Dec. 2019 at GVVU PIA
	Unknown		5	
	Downstream		10	
	Upstream	RZ	0	N=2 stocked Aug.-Sept. 2016 at CO RMI 240.7; one captured July 2017 at CO RMI 193.7 and detected Aug.-Sept. 2019 at GVVU PIA N=19 stocked September 2019 at CO RMI 240.7
	Unknown		3	
	Downstream		18	

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
March 2020	Upstream	BH	7	N=2 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=4 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=1 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		0	
	Downstream		0	
	Upstream	BT	0	N=1 stocked Nov. 2019 at CO RMI 208.5
	Unknown		0	
	Downstream		1	
	Upstream	FM	41	N=11 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=17 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=15 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		1	
	Downstream		1	
	Upstream	RZ	0	N=1 stocked September 2019 at CO RMI 240.7
	Unknown		0	
	Downstream		1	
	Upstream	Unidentified	1	N=1 not a Program distributed tag
	Unknown		0	
	Downstream		0	

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
April 2020	Upstream	BH	37	N=13 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=24 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=5 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		4	
	Downstream			
			1	
	Upstream	BT	2	N=1 stocked July 2019 at CO RMI 240.7 N=2 stocked Nov. 2019 at CO RMI 208.5
	Unknown		0	
	Downstream		1	
	Upstream	BXF	1	N=1 tagged by CPW for 3 Spp. work in October 2017 or 2018
	Unknown		0	
	Downstream		0	
	Upstream	FM	180	N=105 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=73 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=90 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		26	
	Downstream			
			62	
	Upstream	RT	9	N=1 tagged October 2011 in Black Rocks RMI 136, detected each year 2012-2019 at Price-Stubb N=1 tagged by CPW for 3 Spp. work October 2017,2018 or 2019 N=3 tagged October 2017 in Black Rocks CO RMI 136; two detected 2019 at Price-Stubb and GVWU PIA; one detected in 2018 and 2019 at Price-Stubb N=6 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		2	
	Downstream			
			0	
	Upstream	RZ	1	N=1 stocked September 2017 at CO RMI 183.6
	Unknown		0	
Downstream	0			
Upstream	Unidentified		N=3 Distributed to CPW-GJ 2005 or 2013; one detected April 2019 at Price-Stubb N=3 not a Program distributed tag; two detected at either Price-Stubb or GVWU multiple years	
		4		
Unknown		1		
Downstream		1		

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
May 2020	Upstream	BH	30	N=12 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=19 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=8 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		7	
	Downstream		2	
	Upstream	CH	1	
	Unknown		0	
	Downstream		0	
	Upstream	BXF	2	
	Unknown		0	
	Downstream		0	
	Upstream	BT	0	
	Unknown		2	
	Downstream		1	
	Upstream	FM	155	
	Unknown		19	
	Downstream		19	

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
May 2020 Cont.	Upstream	RT	29	N=1 tagged October 2012 in Black Rocks at CO RMI 136 detected in most years 2013-2019 at Price-Stubb N=2 tagged Sept.-Oct. 2016 in Black Rocks CO RMI 136; one detected 2019 at Price-Stubb and GVWU PIA; one detected 2017 by PIA in Black Rocks and detected 2017 and 2018 at Price-Stubb N=1 tagged October 2016 in WW CO RMI 123.5 N=8 tagged October 2017 in Black Rocks CO RMI 136; six detected in 2018 and/or 2019 at Price-Stubb and/or GVWU PIA N=5 tagged October 2017 in WW CO RMI 123.5, 121.7 or 115.8; one detected 2019 at GVWU PIA; one detected 2018 and 2019 at Price-Stubb and GVWU PIA N=2 tagged by CPW for 3 Spp. work October 2017,2018 or 2019 N=21 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		8	
	Downstream			
			3	
	Upstream	RZ	11	N=1 stocked Oct. 2014 at CO RMI 240.7 detected 2019 at Price-Stubb N=2 stocked Oct. 2014 at CO RMI 183.6; one collected in 2015 and 2017 near CO RMI 175; one collected 2016 at CO RMI 177.7 N=1 stocked May 2015 at CO RMI 166.7 and collected July 2015 at CO RMI 155.2 N=4 stocked Aug-Sept. 2016 at CO RMI 240.7; two detected 2019 at Price-Stubb and/or GVWU PIA N=3 stocked September 2016 at CO RMI 185.4; one collected 2018 at CO RMI 181.4 N=3 stocked September 2017 at CO RMI 183.6; one collected 2017 at CO RMI 180.9 N=5 stocked September 2019 at CO RMI 240.7
	Unknown		3	
	Downstream			
			5	
Upstream	Unidentified	4	N=1 Distributed to CPW-GJ 2013 N=3 not a Program distributed tag; three detected at either Price-Stubb or GVWU multiple years	
Unknown		0		
Downstream		0		

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
June 2020	Upstream	BH	8	N=4 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=3 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=1 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		0	
	Downstream		0	
	Upstream	BT	1	N=2 stocked July 2019 at CO RMI 240.7; one detected 2019 at Price-Stubb
	Unknown		0	
	Downstream		1	
	Upstream	CH	1	N=1 tagged September 2016 in Black Rocks notes in data suggest that the fish is most likely a RT
	Unknown		0	
	Downstream		0	
	Upstream	FM	10	N=2 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019 N=3 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019 N=7 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		2	
	Downstream		0	
	Upstream	RT	12	N=1 tagged Sept. 2008 in WW CO RMI 120, collected 2011 at the same location, and detected 2011-2014 and 2016-2019 at Price-Stubb N=1 tagged by CPW for 3 Spp. work October 2017,2018 or 2019 N=4 tagged October 2017 in Black Rocks CO RMI 136; two detected 2018 and 2019 at Price-Stubb and GVWU PIA; one detected 2018 in Salt Creek N=2 tagged October 2017 in WW CO RMI 123.5, 121.7 or 115.8; one detected 2018 and 2019 at Price-Stubb and GVWU PIA N=10 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		5	
	Downstream		1	
	Upstream	RZ	0	N=1 stocked Oct. 2014 at CO RMI 240.7, collected 2016 at GVWU Passage and detected there in 2019 N=1 stocked Aug. 2017 at CO RMI 240.7, detected and collected 2019 at GVWU passage CO RMI 193.7 N=2 stocked Sept. 2019 at CO RMI 240.7
	Unknown		3	
	Downstream		1	

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
July and August 2020	Upstream	BH	1	N=2 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4 many were detected multiple times 2014-2019
	Unknown		2	
	Downstream		7	
	Upstream	BT	8	N=3 stocked July 2019 at CO RMI 187.7; one detected 2019 at Price-Stubb N=1 stocked July 2019 at CO RMI 240.7 N=9 stocked July 2020 at CO RMI 177.4, 183.6 or 240.7
	Unknown		1	
	Downstream		4	
	Upstream	FM	0	N=1 tagged by CPW for 3 Spp. work in October 2017, 2018 or 2019 many were detected multiple times 2017-2019
	Unknown		0	
	Downstream		1	
	Upstream	RT	3	N=1 tagged Sept. 2008 in WW CO RMI 120, collected 2011 at the same location, and detected 2011-2014 and 2016-2019 at Price-Stubb N=3 tagged October 2017 in Black Rocks CO RMI 136; one detected in 2018 and 2019 at Price-Stubb and GVWU PIA; one detected 2018 in Salt Creek; one detected 2019 at GVWU PIA N=3 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		2	
	Downstream		2	
	Upstream	RZ	1	N=1 stocked Sept. 2016 at CO RMI 240.7, collected 2017 at GVWU Passage CO RMI 193.7 and detected there in 2018 and 2019
	Unknown		0	
	Downstream		0	

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Table 5 cont.

Month of Detection	Direction	Species	Number of Fish	History
September 2020	Upstream	BH	1	N=1 rescued then tagged from Grand Valley canal salvage 2019
	Unknown		0	
	Downstream		0	
	Upstream	BT	0	N=3 stocked July 2020 at CO RMI 240.7
	Unknown		1	
	Downstream		2	
	Upstream	FM	0	N=2 tagged by CPW for 3 Spp. work in Oct. 2014, 2015 or 2016 between CO RMI 175.3 and 179.4; these were detected multiple times 2014-2019
	Unknown		1	
	Downstream		1	
	Upstream	RT	1	N=1 tagged by CPW for 3 Spp. work October 2017,2018 or 2019, detected 2019 at Price-Stubb and GVWU PIA N=1 tagged October 2017 in WW CO RMI 115.8
	Unknown		0	
	Downstream		1	
	Upstream	RZ	3	N=24 stocked Sept. 2020 at CO RMI 240.7
	Unknown		10	
Downstream	11			

Table 6.

Price-Stubb Fiscal Year Individual PIT Antenna Detections

Species	BH	BT	CH	CS	FXB	FM	HB	RT	RZ
# of Individuals FY2010***	0	0	0	2	0	0	0	6	0
# of Individuals FY2011**	0	16	0	1	0	1	0	19	83
# of Individuals FY2012**	0	88	0	8	0	3	1	36	135
# of Individuals FY2013**	0	138	0	2	0	1	0	79	239
# of Individuals FY2014**	0	114	0	3	0	1	0	29	69
# of Individuals FY2015**	106	22	0	4	0	251	0	19	19
# of Individuals FY2016**	67	126	0	13	0	245	0	21	36
# of Individuals FY2017**	88	66	0	21	0	103	0	16	140
# of Individuals FY2018**	70	71	0	11	0	73	0	29	81
# of Individuals FY2019**	137	176	0	5	4	328	0	28	278
# of Individuals FY2020**	99	98	1	0	3	474	0	58	142
Grand total¹	567	915	1	70	7	1,480	1	340	1,222
	¹ Many of these fish were detected at Price-Stubb in multiple years								
	* Antenna was only in operation for 1.5 months during FY 2010								
	** Some of these fish were detected in more than one month during the fiscal year								

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Table 7.

Number of fish detected by month for FY 2020 at Government Highline Fish Passage

Species ⁱ	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total	
bluehead sucker	0	0	0	0	0	0	2	12	14	6	0	0	34	
bluehead x flannelmouth sucker	0	0	0	0	0	0	0	1	1	0	0	0	2	
bonytail	164	13	31	7	2	0	0	6	1	4	9	5	242	
Colorado pikeminnow	0	0	0	0	0	0	0	0	0	0	1	1	2	
flannelmouth sucker	0	1	0	0	0	1	16	52	24	11	0	0	105	
razorback sucker	10	3	8	24	5	17	22	17	48	79	31	57	321	
roundtail chub	11	2	1	1	1	2	1	19	23	27	6	2	96	
unidentified	5	1	0	0	0	0	0	0	0	0	0	0	6	
unknown chub*	0	0	0	0	0	0	0	0	1	0	0	0	1	
Tags with no history	0	0	0	0	0	0	1	1	2	5	2	2	13	
Total	190	20	40	32	8	20	42	108	114	132	49	67		
	*chub with both humpback and roundtail characteristics													
	ⁱ Duplicate tag detections within each month have been removed; however, individual fish can be represented in multiple months.													