Project Title
Assessment of Stocked Razorback Sucker Reproduction in the Lower Green and Lower Colorado Rivers

Bureau of Reclamation Agreement Number:
R19AP00059

Project/Grant Period:
Start date: 10/01/2019
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Reporting period end date: 09/30/2022
Is this the final report? Yes ___ No _X_

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Abstract:

Determining the location, timing, extent, and success of razorback sucker spawning is essential for evaluating the effectiveness of the stocking program, identifying recruitment, and guiding future management. This study was designed to determine the spawn timing as well as presence/absence and distribution of larval, young-of-year (YOY) and age-1+ razorback suckers in the Green River downstream from the town of Green River and in the Colorado River downstream of Cisco. The study was prompted by increasing razorback sucker encounters, the presence of multiple age classes, and congregations of ripe razorback suckers (2001 – 2003 and 2006 – 2008; Bestgen et al 2012, UDWR unpublished data) during Colorado pikeminnow surveys. In 2022, larval fish samples were collected during light trapping efforts on both the lower Green and Colorado Rivers. Despite low water levels on both rivers throughout our sampling, most historic priority sites were sampled. Larval fish were captured in both reaches and sent to the Colorado State University Larval Fish Lab (CSU LFL) for identification. In July and August, two passes of seining for juvenile razorbacks were conducted on both reaches, but no confirmed juvenile razorback suckers were captured. A total of 22 samples of unidentifiable suckers were collected and sent to the CSU larval fish lab (LFL). During seining efforts in both July and August, a total of 347 identifiable native fish were captured, compared to 9 the previous year, while a total of 1060 non-native fish were enumerated during sampling.

Study Schedule:
Initial year 2009 – Ongoing

Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

V.	Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
V.A.	Measure and document population and habitat parameters to determine status and biological response to recovery actions.
V.B.2.	Conduct appropriate studies to provide needed life history information.

GREEN RIVER ACTION PLAN: MAINSTEM

V.	Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
V.A.	Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

COLORADO RIVER ACTION PLAN: MAINSTEM

V.	Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
V.A.	Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

Accomplishment of FY 2022 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: Lower Green River light trap sample collection:

Larval light trap samples were collected at 12 unique sites, 10 of which were previous priority tributaries, between river miles (RM) 31 (Lower Anderson Bottom) and 119.6 (Saleratus Wash) during two sampling events that took place between 5/10/2022 – 5/15/2022 and 5/26/2022 – 6/2/2022. A total of 55 light trap samples were collected. Six of the traps contained no larval fish. The 49 samples that contained larval fish were sent to Colorado State University Larval Fish Laboratory (CSU LFL) for identification. During sampling, main channel water temperatures ranged from 15.0 °C to 17.0 °C with an average temperature of 15.2 °C. Habitat water temperatures ranged from 14.0 °C to 22.0 °C with an average temperature of 16.7 °C.

Larval sampling on the Green River this year was completed in conjunction with adult pikeminnow sampling efforts (Project #128). Typically, three passes of larval sampling would have been completed in total, but due to the delayed onset of spring runoff only two larval sampling passes were completed in 2022 (Figure 1). However, as discharge increased most historic priority habitats were inundated and available for sampling. During the first pass seven flooded tributaries were sampled. On the second pass 12 flooded tributaries were sampled. Razorback sucker larvae have consistently been detected in flooded tributary habitats over the course of this study, so we expect to accurately determine presence or absence of razorback larvae by sampling in these locations, pending lab identification.

Task 2: Lower Green River sampling for YOY and age 1+ razorback sucker:

Seine samples were collected between river mile 1.6 (near the confluence with the Colorado River) and 119.6 (near Saleratus Wash) during two sampling passes. The first pass was conducted 7/12/2022 – 7/14/2022. The second pass was conducted 8/16/2022 – 8/18/2022.

During both sampling passes, an estimated total of 3,814 m² was seined in 72 seine hauls within 46 habitats. These habitats included backwaters, which constituted 36% of all habitats sampled, isolated pools (35%), side channels (11%), embayments (8%), flooded tributaries (7%), and undefined habitat (3%). The estimated area of individual habitats ranged from 36 m^2 to 13,600 m^2 with an average habitat area of 2,209 m^2 ± 3,179 m^2 (mean ± standard deviation). Thirty-nine percent of the habitats sampled had a maximum depth of one meter or greater.

During sampling, main channel water temperatures ranged from 24.0 °C to 30.0 °C with an average temperature of 26.7 °C. Main channel Secchi disk measurements ranged from 15 mm to 75 mm with an average Secchi of 51 mm. Habitat water temperatures ranged from 24.0 °C to 35.0 °C with an average temperature of 28.5 °C. Habitat Secchi disk measurements ranged from 15 mm to 340 mm with an average Secchi of 143 mm.

During seine sampling on the lower Green River, there were three samples of unidentified suckers preserved and sent to CSU LFL for identification. These samples were all collected during the first pass of sampling in July, and all collected between river miles 119.6 and 107. There were no juvenile (age-1+) razorback suckers captured during seining.

A limited number of native, identifiable fishes were captured during seining on the lower Green River this year (Table 1), which was still an increase from the previous year. During the second sampling pass on the Green River YOY pikeminnow began appearing in seine hauls (n=63). Few native fishes were measured for total length in order to limit stress on fish related to high water and air temperatures. The average total length of measured Colorado pikeminnow was 25 mm (n=3).

Non-native species captured during 2022 seining efforts on the lower Green River can be found in Table 2. Other non-native fish captured (not reported in Table 2) include: red shiner, sand shiner, and fathead minnow.

Task 3: Lower Colorado River light trap sample collection:

Larval light trap samples were collected at nine unique sites between river mile 21.2 and 63.9 (Courthouse Wash) during two sampling events that took place 5/18/2022 – 5/21/2022 and 6/4/2022 – 6/6/2022. Typically three light trapping sampling passes occur on the lower Colorado River, but only two passes were completed due to low flows early in the season and logistical constraints (Figure 2). A total of 43 light traps were set. Eleven of the traps contained no larval fish, and one trap was lost. The 31 samples containing larval fish were preserved and sent to CSU LFL for identification. During sampling, main channel water temperatures ranged from 13.0 °C to 18.0 °C with an average temperature of 15.4 °C. Habitat water temperatures ranged from 13.5 °C to 22.0 °C with an average temperature of 16.6 °C.

In 2022 all sampling occurred within historic priority sites, all of which were flooded tributaries. For our first sampling effort all tributaries typically sampled were available, but on the second pass river levels and silt inundation limited availability of some tributaries and limited the number of traps set within habitats.

Task 4: Lower Colorado River sampling for YOY and age 1+ razorback sucker:
Seine samples were collected between river miles 0.5 and 110.2 (near the Cisco boat ramp) during two sampling passes. The first pass was conducted 7/6/2022 – 7/15/2022. The second pass was conducted 8/18/2022– 8/25/2022.

During both sampling passes, an estimated total of 4,656 m² was seined in 87 seine hauls within 52 habitats. These habitats included backwaters, which constituted 57% of all habitats sampled, flooded tributaries (19%), embayments (15%), side channels (11%), isolated pools (10%), shorelines (6%) and eddies (3%). The estimated area of individual habitats ranged from 40 m^2 to 6,624 m^2 with an average habitat area of 1,098 $m^2 \pm$ 1,418 m^2. Thirty-five percent of the habitats sampled had a maximum depth of one meter or greater.

During sampling, main channel water temperatures ranged from 21.0 °C to 30.0 °C with an average temperature of 24.1 °C. Main channel Secchi disk measurements ranged from 25 mm to 180 mm with an average Secchi of 84 mm. Habitat water temperatures ranged from 18.0 °C to 35.0 °C with an average temperature of 25.3 °C. Habitat Secchi disk measurements ranged from 20 mm to 420 mm with an average Secchi of 149 mm.

During seining on the Colorado River, there were 19 samples of unidentifiable suckers preserved. All of these samples were collected during the first pass of sampling in July. There were no juvenile (age-1+) razorback suckers captured during seining.

Similar to seining results from the lower Green River, we sampled a higher number of identifiable native fishes compared to sampling in 2021 (Table 1), with a large number of YOY pikeminnow appearing in seine hauls on the second pass (n=237). A small subset of Colorado pikeminnow were measured which had an average length of 34 mm (n=3). Additionally, a number of unidentifiable native chub species were collected during the second sampling pass and had an average length of 41 mm (n=21).

Non-native species captured during 2022 seining efforts on the Colorado River can be found in Table 2. Other non-native fish captured (not reported in Table 2) include: red shiner, sand shiner, and fathead minnow.

Task 5: Preliminary sample identification, data entry, analysis and reporting:
All data has been entered. Collected samples have been submitted to CSU LFL for identification. This annual report will be updated and resubmitted upon completion of fish identification.

Additional noteworthy observations:
Effect of monsoonal activity on sampling effort: Strong monsoonal storms throughout the month of August added substantial debris and loose silt into habitats throughout much of the Colorado and Green Rivers. During the second seining pass these conditions, in addition to low water levels, limited habitats to sample throughout the Colorado River and Green River.

Recommendations:

- Continue seining in both the Colorado and Green Rivers (July-September) to determine

successful recruitment of YOY and juvenile razorback suckers.

- Continue sampling via light trapping for larval razorback sucker in both the Colorado and Green Rivers (May-June) to determine the annual success and timing of reproduction.
- Consider using alternative sampling methods to document recruitment success in areas that are difficult to sample via seine. Alternative methods may include boat electrofishing and using a trawl to sample cobble bars and higher velocity habitats.
- Consider prioritizing the transfer of data for this project into a database, to facilitate data analysis. Through better data management, we may be able to conduct analyses to understand what conditions support reproduction of razorback sucker and survival from larval to early juvenile stages.
- Consider conducting further research to help determine what conditions contribute to high YOY razorback captures in our study area. This may then aid in developing a hypothesis for what conditions support survival of razorback sucker from larval to early juvenile stages.

Project Status:
On track and ongoing

FY 2022 Budget Status
Funds Provided: $53,534
Funds Expended: $53,534
Difference: $0
Percent of the FY 2022 work completed, and projected costs to complete: 100%
Recovery Program funds spent for publication charges: $0

Status of Data Submission
All data will be submitted upon completion of fish identification by CSU LFL.

Signed:
Nick Melone
Principal Investigator
October 26th, 2022

Literature Cited:

Bestgen, K.R., Zelasko, K.A., and G.C. White. 2012. Monitoring reproduction, recruitment, and population status of razorback sucker in the upper Colorado River basin. Final report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, CO.

Howard, J. 2013. Lower Green River Razorback Sucker Larval and Young-of-Year Monitoring Pilot Study, Annual Report. Upper Colorado River Endangered Fish Recovery Program Project 160.

Snyder, D.E., Muth, R.T., and C.L. Bjork. 2004. Catostomid Fish Larvae and Early Juveniles of the Upper Colorado River Basin – Morphological Descriptions, Comparisons, and Computer-Interactive Key. Colorado Division of Wildlife Technical Publication No. 42.

Table 1. Counts of identifiable native fish captured via seining on the lower Green and Colorado Rivers (n represents the number of seine hauls). This table does not include any fish that were preserved for identification by CSU LFL. Species abbreviations are as follows: RZ = razorback sucker; CS = Colorado pikeminnow; CH = unknown chub; FM = flannelmouth sucker; BH = bluehead sucker; RT = roundtail chub; SD = speckled dace.

Reach	RZ	CS	CH	FM	BH	RT	SD
Green River (RM 0-119.6) n=72	0	63	0	4	0	0	0
Colorado River (RM 3.5-110.1) n=87	0	237	26	9	4	3	1
Total	0	300	26	13	4	3	1

Table 2. Counts of non-native fish captured via seining on the lower Green and Colorado Rivers (n represents the number of seine hauls). This table does not include any fish that were preserved for identification by CSU LFL. Species abbreviations are as follows: CP = common carp; GS = green sunfish; GZ = gizzard shad; GA= western mosquitofish; SM = smallmouth bass; LG = largemouth bass; BB = black bullhead; BG = bluegill sunfish; BC = black crappie; PK = plains killifish; CC = channel catfish; WS = white sucker; OT= other (these were all unidentifiable sunfish); UM = unidentifiable minnow

Reach	CP	GS	GZ	GA	SM	LG	BB	BG	BC	PK	CC	WS	OT	UM
Green River (RM 0-119.6) n=72	8	9	0	1	0	0	20	0	0	0	57	0	112	1
Colorado River (RM 3.5-110.1) n=87	36	12	338	140	9	30	108	14	1	2	103	9	50	0
Total	44	21	338	141	9	30	128	14	1	2	160	9	162	1

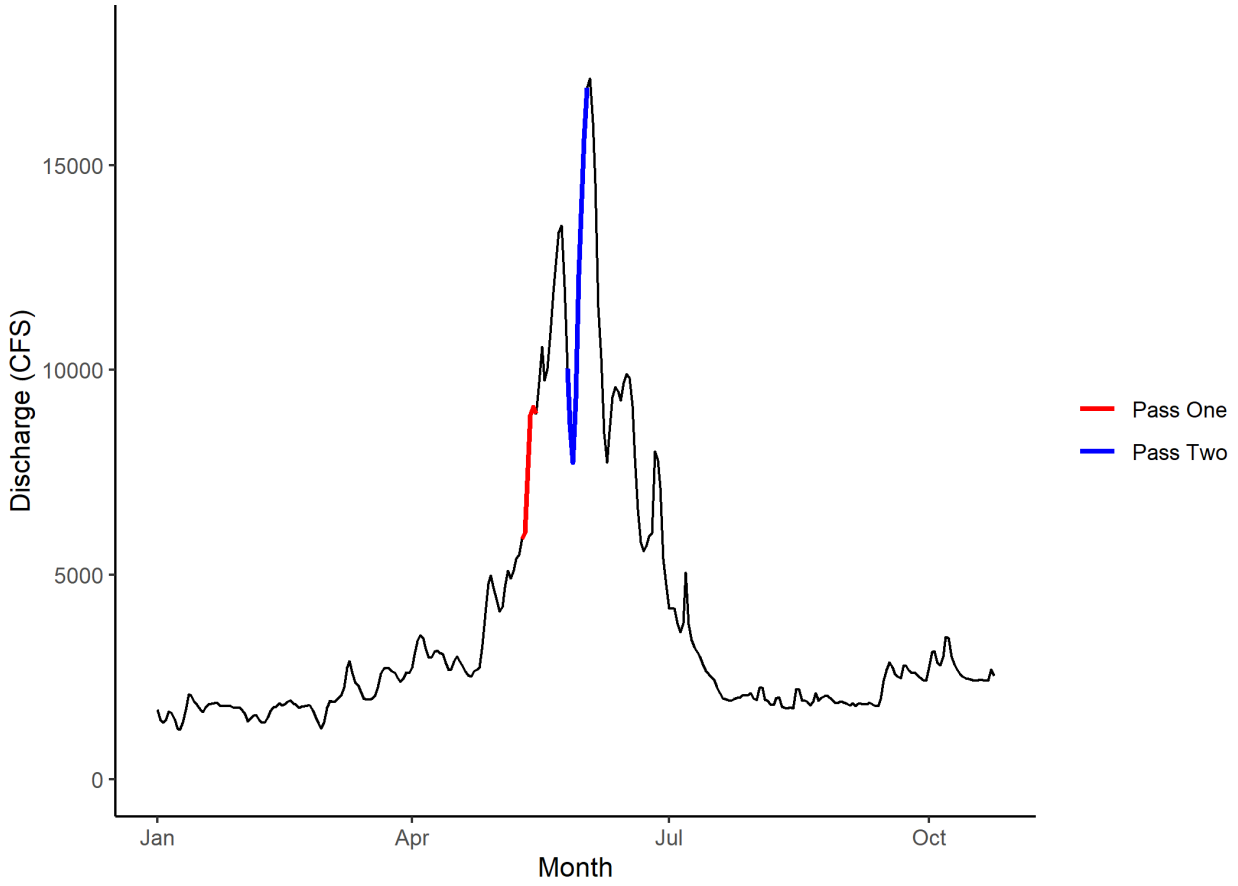

Figure 1. Discharge recorded in 2022 for the Green River at USGS gage #09315000, Green River, UT. The areas of the line highlighted by color show the discharge during light trap sampling on the lower Green River in 2022. The red line corresponds to sampling during pass one (05/10/2022 – 05/15/2022) and the blue line corresponds to sampling during pass two (05/26/2022 – 06/02/2022).

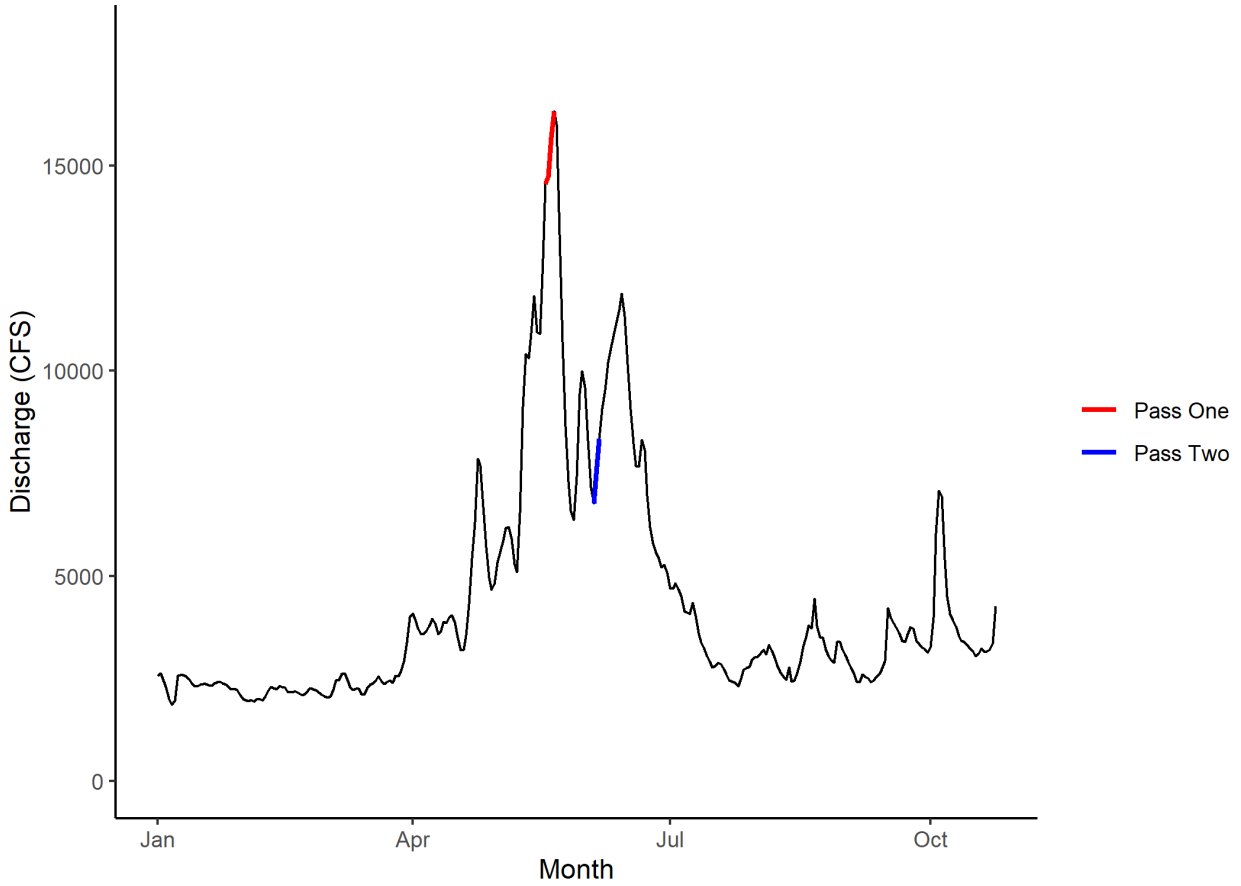

Figure 2. Discharge recorded in 2022 for the Colorado River at USGS gage #09185600, Potash, UT. The areas of the line highlighted by color show the discharge during light trap sampling on the lower Colorado River in 2022. The red line corresponds to sampling during pass one (05/18/2022 – 05/21/2022) and the blue line corresponds to sampling during pass two (06/04/2022 – 06/06/2022).