

SAN JUAN RIVER RECOVERY IMPLEMENTATION PROGRAM

FY 2021 ANNUAL REPORT

PROJECT: 19b

Project Title

Overwinter survival and spatial distribution of the wild Razorback Sucker in the San Juan River 2021

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R17PG00084

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Is this the final report? Yes

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Abstract:

In 2018, the San Juan River saw one of the lowest run offs in recent history, leading to low, warm and very clear summer base flow conditions. This proved to be ideal conditions for Razorback Suckers spawned in the wild to successfully survive and recruit to an older age class. A record number (n = 164) early juvenile life stage (larger than larval) Razorback Suckers were captured during sampling performed by American Southwest Ichthyological Researchers (Farrington et al., 2019). Interest created by these findings and the availability for an impromptu sampling trip from the previous fall's Adult Monitoring trip being canceled led to a spring 2019 trip conducted to document over-winter survival of this 2018 cohort of wild Razorback Suckers.

A single pass with two electrofishing rafts in the spring of 2021 mirroring a sampling pass in 2019 took place from Shiprock Bridge (River Mile [RM] 147.9) to Clay Hills, UT (RM 2.9). Efforts were directed at collecting Razorback Suckers under 300mm total length (TL) and all Colorado Pikeminnow. Numbers of Colorado Pikeminnow were lower in 2021 (n=51) compared to 2019 (n=274). Razorback Sucker numbers were also lower in 2021 (n=25) compared to numbers captured in 2019 (n=45).

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Study Schedule:

April 2021

Relationship to LRP:

Scope of Work 19b under LRP Element 4 - Monitoring and Evaluation of Fish and Habitat in Support of Recovery Actions

Accomplishment of FY 2021 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Method

The single pass electrofishing trip took place from Shiprock Bridge (RM 147.9) in Shiprock, NM on March 30th to Clay Hills Crossing, UT (RM 2.9) on April 10th spanning 145 miles of river in 12 days. This pass consisted of two rafts each outfitted with an ETS electrofishing unit powered by a Honda 6500EG generator. Peak amperage was kept between 9 amps and 12 amps depending on how fish were being affected by electricity. Each raft had one rower and one netter who would collect any small sucker observed and all Colorado Pikeminnow regardless of size in each two-mile sub-reach and place them into a live well.

At the end of each two-mile sub-reach, rafts would pull over and collect data on any targeted fish. Information collected would include total length (TL) and standard length (SL) to the nearest millimeter (mm), weight to the nearest gram (g), habitat/substrate captured in/on if able, river mile captured (start and stop river miles), and fin clip of any suspected small Razorback Sucker under 300mm (TL). Razorback Sucker, Razorback Sucker x Flannelmouth Sucker hybrid, and Colorado Pikeminnow over 120mm TL would be scanned for a Passive Integrated Transponder (PIT) tag; if one was not present, a tag would be implanted into the cavity behind the pelvic girdle with a syringe prior to being released.

Results

Flows for 2018 and 2020 were lower than the last 10 years' average. In 2020 spring runoff was observed from April 27th to July 1st, at total of 66 days, during which a one-day peak of 3383 cubic feet per second (cfs) was achieved. Later in July a monsoon event was observed with a four-day spike peaking 1971 cfs. 2020 reflected a more normal run off year based on the average of the previous 10 years. Comparatively in 2018, a recognized low water year, no spring runoff or monsoonal events were observed (Figure 1). By comparing the flow from the year prior to each spring sampling, i.e., flows from 2018 and 2020 to spring captures of fish in 2019 and 2021 respectively, any potential influences of survival from flow of age-0 fish into age-1 fish can be observed.

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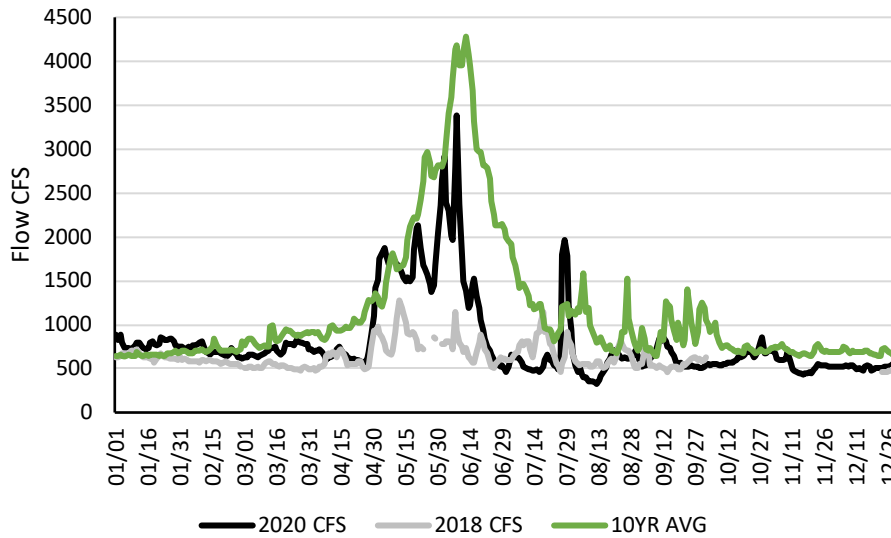


Figure 1. Daily Mean values for flows (CFS) at USGS 09371010 San Juan River at Four Corners, CO.

Every Colorado Pikeminnow observed was captured regardless of age class. A total of 53 captures of 51 individual Colorado Pikeminnow occurred during the spring trip. Of these 51 individuals, 16 fish were stocked in the fall of 2020 in McElmo just upstream of the confluence with the San Juan and 12 fish were stocked in McElmo Creek the day the trip launched at Shiprock Bridge. Length data was collected on 34 of the 51 fish in 2021, comparatively 274 fish were captured in 2019 (Schleicher 2019). Due to the proximity of McElmo Creek and the stocking that occurred three days prior, 17 fish captured next to McElmo Creek were not measured as each fish would have a length associated with it upon stocking. A PIT tag number was recorded for record of that fish being captured outside of McElmo Creek. Fish size ranged from 71mm TL to 800mm TL (Figure 2). Only one Colorado Pikeminnow under 100mm TL (71mm TL) was captured that did not have a PIT tag and thus could not be traced to a stocking event.

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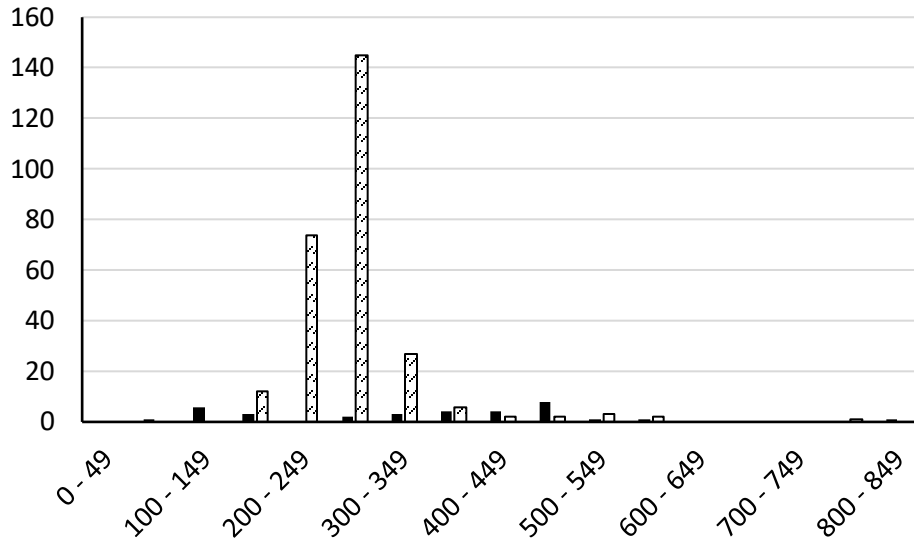


Figure 2. Length frequency for Colorado Pikeminnow. Bins are in 50mm increments. 2021 data is represented by solid black bars, 2019 data is represented by hashed bars.

Razorback Sucker captures totaled 26 individual fish under 300mm TL. One Razorback Sucker was captured that measured 297mm TL and had a PIT tag present prior to being captured. This fish later was found to be stocked in the fall of 2020. This left 25 individual Razorback Suckers that were not tagged, and presumably wild age-1 fish. Each fish was fin clipped for genetic analysis of species purity, 24 had a PIT tag inserted prior to release with exception of the smallest which was under the tagging threshold of 130mm total length.

Lengths of the 25 small Razorback Suckers ranged from 109mm TL to 196mm TL in 2021, compared similarly to the 45 small Razorback Sucker captured in 2019 ranging from 100mm TL to 197mm TL (Figure 3). In both years more than 70% of the fish were between 140mm TL and 189mm TL.

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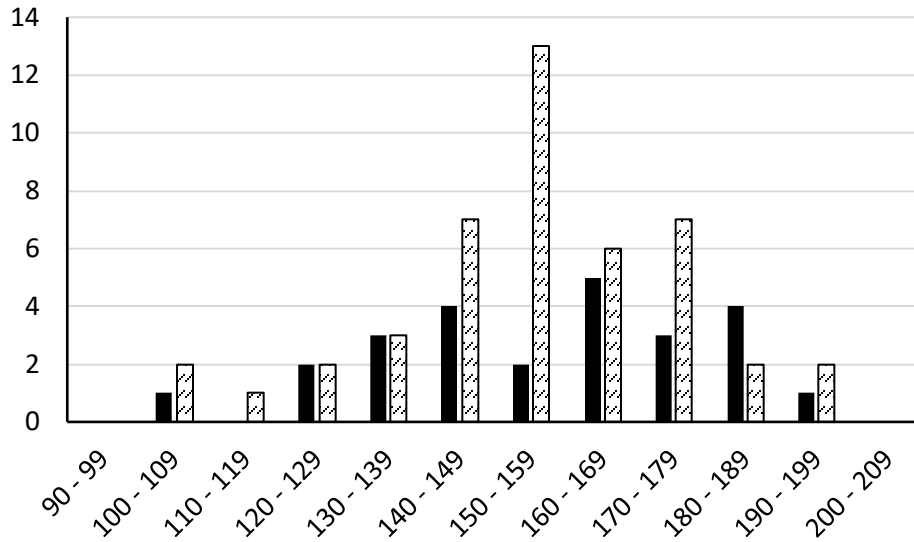


Figure 3. Length frequency for Razorback Sucker. Bins are in 10mm increments. 2021 data is represented by solid black bars, 2019 is represented by hashed bars.

Effort in 2021 accounted for 129.2 hours of electrofishing between two rafts. In 2019 the same project covered the same section of river in 95.7 hours. Catch per unit effort was greater for both Colorado Pikeminnow, $p < 0.001$, and age-1 Razorback Sucker, $p = 0.016$, in 2019 compared to 2021 (Figure 4, Appendix I). Large (greater than 300mm TL) Flannelmouth Sucker x Razorback Sucker hybrids were not targeted in 2019 sampling, so no comparison can be made with CPUE in 2021.

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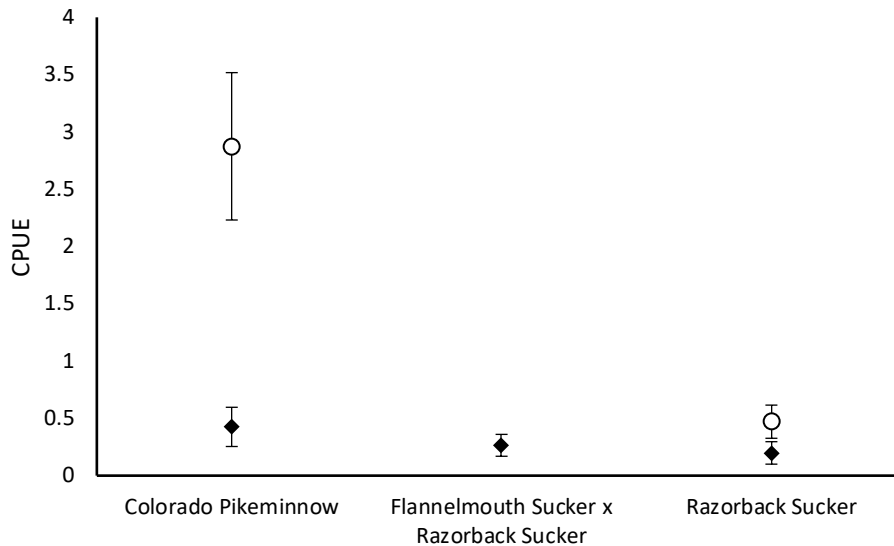


Figure 4. Catch per unit effort, measured in fish per hour of electrofishing for Colorado Pikeminnow, Razorback Sucker, and Razorback Sucker hybrid. 2021 data is represented in filled black diamond, 2019 data is in open circles, error bars are 95% confidence intervals.

Discussion

The original design was set up to compare a low water year and a high-water year effects on age-0 Razorback Sucker by captures in the following spring after a one overwinter period. 2018 was an extremely low water year which produced a larger number of age-0 Razorback Suckers, present in multiple sampling efforts that year. COVID-19 shut down sampling in early 2020 when we would have been able to survey the effects of a higher water year presented by 2019. The water year of 2020 was slightly lower than the average flow from the last 10 years, not ideal for a high water comparison, however, funds had been allocated for efforts to be completed, and a comparison between a low water and more average water year were made (Figure 4).

Catch rates were higher in the spring of 2019 for age-1 Razorback Suckers compared to that of 2021. For comparative purposes, based only on these two years, it would appear that low water years like the one observed in 2018 tend to favor survival of age-0 Razorback Suckers when compared to a more average flow year like that of 2020, more data is needed to definitively state this across all low water years.

In both years, no age-1 size Razorback Suckers were captured between Shiprock, NM and the Four Corners bridge. An observation was made in 2020 that smaller juvenile suckers, of any species, were not present during sampling until we got closer to the Four Corners bridge. In 2019, the first age-1 Razorback Sucker was collected directly downstream of the bridge, in 2021 the first age-1 Razorback Sucker was collected seven miles farther downstream. In both years, these smaller fish were found intermittently as sampling continued downstream.

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In 2019, six fish were fin clipped for genetic analysis, each one came back as a hybrid of a Razorback Sucker and Flannelmouth Sucker. Three sampling passes took place in the fall of 2020 from Sand Island boat launch (RM 76) downstream to Clay Hills takeout (RM 2.9), capturing 56 fish identified in the field as age-0 Razorback Sucker which came back after genetic analysis as all hybrids (Schleicher et al 2021). For this sampling in the spring of 2021, genetic results have yet to be released on the purity of Razorback Suckers under 300mm TL captured. If all age-0 fish identified as Razorback Sucker in the fall of 2020 came back as hybrids, then one could hypothesize that sampling this same cohort after one over winter should produce similar results. If not, meaning that age-1 Razorback Sucker were present in 2021 spring samples, then questions could arise as to efficacy of sampling methods, timing, location, etc.

Capture rates for Colorado Pikeminnow were significantly higher in 2019 compared to 2021 (Figure 4). In 2019 there was a strong age-2 to age-3 cohort present that was not seen in 2021 (2018 to 2019 year-class fish) (Figure 2). Exact classifications of these two-year classes is difficult given the variation and overlap in total length of fish in each age class reported for fish captured between 2009 and 2012 (Durst and Franssen 2014). The large discrepancy in numbers caught could be an artifact of a change in stocking regimes. In the fall of 2018, 430,723 age-0 Colorado Pikeminnow were stocked into the San Juan between Bloomfield, NM (RM 196.0) and Shiprock, NM (RM 147.9). After 2018 the SJRIP moved away from stocking large numbers of age-0 Colorado Pikeminnow to fewer, age-1, fish with PIT tags present prior to going into the river. There were 15 of these larger (age-1) stocked fish picked up from a stocking even in the fall of 2020 and 12 fish stocked in 2021 while this project was being conducted. As stated, these more recent stockings saw a decrease in numbers stocked; in 2019 1,230 fish were stocked in McElmo Creek (RM 100.5), 2,621 in 2020 in McElmo Creek, and 649 in the spring of 2021 also in McElmo Creek. These fish stocked into McElmo accounted for 53% of the observed fish during this trip.

Recommendations:

Efforts need to be made to continue to monitor the hybrid issues between Razorback Sucker and Flannelmouth Sucker. Larval studies show both pure Razorback Sucker and hybrids, yet only the hybrids are apparently recruiting to the age-1 year class.

Work Cited

Durst, S. L., N. R. Franssen. 2014. *Movement and Growth of Juvenile Colorado Pikeminnows in the San Juan River, Colorado, New Mexico, and Utah*. Transactions of the American Fisheries Society 143:519–527, 2014.

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Appendix I

Systat13 ANOVA output for Colorado Pikeminnow and Razorback Sucker captures respectively, in 2019 and 2021

Dependent Variable	Colorado Pikeminnow CPUE
N	412
Multiple R	0.243
Squared Multiple R	0.059

Analysis of Variance					
Source	Type III SS	df	Mean Squares	F-Ratio	p-Value
YEAR	537.946	1	537.946	25.817	0
Error	8543.11	410	20.837		

Least Squares Means				
Factor	Level	LS Mean	Standard Error	N
YEAR	2019	2.874	0.273	280
YEAR	2021	0.425	0.397	132

Dependent Variable	Razorback Sucker CPUE
N	412
Multiple R	0.118
Squared Multiple R	0.014

Analysis of Variance					
Source	Type III SS	df	Mean Squares	F-Ratio	p-Value
YEAR	6.664	1	6.664	5.823	0.016
Error	469.2	410	1.144		

Least Squares Means				
Factor	Level	LS Mean	Standard Error	N
YEAR	2019	0.471	0.064	280
YEAR	2021	0.198	0.093	132