

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: 132

Project Title

Population estimates of humpback and roundtail chub in Westwater Canyon, Colorado River, Utah.

Bureau of Reclamation Agreement Number:

R19AP00059

Project/Grant Period:

Start date: 10/1/2018

End date: 9/30/2023

Reporting period end date: 9/30/2020

Is this the final report? No

Principal Investigator:

Brian Hines

Utah Division of Wildlife Resources

Moab Field Station

1165 S Hwy 191 Suite #4

Moab, UT 84532

Phone: (435) 259-3782

Fax: (435) 259-3785

Email: bhines@utah.gov

Abstract:

Westwater Canyon on the Colorado River contains one of the four remaining populations of the endangered humpback chub in the Upper Colorado River Basin. The most recent adult abundance estimates (2016 – 2017) were significantly higher than those between 2007 and 2012, demonstrating a recent population increase to levels seen approximately 15-20 years ago. In 2020, trammel and hoop nets and electrofishing gear were used to sample humpback and roundtail chubs in Westwater Canyon in order to support another round of population monitoring. Important metrics of population status including catch rates, size structure, and population size were calculated for humpback and roundtail chub. Catch rates of humpback chub in 2020 were the highest (0.79 fish /hr) since starting three pass population estimates in 1998. Mean length of humpback chub in 2020 was 270 mm. We also incorporated hoop netting into the sampling this year and that effort captured 1,057 additional chubs including 823 juvenile *Gila spp.* This was the first year in this two-year cycle of monitoring.

Study Schedule:

Ongoing; initial year of fieldwork cycle-2020, final year of fieldwork cycle-2021.

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.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

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
- V.C.2. Westwater.

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

Task 1: Sampling

In 2020, three sampling passes occurred in Westwater Canyon during September and October as part of the continued efforts to monitor humpback and roundtail chub populations within the Colorado River. Sampling pass one occurred September 15–22, pass two occurred September 30 – October 7, and pass three occurred October 15 – 22. During each pass, sites were surveyed for two consecutive nights at Miners Cabin (RM 123.5), Upper Cougar (RM 121.7), and Little Hole (120.8). The Hades bar site (RM 120.1) was sampled for one night per pass.

Mean daily discharge during passes was measured using data collected remotely from the USGS gauge #09163500 (Colorado River near Colorado-Utah State Line). Temperature was measured once daily at each site due to temperature sensors being cancelled at the USGS gauge. Mean flow for the first pass was 2,826 cfs (2,650 – 3,140 cfs), and temperatures ranged from 17.8 –19.5 °C. Mean flow for the second pass was 2,452 cfs (2,230 – 2,870 cfs), and temperatures ranged from 14.3 – 16.8 °C. Mean flow for the third pass was 2,489 cfs (2,360 – 2,610 cfs), and temperatures ranged from 12.3 – 14 °C.

Humpback and roundtail chub were sampled using trammel and hoop nets, electrofishing, and submersible antennas during the 2020 sampling. Trammel nets were set each day at 15:00 and checked every two hours until 23:00 then they were pulled. The nets were reset the next morning at 5:00, checked every two hours and pulled at 11:00. Three to six trammel nets were set at each site depending upon habitat availability and number of chubs captured. On all three passes the number of trammel nets set had to be reduced because we were catching more chubs than what we could process in a timely manner, specifically at Miners and Little Hole. Hoop nets were used to increase captures of juvenile chubs (<199 mm). Nine to twelve hoop nets were set at each site. Hoop nets were set at 16:00 on the day we arrived at the site and checked the following day at 10:00. At Miners, Upper Cougar, and Little Hole hoop nets were reset, after being checked, and checked again the following morning at 10:00. Hades only had one round of hoop net sets. Electrofishing was conducted every afternoon at 14:00. All *Gila spp.* and endangered fishes were identified to species when possible, measured (total length; mm), weighed (g), scanned for a PIT tag, PIT tagged (if necessary), and released. There were twelve total antennas set for the duration of the 2020 field season (one above all sites, three at each site; Miners, Upper Cougar, and Little Hole, one at Hades, and one below the rapids). Data from the antennas are still being processed and will not be included in this annual report at this time.

The data and analysis in this report are preliminary due to the limited time to review the data between the conclusion of sampling and writing this report. Sampling efforts in 2020 resulted in the capture of 1,037 individual adult (≥ 200 mm) humpback chub and 2,383 individual adult roundtail chub. Additionally, 48 sub-adult (<200 mm) humpback chub, 207 sub-adult roundtail chub, and 1,382 sub-adult *Gila spp.* were collected. Fish identified as *Gila spp.* were too small to reliably identify in the field.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

The average total length of captured humpback chub during 2020 sampling was 270 mm with a range of 70-395 mm (N=1,097) and the average total length of roundtail chub captured was 256 mm with a range of 67-448 mm (N=2,606). The mean length of *Gila spp.* caught during electrofishing and trammel and hoop net surveys was 69 mm with a range of 21 to 263 mm. Analysis of length frequency histograms suggests that there is a broad range of adult humpback and roundtail chub within the Westwater Canyon population (Figure 1). The small node centered around 200 mm for humpback and roundtail chub indicate that recruitment is occurring. However, when we consider the length frequencies of *Gila spp.* recruitment appears strong but we are unable to differentiate humpback chub recruits from roundtail chub recruits for these smaller size classes.

Trammel net surveys resulted in 1,199 hours of total effort during fall of 2020 sampling. Humpback chub trammel net catch per unit effort (CPUE) during 2020 was 0.79 fish per hour (SE=0.04). Catch per unit effort was relatively consistent among passes with slight non-significant temporal decrease (Figure 2). Catch rates for humpback chub were highest at Miners and Little Hole camps (Figure 3). Roundtail chub CPUE was 1.9 fish per hour (SE=0.1). Roundtail chub catch rates increased temporally (Figure 2). Roundtail chub catch rates were highest at Miner's and Little Hole camps (Figure 3). This year we incorporated hoop netting into our sampling and had great results for smaller chubs. Hoop netting surveys resulted in 3,543 hours of total effort during our 2020 sampling. *Gila spp.* had the highest CPUE in hoop nets with 0.29 fish/ hour (SE=0.79). We captured 1,063 total chubs in hoop net sampling and 90% of that catch was juvenile chubs (<199 mm). *Gila spp.* catch rates were highest on pass 3 and at Miners, Upper Cougar, and Hades camps (Figures 4 and 5). Electrofishing was also effective at capturing smaller size class (<200 mm) chubs and adult roundtail chub. Catch per unit effort was highest for all chubs during pass one, except *Gila spp.*, which was during pass two (Figure 6). Miner's camp had the highest electrofishing CPUE for all chubs, except adult humpback chubs, which was at Upper Cougar (Figure 7).

Closed capture population models (Huggins' p and c) were calculated in Program MARK to estimate population size and capture probability for humpback chub and roundtail chub. Model averaging was used to estimate populations for both humpback and roundtail chub because AIC weights were less than 0.90 on all models (Table 1). Population estimates for both humpback and roundtail chubs used the Mo (constant p), Mt (time varying p), and Mb (behavioral response) models to calculate the estimates.

The model averaged estimate for humpback chub for 2020 is 9,123 (95% CI 5,760-12,486, SE=1,553, CV=0.17). The model averaged capture probabilities for humpback chub ranged from 0.03-0.07. The model averaged estimate for roundtail chub for 2020 is 26,541 (95% CI 20,645-32,435, SE=3,003, CV=0.11). The model averaged capture probabilities for roundtail chub ranged from 0.02-0.04. The population estimates for humpback and roundtail chubs are likely inflated due to lower capture probabilities experienced in 2020. Capture probabilities should increase after adding the antenna data to these estimates and will likely increase the precision of these population estimates. These population estimates are preliminary and should be used with caution.

Task 2: Data entry

The 2020 data was entered and quality checked and will be uploaded into STReaMs by January 2021.

Task 3: Annual reporting

An annual progress report including a summary of the 2020 data will be submitted by November 20, 2020.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 1. Program MARK model output for all models used for the 2020 population estimates on humpback and roundtail chubs in Westwater Canyon, UT.

Humpback Chub						
Model	AICc	Delta AICc	AICc Weights	Model Likelihood	Num. Par	Deviance
{Mt}	2389.1901	0	0.71797	1	3	12442.178
{Mt{last p constrained}}	2391.1107	1.9206	0.27482	0.3828	4	12442.093
{Mb}	2398.3947	9.2046	0.0072	0.01	2	12453.386
{M0}	2616.6139	227.4238	0	0	1	12673.608
Roundtail Chub						
{Mt}	5906.3228	0	0.73095	1	3	33442.227
{Mt{Last p constrained}}	5908.3217	1.9989	0.26905	0.3681	4	33442.223
{Mb}	6057.1994	150.8766	0	0	5	33589.098
{M0}	6084.7935	178.4707	0	0	1	33624.7

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

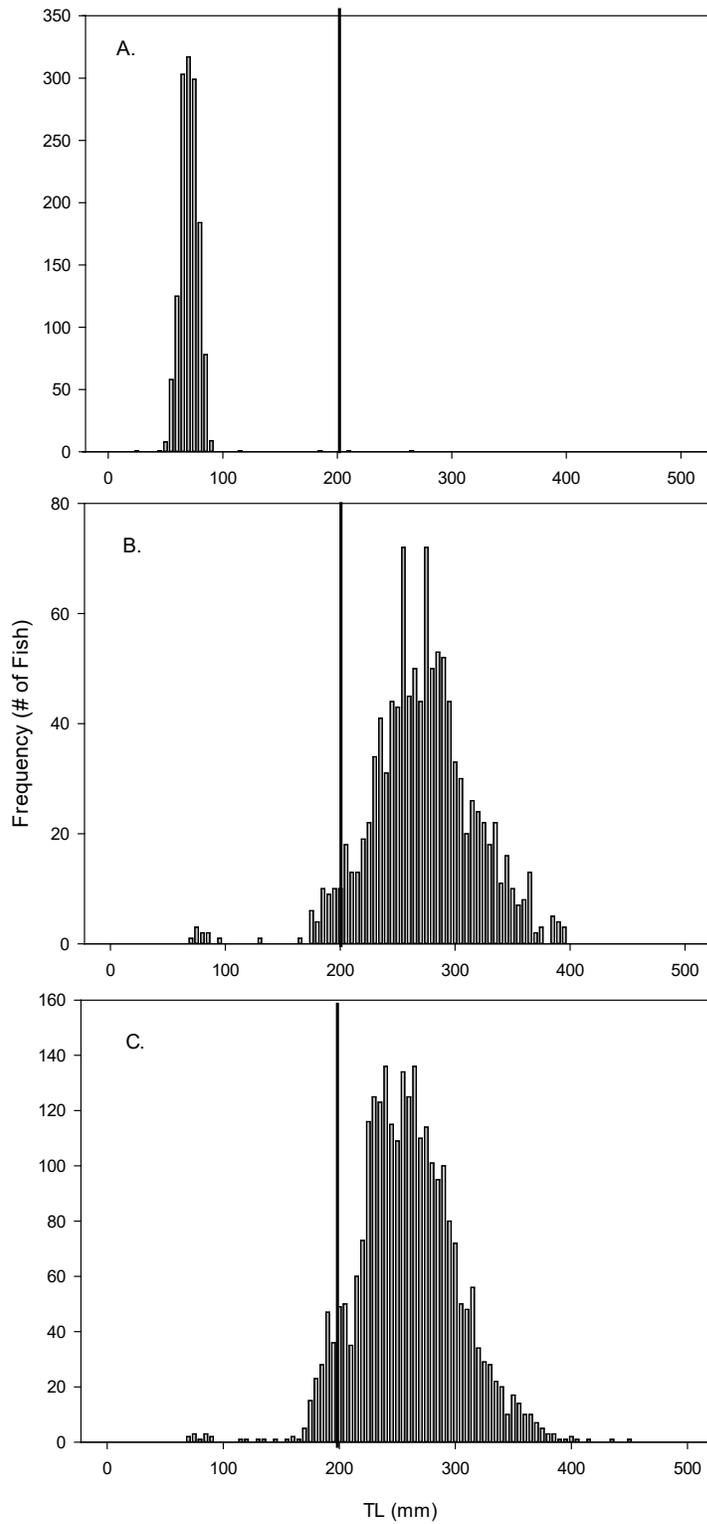


Figure 1. Length-frequency histograms for A.) *Gila spp.* B.) humpback chub, and C.) roundtail chub during Westwater Canyon sampling in 2020. Black bars denote the separation of juvenile and adult fish.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

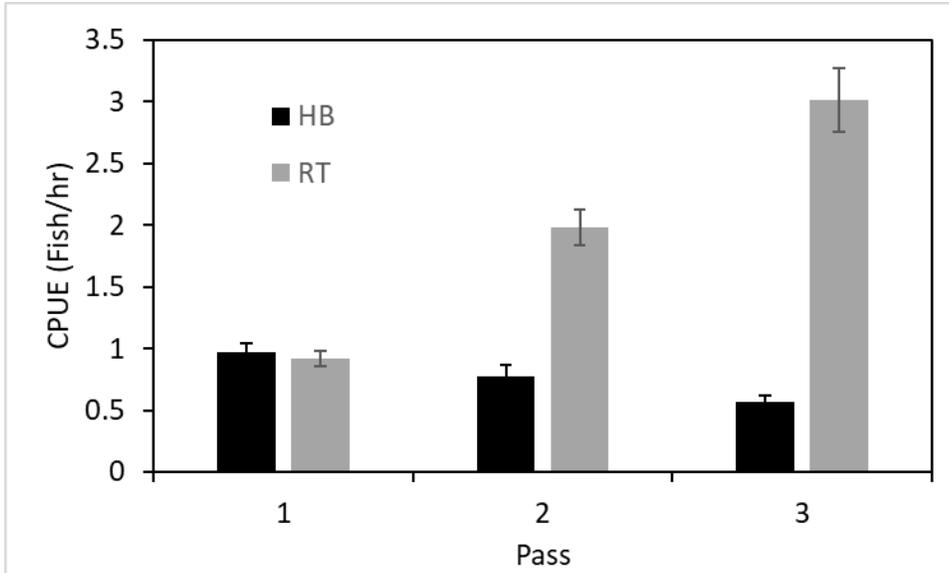


Figure 2. Catch per unit effort (fish/hour) by sampling pass for humpback and roundtail chub captured in trammel nets during fall of 2020. Error bars represent ± 1 SE.

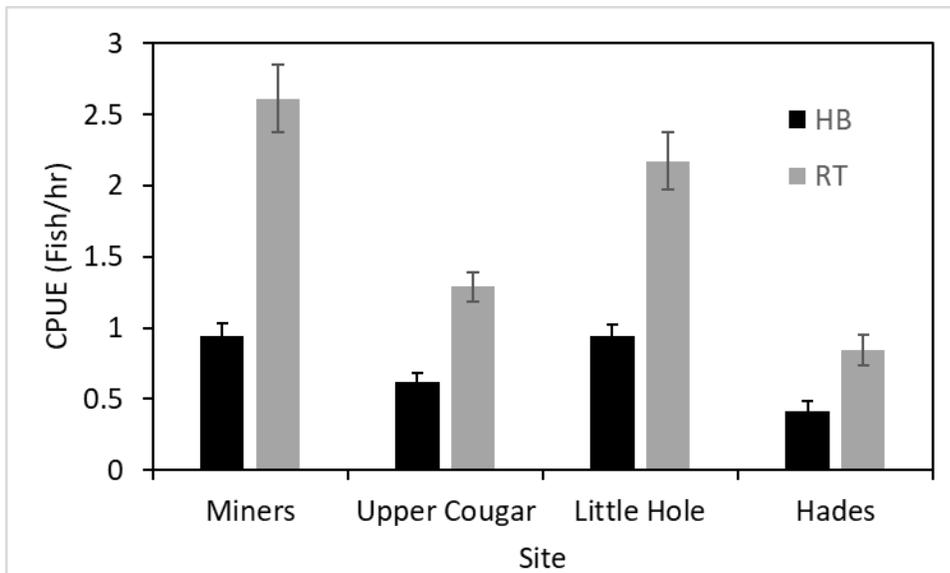


Figure 3. Catch per unit effort (fish/hour) by site for humpback and roundtail chub captured in trammel nets during fall of 2020. Error bars represent ± 1 SE.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

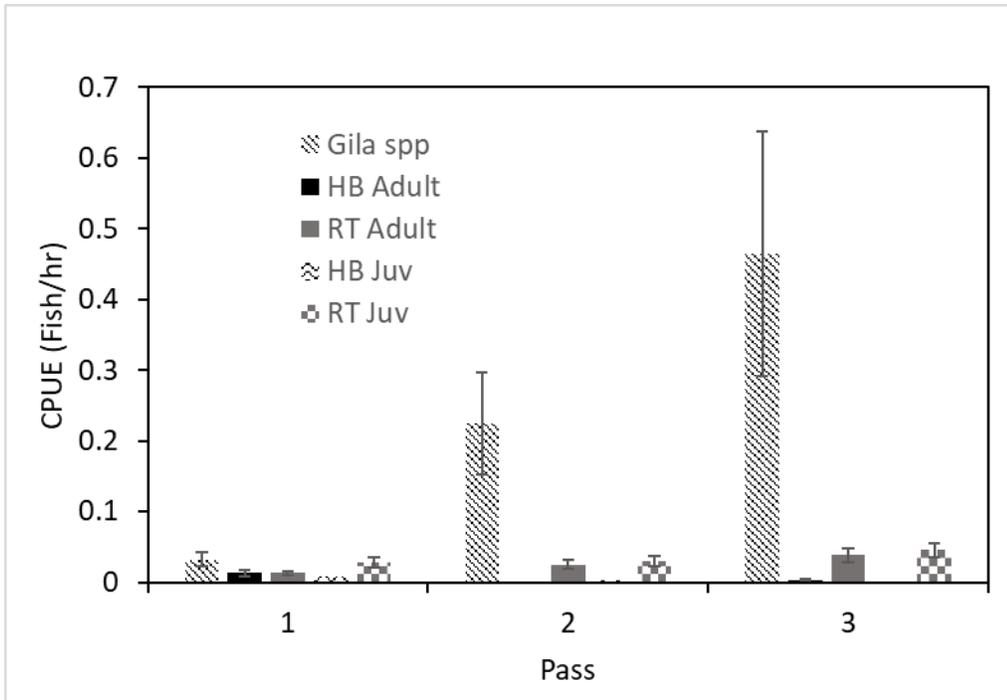


Figure 4. Catch per unit effort (fish/hour) by sampling pass for *Gila spp.*, humpback and roundtail chubs captured in hoop nets during fall of 2020. Error bars represent \pm 1SE.

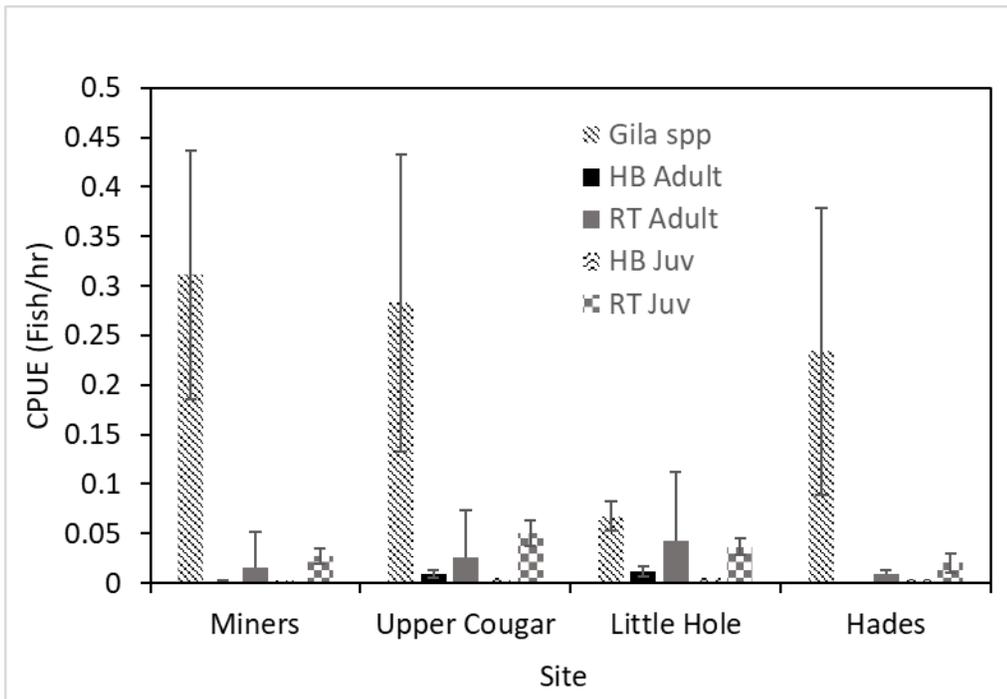


Figure 5. Catch per unit effort (fish/hour) by site for *Gila spp.*, humpback and roundtail chubs captured in hoop nets during fall of 2020. Error bars represent \pm 1SE.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

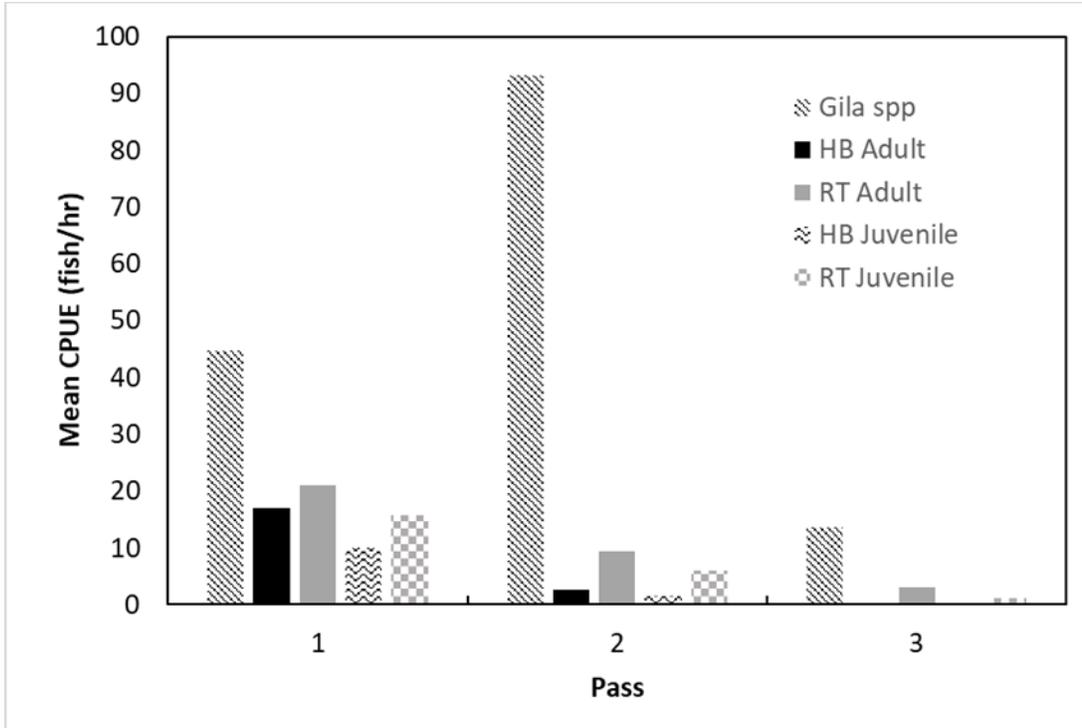


Figure 6. Catch per unit effort (fish/hour) by sampling pass for *Gila spp.*, humpback and roundtail chubs captured electrofishing during fall of 2020.

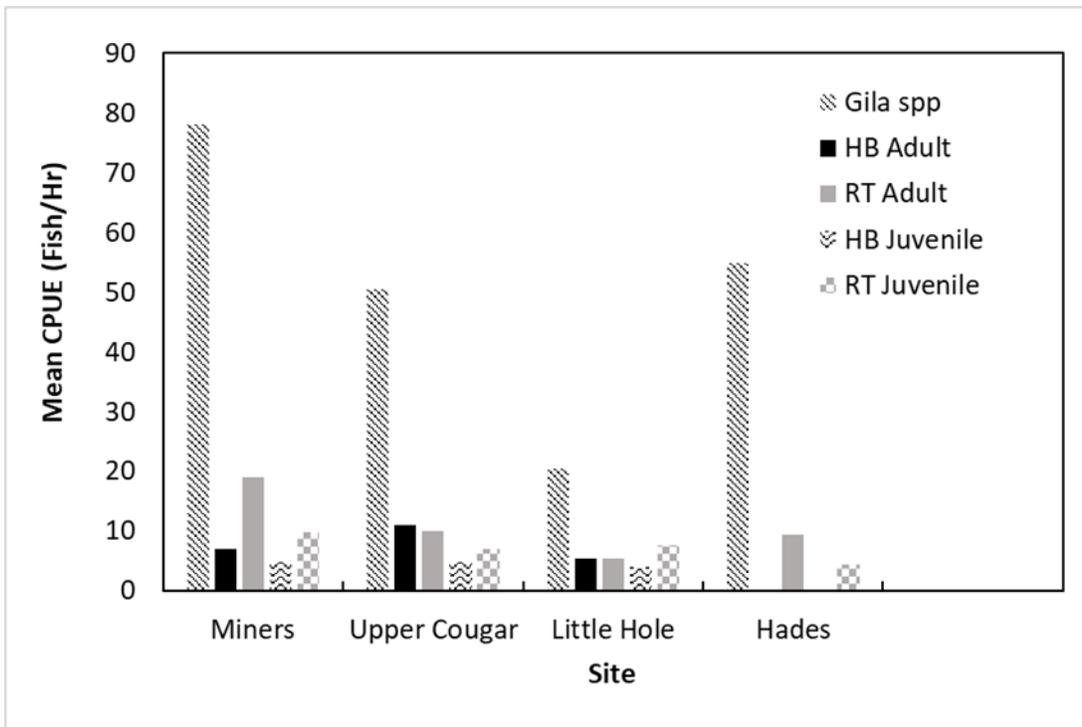


Figure 7. Catch per unit effort (fish/hour) by site for *Gila spp.*, humpback and roundtail chubs captured electrofishing during fall of 2020.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Additional noteworthy observations:

We captured the three other endangered species including one razorback sucker, four Colorado pikeminnow, and nine bonytail. Several nonnative species were captured and removed including 242 black bullheads, 21 green sunfish, 15 gizzard shad, two largemouth bass, 31 smallmouth bass, 11 white sucker hybrids (with bluehead and flannelmouth suckers), and 12 white suckers.

Recommendations:

- Monitoring efforts should remain as currently specified in the Westwater scope of work.
- Continue to use a robust design mark-recapture analysis for humpback and roundtail chubs in the final report.
- Continue to use hoop nets and electrofishing to capture juvenile chubs.
- Continue to use submersible antennas to boost the number of recaptures and increase capture probabilities.
- Examine the effects of nonnative fish expansion (as a separate study) on the Westwater chub population. Nonnative fish (smallmouth bass and walleye) populations are in higher concentrations upstream and downstream of Westwater Canyon (pers comm Chris Michaud) and while the Westwater Canyon fish community continues to be dominated by native fishes, current effects and future risks of nonnative fish expansion into and around the area are unknown.
- Consider expanding sampling into the rapids to determine if they occupy this section of the river in high numbers. To achieve this we would likely have to reduce some other sampling we currently do (i.e. discontinue working up roundtail chubs to save time).

Project Status:

Year one of two-year project was completed. The project is on track and ongoing. No changes in objective, deadlines, predicted funding, project direction or probability of success are foreseen.

FY 2020 Budget Status

Funds Provided: \$90,071

Funds Expended: \$90,071

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 January, 2021.

Signed:

Brian Hines

Principal Investigator

11/12/2020