

COLORADO RIVER RECOVERY PROGRAM  
FY 2016 ANNUAL PROJECT REPORT

RECOVERY PROGRAM  
PROJECT NUMBER: 132

I. Project Title: Population estimates of humpback and roundtail chub in Westwater Canyon, Colorado River, Utah.

II. Bureau of Reclamation Agreement Number(s): #R14AP00007

Project/Grant Period: Start date: 5/1/2014

End date: 09/30/2018

Is this the final report? Yes \_\_\_\_\_ No  x

III. Principal Investigator(s):

Brian Hines

Utah Division of Wildlife Resources

Moab Field Station

1165 S Hwy 191 Suite #4

Moab, UT 84532

435-259-3782

bhines@utah.gov

IV. Abstract:

Westwater Canyon on the Colorado River contains one of the five remaining populations of the endangered humpback chub in the Upper Colorado River Basin. Recovery goals identified by the RIP require maintaining several populations of humpback chub within the Upper Colorado River Basin. Monitoring efforts are essential to evaluate the population of humpback chub in Westwater Canyon and meet the recovery goals. Overall this population of humpback chub has remained relatively stable since 2000, with population estimates around 2000 individuals. In 2016, trammel nets and electrofishing gear were used to sample humpback and roundtail chubs in Westwater Canyon. 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 2016 (0.5 fish /hr) are the highest catch rates calculated since the three pass population estimates were established in 1998. A new cycle of monitoring began in 2016 and will continue in 2017.

V. Study Schedule: Ongoing; initial year of field work cycle-2016, final year of field work cycle-2017.

VI. 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.

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.

VII. Accomplishment of FY 2016 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: Sampling:

In 2016, three sampling trips 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 trip one occurred during September 12 –19, sampling trip two occurred during September 27-October 4, and sampling trip three occurred during October 12-19. During each trip, 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 only sampled for one night per trip.

Mean daily discharge during sampling trips 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 trip was 3,778 cfs (3,630 – 3,950 cfs), and temperature ranged from 17.9 –20.4 °C. Mean flow for the second trip was 4,329 cfs (4,120 – 4,540 cfs), and temperature ranged from 15.3 – 18 °C. Mean flow for the third trip was 4,075 cfs (3,810 – 4,320 cfs), and temperature ranged from 14.3 – 17.4 °C.

Humpback and roundtail chub were sampled using trammel nets, electrofishing, and submersible antennas during the 2016 sampling. Trammel nets were set each day at 15:00 and checked every two hours until approximately 23:00. 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. Electrofishing was conducted every afternoon at 14:00. All *Gila sp.* 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 seven total antennas set for the duration of the 2016 field season (two at Miners, Upper Cougar, and Little Hole and one at Hades). There were several problems that occurred with the antennas. One at Upper Cougar had water get inside of it, so it was taken out on the second trip. One at Little Hole had a microprocessor go out; data from trip three has not yet been retrieved from it. The antenna at Hades disappeared between trips two and three. Data from the antennas are still being processed and will not be included in this annual report at this time, but a revised report incorporating the antenna data will be resent out once all data is acquired (mid-December, 2016).

Sampling efforts in 2016 resulted in the capture of 339 individual adult humpback chub and 1,357 individual adult roundtail chub. Additionally, 13 subadult humpback chub, 39 subadult roundtail chub and 91 sub-adult *Gila spp.* were collected. Fish identified as *Gila sp.* were either too small to reliably identify in the field or displayed characteristics of both species. Humpback chub captures were 21% sub-adult and 79% adult. Roundtail chub captures were 8% sub-adult and 92% adult. The percentages for both humpback and roundtail chub include the 91 sub-adult *Gila spp.* collected.

The average total length of captured humpback chub during 2016 sampling was 264 mm with a range of 109-401 mm (N=397) and the average total length of roundtail chub captured was 282 mm with a range of 114-397 mm (N=1537). The mean length of *Gila spp.* caught during electrofishing and trammel net surveys was 64 mm with a range of 25 to 152 mm. Analysis of length frequencies histograms suggested that there is a broad range of adult humpback and roundtail chub within the Westwater Canyon population (Figure 1). The small modes centered around 150 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.

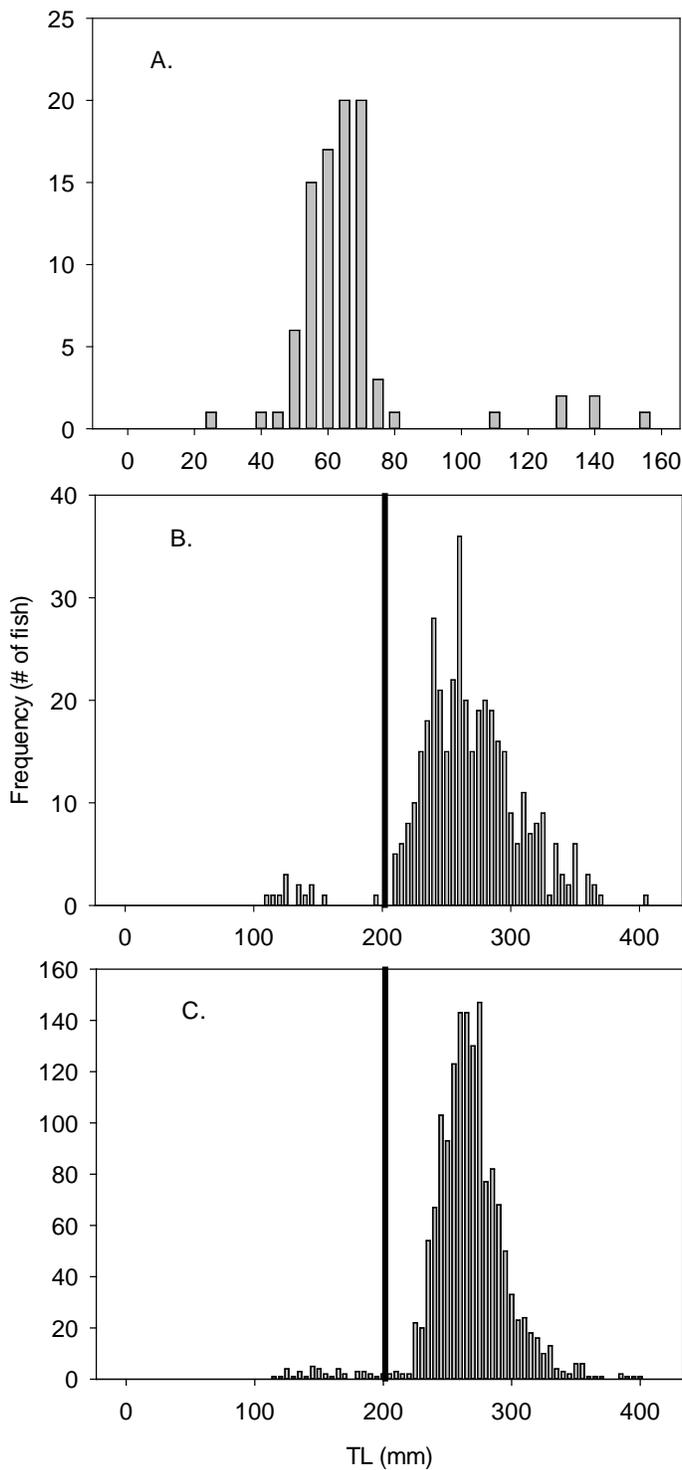


Figure 1. Length-frequency histograms for A.) *Gila spp.* B.) humpback chub, and C.) roundtail chub during Westwater Canyon sampling in 2016. Black bars denotes the separation of sub-adult and adult fish.

Trammel net surveys resulted in 1,107 hours of total effort during fall of 2016 sampling. During 2016 sampling in Westwater Canyon, humpback chub trammel net catch per unit effort (CPUE) was 0.50 fish per hour (SE=0.07). Catch per unit effort was relatively consistent among passes with slight non-significant increases during passes one and three (Figure 2). Catch rates for humpback chub were highest at the Little Hole and Upper Cougar camps (Figure 3). Roundtail chub CPUE was 1.37 fish per hour (SE=0.09). Roundtail chub catch rates exhibited the same trends as humpback chub during passes (Figure 2). Roundtail chub catch rates were relatively consistent at all camps (Figure 3). Electrofishing CPUE was highest for adult roundtail chub and *Gila spp.* during pass two (Figure 4). Passes one and two had the highest electrofishing CPUE for humpback chub (Figure 4). Upper Cougar camp had the highest electrofishing CPUE for adult roundtail and humpback chubs (Figure 5). Hades camp had the highest electrofishing CPUE for the smaller *Gila spp.* (Figure 5).

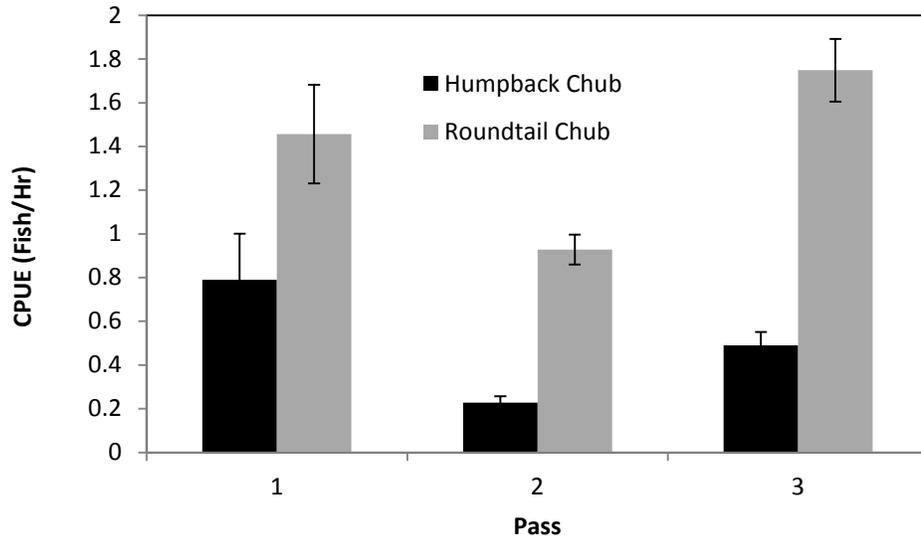


Figure 2. Catch per unit effort (fish/hour) by sampling pass for humpback and roundtail chub captured in trammel nets during fall of 2016. Error bars represent  $\pm 1SE$ .

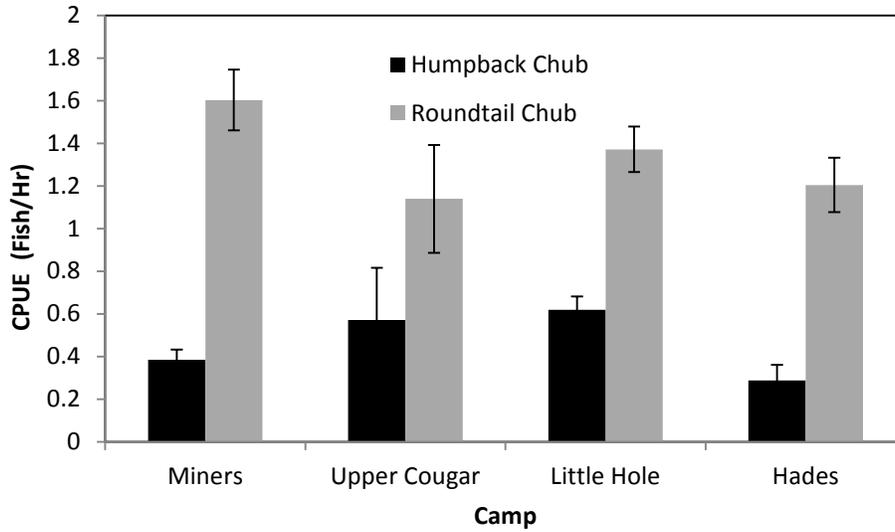


Figure 3. Catch per unit effort (fish/hour) by camp for humpback and roundtail chub captured in trammel nets during fall of 2016. Error bars represent  $\pm 1SE$ .

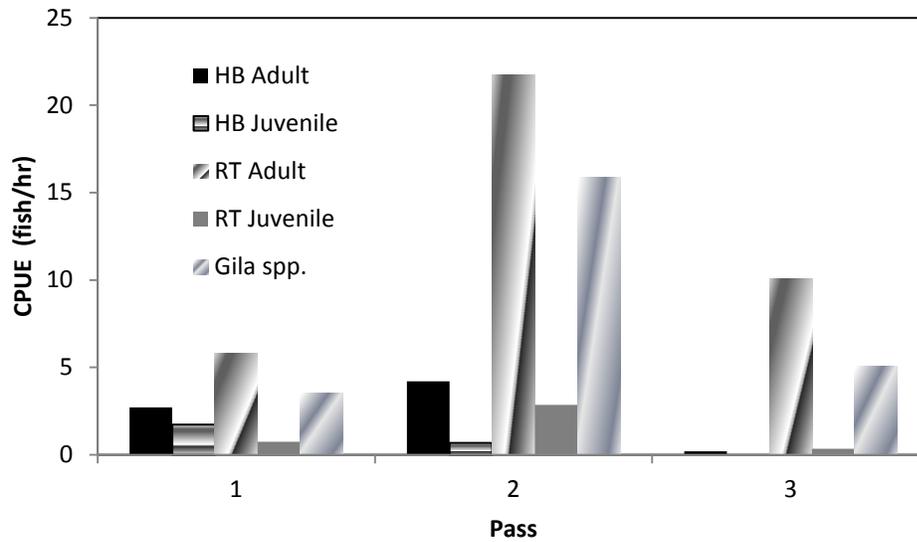


Figure 4. Catch per unit effort (fish/hour) by sampling pass for humpback and roundtail chub captured electrofishing during fall of 2016.

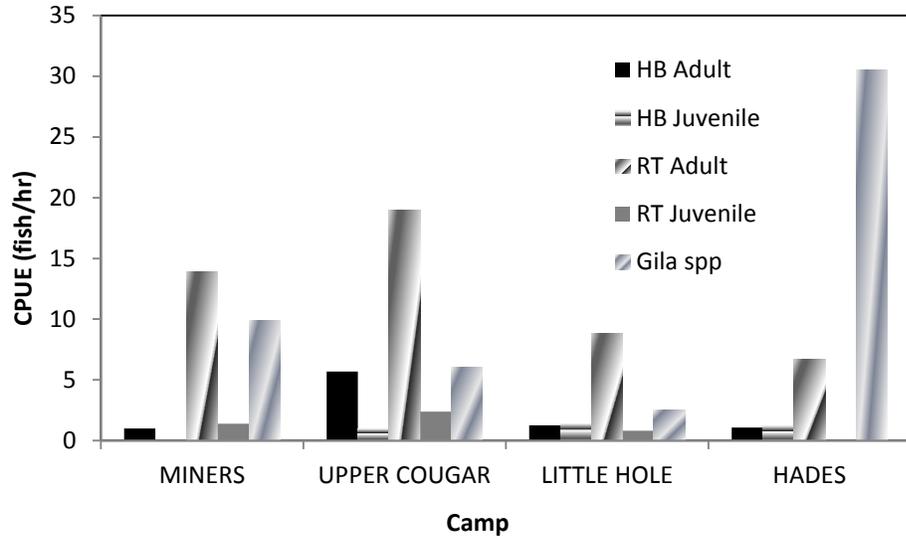


Figure 5. Catch per unit effort (fish/hour) by camp for humpback and roundtail chub captured electrofishing during fall of 2016.

Closed capture population models (Huggin's  $p$  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  $M_0$  (constant  $p$ ),  $M_t$  (time varying  $p$ ), and  $M_b$  (behavioral response) models to calculate the estimates. The model averaged estimate for humpback chub for 2016 is 2,002 (95% CI 1118-2886, SE=430, CV=0.23). The model averaged capture probability for humpback chub was 0.10. The model averaged estimate for roundtail chub for 2016 is 7,916 (95% CI 6,320-9,512, SE=811, CV=0.10). The model averaged capture probability for roundtail chub was 0.06.

Table 1. Program MARK model output for all models used for the 2016 population estimates on humpback and roundtail chubs in Westwater Canyon, UT.

<b>humpback chub</b>						
<b>Model</b>	<b>AIC<sub>c</sub></b>	<b>Delta AIC<sub>c</sub></b>	<b>AIC<sub>c</sub> Weight</b>	<b>Model Likelihood</b>	<b>No. Par</b>	<b>Deviance</b>
{p(t)=c(t)}	880.3	0	0.61464	1	3	3434.006
{p(t)=c(t)} last p constrained	881.2339	0.9339	0.38532	0.6269	4	3432.924
{p(.) c(.)}	899.5313	19.2313	0.00004	0.0001	2	3455.248
{p(.)=c(.)}	929.7568	49.4568	0	0	1	3487.481
<b>roundtail chub</b>						
{p(t)=c(t)}	3657.75	0	0.72802	1	3	17201.11
{p(t)=c(t)} last p constrained	3659.72	1.9692	0.27198	0.3736	4	17201.08
{p(.)=c(.)}	3690.375	32.6243	0	0	1	17237.74

Task 2 – Data entry:

The 2016 data have been entered and quality checked and will be transferred to the UCRRP database manager by January 15, 2017.

Task 3 –Annual reporting:

An annual progress report including a summary of the 2016 data will be submitted by November 14, 2016. A final report will be completed after the final year of sampling (2017).

VIII. Additional noteworthy observations:

One razorback sucker, one Colorado pikeminnow, and nine bonytail were also captured (all were previously PIT tagged). Several nonnative species were captured and removed including one bluegill, three brown trout, one flannelmouth x white sucker hybrid, 15 gizzard shad, eight largemouth bass, five smallmouth bass, and eight white suckers. We also caught a sucker that looked like razorback x flannelmouth x bluehead hybrid (Figure 6).





Figure 6. Photos of a hybrid sucker captured in Westwater Canyon.

IX. Recommendations:

- Monitoring efforts should remain as currently specified in the Westwater scope of work.
- We should also incorporate a robust design mark-recapture analysis for roundtail chub in the next final report.
- We are going to add an additional pass to the 2017 sampling or do a pass during an off year (2018 or 2019) to test the effectiveness of only using hoopnets to sample chubs in Westwater Canyon. We are exploring the option of using hoopnets because of the delayed mortality associated with trammel nets (Hunt et al. 2012) and their ability to capture all size classes of fishes. Also hoopnets would give us the opportunity to calculate recruitment rates when coupled with electrofishing and submersible antennas. This additional pass will be dependent upon acquiring additional funding to purchase ~50 hoopnets.
- Submersible antennas should still be used to boost the number of recaptures.
- Purchase additional submersible antennas (7) to boost recapture rates for chubs and determine if chubs are areas of Westwater Canyon below the camps (i.e. in and below the rapids).

X. Project Status: First year 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.

XI. FY 2016 Budget Status

A. Funds Provided: \$ 83,578

B. Funds Expended: \$ 83,578

C. Difference: \$ 0

D. Percent of the FY 2016 work completed, and projected costs to complete: 100%

E. Recovery Program funds spent for publication charges: \$ 0

XII. Status of Data Submission: Data will be transferred to USFWS by January 15, 2016

XIII. Signed: Brian Hines

Principal Investigator

Date: 11/14/2016

XIV. Literature Cited:

Hunt, T.A., D.L. Ward, C.R. Propper, A.C. Gibb. 2012. Effects of capture by trammel net on Colorado River fishes. Journal of Fish and Wildlife Management 3(1): 133-141.