

**RECOVERY PROGRAM
FY 2020-2021 SCOPE OF WORK for:**

Recovery Program Project Number: 132

Population estimate of Humpback Chub in Westwater Canyon.

Reclamation Agreement number: R19AP00059
Reclamation Agreement term: Oct. 1, 2019 – Sept. 30, 2024

Note: Recovery Program FY20-21 scopes of work are drafted in May 2019. They often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants also recognize the need and allow for some flexibility in scopes of work to accommodate new information (especially in nonnative fish management projects) and changing hydrological conditions.

Lead agency: Utah Division of Wildlife Resources

Submitted by: Brian Hines and Katherine Creighton
Utah Division of Wildlife Resources
Moab Field Station
1165 S. Hwy 191 Suite 4
Moab, UT 84532
Phone: 435-259-3782, 435-259-3780; Fax: 435-259-3785
E-mail: bhines@utah.gov, katherinecreighton@utah.gov

Date Last Modified: 5/22/2019 4:23:00 PM

Category:

- Ongoing project
- Ongoing-revised project
- Requested new project
- Unsolicited proposal

Expected Funding Source:

- Annual funds
- Capital funds
- Other *[explain]*

I. Title of Proposal: Population estimate of Humpback Chub in Westwater Canyon, Colorado River, Utah.

II. 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.3. Westwater

III. Study Background/Rationale and Hypotheses:

In 2002, the Recovery Program set recovery goals for the endangered Humpback Chub. Recovery goals are based in part on maintaining populations of Humpback Chub in several locations, among which is the Westwater Canyon population on the Colorado River. Setting, maintaining, and monitoring a population necessitates obtaining accurate population estimates based on a multiple mark-recapture model. To achieve downlisting, accurate population estimates are needed over a 5-year monitoring period. Delisting requires a 3-year monitoring period beyond once downlisting is achieved (USFWS 2002)

Three-year population estimates were conducted for the Westwater Canyon Humpback Chub population during 1998-2000 and 2003-2005. Capture M_0 model (null model) population estimates were: (1998: 4,744, 1999: 2,215, 2000: 2,201) with respective profile likelihood intervals (1998: 3,760-14,665; 1999: 1,608-7,508; 2000: 1,335-4,124) (Jackson 2010). From 1998 through 2000, the probability of capture (p -hat) and coefficient of variation (CV) increased slightly (1998: p -hat=0.035, CV= 0.23; 1999: p -hat=0.041, CV= 0.28; 2000: p -hat=0.041, CV= 0.28) (Jackson 2010). The population model estimates from Capture M_t model were: (2003: 2,973, 2004: 1,729, 2005: 1,210) with respective profile likelihood intervals (2003: 1,710-6,042, 2004: 1,121-2,967, 2005: 880-1,769) (Jackson 2010).

Two-year population estimates were conducted for Westwater Canyon in 2007-2008 and 2011-2012. The population model estimates from Capture M_t model were: (2007: 1,757, 2008: 1,315) with respective profile likelihood intervals (2007: 1,097-3,173, 2008: 969 - 1,896,) (Elverud 2012). The probability of capture (p -hat) and coefficient of variation (CV) from 2007 and 2008 were: (2007: p -hat = 0.05, CV = 0.27; 2008: p -hat = 0.08, CV = 0.17) (Elverud 2012). The population model estimates for 2011-2012 were calculated using robust design closed capture models. The estimates for 2011 were 1,467 (1,175-1,861 95% CI) and 1,315 (1,022-1,1713 95% CI) for 2012 (Hines et al 2016). The probability of capture (p -hat) and coefficient of variation (CV) from 2011 and 2012 were: (2011: p -hat = 0.23, CV = 0.12; 2012: p -hat = 0.16, CV = 0.13) (Hines et al 2016). The abundance estimates for 2016 and 2017 are 2,002 (1,175-1,861 95% CI) and 3,656 (1,177-6,133 95% CI), respectively. The probability of capture (p -hat) and coefficient of variation (CV) from 2016 and 2017 were: (p -hat = 0.10, CV = 0.23; p -hat = 0.04, CV = 0.30, respectively)

The recovery goals require that population estimates for Westwater Canyon Humpback Chub be conducted 2–3 consecutive years with 1–2 years between blocks of estimates. Information collected previously by the Utah Division of Wildlife Resources-Moab Field Station and recommendations from the USFWS population estimate workshops held in Winter 2002 are incorporated into the approach to provide the best opportunity of

determining the most accurate and precise estimate for the Westwater Canyon Humpback Chub population.

IV. Study Goals, Objectives, End Product(s):

Goal: To estimate the population size of Humpback Chub in Westwater Canyon with coefficient of variation of less than 20%.

Objectives:

1. Obtain a population estimate of adult Humpback Chub (> 200 mm) in Westwater Canyon
2. Determine mean estimated recruitment of naturally produced subadult Humpback Chub (150-199 mm) in Westwater Canyon

End Product: Annual progress report detailing these data (including population estimates, 95% confidence intervals, coefficients of variation, and probabilities of capture). In the year following field work a final report will be prepared, which will incorporate in-depth analyses (including population estimates, 95% confidence intervals, coefficients of variation, and probabilities of capture) for both years of the study.

V. Study Area:

Westwater Canyon, Colorado River (RM 124.5-112.5), Utah.

Sampling will occur at four locations:

1. RM 124.5-123.7 - Above and Below Miners Cabin
2. RM 123.2-121.7 – Above Cougar Bar
3. RM 121.7-120.8 - Cougar Bar to Little Hole
4. RM 120.0-119.5 - Hades Bar

VI. Study Methods/Approach:

Three sampling trips will be made in September and October approximately one to two weeks apart. The first trip is scheduled when river temperatures are below 20°C to reduce handling stress and delayed mortality (Hunt et al 2012). Each of the four sampling locations will be sampled for one night around the crepuscular hours (i.e., late afternoon to midnight, and pre-dawn to mid-morning). Three of these sites will be sampled for an additional night to maximize captures of Humpback Chub in Westwater Canyon (Above and Below Miners Cabin, RM 124.5-123.7; Above Cougar Bar, RM 123.2-121.7; Cougar Bar to Little Hole, RM 121.7-120.8).

Humpback Chub will be captured using trammel and hoop nets and electrofishing at each sampling location. The number of trammel nets set at each sampling location will be maximized according to available sampling habitat (5-8 nets per sampling location). Trammel nets will be fished in 1.5 to 2 hour sets from late afternoon through approximately 2300 hrs. At that time, the nets will be pulled for the remainder of the night. Trammel nets will again be fished in 1.5 to 2 hour nets sets from pre-dawn through mid-morning. The number of hoop nets set at each sampling location will be maximized according to available sampling habitat (~5-10 set in areas where we cannot set trammel nets). Hoop nets will be scented and fished for ~18-20 hrs (set early afternoon and checked midmorning the following day). Electrofishing will be conducted at each sampling location prior to nets being set in the afternoon. All chubs will be scanned for a PIT tag, tagged (if necessary), measured for total length (mm), weighed (g), principal dorsal and anal fin rays counted, and released. Other endangered fish captured will be scanned for a PIT tag, tagged (if necessary), measured for total length (mm), weighed (g), and released. All other native fish captured will be counted and released. All nonnative fish will be counted and euthanized fish will also be measured for total length (mm), weighed (g), and disposed of accordingly. This information will be collected immediately after capture to reduce handling stress.

VII. Task Description and Schedule:

- Task 1: Sampling: Complete 3 sampling trips in Westwater Canyon (September-October 2020 and 2021).
- Task 2: Data entry, analysis, and reporting: Data will be entered into a database on the computer and transferred to the UCRRP database manager by January 15 each year following sampling. An annual progress report including: 1) number of passes made; 2) estimator model used (and why) and point estimate (\hat{N}); 3) confidence interval; 4) probability of capture (\hat{p}) and coefficient of variation (C.V.); 5) length frequency charts with demarcation of subadults and adults; and 6) percentage of subadult to adult fish, which will be submitted in November each year following sampling (October-November 2020 and 2021). 7) summary table of all species collected/trip
- Task 3: A final report will be prepared following the final year of sampling (March 2023)

Schedule:

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1									X	X		
2										X	X	X
3	X	X	X	X	X	X	X	X	X	X	X	X

VIII. Deliverables, Due Dates, and Budget by Fiscal Year:

	Deliverable	Due Date
FY 2020	Annual Report	November 2020
FY 2021	Annual Report, Final Report	November 2021, March 2023
FY 2022		
FY 2023		
FY 2024	Annual Report	November 2024

IX. Budget Summary:

FY	UDWR-Moab
FY 2020	\$90,071
FY 2021	\$108,970
FY 2022	\$0
FY 2023	\$0
FY 2024	\$97,496
TOTAL	\$296,537

X. Reviewers:

XI. References:

Elverud, D.S. 2012. Population Estimates for Humpback Chub (*Gila cypha*) and Roundtail Chub (*Gila robusta*) in Westwater Canyon, Colorado River, Utah. Final Report Of the Utah Division of Wildlife Resources to the Upper Colorado River Endangered Fish Recovery Program, Denver, CO.

Hines, B. A., K. R. Bestgen, and G. C. White. 2016. Abundance Estimates for Humpback Chub (*Gila cypha*) and Roundtail Chub (*Gila robusta*) in Westwater Canyon, Utah 2011-2012. Final Report of the Utah Division of Wildlife Resources to the Upper Colorado River Endangered Fish Recovery Program, Denver Colorado.

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

Jackson, J.A. 2010. Population Estimate for Humpback Chub (*Gila cypha*) and Roundtail Chub (*Gila robusta*) in Westwater Canyon, Colorado River, Utah 2003-2005. Final Report of the Utah Division of Wildlife Resources to the Upper Colorado River Endangered Fish Recovery Program, Denver Colorado.

U.S. Fish and Wildlife Service. 2002. Humpback Chub (*Gila cypha*) Recovery Goals: amendment and supplement to the Humpback Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.