

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

Black Rocks Humpback Chub Population Estimate

Recovery Program Project Number: 131 (22a-3)

Reclamation Agreement number: TBD

Reclamation Agreement term: October 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.

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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 Black Rocks.**
- II. Relationship to RIPRAP: Colorado River Action Plan: Mainstem
 - V. Monitor Populations.
 - C.1. Estimate Humpback Chub Populations in Black Rocks.
- III. Study Background/Rationale and Hypotheses: Robust population estimates are now critical to monitor recovery of the humpback chub population (USFWS 2002). Recovery goals require estimates of population size at regular intervals to measure population response to management activities under the Recovery Program. A population estimate was made for the 1998-2000 time period (McAda 2002) a second estimate was made for 2003 - 2004 (McAda 2007) a third estimate was conducted 2007-2008 (Francis and McAda 2011), a fourth estimate was conducted in 2011-2012 (Francis et al 2016), and a fifth estimate from 2016-2017 is in prep. This scope of work identifies the work necessary to complete a sixth and seventh estimate of population size for humpback chub in Black Rocks in 2020-2021 and 2024-2025.

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

A. Goals:

1. Estimate size and recruitment of the humpback chub population in Black Rocks.
2. Evaluate young-of-year (YOY) *Gila* year-class strength and determine what habitats and capture techniques are most productive for capturing YOY.

B. Objectives:

1. Use mark-recapture to estimate the population size (including adults ≥ 200 mm TL) and recruitment (i.e., juveniles 150-199 mm TL) of humpback chub in Black Rocks.
2. Describe population structure of humpback chub in Black Rocks by analyzing length-frequency distributions.
3. Monitor and describe relative condition of the chub populations.
4. Determine and describe YOY *Gila* hatch dates and year-class strength (densities) if the numbers of fish collected warrant such analysis.

C. End Products:

1. Complete final report describing population size and structure of humpback chub in Black Rocks; winter, spring, summer 2022. Draft report December 15, 2022. Final Report, March 15, 2023.

V. Study Area: Upper Colorado River Basin – Black Rocks area (RM 135.5-136.5). New for 2020, expand area to RM 135-137. Antenna data suggests that this population center may be larger than once described.

VI. Study Methods/Approach:

The Recovery Program (2002) summarized population estimates conducted through 2001 and made recommendations for sampling methodologies for future work. The study methodology outlined here corresponds to those recommendations.

Conduct four intensive 4-day (3 nights) sampling efforts in Black Rocks between mid-September and late October in 2020 and 2021, and again in 2024 and 2025, with intervals of 1-2 weeks between samples. Capture as many adult-sized chubs as possible using the most efficient gear for handling as many fish as possible for the effort expended. Sampling will encompass the entire length of Black Rocks occupied by humpback chub to ensure that all fish have an equal chance of being captured.

Based on previous field efforts the most effective gear is 1-in inner mesh trammel nets (McAda 2002; Chart and Lentsch 1999). However, there is some concern that trammel nets can produce injuries that might lead to delayed mortality if not used carefully (McAda 2002). To reduce stress to humpback chub, sampling will be done in fall as river temperatures are falling (mid-September through October; temperatures below 20° C) Trammel nets will be run every hour to the extent possible, with 1.5 hr as the absolute maximum length of set. Fewer nets may be set than during the previous study to ensure that maximum length of set is not exceeded.

Extensive sampling will also be done with electrofishing, seining, baited hoop nets and submersible PIT tag antenna. The extra sampling will target chubs < 200 mm TL to estimate population size of fish about to recruit into the adult population. Recapture rates for fish this size are low, so catch per effort may have to be relied on to estimate recruitment rates. The extra sampling will also be used to evaluate techniques that might supplement or replace (if deemed necessary) trammel netting and reduce potential stress to the fish.

YOY *Gila* will be collected during four overnight trips in late July and August using the methods described in the Interagency Standardized Monitoring Program Handbook (ISMP, USFWS 1987). Sample sites will include the Colorado River above Black Rocks proper (as far upstream as Mee Canyon, RM 138.3), sites within Black Rocks and sites below Black Rocks extending downstream as far as Westwater Wash (RM 124.8). Larval and YOY fish will be collected with a beach seine (4.6 m in length, 1.5 mm mesh) or a one-man seine (1 m in length, 0.8 mm mesh). Physical data (habitat length and width, depth, temperature, and secchi measurements) will be collected at each collection site. Spawning date (subtract 6 days from hatch date, Muth et al 1985, Marsh 1985) will be calculated from a back calculated hatch date (Muth 1990) that will be generated from YOY total lengths (collected in the field) which will be converted to standard lengths (SL, required to calculate days after hatch) by using the following regression:

$$SL = 2.02 + .7205(TL)$$

This YOY *Gila* work should provide insight on where and how to proceed with future investigations into environmental variables (abiotic and biotic) that may limit or promote these species ability to successfully produce YOY and recruit fish into the adult life stage.

All specimens captured will be identified to species using criteria described by Douglas et al. (1989, 1998). Careful examination and use of specific criteria will be especially important for fish < 200 mm which can be difficult to distinguish to species. After handling, all chubs will be treated in a salt dip (1.5%, ~20 min) before release. In addition, treatment with a commercial fungicide (200 ppm, ~1 hr) will be explored. However, use of the fungicide will require holding the fish in a tank with aeration for about one hour before release.

All Colorado pikeminnow, humpback chub, and roundtail chub captured will have their total length (mm) and weight (g) measured. All Colorado pikeminnow, humpback chub and roundtail chub, greater than 160 mm total length, will be PIT tagged. All sympatric fishes collected during all sampling efforts will be identified and enumerated.

Capture-recapture data for humpback chub will be placed into a matrix and run through program MARK. A population estimate will be calculated using the model most suitable for

the sampling methods used. Survival rates may also be estimated. Population trends and population size structure will be determined using standard techniques described in Recovery Program (2002). Analysis of similar data collected during 1998 to 2013 indicated that capture probabilities (P^{\wedge}) ranged from 0.09-0.30 and coefficient of variation (CV) ranged from 0.11-0.29 (Francis et al 2016). These parameters varied with catch rates and number of sampling trips, but the current study will attempt to produce P^{\wedge} s > 0.07 and CVs of 0.25 or less.

VII. Task Description and Schedule

1. Sample humpback chubs in Black Rocks; fall 2020 (spanning FY 2020 and FY 2021); and fall 2021 (spanning FY 2021 and FY 2022); and again in fall 2024 (spanning FY 2024 and FY 2025); and fall 2025 (spanning FY 2025 and FY 2026).
2. Sample YOY *Gila* from Mee Canyon to Westwater Wash; July and August 2020; July and August 2021; July and August 2024; and July and August 2025.
3. Compile data annually, prepare preliminary and annual reports.
4. Complete final report describing population size and structure of humpback chub in Black Rocks 2020-2021 during winter, spring, and summer 2022. Estimates will include numbers of adults (\leq 200 mm TL) in the population, as well as recruitment by juveniles (150-199 mm TL) and young-of-year class strength. Continue to summarize species composition information in the final report.
Draft report by December 15, 2022. Final report by March 15, 2023.

VIII. Deliverables, Due Dates, and Budget by Fiscal Year: Budget Summary: Please See Interagency Agreement Cost Estimating Tool Spreadsheet Budget Summary:

FY2020

USFWS-GJ	\$ 91,829.94
CSU LFL	<u>costs included in Proj. No. 15</u>
Grand Total	\$ 91,829.94

FY2021

USFWS-GJ	\$ 94,858.98
CSU LFL	<u>costs included in Proj. No. 15</u>
Grand Total	\$ 94,858.98

2020-2021 Total = \$186,688.92

Estimated Budget Summary for Fiscal Years 2022-2024:

FY2022

USFWS-GJ	\$ 82,876.53
CSU LFL	<u>costs included in Proj. No. 15</u>
Grand Total	\$ 82,876.53

FY2023	
USFWS-GJ	\$ 0
USFWS-GJ YOY Gila	\$ 0
CSU LFL	<u>costs included in Proj. No. 15</u>
Grand Total	\$ 0

FY2024	
USFWS-GJ	\$101,072.17
CSU LFL	<u>costs included in Proj. No. 15</u>
Grand Total	\$101,072.17

2020-2022 Total = \$183,948.70

5-Year Total USFWS GJ = \$370,637.62

5-Year Total CSU LFL = SOW 15

IX. Reviewers: Program Staff and Biology Committee

X. References:

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Francis, T.A., and C.W. McAda, 2011. Population size and structure of humpback and roundtail chub in Black Rocks, Colorado River, Colorado, 2007-2008. Final report to Upper Colorado River Endangered Fish Recovery Program, Project Number 131 (22-a-3). U.S. Fish and Wildlife Service, Grand Junction, Colorado.

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Recovery Program (Program Director's Office, Upper Colorado River Endangered Fish Recovery Program). 2002. Protocols for Colorado pikeminnow and humpback chub population estimates. Draft Final Report to Upper Colorado River Endangered Fish Recovery Program. U. S. Fish and Wildlife Service, Denver, Colorado.

USFWS (U. S. Fish and Wildlife Service). 2002. Recovery goals for the endangered fishes of the upper Colorado River Basin. Draft Report, U. S. Fish and Wildlife Service, Denver, Colorado.

USFWS (U.S. Fish and Wildlife Service). 1987. Interagency Standardized Monitoring Program Handbook. U.S. Fish and Wildlife Service, Grand Junction, Colorado.