

**RECOVERY PROGRAM
FY 2016-17 PROPOSED SCOPE OF WORK for:**

Recovery Program Project Number: 129

Humpback chub population estimates for Desolation/Gray Canyons

Reclamation Agreement number: R14AP00007
Reclamation Agreement term: 5/1/2014-9/30/2018

Note: Recovery Program FY16-17 scopes of work are drafted in May 2015. 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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<u>Category:</u>	<u>Expected Funding Sources:</u>
<input checked="" type="checkbox"/> Ongoing project	<input checked="" type="checkbox"/> Annual funds
<input type="checkbox"/> Ongoing-revised project	<input type="checkbox"/> Capital funds
<input type="checkbox"/> Requested new project	<input type="checkbox"/> Other
<input type="checkbox"/> Unsolicited proposal	

I. Title of Proposal: Humpback chub population estimates for Desolation/Gray Canyons, Green 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.

GREEN 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.B. Conduct population estimate for humpback chub.
- V.B.1. Desolation/Gray

III. Study Background/Rationale and Hypotheses:

In 2002, the RIP 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 Desolation/Gray Canyon population on the Green River. Setting, maintaining, and monitoring a population necessitates obtaining accurate population estimates. A five-year study on humpback chub reproduction and habitat use 1992-1996 was completed (Chart and Lentsch 1999) as part of the Flaming Gorge studies. However, catch rates were variable and recapture rates low, so a good population estimate could not be produced. An estimate using those data was made by Ron Ryel and Rich Valdez (USFWS 2002).

Annual point population estimates for the Desolation/Gray Canyon humpback chub have been calculated for 2001-03 (Jackson and Hudson 2005), 2006-07 (Badame 2012), 2010 (Badame 2010) and 2014 (Howard 2014). Population estimates during 2001-2003 ranged between 970 and 2,612 adults and over each year the related coefficient of variation (CV) declined from 36% to 21%; these estimates were calculated for the entire reach by combining all capture data from all sites. In 2006-2007 due to 100% site fidelity during sampling, population estimates were calculated for each site and extrapolated to cover the entire reach. Those estimates ranged between 1,108 and 2,578 (Badame 2012). The estimate in 2010, following methods used in 2006-2007, ranged between 1,023 and 5,465 chub with an estimate of 1,625 individuals throughout the study reach (Badame 2010). In 2011 estimates were not calculated due to a lack of recaptures (Badame 2011). The estimate in 2014, following the extrapolation method and calculated with Program MARK using model averaging, ranged between 924 and 2,802 chub (Howard 2014). There has been no significant decline in catch rates of humpback chub in long-term trend sites ($r^2=0.058$, $p=0.294$) or for overall catch rates at all sites sampled ($r^2=0.043$, $p=0.692$). Recruitment in this reach has been measured by the proportion of first year adults (200-220 mm) to all adults captured (Jackson and Hudson 2005); a population estimate of juvenile humpback chub in this reach has not been feasible as fish <200 mm have been difficult to capture using current sampling methods. There has been a significant decline of the recruitment metric from 2001 to 2014 ($r^2=0.661$, $p=0.014$). A decline in recruitment may serve as a prediction of future changes in population health and abundance.

An important factor in determination of how past estimates relate to the actual population size is the nearly 100% site fidelity observed during fall sampling. High site fidelity results in no mixing between sites within a sampling period and results in an estimate that is only related to sample sites and not the entire reach, suggesting potential

underestimation of the total Desolation/Gray population size when estimated from fall samples. Individual sample site estimates can be made from mark recapture data and then translated into a density estimate based on the number of potential humpback chub habitat sites.

The current monitoring schedule for humpback chub in the upper Colorado River Basin is two years on, two years off; 2018 will mark the start of another two year round of population estimates in Desolation/Gray Canyons.

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

Goals: To estimate the population size of humpback chub in four long-term sampling sites within Desolation/ Gray Canyon with coefficient of variation of less than 20%.

Objectives:

1. Obtain site specific population estimates of late juvenile/adult humpback chub in long-term sample sites within Desolation/Gray Canyon.
2. Determine estimated recruitment of naturally produced first-year adult humpback chub (200-220 mm) in Desolation/Gray Canyon.

End Products: Data collected during the study will contribute to long term monitoring and population estimation of humpback chub populations in the Desolation/Gray Canyon. Annual reports will be submitted in November following fall sampling. A draft report will be submitted to peer reviewers and the Biology Committee by April 1, 2020. A final report will be submitted to the Biology Committee by August 1, 2020.

V. Study Area:

Desolation and Gray canyons are south of the Uinta Basin, UT, beginning at Sand Wash (RM 216) and ending 12 river miles upstream of the town of Green River, UT (RM 120).

In previous years, a total of 12 sites were sampled throughout the canyons located at RM 189, 185, 182, 178.5, 174.4, 166.8, 160.4, 157.4, 154.4, 150.8, 148, and 145.7 (Fig. 1). These include the four long-term trend sites at which have been sampled since 1989. Several sites sampled between 2001 and 2003 were relocated in 2006 and 2007 to provide tighter coverage of the canyon and redistribute effort from sites which were too close together (less than ½ a mile). During the 2010 field season five sites were sampled including the four long-term sites: Cedar Ridge (RM 185), Log Cabin (RM 174.4), Cow Swim (RM 160.4), Coal Creek (RM 145.7), and Chandler Falls (RM 167). During the 2011 field season six sites were sampled including three long term sites: Cedar Ridge (RM 185), Log Cabin (RM 174.4), Cow Swim (RM 160.4), Range Creek (RM 151), Chandler Falls (RM 167), and Curry Rapid (RM 148). The long-term site not sampled, Coal Creek (RM 145.7) was purposefully avoided because humpback chub were removed

in late September of 2010 and transported to Ouray National Fish Hatchery for the preservation of genetic material.

Sampling sites in 2018 and 2019 will likely be the four long-term sites as well as two sites randomly selected. The long-term trend sites are as follows: Cedar Ridge (RM 185), Log Cabin (RM 174.4), Cow Swim (RM 160.4), and Coal Creek (RM 145.7). The other sites (RM 189, 182, 178.5, 166.8, 157.4, 154.4, 150.8, 148) will be selected at random. For the 2018 and 2019 effort, sampling methods and sites will ultimately be guided by recommendations produced in a 2016 final report.

VI. Study Methods/Approach:

Study methods will be similar to those used in previous Desolation population estimates (Chart and Lentsch 1999, Jackson and Hudson 2005, Badame 2010) and in the Westwater Canyon population estimates.

Three sampling trips will be completed in the last week of August through the beginning of October, with intervals of 5-8 days between sampling. The six sites will be sampled for one night each. Trammel nets, hoop nets and electrofishing will be used to collect chubs. Each site will be electrofished before nets are set in the afternoon. Six to eight trammel nets will be set in the evening beginning at approximately 1630 hrs and checked every 1.5 to 2 hours until approximately 2230 hrs. Nets will be set again before sunrise and checked through mid-morning. Hoop nets (n=10) will be set after electrofishing occurs in the afternoon and will be pulled the following morning. All chubs will be scanned for a PIT tag, tagged if needed, measured (mm) and weighed (g), and released. All chub captured will be identified to species using the criteria described in Douglas et al. (1989, 1998). All other endangered species will also be scanned for a PIT tag, tagged if needed, measured (mm) and weighed (g), and released. All invasive non-natives such as smallmouth bass, walleye, black crappie, etc will be removed when encountered.

VII. Task Description and Schedule:

Task 1. Sampling: Complete 3 sampling trips in Desolation/Gray Canyon in fall of 2018 and 2019 (September-October).

Task 2. Data entry, analysis, reporting: Data will be entered into a database and transferred to the UCRRP database manager by January 15 of each year following sampling. An annual progress report including: 1) number of passes made; 2) estimator model used (and why) and point estimates (N-hat); 3) confidence interval; 4) probability of capture (p-hat) and coefficient of variation (C.V.); 5) density estimates; 6) length frequency charts with demarcation of subadults and adults; and 7) percentage of subadult to adult fish, which will be submitted in November of each year of sampling (October-November).

Task 3. Final Report: A final report will be prepared following the final year of sampling. A draft will be submitted to peer reviewers and the Biology Committee by

April 1, 2020. A final report will be submitted to the Biology Committee by August 1, 2020. The final report will include: 1) population estimates for 2018-2019 using MARK model averaging 2) long-term survival estimates; and 3) recommendations to improve estimates/metrics for this study reach. Analysis and end products for this report will be guided by recommendations produced in a 2016 final report (January-August).

Schedule:

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

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

FY2016: No work will be completed in FY2016.

FY2017: No work will be completed in FY2017.

FY2018: Annual Report by November 2018.

FY 2018 Costs for UDWR- Moab

Task 1. Sampling in Desolation/Gray Canyons (3 passes)

Personnel Costs (salary + fringe costs)

	Rate	Hours	Cost
Project Leader	\$35.07	200	\$7,014
Biologist	\$32.00	800	\$25,602
Technician	\$17.45	1400	\$24,427
		subtotal	\$57,042

Food and Travel

	Rate	Quantity	Cost
Fleet Costs ^a (3 trucks for 15% of total fleet costs)	\$42,448.32	0.15	\$6,367
Food (6 people, 8 days, 3 trips)	\$31.21	144	\$4,495
Shuttle (3 trucks, 3 trips)	\$182.07	9	\$1,639
		subtotal	\$12,500

Equipment

	Rate	Quantity	Cost
Camping gear repair/replacement ^b :			\$1,802
Sampling gear repair/replacement ^c :			\$2,302
Boating gear repair/replacement ^d :			\$3,121
Fuel for motors	\$4.16	90	\$375
		subtotal	\$7,601

Task 1 subtotal	\$77,143
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Task 2. Annual Data Entry, Analysis and Reporting

Personnel Costs (salary + fringe costs)

	Rate	Hours	Cost
Project Leader	\$35.07	60	\$2,104
Biologist	\$32.00	160	\$5,120
		subtotal	\$7,225

Task 2 subtotal	\$7,225
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Grand Total FY 2018	\$84,368
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^aThe State of Utah uses Automotive Resources Inc. for motor pool operations. Rental is approximately \$6,800/year/vehicle (includes fleet rental, mileage, and gas), which is based on the average annual cost for all trucks used in our program.

^bIncludes, but is not limited to, tents, sleeping pads, toilet system, cookware, stoves, propane, charcoal, satellite phone and service, drybags, coolers, first aid supplies.

^cIncludes, but is not limited to, trammel nets, dip nets, PIT tag readers, scales, spot lights, electrofishing units, generators, data loggers.

^dIncludes, but is not limited to, raft repair/replacement, outboard motor parts and maintenance, propellers, oars, raft frame repair, dry boxes.

^{b,c,d}Estimated costs are based on actual costs from previous years plus an estimated 2% cost of living increase each year following.

FY2019: Annual Report by November 2019, final report by August 2020.

FY 2019 Costs for UDWR- Moab

Task 1. Sampling in Desolation/Gray Canyons (3 passes)

Labor: salary + benefits + applicable overtime (personnel services)

	Rate	Hours	Cost
Project Leader	\$35.77	200	\$7,154
Biologist	\$32.64	800	\$26,114
Technician	\$17.80	1400	\$24,915
		subtotal	\$58,183

Food and Transport (current expense)

	Rate	Quantity	Cost
Fleet Costs (3 trucks for 15% of total fleet costs)	\$43,297.29	0.15	\$6,495
Food (6 people, 8 days, 3 trips)	\$31.84	144	\$4,584
Shuttle (3 trucks, 3 trips)	\$185.71	9	\$1,671
		subtotal	\$12,750

Equipment (current expense)

	Rate	Quantity	Cost
Camping gear repair/replacement:			\$1,839
Sampling gear repair/replacement:			\$2,348
Boating gear repair/replacement:			\$3,184
Fuel for motors (30 gallons/trip)	\$4.24	90	\$382
		subtotal	\$7,753

Task 1 subtotal **\$78,686**

Tasks 2-3. Data Entry, Analysis, and Reporting (includes final report)

Labor: salary + benefits + applicable overtime (personnel services)

	Rate	Hours	Cost
Project Leader	\$35.77	120	\$4,293
Biologist	\$32.64	500	\$16,321
Technician	\$17.80	0	\$0
		subtotal	\$20,614

Tasks 2-3 subtotal **\$20,614**

Grand Total FY 2019	\$99,300
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FY2020: No work will be completed in FY2020.

IX. Program Budget Summary

	UDWR-Moab
FY2016	\$0
FY2017	\$0
FY2018	\$84,368
FY2019	\$99,300
FY2020	\$0
total:	\$183,667

X. Reviewers:

XI. References:

Badame, P.V. 2012. Population Estimate for Humpback Chub (*Gila cypha*) in Desolation and Gray Canyons, Green River, Utah 2006-07. Final Report. Upper Colorado River Endangered Fish Recovery Program. Recovery Implementation Project #22k

Badame, P.V. 2010. Humpback chub population estimates for Desolation/Gray Canyons, Green River Utah. Annual Report. Upper Colorado River Endangered Fish Recovery Program Project

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Badame, P.V. 2011. Humpback chub population estimates for Desolation/Gray Canyons, Green River Utah. Annual Report. Upper Colorado River Endangered Fish Recovery Program Project #129

Chart, T.E. and L. Lentsch. 1999. Reproduction and recruitment of *Gila* spp. and Colorado pikeminnow (*Ptychocheilus lucius*) in the middle Green River 1992-1996. Report C in Flaming Gorge Studies: Reproduction and Recruitment of *Gila* spp. and Colorado pikeminnow in the middle Green River. Final Report. Recovery Implementation Program Project #39.

Howard, J. 2014. Humpback chub population estimates for Desolation/Gray Canyons, Green River Utah. Annual Report. Upper Colorado River Endangered Fish Recovery Program Project #129

Jackson, J.A. and J. M. Hudson. 2005. Population Estimate for Humpback Chub (*Gila cypha*) in Desolation and Gray Canyons, Green River, Utah 2001-2003. Upper Colorado River Endangered Fish Recovery Program. Draft Report. Recovery Implementation Project #22k.

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.

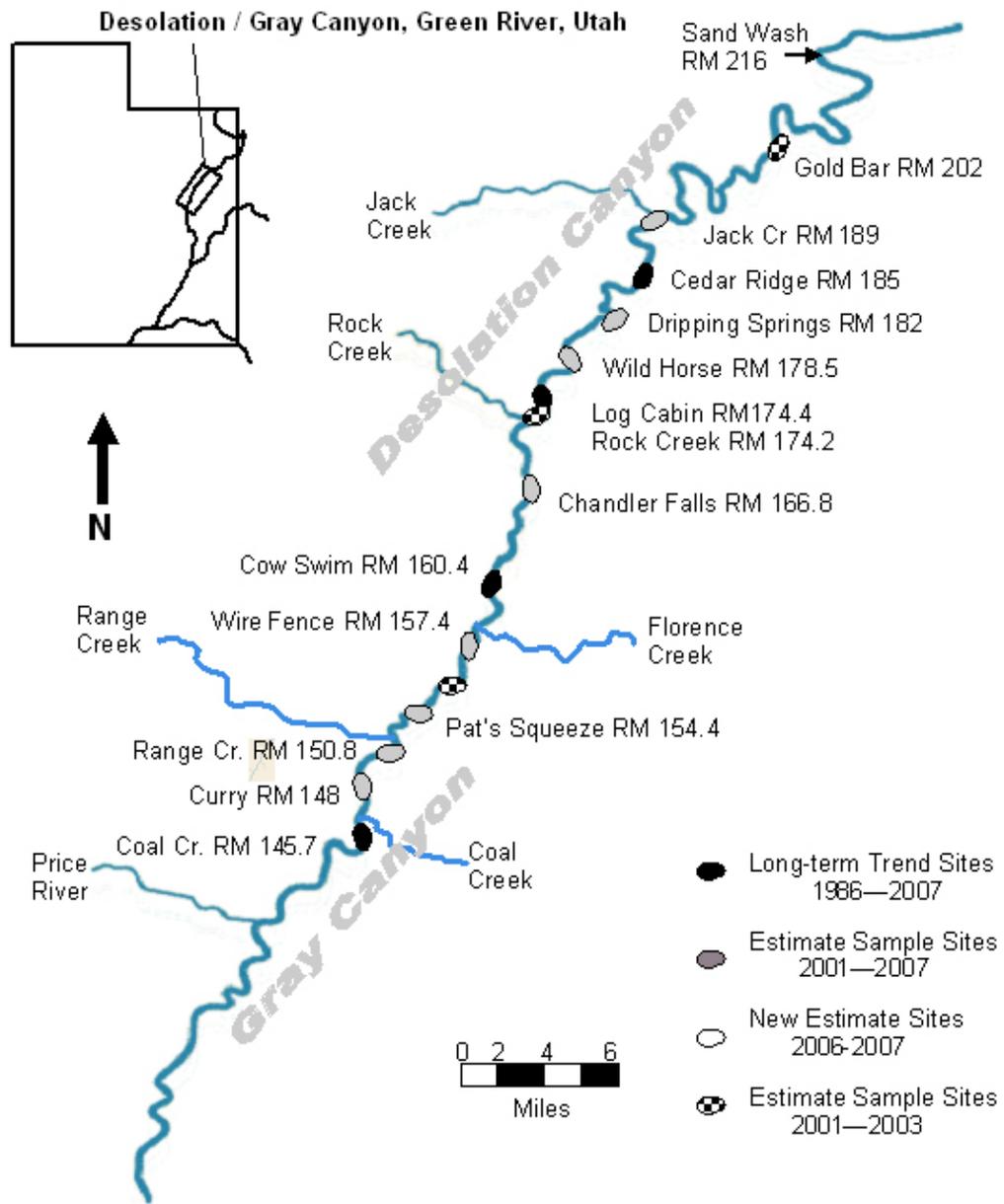


Figure 1. Sites sampled between 1986 and 2007, located within Desolation/Gray Canyons of the Green River.