

**COLORADO RIVER RECOVERY PROGRAM
FY 2018-19 PROPOSED SCOPE OF WORK for:**

Project No.: 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 FY18-19 scopes of work are drafted in May 2017. 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 to 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 type="checkbox"/> Ongoing project	<input checked="" type="checkbox"/> Annual funds
<input checked="" type="checkbox"/> Ongoing-revised project	<input type="checkbox"/> Capital funds
<input type="checkbox"/> Requested new project	<input type="checkbox"/> Other (explain)
<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 U.S. Fish and Wildlife Service finalized 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. 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). During the next round of estimates in 2006-2007 it was determined that humpback chub site fidelity in fall when sampling occurred was high (90-100%). As very little movement was occurring among humpback chub among sites, population estimates were calculated for each site and extrapolated across a determined number of available sites within Desolation and Gray Canyons (Badame, 2010). The same population estimation technique was attempted in the 2010-2011 and 2014-2015 but due to poor site estimates in 2011 and 2015 reach-wide estimates could not be calculated for those years.

A 2017 final report (Howard and Caldwell, 2017) addressed the complexity and difficulties of estimating populations at individual sites and then extrapolating those estimates to the entire reach. An increase in captures and encounters is needed to improve individual site estimates. We plan to accomplish this by increasing effort with hoop netting and PIT tag antennas during 2018 sampling. Hoop nets have proven to be a good complement to the more traditional trammel netting in other humpback chub population sampling (Ahrens 2017) and antennas have been used successfully to encounter tagged fish (Hines 2017). We plan to consult with a biometrician prior to field sampling to determine the best technique for including these sampling methods in population estimation. Additionally, a habitat study of the Desolation/Gray Canyons reach will be designed to improve the reach-wide population estimate by quantifying the amount of Humpback Chub habitat available throughout the entire reach.

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):

Note: This Scope of Work is a revision to the previously submitted (April 2017) version. Based on recommendations in Howard and Caldwell's 2017 Report ("Population Estimates for Humpback Chub in Desolation and Gray Canyons, Green River, Utah 2001-2015"), sampling in 2018 will focus on increasing captures, recaptures and encounters at known locations using revised and augmented sampling techniques. Future work will be guided by 2018 findings. Pending these results, the FY 2019 SOW will be revised to include a habitat evaluation study and additional sampling if necessary.

Goal: To estimate the population size of humpback chub within Desolation/ Gray Canyon with coefficient of variation of less than 20%. (*Pending study design revision*)

Objectives:

1. Obtain site-specific population estimates of late juvenile/adult humpback chub at long-term sampling sites within the Desolation and Gray Canyon reach and extrapolate to a reach-wide estimate.
2. Determine mean estimated recruitment of naturally produced subadult humpback chub (150-199 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 2018 following fall sampling. All other species collected will be summarized by gear type, site and trip. A final report will be completed the year after the two-year sampling round concludes.

V. Study Area:

Desolation and Gray canyons occur 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 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 2010-2011 and 2014-2015 sampling efforts, six sites were sampled including four long-term trend sites (Cedar Ridge (RM 185), Log Cabin (RM 174.4), Cow Swim (RM 160.4), and Coal Creek (RM 145.7)) and two randomly selected sites.

VI. Study Methods/Approach: (*Pending study design revision*)

Six sites will be sampled three times in late summer/early fall. Sampling events will occur approximately two weeks apart. Trammel nets will be the primary method to collect adult fish.

Six to eight nets will be set in the evening beginning at approximately 1500 hours and checked every 1.5 to 2 hours to approximately 2300 hrs. Nets will be set again before sunrise and checked through mid-morning. An increase in hoop net effort, up to 20 hoop nets per site depending on habitat, will be used to increase captures of all age classes. Submersible PIT antennas, two per site, will be used to increase the number of encounters with tagged fish. We plan to consult with a biometrician about the incorporation of antenna and hoop net data into population modeling to improve the population estimates.

All chubs captured will be scanned for a PIT tag. If the fish is large enough and does not already contain a PIT tag, one will be implanted. Length (mm), weight (g), number of fin rays (dorsal and anal fins), and species will be recorded for each chub prior to released. Photos will be taken for verification when uncertainty of species identification exists. When identification of small fish is not possible the individual will be recorded as a *Gila sp.* All other endangered species will also be scanned for a PIT tag, tagged if needed, measured (mm), weighed (g), and released.

VII. Task Description and Schedule: (*Pending study design revision*)

Task 1: Sampling: Complete three sampling trips in Desolation/Gray Canyon (August-October 2018 and 2019).

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 estimates (\hat{N}); 3) confidence interval; 4) probability of capture (\hat{p}) 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-January)

Task 3: A final report will be prepared following the final year of sampling (2020)

Schedule: FY 2018-2019

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

UDWR personnel costs are based on previous year costs plus a 2% increase on hourly rates and fringe costs per year. Vehicle 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. Vehicle costs for this budget are an estimated percentage of this total based on previous year's usage. Equipment costs are based on previous year costs and rates with a 2% increase on all line

items for each year following. Equipment includes but is not limited to trammel nets, scales, outboard repair, rafts, oars, dry boxes, coolers, tents, sleeping pads, PFDs, first aid supplies, satellite phone services, propane, fuel, etc...

FY2018: Annual Report by November 2018.

FY 2018 Costs for UDWR- Moab			
Task 1. Sampling in Desolation/Gray Canyons (3 passes: 7 people)			
<u>Personnel Costs (salary + fringe costs)</u>			
	Rate	Hours	Cost
Project Leader	\$35.07	280	\$9,819
Biologist	\$32.32	720	\$23,267
Technician	\$16.96	1760	\$29,850
		subtotal	\$62,936
<u>Food and Travel</u>			
	Rate	Quantity	Cost
Fleet Costs ^a (4 trucks for 20% of total fleet costs)	\$42,000.00	0.20	\$8,400
Food (7 people, 8 days, 3 trips)	\$30.00	168	\$5,040
Shuttle (4 trucks, 3 trips)	\$175.00	12	\$2,100
		subtotal	\$15,540
<u>Equipment</u>			
	Rate	Quantity	Cost
Camping gear repair/replacement ^b :			\$2,409
Sampling gear repair/replacement ^c :			\$1,785
Boating gear repair/replacement ^d :			\$3,750
Fuel for motors (50 gallons per pass)	\$4.00	150	\$600
		subtotal	\$8,544
Task 1 subtotal			\$87,020
Task 2. Annual Data Entry, Analysis, Reporting, and Administrative Costs			
<u>Personnel Costs (salary + fringe costs)</u>			
	Rate	Hours	Cost
Project Leader	\$35.07	60	\$2,104
Biologist	\$32.32	180	\$5,817
		subtotal	\$7,921
Task 2 subtotal			\$7,921
Grand Total FY 2018			\$94,940

^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: SOW will be revised and re-submitted pending 2018 findings and consultation with biometrician. Annual Report by November 2019. Final Report by 2020.

FY 2019 Costs for UDWR- Moab

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

Personnel Costs (salary + fringe costs)

	Rate	Hours	Cost
Project Leader	\$35.77	280	\$10,015
Biologist	\$32.96	720	\$23,733
Technician	\$17.30	1760	\$30,447
		subtotal	\$64,194

Food and Transport (current expense)

	Rate	Quantity	Cost
Fleet Costs ^a (4 trucks for 20% of total fleet costs)	\$42,840.00	0.20	\$8,568
Food (7 people, 8 days, 3 trips)	\$30.60	168	\$5,141
Shuttle (4 trucks, 3 trips)	\$178.50	12	\$2,142
		subtotal	\$13,709

Equipment (current expense)

	Rate	Quantity	Cost
Camping gear repair/replacement:			\$2,457
Sampling gear repair/replacement:			\$1,821
Boating gear repair/replacement:			\$3,825
Fuel for motors (50 gallons per pass)	\$4.08	150	\$612
			\$8,715
		subtotal	

Task 1 subtotal			\$86,618
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Task 2. Data Entry, Analysis, and Reporting

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

	Rate	Hours	Cost
Project Leader	\$35.77	60	\$2,146
Biologist	\$32.96	180	\$5,933
		subtotal	\$8,079
Task 2 subtotal			\$8,079

Task 3. Final Report

Personnel Costs (salary + fringe costs)

	Rate	Hours	Cost
Project Leader	\$35.77	80	\$2,861
Biologist	\$32.96	400	\$13,185
Biometrician Consultation			\$2,000
		subtotal	\$18,046
Task 3 subtotal			\$18,046

Grand Total FY 2019	\$112,743
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FY2020: No work for this SOW will be conducted in FY2020. A final report will be written in 2020 but is included under the FY2019 SOW and FY2019 budget.

FY2021: No work will be conducted in FY2021.

FY2022: Annual Report by November 2022. SOW will be revised and re-submitted pending 2018 findings and consultation with biometrician.

FY 2022 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	\$37.96	280	\$10,628
Biologist	\$34.98	720	\$25,185
Technician	\$18.36	1760	\$32,310
		subtotal	\$68,124

Food and Transport (current expense)

	Rate	Quantity	Cost
Fleet Costs ^a (4 trucks for 20% of total fleet costs)	\$45,462.15	0.20	\$9,092
Food (7 people, 8 days, 3 trips)	\$32.47	168	\$5,455
Shuttle (4 trucks, 3 trips)	\$189.43	12	\$2,273
		subtotal	\$14,548
<u>Equipment (current expense)</u>			
	Rate	Quantity	Cost
Camping gear repair/replacement:			\$2,607
Sampling gear repair/replacement:			\$1,932
Boating gear repair/replacement:			\$4,059
Fuel for motors (50 gallons per pass)	\$4.33	150	\$649
			\$9,248
		subtotal	
Task 1 subtotal			\$91,920
Task 2. Data Entry, Analysis, and Reporting			
<u>Labor: salary + benefits + applicable overtime (personnel services)</u>			
	Rate	Hours	Cost
Project Leader	\$37.96	60	\$2,277
Biologist	\$34.98	180	\$6,296
		subtotal	\$8,574
Task 2 subtotal			\$8,574
Grand Total FY 2022			\$100,493

IX. Program Budget Summary

	UDWR-Moab
FY2018	\$94,940
FY2019	\$112,743
FY2020	\$0
FY2021	\$0
FY2022	\$100,493
total:	\$308,177

X. Reviewers:

XI. References:

Ahrens, Z. 2017. Population monitoring of humpback and bonytail chub in Cataract Canyon. Annual Report. Upper Colorado River Endangered Fish Recovery Program.

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.

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.

Hines, B. 2017. Population estimates of humpback and roundtail chub in Westwater Canyon, Colorado River, Utah. Upper Colorado River Endangered Fish Recovery Program.

Howard, J.L. and J.M. Caldwell 2017. Population Estimate for Humpback Chub (*Gila cypha*) in Desolation and Gray Canyons, Green River, Utah 2001-15. Final Report. Upper Colorado River Endangered Fish Recovery Program.

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.

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.

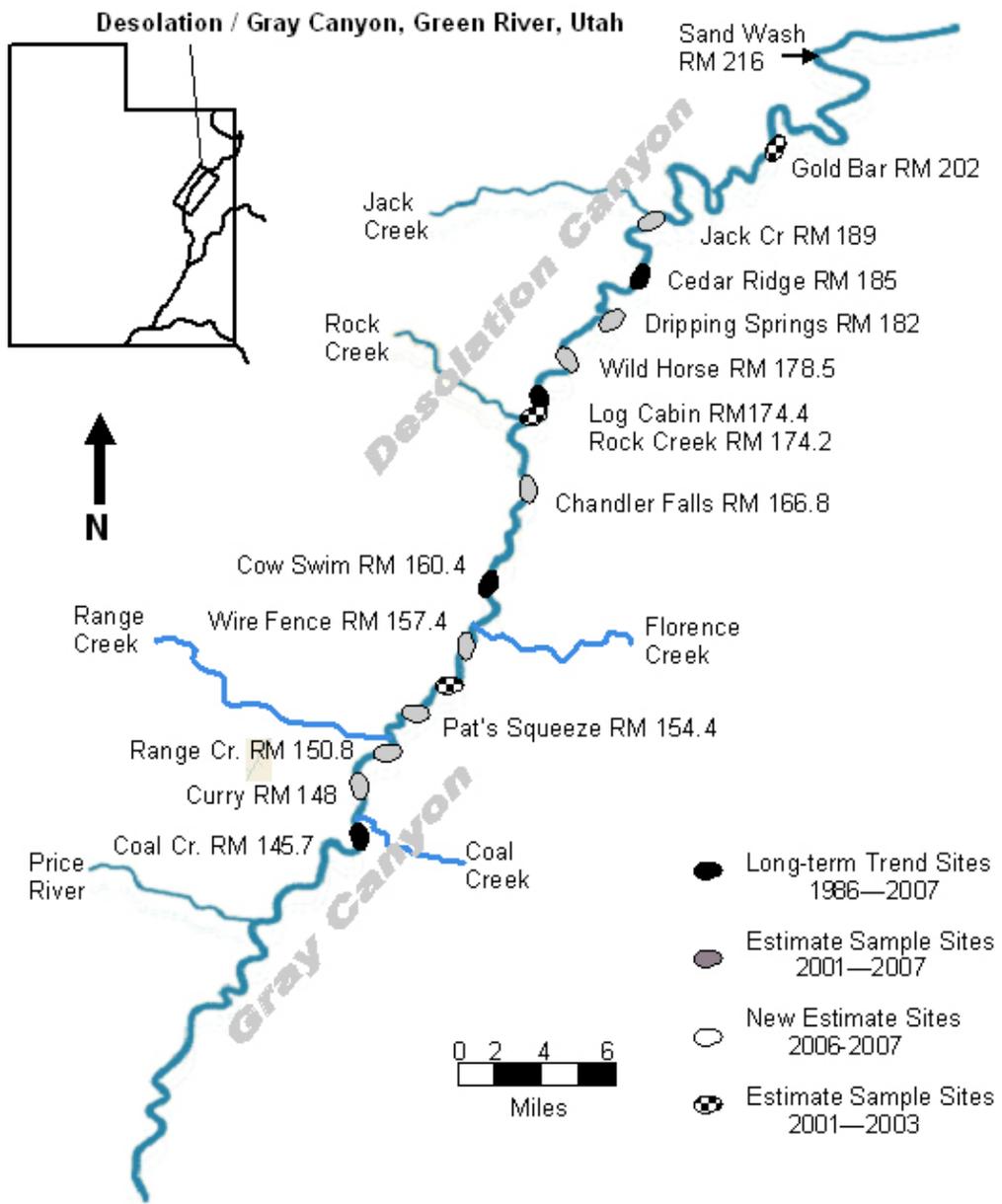


Figure 1. Sites sampled between 1986 and 2007, located within Desolation/Gray Canyons of the Green River.