

I. Project Title: **Humpback chub population estimate in Cataract Canyon, Colorado River, Utah.**

II. Principal Investigators:

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III. Project Summary:

The RIP recently identified 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 Cataract canyon population on the Colorado River. Identifying, maintaining, and monitoring a population necessitates obtaining accurate population estimates.

Objectives:

1. To obtain a population estimate of late juvenile/adult humpback chub in Cataract Canyon.
2. To determine if a relationship exists between ISMP catch rates and population size.

This project was initially scheduled to begin in 2002. However, due to record low flows that year, the beginning was delayed until fall 2003. Three sampling trips were conducted

through Cataract canyon in September through early November. Sampling occurred in three primary sites which were identified as trend sites for long-term monitoring (RM 212-211, RM 208.5-207, RM 207-205). Due to low flows, the trend site at RM 207-205 was moved to RM 211.5-209.8. In addition to the three trend sites, two other elective sites were sampled. Both elective sites were located below the “big drops” section of the canyon at RM 201.5-201 and 201-200.5.

A total of 32 individual humpback chub and 16 individual bonytail chub were collected in Cataract canyon by trammel netting and electrofishing. Trammel nets yielded the highest catch for all chub species. Three humpback chub were recaptured between trips and 2 bonytail chub were recaptured between trips. All bonytail captured were hatchery-reared and previously marked with coded wire tags. These data will be used to obtain an abundance estimate for humpback chub and bonytail within Cataract Canyon.

IV. Study Schedule:

- a. Initial year: 2003
- b. Final year: 2005

V. Relationship to 2003 RIPRAP:

Colorado River Action Plan: Mainstem (pg. 36)

- V.C. Estimate humpback chub populations
- V.C.3. Cataract Canyon

VI. Accomplishments of FY03 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Goal:

- 1) Estimate the Cataract Canyon humpback chub population with confidence intervals as tight as possible.
- 2) Transport presumed wild bonytail (*Gila elegans*) to a hatchery.

Three sampling trips were conducted in Cataract canyon on September 11–18, October 8–15, and November 2–9. Flows during sampling ranged from approximately 10,000 to 4,500 cfs. Daily mean water temperature ranged from 19° C to 8.5° C. Sampling occurred in three primary sites which were identified as trend sites for long-term monitoring (RM 212-211, RM 208.5-207, RM 207-205). Due to low flows on trips 2 and 3, the trend site at RM 207-205 was moved to RM 211.5-209.8. In addition to the three trend sites, two other elective sites were sampled. Both elective sites were located below the “big drops” section of the canyon at RM 201.5-201 (trip 1) and 201-200.5 (trip 2). An elective site was not sampled on trip 3.

Humpbacks: A total of 44 humpback chub captures were recorded during 1,375 net hours

of trammel netting, yielding a catch rate of 0.022 fish/net hr (Table 1). Only two humpback chub were collected during 8.93 hours of electrofishing at a rate of 0.22 fish/hr. Overall, 32 unique individuals were captured with a mean total length of 240.8 mm (range 208-303 mm TL). None of the humpback chub captured were sub-adults (<200 mm TL).

A population estimate was calculated for humpback chub using program CAPTURE within the program MARK. The model selection procedure within CAPTURE was used to select an appropriate estimator. The null model (M_0) was selected by the program, this selection is supported by lack of any significant difference in catch rates between trips (Table 1). The estimate was calculated using 32 individuals and three recaptures between trips. The population estimate for humpback chub in Cataract Canyon is 150 individuals (\hat{p} = 0.084, C.V.= 0.50) with a 95% confidence interval of 71-407 individuals.

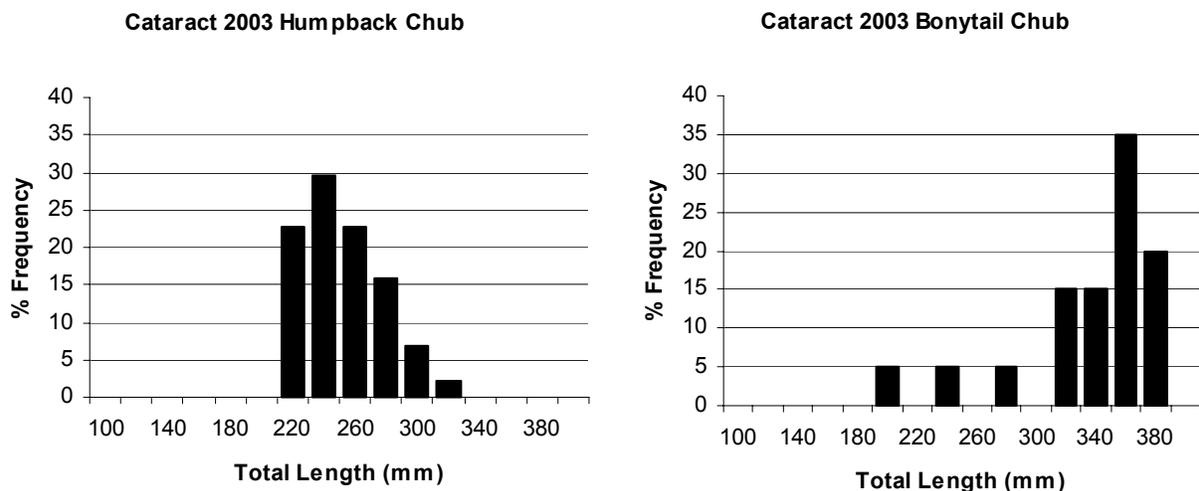
Bonytails: A total of 20 bonytail captures were recorded during 1,375 net hours of trammel netting, yielding a catch rate of 0.010 fish/net hr (Table 1). Only two bonytail were collected during 8.93 hours of electrofishing at a rate of 0.22 fish/hr. Overall, 16 unique individuals were captured with a mean total length of 324.2 mm (range 194-366 mm TL). Only one of the bonytails captured was a sub-adult (<200 mm TL). All bonytail captured were hatchery-reared and previously marked with coded wire tags.

A population estimate was calculated for bonytail chub using program CAPTURE within the program MARK. The model selection procedure within CAPTURE was used to select an appropriate estimator. The null model (M_0) was selected by the program. This selection is supported by lack of any significant difference in catch rates between trips (Table 1). The estimate was calculated using 16 individuals and two recaptures between trips. The population estimate for bonytail chub in Cataract Canyon is 66 individuals (\hat{p} = 0.106, C.V.= 0.59) with a 95% confidence interval of 31-212 individuals.

The relatively low numbers of recaptures produced estimates for humpback and bonytail chub which are questionable in terms of accuracy. However, given the potential effects of a 5 year drought and the newly found presence of adult bonytail chub, we believe that further investigation applying the same intensive level of effort will provide a much needed insight into the biological value of Cataract Canyon. The option of examining densities within 3 to 4 large scale habitats (ie. a large eddy complex) may warrant consideration. This would consist of 4-5 days of mark/ recapture effort in one section (1/2 – 1/4 mile). Recaptures would be counted between days instead of trips. The underlying assumption is that chub mix back into the population within that habitat but do not leave the larger section within the sample period. This assumption is likely met within Cataract Canyon in the fall months. Our sampling in 2003 found many recaptures between days within the same habitat, and recaptures of fish between trips showed no movement from their original capture section. The section densities could then be extrapolated throughout the canyon. This type of sampling should provide a greater number of recaptures and a more acceptable level of variation within the estimate. An example of these density estimates will be further examined this winter using the 2003 data, and results will be relayed to interested parties.

Table 1. Trammel net effort and catch rates for humpback and bonytail for all sites combined.

Trip #	Effort (net hrs)	# HB	HB CPUE (fish/net hr)	# BT	BT CPUE (fish/net hr)
1	385	8	0.021	3	0.008
2	495	21	0.042	12	0.024
3	381	15	0.039	5	0.013



Total	1,375	44	0.032	20	0.015
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Figure 2. Percent total length frequency for humpback chub and bonytail captured via trammel netting and electrofishing within Cataract Canyon 2003.

VII. Recommendations:

- Continue with current 3 pass mark/recapture methods. Although catch rates (trammel net CPUE) were low, they were not much lower than observed in Desolation/Gray canyons. In addition the presence of adult bonytail should be closely monitored.
- Continue sampling in fall months to maintain consistency with past sampling and to reduce handling stress
- Future sampling should focus on areas above the “big drops” section of the canyon.

- Consider sectional density estimates.

VIII. Project Status: Ongoing
First year of three for project completed.

IX. FY03 Budget:

A. Funds budgeted:	\$ 84,000
B. Funds expended/obligated:	\$ 67,200
C. Difference:	\$ 16,800
D. Percent FY2003 work completed:	80%
E. Recovery Program funds spent for publication charges:	\$ 0

X. Status of data submission:
Data will be entered on the computer and transferred to USFWS by January 15, 2004.

XI. Signed: **Richard A. Valdez** Date: 11/26/2003