

I. Project Title: Population monitoring of humpback and bonytail chub in Cataract Canyon.

II. Lead Agency: Utah Division of Wildlife
Principal Investigators:

Paul Badame
Utah Division of Wildlife Resources
Moab Field Station
1165 South HWY 191 - Suite 4
Moab, UT 84532
(435) 259-3780, office
(435) 259-3785, fax
paulbadame@utah.gov

Katrina Lund
Utah Division of Wildlife Resources
Moab Field Station
1165 South HWY 191 - Suite 4
Moab, UT 84532
(435) 259-3781, office
(435) 259-3785, fax
katrinalund@utah.gov

III. Project Summary:

Achievement of recovery goals for humpback chub (*Gila cypha*) will be determined in part by monitoring the six known self-sustaining populations in the upper and lower Colorado River basins. These populations include Black Rocks, Westwater Canyon, Desolation/Gray Canyons, Yampa Canyon, Cataract Canyon, and Grand Canyon. The period of monitoring for downlisting is 5 years, in which at least three reliable population estimates will be taken for each of the six populations. Sampling in Cataract Canyon began in 1979 under the U.S. Fish and Wildlife Service's Colorado River Fishery Project (Valdez et al. 1982), and then continued under the U.S. Bureau of Reclamation contracted studies with Bio/West (Valdez 1990). Between 1990 and 2000, sampling was conducted intermittently by the Utah Division of Wildlife Resources. This sampling included annual monitoring of the fish community in Cataract Canyon which was added to the Interagency Standardized Monitoring Program beginning in 1998. The catch rates observed during these studies were variable, and the population size could not be determined from these data. Beginning in 2003, three pass mark/recapture sampling was conducted for three consecutive years. This sampling protocol was used to develop three annual point estimates for adult humpback in the canyon. The estimates for the Cataract population ranged from 273–468 humpback chub within the canyon. Due the small size of the population and probable violations of modeling assumptions, it was determined

that this level of monitoring is not necessary for the Cataract population and that in 2008 monitoring would return to following annual fall catch rate trends. The monitoring schedule for this population will be an annual single trip occurring in September or October.

IV. Study Schedule:

- a. Initial year: 2008
- b. Final year: ongoing

V. Relationship to RIPRAP:

General Recovery Program Support Action Plan

V.B. Conduct research to acquire needed life history information.

V.B.1. Identify significant deficiencies in life history information and needed research.

Colorado River Action Plan: Mainstem

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

VI. Accomplishments of FY09-10 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1) Complete two sampling trips in Cataract Canyon: one in October 2008 and one in October 2009. **Reporting includes results from FY09 (Oct 2008) and FY10 (Sep-Oct 2009).

Annual sampling trips were conducted in Cataract Canyon in 2008 and 2009. Sampling for both years occurred in three primary sites which were identified as trend sites for long-term monitoring (Figure 1, Site 1: RM 212–211.5, Site 2: RM 209.8–210.5, Site 3: RM 207.3–208.3). In 2008, sampling occurred October 25–30. Daily mean flows ranged from 6570–6670 cfs and daily mean water temperatures were 9–15° C. Two additional sites were sampled: Rapid 12 (RM 205.5–207) and Gypsum Canyon (RM 196.7, located below the “Big Drops”) to see if newly available habitat was being utilized by endangered fish.

In 2009, the sampling trip dates were September 23–October 1. Daily mean flows were 6680–7060 cfs. Water temperatures were relatively warmer, ranging from a mean daily temperature of 14–21° C. A new area was sampled to see if humpback chub were present in suitable habitat between Rapids 7 and 8 (RM 209.4).

Humpback chub: In 2008, a total of 6 unique humpback chub were captured. All were captured using trammel nets resulting in 409 hours of effort and a catch rate of 0.015 fish/net hour (Table 1). Mean total length was 244 mm. No humpback chub were captured through other methods of sampling (electroshocking and seine netting). No humpback chub were captured below the “Big Drops”, and no recaptures occurred.

In 2009, a total of 20 unique individual adult humpback chub and 6 juveniles (2 identified as *Gila spp.*) were captured from both trammel netting and electroshocking.

Trammel netting yielded a total of 18 humpback chub captures which were recorded during 623 hours of trammel netting, giving a total catch rate of 0.029 fish/net hour (Table 1). Seventeen unique individuals were captured by trammel netting with a mean total length of 248 mm. A large adult humpback was captured (416 mm), and this was a notable event because the individual was unmarked, suggesting there are adult humpback chub in the system that may be evading capture.

Electrofishing yielded two adult and five juvenile (range 68–80 mm TL) chubs during 5.46 hours, giving a catch rate of 0.364 fish/hour for adults and 0.909 fish/hour for juveniles. Two of these juveniles were located upstream of the study area around the Spanish Bottom area (RM 213.7–214). No humpback chub were captured below the “Big Drops”.

Three humpback chubs were recaptured in 2009 from previous marking in 2004, 2005, and 2008. All recaptured individuals were found in the location of their original markings one to five years later.

Bonytails: No bonytail (*Gila elegans*) were caught in 2008, and in 2009, one bonytail capture was recorded during 623 hours of trammel netting (Table 1). This individual was a stocked fish, 274 mm in total length, and was recapture at Rapid 10 (RM 207.3–208.3).

Overall Catch: For 2008: A total of 133 fish consisting of twelve species were captured in Cataract Canyon. Only humpback chub and razorback sucker (*Xyrauchen texanus*) were present of the four main-stem endangered fish, comprising 6% of the total catch. Flannelmouth suckers (*Catostomus latipinnis*) were the most common native fish in the samples. Channel catfish (*Ictalurus punctatus*) and carp (*Cyprinus carpio*) were the most abundant nonnative species in the catch (Table 2) with numerous walleye (*Stizostedion vitreum*) and two gizzard shad (*Dorosoma cepedianum*) below the “Big Drops”.

For 2009: The total catch consisted of 353 fish and twelve different species. All four endangered fish were present. Humpback chub were the most common native fish present in the samples. Channel catfish were the most abundant nonnative species collected (Table 2). A concerning event was the collection of four striped bass (*Morone saxatilis*) above the “Big Drops”. The bass were captured by trammel netting in Site 2 (RM 209.8–210.5) and Site 3 (RM 207.3–208.3). To our knowledge, this is the first time these fish have been observed above the “Big Drops”. Three gizzard shad were also collected in Sites 1–3.

Discussion: The humpback chub population within Cataract Canyon continues to be stable. Trammel catch rates recorded over the last 18 years have fluctuated between 0.010 and 0.035 and show no significant trend up or down among years (Fig. 2). The longitudinal distribution of humpback chub captures within Cataract has also remained similar through the same period, with no captures in river stretches below the “Big Drops” (Fig. 5). The 2008 and 2009 collections continue to demonstrate the narrow relative size structure for humpback chub in Cataract Canyon with the large majority of adults confined to the 200–260 mm range (Figure 4).

Humpback chub have been recorded to reach a maximum total length of 480mm and a maximum age of >20 years. Unfortunately, relating length to age is not possible for any chub over 200 mm. The three humpback recaptures in 2009 demonstrate this problem a maximum of 21 mm growth in 5 years and a minimum of 1mm in one year (Table 4). These recaptures continue to support the idea that growth rates of humpback chub in Cataract Canyon slows greatly around 240mm TL.

Sampling in 2009 did yield some unique and encouraging findings: increased catch rates in most sampling methods, especially electrofishing (Table 1); a very large, unmarked humpback chub individual (416mm TL); and the presence of young-of-the-year (YOY) and juvenile chub (<150mm TL). These findings confirm spawning and suggest a broader age distribution may be present, however they also demonstrate the difficulties in capturing long lived, rare fish in very high volume rivers.

Task 2) Data entry:

The 2008 and 2009 data have been entered and quality checked and will be transferred to the UCRRP database manager by January 1, 2010.

Task 3) Annual reporting:

An annual progress report summarizing the 2008 and 2009 data and comparing it with past monitoring efforts will be submitted by Nov 13, 2009.

VII Recommendations:

- Persistent occurrence of humpback chub and bonytail warrants continued monitoring of distribution and relative abundance via a single sampling pass.
- Future monitoring should employ trammel nets as the primary sampling tool.
- Future monitoring should include electroshocking as an additional sampling tool for collecting YOY and juvenile chub.
- Future monitoring should include baited minnow traps for juvenile and YOY sampling.

VIII. Project Status: Ongoing and on schedule.

IX. FY09 Budget:

A. Funds budgeted:	\$ 27,632
B. Funds expended/obligated:	\$ 27,632
C. Difference:	\$ 0
D. Percent FY2009 work completed:	100%
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, 2010.

XI. Signed: Katrina Lund / Paul Badame Date: November 9, 2009

Table 1. Comparison of methods, years sampled, effort, and catch rates for adult humpback chub (HB, >150 mm TL), bonytail, and juvenile chub (all *Gila spp.*, <150mm) for all sites combined, Cataract Canyon, 2003-2009.

Method	Year	<i>Gila spp.</i>			Effort (hrs or m ²)	CPUE (fish/hr)		
		# HB	# BT	# juv		HB CPUE	BT CPUE	juv CPUE
Trammel netting	2003	44	20	0	1375	0.032	0.008	0.000
	2004	43	1	0	1245	0.035	0.001	0.000
	2005	31	5	0	1375	0.022	0.003	0.000
	2008	6	0	0	409	0.015	0.000	0.000
	2009	18	1	0	623	0.029	0.002	0.000
	Total		142	27	0	5027	0.028	0.005
Electroshocking	2003	2	2	0	8.9	0.225	0.225	0.000
	2004	0	0	0	7.5	0.000	0.000	0.000
	2005	0	0	0	8.2	0.000	0.000	0.000
	2008	0	0	0	1.5	0.000	0.000	0.000
	2009	2	0	5	5.5	0.364	0.000	0.909
	Total		4	2	5	31.6	0.127	0.063
Seine netting	2003	0	0	0	0	0.000	0.000	0.000
	2004	0	0	0	0	0.000	0.000	0.000
	2005	0	0	0	0	0.000	0.000	0.000
	2008	0	0	0	184	0.000	0.000	0.000
	2009	0	0	0	56	0.000	0.000	0.000
	Total		0	0	0	240	0.000	0.000
Minnow trap & Hoop netting	2003	0	0	0	9.9	0.000	0.000	0.000
	2004	0	0	0	0	0.000	0.000	0.000
	2005	0	0	0	0	0.000	0.000	0.000
	2008	0	0	0	0	0.000	0.000	0.000
	2009	0	0	1	76.5	0.000	0.000	0.013
	Total		0	0	1	86.4	0.000	0.000
Grand Total		146	29	6	---	---	---	---

Table 2. Comparison of catch rates and methods for various fish species for all sites combined, Cataract Canyon 2008-2009.

Species	Year	Trammel netting CPUE (fish/netting hr)	Electroshocking CPUE (fish/shocking hr)
Humpback chub	2008	0.015	0.000
	2009	0.029	1.085
Bonytail	2008	0.000	0.000
	2009	0.002	0.000
Colorado pike minnow	2008	0.000	0.000
	2009	0.001	0.542
Razorback sucker	2008	0.005	0.000
	2009	0.014	0.362
Channel catfish	2008	0.188	NA
	2009	0.356	63.539
Common carp	2008	0.039	NA
	2009	0.127	9.774

Table 3. Recapture and growth information for three individual humpback chub, Cataract Canyon 2009.

Individual	Year	Location	Total Length (mm)	Weight (g)
HB	2005	RM 210 (Rapid 5)	242	100
	2009	RM 210 (Rapid 5)	253	160
		Growth	9	60
HB	2004	RM 207.5 (Rapid 10)	226	75
	2009	Rapid 10	247	160
		Growth	21	85
HB	2008	Rapid 10	240	90
	2009	Rapid 10	241	100
		Growth	1	10

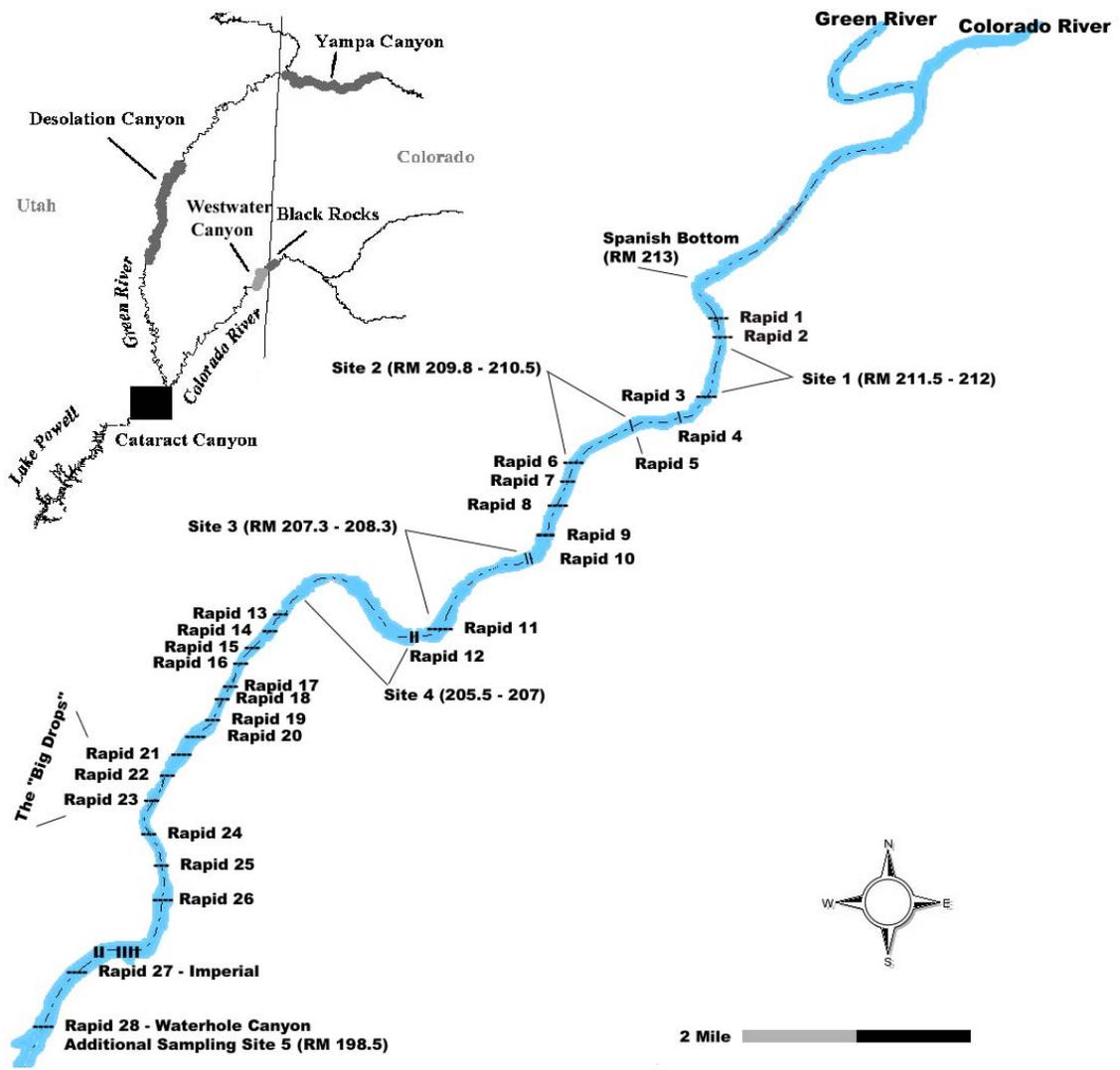


Figure 1. Cataract Canyon map detailing sampling locations for FY 2009-2010.

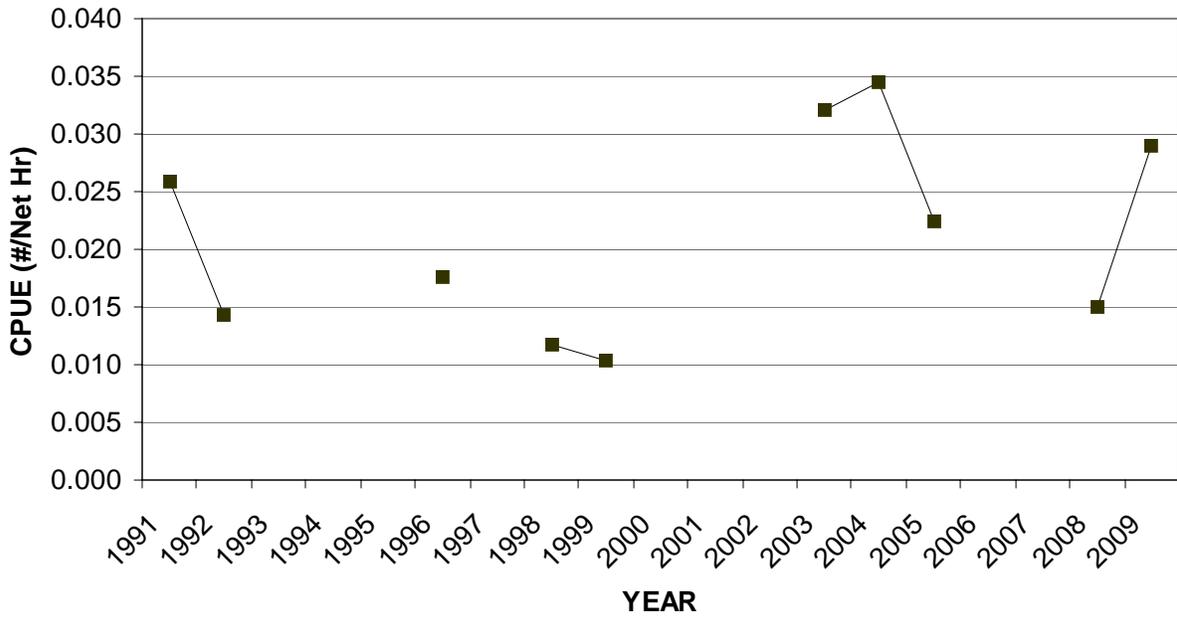


Figure 2. Total catch per unit effort (CPUE) for humpback chub in Cataract Canyon fall collections for all captures between 1991 and 2009.

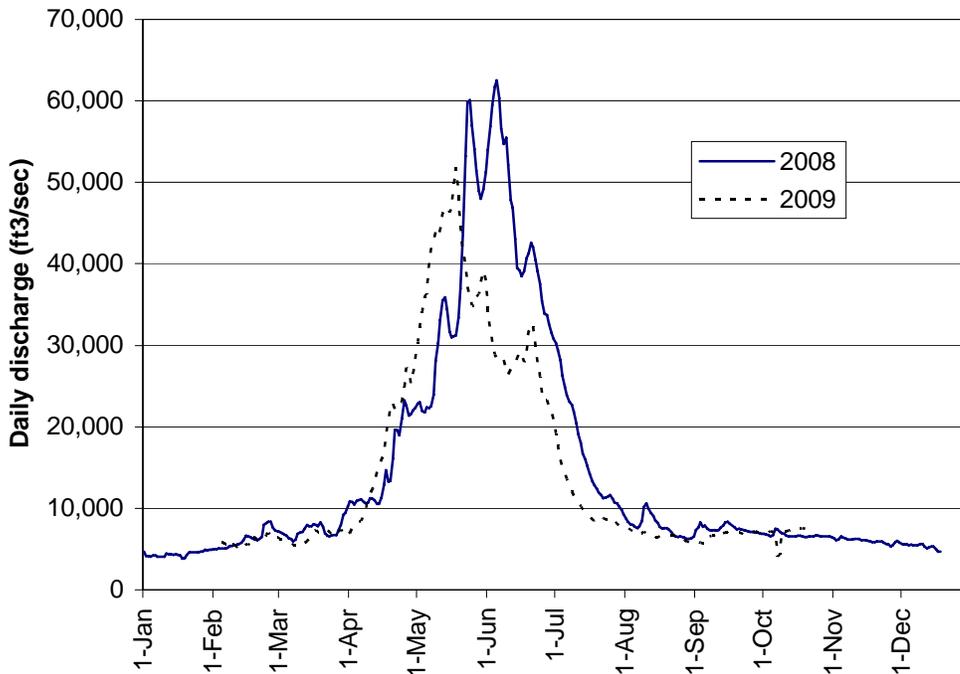


Figure 3. Hydrograph of daily discharge (ft³/sec) of Cataract Canyon, 2008-2009.

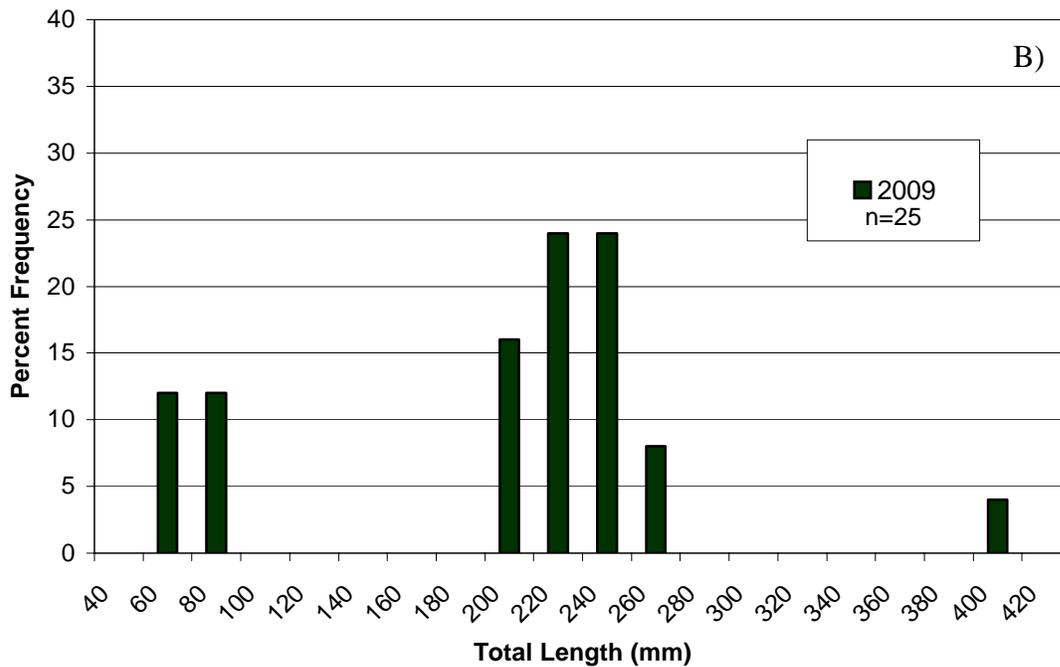
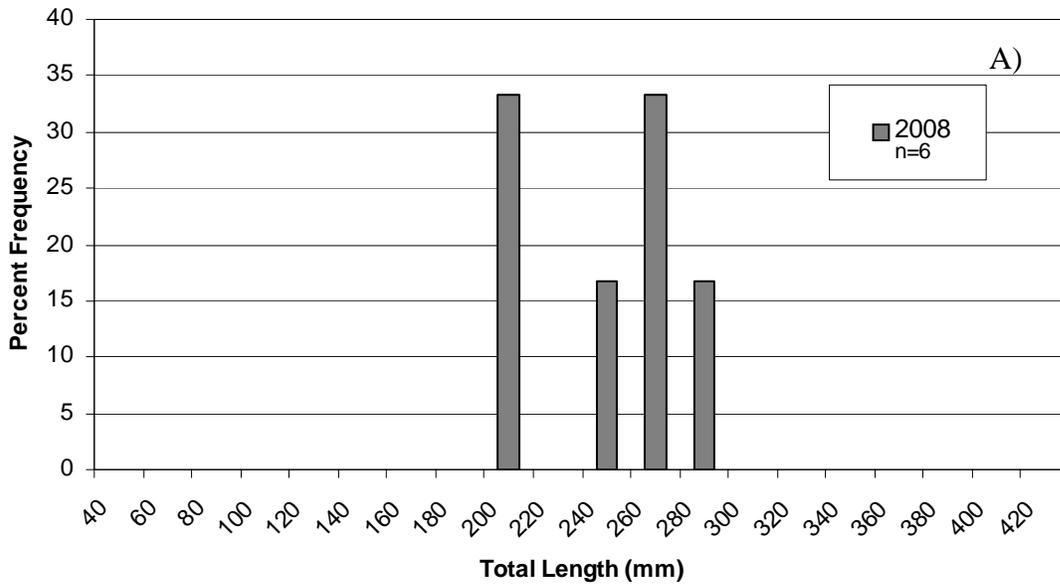


Figure 4. Annual total length frequency distributions for adult humpback chub >150mm TL (A) and all *Gila spp.* juvenile chub <150mm TL (B), in Cataract Canyon caught by all sampling methods for all captures in 2008 and 2009.

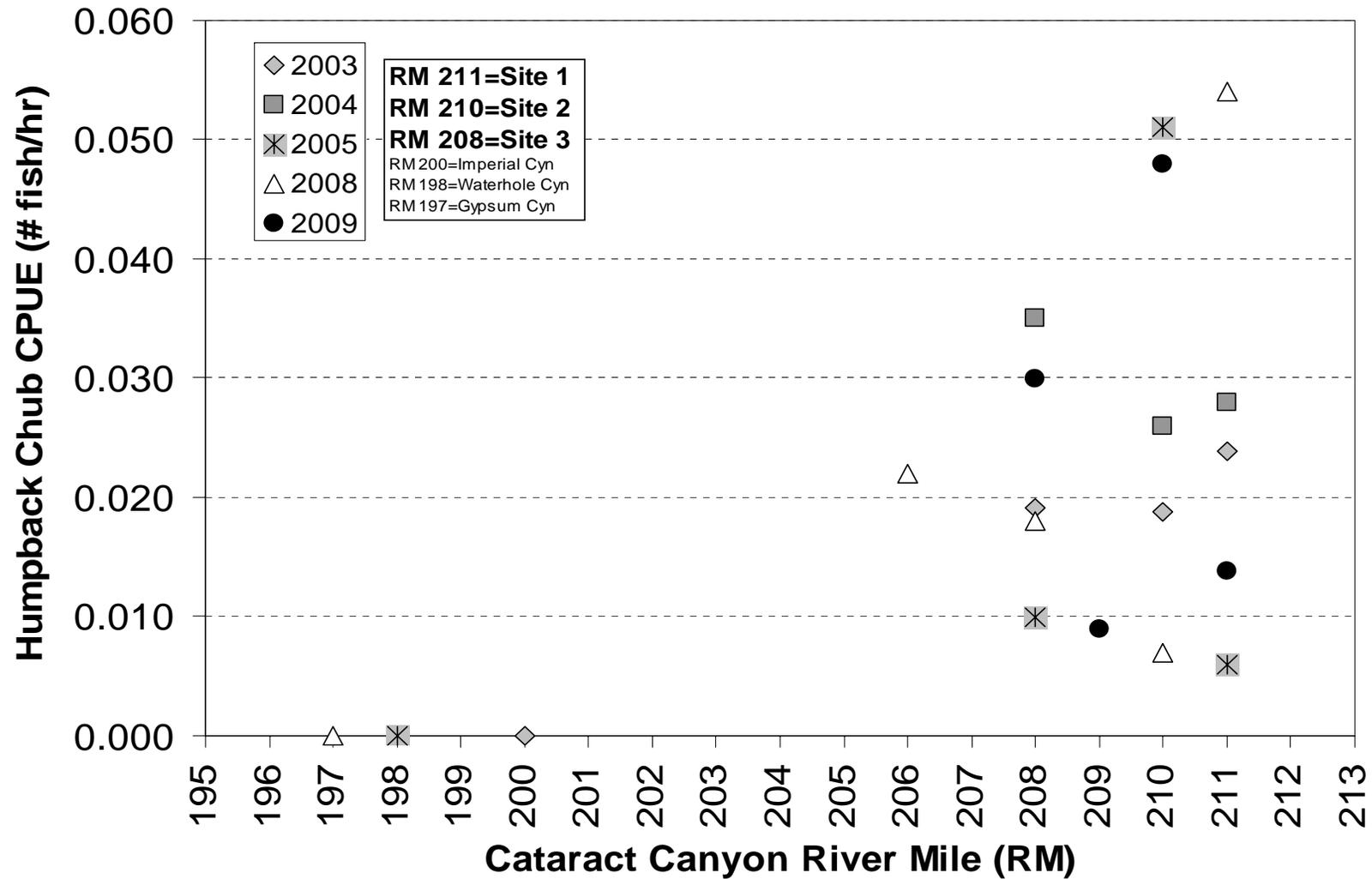


Figure 5. Catch per unit effort (CPUE) compared to river mile, for adult humpback chub (>150mm TL) captured by trammel netting for individual sampling sites within Cataract Canyon, 2003-2009.