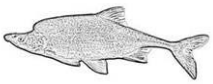
LITTLE COLORADO RIVER FISH MONITORING
2004 ANNUAL REPORT



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EXECUTIVE SUMMARY (WHAT'S NEW IN 2004)

Catch-per-unit-effort trends presented in this report may appear slightly different than trends reported in previous years. Differences in collection methodology among years created the necessity to refine and standardize the data so that only comparable data was included in the catch trend analysis. We took the following steps to refine the data prior to analysis.

1. Fixed Trip ID's within the GCMRC 14.5 database so that the data for any given of year of Little Colorado River sampling since 1987 could be obtained by the trip ID. (Table 2).
2. Queried out all Lower 1200 meter Little Colorado River sampling by trip ID and verified that each year was accounted for.
3. Added the 2004 Lower 1200 meter data.
4. Removed all D-Hoop nets and Fyke nets from the analysis so that only Gear types, HN, MH, and GFH were included.
5. Standardized effort. Many records were missing effort. In some cases effort could be calculated from start and end times and in other cases effort was extrapolated. In most cases nets were set for either 12 or 24 hours.
6. Queried only data collected during the months of April and May. Some years had extensive effort at other times of the year which biased CPUE trends.

We have added length frequency histograms for the most recent 6 years of monitoring for all of the native species (Figures 1-3). Although catch is highly influence by runoff from the LCR some of the more general trends are evident, such as the large number of age 1 HBC that have been present during the past few years as well as large increase in all size classes of flannelmouth and bluehead suckers. We have also included CPUE trends since monitoring began in 1987 for more size groups of humpback chub (Figure 9). These trends were created using the refined data set described above and confirm the declining trend in adult HBC numbers as seen in mark-recapture population estimates and open population models. The majority of the humpback chub recaptured in 2004 were either tagged within the last 3 years or were tagged 9-15 years ago (Figure 14). This supports ideas that adult chub are not remaining within the Little Colorado River continuously and may only return to the LCR to spawn sporadically.

During 2004 we experimented with a solar powered PIT tag antenna to remotely detect tags in moving fish without handling them. A total of 62 unique fish passed through the antenna (Table 9, Appendix-recapture histories). This type of non-intrusive sampling with a remote antenna could be used in conjunction with a temporary weir to answer questions about population closure, spawning and movement patterns of humpback chub in the Little Colorado River.

INTRODUCTION

In 1987, the Arizona Game and Fish Department (AGFD) began to monitor fish in the Little Colorado River (LCR) to assess the population trends and status of endangered humpback chub (*Gila cypha*)(HBC) (Robinson and Clarkson 1992). Annual standardized hoop net sampling is conducted for 30 – 40 days to capture humpback chub during the spring spawning period (Table 1). This program was discontinued in 2000 but then reinstated in 2002 at the advice of the Grand Canyon Monitoring and Research Center Protocol Evaluation Panel (Anders *et al*. 2001). Catch-per-unit-effort (CPUE) indices derived from this monitoring program are useful as independent validation for mark-recapture population models of humpback chub developed by Coggins and Walters (2001). With the exception of the period 2000-2001, the lower 1200 meter sampling represents one of the most consistent, long-term sampling methods in use for Grand Canyon fishes.

STUDY SITE

The study site is the lower LCR, 1200 m upstream from its confluence with the Colorado River. The LCR in the study area is a deeply entrenched channel located in a vertical-walled canyon that in places narrows to less than 50 m. The LCR channel contains runs, riffles, deep pools and small rapids. Substrates are primarily silt and sand with scattered large boulders. The LCR is the primary spawning site for endangered HBC in Grand Canyon and is the only known HBC aggregate in the Colorado River Ecosystem (CRE) from which fish are recruited into the adult population (Valdez and Ryel 1995; Coggins and Walters 2001). Other native fishes, bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), and speckled dace (*Rhinichthys osculus*) spawn in the LCR (Robinson *et al*. 1998) as do exotic species including channel catfish (*Ictalurus punctatus*), fathead minnow (*Pimephales promelas*), red shiner (*Cyprinella lutrensis*), and common carp (*Cyprinus carpio*).

METHODS

Thirteen standardized AGFD hoop nets were fished continuously from April 9 through May 3, 2004, and checked once daily. Hoop nets measured 5 m long and 1 m diameter with 6.3 mm mesh, 7 hoops and two throats. Nets were set at 100, 119, 137, 165, 420, 480, 500, 577, 675, 1045, 1110, 1160, and 1195 m upstream from the confluence. Net locations were set as close as possible to those used in previous sampling efforts (Brouder and Hoffnagle 1998). Catch per unit effort was calculated as number of fish caught per hour.

All fish caught (3,401) were handled following protocols in Ward (2002). All fish collected were identified to species and measured for total length (TL; nearest mm). Fork length was also measured for humpback chub, flannelmouth sucker, and bluehead sucker. Weights were not measured because scales did not yield accurate weights in high winds common during the study period. Native fish were sexed when possible based on external sexual characteristics or manual expulsion of gametes and sexual condition (not ripe, ripe, spent) was recorded. Examination of sexual characteristics (none, color, tuberculate) was also noted. Number and type of external parasites were recorded. Native fish ≥ 100 mm TL were scanned for the presence of a PIT tag with both new 134.2 kHz tag reader and an old 400 kHz tag reader to verify that no tags were missed. If a tag was not found and the fish was ≥ 150 mm TL, a 134.2 kHz PIT tag was inserted into the abdominal cavity. Tag presence or absence and PIT tag number were recorded. Fish were also checked for fin clips or elastomer dye (marks used in previous years to identify tag loss or fish translocated above Chute Falls). PIT tag information was downloaded electronically and checked for errors.

Catch-per-unit-effort trends presented in this report may appear slightly different than trends reported in previous years. Differences in collection methodology among years created the necessity to refine and standardize the data so that only comparable data was included in the catch trend analysis. We took the following steps to refine the data prior to analysis.

1. Fixed Trip ID's within the GCMRC 14.5 database so that the data for any given of year of Little Colorado River sampling since 1987 could be obtained by the trip ID. (Table 2).
2. Queried out all Lower 1200 meter Little Colorado River sampling by trip ID and verified that each year was accounted for.
3. Added the 2004 Lower 1200 meter data.
4. Removed all D-Hoop nets and Fyke nets from the analysis so that only Gear types, HN, MH, and GFH were included.
5. Standardized effort. Many records were missing effort. In some cases effort could be calculated from start and end times and in other cases effort was extrapolated from other data collected within the same trip. In most cases nets were set for either 12 (1993-1997) or 24 hours.

6. Queried only data collected during the months of April and May. All years had data collected during April and May but some years had extensive effort at other times of the year which if included may introduce bias into CPUE trends.

RESULTS

A total of 3,401 fish representing 11 species were captured in the LCR during standardized monitoring in 2004. Native species dominated the catch and comprised 93 % of total fish caught (Table 3). Speckled dace, humpback chub, flannelmouth sucker, and bluehead sucker were the predominant species caught (Table 3 & 4). Catch rates of native fishes were generally not as high as in 2003 but still represented an overall increase since 2000. (Table 5 & 6, Figures 9-10).

The LCR was at or near base flow during the entire 2004 sampling period (approximately 222 cfs, Robinson *et al*. 1998). Turbidity was also very low during the entire sampling period but decreased overall as the trip progressed from 29 NTU's at the beginning of the sampling period to less than 6 NTU's at the end (Figure 4). Water temperature ranged from 15 – 23 ºC during the sampling period (Figure 7 & 8).

Native species

Humpback chub

A total of 743 humpback chub were collected in standardized hoop net sets during the 2004 spring monitoring period. The number of humpback chub caught in 2004 was more than double that of 2003 (322) and the highest number recorded since 1992, but most of the fish caught were less than 120 mm TL (Tables 4 & 8). In 2004 less than half as many humpback chub $\geq$ 150 mm TL were caught than in 2003 and there were also one third fewer recaptures. Large chub appeared to be mostly spent adults.

We examined 87 humpback chub $\geq$ 150 mm TL for presence of a PIT tag and 34 (39 %) were PIT tag recaptures (Table 4). Four hundred thirty eight humpback chub < 100 mm TL were caught; the smallest was 36 mm TL, although most (346) were between 80 and 99 mm TL. Only two ripe male HBC were found in 2004 and no ripe female chub were collected. Only one *Lernaea* was found on a HBC during the 2004 sampling and no other fish were reported with parasites. Of the 51 new tags that were inserted only 2 of them were over 250 mm TL indicating

that most of the new fish being tagged are new fish recruiting to the population and not previously untagged older fish.

Flannelmouth sucker

Flannelmouth sucker were the third most abundant species captured (356, 11.2%) in 2004 (Table 3). Most flannelmouth suckers were presumed to be Age-1 fish (Figure 2). A total of 202 flannelmouth suckers over 150 mm TL were caught and 65 (32.2%) were recaptures fish (Table 4). The number of flannelmouth suckers recaptured in 2004 was almost one third less than the number recaptured in 2003, but CPUE of flannelmouth suckers was still the second highest recorded annually since 1987. These results suggest good recruitment in 2003. Fewer flannelmouth suckers from 175 to 275 mm TL were caught in 2004 than in 2003.

Bluehead sucker

Bluehead suckers caught in 2004 had a mean TL of 161 mm and ranged in size from 44 to 308 mm TL (Table 8). A large cohort of age-0 bluehead suckers was not detected in 2004. Spawning of bluehead suckers may have occurred later in 2004 than in the two previous years and age-0 blueheads may have been too small for the 6.3 mm mesh during the sampling period. (Figure 3). A total of 88 bluehead suckers were scanned for presence of a PIT tag, only one was a recapture and this number was a new PIT tag that is not listed in the GCMRC 14.5 database indicating that this fish was either recently tagged and the number is not yet in the database or else an error was made in recording the initial tag number.

Speckled dace

Speckled dace were the most abundant species caught in 2004 with 1,918 caught (Table 3). CPUE for speckled dace was the highest ever recorded since sampling began in 1987 (Figure 10). Reduced numbers of large bodied predators within the system and low flows may be responsible for the increase in speckled dace numbers.

Nonnative species

Nonnative species made up only 7 % of the total catch in 2004 with fathead minnow and red shiner being the most abundant nonnative species caught (Table 3 & Figure 6). Stomachs from 9 large bodied predators were examined. Seven channel catfish were also caught but they were all < 105 mm TL and stomachs were not taken. One speckled dace was found in the gut of a rainbow trout and all other stomachs were empty (Table 7).

DISCUSSION

Native species

High catch rates of native fishes reported in 2004 can be partially attributed to very low turbidity during the sampling period (Figure 5). Recent investigations of the effects of turbidity on hoop net catch rates have revealed that at turbidities < 180 NTU catch rates increase significantly (Stone 2004). We hypothesize that chub use the nets as cover in clear water.

The mean CPUE of humpback chub ≥ 150 mm TL shows severe declines from 1987 to 1994 and has remained relatively stable since about 1994 (Figure 9). It may be that the pre-1987 population of humpback chub represented individuals that were born prior to or during the time in which Lake Powell was filling when mainstem Colorado River water temperatures were warmer and the mainstem Colorado River was humpback chub habitat. Since about 1994 the number of humpack chub has been relatively stable at a lower level. This may indicate that the present chub population represents the carrying capacity of the Little Colorado River alone and the higher pre-1987 chub population represented the carrying capacity of the mainstem Colorado River and the Little Colorado River (Figure 13). The ongoing trout removal efforts near the confluence of the Little Colorado River should help to address the question of whether or not the mainstem Colorado River is actually humpback chub habitat. If chub numbers do not increase as a result of these efforts it may be that the mainstem Colorado River is still not humpback chub habitat possibly because of the cold water temperatures, even after predators are removed.

The majority of the humpback chub recaptured in 2004 were either tagged within the last 3 years or were tagged 9-15 years ago (Figure 13). Capture probabilities using age structured mark-recapture models indicate the same trends (Coggins *et al*. 2005). This pattern is largely a function of the amount of work that was done in the Little Colorado River from many different agencies during the extensive tagging efforts of 1991-1995 (AGFD, FWS, ASU). There were 10 adult chub recaptured in 2004 which were previously tagged in the mainstem Colorado River (Appendix). All of these fish were tagged within 5 miles of the LCR confluence indicating little long distance movement for humpback chub within the mainstem Colorado River.

In 2004, mean CPUE of flannelmouth sucker was about one third that of 2003 but still represents an increasing trend since 2000 (Figure 9). Catch rates of flannelmouth suckers collected in the Little Colorado River and in the mainstem Colorado River within Grand Canyon between 1991 and 2000 suggest that the population of flannelmouth suckers was stable and

showed few strong year classes (Figure 2). The population of flannelmouth suckers sampled during this time was dominated by age 0 fish (< 150 mm TL) and adults (> 400 mm TL). Recent monitoring in the Little Colorado River (2002-2004) as well as electrofishing in the mainstem shows evidence of increased abundance of sub-adult flannelmouth suckers. This trend was most evident in mainstem electrofishing data between 233 km and 346 km downstream of Glen Canyon Dam (Scott Rogers AGFD, personal communication). The observed trend corresponds temporally and spatially to an increased number of days with water temperature greater than 15°C (Figure 12). It is likely that increased river temperatures resulting from lower Lake Powell water levels and stable summer discharges from Glen Canyon Dam are partially responsible for the increased recruitment of flannelmouth suckers within the Little Colorado River. One flannelmouth sucker initially tagged at rkm 193 below Shinumo Creek in the Mainstem Colorado River was subsequently caught in 2004 in the LCR (Appendix). Adult flannelmouth suckers are known to make long distance upstream movements when they reach reproductive size.

Catch of bluehead suckers ≥ 150 mm TL continued to increase in 2004(Figure 10). Large numbers of age 2 and 3 flannelmouth suckers continue to be caught compared with previous years (Figure 2). High recruitment of flannelmouth and bluehead suckers may have been caused by the low summer steady flows in 2000 which increased mainstem water temperature by approximately 2 °C in the lower river. Subsequent warmer mainstem water temperatures caused by drought conditions and lowered water levels in Lake Powell (Susan Hueftle, USGS unpublished data) may have also led to increased survival of suckers. The removal of rainbow trout in the area around the confluence of the Little Colorado River may also be partly responsible for the increased catch of suckers within the Little Colorado River. One bluehead sucker was recaptured in 2004 but the tag information is not currently in the GCMRC 14.5 database. (See Appendix). The low number of recaptures recorded for bluehead sucker suggests tagging mortality may be high and indicates further research is needed on tag retention and tag related mortality in bluehead suckers.

Catch of speckled dace was the highest that has ever been recorded since monitoring began in 1987 (Figure 10). The reason for this increase is unknown but could be attributed to lower numbers of large predators in the LCR including humpback chub and lower numbers of rainbow trout in the mainstem near the confluence. In spite of the unusually large catch of

speckled dace in 2004, CPUE is highly variable among years and does not appear to show any directional trend in the years prior to 2004 (Figure 10).

Nonnative species

There is some indication that the number of fathead minnows in the system has increased since 1994 although because of extremely high variance in catch rate among years it is difficult to clearly establish this trendFigure 11). Catch rate of red shiner also appears to have increased since 2002 (Figure 11). Black bullhead has shown higher variability in catch since 1995 (Figure 11). Catch of channel catfish is also highly variable creating very large confidence intervals surrounding the mean. This makes it difficult to assess trends for channel catfish although no increases in CPUE are apparent since monitoring began in 1987 (Figure 11). Seven channel catfish < 105 mm TL were caught in 2004 suggesting that some spawning of channel catfish is occurring within the Little Colorado River. No trends are evident in catch rate of common carp (Figure 11). Adult carp are unsusceptible to capture in hoopnets within the Little Colorado River so hoopnet catch trends are likely not be a good indicator of the carp population within the Little Colorado River. The percentage of nonnative fish in the catch, although low, appears to be increasing since monitoring began in 1987 (Figure 6).

Remote detection of PIT tags using a continuous underwater PIT tag scanner

Recent technological advances and 134.2 kHz PIT tags allow new possibilities for remote detection of fish which may help to address questions of fish movement and population closure within the Little Colorado River. During the 2004 lower 1200 meter monitoring we experimented with a solar powered PIT tag antenna to remotely detect tags in fish without handling them. An 11- inch diameter remote antenna (Biomark) was fastened to the cod end of a baited Fyke net and fished in 3 separate locations in the Little Colorado River for 28 nights. A total of 62 unique fish passed through the antenna and a date and time stamp was recorded for each PIT tag detected. This type of non-intrusive sampling with a remote antenna could be used in conjunction with a temporary weir to answer questions about spawning and movement patterns of humpback chub in the Little Colorado River.

Long-term catch trends

Catch-per-unit-effort trends presented in this report may appear slightly different than trends reported in previous years. Differences in collection methodology among years created

the necessity to refine and standardize the data so that only comparable data was included in the catch trend the analysis. (See methods section for steps used to refine data prior to analysis.)

Catch-per-unit-effort (CPUE) indices derived from the lower 1200-meter monitoring show dramatic declines in CPUE of adult humpback chub and validate mark-recapture population estimates. This index of catch rate is also valuable as an independent method to confirm output of age structured mark recapture (ASMR) open population models and demonstrates the importance of long-term monitoring programs. Standardized monitoring should be continued to compare catch rate data with population estimates from the USFWS and validate ASMR stock assessment models produced by GCMRC.

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TABLES

Table 1. Little Colorado River hoop netting effort by year, 1987 – 2004.

Year	Effort (Hours)	Days
1987	3050.14	21
1988	7829.10	26
1989	6722.05	25
1990	9178.27	27
1991	22849.02	58
1992	19931.53	55

Year	Effort (Hours)	Days
1993	12001.29	31
1994	12679.32	32
1995	10688.84	30
1996	13192.12	30
1997	12089.22	31
1998	8182.49	21

Year	Effort (Hours)	Days
1999	93725.55	25
2000	0.00	0
2001	0.00	0
2002	9057.58	30
2003	7152.27	25
2004	7165.46	23

Table 2. Trip dates and number of net sets 1987 -2004.

Lower 1200 meter LCR trips						
Year	Start	End	Trip ID	Days	# of fixed site nets	# of net sets per year [a]
1987	9-May	30-May	LC19870509	21	6	124
1988	3-May	29-May	LC19880503	26	11	329
1989	3-May	28-May	LC19890503	25	10	205
1990	17-Apr	14-May	LC19900417	27	13	189
1991	3-May	30-Jun	LC19910503	58	13	535
1992	5-May	28-May	LC19920505	23	13	319
1993	30-Apr	31-May	LC19930430	31	13	744
1994	19-Apr	21-May	LC19940419	32	13	814
1995	20-Apr	20-May	LC19950420	30	13	787
1996	18-Apr	18-May	LC19960418	30	13	750
1997	13-Apr	14-May	LC19970413	31	13	753
1998	5-Apr	26-Apr	LC19980405	21	13	431
1999	7-Apr	1-May	*GC19990406	24	13	497
2002	19-Apr	19-May	LC20020419	30	13	130
2003	11-Apr	9-May	LC20030411	28	13	138
2004	9-Apr	3-May	LC20040409	24	13	299

[a] This number represents all hoop nets set within the lower 1200 meters of the LCR during the months of April and May but does not include Fyke nets or D hoop nets.
* 1999 has a GC extension because it was submitted with USFWS downstream data.
From 1993 to 1997 nets were often checked twice daily which led to a higher number of net sets.

Table 3. Catch by species, lower 1200 m hoop net monitoring, Little Colorado River, April 9 - May 3, 2004. Total effort = 7,165.46 net hours.

Species	Number	%
Bluehead sucker (BHS)	154	4.9
Flannelmouth sucker (FMS)	356	11.2
Humpback chub (HBC)	743	23.4
Speckled dace (SPD)	1918	60.5
Total Native	**3,171**	**93.2**
Black bullhead (BBH)	5	2.2
Channel catfish (CCF)	6	2.6
Common carp (CRP)	7	3.0
Fathead minnow (FHM)	91	39.6
Plains killifish (PKF)	51	22.2
Rainbow trout (RBT)	5	2.2
Red shiner (RSH)	65	28.3
Yellow bullhead (YBH)	0	0.0
Total Non-native	**230**	**6.7**
Total	**3,401**	**100**

Table 4. Numbers of fish scanned, tagged, and recaptured by species during LCR lower 1200 meter hoopnet monitoring, 2004.

Species	<150 mm TL	≥ 150 mm TL	New tags inserted	Recaps	*Total Catch
BBH	1	4			5
BHS	66	88	13	1	154
CCF	6	0			6
CRP	3	4	0	0	7
FHM	91	0			91
FMS	154	202	131	65	356
HBC	656	87	51	34	743
PKF	51	0			51
RBT	0	5			5
RSH	65	0			65
SPD	1917	1			1918
				Total	3,401

*Effort = 23 days x 24 hours/day x 13 nets (7,165 hours).

Table 5. Total Catch of species by year, LCR standardized hoop net monitoring 1987 – 2004.

	Year															
Species	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2002**	**2003**	**2004**
BBH					1				1		1	2		5	5	5
BHS	48	87	121	37	150	102	49	64	32	413	45	82	61	299	400	154
CCF	9	9	53	10	8	19		5	1	1	12	20	10	9	4	6
CRP	2	1				1			1	8	60	2	5	2	19	7
FHM	1	12	22	10	8	8	1	265	19	237	726	161	14	92	79	91
FMS	83	137	53	47	171	126	51	88	65	237	97	17	21	540	590	356
HBC	483	880	897	612	772	912	475	657	243	359	123	348	155	430	322	743
PKF						1					97	3		4	2	51
RBT			1		4	1	2		1	8	1	11	6	5	2	5
RSH			2							14	74	26	70	14	56	65
SPD	141	271	261	126	1683	1236	468	1022	488	741	417	268	187	763	520	1918
Total	*767*	*1397*	*1410*	*842*	*2797*	*2406*	*1046*	*2101*	*851*	*2018*	*1653*	*940*	*529*	*2163*	*1999*	*3401*

Table 6. Catch per 24 hours of hoop net effort in the LCR by year, 1987-2004.

Species	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2002**	**2003**	**2004**
BBH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02
BHS	0.82	0.48	0.85	0.17	0.26	0.16	0.11	0.16	0.08	1.64	0.1	0.09	0.16	0.41	1.23	0.52
CCF	0.14	0.05	0.38	0.05	0.01	0.03	0.00	0.01	0.00	0.00	0.03	0.02	0.03	0.01	0.01	0.02
CRP	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.09	0.14	0.00	0.01	0.00	0.06	0.02
FHM	0.00	0.07	0.13	0.09	0.01	0.01	0.00	0.67	0.05	0.91	1.84	0.14	0.04	0.13	0.24	0.30
FMS	0.85	0.73	0.36	0.22	0.26	0.21	0.12	0.20	0.17	0.37	0.22	0.03	0.05	0.75	1.82	1.19
HBC	7.99	4.73	5.98	3.01	1.23	1.54	1.11	1.66	0.61	0.87	0.31	0.41	0.40	0.60	0.99	2.49
PKF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.25	0.00	0.00	0.01	0.01	0.17
RBT	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.02	0.01	0.01	0.02
RSH	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.05	0.2	0.02	0.18	0.02	0.17	0.22
SPD	2.45	1.61	1.81	0.71	3.09	2.00	1.33	2.65	1.27	2.63	1.00	0.29	0.48	1.05	1.60	6.42

Table 7. Catch of predators and stomach contents examined during 2004 LCR sampling.

Species	Number	Size Mean (Range)	Stomach Contents
BBH	4	175 (91 - 230)	All empty
CCF	7	88 (68 -105)	All small, not dissected
RBT	5	359 (332-382)	1 SPD

Table 8. Length frequency distributions of fish collected during LCR sampling, April 9 – May 3, 2004.

	Species										
Length	BBH	BHS	CCF	CRP	FHM	FMS	HBC	PKF	RBT	RSH	SPD
30 - 39							1				2
40 - 49		6			2		9	2		5	13
50 - 59		22			24	3	9	36		44	530
60 - 69		12	1		44	1	8	11		16	1004
70 - 79		2			19	13	65	3			235
80 - 89		4	2		2	10	147				74
90 - 99	1	1	1			22	199				36
100 - 109		1	2			18	137				14
110 - 119		5				24	47				6
120 - 129		2		1		18	24				3
130 - 139		6		2		24	7				
140 - 149		5				21	3				
150 - 159				1		18	8				1
160 - 169		1		3		12	15				
170 - 179	2	2				3	6				
180 - 189		6				5	17				
190 - 199		10				1	10				
200 - 209		13				2	2				
210 - 219	1	14				4					
220 - 229		11				2	4				
230 - 239	1	9				4	1				
240 - 249		6				7					
250 - 259		5				8					
260 - 269		8				6	1				
270 - 279		1				9	1				
280 - 289						4	1				
290 - 299		1				7					
300 - 309		1				6					
310 - 319						6					
320 - 329						11	1				
330 - 339						3	1		1		
340 - 349						16					
350 - 359						6	3		1		
360 - 369						7	2		2		
370 - 379						9	1				
380 - 389						8	1		1		
390 - 399						5	4				
400 - 409						5	5				
410 - 419						2	1				
420 - 429						2	1				
430 - 439						5					
440 - 449						5					
450 - 459							1				
460 - 469						1					
470 - 479						2					
480 - 489						1					
490 - 499											
500 - 509						5					
510 - 519						3					
520 - 529						1					
530 - 539											
540 - 549						1					

Table 9. Humpback chub detected by remote PIT tag antenna.

Location	(Rkm)	Dates fished	# of Nights	# of fish detected
*Boulder Camp	(1.9)	4/10 - 4/28	19	210
Amazon Island	(1.4)	4/29 - 5/3	5	9
A- Rock	(2.1)	5/4 - 5/7	4	4
*Baited net		Total # of unique fish detected =		60

FIGURES

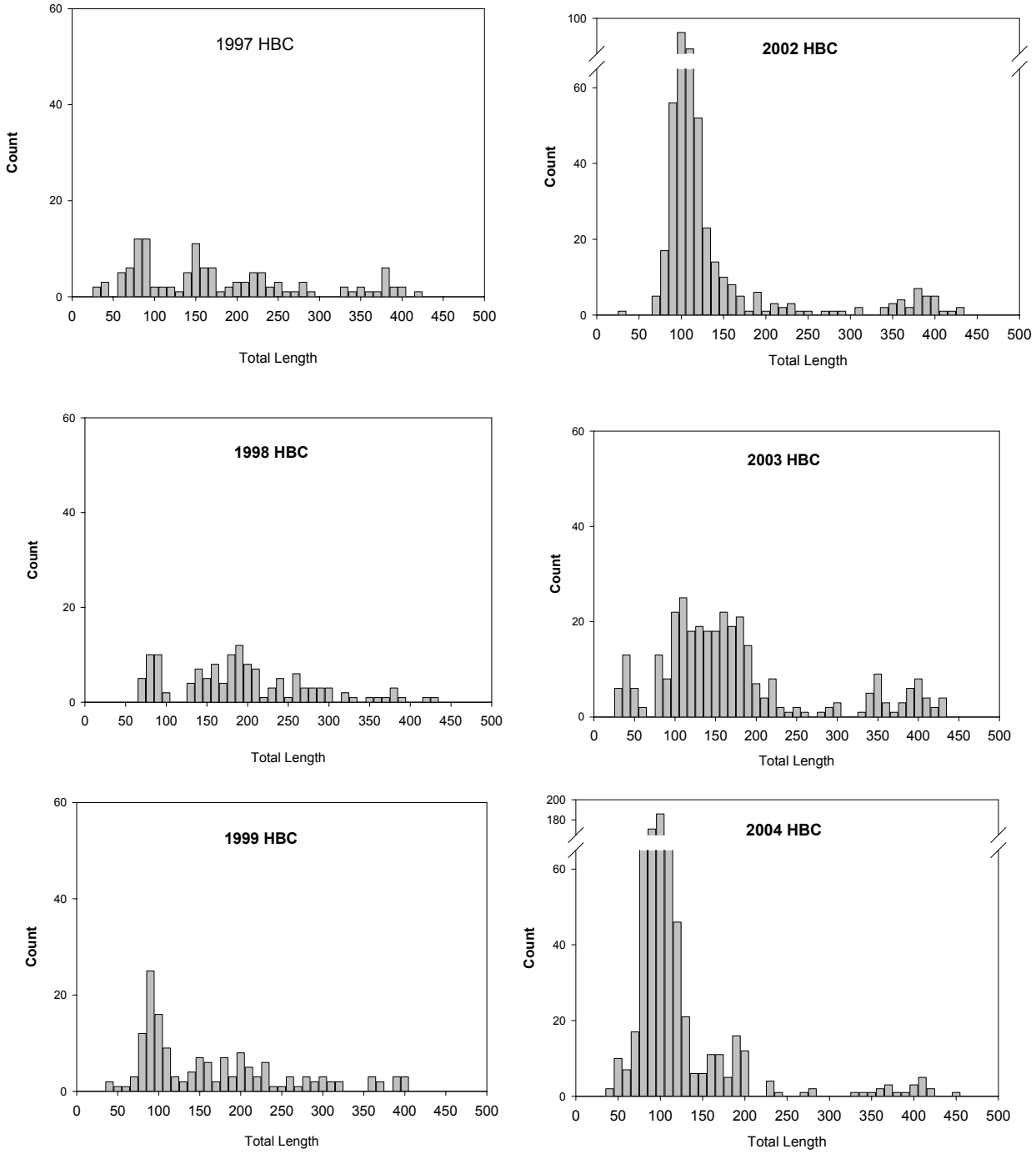

Figure 1. Length frequency distributions for humpback chub (HBC), caught in the Little Colorado River during the most recent 6 years of monitoring.

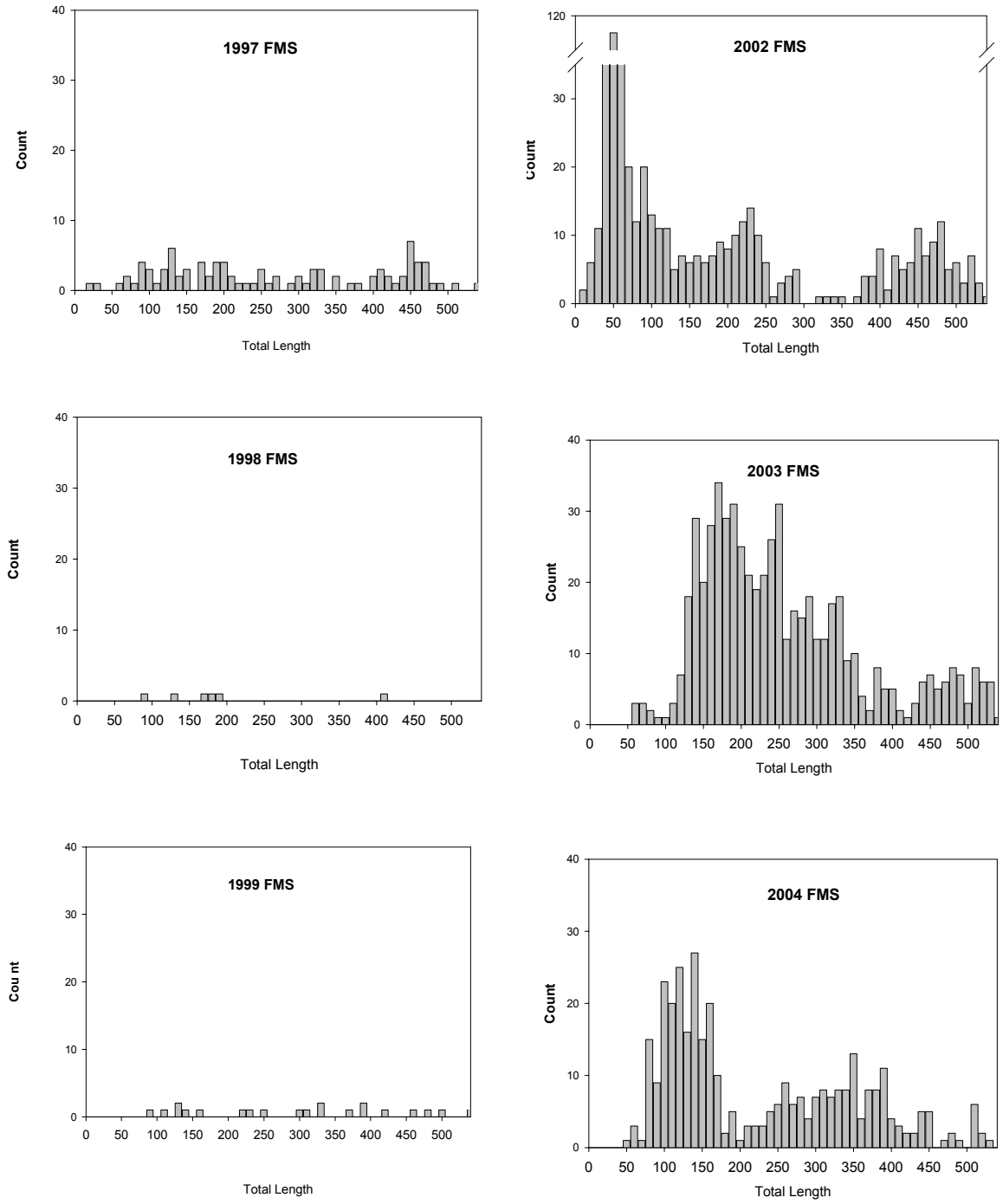

Figure 2. Length frequency distributions of flannelmouth sucker (FMS), caught in the Little Colorado River during the most recent 6 years of monitoring.

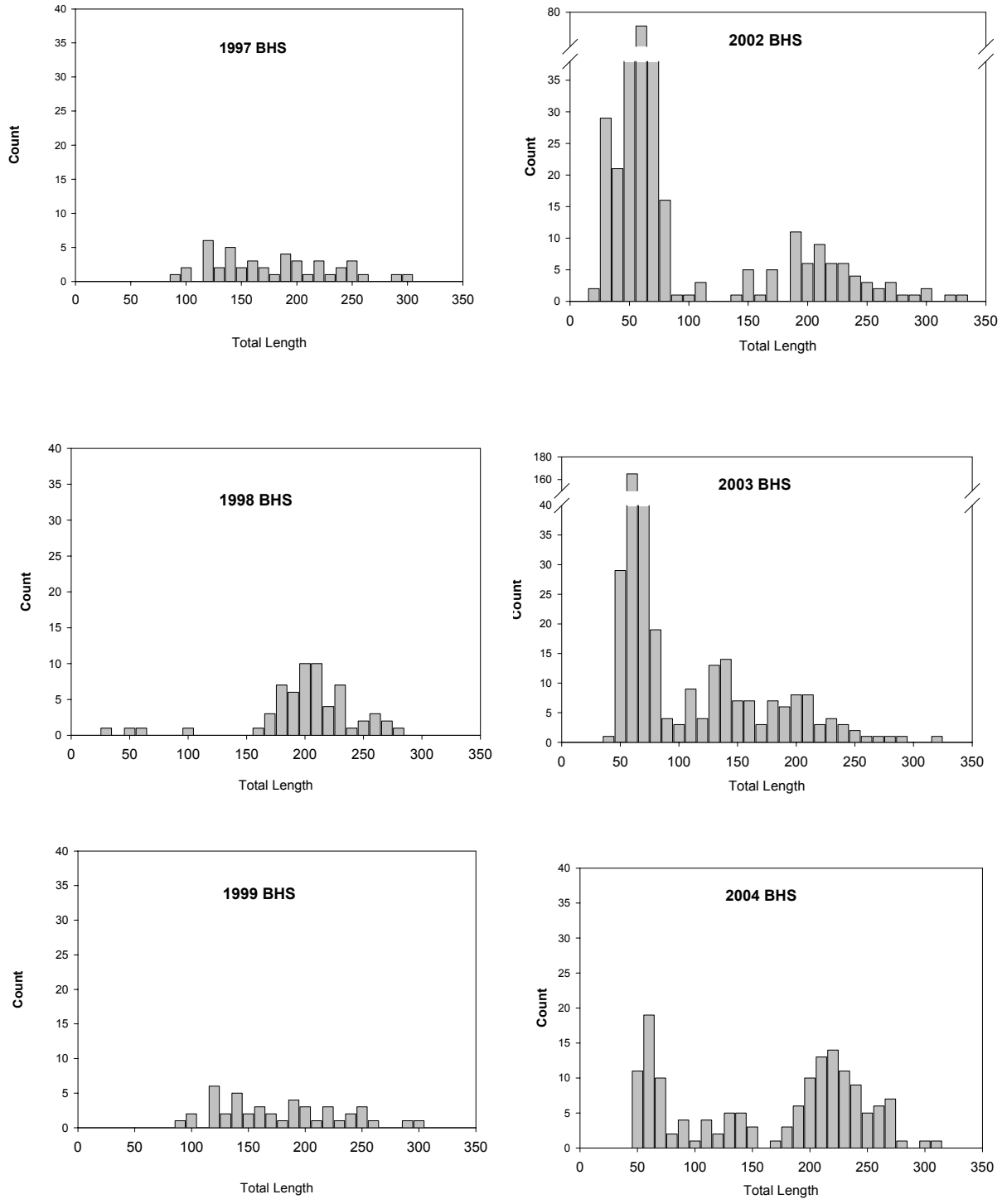

Figure 3. Length frequency distributions of bluehead sucker (BHS), caught in the Little Colorado River during the most recent 6 years of monitoring.

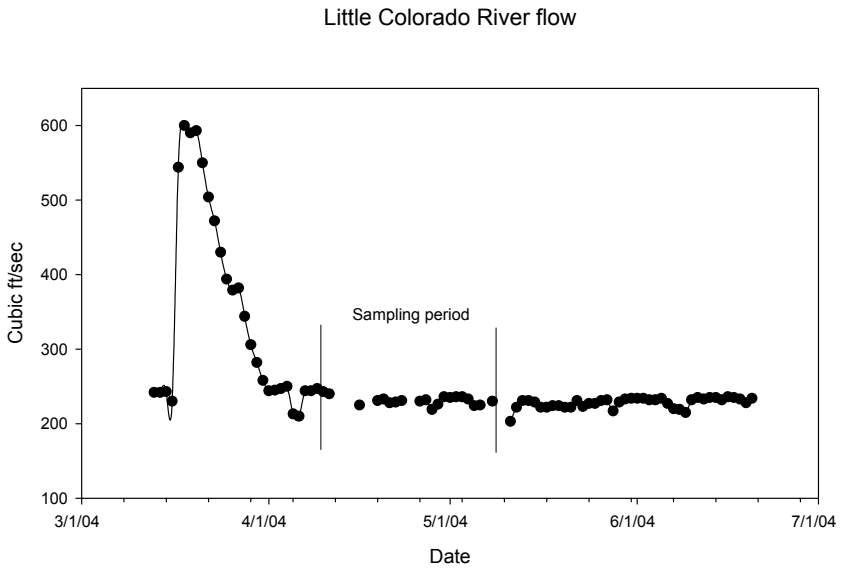

Figure 4. Mean daily flow of the Little Colorado River during the sampling period in 2004. USGS gauge above confluence with the Colorado River.

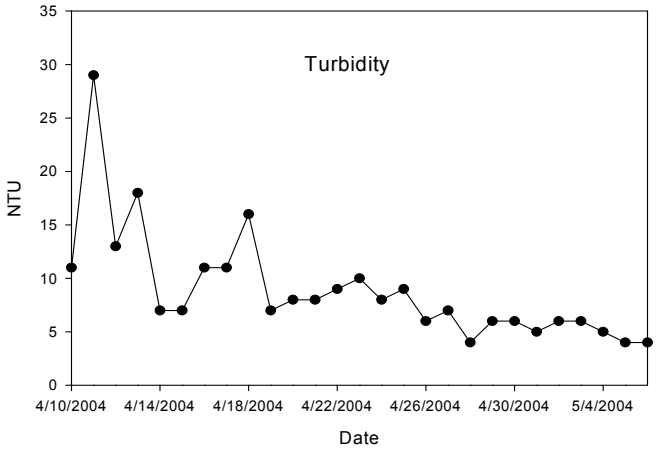

Figure 5**.** Mean daily turbidity (NTU's) in the Little Colorado River during 2004 sampling measured at Boulder Camp.

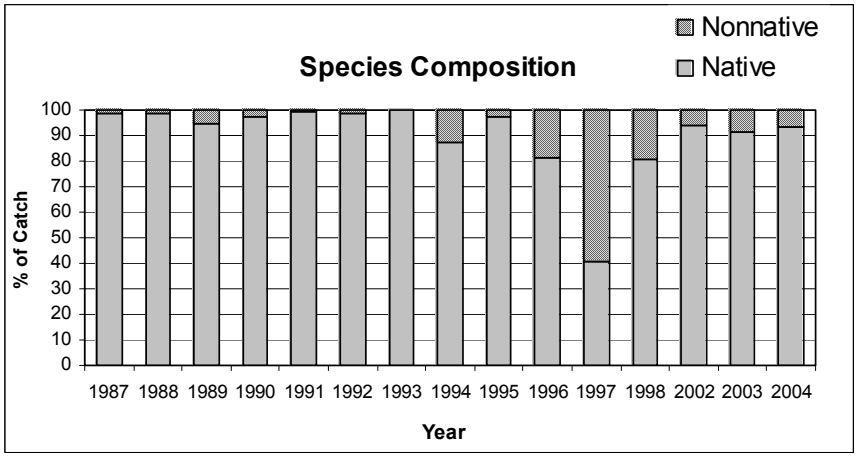

Figure 6. Species composition in standardized hoop net monitoring, 1987 - 2004.

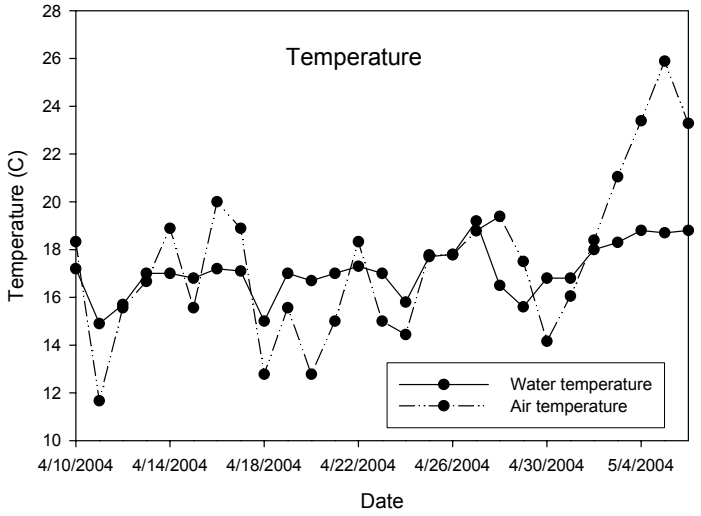

Figure 7. Daily water and air temperature (°C), at Boulder camp, LCR 2004.

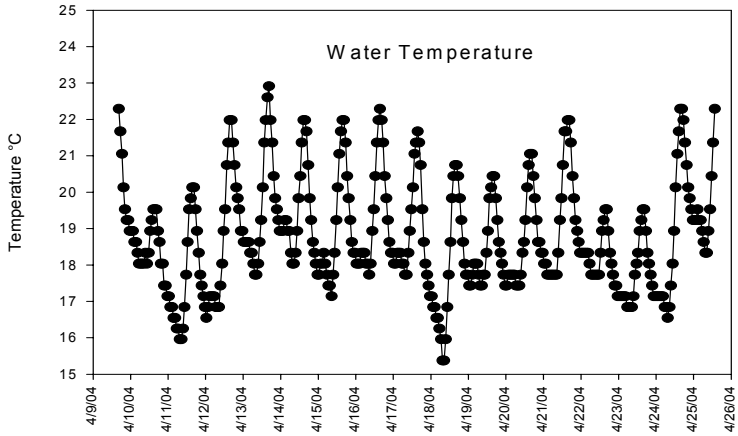

Figure 8. Daily water temperature fluctuations in the Little Colorado River as measured with an hourly Hobotemp® data logger.

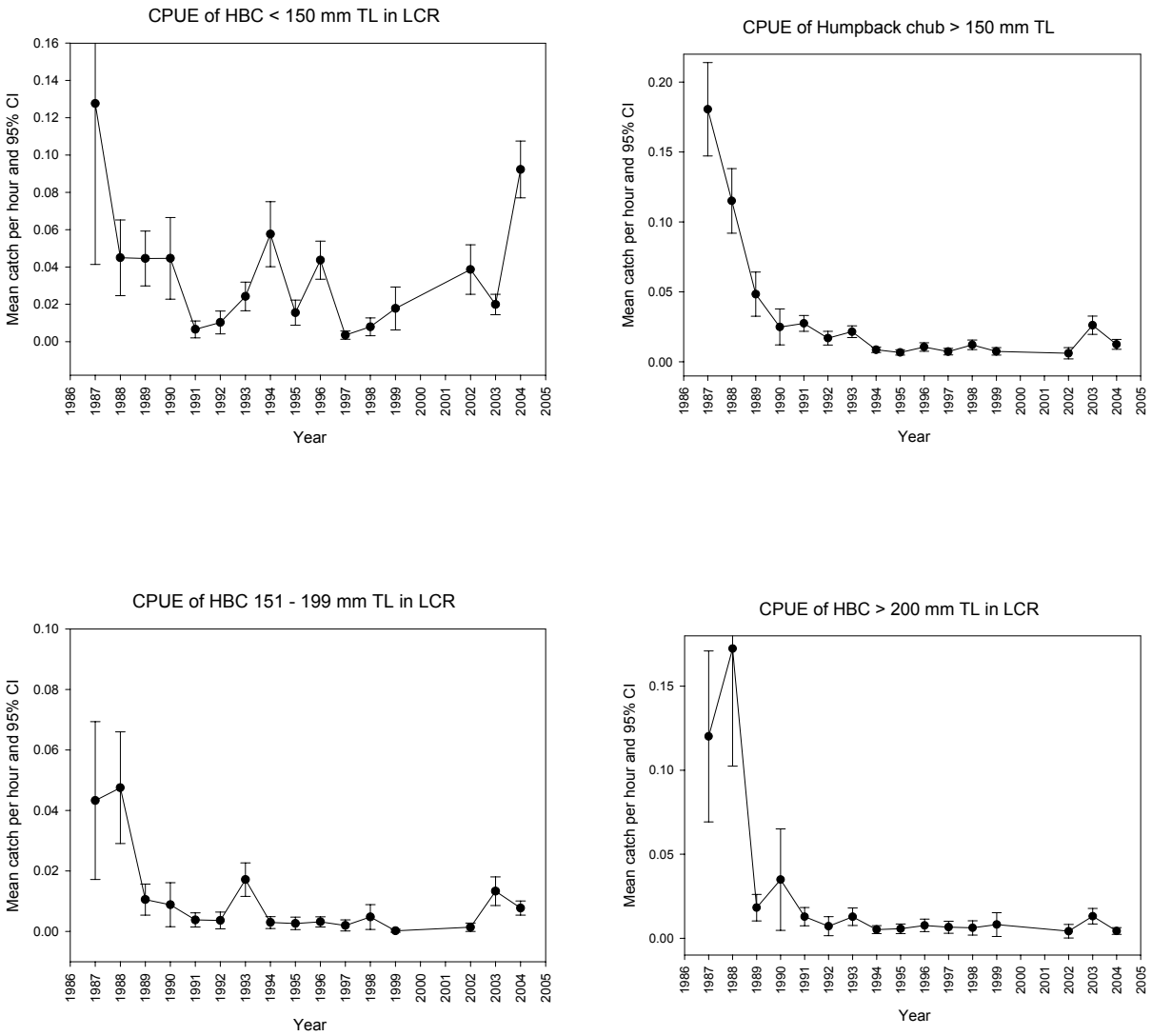

Figure 9. Mean catch/hr of humpback chub for four size groupings in the LCR, 1987 – 2004.

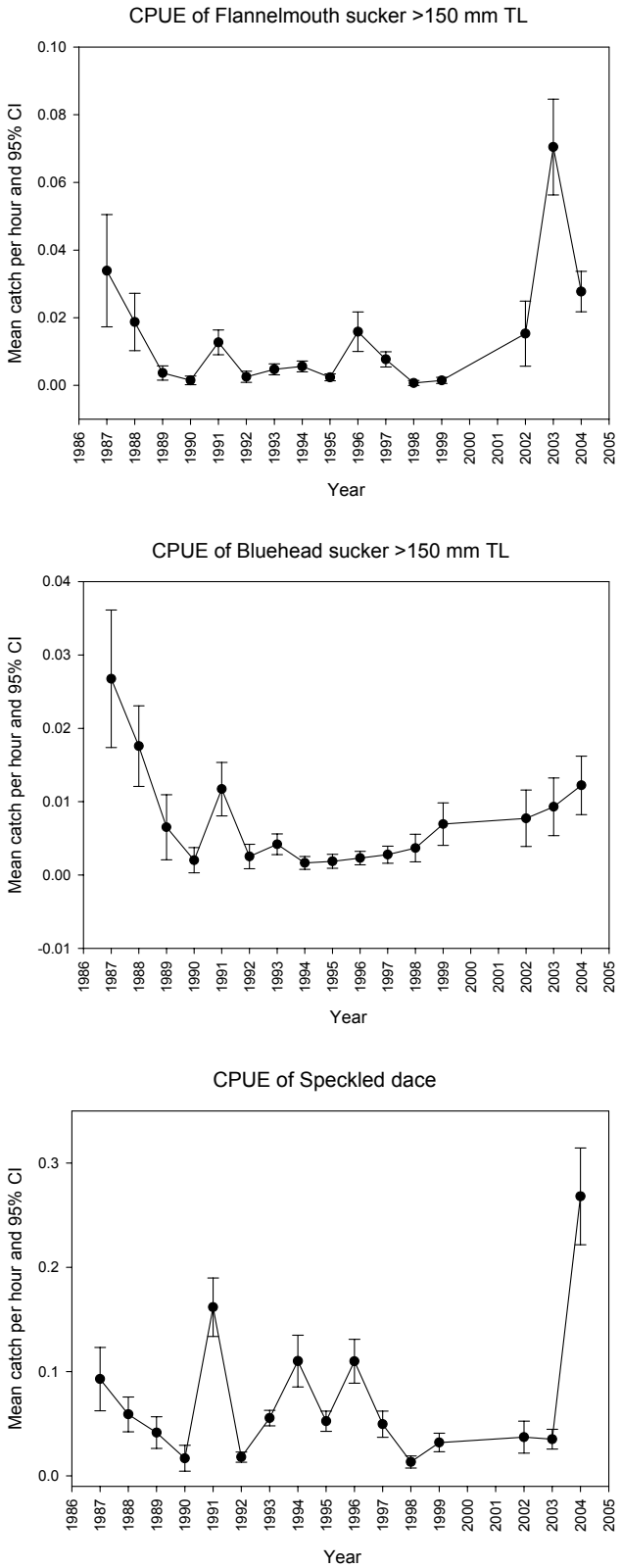

Figure 10. Mean catch/hr of flannelmouth sucker >150 mm, Bluehead sucker >150 mm and all sizes of speckled dace in the LCR, 1987 – 2004.

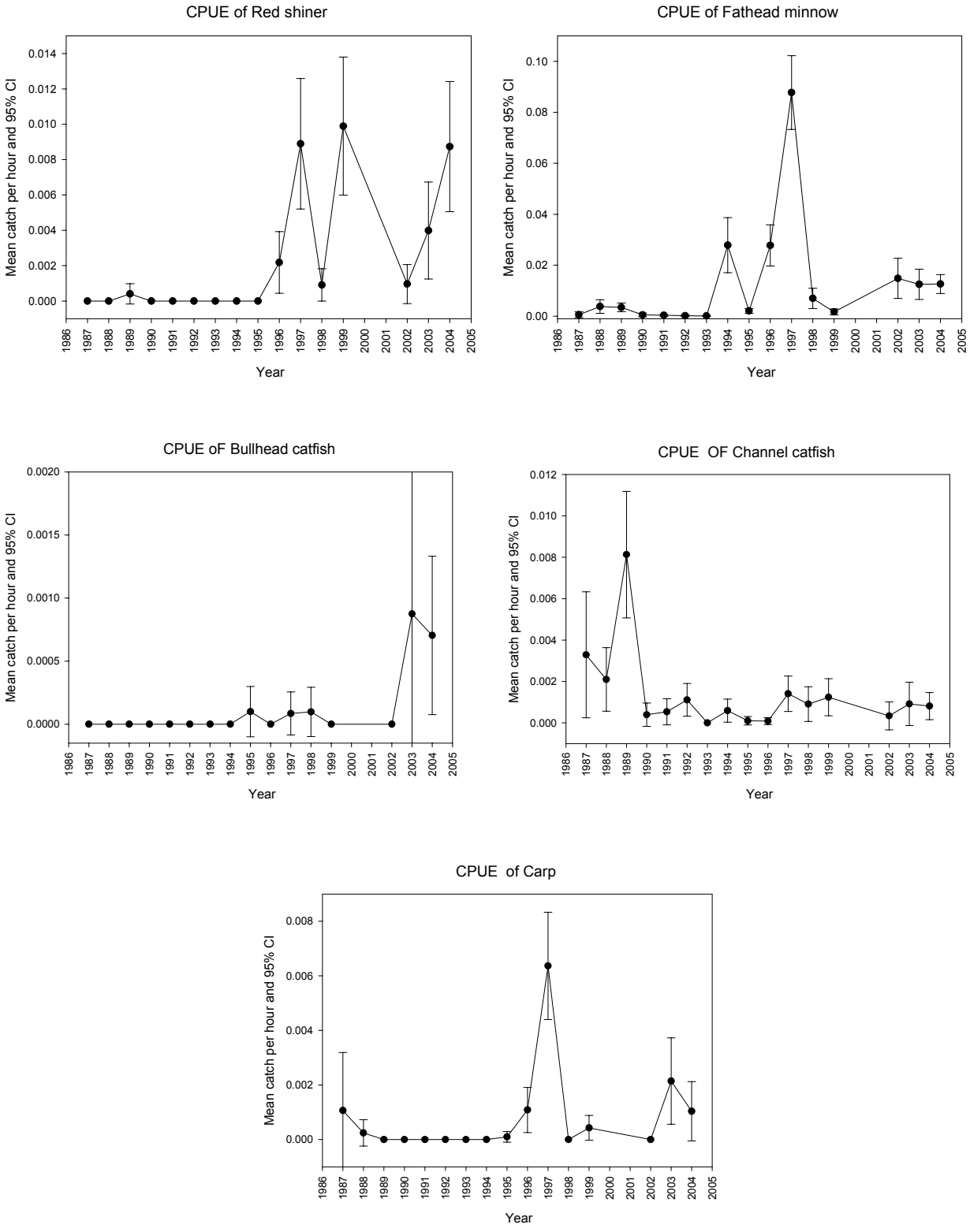

Figure 11. Mean catch/hr of nonnative fishes in the LCR, 1987-2004.

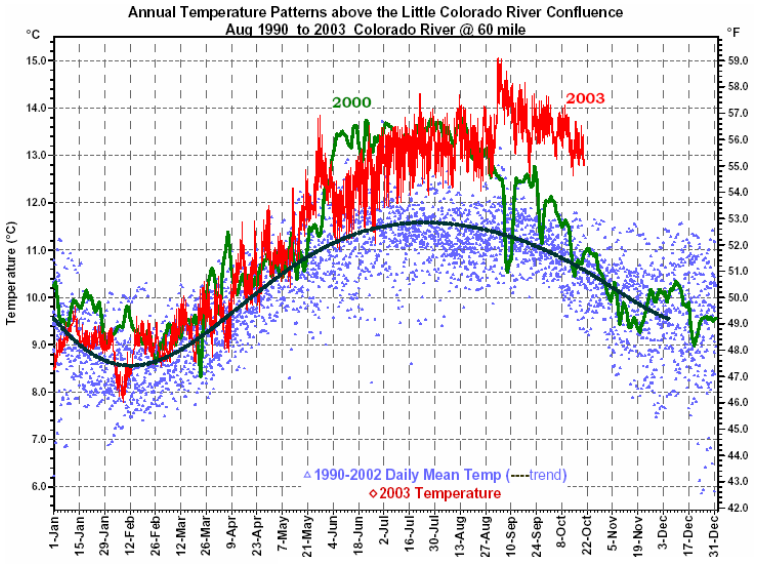

Figure created by Susan Hueftle (USGS)

Figure 12. Mainstem Colorado River water temperature above the Little Colorado River. Cloud of points represents 1990 – 2002 water temperatures.

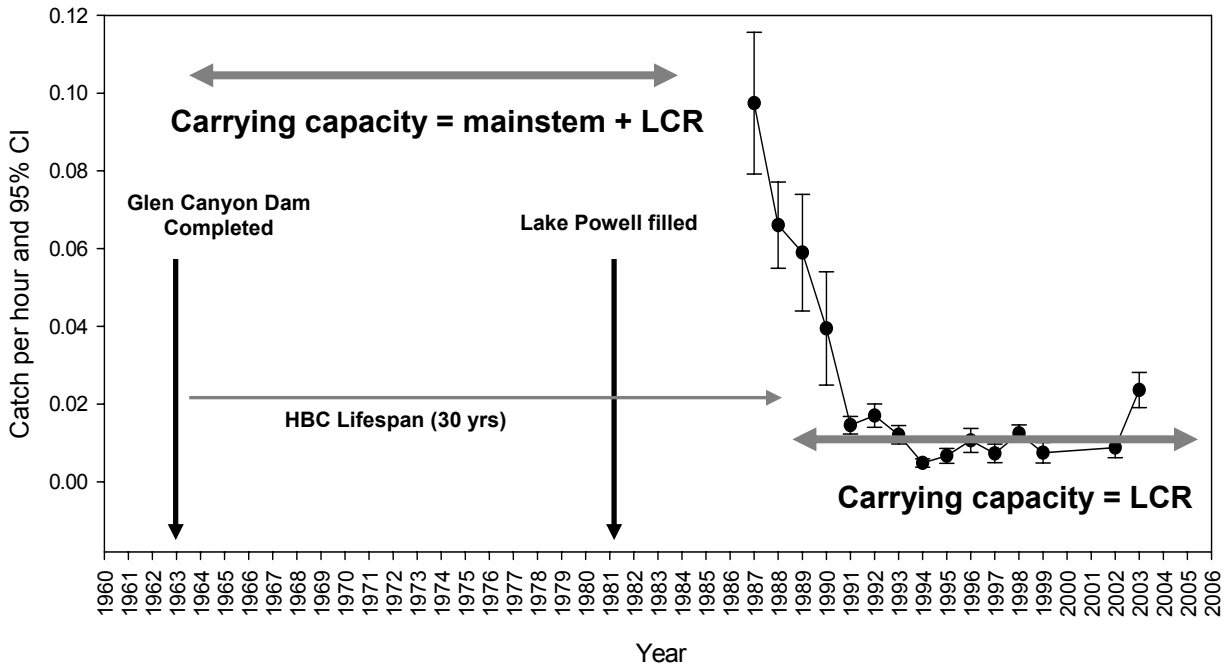

Figure 13. Potential explanation for the humpback chub CPUE trends observed since 1987. Two different carrying capacities based on different amount of area available as humpback chub habitat.

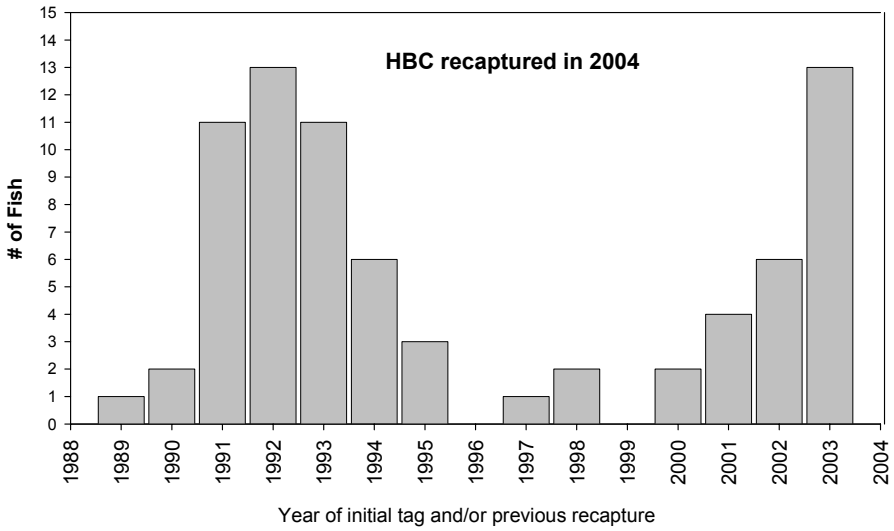

Figure 14. Number of years at large for humpback chub recaptured during Little Colorado River sampling in 2004. This analysis includes year of initial tagging as well as all subsequent captures.

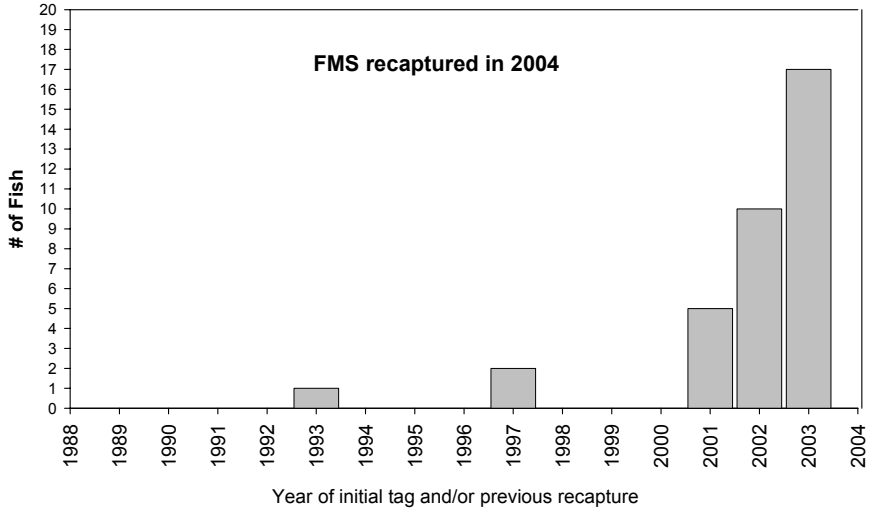

Figure 15. Number of years at large for flannelmouth suckers recaptured during Little Colorado River Monitoring in 2004. Includes initial capture as well as subsequent captures.

APPENDIX

2004 Humpback chub recapture summary

Tag Number	Old Tag Number	Species	TL	Recapture Date	Initial Tag Date	TL	RIVER	River Mile	RKM	Delta TL	Years out
3D9.1BF1994018	4360507121	HBC	279	4/10/2004	9/22/2002 3:09:00 PM	257	LCR		6.11	22	2
3D9.1BF1AC5A33	1F46600F2C	HBC	450	4/12/2004	3/16/1994 12:30:00 PM	459	LCR		6.46	-9	10
3D9.1BF1AC5A33	1F46600F2C	HBC	450	4/12/2004	4/19/1995 12:00:00 PM	455	LCR		6.5	-5	9
3D9.1BF19F8170	423E683550	HBC	327	4/27/2004	9/1/2001 8:41:00 PM	327	COR	65.2		0	3
3D9.1BF1A0DD4A	4269252D76	HBC	265	4/24/2004	11/8/2001 8:06:00 AM	131	LCR		2.15	134	2
3D9.1BF1A0DD4A	4269252D76	HBC	265	4/24/2004	5/20/2002 11:14:00 AM	170	LCR		1.3	95	2
3D9.1BF1A0DD4A	4269252D76	HBC	265	4/24/2004	9/18/2002 10:30:00 AM	220	LCR		2.3	45	2
3D9.1BF19F96C3	436229667C	HBC	280	5/2/2004	9/21/2002 9:41:00 AM	255	LCR		3.1	25	2
3D9.1BF1991F4B	53265F4A7A	HBC	362	4/14/2004	4/22/2000 5:40:00 PM	324	LCR		11.7	38	4
3D9.1BF1A0C80D	7F7A134E26	HBC	367	4/17/2004	4/26/1995 6:03:00 PM	198	LCR		1.045	169	9
3D9.1BF1A0C80D	7F7A134E26	HBC	367	4/17/2004	5/20/1995 2:00:00 PM	200	LCR		3.26	167	9
3D9.1BF1A0F0B5	7F7D173222	HBC	357	4/13/2004	7/5/1991 9:00:00 AM	331	LCR		10.4	26	13
3D9.1BF1A0F0B5	7F7D173222	HBC	357	4/13/2004	6/12/1993 6:00:00 AM	331	LCR			26	11
3D9.1BF1A0F0B5	7F7D173222	HBC	357	4/13/2004	2/17/1994 3:30:00 PM	333	LCR		1.46	24	10
3D9.1BF1A0F0B5	7F7D173222	HBC	357	4/13/2004	2/18/1994 12:30:00 PM	335	LCR		2.26	22	10
3D9.1BF19FA21B	7F7D175A14	HBC	380	5/2/2004	8/21/1991 9:45:00 AM	275	LCR		3.1	105	13
3D9.1BF19FA21B	7F7D175A14	HBC	380	5/2/2004	4/27/1992 9:52:00 AM	284	LCR		2.35	96	12
3D9.1BF19FA21B	7F7D175A14	HBC	380	5/2/2004	3/8/1993 12:15:00 PM	307	LCR		1.25	73	11
3D9.1BF1A0EDAB	7F7D180E1F	HBC	392	4/13/2004	6/17/1991 10:15:00 AM	325	LCR		9.1	67	13
3D9.1BF1A0EDAB	7F7D180E1F	HBC	392	4/13/2004	4/23/1992 9:29:00 AM	330	LCR		11.747	62	12
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	7/16/1991 8:34:00 PM	352	COR	60.9	124.2	24	13
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	3/29/1992 10:13:00 AM	354	LCR		2.5	22	12
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	4/22/1992 5:30:00 PM	356	LCR		11.747	20	12
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	4/20/1993 4:30:00 PM	357	LCR			19	11
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	3/27/1995 2:00:00 PM	354	LCR		8.58	22	9
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	4/17/2000 6:27:00 PM	375	LCR		10.7	1	4
3D9.1BF198CAB9	7F7D181C5C	HBC	376	4/14/2004	10/24/2002 2:25:00 PM	383	LCR		12.24	-7	1
3D9.1BF19FAECA	7F7D226737	HBC	420	4/26/2004	7/25/1991 5:30:00 AM	388	LCR			32	13
3D9.1BF19FAECA	7F7D226737	HBC	420	4/26/2004	3/9/1993 10:00:00 AM	392	LCR			28	11
3D9.1BF19FAECA	7F7D226737	HBC	420	4/26/2004	6/10/1993 12:30:00 AM	397	LCR			23	11
3D9.1BF19FAECA	7F7D226737	HBC	420	4/26/2004	8/12/1993 2:45:00 PM	400	LCR		5.16	20	11
3D9.1BF19FAECA	7F7D226737	HBC	420	4/26/2004	4/16/2002 10:00:00 AM	425	LCR		5.4	-5	2
3D9.1BF19F6F26	7F7D2A5808	HBC	350	5/1/2004	8/14/1991	258	LCR		12.4	92	13
3D9.1BF19F6F26	7F7D2A5808	HBC	350	5/1/2004	6/19/1992 10:30:00 AM	272	LCR		12.31	78	12
3D9.1BF19F6F26	7F7D2A5808	HBC	350	5/1/2004	2/15/1995 10:45:00 AM	312	LCR		2.18	38	9
3D9.1BF19F6F26	7F7D2A5808	HBC	350	5/1/2004	8/28/1998 9:53:00 PM	340	COR	60.8	124	10	6
3D9.1BF1992CBF	7F7D2A7A12	HBC	405	4/18/2004	7/28/1991 4:15:00 AM	375	LCR		10.4	30	13
3D9.1BF1992CBF	7F7D2A7A12	HBC	405	4/18/2004	3/29/1992 8:23:00 AM	371	LCR		3	34	12
3D9.1BF1992CBF	7F7D2A7A12	HBC	405	4/18/2004	7/17/1992 8:34:00 PM	371	COR	62.6	126.9	34	12
3D9.1BF1992CBF	7F7D2A7A12	HBC	405	4/18/2004	3/3/1993 1:20:00 PM	369	LCR			36	11
3D9.1BF1992CBF	7F7D2A7A12	HBC	405	4/18/2004	1/18/1994 1:45:00 PM	378	LCR		10.92	27	10
3D9.1BF1992CBF	7F7D2A7A12	HBC	405	4/18/2004	4/16/1995 11:00:00 AM	380	LCR		10.12	25	9
3D9.1BF199369E	7F7D330E00	HBC	408	4/13/2004	2/15/1992 12:20:00 PM	380	LCR		0.4	28	12
3D9.1BF199369E	7F7D330E00	HBC	408	4/13/2004	4/28/1992 10:15:00 AM	378	LCR		1.34	30	12
3D9.1BF199369E	7F7D330E00	HBC	408	4/13/2004	4/12/1995 11:15:00 AM	382	LCR		1.36	26	9

Tag Number	Old Tag Number	Species	TL	Recapture Date	Initial Tag Date	TL	RIVER	River Mile	RKM	Delta TL	Years out
3D9.1BF1929735	7F7D3E6F77	HBC	411	5/2/2004	6/14/1993 10:15:00 PM	375	COR	61.7	125.4	36	11
3D9.1BF1929735	7F7D3E6F77	HBC	411	5/2/2004	3/20/1994 11:00:00 AM	382	LCR		3.92	29	10
3D9.1BF1929735	7F7D3E6F77	HBC	411	5/2/2004	3/22/1995 4:15:00 PM	369	LCR		0	42	9
3D9.1BF1929735	7F7D3E6F77	HBC	411	5/2/2004	4/19/1995 12:00:00 PM	379	LCR		6.5	32	9
3D9.1BF1991FB8	7F7F331E1D	HBC	402	4/17/2004	2/16/1993 12:40:00 PM	361	LCR		0.39	41	11
3D9.1BF1991FB8	7F7F331E1D	HBC	402	4/17/2004	5/14/1993 5:57:00 PM	359	COR	61.4	125	43	11
3D9.1BF1991FB8	7F7F331E1D	HBC	402	4/17/2004	4/4/1998 11:00:00 AM	371	LCR		0	31	6
3D9.1BF1991FB8	7F7F331E1D	HBC	402	4/17/2004	4/19/1999 8:50:00 AM	386	LCR		0.48	16	5
3D9.1BF1991FB8	7F7F331E1D	HBC	402	4/17/2004	4/22/2002 9:07:00 AM	396	LCR		0.1	6	2
3D9.1BF198D39A	7F7F446643	HBC	403	4/25/2004	4/23/1990 12:16:00 PM	202	LCR		1.365	201	14
3D9.1BF198D39A	7F7F446643	HBC	403	4/25/2004	9/12/1992 6:23:00 PM	283	COR	60.6	123.7	120	12
3D9.1BF198D39A	7F7F446643	HBC	403	4/25/2004	3/27/1993 10:50:00 AM	286	LCR		0.56	117	11
3D9.1BF198D39A	7F7F446643	HBC	403	4/25/2004	3/28/1993 10:30:00 AM	287	LCR		0.49	116	11
3D9.1BF1CD25EB	7F7F456122	HBC	390	4/14/2004	4/21/1990 9:19:00 AM	341	LCR		1.2	49	14
3D9.1BF1CD25EB	7F7F456122	HBC	390	4/14/2004	5/10/1990 9:31:00 AM	342	LCR		0.621	48	14
3D9.1BF1CD25EB	7F7F456122	HBC	390	4/14/2004	11/8/1992 4:21:00 PM	354	COR	64.3	129.7	36	11
3D9.1BF1CD25EB	7F7F456122	HBC	390	4/14/2004	4/10/2002 10:30:00 AM	398	LCR		7.9	-8	2
3D9.1BF195DCF5		HBC	186	4/27/2004	5/6/2003 12:03:00 PM	158	LCR		0.96	28	1
3D9.1BF195DCF5		HBC	186	4/27/2004	10/26/2003 3:42:00 PM	186	LCR		0.96	0	1
3D9.1BF195DCF5		HBC	186	4/27/2004	10/28/2003 12:43:00 PM	184	LCR		0.96	2	0
3D9.1BF198B975		HBC	181	4/16/2004	9/15/2003 3:12:00 PM	175	COR			6	1
3D9.1BF198C26F		HBC	197	4/28/2004	10/26/2003 9:35:00 AM	192	LCR		10.54	5	1
3D9.1BF198C91D		HBC	178	4/26/2004	8/17/2003 12:11:00 AM	163	COR			15	1
3D9.1BF198D0D6		HBC	437	5/1/2004	5/6/2003 7:56:00 PM	346	COR	60.8		91	1
3D9.1BF198E5FA		HBC	395	4/10/2004	7/19/2003 2:22:00 AM	391	COR			4	1
3D9.1BF1991D7C		HBC	185	4/28/2004	10/28/2003 12:02:00 PM	169	LCR		0.31	16	1
3D9.1BF1991EEE		HBC	162	4/10/2004	10/27/2003 2:22:00 PM	161	LCR		5.3	1	0
3D9.1BF199329D		HBC	195	4/25/2004	10/24/2003 11:14:00 AM	189	LCR		2.83	6	1
3D9.1BF1A0E751		HBC	184	4/26/2004	9/23/2003 12:19:00 PM	172	LCR		0.53	12	1
3D9.1BF1A0F303		HBC	162	5/2/2004	10/26/2003 3:11:00 PM	139	LCR		1.33	23	1

2004 Flannelmouth sucker recapture summary

Tag Number	Old Tag Number	Species	TL	Recapture Date	Initial Tag Date	TL	RIVER	River Mile	RKM	Delta TL	Years out
3D9.1BF198CEA7	4242516416	FMS	439	4/22/2004	6/7/2001 12:50:00 PM	146	LCR		4.26	293	3
3D9.1BF198CEA7	4242516416	FMS	439	4/22/2004	4/14/2002 11:10:00 AM	260	LCR		2.1	179	2
3D9.1BF198CEA7	4242516416	FMS	439	4/22/2004	5/15/2002 5:08:00 AM	269	LCR		4.58	170	2
3D9.1BF198CEA7	4242516416	FMS	439	4/22/2004	9/21/2002 11:50:00 AM	302	LCR		3.8	137	2
3D9.1BF1A0E7FF	4362614253	FMS	356	4/12/2004	1/24/2003 9:58:00 PM	277	COR			79	1
3D9.1BF1CD26B2	42424B702E	FMS	545	4/20/2004	6/5/2001 2:30:00 PM	520	LCR		0	25	3
3D9.1BF192ADE2	42424D0A33	FMS	383	4/26/2004	6/4/2001 4:27:00 PM	123	LCR		4.2	260	3
3D9.1BF1A0DEE7	426D533B0B	FMS	390	4/11/2004	2/17/2002 8:08:00 PM	192	COR	61.2		198	2
3D9.1BF1A0DEE7	426D533B0B	FMS	390	4/11/2004	4/13/2003 8:20:00 AM	290	LCR		0.1	100	1
3D9.1BF1A0DEE7	426D533B0B	FMS	390	4/11/2004	4/21/2003 8:38:00 AM	294	LCR		0.1	96	1
3D9.1BF19F8F20	433F051263	FMS	346	4/27/2004	3/11/2003 7:18:00 PM	240	COR			106	1
3D9.1BF19F8F20	433F051263	FMS	346	4/27/2004	4/17/2003 11:58:00 AM	246	LCR		1.045	100	1
3D9.1BF19FA217	434729497F	FMS	449	4/30/2004	5/16/2002 11:10:00 AM	265	LCR		12.24	184	2
3D9.1BF19F71BE	43624C5A33	FMS	502	4/30/2004	1/20/2003 12:35:00 AM	499	COR			3	1
3D9.1BF19F8569	436278627F	FMS	371	4/26/2004	1/23/2003 6:40:00 PM	205	COR			166	1
3D9.1BF1E916C6	43642C347C	FMS	468	4/19/2004	2/20/2003 6:55:00 PM	428	COR			40	1
3D9.1BF19F7E58	7F7B1A0616	FMS	511	5/1/2004	5/14/1997	415	LCR		0	96	7
3D9.1BF19F7E58	7F7B1A0616	FMS	511	5/1/2004	3/28/1998 11:00:00 AM	445	LCR		0	66	6
3D9.1BF1AC509B	7F7D1E2E60	FMS	510	4/10/2004	4/18/1993 2:00:00 PM	206	COR	120.47		304	11
3D9.1BF198BA33		FMS	412	4/13/2004	8/17/2003 2:25:00 AM	351	COR			61	1
3D9.1BF198C1C3		FMS	345	4/16/2004	7/26/2003 9:20:00 PM	286	COR			59	1
3D9.1BF198C3DF		FMS	303	4/16/2004	7/23/2003 1:59:00 AM	245	COR			58	1
3D9.1BF198C3DF		FMS	303	4/16/2004	9/13/2003 12:35:00 AM	271	COR			32	1
3D9.1BF198C845		FMS	425	4/14/2004	9/13/2003 10:30:00 PM	376	COR			49	1
3D9.1BF198C964		FMS	320	4/10/2004	7/23/2003 8:20:00 PM	272	COR			48	1
3D9.1BF198CF81		FMS	256	4/28/2004	10/27/2003 12:25:00 PM	214	LCR		1.27	42	1
3D9.1BF198E2A6		FMS	341	4/29/2004	5/6/2003 1:30:00 PM	224	LCR		1.34	117	1
3D9.1BF198E49A		FMS	328	4/29/2004	4/29/2003 3:51:00 PM	220	LCR		8.12	108	1
3D9.1BF198EFFA		FMS	214	4/13/2004	8/17/2003 8:09:00 AM	175	COR			39	1
3D9.1BF1992B8C		FMS	263	5/1/2004	5/5/2003 1:21:00 PM	159	LCR		0.47	104	1
3D9.1BF1992B8C		FMS	263	5/1/2004	8/17/2003 2:00:00 AM	175	COR			88	1
3D9.1BF1A0D415		FMS	257	4/29/2004	9/14/2003 12:03:00 AM	239	COR			18	1
3D9.1BF1A0D6D2		FMS	364	4/17/2004	9/18/2003 8:40:00 PM	316	COR			48	1
3D9.1BF1A0E71B		FMS	298	4/19/2004	7/20/2003 8:27:00 PM	229	COR			69	1
3D9.1BF1A0E928		FMS	373	4/22/2004	7/22/2003 10:40:00 PM	305	COR			68	1

2004 Bluehead sucker recapture summary

Tag Number	Old Tag Number	Species	TL	Recapture Date	Initial Tag Date	TL	RIVER	River Mile	RKM	Delta TL	Years out
3D9.1BF1A07283					Not in GCMRC 14.5 Database						

2004 Auto Detect Antenna - recapture summary

Tag Number	Old Tag Number	Species	TL	Recapture Date	Initial Tag Date	TL	RIVER	River Mile	RKM	Delta TL	Years out
	1F0F61363B	HBC		4/17/2004	7/16/1993	342	LCR		0.04		11
	1F0F61363B	HBC		4/17/2004	8/11/1993	338	LCR				11
	1F0F61363B	HBC		4/17/2004	4/30/2001	388	LCR		-0.04		3
	1F46675262	HBC	**Not**	4/15/2004	3/16/1994	340	LCR		6.82	**Not**	10
	1F46675262	HBC	**Applicable**	4/15/2004	4/25/2003	380	LCR		0.119	**Applicable**	1
	423E5F690F	HBC		4/18/2004	4/11/2002	125	LCR		1.76		2
	423E5F690F	HBC		4/18/2004	4/12/2002	124	LCR		1.76		2
	423E5F690F	HBC	**Fish**	4/18/2004	4/13/2002	125	LCR		1.76		2
	423E5F690F	HBC	**Not**	4/18/2004	10/24/2002	185	LCR		2.35		1
	423E683550	HBC	**Handled**	4/26/2004	9/1/2001	327	COR	65.2			3
	42410C4E36	HBC	**when**	4/15/2004	4/15/2002	102	LCR		1.13		2
	4362206D6E	FMS	**Passing**	4/15/2004	2/20/2003	180	COR				1
	53207B7C19	HBC	**through**	4/26/2004	4/17/2000	277	LCR		14.53		4
	53207B7C19	HBC	**Auto**	4/26/2004	4/27/2003	295	LCR		0.5		1
	7F7A134E26	HBC	**Detect**	4/15/2004	4/26/1995	198	LCR		1.045		9
	7F7A134E26	HBC	**Antenna**	4/15/2004	5/20/1995	200	LCR		3.26		9
	7F7D18130C	HBC		4/12/2004	6/4/1991	360	LCR		11.58		13
	7F7D18130C	HBC		4/12/2004	6/8/1991	362	LCR		11.58		13
	7F7D18130C	HBC		4/12/2004	6/25/1991	356	LCR		11.58		13
	7F7D18130C	HBC		4/12/2004	7/26/1991	358	LCR		11.5		13
	7F7D18130C	HBC		4/12/2004	8/1/1991	352	LCR		11.5		13
	7F7D18130C	HBC		4/12/2004	3/9/1993	365	LCR		1.63		11
	7F7D18130C	HBC		4/12/2004	5/4/2001	392	LCR		11.8		3
	7F7D18130C	HBC		4/12/2004	6/10/2001	388	LCR		11.7		3
	7F7D18130C	HBC		4/12/2004	4/11/2002	393	LCR		11.7		2
	7F7D18130C	HBC		4/12/2004	4/12/2002	393	LCR		11.8		2
	7F7D225850	HBC		4/16/2004	7/26/1991	255	LCR		3.8		13
	7F7D225850	HBC		4/16/2004	7/31/1991	255	LCR		3.1		13
	7F7D225850	HBC		4/16/2004	4/16/1993	290	LCR		0.54		11
	7F7D225850	HBC		4/16/2004	4/13/1994	309	LCR		2.18		10
	7F7D225850	HBC		4/16/2004	5/17/1994	310	LCR				10
	7F7D225850	HBC		4/16/2004	2/15/1995	312	LCR		0.98		9
	7F7D225850	HBC		4/16/2004	4/13/1995	318	LCR		2.2		9
	7F7D225850	HBC		4/16/2004	4/7/1999	356	LCR		2.897		5
	7F7D225850	HBC		4/16/2004	4/26/1999	356	LCR		2.363		5
	7F7D225850	HBC		4/16/2004	4/27/1999	357	LCR		2.363		5
	7F7D226078	HBC		4/15/2004	7/11/1991	314	LCR		10.2		13
	7F7D226078	HBC		4/15/2004	5/24/1992	306	LCR		8.568		12
	7F7D226756	HBC		4/11/2004	7/6/1991	324	LCR		0		13
	7F7D226756	HBC		4/11/2004	3/9/1993	339	LCR		0.37		11
	7F7D226756	HBC		4/11/2004	4/16/1994	340	LCR		2.18		10
	7F7D226756	HBC		4/11/2004	4/18/1994	339	LCR		2.32		10
	7F7D226756	HBC		4/11/2004	4/21/1999	357	LCR		0.093		5
	7F7F050725	HBC		4/25/2004	5/19/1989	170	LCR		1.11		15
	7F7F050725	HBC		4/25/2004	5/22/1989	166	LCR		1.2		15
	7F7F050725	HBC		4/25/2004	8/23/1991	261	LCR		3.05		13

Fish caught in both lower 1200 meter monitoring and detected by auto-detect antenna.

Tag Number	Old Tag Number	Species	TL	Recapture Date	Initial Tag Date	TL	RIVER	River Mile	RKM	Delta TL	Years out
	7F7F050725	HBC		4/25/2004	4/16/1994	320	LCR		0.62		
	7F7F1F7F17	HBC	**Not**	4/15/2004	3/8/1993	347	LCR		1.62	**Not**	
	7F7F1F7F17	HBC	**Applicable**	4/15/2004	2/10/1994	345	LCR		0.08	**Applicable**	
	7F7F205501	BHS		4/15/2004	4/24/1992	272	LCR		0.63		
	7F7F205501	BHS		4/15/2004	4/24/1992	275	LCR		0.63		
	7F7F205501	BHS	**Fish**	4/15/2004	4/25/1992	273	LCR		0.63		
	7F7F205501	HBC	**Not**	4/15/2004	4/25/1992	341	LCR		1.39		
	7F7F205501	HBC	**Handled**	4/15/2004	5/14/1993	280	LCR		5.96		
	7F7F205501	HBC	**when**	4/15/2004	2/15/1995	299	LCR		2.32		
	7F7F205501	HBC	**Passing**	4/15/2004	4/18/1995	298	LCR		3.24		
	7F7F205501	HBC	**through**	4/15/2004	4/19/1995	295	LCR		2.92		
	7F7F205501	HBC	**Auto**	4/15/2004	4/26/1996	310	LCR		0.2		
	7F7F20597D	HBC	**Detect**	4/15/2004	4/22/1992	353	LCR		12.367		
	7F7F20597D	HBC	**Antenna**	4/15/2004	4/25/1992	348	LCR		10.68		
	7F7F20597D	HBC		4/15/2004	4/25/1992	348	LCR		10.66		
	7F7F27195B	HBC		4/15/2004	3/8/1993	401	LCR		1.62		
	7F7F272D75	HBC		4/26/2004	3/8/1993	393	LCR		1.62		
	7F7F272D75	HBC		4/26/2004	4/18/1993	390	LCR				
	7F7F272D75	HBC		4/26/2004	10/22/2002	410	LCR		9.51		
	7F7F390F12	HBC		4/16/2004	5/21/1992	347	LCR		0.39		
	7F7F390F12	HBC		4/16/2004	4/19/1995	347	LCR		2.86		
	7F7F395640	HBC		4/15/2004	3/9/1993	385	LCR				
	7F7F395640	HBC		4/15/2004	3/20/1994	380	LCR		0.62		
	7F7F3E3C5C	HBC		4/15/2004	11/18/1990	422	COR	61.1	124.5		
	7F7F3E3C5C	HBC		4/15/2004	7/25/1991	411	LCR		2.9		
	7F7F3E3C5C	HBC		4/15/2004	11/10/1991	407	COR	60.9	124.2		
	7F7F3E3C5C	HBC		4/15/2004	5/12/1993	409	LCR		5.91		
	7F7F3E3C5C	HBC		4/15/2004	7/15/1993	408	COR	61.1	124.5		
	7F7F3E3C5C	HBC		4/15/2004	10/13/1993	410	LCR		0.06		
	7F7F3E3C5C	HBC		4/15/2004	5/11/1997	415	LCR		0.1		
3D9.1BF195C33A		HBC		4/21/2004	9/22/2003	168	LCR		0.76		
3D9.1BF195C33A		HBC		4/21/2004	10/27/2003	175	LCR		1.33		
3D9.1BF1962DBB		HBC		4/18/2004	5/1/2003	167	LCR		2.62		
3D9.1BF198B6DD		HBC		4/16/2004	7/22/2003	389	COR				
3D9.1BF198B90E		HBC		4/30/2004	10/26/2003	196	LCR		1.33		
3D9.1BF198B975		HBC		4/21/2004	9/15/2003	175	COR				
3D9.1BF198C182		HBC		4/14/2004	10/28/2003	255	LCR		1.5		
3D9.1BF198C1C6		HBC		4/15/2004	5/5/2003	163	LCR		1.25		
3D9.1BF198C5EC		HBC		4/15/2004	9/13/2003	224	COR				
3D9.1BF198EC60		HBC		4/14/2004	9/15/2003	375	COR				
3D9.1BF19920DD		HBC		4/12/2004	9/18/2003	373	LCR		1.86		1
3D9.1BF1992334		HBC		4/18/2004	10/27/2003	124	LCR		0.96		0
3D9.1BF1A0D529		HBC		4/17/2004	9/15/2003	103	LCR		3.05		1
3D9.1BF1A0E30A		HBC		4/16/2004	10/26/2003	140	LCR		1.76		0
3D9.1BF1A0E4CD		HBC		4/16/2004	10/23/2003	191	LCR		2.19		0
3D9.1BF1A0EB2E		HBC		4/17/2004	10/26/2003	215	LCR		1.25		0
3D9.1BF1A131D1		HBC		4/17/2004	4/5/2003	174	LCR		2.81		1

Fish caught in both lower 1200 meter monitoring and detected by auto-detect antenna.