

- I. Project Title: Smallmouth bass and channel catfish control in the lower Yampa River
- II. Principal Investigator(s):  
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- III. Project Summary: This project is a continuation of work that began in 2001 to reduce the impacts of increasing smallmouth bass (SMB) densities and channel catfish on native and endangered fish in the lower Yampa River. The methods and objectives for a specific year can be reviewed in the annual reports and a synthesis report for this project. Study objectives included estimating the smallmouth bass population of the lower Yampa River in Yampa Canyon, reducing the abundance of smallmouth bass, analyzing catch rates to assess efficacy, determining native and nonnative fish composition, and locating possible “hotspots” of spawning activity. This year a marking pass for smallmouth bass population estimation was conducted, in addition to three removal passes for smallmouth bass and channel catfish >400mm. The composition and relative abundance of both nonnative and native species was also determined for four one-mile sub-reaches in order to monitor the fish community response to removal efforts.
- IV. Study Schedule: To be continued as needed
- V. Relationship to RIPRAP:  
General Recovery Program Support Action Plan  
III.A.2.c Evaluate the effectiveness and develop and implement an integrated, viable active control program.
- Green River Action Plan: Yampa and Little Snake Rivers  
III.A.1. Implement Yampa Basin aquatic wildlife management plan...
- VI. Accomplishment of FY 2008 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

*Smallmouth Bass Population Estimate and Exploitation*

Three hundred nine “juvenile” (100-199mm) and 61 adult ( $\geq 200$ mm) smallmouth bass were marked on the first pass. Of those fish, 18 juveniles and 5 adults were removed in the second pass. The population of adult smallmouth bass was estimated at 537 (155-919 95% C.I.) and for juvenile bass at 6,510 (3,669- 9,351 95% C.I.; Table 1). The last population estimate was conducted for bass of all sizes in 2005, with an estimate of 24,893 (15,890-39,460 95% C.I.). The estimate in 2008 was 6,956 (4,249-9,664 95%

C.I.) for bass  $\geq 100\text{mm}$  (Table 1). The difference in sizes of bass included in the two estimates makes direct comparisons difficult. For 2008, the number of bass per river mile was estimated at 151 bass/mile for bass  $\geq 100\text{mm}$ , with 12 adults/mile and 142 juveniles/mile.

The exploitation rate for 2008 based on the point estimate for fish  $\geq 100\text{mm}$  was 23% for three passes. This compares to a 10.7% exploitation rate in 2005, the last time the population was estimated. Based on the point estimates for juveniles and adults, 22% of the estimated number of juveniles was removed, and 28% of the estimated number of adults was removed. If tag returns are used to calculate exploitation rates, 13% of tagged juvenile fish were removed and 16% of tagged adult fish were removed.

#### *Smallmouth Bass Removal*

The number of bass removed in each pass is shown in Table 2. For the following analyses, the terms “juvenile” and “adult” were applied to fish in growth adjusted size classes based on recapture of tagged fish. During the marking pass, fish  $\geq 200\text{mm}$  were classified as adults, fish 100-199mm as juveniles, and fish  $< 100\text{mm}$  were categorized as “age-1.” Only one potential young of year bass (TL = 47mm) was captured during pass 4. As growth rates were determined for recaptured fish, the total lengths used for age classification were adjusted to reflect maximum growth of recaptured fish, except in instances where adjustments would result in marked fish being reclassified in a younger age class than they were originally marked.

For all passes combined, the catch rate was 17.9 bass/hour, with 1.4 adult fish/hour, 11.6 juveniles/hour, and 5 age-1 fish/hour. In order to compare the catch rate with previous years, the catch rate for SMB  $\geq 100\text{mm}$  was calculated at 15.5 fish/hr, an increase from the previous two years (Figure 1). Catch rates for all bass by pass showed an increase in passes 1-3, and a decrease in pass 4 (Figure 2). When catch rates were broken down into size classes, only catch rates for adults showed an overall decline by pass (Figure 3). Trends for CPUE by pass were similar whether analyzing bass  $\geq 100\text{mm}$ , juveniles, or all bass combined, reflecting the fact that 92% of bass captured were juveniles or age-1. Length frequencies show the most abundant length category was fish 100-125mm (Figure 4).

Sampling Yampa Canyon for seven passes continued to be difficult given the high flows this summer and the rapid decrease in discharge following peak flows. The addition of a marking pass for population estimation also decreased the number of trips available in which to conduct removal. Despite only three removal passes, we were able to remove 25% of the estimated bass  $\geq 100\text{mm}$ . Increases in catch rates are mainly attributed to an increase in fish  $< 125\text{mm}$ . The proportion of fish 100-125mm doubled relative to 2007, and follows a large proportion of  $< 100\text{mm}$  fish being caught in 2007 in Lily Park and Little Yampa Canyon (Hawkins 2007), and Yampa Canyon (Fuller 2007).

Adult bass were distributed throughout the canyon in similar numbers (Figure 5), but juvenile bass, and particularly “age-1” bass, were more abundant in reaches 1-2 and 6-10.

These reaches are characterized by lower gradients and more riffle and pool habitats. Reaches 3-5 between Teepee Rapid and Big Joe Rapid are characterized by higher gradient and more continuous stretches of rapids and riffles.

#### *Channel Catfish Removal*

Eighty-three channel catfish >399mm total length were removed during the four passes, with a catch rate of 0.54 large catfish per hour. In 2007, the catch rate for the same size of catfish was 0.46 fish/hour. Catch rates increased with each pass, likely due to decreasing flows and more effective sampling of river bottom habitat.

#### *Ancillary Captures*

Ancillary fish captures are listed in Table 3.

#### *Monitoring Reaches*

Four monitoring reaches were sampled during pass 2. Flannemouth sucker and bluehead sucker were the most abundant species caught, followed by channel catfish and roundtail chub (Figure 6). In comparison with 2007, there was a decrease in catch rate of flannemouth sucker and an increase in catch rate of bluehead sucker (Figure 7). Channel catfish catch rates appeared to remain similar. Although smallmouth bass and roundtail chub catch rates declined, the small number of these fish caught makes it difficult to determine if these decreases were significant.

#### *Movement of Marked Smallmouth Bass*

Nine of 61 adult (TL  $\geq$ 200mm) bass were recaptured during the three removal passes. Of those bass recaptured, seven (78%) were caught in the same reach where they were marked. One bass (11%) moved into the next reach downstream, and one (11%) moved three reaches upstream. Two marked bass >350mm from the USFWS/Utah DWR Whirlpool/Split Mountain study (SOW #123) were caught over 20 and 32 river miles up Yampa Canyon. Six bass >200mm were caught from John Hawkins' study reaches upstream. Thirty-nine of 309 marked juvenile (TL 100-199mm) bass were recaptured during removal passes. Twenty-seven (69%) of these juvenile recaptures were found in the same reach where they were marked, and the remaining twelve (31%) were caught one reach downstream of their original capture. Two fish with fin clips but no tags were recaptured—one juvenile and one adult—giving an estimate of 4% tag loss from this study reach.

## VII. Recommendations:

- 1) Complete seven passes in order to increase exploitation and determine if mechanical removal is feasible. Labor intensive scopes of work early in the season and high spring flows have delayed crews' ability to sample Yampa Canyon. Decreasing flows following run-off the past several years have been characterized by a brief window during which electrofishing boats can be used in the canyon. Perhaps completing two passes for the population estimate in early spring would allow more removal passes to be completed when flows return to levels where electrofishing is more effective. In addition, earlier marking may provide insights into the possible



Fuller, M. 2007. Development of a smallmouth bass and channel catfish control program in the lower Yampa River. 2007 Annual Report. Recovery Implementation Program for the Recovery of Endangered Fishes in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Denver, CO.

Table 1. Lincoln-Petersen estimates of smallmouth bass in Yampa canyon, 2008.

Size class	Abundance	95% CI	SE	CV (%)
Juvenile (100-199mm TL)	6510	3669-9351	1421	22
Adult (>200mm TL)	537	155-919	191	36
>100mm (used in previous years)	6956	4249-9664	1354	19

Table 2. Smallmouth bass removed by pass, 2008.

Pass	Date	Bass <100mm	Bass 100-199mm	Bass >200mm
1	July 8-11	111	51	4
2	July 14-17	196	398	51
3	July 22-25	315	603	67
4	July 29-Aug. 1	142	434	31
Total		764	1486	153

Table 3. Ancillary fish captures.

Species	Number removed
Northern pike	3
Walleye	3
Green sunfish	6
Bluegill	23
Black crappie	3

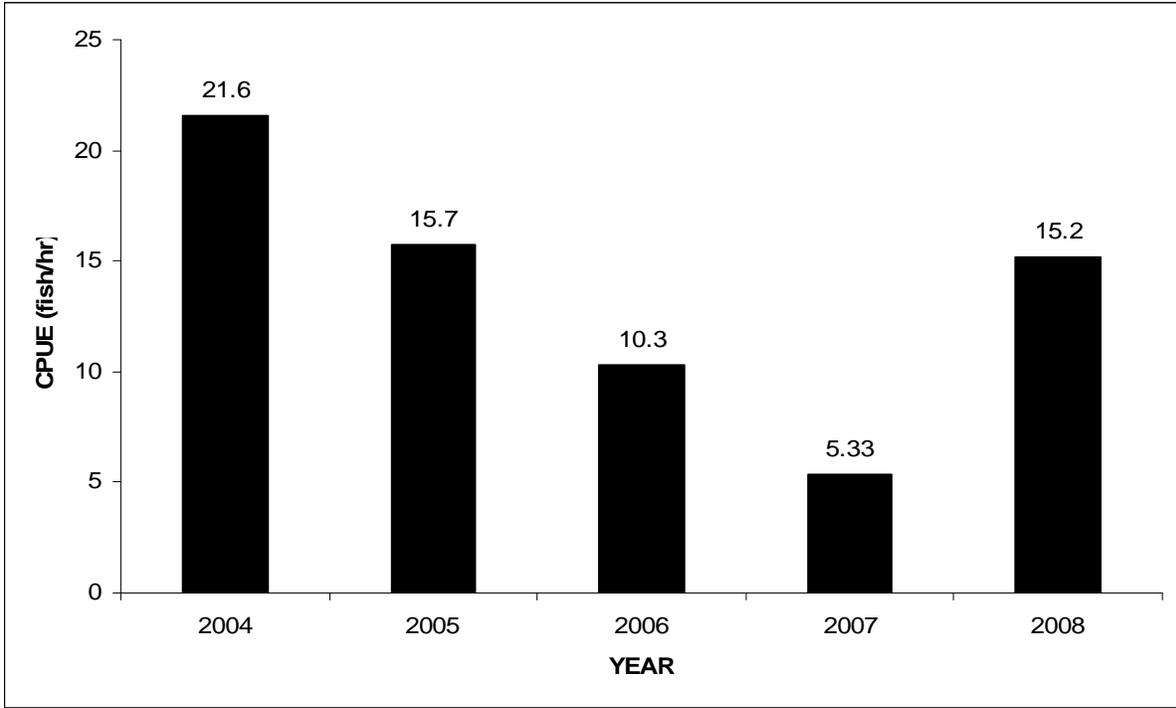


Figure 1. Catch per unit effort for smallmouth bass >100mm total length, all passes combined, 2004-2008.

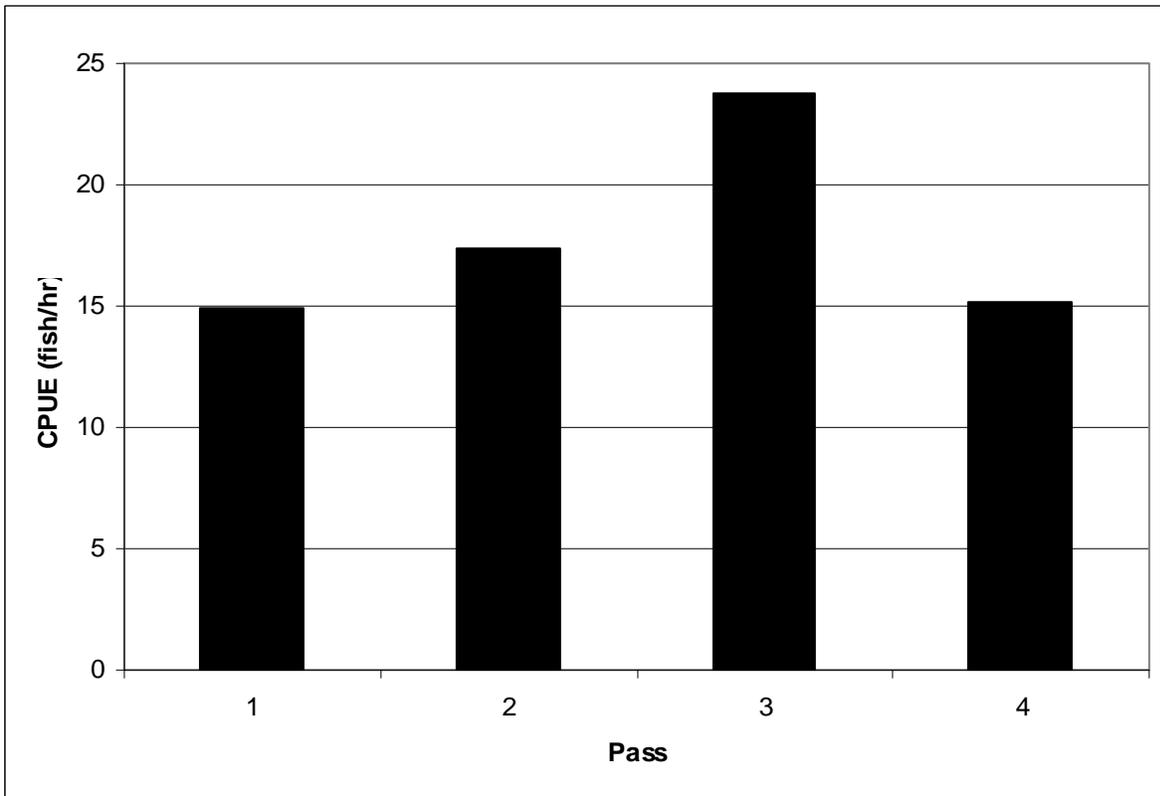


Figure 2. Catch per unit effort, all smallmouth bass by pass, 2008.

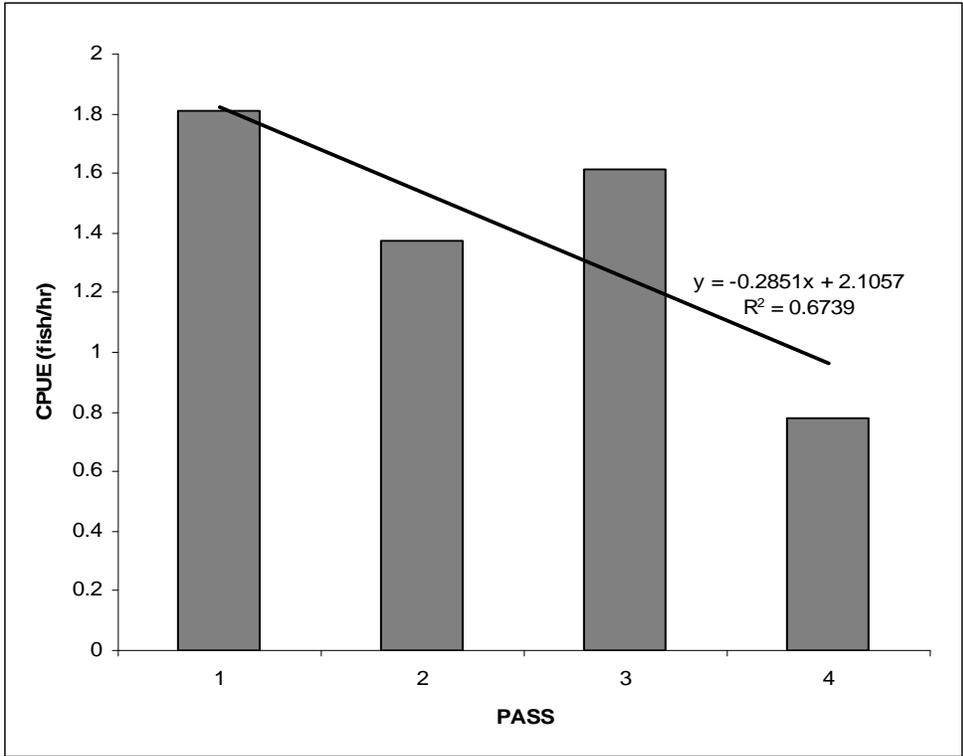


Figure 3. Catch per unit effort, adult smallmouth bass (TL>=200mm) by pass, 2008.

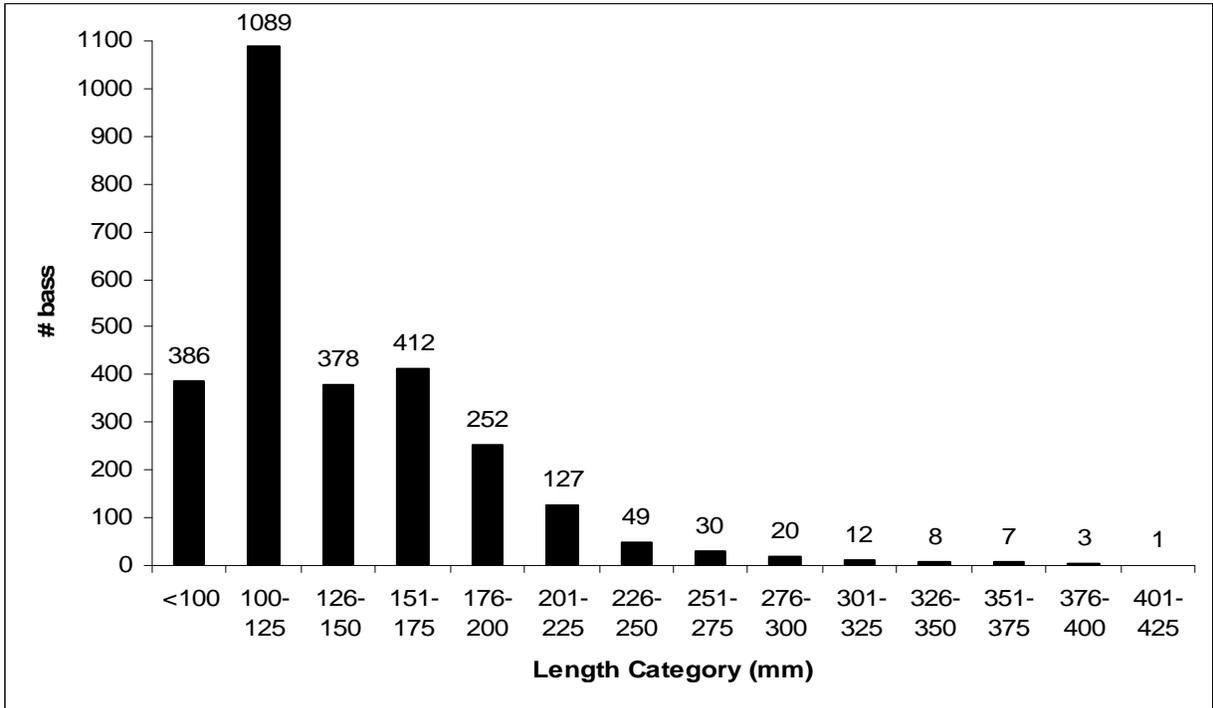


Figure 4. Length frequency of smallmouth bass caught in all passes, 2008.

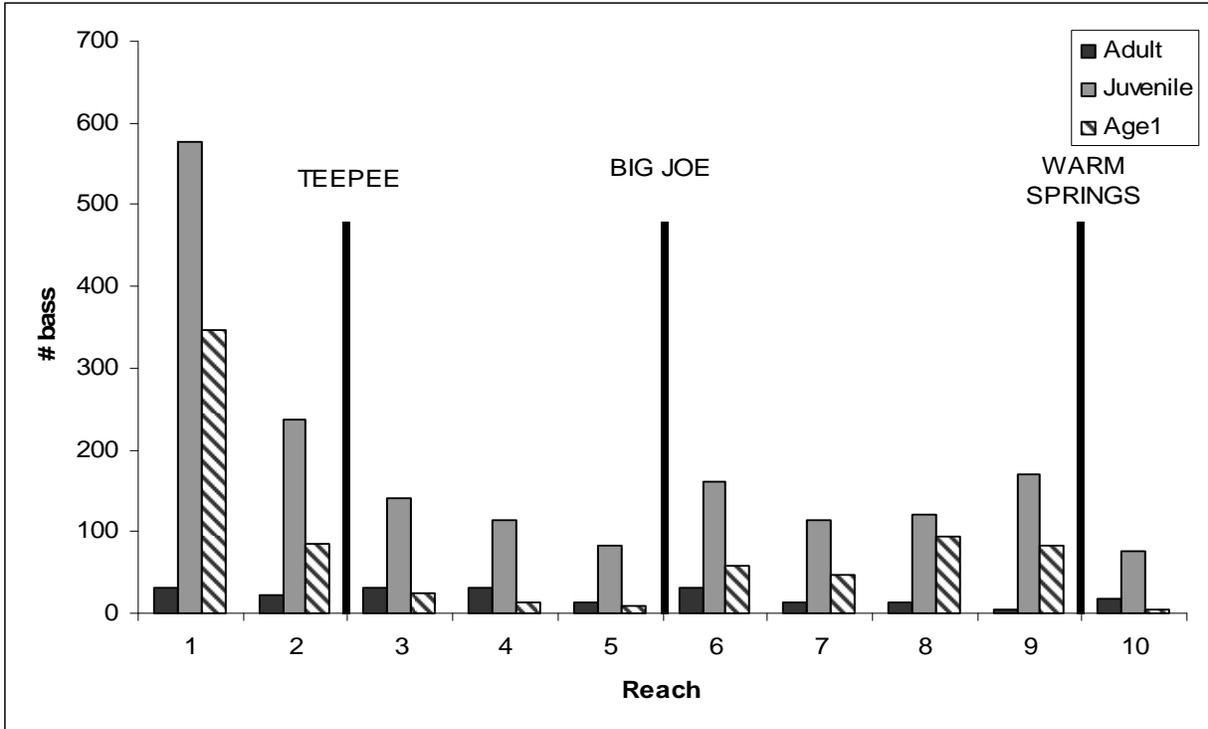


Figure 5. Total bass caught by age class, all passes, 2008. The approximate locations of prominent rapids are noted. Reaches 1-2 and 6-10 are characterized by lower gradient and periodic riffles. Reaches 3-5 have higher sustained gradient and numerous rapids.

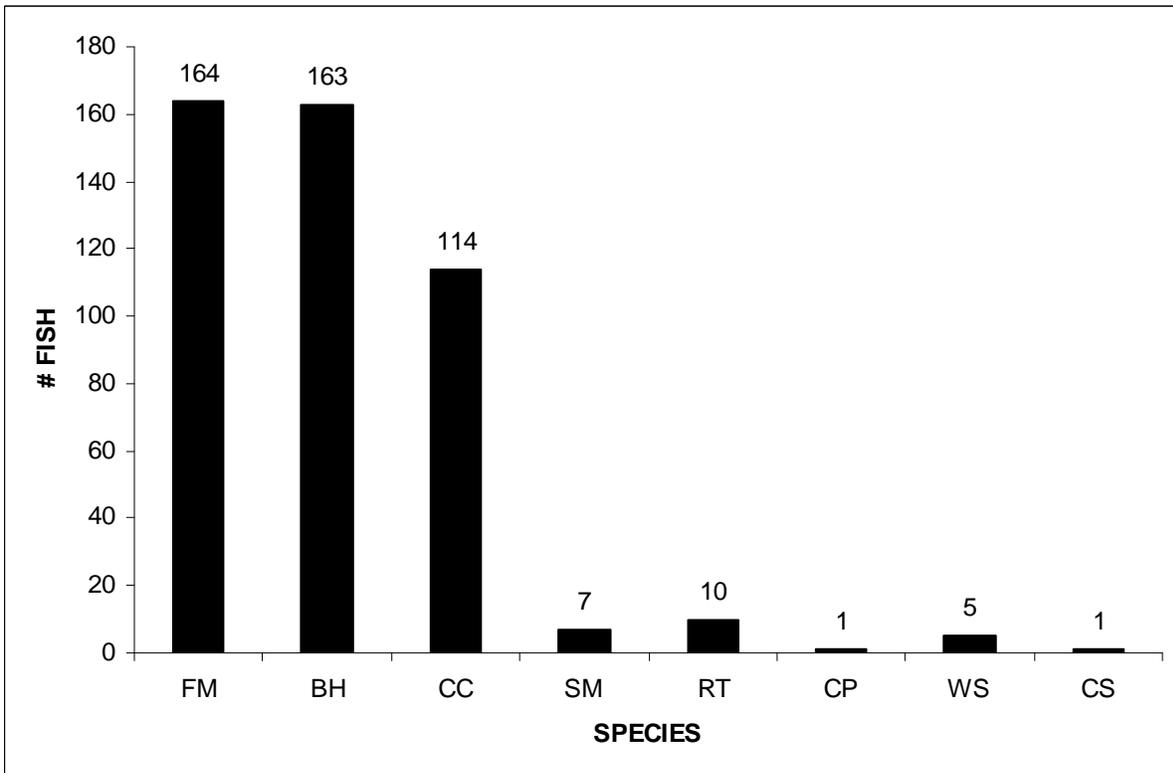


Figure 6. Total fish caught in four monitoring reaches, 2008.

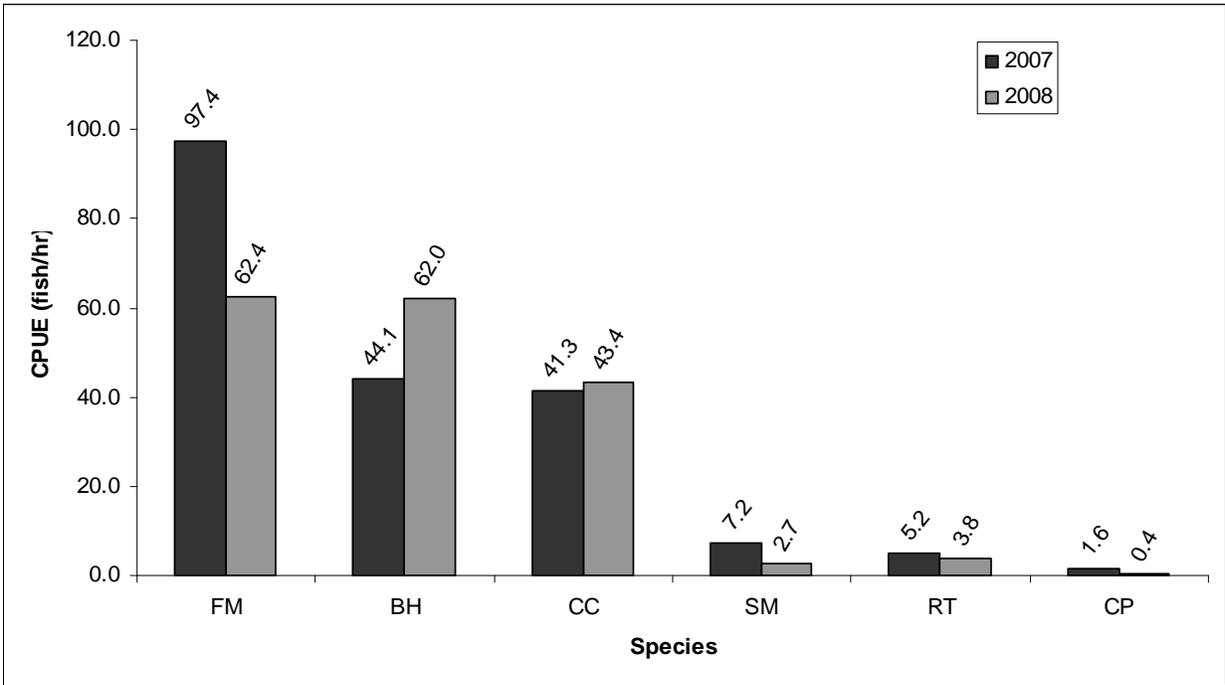


Figure 7. Catch rates for all monitoring reaches combined, 2007-2008.