

**COLORADO RIVER RECOVERY PROGRAM  
FY 2005 ANNUAL PROJECT REPORT**

**RECOVERY PROGRAM  
PROJECT NUMBER: 123**

I. Project Title: Smallmouth bass control in the middle Green River

II. Principal Investigator(s):

Kevin Christopherson  
Utah Division of Wildlife Resources  
Northeast Regional Office  
152 East 100 North  
Vernal, Utah 84078  
Phone: 435-789-3103; Fax: 435-789-8343  
E-mail: [kevinchristopherson@utah.gov](mailto:kevinchristopherson@utah.gov)

Paul Badame  
Utah Division of Wildlife Resources  
Moab Field Station  
1165 S. Hwy 191 – Suite 4  
Moab, UT 84532  
435-259-3780/fax 435-259-3785  
[Paulbadame@utah.gov](mailto:Paulbadame@utah.gov)

Mark H. Fuller  
Vernal Colorado River Fish Project  
U. S. Fish and Wildlife Service  
Vernal, UT 84078  
Phone: (435) 789-0354; Fax: (435) 789-4805  
E-mail: [Mark\\_H\\_Fuller@fws.gov](mailto:Mark_H_Fuller@fws.gov)

### III. Project Summary:

The Upper Colorado River Endangered Fish Recovery Program has determined that control of nonnative fish in the upper Colorado River basin is essential to the recovery of the four endangered fish species: Colorado pikeminnow, razorback sucker, humpback chub, and bonytail. This determination has been documented specifically for humpback chub in Desolation/Gray canyons in Section 4.3.2 of the Humpback Chub (*Gila cypha*) Recovery Goals (USFWS 2002). The humpback chub recovery goals identify channel catfish as the principle predator of humpback chub in Desolation/Gray canyons. However, in conjunction with recent low flow years, smallmouth bass numbers have been on the rise in both Desolation/Gray canyons (J. Jackson, UDWR, personal communication) and elsewhere in the middle Green River (K. Christopherson, and M. Fuller personal communication). This information resulted in a recommendation from the December 2003 Nonnative Fish Control Workshop (Grand Junction, CO) to attempt control of this species in Desolation/Gray canyons.

The purpose of this project is to minimize the expansion of smallmouth bass in the Green River. The objectives to meet this goal are 1) Calculate an annual population estimate of smallmouth bass in the Green River. The population estimate was not done on the Middle Green. 2) Remove smallmouth bass from the middle Green River from Echo Park (RM 344) to Swasey's Rapid (RM 132). This was the second year for this removal evaluation effort.

IV. Study Schedule: 2005 – 2006

V. Relationship to RIPRAP:

#### GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
- III.A. Reduce negative interactions between nonnative and endangered fishes.
- III.A.2. Identify and implement viable active control measures.

#### GREEN RIVER ACTION PLAN: MAINSTEM

- III. Reduce impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
- III.A. Reduce negative impacts to endangered fishes from sportfish management activities.
- III.A.4. Develop and implement control programs for nonnative fishes in river reaches occupied by the endangered fishes to identify required levels of control. Each control activity will be evaluated for effectiveness, and then continued as needed.

VI. Accomplishment of FY 2005 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Electrofishing was the primary gear type used to collect smallmouth bass for a mark-recapture abundance estimate. Four complete shoreline electrofishing passes were completed in each reach of the Green River. On the first electrofishing pass smallmouth bass were marked and on the remaining three passes smallmouth bass were examined for marks and removed from the river. In the two lower reaches tag retention problems were encountered, reducing our ability to evaluate density reductions.

**Task 1. Complete four smallmouth bass collecting passes from Echo Park to Split Mountain boat ramp (USFWS CRFP – Vernal)**

The USFWS sampled the furthest upstream 26-mile reach from Echo Park (RM 344) downstream to Split Mountain boat ramp (RM 318). This effort started with a marking pass August 2-5. Two electrofishing rafts were used to sample both shorelines of the entire river reach. During the first pass, 132 smallmouth bass were measured, weighed, marked (with green Floy tags), and released back to the river alive; another 15 were removed. Three subsequent electrofishing passes were then completed during which 703 bass were removed, 25 being recaptures (Table 1). Smallmouth bass with foreign marks included 8 bass with yellow Floy-tags that were tagged outside the study area. The 2005 smallmouth bass catch was much less than the 2004 catch, 718 compared to 2,440 respectfully.

**Table 1.** 2005 Smallmouth bass collected from Echo Park to Split Mountain Boat Ramp.

Echo Park – Split Mountain	Pass 1	Pass 2	Pass 3	Pass 4	Total
Date	8/2-5	8/9-11	8/22-24	8/29-31	
Marked & Released	132				132
Recaptures		11	9	5	25
# Removed, includes Recaptures	15	288	244	171	718

*Abundance Estimate*

Smallmouth bass marking (green Floy-tags) during the first pass preceded three removal passes and capture-recapture analysis. The population estimate was calculated using both the Adjusted Peterson estimate and a closed captures model in program Mark (Table 2).

All recaptures and unmarked captures in their respective passes were considered using the Adjusted Peterson estimate. For pass 1 and 2, the point estimate is 3,203 bass with standard error 870, estimated probability of capture (p-hat) 0.0899, and coefficient of

variation 0.27. From this point estimate, a 22% reduction in population size was attained or with limits of confidence (95%) the measure of reduction ranged from 15 – 49% (Table 2). The adjusted Peterson estimates which combined catch and recapture criteria for passes 1-3 and 1-4 resulted in increases of N (3,544 and 3,740 bass) which may be indicative of a short closure period.

Under the assumption that closure is sullied within 2-3 weeks, a two-pass estimate using program Mark was used. The 2005 two-pass point estimate is 3,437 bass with standard error 973, probability of capture ( $\hat{p}$ ) 0.0838, and coefficient of variation .28. From this estimate a 21% population reduction was attained, or when considering confidence limits (95%) the measure of reduction ranged from 11 – 35%, and the post-removal estimate is 2,719 sub-adult and adult bass.

The number of smallmouth bass removed per river mile was 28, compared to 94 bass/rm in 2004 (Figure 3). Last years point estimate was recalculated using the program Mark and the (M(t)) model to standardize the estimates. The estimate (N) was 8000 bass of which 2440 or 31% were removed (Table 2). The past two years has resulted in 3,158 bass removed which is 43% of the 2004 estimate.

**Table 2.** 2004-2005 smallmouth bass population estimates from Echo Park to Split Mountain Boat Ramp.

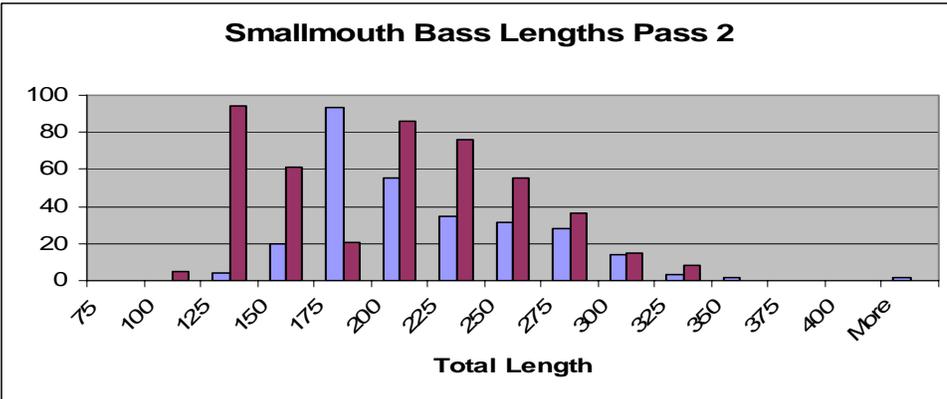
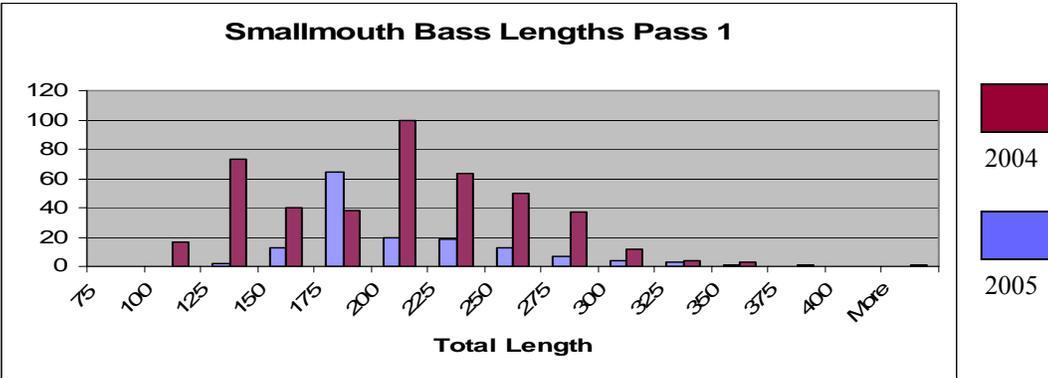
Year	Type	Model	N	CI	SE	P-hat	CV	Removed	Deplet.
2004	Mark	M(t)	8,000	5,306-12,294	174	.058	.22	2,440	31%
2005	Adj. Peterson	M(t)	3,203	1,464-4943	870	.089	.27	718	22%
2005	Mark	M(t)	3,437	2,048-6006	973	.083	.28	718	21%
<b>Present</b>								<b>3,158</b>	<b>43%</b>

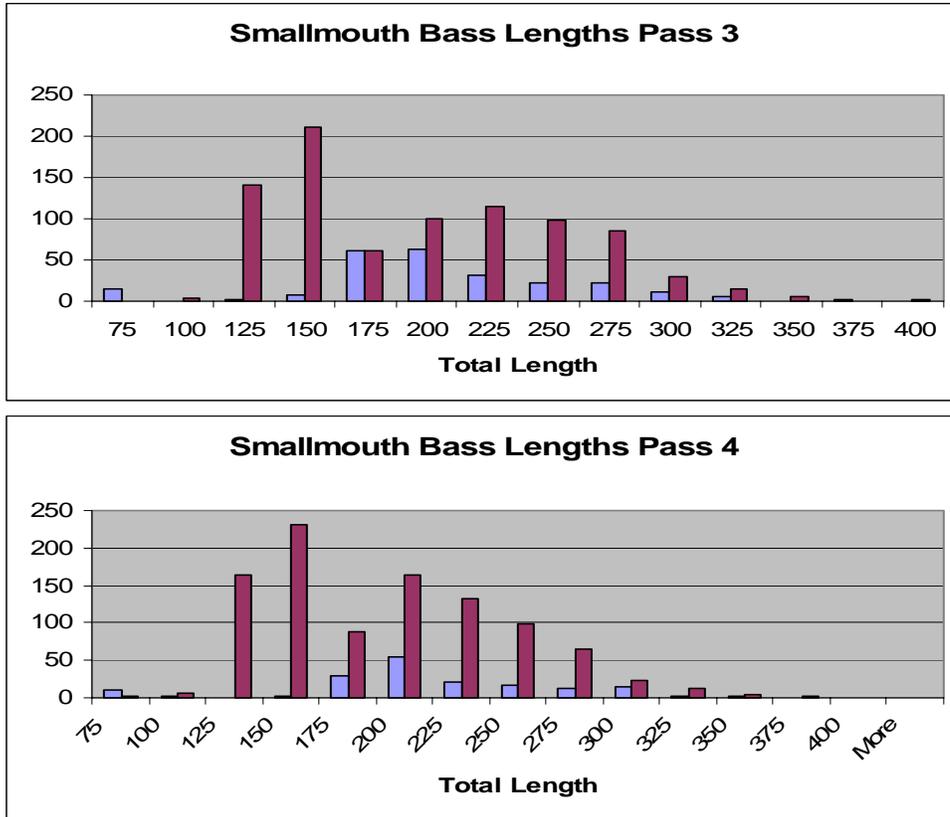
*Size Structure*

Mean total length (TL) of smallmouth bass collected for all passes was 197 mm. No significant differences in mean length between passes occurred. Length data show the strongest size classes to be 175 - 200 mm, from where frequency decreased as fish increased in size (figure 2). Very few bass in the 125 -150mm size-class were collected and likely to be age-2 (Carlander 1977). This may be indicative of poor recruitment in 2003. Comparatively, in 2004 this was the strongest size-class collected, and with one year’s growth, the frequent cohort caught this year (175-200 mm, Figures 3-6).



**Figure 1.** 2004 and 2005 smallmouth bass length/frequency (all passes) caught electrofishing the Green River between Echo Park and Split Mountain boat ramp.

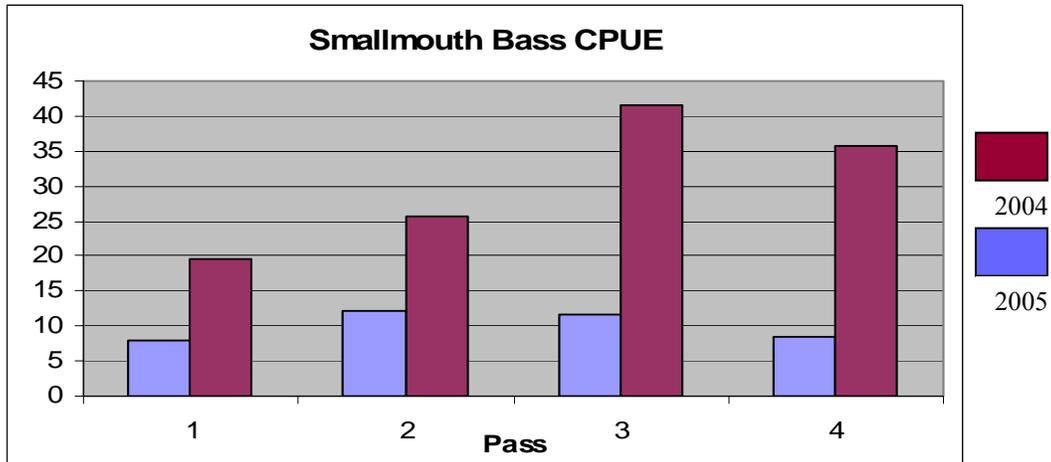




**Figures 2-5.** 2004 and 2005 length/frequencies passes 1-4.

*Smallmouth Bass Catch Rates*

Catch rates in 2005 were consistently lower than in 2004; as much as 30.14 fish per hour lower during pass three. This is a welcome decrease and can be partially credited to the control effort. Factors other than physical removal account for 26.5 percent of this year's pre-removal estimate. In other words, the difference between the 2004 post-removal estimate (5,560) and this year's pre-removal estimate (3,437) is a 2,123 bass or 26.5%, a reduction that did not result from physical removal. Other causes for lower catch rates may be environmental. This year's prolonged high flows in late spring may have displaced bass from the study area as floods and low temperatures are related to low year-class success (Carlander 1977).



**Figure 6.** 2004-2005 catch per unit effort (fish/hour electrofishing)

*Recruitment*

The 125-150 mm size-class or age-2 cohort (Carlander 1977) is important when determining recruitment because at this size they are fully susceptible to capture by electrofishing. Smaller bass, though collected, are caught with less consistency. This age-two cohort was 2005's weakest; very few bass this size were caught during the third and fourth pass (Figure 4-5). By following this cohort back to its early life stages in 2003, an assessment of conditions that resulted in poor recruitment can be made.

First, the temperature optimal for smallmouth bass to spawn is 55-60 °F. When peak spring flows are lower than normal and river temperatures increase to 55 °F before high water levels are reached, good recruitment can be expected. This happened in the years 1998, 2000 and 2001 in the lower Yampa River when peak flows were less than 10,000 cfs (unpublished data, Fuller 2004). In 2003 peak flows were 16,200 cfs in the lower Yampa and greater after its confluence with the Green River and the results show poor recruitment (Figure 4 and 5). Other reasons for poor smallmouth bass recruitment in rivers are being explored. High water and turbidity can destroy nests (Brown, 1960) and the microcrustaceans needed by the fry (Cleary, 1956); and water level recession has been considered a major cause for low nest success (Neves, 1975).

*References*

Brown, E. H., Jr., 1960. Little Miami River headwater-stream investigations. Ohio Dept. Nat. Res. Div. Wildl. 1-143.

Carlander, K. D., 1977. Life history data on centrarchid fishes. Handbook of freshwater fishery biology; v. 2.

Cleary, R. E., 1956. Observations on factors affecting smallmouth bass production in Iowa. J. Wildl. Manage. 20(4):353-359.

Neves, R. J., 1975. Factors affecting fry production of smallmouth bass (*Micropterus dolomieu*) in South Branch Lake, Maine. Trans. Am. Fish. Soc. 104(1):83-87.

**Task 2. Complete four smallmouth bass collecting passes from Split Mountain boat ramp to Sand Wash boat ramp (UDWR – Vernal).**

2004

The first electrofishing pass for tagging smallmouth bass in the middle Green River began at the Split mountain boat ramp (RM 318) on 30 April 2004 and was completed on 3 June near the Sand Wash boat ramp (RM 215). This pass took 14 sampling days to complete. A total of 320 smallmouth bass were tagged using red flag tags and released into the river. Five northern pike, none of which were tagged, and seven walleye were also caught during this pass and removed from the river. The highest densities of smallmouth bass were encountered near the confluence of the Duchesne River (RM 248) and downriver to the Sand Wash boat ramp (RM215). Endangered fish species encountered included 41 Colorado pikeminnow and 29 razorback sucker.

The first of three removal passes began at Split mountain boat ramp on 14 June and was completed on 15 July. This effort took 12 sampling days to complete and resulted in the capture and removal of 468 smallmouth bass and included five recaptures. The highest catch rates of smallmouth bass occurred on Dinosaur National Monument beginning at the Split Mountain boat ramp (RM 318) downriver to the Escalante spawning bar (RM 307). One walleye, two northern pike and six black crappie were also removed. Endangered fish encountered included eight Colorado pikeminnow and 11 razorback sucker.

The second removal pass for smallmouth bass in the middle Green River began on July 20 and was completed on August 9. This pass took 10 field days to complete and resulted in the removal of 690 smallmouth bass of which 23 were recaptures. Endangered species encountered included 15 Colorado pikeminnow. One walleye and four black crappie were also captured and removed.

The third and final removal pass began on August 11 and was completed on August 26. This pass took 9 field days to complete and resulted in the removal of 757 smallmouth bass of which 19 were recaptures. Two northern pike and three black crappie were also removed. Endangered species encountered included 15 Colorado pikeminnow and 19 razorback sucker. Highest capture rates of smallmouth bass continue to be at the uppermost stretch of this reach beginning at the Split Mountain boat ramp (RM 315) and continuing downriver to near the Escalante razorback spawning bar (RM 307). A total of 311 smallmouth bass were removed from this area during one day of electrofishing using two boats.

A total of 1,915 smallmouth bass including 47 of the 320 tagged fish were removed over the three electrofishing passes (Table 2). There weren't any tagged smallmouth bass from other researchers encountered in this reach of the middle Green River from Split

Mountain boat ramp (RM 318) to Sand Wash (RM 215). Tagged fish from this reach were collected by other researchers in Yampa Canyon (Fuller), Lodore Canyon (Bestgen) and Desolation Canyon (Badame).

In 2004, an initial population estimate was obtained by calculating two Lincoln-Peterson estimates. The first estimate was calculated using the first electrofishing pass as the marking pass and the second pass only as the recapture pass (Table 3). The second estimate used the first pass as the marking pass and the remaining three passes as the recapture pass (Table 4). A total of 320 smallmouth bass were tagged using red Floy flag tags on the first electrofishing pass. A total of 468 smallmouth bass were captured on the second pass and examined for marks. Only five recaptured smallmouth bass were collected in the second electrofishing pass. The abundance estimate of smallmouth bass using only the first and second passes was 24,960 with a 95% CI of 12,362 – 50,689 (Table 3). This represents an estimated density of 243 bass/mile and an exploitation rate of 7.6% of the initial population (C/N). An estimate of 12,813 (95% CI 9,772 – 17,237) smallmouth bass is obtained using all passes (Table 4). This represents 124 bass/mile and an exploitation rate of 15%.

Table 1. Two-pass abundance estimate for smallmouth bass in the middle Green River (Split Mountain – Sand Wash): 2004.

---

<b>2004 Middle Green River (Split Mountain – Sand Wash)</b>			
Two-pass			
Lincoln-			
Peterson			
	$N_{\text{hat}} = (C+1)(M+1)/(R+1)$	M =	320
		C =	468
		R =	5
=	<b>24,960</b>		
	95 % Confidence Interval		
		R = 5	
Lower limit	<b>12,362</b>		
Upper limit	<b>50,689</b>		

---

Table 2. All-pass abundance estimate for smallmouth bass in the middle Green River (Split Mountain – Sand Wash): 2004.

---

<b>2004 Middle Green River (Split Mountain – Sand Wash)</b>			
All-pass Lincoln- Peterson			
		M =	320
	$N_{\text{hat}} = (C+1)(M+1)/(R+1)$	C =	1915
		R =	47
=	<b>12,813</b>		
	95 % Confidence Interval		
		R = 47	
	Lower limit	<b>9,772</b>	
	Upper limit	<b>17,237</b>	

---

Length frequency distribution shows the presence of multiple year classes including young-of-the-year throughout the study reach. A larger proportion of smaller smallmouth bass were collected during the third and fourth passes in 2004.

### 2005

The first electrofishing pass for tagging smallmouth bass in the middle Green River began at the Split mountain boat ramp (RM 318) on 6 July 2005 and was completed on 20 July near the Sand Wash boat ramp (RM 215). This pass took 9 sampling days to complete. A total of 315 smallmouth bass were tagged using numbered streamer tags and released into the river. One northern pike, one walleye, two black crappies and a blue gill were also caught during this pass and removed from the river. The highest densities of smallmouth bass were encountered in Dinosaur National Monument beginning at the Split Mountain boat ramp (RM 318) downriver to Escalante spawning bar (RM 307). Endangered fish species encountered included 18 Colorado pikeminnow, 5 razorback sucker, 16 bonytail and 3 chubs.

The first of three removal passes began at Split mountain boat ramp on 26 July and was completed on 10 August. This effort took 8 sampling days to complete and resulted in the capture and removal of 242 smallmouth bass. Again, the highest catch rates of smallmouth bass occurred on Dinosaur National Monument beginning at the Split Mountain boat ramp (RM 318) downriver to the Escalante spawning bar (RM 307). Five black crappies were also removed. Endangered fish encountered included seven Colorado pikeminnow, 2 chubs and 2 razorback suckers.

The second removal pass for smallmouth bass in the middle Green River began on 11 August and was completed on 30 August. This pass took 10 field days to complete and resulted in the removal of 281 smallmouth bass. Four northern pike, 3 black crappie, 1

bluegill and 1 gizzard shad were also removed from the river. Endangered species encountered included 10 Colorado pikeminnow, 5 razorback suckers, 4 bonytail, two roundtail and 1 chub. One walleye and four black crappie were also captured and removed.

The third and final removal pass began on 29 August and was completed on 27 September. This pass took 8 field days to complete and resulted in the removal of 96 smallmouth bass. Two bluegill and 2 black crappie were also removed. Endangered species encountered included 7 Colorado pikeminnow, 9 razorback sucker, 3 bonytail and 1 roundtail. Highest capture rates of smallmouth bass continues to be at the uppermost stretch of this reach beginning at the Split Mountain boat ramp (RM 315) and continuing downriver to near the Escalante razorback spawning bar (RM 307).

In 2005, 619 smallmouth bass were removed over the four electrofishing passes. None of these fish were recaptures from the first marking pass (Table 2). An additional 142 smallmouth bass were removed from the river during efforts to remove northern pike. In contrast, 1,915 smallmouth bass plus 47 recaps were encountered and removed during the four electrofishing passes in 2004. While Dinosaur National Monument continued to have a high concentration of smallmouth bass in 2005, the area from the Duchesne River to Sand Wash didn't have the concentrations of smallmouth bass that were encountered in 2004. The overall CPUE for 2005 (4.02) is more than 50% lower than the 2004 catch rates (9.34).

Table 3. Catch statistics for smallmouth bass removal evaluation in the middle Green River (Split Mountain – Sand Wash): 2004 and 2005.

Pass	Effort (hours)		Captures		CPUE (fish/hour)		Number tagged		Recaptures	
	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
1	57.63	51.77	320	315	5.55	6.08	320	315	0	0
2	54.09	33.07	468	242	8.65	7.31	0	0	5	0
3	45.99	42.85	690	281	15.00	6.55	0	0	23	0
4	48.39	26.20	757	96	15.64	3.66	0	0	19	0
Total	205.10	153.89						315	47	0
Removed			1915	619						

#### *Tag Retention Study*

After one tagging pass and two removal passes, crews had not encountered any smallmouth bass that were tagged. Prior to the completion of the final removal pass a tag retention side study was conducted from 24 through 30 August to determine if the streamer tags used were remaining in the tagged fish. A known concentration area from Split Mountain to Razorback Bar was electrofished to conduct this evaluation. A total of 76 smallmouth bass were tagged and released in this area. Fish that were too small to be tagged were removed. On 30 August this area was electrofished again and smallmouth

bass were removed and examined for tags. With this effort, five smallmouth bass were recaptures of fish tagged for this side study. Only one of the recaptured smallmouth bass still had a streamer tag. Three had flag tags with no streamer tag, but a hole in the lip membrane indicating a streamer tag had at one time been inserted. The remaining fish didn't have either a streamer tag or a flag tag, but evidence of being tagged by both.

Several age classes of smallmouth bass were encountered and total lengths ranged from 38 – 408 mm. A total of 45 smallmouth bass under 100 mm were removed ranging from 38 – 90 mm. Young-of-year smallmouth bass were encountered in the third and fourth pass only (figures 1-3).

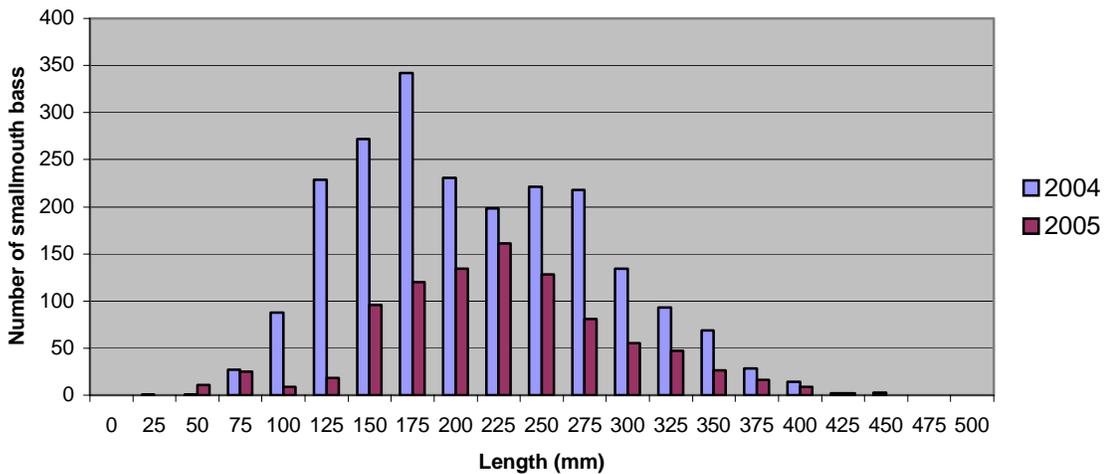
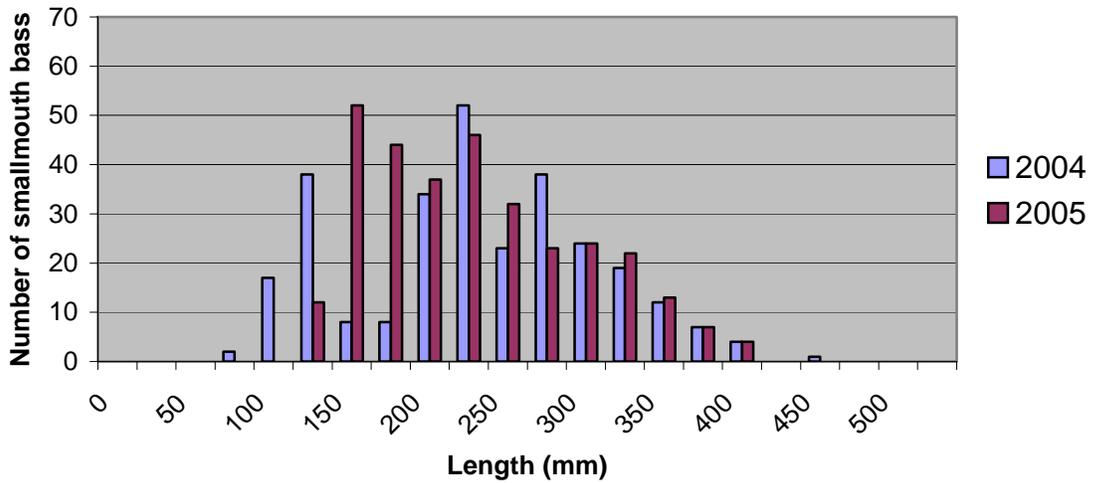


Figure 3. Length frequency distribution of smallmouth bass collected on all passes on the middle Green River from Split Mountain boat ramp (RM 318) to Sand Wash (RM 215): 2004 and 2005.

**2004 and 2005 Pass 1  
Split Mountain - Sand Wash**



**2004 and 2005 Pass 2  
Split Mountain - Sand Wash**

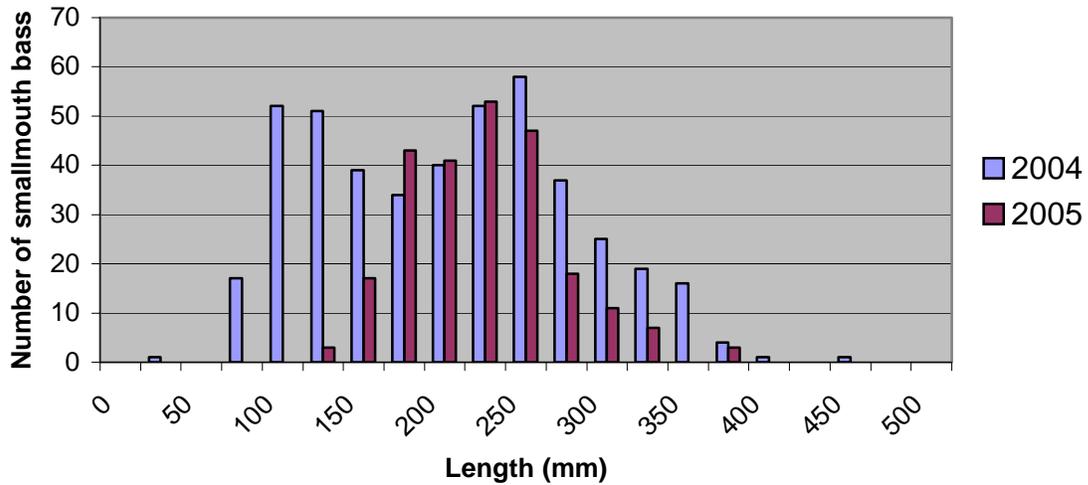
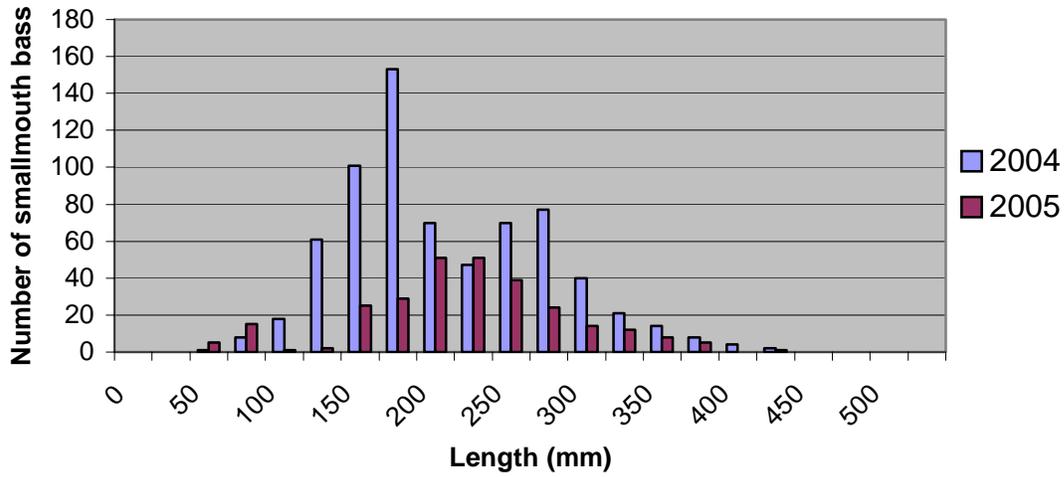


Figure 1. Length frequency distribution of smallmouth bass collected on the first (marking) pass and the second pass on the middle Green River from Split Mountain boat ramp (RM 318) to Sand Wash (RM 215): 2004 and 2005.

**2004 and 2005 Pass 3  
Split Mountain - Sand Wash**



**2004 and 2005 Pass 4  
Split Mountain - Sand Wash**

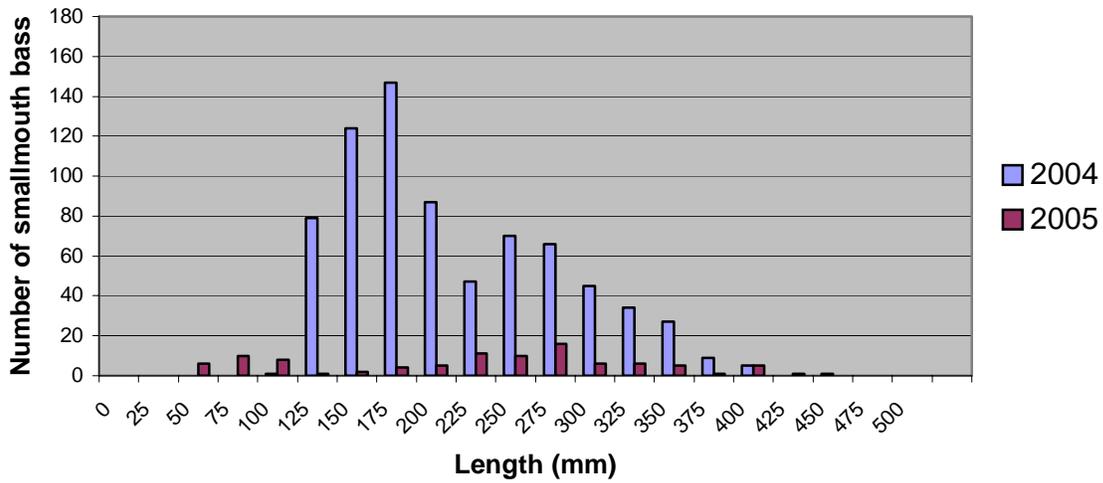


Figure 2. Length frequency distribution of smallmouth bass collected on the third and fourth pass on the middle Green River from Split Mountain boat ramp (RM 318) to Sand Wash (RM 215): 2004 and 2005.

**Task 3. Complete four smallmouth bass collecting passes from Sand Wash boat ramp to Swasey’s Rapid (UDWR – Moab).**

Four electrofishing passes were completed between Sand wash (RM 216) and Swaseys Rapid (RM 132) between July 24 and September 18, 2005. Over 198 hours of electrofishing effort was expended and a total of 1,117 smallmouth bass were captured. During the second pass only one boat was used due to mechanical problems. The single electrofishing boat switched shorelines depending on the quality of the habitat; this likely caused the increase in CPUE for pass 2 (Table 1). On all other passes two boats shocked continuously on both shorelines until Chandler Creek Canyon (RM 168), at which time only areas with potential habitat were spot shocked. Smallmouth bass were found only in the upper 55 miles of Desolation Canyon (Figure 1). No significant changes in distribution were observed between 2004 and 2005.

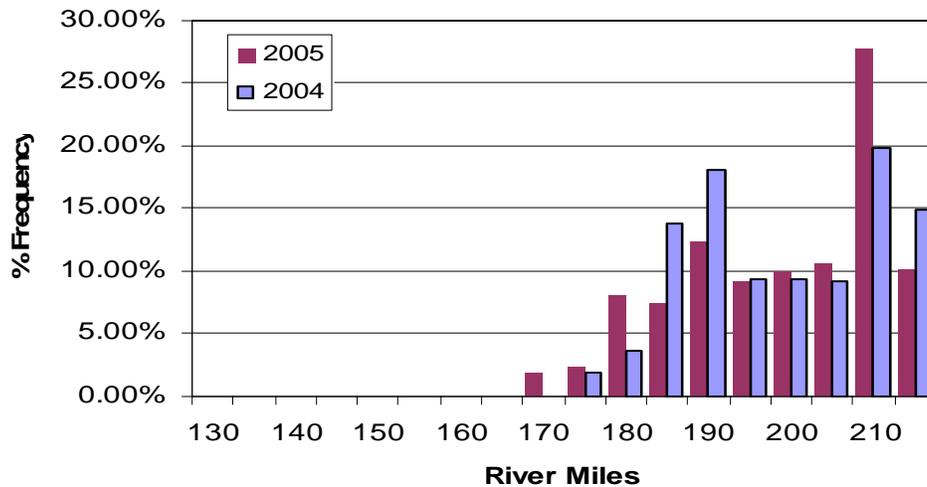


Figure 1. Percent frequency of smallmouth bass captures by river mile between Swasey’s Rapid (RM 132) and Sand Wash (RM 216).

During the first pass 82 smallmouth bass were tagged with blue t-bar anchor tags and released. Over the three subsequent passes, a total of 371 bass were removed. Of the bass removed, 3 were recaptured with blue tags and 6 were recaptured with yellow flag tags from 2004.

A Lincoln-Peterson population estimate was calculated for 2004 and 2005 to derive initial population estimates using the formula (Table 1).

$$N = (C+1)(M+1)/(R+1)$$

Each estimate used all recaptures of marked fish in their respective year of capture. In 2005 the low number of recaptures resulted in an unreliable estimate. The recapture of six of the 2004 yellow flag tags and a comparison to last year tag recovery rates infers

that we may have had a tag retention problem in 2005. A new smaller anchor tag, made with a more pliable material was used. In addition, of the three 2005 recaptures 2 had their tags easily pulled out and two other bass were captured with what appeared to be fresh tag scars.

Table 1. Lincoln Peterson estimate parameters for two 2004 – 2005 Desolation Canyon reach.

<b>Year</b>	<b>M</b>	<b>C</b>	<b>R</b>	<b>N</b>	<b>95% C.I.</b>
2005	82	369	3	10,086	0 - 21,685
2004	178	937	32	5,212	3,401 – 7,023

The overall CPUE for 2005 was 2.33 fish per hour (Table 2). The 2005 catch rates are a third of what they were in 2004 for this reach (7.83). Overall sampling conditions and application of effort were similar between years, so it is probable that the change in catch rates is indicative of a real reduction in population size. Unfortunately, neither the actual scale of the reduction; or, the portion caused by environment or by removal efforts can be determined for this reach.

Table 2. Catch Statistics for all smallmouth bass removal electrofishing passes in Desolation Canyon 2005. Recaps only include fish marked in the year recaptured.

<b>PASS</b>	<b>HOURS</b>		<b>CAPTURES</b>		<b>CPUE</b>		<b>TAGGED</b>		<b>RECAPS</b>	
	<b>2005</b>	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>	<b>2004</b>	<b>2005</b>	<b>2004</b>
1	41	40	91	180	2.22	4.44	82	178	-	-
2	27	36	139	270	5.08	7.42	-	-	0	14
3	67	21	75	250	1.12	11.84	-	-	1	4
4	63	44	157	417	2.50	9.35	-	-	2	14
<b>TOTALS</b>	<b>198</b>	<b>141</b>	<b>462</b>	<b>1117</b>	<b>2.33</b>	<b>7.83</b>	<b>82</b>	<b>178</b>	<b>3</b>	<b>32</b>

Length frequency distributions show the presence of multiple year classes including 1+ year old smallmouth as far down as river mile 184 (Figure 2). There were no significant changes in size structure observed over the 2005 removal period (Figures 3-4). Between 2004 and 2005 growth of the 2 year old cohort was observed. For fish over 300 mm, the observed frequency was down about 10% over all passes combined (Figure 2).

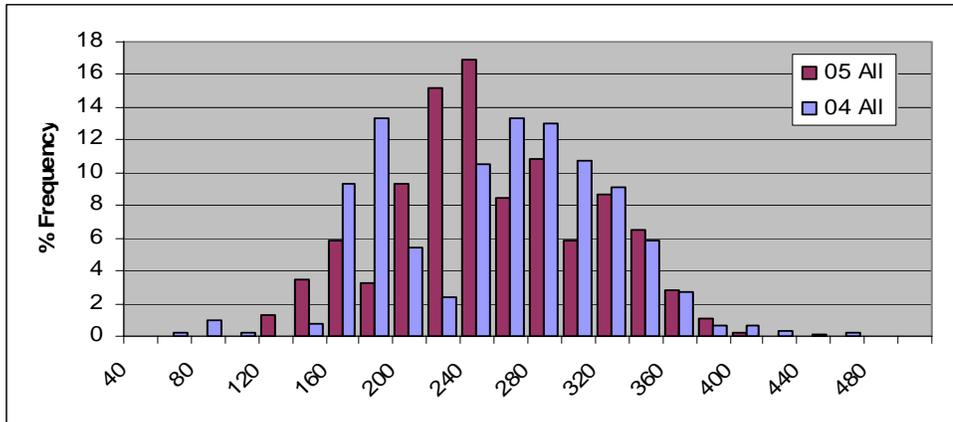


Figure 2. Smallmouth bass total length distributions for 2004 and 2005 all passes combined. Sand wash (RM 216) to Swasey's Beach (RM 132).

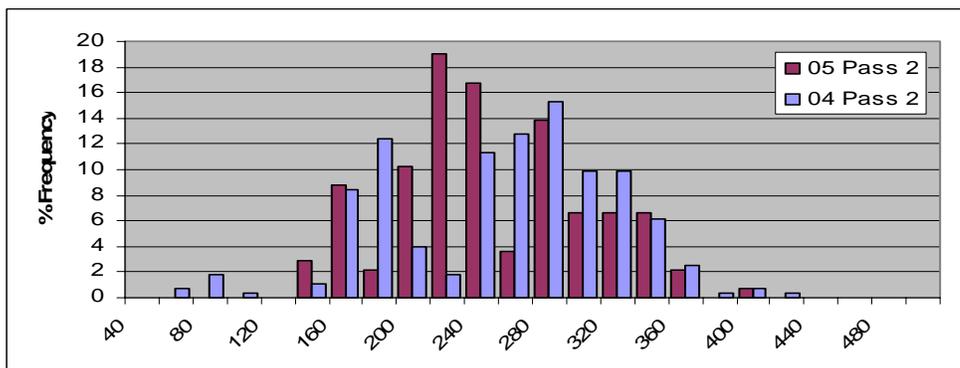
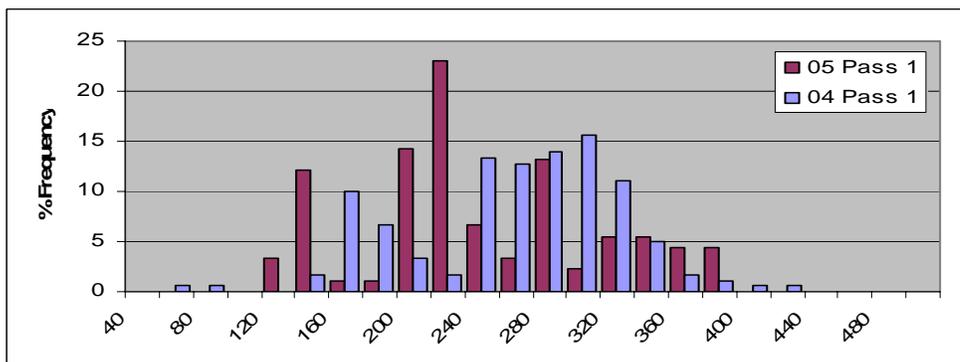


Figure 3. Smallmouth bass total length distributions for 2004 and 2005, passes 1 and 2 compared. Sand wash (RM 216) to Swasey's Beach (RM 132).

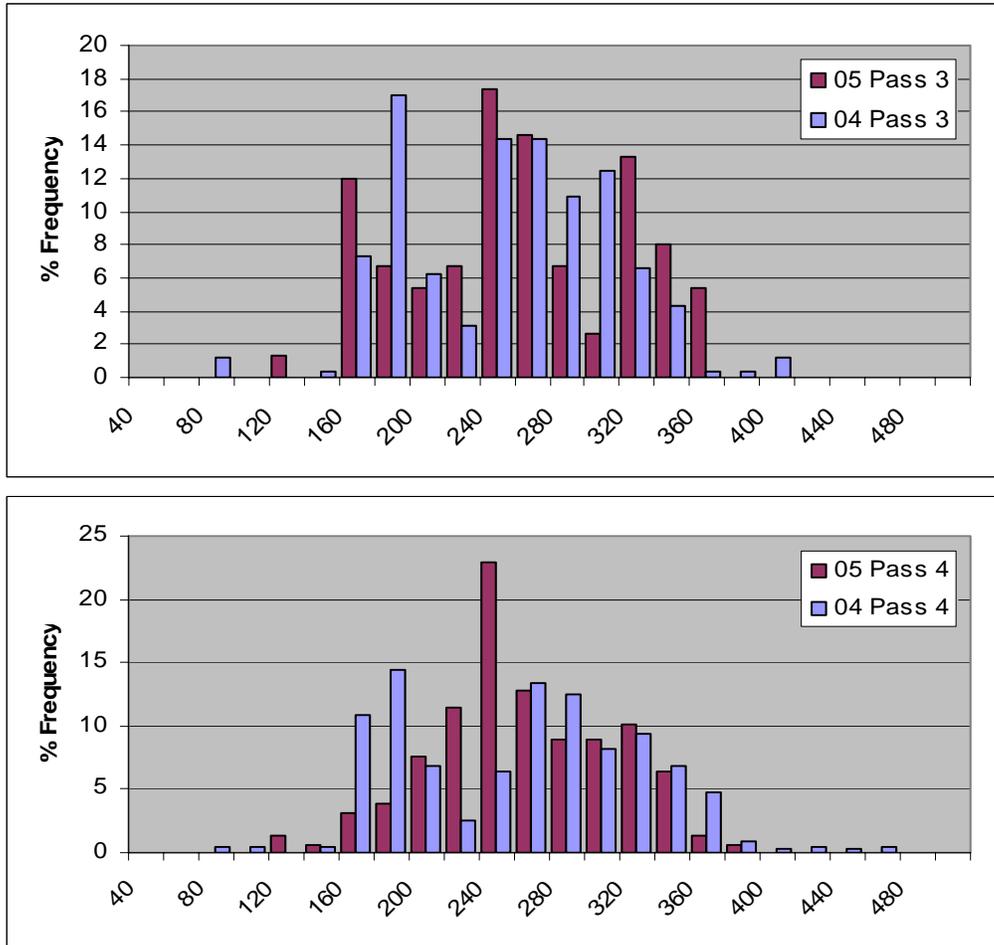


Figure 4. Smallmouth bass total length distributions for 2004 and 2005, passes 3 and 4 compared. Sand wash (RM 216) to Swasey’s Beach (RM 132).

No Tagged fish from other reaches were captured in 2005. In addition the three 2005 recaptures occurred within one mile of their respective release sites.

Other non-native species removed included, 11 black crappie and 1 walleye. Endangered species collected included, 30 Colorado pikeminnow, 43 humpback chub, and 19 razorback sucker. All endangered fish were weighed, measured, checked for tags, PIT tagged if needed, and released at their site of capture.

VII. Recommendations:

- Based on the tag retention study, we recommend that the larger Floy-tags used in the upper reach be used to tag smallmouth bass and that streamer type tags be avoided.
- To improve total catch and catch rate of smallmouth bass, more time should be spent in the areas the fish concentrate. In general, the smallmouth seems to be

found most in rocky and brushy areas. Electrofishing in areas and habitats of known concentration and skipping over sandy stretches would improve the catch rate and the total catch.

- Evaluate additional capture techniques (e.g., electric seining) in appropriate habitats.
- Continue to evaluate removal of smallmouth bass in the Green River using annual mark-recapture estimates.

VIII. Project Status: On track and ongoing

IX. FY 2005 Budget Status

- A. Funds Provided: \$188,610
- B. Funds Expended: \$188,610
- C. Difference: \$0
- D. Percent of the FY 2005 work completed, and projected costs to complete: 100%
- E. Recovery Program funds spent for publication charges: \$0

X. Status of Data Submission: PIT tagging data for the 2005 field season will be submitted to the database manager by January 2006.

XI. Signed: Paul Badame November 9, 2005  
Principal Investigator Date