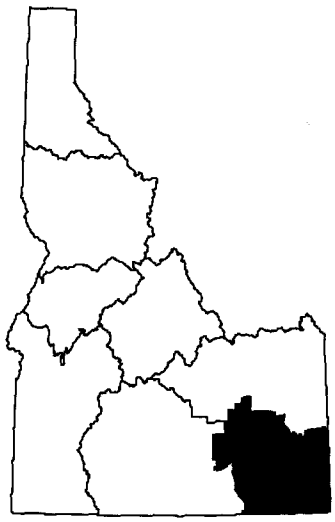
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director



SOUTHEAST REGION

2005

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SOUTHEAST REGION 2005 FISHERY MANAGEMENT ANNUAL REPORT

Investigations of Smallmouth Bass in the Snake River between Lake Walcott and American Falls Dam

INTRODUCTION

In the late 1980s, smallmouth bass *Micropterus dolomieu* were introduced into the upper Snake River System. Stocking locations included Gem Lake, Lake Walcott, and American Falls Reservoir. The initial stocking events resulted in natural reproducing populations, which expanded rapidly during the 1990s. The success of the smallmouth bass population enhanced fishing opportunities in the Snake River system.

Anglers quickly responded to the new smallmouth bass fishery. In American Falls Reservoir, smallmouth bass increased from 0% of total catch in 1993 to 28% in 2000. The same trend was observed in the Snake River below American Falls Dam. Smallmouth bass started contributing to river creels in the late 1990s and currently make up a major component of effort and total catch. Perhaps the best indicator of angler response is growth in tournament angling. The first tournament on the river was held at the Massacre Rocks State Park boat launch in 2001. The number of tournaments increased to four in 2004, six in 2005, and nine bass tournaments are scheduled for Massacre Rocks in 2006.

The U.S. Fish and Wildlife Service manages a wildlife refuge that includes 40 km of the Snake River between American Falls and Minidoka dams. The primary function of the refuge is to preserve breeding grounds for water birds. To facilitate that goal, about 60% of the refuge is closed to boating. Since the primary method of fishing for smallmouth bass is by boat and shore access is extremely limited, the closed boating sections are largely unexploited by anglers.

Angler opinions regarding future management of the fishery vary. Local bass club members prefer restrictive harvest regulations. Other users support the current regulation to harvest six smallmouth bass over 305 mm (12 inches). In 2003, results of a random survey of 1,000 anglers showed more support for general bass regulations (41%) compared to those that favored a change to more restrictive harvest (28%). In addition to interest in harvest regulations, anglers are requesting more fishing access for sections of the Snake River that are currently closed to boats.

In 2005, the Idaho Department Fish and Game (Department) began investigating the smallmouth bass fishery in the Snake River from the tailrace of American Falls Dam downriver to Minidoka Dam. The primary goals of the work were to estimate angler exploitation and determine how the closed boating zones affect angling impacts on smallmouth bass populations. The boating closure provides a unique opportunity to compare smallmouth bass populations from open (exploited) and closed (unexploited) areas. Specific questions included: 1) are smallmouth bass mortality rates different between open and closed boating zones, 2) has the quality of smallmouth bass being caught in the open boating zones declined with increases in angling pressure, 3) do smallmouth bass migrate between open and closed boating zones, and 4) if so, how do migratory bass contribute to angling opportunities.

STUDY AREA

The study area includes the Snake River beginning at the tailrace of American Falls Dam and runs downriver to Minidoka Dam. The study area includes about 71 km of combined reservoir and river habitat. Lake Walcott makes up about 18 km of the study area and the Snake River constitutes the remaining 53 km. A key feature of the study area is the Minidoka National Wildlife Refuge. Figure 1 shows the wildlife refuge and river reaches open and closed to boating access.

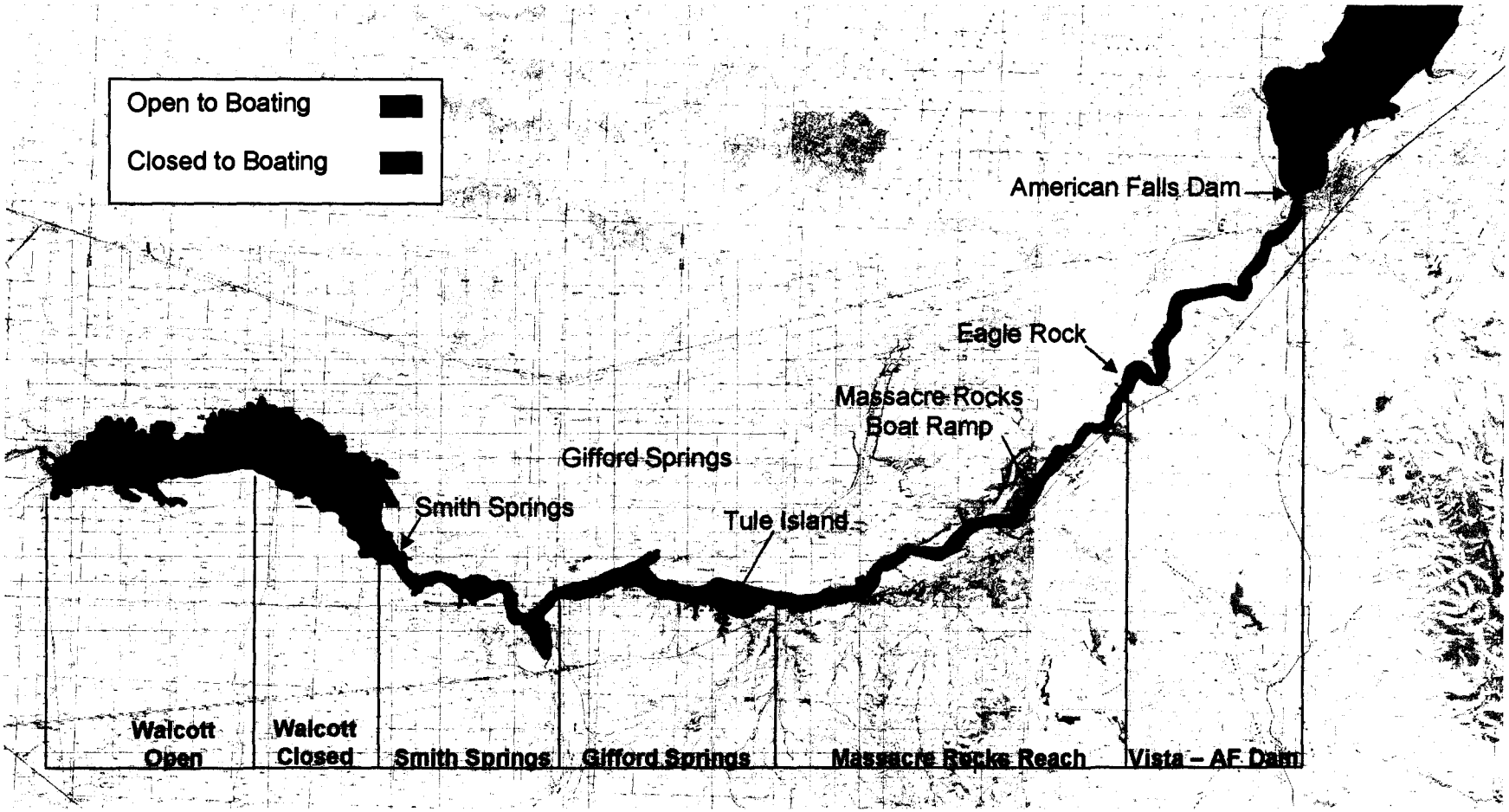

Figure 1. Study area showing Lake Walcott and the Snake River sampled during 2005. The Minidoka Wildlife Refuge boundaries extend from Tule Island downriver to Minidoka Dam. River and reservoir reaches described in the report are delineated at the bottom of the figure.

METHODS

Electrofishing

Smallmouth bass were sampled using boat electrofishing. All electrofishing was completed at night between 2100 and 0500 hours. Data collected included recording sample location, sample time, boating access (open or closed), number of bass collected, and measuring smallmouth bass lengths and weights. Smallmouth bass collected in these surveys were tagged (floy or telemetry), released untagged, or sacrificed for otolith age analysis. Electrofishing transects were completed starting at the lowest point within a river reach (Figure 1) and sampling upriver. We attempted to tag two smallmouth bass with radio tags every 1.6 km of river sampled.

Age analysis

An attempt was made to collect 25 fish from each potential cohort. In the field, cohorts were estimated visually or roughly grouped by 25 mm length bins. Otoliths were removed and stored in scale envelopes. Prior to aging, otoliths were mounted in epoxy and sectioned using a Dremel tool. To finish the otoliths for reading, the sections were lightly sanded with 400 and 600 grit wet-dry sandpaper. The otolith sections were placed in water and read with translucent light at 20 to 35 X magnification. Annuli were identified as the dark regions of the otolith.

Radio Telemetry Study

Advanced Telemetry System (ATS) transmitters and receivers were used to complete the migration and habitat use study. The radio transmitters weighed approximately 14 grams and were implanted in 34 smallmouth bass that weighed at least 800 grams. Tagging began on 20 June and was completed 14 July 2005. The ATS transmitters are guaranteed to last 365 days. Expected life is roughly 680 days. The transmitters should provide data from July 2005 to May 2007. Tracking will continue into the 2007 field season.

The radio transmitters were surgically implanted into the fish body cavity following the procedures described in Swanberg et al. 1999. Transmitters were inserted into the body cavity through a 35 mm long incision. The transmitters were fitted with external antennas that exited the fish posterior to the incision made for the body of the tag (Figure 2). Incisions were closed with three or four stitches. Surgery times ranged from 6-8 minutes. Post surgery, fish were placed in live wells filled with fresh water to recover. Telemetry tagged smallmouth bass were released near their original sampling locations. Collection, tagging, and release of smallmouth bass were distributed spatially such that no more than two smallmouth bass were tagged per 1.6 km from American Falls Dam downriver to Smith Springs.

Tracking was completed using aerial, truck, and boat systems. Tracking by boat was the primary method of locating fish. Boat tracking was completed about twice a month during the summer, but less frequently during fall and winter seasons. Aerial tracking was used to locate fish that we were unable to locate by ground tracking. GPS locations were recorded for each tracked fish. Individual tracking locations were used to calculate home range. Home range was defined as the distance between a fish's furthest downriver and upriver positions. All fish locations were standardized by estimating their distance from Minidoka Dam.

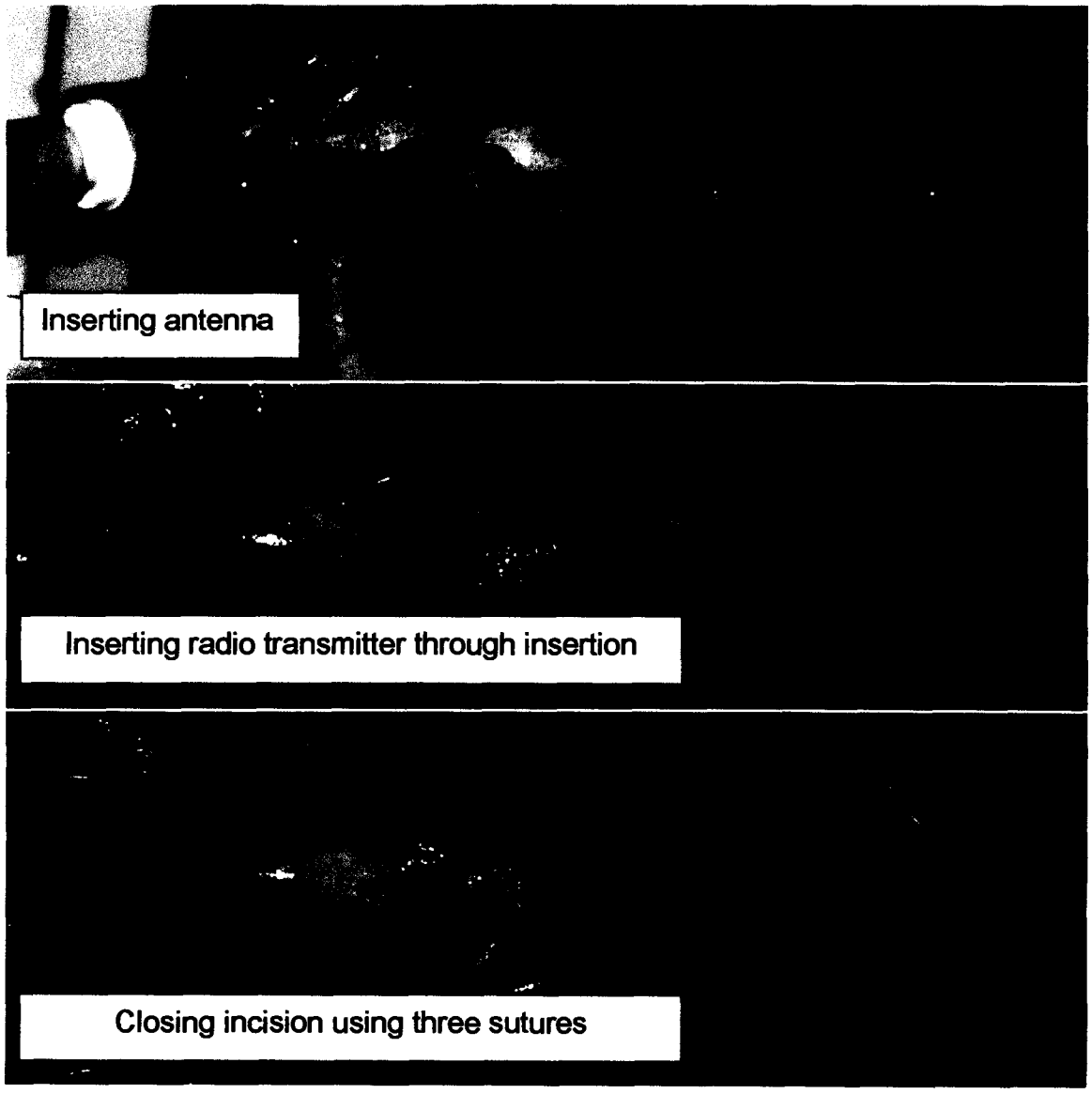

Figure 2. Methods used to implant transmitters in smallmouth bass.

Angler Exploitation

We indirectly estimated angler exploitation by comparing total annual mortality rates from exploited (open boating) and unexploited (closed boating) populations. All fish caught from those areas were assigned an age using a SAS program (Dan Isermann, personal communication). Results from the SAS program are here to for referred to as the Isermann Model. Age assignments were compiled for open and closed boating areas and used to develop catch curves. The catch curves and total annual mortality (TAM) estimates were generated using FAST (2.1) fishery analyses and simulation model (Slipke and Maceina 2000).

Catch curves and TAM were estimated separately for closed and open boating reaches. We hypothesized that TAM would be higher in the open boating areas (TAM = natural + angler cause mortality) compared to closed boating areas (TAM = natural mortality). We used the following equation to indirectly estimate angler exploitation:

Angler Exploitation = BTAM – CTAM

Where;
BTAM = total annual mortality using catch curve data collected in open boating areas. This value includes natural and angler caused mortality.

CTAM = total annual mortality using catch curve data collected in closed boating areas. Because very few anglers access these areas, this value is an estimate of natural mortality.

The Department began a statewide research project with the goal of using angler tag returns to estimate harvest rates. The Snake River smallmouth bass fishery was included in the statewide research study. To participate in the study, smallmouth bass were tagged with FLOY tags. The goal was to tag 200 smallmouth bass with FLOY tags. Only bass large enough to be legally harvested were tagged (> 12 inches total length). Information signs were posted at all major access points. The signs identified a 1-800 telephone number for tag reporting. The statewide research project will take several years to complete. The goal of the statewide research project is to determine angler reporting compliance for non-reward and reward tags. To estimate true harvest rates of tagged smallmouth bass in this study, tag reporting rates need to be adjusted for anglers that do not report their tags. Since those data will not be available for several years, return rates of FLOY tags reported here have not been corrected for non-reporting bias. In addition to the FLOY tags, telemetry tags were also return by anglers. Each telemetry tag had a request inscribed on the body of the tag to return them to the Pocatello regional office.

RESULTS

Electrofishing

A total of 1,362 smallmouth bass were collected during 32 hrs of electrofishing (Table 1). Electrofishing catch per hour was greatest in the closed boating area of Lake Walcott (123 fish per hour) followed by Smith Springs (72 fish per hour). Catch for all other areas ranged from 20 to 51 smallmouth bass per hour of electrofishing. The lowest catch rates came from the closed boating area of Gifford Springs (Table 1).

Table 1. Catch statistics for smallmouth bass sampled in the Snake River below American Falls Dam downriver to Lake Walcott. Catch per electrofishing hour of stock, quality, preferred, and memorable smallmouth bass are shown. Proportional stock densities and the percent of bass in the catch of legal harvest size (> 12 inches) are shown for each of the sample reaches.

				Catch per hour (mm)					
				Stock	Quality	Preferred	Memorable		
	Effort (hr)	Catch	Catch Per hr	≥178	≥ 279	≥ 356	≥ 432	PSD	% ≥ 305 mm
Walcott Closed	1.0	123	123	110	70	55	33	63	52%
Gifford Closed	7.8	154	20	16	8	5	1	52	38%
Smith Springs Closed	3.3	237	72	53	26	15	4	49	31%
Vista open	4.5	113	25	20	8	1	0	42	23%
Below Massacre open	4.0	117	29	27	11	7	1	40	32%
Dam open	3.4	158	46	34	11	1	0	31	17%
Gifford Open	2.0	102	51	31	9	4	1	27	12%
Above Massacre open	4.8	256	53	36	7	1	0	18	7%
Walcott Open	1.0	102	102	53	6	5	3	11	6%
Combined Closed	12.1	514	42	35	19	13	5	55	40%
Combined Open	19.8	848	43	31	9	3	1	29	15%

Smallmouth bass size distributions varied between open and closed boating zones. The mean length of smallmouth bass sampled in open boating zones was 209 mm (n = 849). In closed boating zones, mean length of smallmouth bass was 265 mm (n = 529; Figure 3). Differences in mean lengths were statistically significant ($T = 11.5$, $df = 1,376$, $P < 0.0001$). In addition to differences in mean lengths, the other primary length-frequency indices such as proportional stock density (PSD) show similar trends between open and closed boating zones. For example, the PSD for the closed boating zone of Lake Walcott was 63 compared to only 11 in the open boating zone. All three of the highest PSD estimates came from closed boating zones. Table 1 shows PSD, catch per hour of quality, preferred, and memorable sized smallmouth bass collected in each river reach. Figure 4 shows length frequencies from each sample area.

Age analysis

A total of 127 smallmouth bass were sacrificed for age analysis. Total lengths of those fish ranged 78 to 510 mm. Length at age data are presented in Table 2 and Figure 5.

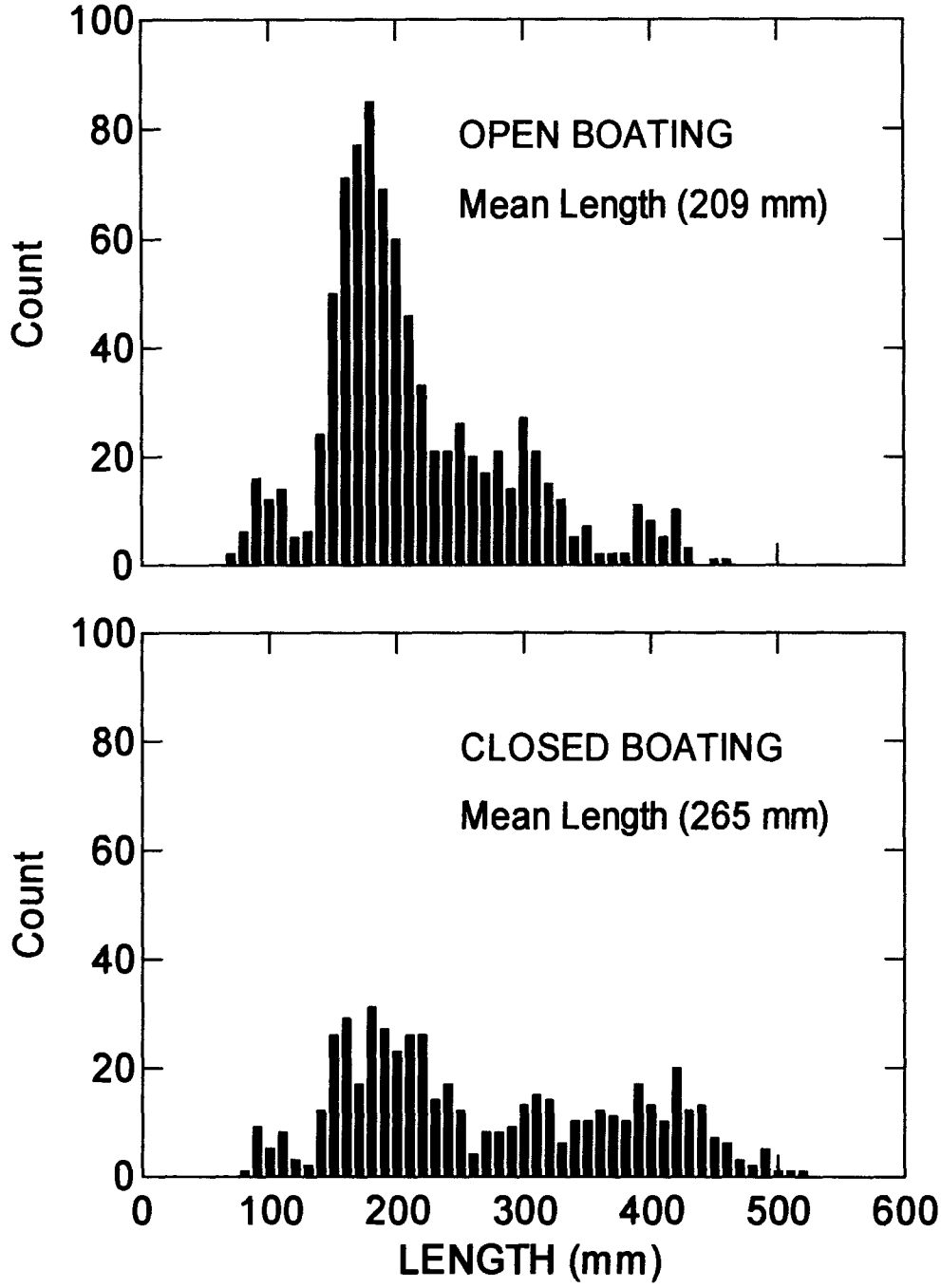

Figure 3. Pooled length frequency data from open and closed boating areas from American Falls Dam downriver to Lake Walcott.

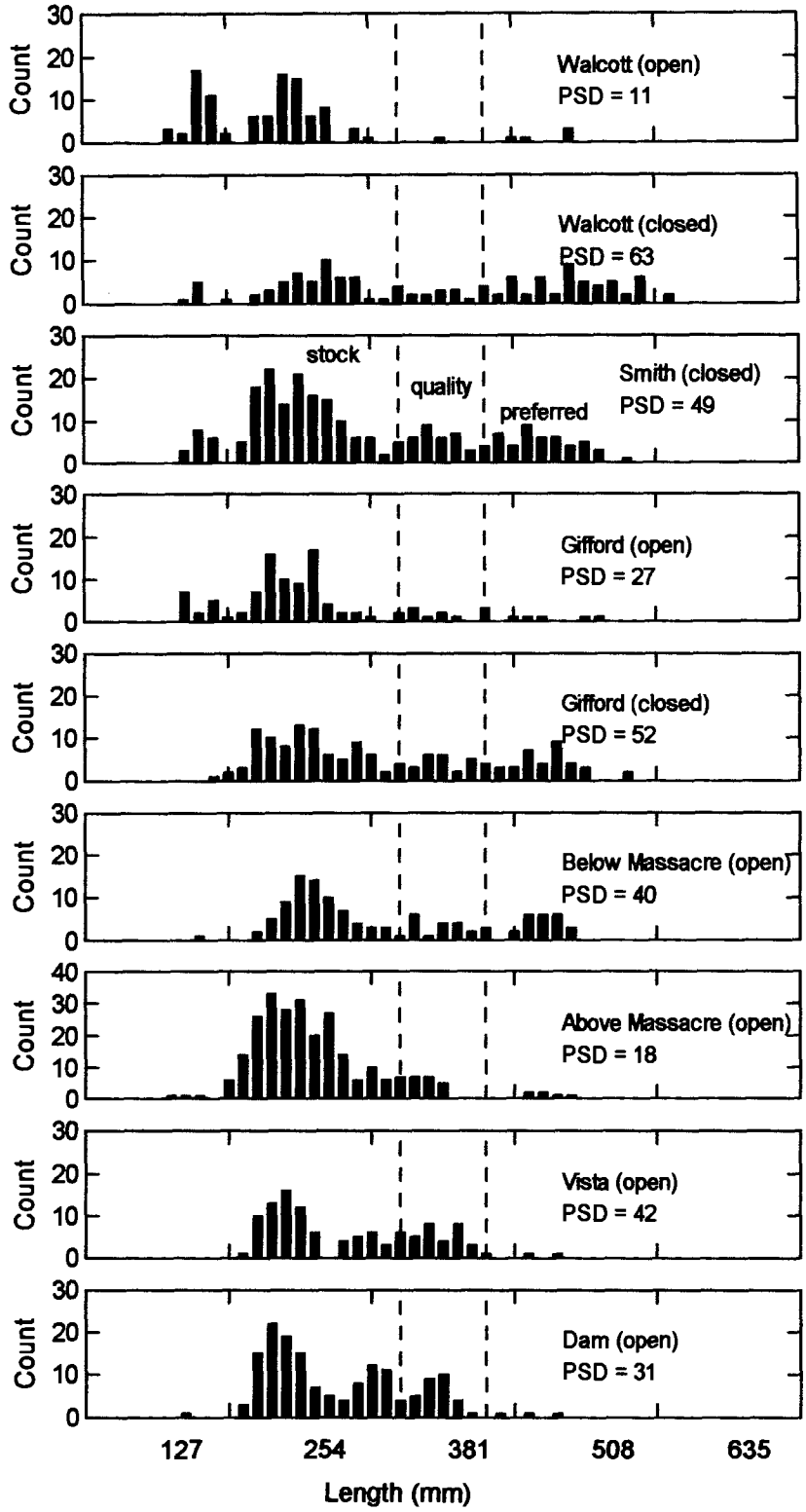

Figure 4. Length frequency histograms and proportional stock densities values for smallmouth bass sampled in the Snake River from American Falls Dam downriver to Lake Walcott. Boating designations (open and closed) are shown.

Table 2. Mean Length (mm) at age for smallmouth bass sampled in the Snake River from American Falls Dam downriver to Lake Walcott. The Isermann Model uses the estimated age information from sectioned otoliths and assigns an age to every fish in the length frequency distributions.

Age	n	Mean length (mm)
1	26	121
2	24	194
3	17	279
4	16	340
5	8	391
6	8	413
7	6	423
8	6	436
9	2	451
10	3	467
11	3	468
12	1	485
13	1	510

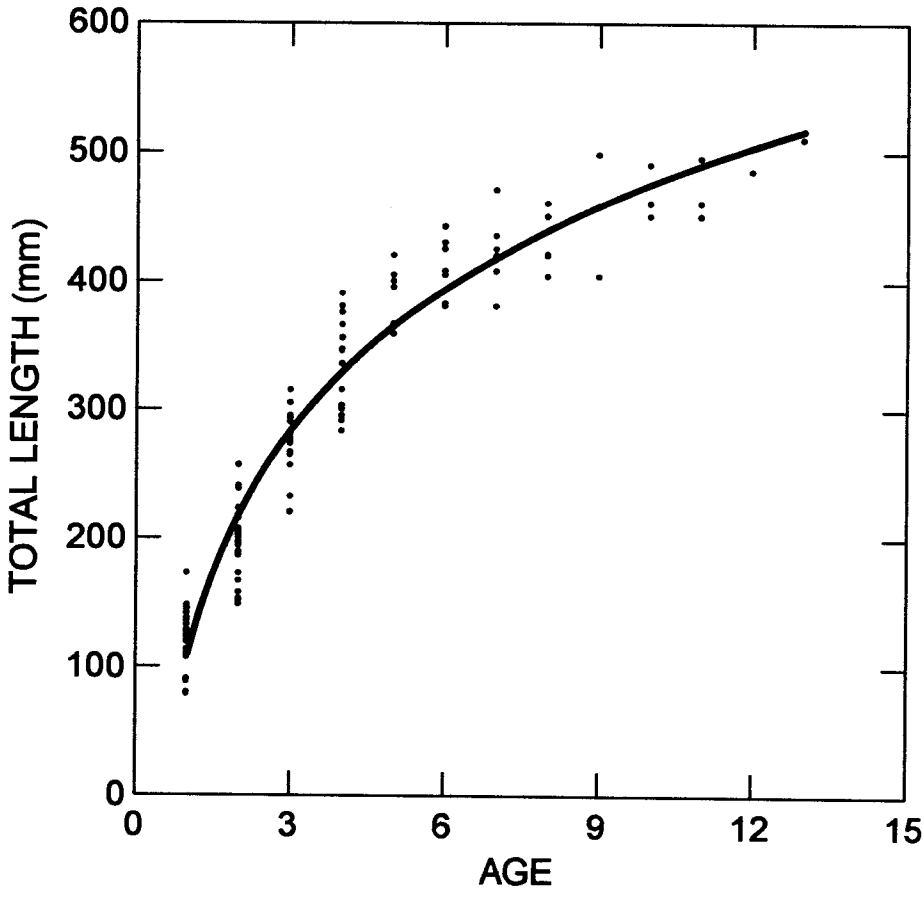

Figure 5. Length-at-age plots for Snake River smallmouth bass.

Radio Telemetry Study

A total of 34 radio transmitters were implanted in smallmouth bass from American Falls Dam downriver to Smith Springs. Mean weights of the tagged bass ranged from 800 to 1,800 grams with a mean of 1,209 grams. From July 7 to November 28, 2005, we completed 11 tracking surveys. During those surveys, 98 smallmouth bass locations were documented. Individual bass were located between 0 and 7 times, with a mean location frequency of 3.3. Two smallmouth bass were never relocated after being tagged.

Of the 31 bass with tracking history, 21 (68%) migrated upriver from their initial tagging locations and 10 (32%) were found downriver. We documented 356 km of total movement during five months of tracking. Twenty six smallmouth bass moved a total of 154 km during July. Average individual bass migration distance in July was 6.0 km. In August, 21 bass moved a total of 48 km with an average movement distance of 2.3 km per bass. In September, we tracked 20 smallmouth bass that moved and average distance of 4.0 km. Due to the small number of fish tracked (n = 6), in October and November we combined results. Of the few fish tracked during those months, they migrated much longer distances than during the summer months. Average migration distance for the six bass observed in October and November was 12.4 km.

Home range varied with initial tagging location. Home range estimates were greatest for smallmouth bass tagged in the Gifford Springs area. Of the 13 bass tagged in that reach, mean home range was 16.4 km (Figure 6; Table 3). Mean home ranges were 8.7 km (n = 6) for bass from Smith Springs and 7.4 km (n = 9) for bass tagged in the Massacre Rocks reach. Due to the small sample size (n = 4), home range data were not calculated for fish tagged in the American Fall Dam and Vista boat launch areas.

Migration patterns varied with initial tagging location. Smallmouth bass tagged in the Smith Springs area either stayed very close to their initial release site or migrated downriver towards Minidoka Dam. Conversely, 10 of 14 (71%) smallmouth bass tagged in the Gifford Springs reach moved upriver (Figure 6). The upriver migrants concentrated in late summer and early fall above the Massacre Rocks State Park boat launch. Those migrations indicate that the lower reach of Lake Walcott and the deep water section of the Snake River between Massacre Rocks and Eagle Rock are habitats important for wintering smallmouth bass.

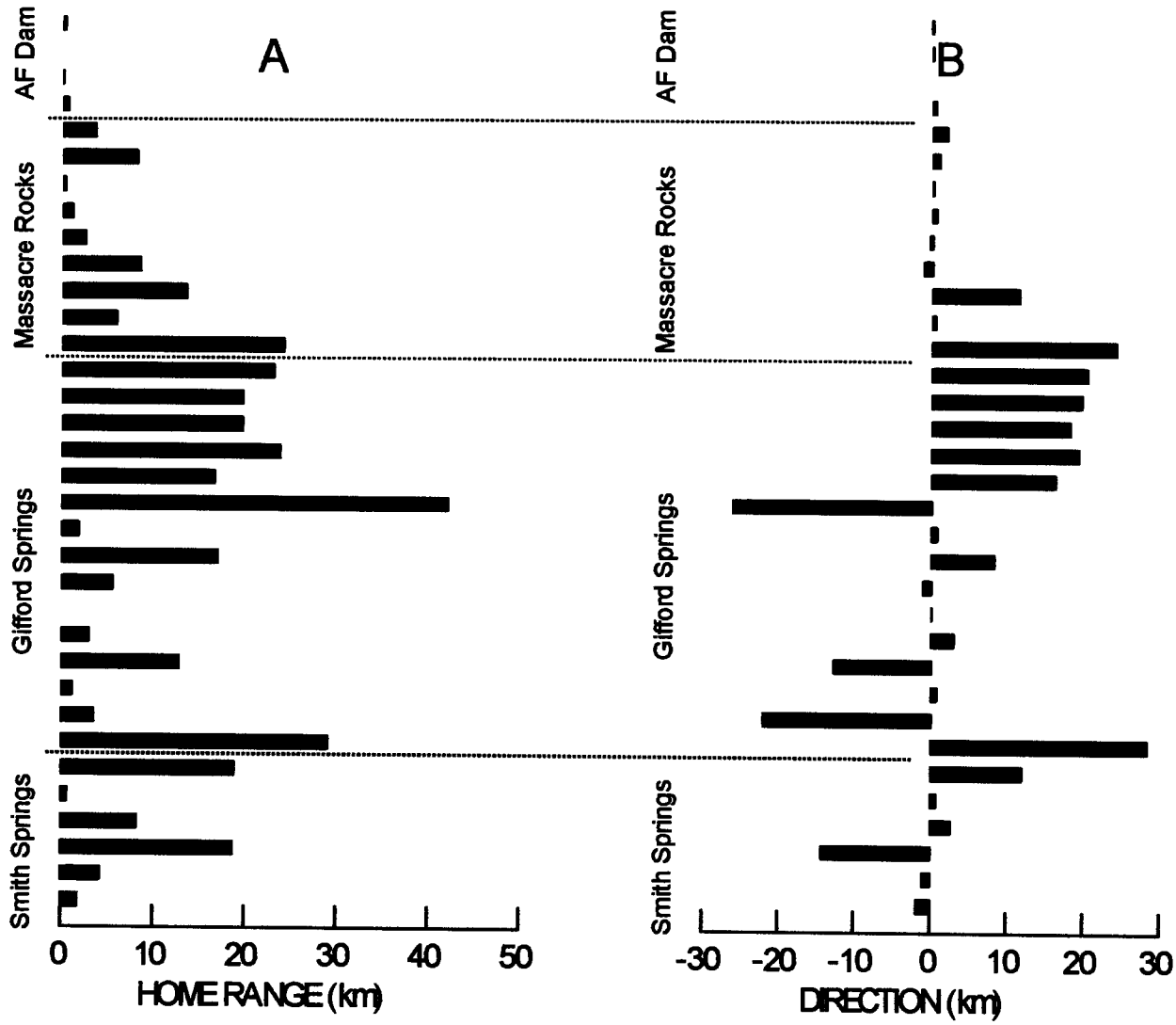

Figure 6. Home range (A) and migration direction (B) for 31 smallmouth bass tagged in the Snake River between American Falls Dam and Smith Springs. Individual smallmouth bass home range estimates were calculated by taking the difference in river km between the uppermost and lowermost location. Figure B shows the distance and direction (up or downriver) of movement between a fishes initial and last tracking location.

Table 3. Telemetry results for smallmouth bass in the Snake River between Lake Walcott and American Falls Dam. River km is the distance upriver from Minidoka Dam. Home range was calculated by subtracting the highest upriver location from the lowest downriver position. The direction column refers to the end tracking position relative to the initial tagging location. Negative values describe downriver movement and upriver migrations are positive values.

Tag	Tagging		Last	Times	Home range	Direction
Freq	River Km	Description	Observed	tracked	(km)	(km)
317	67.4	AF Dam	Dam	1	0.2	-0.2
509	64.4	AF Dam	Not Found	0		
366	60.8	Vista	Harvested	0		
335	58.4	Vista	Harvested	2	0.5	0.5
465	49.2	Massacre Rocks	Massacre Rocks	4	2.7	1.9
549	49.2	Massacre Rocks	Massacre Rocks	7	4.2	1.0
259	46.0	Massacre Rocks	Harvested	1	0.2	0.2
865	46.0	Massacre Rocks	Massacre Rocks	4	0.8	0.5
56	43.1	Massacre Rocks	Harvested	4	1.1	-0.3
445	43.1	Massacre Rocks	Massacre Rocks	5	4.7	-1.1
486	41.7	Massacre Rocks	Massacre Rocks	5	12.2	11.4
527	41.7	Massacre Rocks	Massacre Rocks	2	0.0	0.5
894	38.0	Massacre Rocks	Harvested	0	24.1	-24.1
116	34.9	Gifford_closed	Eagle Rock	6	20.3	20.3
773	34.9	Gifford_closed	Eagle Rock	1	19.6	19.6
807	34.9	Gifford_closed	Eagle Rock	3	18.8	18.2
238	33.5	Gifford_closed	Eagle Rock	5	21.4	19.3
926	33.5	Gifford_closed	Massacre Rocks	5	16.3	16.3
138	32.2	Gifford_closed	Walcott	3	34.1	-26.1
627	32.2	Gifford_closed	Gifford Closed	4	1.3	0.8
278	31.1	Gifford_closed	Gifford Closed	3	8.2	8.2
407	30.7	Gifford Open	Gifford Open	2	3.2	-1.1
655	28.6	Gifford Open	Not Found	0		
77	25.9	Gifford_closed	Gifford Closed	1	2.9	2.9
427	25.9	Gifford_closed	Walcott	1	12.7	-12.7
296	24.8	Gifford_closed	Gifford Closed	3	1.0	0.8
565	24.8	Gifford_closed	Walcott	1	22.2	-22.2
835	24.8	Gifford_closed	Eagle Rock	4	28.3	28.3
156	23.3	Smith Springs	Massacre Rocks	4	15.4	11.9
746	22.5	Smith Springs	Smith Springs	2	0.6	0.6
95	20.4	Smith Springs	Smith Springs	6	4.0	2.6
716	19.0	Smith Springs	Walcott	2	16.6	-14.3
387	18.3	Smith Springs	Smith Springs	4	2.6	-1.0
196	17.5	Smith Springs	Walcott	3	1.8	-1.8

Angler Exploitation Estimate

Angler effects were apparent in open boating zones. Using catch curve statistics, estimates of total annual mortality were 48% in open and 32% in closed boating zones. Due to limited angler access, mortality estimates from the closed boating zones approximate natural mortality. Mortality estimates from open boating zones include both natural and angling mortality. The mortality estimate from the open boating zone was 16 percentage points higher (50% increase) than the closed boating zone.

A total of 174 FLOY and 34 radio telemetry tagged smallmouth bass were available for anglers to harvest in 2005. Tags were distributed in open (n = 96) and closed (n = 112) boating zones. In open boating areas, 11% of all the tagged smallmouth bass were reported as being harvested by anglers. Reported harvest of smallmouth bass tagged in closed boating areas was 2%. Those estimates were not corrected for non-reporting bias.

Harvest reporting rates were higher for telemetry tags than for FLOY tags returns. Anglers returned 6 of the 34 telemetry tags to Department regional offices. Confirmed harvest of telemetry tagged bass was 36% for open and 5% in closed boating zones. Comparable estimates of harvest using FLOY tags were 7% and 1%, respectively (Table 4).

Table 4. Sample size and catch rate statistics for smallmouth bass tagged in the Snake River between American Falls Dam and Smith Springs.

	FLOY Tags		Telemetry Tags	
	Open boating	Closed boating	Open boating	Closed boating
Tagged	82	92	14	20
Caught	11	3	9	1
Harvested	6	1	5	1
%caught	13%	3%	64%	5%
%harvested	7%	1%	36%	5%

CONCLUSIONS

This study provided a unique opportunity to compare smallmouth bass populations from exploited and unexploited sections of an impounded reach the Snake River. Estimates of smallmouth bass mortality were 50% higher in open boating zones than in closed boating zones. Additionally, mean size and PSD estimates were much lower for smallmouth bass caught in the open boating zones. The difference in mean size between open and closed boating zones was 56 mm.

The closed vs. open access evaluation compared populations that experienced similar habitat and temporal variation. Slipke et al. (1998) evaluated the impacts of a 356-mm minimum harvest regulation for smallmouth bass on Tennessee River below Wilson Dam. Smallmouth bass were collected seven years apart (1988 and 1995) with a management change implemented in year three (1991). Smallmouth bass populations changed markedly between pre and post regulation change (Slipke et al. 1998). During that evaluation, however, hydroelectric operations at Wilson Dam varied and were shown to impact year class strength. Water management changes at Wilson Dam may have influence the outcome of the regulation evaluation. Hydrological variation in the Snake River did not impact our evaluation because both populations experienced the same time scale and water variations.

Most of the telemetry tagged smallmouth bass occupied both closed and open boating areas in the Snake River system. The prevailing migration pattern appeared to be as follows: 1) spend the winter in deep water available in the open boating zone above the Massacre Rocks boat launch, 2) migrate downriver to closed boating zones in April and May, and 3) migrate back upriver to deep water in the fall. Coincidentally, migrating smallmouth bass left the open boating zones prior to the June peak in fishing pressure and returned after summer fishing subsided. The timing of migration protected many of the telemetry tagged bass from potentially being harvested in the heavily fished Massacre Rocks reach.

The popularity of the Snake River smallmouth bass fishery has grown rapidly over the past several years. Because of the increase in fishing pressure, local bass clubs and some non-club anglers would like to see more restrictive harvest regulations. Other anglers enjoy the current general harvest regulation. The unexploited sections of the Snake River illustrate the potential for a very high quality bass fishery. For example, in the closed boating zone of Lake Walcott, 27% of the smallmouth bass exceed 432 mm total length. The quality bass fishery could be expanded to open boating zones by implementing restrictive harvest regulations. However, restrictive regulations would substantially reduce current harvest opportunity and displace anglers that like to harvest fish. Moreover, while the populations in the open boating zones show harvest impacts, tournament anglers continue to report five-fish catches that exceed 6.8 kg and general angler interviews suggest a relatively satisfied user constituency.

MANAGEMENT RECOMMENDATIONS

1) Complete a comprehensive angler opinion survey for the Snake River Fishery between American Falls Dam and Lake Walcott.

2) Monitor angling pressure and exploitation in the Massacre Rocks reach of the Snake River.

SOUTHEAST REGION 2005 FISHERY MANAGEMENT ANNUAL REPORT

Bonneville Cutthroat Trout Distribution and Telemetry Study in the Bear River, Idaho

INTRODUCTION

In 2005, IDFG and Idaho State University initiated a Bonneville cutthroat trout *Oncorhynchus clarkii utah* (BCT) study in the Bear River. The objectives of this work were to document the distribution of BCT in mainstem Bear River, identify spawning tributaries, and describe seasonal changes in habitat use. Results from this project will be used to evaluate current management of the species in the Bear River system and help direct conservation measures to enhance current populations. This project was jointly funded by IDFG and PacifiCorp. This document is a preliminary review of findings from 2005. A full analysis and report of this work will be completed by an Idaho State University graduate student, scheduled to complete a thesis in the spring of 2007.

STUDY AREA

The study area included 241 km of the mainstem Bear River in Idaho. For reporting and analysis purposes, four river segments were distinguished. The river segments are shown in Figure 7 and are named after local communities (Pegram, Nounan, Thatcher, and Riverdale). Of the 241 km of river habitat, about 169 km were sampled during the spring and fall periods (Table 5).

METHODS

Fish Distribution

Fish distribution surveys were completed in the spring and fall. Fish were collected with boat-mounted electrofishing equipment. Electrofishing was completed while drifting downriver. Fish species, lengths, and weights were recorded for game species. Common carp *Cyprinus carpio* and Utah sucker *Catostomus ardens* were counted but not netted. A tally meter was mounted to the railing of the electrofishing boat and used to record non-game species as they passed by the electrofishing boat.

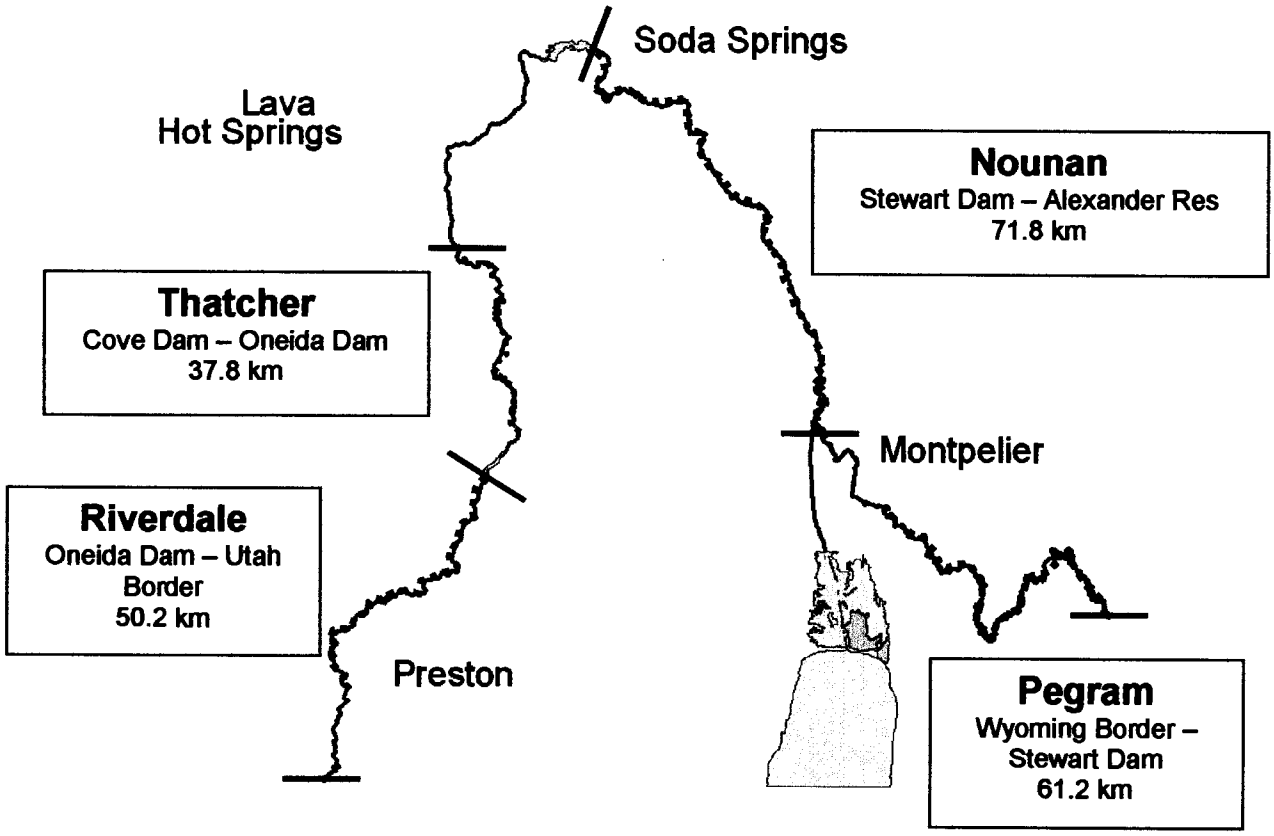

Figure 7. River segment delineations. The dotted lines show river reaches that were sampled within each segment.

Table 5. UTM GPS coordinates for each river reach within the major river segments. All coordinates are Zone 12, NAD 83. * indicates reaches that were not sampled due to boat access limitations.

Segment	Reach	East	North	Km	Segment	Reach	East	North	Km
Riverdale	R1*	422620	4650238	17.9	Nounan	N1	449392	4722037	8.8
	R2*	424236	4660966	7.6		N2	451984	4718365	8.8
	R3	424485	4665001	6.0		N3	457319	4717441	9.0
	R4	431200	4668531	9.2		N4	459411	4712522	9.8
	R5	435307	4671819	9.5		N5	463950	4707341	8.5
			total	**50.2**		N6	466607	4702883	10.5
Thatcher	T1	440963	4686391	12.6		N7	470778	4694343	16.4
	T2	439645	4695346	8.3				**Total**	**71.8**
	T3*	439686	4699454	12.5	Pegram	P1	476253	4677786	8.1
	T4*	434919	4705066	3.3		P2	479647	4675269	14.9
	T5*	434593	4708043	1.1		P3	485548	4671803	4.8
			total	**37.8**		P4*	487674	4669889	9.9
						P5	487503	4665065	10.3
						P6	490139	4666808	5.6
						P7	493344	4671173	7.6
								Total	**61.2**

Radio Telemetry

BCT captured during the Bear River fish distribution surveys in both spring and fall were fitted with radio transmitters. Those periods allowed for habitat selection observations over a complete year. Only the spring telemetry results are reported here. Fall tagged fish continue to be tracked and will be reported in a final telemetry report completed by Idaho State University.

The radio telemetry study equipment was purchased from Advanced Telemetry Systems (ATS). The radio transmitters were surgically implanted into the fish body cavity following the procedures described in Swanberg et al. (1999). The fish transmitters included mortality and temperature indicators. Transmitter pulse rates changed with water temperature and were converted by the ATS 4500 receiver to give fish temperature.

BCT caught during electrofishing surveys were weighed to determine if they were large enough to be included in the telemetry study. Fish weighing at least 350 grams were included in the study. An incision was made approximately 35 mm long, centered between the pectoral fins and pelvic fins. A grooved directional tool approximately 100 mm long is then inserted into the incision and slid posterior, close to the flesh to prevent any contact with the internal organs, until it reaches 6 mm behind the pelvic fins. Then a 100 mm long catheter needle is inserted behind the pelvic fins and slid up the directional tool until it exits the 35 mm incision. The antennae was directed through the hole that the catheter needle made behind the pelvic fins. The body of the tag was gently inserted into the 35 mm incision. Either 3 or 4 stitches were used to close the 35 mm incision. All fish were released back to the river after recovering from surgery in a holding tank on the electrofishing boat. Tracking radio tagged fish began several days post surgery and continued at weekly intervals thereafter.

RESULTS

Fish Distribution

During 35 days of electrofishing, fisheries crews surveyed 169 km of the Bear River. That effort represented about 70% of the 241 km of Bear River that occur in Idaho. Most of those river km were surveyed spring and fall for a total sampling effort that exceeded 300 km. Sampling effort was distributed roughly equal between spring (23 reaches) and fall (21 reaches).

A total of 7,718 fish were recorded during the surveys. Fish counts were greatest in the Pegram and Nounan segments (Table 6). Common carp, sucker sp, and mountain whitefish *Prosopium williamsoni* dominated the fish community throughout the Bear River. Rainbow trout *Oncorhynchus mykiss*, BCT and brown trout *Salmo trutta* followed in relative abundance. Total catch statistics are shown in Table 6.

A total of 104 BCT were collected during the sampling effort. All of the BCT were collected in the Pegram (67) and Nounan (37) segments. Catch of BCT across all segments was less than 1 BCT per river km sampled (104 BCT in 300 river km sampled). The mean length of BCT was 369 mm in Nounan and 338 mm in Pegram. The largest BCT measured was 545 mm collected from Pegram (Figure 8).

A total of 129 rainbow trout were sampled. The rainbow trout were most abundant in the Riverdale segment where the Department stocks them regularly. No rainbow trout were sampled in the Pegram segment. Brown trout occurred in low numbers in all of the segments except Thatcher. Mountain whitefish abundance was greatest in the Riverdale and Pegram reaches (Figure 9). Walleye were collected in the Riverdale and Thatcher segments. Oneida Reservoir is stocked annually with 0.5 million walleye fry. Walleye drift downriver into the Riverdale segment as well as migrate upriver into the Thatcher reach.

Table 6. Catch statistics for electrofishing in the Bear River, Idaho. The values shown for redside shiners are biased due to inconsistencies in attempts to net them.

	Riverdale		Thatcher		Nounan		Pegram		Total	
	count	%	count	%	count	%	count	%	count	%
Common Carp	311	23.1	547	96.0	2,077	58.2	576	25.9	3,511	45.5
Sucker (Var. Sp.)	783	58.0	11	1.9	1,317	36.9	702	31.5	2,813	36.4
Mountain Whitefish	159	11.8	0	0.0	32	0.9	848	38.1	1,039	13.5
Rainbow Trout	74	5.5	4	0.7	51	1.4	0	0.0	129	1.7
Bonn. Cutthroat Trout	0	0.0	0	0.0	37	1.0	67	3.0	104	1.3
Brown Trout	19	1.4	0	0.0	34	1.0	17	0.8	70	0.9
Redside Shiner	0	0.0	0	0.0	21	0.6	0	0.0	21	0.3
Utah Chub	0	0.0	0	0.0	1	0.0	10	0.4	11	0.1
Walleye	1	0.1	7	1.2	0	0.0	0	0.0	8	0.1
Yellow Perch	0	0.0	0	0.0	0	0.0	8	0.4	8	0.1
Brook Trout	0	0.0	1	0.2	1	0.0	0	0.0	2	0.0
Largemouth Bass	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0
Smallmouth Bass	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0
Grand Total	**1,349**		**570**		**3,571**		**2,228**		**7,718**	

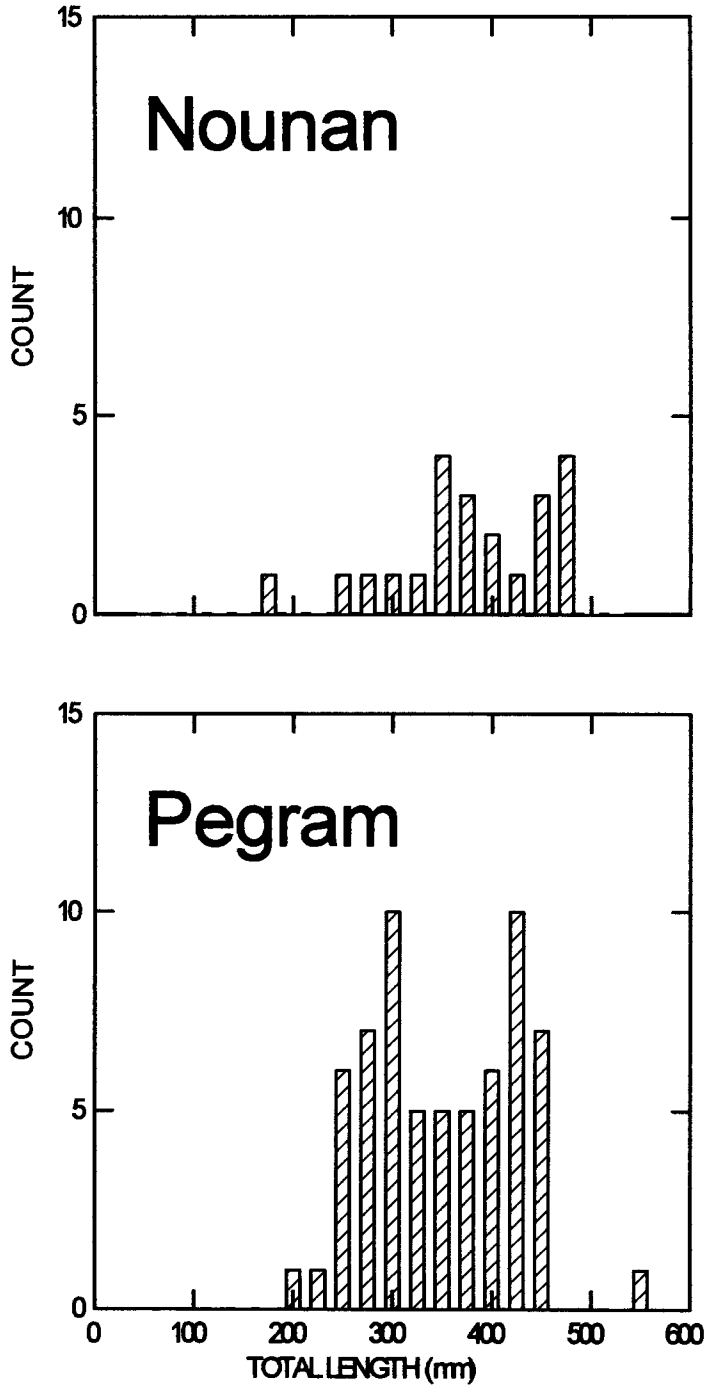

Figure 8. Length frequency distributions of Bonneville cutthroat trout caught in Bear River 2005. No Bonneville cutthroat trout were sampled from the Thatcher or Riverdale segments.

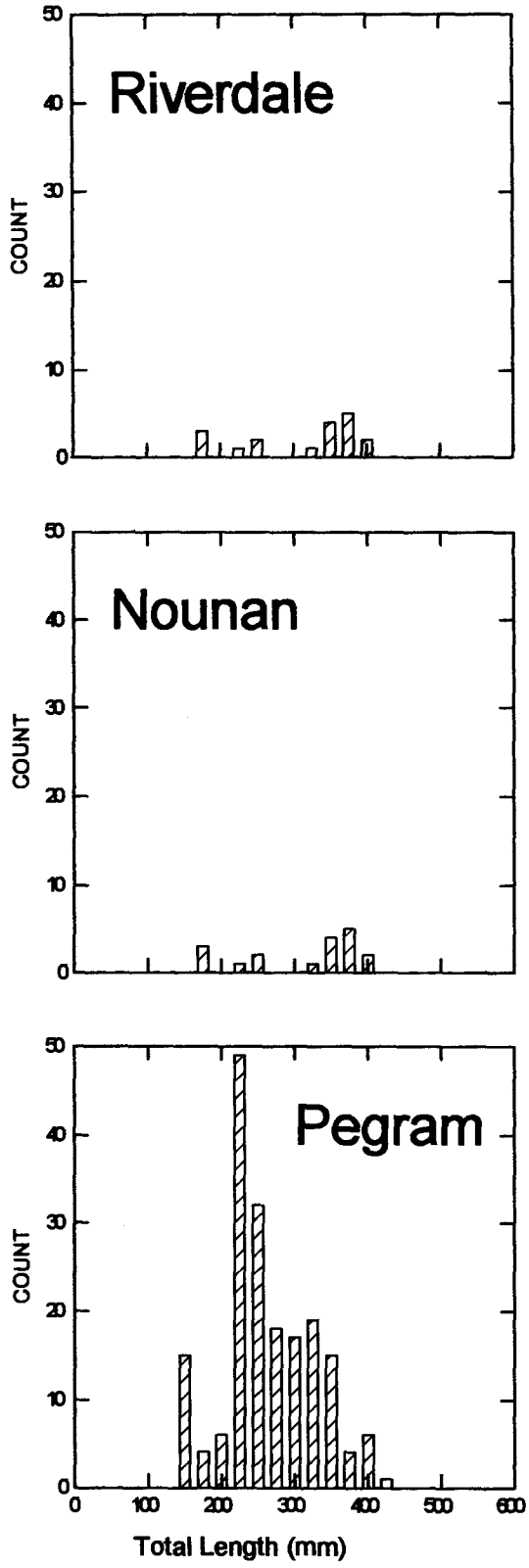

Figure 9. Length frequency distributions of mountain whitefish collected during electrofishing surveys in the Bear River 2005.

Radio Telemetry

A total of 26 BCT were tagged during the spring sampling period. Tagging locations are shown in Figure 10. Fall tagged fish are not reported here because tracking of those fish was not complete during preparation of this report. All of the spring-tagged fish were caught either in the Nounan (14) or Pegram (17) segments. Lengths, weights, and tagging locations are shown in Table 7.

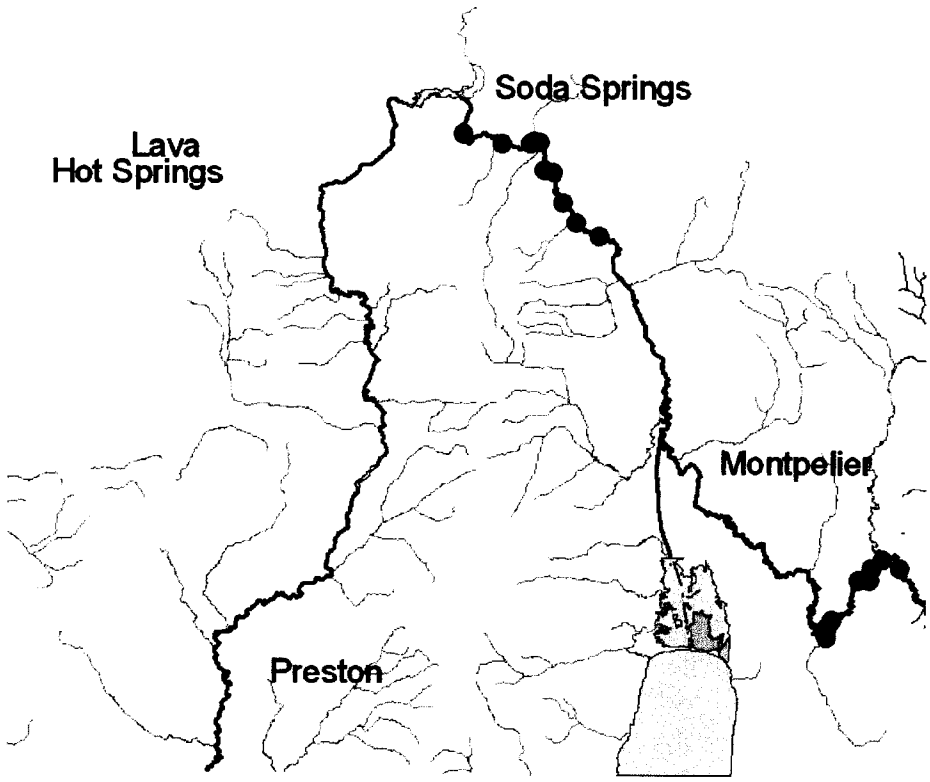

Figure 10. Spring 2005 tagging locations for Bonneville cutthroat trout.

The primary goal of the spring tagging effort was to identify spawning tributaries. In the Nounan river segment, Eightmile Creek was the primary spawning tributary. Eight BCT used Eightmile Creek and one radio tagged fish was observed in Georgetown Creek. In the Pegram river segment, most of radio tagged fish migrated past the Thomas Fork and upriver to the Smiths Fork River in Wyoming. None of radio tagged fish from the Pegram river segment used the Thomas Fork to spawn (Figure 11).

Table 7. Dates, fish lengths, weights, and GPS locations for Bonneville cutthroat trout tagged spring 2005. Different radio frequencies were used for Nounan (148) and Pegram (149) segments.

Date	Len (mm)	Wt (g)	UTM E	UTM N	Frequency	Comments
4/11/2005	355	505	0453933	4716985	148.025	N2, Very good condition.
4/13/2005	333	380	459369	4713992	148.056	
5/4/2005	353	390	0493542	4671332	148.095	
4/12/2005	347	510	0457404	4717297	148.104	
4/13/2005	345	420	458427	4714235	148.125	
4/11/2005	375	530	0456972	4717061	148.145	N2, Fish hit hard by electricity.
4/15/2005	344	510	0464336	4707173	148.155	N4, Fish hit hard by electricity.
4/10/2005	335	405	0449786	4718132	148.165	N1, Good condition.
4/22/2005	352	500	0461914	4708504	148.207	N4, Fish in good condition.
4/24/2005	365	520	0488766	4665556	148.246	Black spot parasites thick.
4/22/2005	500	1200	0460495	4710661	148.295	N4, caught at old bridge.
4/13/2005	425	940	0457923	4717170	148.327	N3, Very strong recovery.
4/28/2005	360	380	0489211	4666221	149.004	A few black spots.
4/26/2005	340	360	0493461	4671776	149.016	
5/4/2005	350	370	0493506	4671736	149.055	
5/4/2005	357	380	0494675	4672731	149.086	No black spots.
4/24/2005	380	460	0488670	4664399	149.106	Black spots.
4/26/2005	365	450	0493253	4670449	149.126	Few black spots.
5/4/2005	372	460	0493498	4671737	149.136	
4/24/2005	375	560	0488670	4664399	149.166	Ad-clip
4/26/2005	410	655	0492048	4670437	149.186	Lots of black spots.
5/4/2005	391	620	0493542	4671332	149.195	
5/4/2005	378	520	0494675	4672731	149.224	No black spots.
4/25/2005	384	550	0488584	4665107	149.235	Lots of black spots.
5/4/2005	389	525	0493503	4671730	149.256	A few black spots.
5/4/2005	390	560	0493542	4671332	149.285	

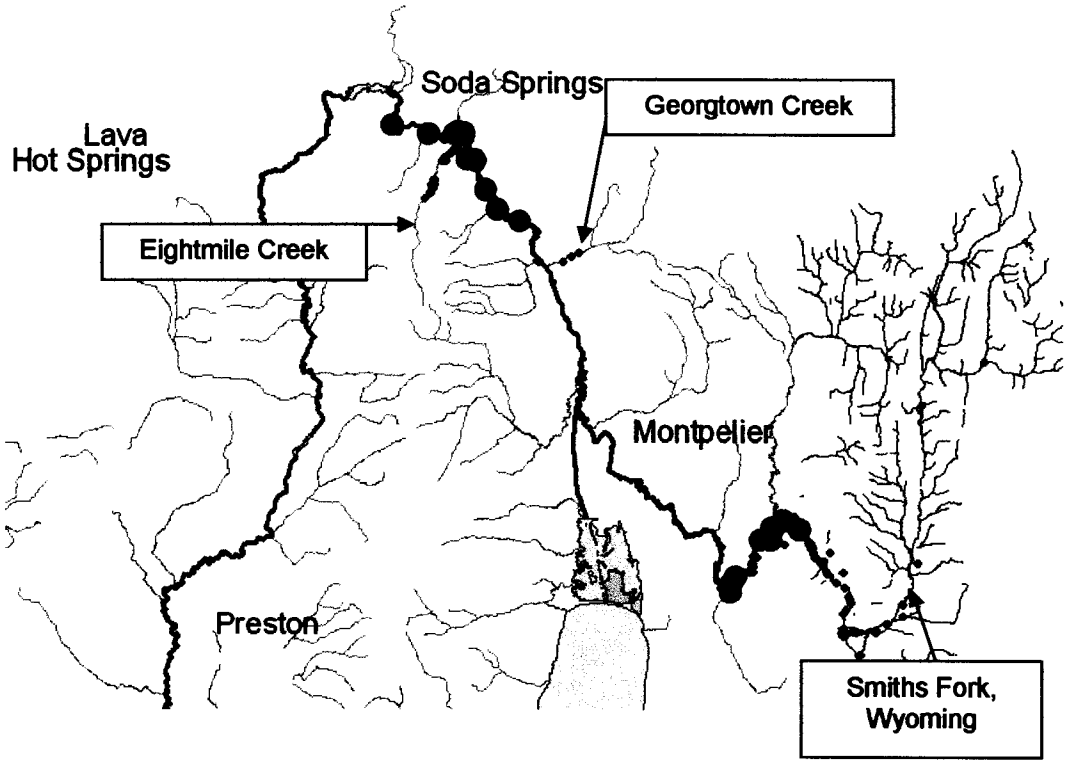

Figure 11. Spring and summer tracking locations for Bonneville cutthroat trout tagged in the Bear River. The large dots represent initial tagging locations. The small dots show tracking locations. The primary spawning tributaries are identified with inset text boxes. The Smiths Fork is a Wyoming tributary of the Bear River.

CONCLUSIONS

Overall catch of BCT in the Bear River was less than one fish per river km sampled. The highest catch rates occurred near the Wyoming border of the Pegram river segment. A second concentration of BCT occurred near the confluence of Eightmile Creek with the Bear River in the Nounan river segment. Surprisingly, no BCT were caught in the Thatcher or Riverdale segments. Despite the lack of BCT in our electrofishing samples, anglers continue to report catching the occasional BCT in those river segments. In a 2002 creel survey, one angler interviewed reported catching a cutthroat trout below Oneida Dam in the Riverdale segment. Furthermore, many of the tributaries that enter the Bear River in the Thatcher and Riverdale segments support BCT. Those tributary populations likely have seasonal connection to the Bear River and may supply fish to the mainstem river.

Eightmile Creek and the Smiths Fork River appear to be the two most important spawning tributaries for BCT caught in the Nounan and Pegram segments, respectively. Only one BCT was tracked to a location other than those two tributaries during the spawning period. These preliminary telemetry results demonstrate the importance of Eightmile Creek to the fluvial population of BCT in Idaho. Opportunities to improve habitat in Eightmile Creek should receive high priority.

The nearly exclusive selection of Eightmile Creek by BCT for spawning in the Nounan segment is disconcerting. There are a number of other tributaries that should provide spawning habitat in the Nounan segment (i.e., Skinner, Stauffer, Pearl, Ovid, Georgetown, and Co-op creeks). The paucity of spawning in those tributaries may be due to a small sample size of tagged fish (n = 14) or some habitat limitation. A much larger sample of fish will be tagged and monitored in the Nounan segment in 2006. If the same lack of diversity in spawning tributaries is observed in 2006, further investigation of habitat in those tributaries is warranted. There may be barriers to migration, dewatering, or some other habitat limitation that prevents successful spawning or recruitment from those tributaries. Identifying limiting factors in the Nounan segment tributaries, where a significant fluvial population persists, should be useful in directing enhancement efforts downriver, where fluvial BCT populations appear to be much lower (Thatcher and Riverdale segments, where no BCT were found in electrofishing samples).

MANAGEMENT RECOMMENDATIONS

1) The current population of Bonneville cutthroat trout in the Bear River is very low. While no long-term trend data are available, the current population does not appear to have a harvestable surplus. Close harvest of Bonneville cutthroat trout in the mainstem Bear River.

2) Establish long-term monitoring site in each of the four river segments.

3) Delay harvest of Bonneville cutthroat trout in tributaries until after spawning has occurred.

SOUTHEAST REGION 2005 FISHERY MANAGEMENT ANNUAL REPORT

Yellowstone Cutthroat Trout Monitoring on the upper Blackfoot River

INTRODUCTION AND METHODS

In 1994, the Department, with assistance from the Conservation Fund, purchased the 700-hectare Revee Stocking Ranch and began managing the property as a wildlife management area (WMA). The ranch straddles the upper Blackfoot River with an upper boundary where Lanes, Diamond, and Spring creeks meet to form the river and the lower boundary is at the head of a canyon commonly known as the upper narrows. Approximately 9 km of river wind through the property as well as about 1.6 km of Angus Creek, a historical cutthroat trout spawning and rearing stream. Since purchasing the WMA lands, the Department has completed periodic population estimates to monitor native Yellowstone cutthroat trout abundance.

In 2005, we estimated trout population densities using a mark-recapture method. Fish were sampled with drift boat-mounted electrofishing gear. Fish were marked on July 8 and recaptured July 12, 2005. Data were analyzed using Fish Analysis + (Montana Fish Wildlife and Parks 2004). All trout caught were measured and weighed.

RESULTS AND DISCUSSION

A total of 472 cutthroat trout, 1 rainbow trout, and 3 rainbow X cutthroat hybrid trout were sampled during the electrofishing survey. The total trout population estimates for the WMA was 4,092 ± 988 (455 per km). Mean size of YCT was 270 mm (Figure 12). About 10% of the cutthroat trout captured during the survey exceeded 400 mm TL.

The WMA reach of the upper Blackfoot River appears to be productive rearing water for juvenile cutthroat trout. In past surveys of the WMA reach, juveniles (< 300 mm TL) dominated catch. During the late 1970s, Thurow (1981) reported that about 80% of the fish caught during population surveys were less than 300 mm TL. Results from 1995 and 2005 surveys show similar ratios of juvenile cohorts. Conversely, in 2002, very few small fish were collected during the population survey (Figure 12). Escapement of spawning cutthroat trout from Blackfoot Reservoir during the 2001 survey was exceptional (4,747). Therefore, the paucity of small fish in the 2002 survey was not related to low adult escapement.

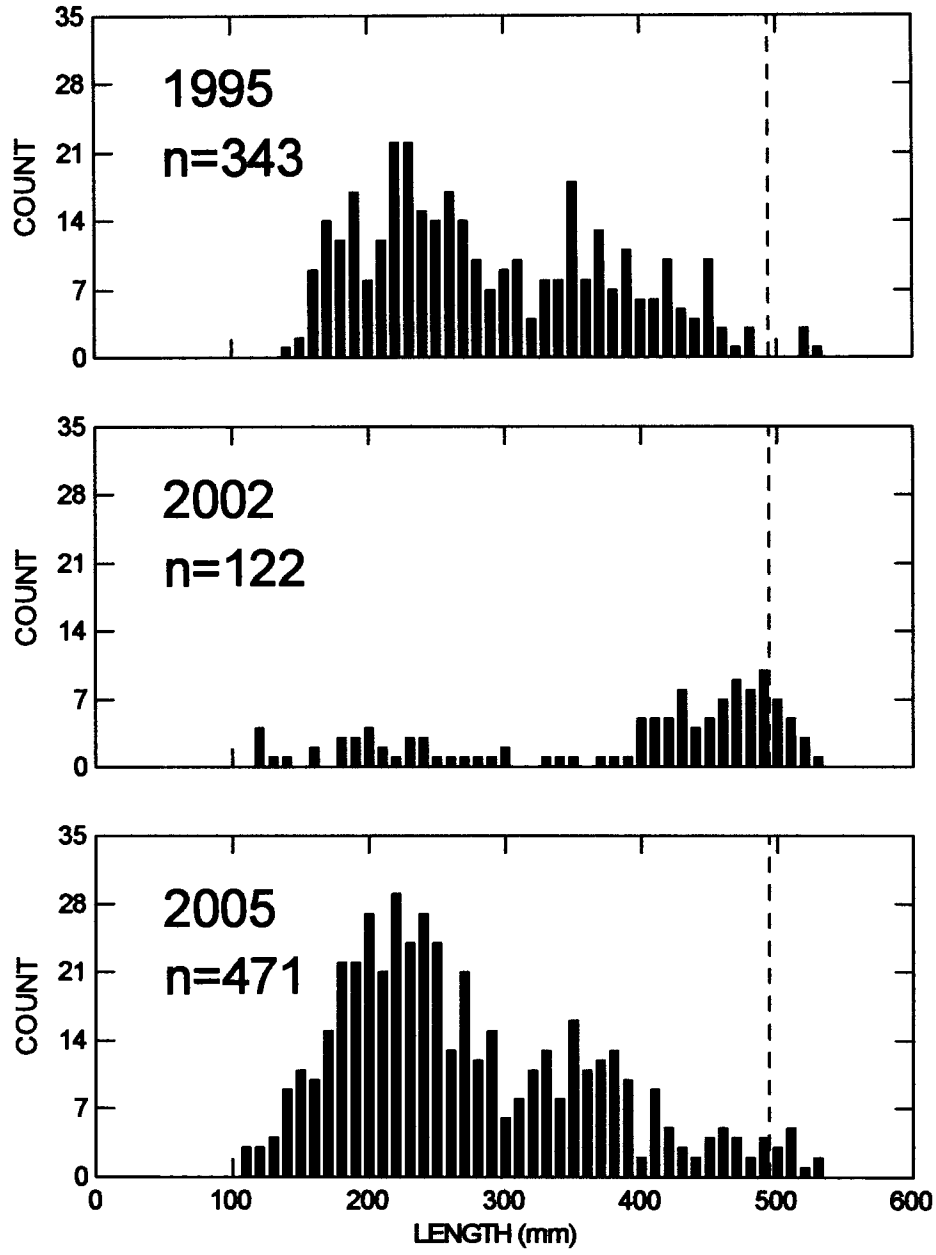

Figure 12. Length frequency distributions for Yellowstone cutthroat trout caught on the Wildlife Management Area of the Blackfoot River.

MANAGEMENT RECOMMENDATION

1) Continue monitoring Yellowstone cutthroat trout abundance on the Wildlife Management Area. Develop a relationship between escapement counts at the spawning trap and abundance of Yellowstone cutthroat trout that exceed 400 mm TL on the Wildlife Management Area. If a strong correlation exists, the time consuming and expensive escapement counts may not be necessary to monitor the long-term trends in Yellowstone cutthroat trout in the upper Blackfoot River system.

2005 management plan for reducing American White Pelican predation on Yellowstone cutthroat trout in the Blackfoot River system

Predation by American white pelicans *Pelecanus erythrorhynchos* (AWP) is threatening a genetically unique population of Yellowstone cutthroat trout (YCT) in the Blackfoot River system. The adult AWP population at Blackfoot Reservoir increased from a few hundred in 1993 to over 1,700 in 2004. This AWP population represents one of only two breeding colonies in Idaho. Conversely, the adult population of YCT declined from 4,747 in 2001 to about 120 in 2004. Both AWP and YCT are classified by IDFG as species of special concern. In addition to special concern status, recent genetic work showed that Blackfoot River cutthroat trout carry unique genetic markers not found in any other YCT population.

Recent drawdown of the Blackfoot Reservoir has created optimal foraging conditions for AWP. Over the past four years, the reservoir's water level during peak cutthroat trout migration (~ May 15) dropped by 4 m. The decline in water level exposed approximately 5 km of old river channel. Water flowing through the old river channel is generally less that 0.5 m deep, uniform, and without protective cover –perfect AWP foraging habitat. In 2004, bird scars were observed on 70% of the 120 migrating cutthroat trout. Additionally, a small percentage of the AWP population foraged upstream on the Blackfoot River on cutthroat trout spawning grounds. In a 2004 telemetry study, three of 14 (21%) cutthroat trout carrying radio transmitters were preyed on by AWP about 50 km upstream of the reservoir.

In 2004, to protect migrant YCT, IDFG began hazing AWP. Hazing methods included zon guns, cracker shells, chasing birds way from the confluence area using an air boat, and placing flagged monofilament "bird lines" across the river. The monofilament lines produced the desired affect of making the treated river reach inaccessible to feeding AWP.

The objective of this adaptive management program is to reduce AWP predation on cutthroat trout, not reduce the overall AWP population. Our proposal is to lethally take birds in areas where fish are most vulnerable to predation. Lethal methods will take no more than 3% of the breeding population on Blackfoot Reservoir. At current AWP population levels this could result in up to 50 birds being removed from the population. We do not feel this will significantly reduce the reproductive capacity of this population. We will continue to monitor the breeding population to insure that our actions do not negatively impact the nesting birds on Gull Island.

The following summarizes proposed management of AWP in the Blackfoot River system.

1. Install bird lines to make the river sections where cutthroat trout are highly vulnerable to bird predation inaccessible to foraging AWP.

2. In the event the above action is not effective, we will incorporate intense hazing with lethal methods to keep AWP off river sections where trout are especially vulnerable.

3. AWP behavior will be monitored to evaluate effectiveness of hazing and lethal methods.

4. Qualitative observation of AWP abundance will be made at the confluence and upriver near cutthroat trout spawning areas. This will be used to determine if AWP are displaced from the confluence upstream to spawning grounds.

5. Nest counts will continue on Gull Island to monitor the breeding population's response to lethal methods.

6. Abundance of cutthroat trout and incidence of bird scaring will be monitored.

2005 ACTIONS AND CONCLUSIONS

Preliminary results suggest that the bird lines were effective at deterring AWP from concentrating at the confluence. The run of YCT was extremely low (< 20 fish). Of those fish, only one of the cutthroat trout caught in the trap had a bird scar. In addition to fewer bird scars on cutthroat trout, the Utah sucker run increased from 2004 and very few bird scars were observed on Utah suckers. The low cutthroat trout count was not attributed to bird predation. Due to the paucity of migrating cutthroat trout, and what appeared to be successful bird line effort, no AWP were shot in 2005.

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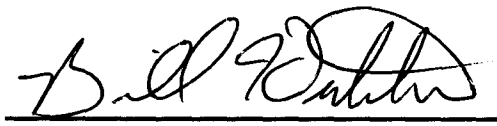

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