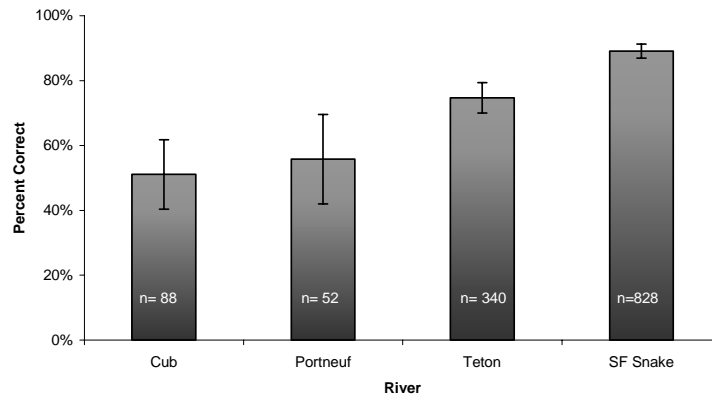FISHERY RESEARCH

HUMAN DIMENSION STUDIES

Grant #F-73-R-23

Report Period July 1, 2000 to June 30, 2001

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IDFG Report Number 02-17
November 2001

Annual Performance Report

July 1, 2000 to June 30, 2001

Grant #F-73-R-23

Project 3: Human Dimension Studies

Subproject 1: Regulation Awareness and Ability of Anglers to Identify Five Trout Species in Southeast Idaho Waters Containing Cutthroat Trout.

Subproject 2: Effects of Three Education Strategies on Angler Ability to Identify Bull Trout and Other Salmonids

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SUBPROJECT #1: REGULATION AWARENESS AND ABILITY OF ANGLERS TO IDENTIFY FIVE TROUT SPECIES IN SOUTHEAST IDAHO WATERS CONTAINING CUTTHROAT TROUT

State of: <u>Idaho</u>   Grant No.: <u>F-73-R-23, Fishery Research</u>

Project No.: <u>3</u>   Title: <u>Human Dimension Studies</u>

Subproject #1:   <u>Regulation Awareness and Ability of Anglers to Identify Five Trout Species in Idaho Waters Containing Yellowstone Cutthroat Trout</u>

Contract Period: <u>July 1, 2000 to June 30, 2001</u>

ABSTRACT

We quantified regulation awareness and the ability of 1,308 anglers to identify five different trout species along nine sections of the Cub River (Cub), Portneuf River (Portneuf), Teton River (Teton), and South Fork Snake River (SFSR). Between 22.9% and 40.6% of the anglers interviewed correctly recited the six-fish bag limit. Cutthroat trout *Oncorhynchus clarki* regulation awareness was lowest on the Portneuf (23.1%) and highest on the SFSR (46.9%).

During the interviews, anglers were asked to identify replicas of five different trout species. Identification rates for the different species varied between drainage and species. The rainbow trout *O. mykiss* replica was correctly identified the most often by anglers with rates ranging from 77.3% on the Cub to 95.5% on the SFSR. A cutthroat trout replica designed to represent a Yellowstone cutthroat trout *O. clarki bouvieri* was the second most correctly identified species, ranging from 51.1% on the Cub to 89.1% on the SFSR. The brown trout *Salmo trutta* replica was correctly identified by a greater number of anglers from the SFSR (76.9%) and Teton (66.5%) than from the Portneuf (38.5%) or Cub (37.5%). Anglers found it more difficult to identify the brook trout replica *Salvelinus fontinalis,* ranging from 40.4% on the Portneuf to 53.1% on the Teton. Anglers from all sections had difficulty identifying the bull trout replica *S. confluentus*. Only 17.3% and 17.4% of Portneuf and SFSR anglers, respectively, correctly identified the bull trout replica, while a slightly higher proportion could do so on the Cub (25.0%) and Teton (25.6%).

We tested demographic variables from the Teton and SFSR for association with correct responses. Gender and years of angling experience were the only two demographic variables highly associated with both regulation awareness and identification ability. However, anglers comprising the demographic groups that would benefit most involve only a small proportion of the total number of anglers. Females comprised only 11.5% and 28.0% of the anglers on the Teton and SFSR, respectively. The proportion of anglers with less than five years of fishing experience was also low on the Teton (8.5%) and SFSR (1.4%).

We recommend a signing program on waters that contain cutthroat trout in southeastern Idaho to improve anglers regulation awareness and their ability to identify different trout species.

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INTRODUCTION

Over the past 20 years, the Idaho Department of Fish and Game (IDFG) has introduced a variety of special regulations on waters containing Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* and Bonneville cutthroat trout *O. clarki utah* (cutthroat trout). The regulations are designed to protect these fish until they have an opportunity to spawn and have included bag and slot limits along with late season openers to protect spawning fish. The current regulations concerning cutthroat trout are a daily bag limit of two fish on all waters in IDFG Regions 4, 5, and 6 with a minimum length restriction of >406 mm on many streams. The fishing season begins on July 1 for streams with late openers (IDFG 2000).

The inherent assumption with special regulations is that anglers understand the regulation and are able to identify the species for which the regulation is intended (Schill and Lamansky 1999). If anglers are unable to correctly identify the fish or do not understand the regulations, they may inadvertently harvest fish illegally (Schill and Kline 1995). Failure to comply with regulations, if widespread, may affect the population dynamics of the protected species and negate the biological benefits of the regulation.

Several investigators have assessed the ability of anglers to identify sport fish with mixed results. Green et al. (1983) reported that 93 of 95 of Texas saltwater anglers (98%) could correctly identify the saltwater fish in their creel but were unclear if all the identifications were to species level. In Alberta, 77% to 83% of anglers in the Highwood River and Sheep River drainages were able to correctly identify bull trout *Salvelinus confluentus* from pictures (Isley 1997). A lower proportion of Montana anglers (44%) were able to correctly identify bull trout from a variety of replicas, including photographs, drawings, mounts, live fish in aquariums, or fish in the creel (Schmetterling and Long 1999). Schill and Lamansky (1999) estimated that only 30% to 45% of southwest Idaho anglers could identify bull trout replicas in two drainages. Results for four other species including brook trout *S. fontinalis*, brown trout *Salmo trutta*, cutthroat trout *O. clarki* and rainbow trout *O. mykiss* ranged from 30% to 80%, respectively. Schwartz (2000) provided no numerical evidence but asserted that anglers commonly misidentify various salt and freshwater fish species in southeastern America. Thus while a single author above reported excellent fish identification ability by anglers, subsequent authors have reported moderate to poor angler ability to identify game fish species.

The low rates of regulation knowledge and fish identification ability for anglers fishing in two southwest Idaho drainages (Schill and Lamansky 1999; Schill et al. 2000) prompted the initiation of this study. We sought to quantify the ability of southeast Idaho anglers fishing cutthroat trout waters to identify the species and to assess their knowledge of applicable species-specific regulations. Demographic information was also collected from anglers to identify segments of the population on which to focus educational efforts if necessary.

OBJECTIVES

1.   Quantify the ability of southeastern Idaho anglers to identify cutthroat trout and other salmonids.

2.   Quantify angler knowledge of cutthroat trout and water-specific regulations to determine if better communication of regulations is necessary.

STUDY AREA

Angler interviews were conducted on nine discrete sections of four major river drainages in eastern Idaho including the Cub River (Cub), Portneuf River (Portneuf) (Figure 1), Teton River (Teton), and South Fork Snake River (SFSR) (Figure 2). The Portneuf, Teton, and SFSR all contain populations of Yellowstone cutthroat trout, while the Cub River lies within Bonneville cutthroat trout range. Sections were delineated by drainage, differing regulation, date of season opener, and use in previous IDFG studies. One Portneuf section has a two cutthroat trout limit but no length restriction included in the six-fish limit. One SFSR section is managed with the regulation of only two brown trout or cutthroat trout >406 mm in the aggregate included in the general six-fish bag limit. The remaining seven study sections are managed with the bag limit of only two cutthroat trout >406 mm included in the general six-fish limit. Also, two SFSR sections opened on July 1, 2000. The remainder opened for fishing on the general season opener on May 27, 2000. The statewide bonus brook trout limit of 10 in addition to the six-fish trout limit applies on all sections. Barbless hooks are recommended in the IDFG regulation booklet but are not required in any of the sections, and none of the waters were managed with bait restrictions.

Section C1: Cub River

Cub River anglers were interviewed on the upper 1.5 km roaded section near the Willow Springs Campground (Figure 1). Only two cutthroat trout >406 mm in length may be included in the general six-fish bag limit for trout.

Sections P1-P2: Portneuf River

Section P1 included the main portion of the Portneuf River from the Highway 30 bridge near the town of Lava Hot Springs upstream to the Kelly Toponce Road bridge (18.9 km) (Figure 1). Section P2 comprised the 9.7 km roaded section of Pebble Creek, a tributary to the Portneuf River. This section extended from the mouth of Pebble Creek to the USFS campground at Big Springs Creek. Both sections on the Portneuf River are managed with the general six-fish bag limit for trout. However, only two cutthroat trout >406 mm in minimum length may be included in the six trout limit in section P1. In section P2, only two cutthroat trout may be included in the six trout limit, with no length restriction.

Sections T1-T3: Teton River

The three sections on the Teton River are those used in current and past creel surveys on the river (Irving 1977). Section T1 is the lower section of the Teton River from its confluence with the Henrys Fork of the Snake River upriver to the Teton Dam site. Section T2 begins at the Teton Dam site and continues upstream to the Highway 33 Bridge (Harrop Bridge). Section T3 is the upper section from the Highway 33 bridge upstream to White Bridge (Figure 2). Anglers fishing the Teton are restricted to two cutthroat trout >406 mm in length which are included in the six-fish bag limit for trout.

Figure 1.   The Cub River and Portneuf River drainages and the study sections used in the 2000 fish identification survey.
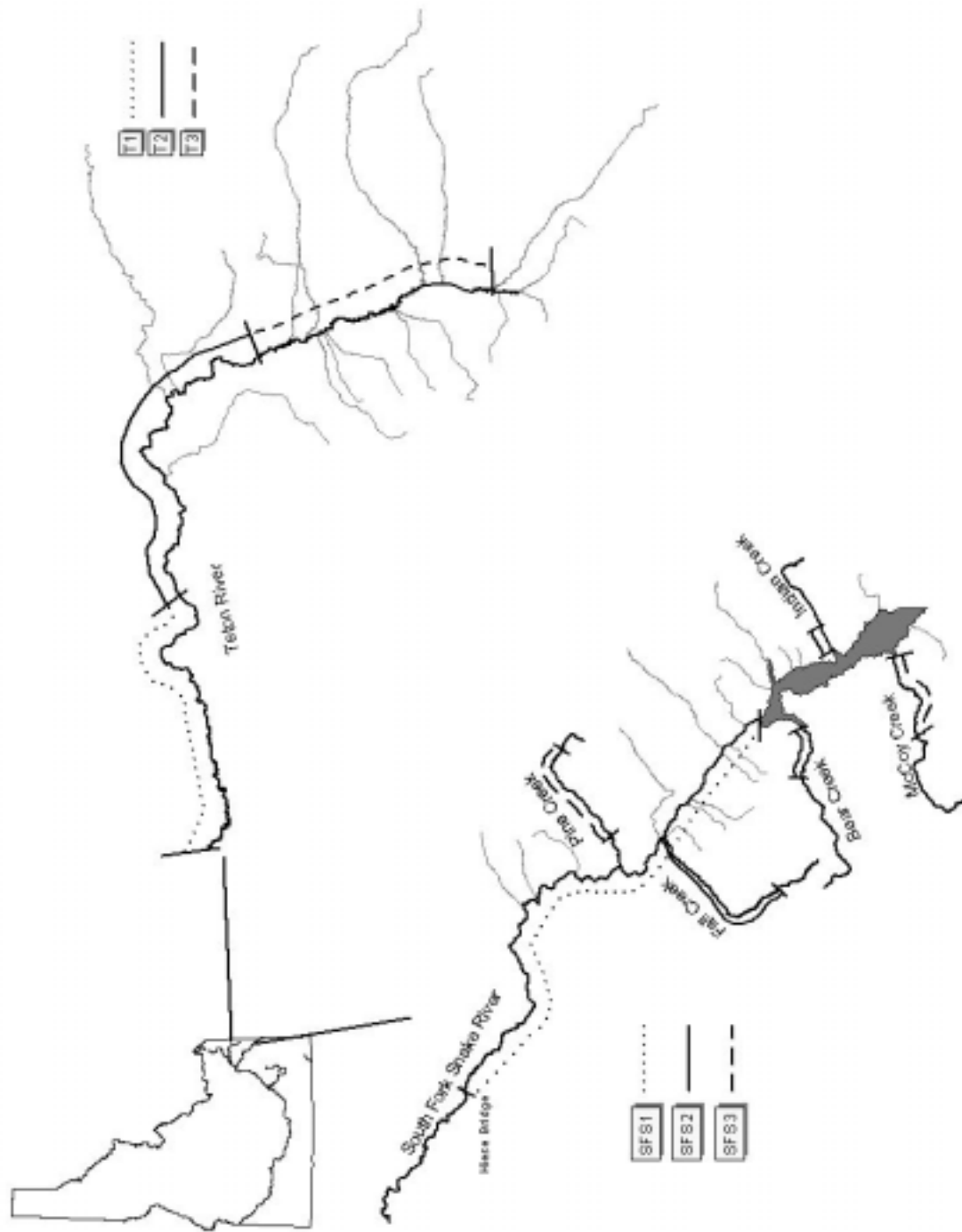
Figure 2. The Teton River and South Fork Snake River drainages and the study sections used in the 2000 fish identification survey.

Sections SFS1-SFS3: South Fork Snake River

Section SFS1 included the mainstem South Fork Snake River from the Heise Bridge upstream to Palisades Dam (79.5 km). The regulation on section SFS1 is the general six-fish bag limit for trout with only two cutthroat trout or brown trout >406 mm included in the aggregate.

Section SFS2 incorporated the roaded portions of three tributaries of the South Fork Snake River. The first was Bear Creek from its mouth at Palisades Reservoir upstream 1.8 km to the road crossing at the confluence with Elk Creek. The second was Indian Creek, again from its mouth at Palisades Reservoir upstream 2.9 km to the end of the road at the Idaho/Wyoming border. The third was Fall Creek from its mouth upstream to the road crossing at the confluence with Monument Creek (14.8 km). These three streams are managed with the two cutthroat trout >406 mm minimum size included in the general six-fish limit for trout.

Section SFS3 also included roaded portions of two tributaries of the South Fork Snake River (Figure 2). The first was McCoy Creek from its mouth in Palisades Reservoir upstream 14.9 km to the road crossing immediately below the confluence of Iowa Creek. The second stream was Pine Creek (15.7 km) from the Highway 31 Bridge upstream to the road crossing at the confluence of the North Fork Pine Creek. Both streams in section SFS3 are managed with the same regulations as above, except they do not open to fishing until July 1 to protect spawning cutthroat trout.

METHODS

Angler Interviews

We used the interview approach developed by Schill and Lamansky (1998, 1999) to quantify anglers' regulation awareness and their ability to identify five species of trout including cutthroat trout, rainbow trout, brook trout, brown trout, and bull trout. Sections C1, P1, and P2 were surveyed intermittently between the fishing season opener on May 27 and September 11, 2000 as manpower and time allowed. Personnel from IDFG Region 6 performed surveys on sections T1-3 during a structured creel survey between May 27 and August 20, 2000. Count dates and associated angler interview times on the Teton were randomly selected after Irving (1977). Sections SFS1-3 were surveyed to maximize angler interviews. Five days were chosen randomly each week and included at least one weekend day. Start times on SFSR streams were not chosen randomly but were designed to locate anglers at peak fishing times, particularly on lightly fished tributary streams. Sections SFS1 and SFS2 were surveyed between May 27 and September 11, 2000, while section SFS3 was surveyed from its opener on July 1 to September 11, 2000.

Project personnel interviewed anglers at bridges, access points, boat launches, and any place anglers were observed fishing, preparing to fish, or ending a trip. We did not seek out people in camps in the area who had or were going to fish a particular water. No attempts were made to float the sections in a boat to gain interviews from anglers not readily accessible from roads.

When multiple anglers were together, we asked one individual at a time to step away from the group for the interview process. Project personnel took the individual out of hearing range and stood so they could not see the interview process. When the interview was completed, another was asked to participate. This process continued until all anglers in a group were surveyed. Anglers were asked not to speak with others in the group about the interview, and it was explained that information would be shared with the group when all the interviews were completed.

Anglers were first asked a series of standard creel survey questions including residency, hours fished, gear type, number and species of trout kept, and number released. This information was collected for several reasons; first, on the Teton River Region 6 personnel used it to estimate harvest and catch rates. Second, residence and gear type are potentially important demographic variables of interest; thirdly, we sought to determine angler ability to identify real fish as compared to the replicas we showed them. For anglers with fish in the creel we observed their catch, recorded the species, and then asked the angler to identify the fish they had kept.

A second series of questions was directed toward fish identification. All anglers were first asked their age, years of angling experience, and to recite the regulations for the area in which they were fishing. Anglers who knew the general six-fish bag limit for trout were given credit for a correct answer to this question (area regulation). Next, we asked them to rate their ability to identify different kinds of trout on a scale from 1 to 5, with 5 being the most confident. We then asked them to identify five different trout replicas. We used 250 mm to 280 mm long taxidermist mounts of rainbow trout, brook trout, bull trout, brown trout, and cutthroat trout. The latter replica was given a prominent orange slash on the throat and large spots located away from the head, which represented a Yellowstone cutthroat trout. We assumed it was an adequate surrogate for a Bonneville cutthroat trout for those anglers interviewed on the Cub River. The five replicas were mounted on a 1 x 1 m board with a handle for easy presentation. All mounts were covered with a piece of light fabric so anglers could only view and identify one fish at a time. To eliminate potential bias from guessing, we systematically varied the order in which the fish were presented so each one had the same probability of being viewed first. Although rainbow trout and cutthroat trout reside in all of the sections surveyed, not all of the replicas of species we presented to anglers are found in all the sections. Brook trout and brown trout are known to exist in the Cub, Portneuf, and Teton but not necessarily in the study sections. Brown trout are also found in the SFSR. Bull trout do not exist in any of the study sections.

To conclude the interview, we asked three questions specific to cutthroat trout. We first asked if they could recite the regulation concerning cutthroat trout on the water they were fishing (cutthroat trout regulation). If they answered correctly, we asked where they obtained information pertaining to the cutthroat trout regulation. Finally, if they correctly identified the cutthroat trout replica, we asked where they obtained their information on how to identify cutthroat trout. Because the last two questions were open ended, sometimes more than one reply was given. In those cases, we asked which one they thought was most helpful and circled the response on the data sheet to identify it as the primary source of information. These last two questions were asked to help direct any educational effort IDFG could take in the future.

Data Analysis

We summarized angler responses to regulation knowledge and fish identification questions by river section and gear type for the four study waters. A summary of responses for regulation awareness and trout identification ability for each individual section can be found in

Appendix 1. Even though there are different regulations and opening dates, we pooled data from different sections within the Cub, Portneuf, Teton, and SFSR because of the similarities in the information. We also calculated the proportion of several angler demographic groups (sex, age, residence, and years of angling experience) that could correctly recite the regulations and identify the cutthroat trout replica. We pooled data for the SFSR and Teton sections to test relationships among demographic variables using a chi-squared test of association. We made statistical comparisons at the 0.05 significance level using Yates Correction when necessary (Zar 1974). We summarized responses by demographic groups for the Cub and Portneuf but did not test them statistically due to limited sample size. Demographic information for anglers from the Cub and Portneuf can be found in Appendix 2.

We constructed 95% confidence limits around all proportions using the standard binomial approximation (Zar 1974):

$p \pm 1.96 \sqrt{pq/n}$
p = the proportion in question
q = the complement proportion of p
n = sample size

For proportions less than 0.10 we used the more complex formula of Fleiss (1981).

RESULTS

In all, we sampled 1,308 anglers fishing on the nine study sections across southeast Idaho in 2000. For all sections, 456 (34.9%) anglers surveyed could recite the area regulation where they were fishing, while 527 (39.8%) could recite the cutthroat trout regulation. All together, 81.5% of the anglers surveyed correctly identified the cutthroat trout replica. However, IDFG Region 6 anglers were significantly better than those in Region 5 at identifying the cutthroat trout replica (84.9% and 52.9%, respectively) and reciting the cutthroat trout regulation (41.1% and 29.3%, respectively) as evidenced by non-overlapping confidence intervals (Figure 3). However, no difference was seen between Regions 5 and 6 (30.0% and 35.4%, respectively) in anglers' ability to recite the area regulation (Figure 3).

Regulation Awareness

Awareness of the area regulation for trout ranged from 22.9% on the Teton to 40.6% on the SFSR. On the Cub and Portneuf, 30.7% and 28.8% of the anglers correctly responded to the area regulation question, respectively (Figure 4). These results do not include responses to the various cutthroat trout regulations. Anglers had a slightly higher awareness of the special regulations for cutthroat trout but the proportions were similar, ranging between 23.1% on the Portneuf to 46.9% on the SFSR. Anglers on the Teton and Cub were able to correctly recite the pertinent cutthroat trout regulation 27.1% and 33.0% of the time, respectively (Figure 5).
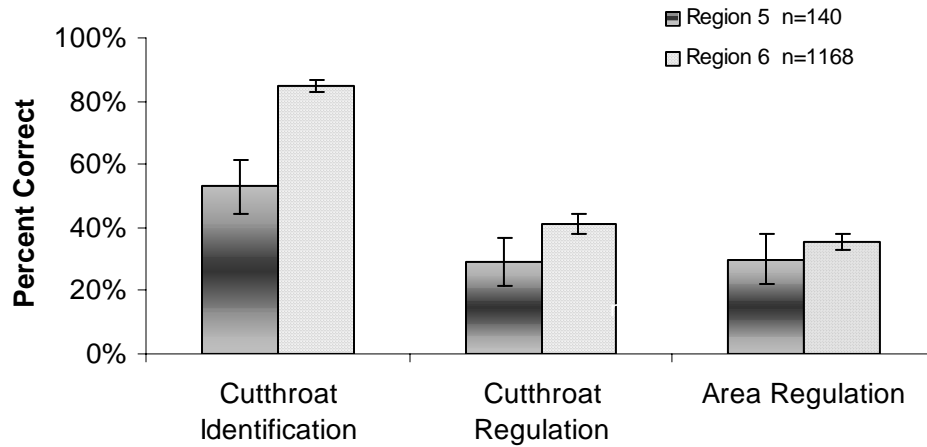
Figure 3.   Percentage of anglers in IDFG Regions 5 and 6 who correctly identified the cutthroat trout replica and correctly recited the cutthroat regulation and area regulation for the area they were fishing, May to September 2000. Bars denote 95% confidence limits.

Figure 4.   Percentage of all Cub River, Portneuf River, Teton River, and South Fork Snake River anglers who were able to correctly recite the general six fish bag limit regulation for trout for the various areas in which they were fishing, May to September 2000. Data do not reflect awareness of cutthroat trout regulations. Bars denote 95% confidence limits.

Ability to Identify Trout

Anglers fishing all four streams rated their own ability to identify trout above average. Those fishing the Portneuf had the lowest average self-rating at 2.8, while those fishing the Teton rated themselves the highest at 3.8. Cub and SFSR anglers had average self-ratings of 3.2 and 3.6, respectively.

Our comparisons of fish identification of fish in the creel between anglers and the creel clerk were hampered by a small sample size, because few people interviewed had kept fish. Of the 828 anglers interviewed on the SFSR, only 39 (4.7%) had harvested fish, and no fish were observed in the creel after mid-July. Project personnel observed only 34 harvested fish on the Cub, 20 on the Teton, and nine on the Portneuf while interviewing 88, 340, and 52 anglers, respectively. Oftentimes a single angler had more than one species in the creel.

On the SFSR sections, only four of eight people who identified their fish as rainbow trout were correct, while nine of 11 who believed they had creeled a cutthroat trout were correct. All 11 of the people who identified their creeled fish as brown trout were correct. Including rainbow-cutthroat trout hybrids, four other species were observed in angler creels in the SFSR, and all were identified correctly (Table 1). On the Teton, five of the eight people who identified their fish as rainbow trout were correct; five of six who said they had cutthroat trout were correct; all four who said they had a brook trout were correct, and one who reported a brown trout was incorrect. Thirty anglers on the Cub who identified their fish as a rainbow trout were correct, as was a lone angler with a cutthroat trout in possession. Of the three who believed they had creeled a brook trout, only one was correct. Of the nine fish creeled on the Portneuf, eight identified their catch as a rainbow trout of which seven were correct, while the remaining fish was correctly identified as a cutthroat trout (Table 1). Overall, anglers with fish in the creel were predominantly bait anglers (65%), followed by fly anglers (25%) and lure anglers (10%).

Figure 5. Percentage of all Cub River, Portneuf River, Teton River, and South Fork Snake River anglers who were able to correctly recite the two-fish cutthroat trout restriction on the various waters, May to September 2000.

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Generally, anglers fishing Region 6 waters correctly identified the five replicas at higher rates than those in Region 5. South Fork Snake River and Teton anglers correctly identified the rainbow trout replica 95.5% and 83.5% of the time respectively, while 92.3% of those fishing the Portneuf and 77.3% on the Cub correctly identified the rainbow trout (Appendix 1). The cutthroat trout replica had the next highest identification rate, ranging from 51.1% on the Cub to 89.1% on the SFSR. The brown trout replica was correctly identified by 76.9% and 66.5% of SFSR and Teton anglers, respectively, compared to less than 40% of Portneuf and Cub anglers. A lower proportion of anglers (40.4-53.1%) correctly identified the brook trout replica. Anglers from all sections had a very difficult time identifying the bull trout replica, with rates ranging from 17.3% to 25.0% (Figure 6).

Anglers from the SFSR were better at identifying the cutthroat trout replica (89.1%) than those from other sections, as evidenced by non-overlapping confidence intervals (Figure 7). Anglers from the Cub and Portneuf correctly identified the cutthroat trout replica at very similar rates of 51.1% and 55.8%, respectively. Angler ability to identify cutthroat trout on the Teton was intermediate at 74.7% (Figure 7).

Although more than half of all anglers interviewed correctly identified the cutthroat trout replica, those who answered incorrectly gave varied responses. The most common reply other than cutthroat trout on the SFSR, Teton, and Cub was "don't know" (8.7%, 9.7%, and 27.3%), respectively, while on the Portneuf it was "brown trout" (19.2%). Brown trout were the most commonly mistaken individual species for cutthroat trout on the SFSR, Teton, and Portneuf (0.7%, 9.1%, 19.2%), while "rainbow trout" was the most frequently mistaken reply for cutthroat trout on the Cub (9.1%). However, on the SFSR and Cub, 1.4% and 12.5% of responses when a fish species was incorrectly given for the cutthroat trout included a variety of other species (Figure 8).

Table 1. Angler identifications of fish in the creel from the South Fork Snake River, Teton River, Cub River, and Portneuf River, number correctly identified, percentage correct, and actual identification of each species by the creel clerk, 2000. Clerk assumed to be correct.

	RB*	CT	BK	BR	Hyb	WF	KOK	LK
SF Snake R.								
Angler ID	8	11	-	11	1	5	2	1
Angler Correct	4	9	-	11	1	5	2	1
% Correct	50.0%	81.8%		100%	100%	100%	100%	100%
Clerk ID	4-RB 2-HYB 1-CT 1-BR	9-CT 1-HYB 1-BR		11-BR	1-HYB	5-WF	2-KOK	1-LK
Teton R.								
Angler ID	8	6	4	1	1	-	-	-
Angler Correct	5	5	4	0	0	-	-	-
% Correct	62.5%	83.3%	100%	0.0%	0.0%			
Clerk ID	5-RB 2-CT 1-BK	5-CT 1-HYB	4-BK	1-HYB	1-BK			
Cub R.								
Angler ID	30	1	3	-	-	-	-	-
Angler Correct	30	1	1	-	-	-	-	-
% Correct	100.0%	100.0%	33.3%					
Clerk ID	30-RB	1-CT	1-BK 2-RB					
Portneuf R.								
Angler ID	8	1	-	-	-	-	-	-
Angler Correct	7	1	-	-	-	-	-	-
% Correct	87.5%	100%						
Clerk ID	7-RB 1-CT	1-CT						
Totals								
Angler ID	54	19	7	12	2	5	2	1
Angler Correct	46	16	5	11	1	5	2	1
% Correct	85.2%	84.2%	71.4%	91.7%	50.0%	100.0%	100.0%	100.0%

* RB - Rainbow trout, CT - cutthroat trout, BK - brook trout, BR - brown trout, Hyb - rainbow trout/cutthroat trout hybrid, WF - whitefish, LK - lake trout.
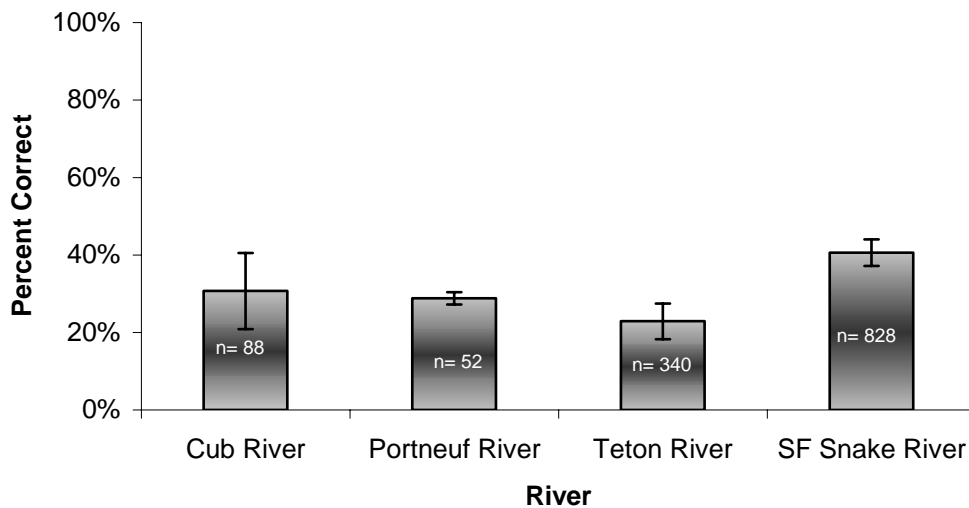
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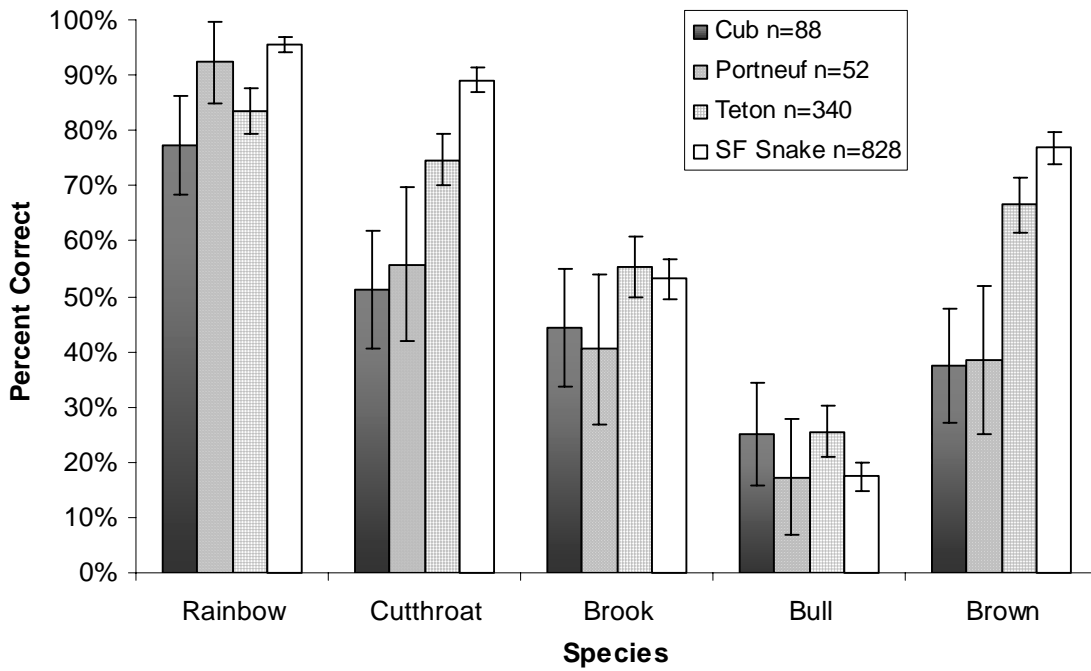
Figure 6.   Percentage of all Cub River, Portneuf River, Teton River, and South Fork Snake River anglers interviewed that correctly identified the five species replicas May to September 2000. Bars denote 95% confidence limits.

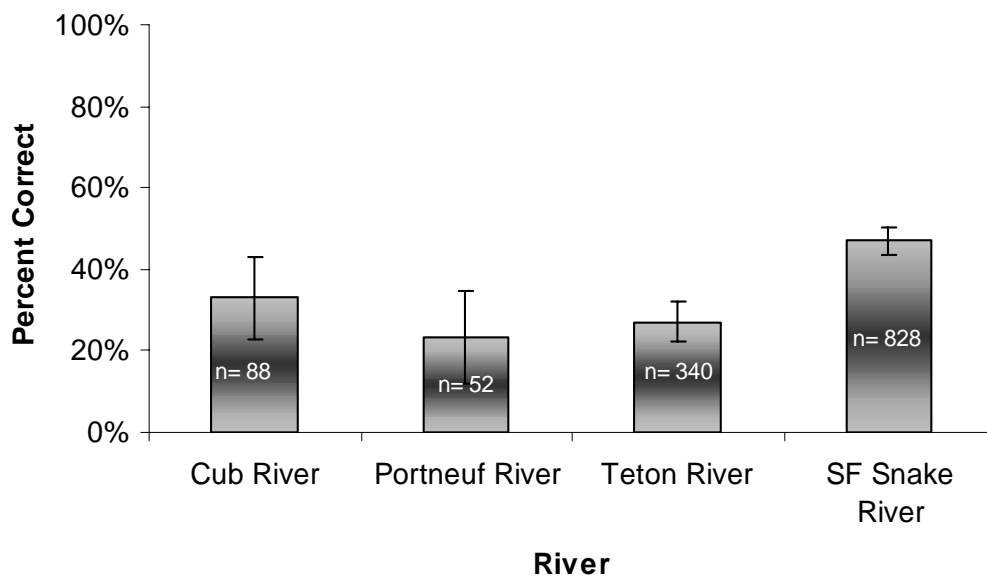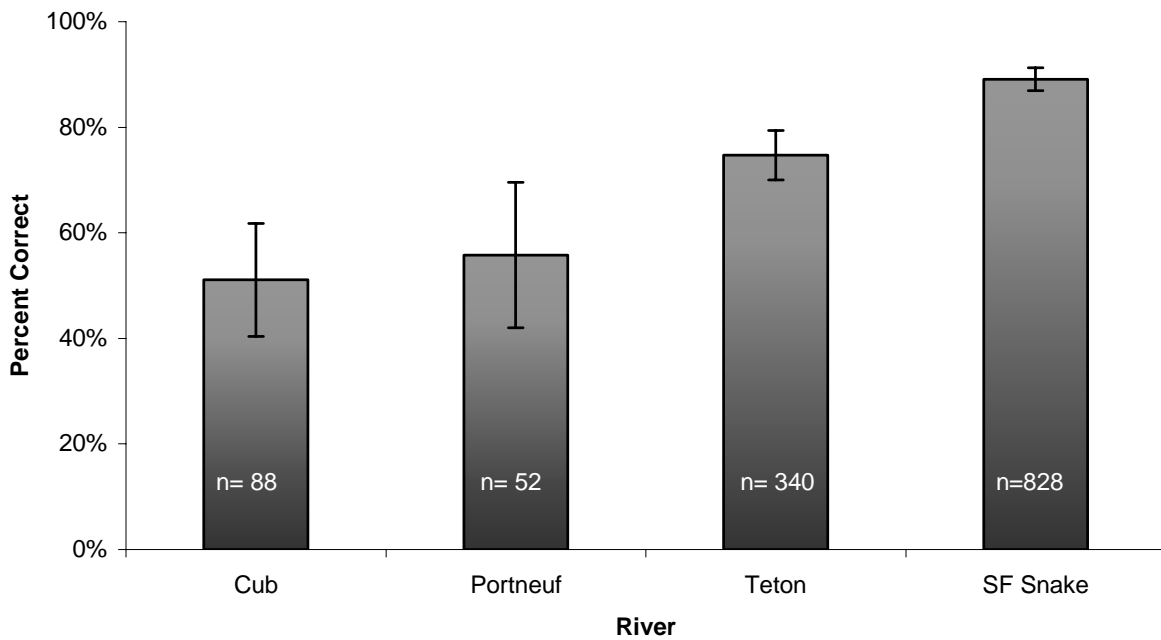
Figure 7.   Percentage of all Cub River, Portneuf River, Teton River, and South Fork Snake River anglers that correctly identified the cutthroat trout replica May to September 2000. Bars denote 95% confidence limits.

Angler Demographics

We tested demographic variables from the SFSR and Teton against angler responses to the questions for area regulation, cutthroat trout regulation, and cutthroat trout replica identification (Table 2a and 2b). We did not attempt to analyze these variables for the Cub and Portneuf because of insufficient sample sizes. Several of the demographic variables tested were highly associated with correct responses of anglers, while others were weakly or not related (Tables 2a and 2b).

On both the SFSR and Teton, gender was statistically associated with the ability to correctly answer the three questions. Male anglers responded correctly more often than females in all cases to the inquiries on both waters (Tables 2a and 2b). Males correctly identified the cutthroat trout replica 18.7% more often than females on the SFSR ($X^2 = 53.57$; $P < 0.0001$) and 41.9% more often on the Teton ($X^2 = 29.13$; $P < 0.0001$). Females were 340% and 290% less likely than males to know either the cutthroat trout regulation ($X^2 = 6.57$; $P = 0.009$) or the area regulation ($X^2 = 4.56$; $P = 0.033$) on the Teton (Table 2a) and were 170% ($X^2 = 20.86$; $P < 0.0001$)and 160% ($X^2 = 18.3$; $P < 0.0001$) less likely on the SFSR (Table 2b).

Likewise, the variable "years of angling experience" was associated with correct responses to the cutthroat regulation and area regulation on the Teton ($X^2 = 45.95$; $P < 0.0001$ and $X^2 = 18.95$; $P = 0.002$, respectively) and SFSR ($X^2 = 19.41$; $P < 0.002$ and $X^2 = 21.05$; $P < 0.001$, respectively). In nearly all cases, we observed an incremental increase in the ability of anglers to answer correctly as their years of experience increased. Angler ability to identify the cutthroat trout replica was more consistent across age groups, yet still statistically different on both the Teton ($X^2 = 22.995$; $P = 0.0003$) and the SFSR ($X^2 = 60.52$; $P < 0.0001$). For example, anglers on the SFSR with less than five years experience correctly identified the cutthroat trout replica more often than those with 5-10 years of experience, but 24.7% less often than those with 30-40 years of experience (Table 2b).

We found that angler age was statistically related to their ability to correctly recite the cutthroat and area regulations and identify the cutthroat trout replica on the SFSR ($X^2 = 16.26$; $P < 0.006$, $X^2 = 17.06$; $P = 0.004$, and $X^2 = 43.24$; $P < 0.0001$, respectively) but not on the Teton ($X^2 = 8.72$; $P = 0.121$, $X^2 = 3.78$; $P = 0.582$, and $X^2 = 7.9$; $P = 0.161$, respectively). Unlike "years of experience," we did not see a uniform increase in the ability to answer correctly for questions from either section as age increased. For example, anglers fishing the Teton who were younger than 25 years of age could recite both the area and cutthroat trout regulation (18.2% and 18.2%) at virtually the same rate as those who were older than 55 (18.7% and 18.2%). With one exception, anglers who were between the ages of 45 and 55 responded correctly more often than those in other age groups (Tables 2a and 2b).

Whether or not the angler was an Idaho resident was significantly associated with their ability to recite the cutthroat regulation but not identify the cutthroat trout replica. Idaho residents correctly identified the cutthroat trout replica only 2.1% more often than non-residents on the SFSR, while residents fishing the Teton were correct 11.5% more often.

Generally, anglers using different types of gear correctly identified individual species at similar rates; however, there were several exceptions. On the Teton, statistical differences were observed between fly anglers and bait anglers in their ability to identify the brook trout and brown trout replicas and between lure and bait anglers' ability to identify the cutthroat trout replica (Figure 9a). On the SFSR, fly anglers identified the cutthroat trout replica at a statistically

different rate than either lure or bait anglers. Fly anglers also identified the brook trout and brown trout replicas at a higher rate than bait anglers as evidenced by non-overlapping confidence intervals (Figure 9b). We could not make usable comparisons between gear types for the Cub or Portneuf because of low sample size.

DISCUSSION

Regulation Awareness

The ability of anglers in this study to recite the statewide general regulation ranged from 22.9% to 40.6% in the four study sections, lower than in several past studies. Anglers fishing general regulation sections on the Middle and South Forks of the Boise River in 1998 correctly recited the general six-fish bag limit 37.7% to 69.2% of the time, respectively (Schill and Lamansky 1999). Schramm and Dennis (1988) reported that 41% of urban lake anglers in Lubbock, Texas could recite the statewide bag or size limit. Helfrich et al. (1987) reported that only 30% of anglers fishing one section of the Shenandoah River were aware that no minimum size limit existed there for bass.

The ability of anglers to recite the cutthroat trout regulation was slightly higher than their ability to recite the area regulation (23.1%-46.9%), but it was still poor. Anglers fishing the Middle and South Forks of the Boise River were able to correctly recite the statewide no-harvest regulation for bull trout 64.5%-67.8% of the time (Schill and Lamansky 1999). Schill and Kline (1995) suggested that anglers fishing areas with more restrictive regulations tended to know them better than their counterparts fishing in simpler, general regulation sections. Even though the regulations in our study streams are relatively simple, they are more complex than just the basic six-fish bag limit.

Portneuf River n=52

Cub River n=88

SF Snake River n=828
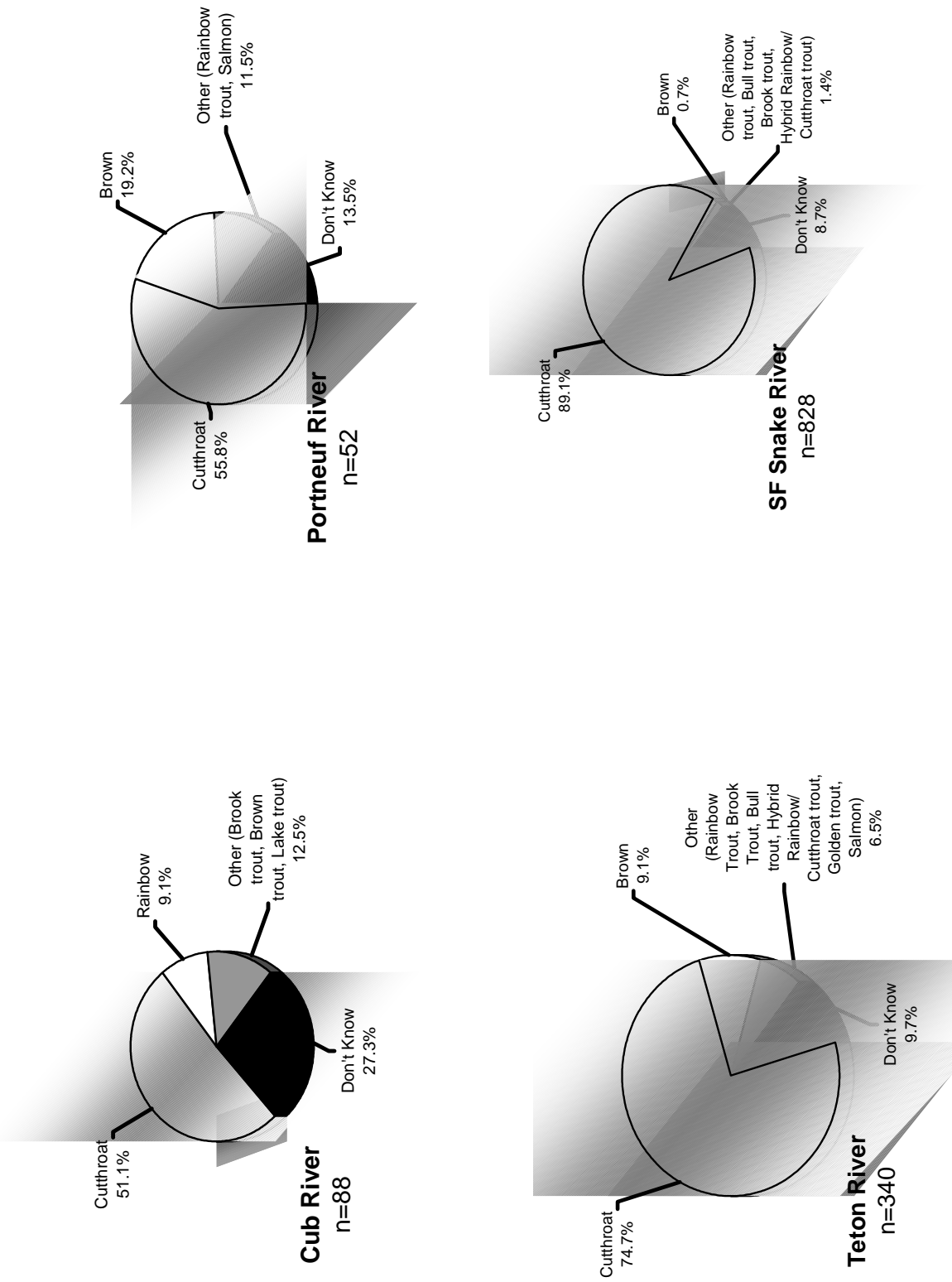
Teton River n=340

Figure 8. Distribution of responses to the cutthroat trout replica by Cub River, Portneuf River, Teton River, and South Fork Snake River anglers May to September 2000.

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Table 2a Pooled summary of regulation awareness and angler ability to correctly identify the cutthroat trout replica for the Teton River, May to September 2000.

Able to Recite Section Specific Regulation

Measurement	Sex		Age						Gear			Residence		Years Angling Experience				
	M	F	<25	19-24	25-34	35-44	45-54	55+	Fly	Lure	Bait	ID	NR	<5	5-10	11-20	21-30	31-40
Percent	24.6%	8.6%	18.2%	21.1%	19.0%	29.1%	26.3%	18.7%	19.3%	38.0%	21.7%	28.5%	13.5%	0.0%	11.1%	18.3%	29.5%	32.0%
95% CI	±4.9	±9.5	±23.3	±13.2	±8.8	±10.2	±11.7	±10.8	±6.0	±13.7	±7.7	±6.2	±6.1	±0.0	±10.5	±8.5	±10.3	±13.2
X^2	X^2=4.56, P=0.033		X^2=3.78 P=0.582						X^2=7.8, P=0.02			X^2=10.11, P=0.001		X^2=18.95, P=0.002				

Able to Recite Statewide Cutthroat Trout Regulation

Measurement	Sex		Age						Gear			Residence		Years Angling Experience				
	M	F	<25	19-24	25-34	35-44	45-54	55+	Fly	Lure	Bait	ID	NR	<5	5-10	11-20	21-30	31-40
Percent	29.2%	8.6%	18.2%	23.7%	24.1%	38.0%	29.8%	18.7%	22.2%	42.0%	27.0%	34.1%	15.1%	0.0%	13.9%	25.6%	37.2%	34.0%
95% CI	±5.2	±9.5	±23.3	±13.8	±9.6	±10.9	±12.1	±10.8	±6.4	±13.9	±8.3	±6.5	±6.4	±0.0	±11.5	±9.6	±10.9	±13.4
X^2	X^2=6.75, P=0.009		X^2=8.72, P=0.121						X^2=7.72, P=0.121			X^2=14.56, P<0.0001		X^2=45.95, P<0.0001				

Correctly Identified the Cutthroat Trout Image

Measurement	Sex		Age						Gear			Residence		Years Angling Experience				
	M	F	<25	19-24	25-34	35-44	45-54	55+	Fly	Lure	Bait	ID	NR	<5	5-10	11-20	21-30	31-40
Percent	79.0%	37.1%	63.6%	65.8%	69.6%	84.8%	77.2%	73.3%	78.4%	86.0%	64.3%	79.0%	67.5%	58.6%	55.6%	67.1%	85.9%	86.0%
95% CI	±4.7	±16.0	±29.0	±15.4	±10.3	±8.1	±11.1	±7.6	±6.3	±9.8	±8.9	±5.6	±8.3	±18.3	±16.6	±10.4	±7.9	±9.8
X^2	X^2=29.13, P<0.0001		X^2=7.9, P=0.161						X^2=1.64, P=0.441			X^2=0.82, P=0.365		X^2=22.995, P=0.0003				
N	305	35	11	38	79	79	57	75	171	50	115	214	126	29	36	82	78	50

Table 2b. Pooled summary of regulation awareness and angler ability to correctly identify the cutthroat trout replica for the South Fork Snake River, May to September 2000.

Measurement	Sex		Age						Gear			Residence		Years Angling Experience				
	M	F	<25	19-24	25-34	35-44	45-54	55+	Fly	Lure	Bait	ID	NR	<5	5-10	11-20	21-30	31-40
Able to Recite Section Specific Regulation																		
Percent	45.0%	27.1%	25.0%	37.0%	41.5%	47.0%	46.1%	31.3%	38.7%	50.0%	48.2%	45.3%	31.9%	16.7%	25.8%	38.0%	39.1%	52.7%
95% CI	±3.9	±6.6	±13.1	±13.1	±7.8	±6.6	±7.8	±7.0	±4.0	±21.3	±7.1	±4.2	±5.7	±21.5	±10.8	±7.2	±6.7	±7.3
	X^2=18.3, P<0.0001		X^2=17.06 P=0.004						X^2=6.31, P=0.43			X^2=13.64, P<0.0001		X^2=21.05, P<0.001				
Able to Recite Statewide Cutthroat Trout Regulation																		
Percent	51.8%	32.6%	34.1%	46.3%	50.9%	51.3%	52.1%	35.8%	45.6%	50.0%	54.3%	54.9%	32.2%	25.0%	33.3%	44.6%	44.2%	59.0%
95% CI	±3.9	±7.0	±14.3	±13.6	±7.9	±6.6	±7.8	±7.2	±6.3	±10.7	±6.1	±4.2	±5.7	±25.0	±11.6	±7.3	±6.8	±7.2
	X^2=20.86, P<0.0001		X^2=16.26, P<0.006						X^2=4.58, P=0.101			X^2=37.34, P<0.0001		X^2=19.41, P<0.002				
Correctly Identified the Cutthroat Trout Image																		
Percent	93.8%	75.1%	72.7%	72.2%	91.2%	95.7%	92.1%	85.2%	94.0%	72.7%	80.9%	90.6%	88.5%	58.3%	68.2%	85.9%	89.3%	97.3%
95% CI	±1.9	±6.4	±13.4	±12.2	±4.5	±2.7	±4.2	±5.3	±1.9	±8.9	±2.8	±2.5	±3.9	±28.5	±11.5	±5.1	±4.2	±2.3
	X^2=53.57, P<0.0001		X^2=43.24, P<0.0001						X^2=36.71, P<0.0001			X^2=0.911, P=0.34		X^2=60.52, P<0.0001				
N	647	181	44	54	159	230	165	176	597	22	199	556	270	12	66	184	215	188

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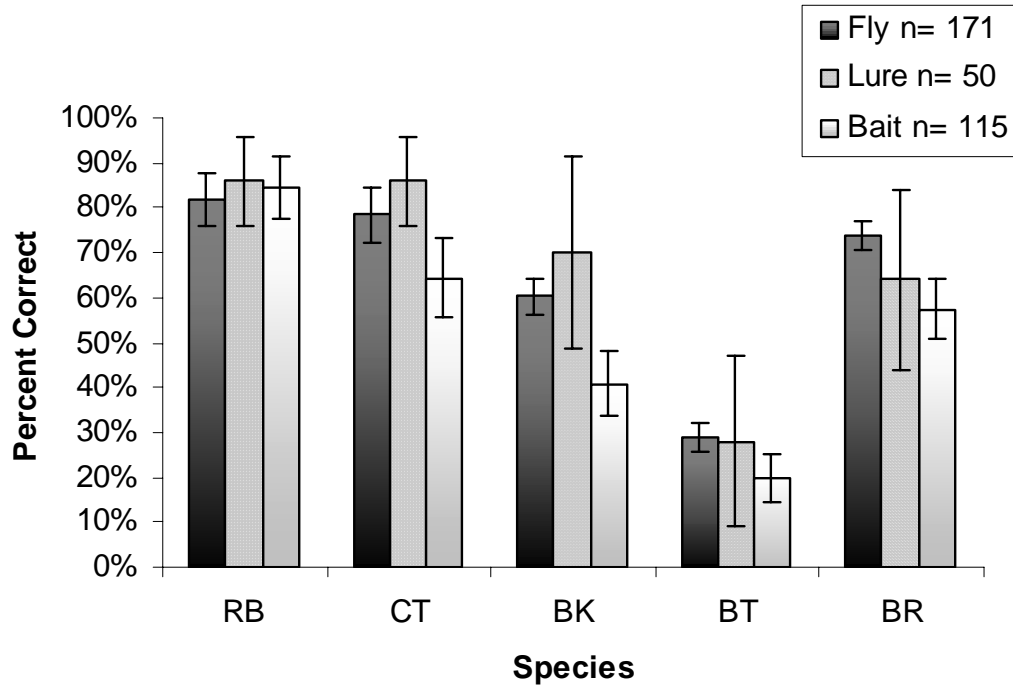
Figure 9a. Percentage of anglers from the Teton River using different types of gear that correctly identified the five species replicas, May to September 2000. Bars denote 95% confidence limits.
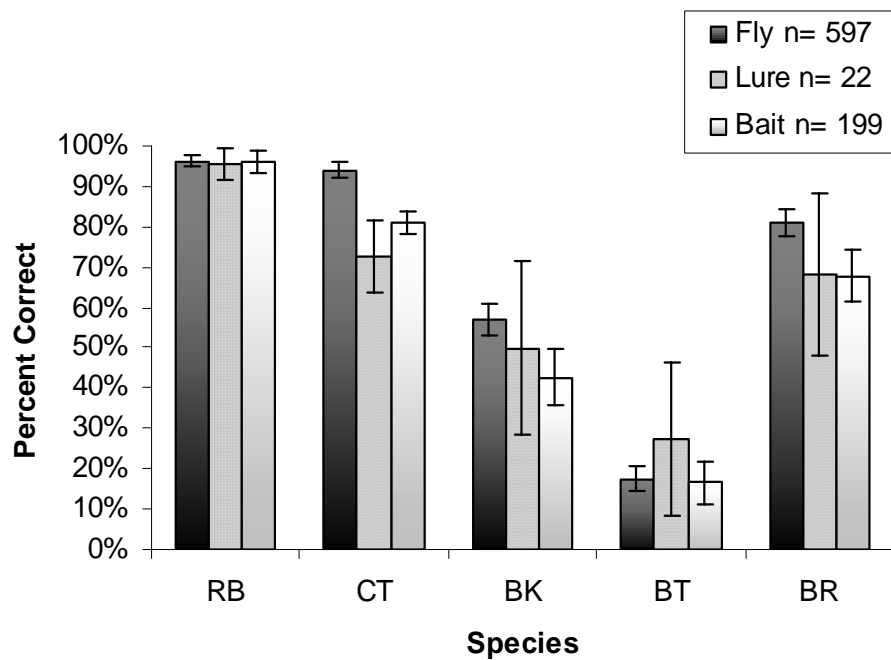
Figure 9b. Percentage of anglers from the South Fork Snake River using different types of gear that correctly identified the five species replicas, May to September 2000. Bars denote 95% confidence limits.

Although few anglers correctly recited the regulations on waters that contain cutthroat trout, our data suggests that very few anglers harvested fish on the SFSR and Teton. Only 39 out of 828 (4.7%) anglers surveyed on the SFSR kept one or more fish, and no fish were seen in angler creels after mid-July. Likewise, on the Teton, only 20 of 340 anglers (5.9%) had kept a fish. While not all of these contacts were complete-trip interviews, it does suggest that most anglers on these waters are not interested in keeping fish and, therefore, whether or not they know the regulation is unimportant. Conversely, we observed a considerably higher proportion of anglers keeping fish on the Cub and Portneuf, which are stocked with put-and-take hatchery rainbow trout. On the Cub, 34.1% of the anglers we interviewed had kept a fish, while 19.2% of those surveyed kept fish on the Portneuf. However, only 28.8% of anglers on the Portneuf correctly recited the area regulation, and 23.1% knew the cutthroat trout regulation. Likewise, only 30.7% and 33.0% of anglers on the Cub correctly recited the area and cutthroat trout regulation, respectively. On those waters where anglers are keeping fish, the issue of whether or not they know the regulations becomes more important, because the chance of inadvertently harvesting an illegal fish is greater. Idaho Department of Fish and Game should consider a water-specific education program for cutthroat trout following that of Schill and Lamansky (2000) targeting anglers who fish waters where this species occurs and relatively high exploitation rates are observed or suspected, or that also support put-and-take fisheries. Schill and Lamansky (2000) reported that angler ability to correctly recite the statewide bull trout no-harvest regulation increased from 65% in 1998 to 91% in 1999 after a high-intensity signing program.

Angler Trout Identification

The ability of anglers in this study to correctly identify different trout species was similar to those found in other studies. Response rates for trout identification from IDFG Region 5 for rainbow trout (82.8%), cutthroat trout (52.9%), brook trout (42.9%), and brown trout (37.9%) were similar to those reported by Schill and Lamansky (1999) before an educational program directed toward bull trout identification. They found that 81% of Middle Fork Boise River (MFBR) anglers could identify the rainbow trout, while 44%, 45%, and 35% could correctly identify the cutthroat trout, brown trout, and brook trout, respectively. In this study, angler responses from IDFG Region 6 for rainbow trout (92.0%), cutthroat trout (84.9%), brook trout (53.8%), and brown trout (73.9%) were more similar to anglers fishing rivers and streams in a Montana study where 89.5%, 76.5%, 65.0%, and 50.2% correctly identified the rainbow trout, cutthroat trout, brown trout, and brook trout, respectively (Schmetterling and Long 1999). In 1998, Schill and Lamansky (1999) found that 30% of anglers correctly identified the bull trout on the MFBR. Montana anglers interviewed on rivers and streams where bull trout are found correctly identified bull trout more than twice as often with rates of 43.4% (Schmetterling and Long 1999). The ability of all anglers in the present study to identify bull trout was poor (20.0%). These results were not surprising, however, because bull trout are not found in the study area.

As stated previously, anglers using different types of gear correctly identified the same species at similar rates; however, there were several exceptions (Figures 9a and 9b). These result are very different from those reported by Schill and Lamansky (1999), where fly anglers were considerably better at identifying all five replicas than lure or bait anglers.

There are several limitations in our study pertaining to fish identification estimates. The low sample sizes on the Cub (n = 88) and Portneuf (n = 52), along with the inconsistent nature of the sample dates and times could explain the difference between these waters and the SFSR and Teton, especially for the Portneuf. Because of manpower limitations, all interviews on the Portneuf were performed during June, the first month of the fishing season; thus, a biased

estimate could have been obtained for that water. However, the Portneuf results closely match those from the Cub where interviews were conducted on a regular basis throughout the fishing season.

Schill and Lamansky (1999) suggested that identification rates estimated using mounts could be biased low because anglers might be more accurate at identifying a real trout rather than the replicas. In the present study, angler identification rates for actual fish were in some cases higher than those for the replicas and in other cases lower (Table 1). However, as Schill and Lamansky (1999) described, very few anglers interviewed had a trout in the creel, so a comparison of the identification rates between live fish and the replicas was problematic. Even though it is possible that anglers could more easily identified a real trout, we believe the key identifying characteristics for each species were clearly visible, and thus our results should represent a reasonable estimate of angler identification ability.

Even though 81.5% of all anglers interviewed in southeast Idaho correctly identified the cutthroat trout, there is room for improvement in several of the study areas we surveyed. With the exception of the Portneuf, the second highest response to the cutthroat trout replica, besides the correct answer, was "don't know." On the Portneuf, "brown trout" was the second most common answer. The brown trout was the most commonly mistaken individual fish for the cutthroat trout replica on all sections except the Cub, where the rainbow trout was most commonly mistaken. The cutthroat trout and brown trout are similar in basic color and closest in appearance. However, on the SFSR and Cub, a higher proportion of anglers who misidentified the cutthroat trout responded with a variety of other species (Figure 8). Schill and Lamansky (1999) also observed this phenomenon where several unrelated species were more often confused with a bull trout than the most related species, the brook trout. They recommended that any educational signing effort should focus primarily on the species of concern and not attempt to reduce confusion between the closest related species as done previously in several poster campaigns. Based on the present study results, we would concur with that suggestion.

Demographics

We collected demographic information to identify possible groups that may benefit from a directed educational effort. Because of their availability via the statewide license database, Schill and Lamansky (1999) identified gender, age, and residence as the most promising variables. They concluded that gender and age were statistically associated with correct angler responses while residence was not. For the SFSR and Teton, we determined that gender was associated with correct responses. However, females only comprised 11.5% of the anglers interviewed on the Teton and 28.0% on the SFSR, a relatively small proportion of total angler numbers. We also found that angler age was associated with correct responses on the SFSR but not on the Teton. At the same time, residence was associated with the ability to recite the regulations on both waters but not identify the cutthroat trout (Tables 2a and 2b). The variable "years of angling experience" was strongly associated with correct responses. For example, none of the anglers with less than five years experience on the Teton and less than a quarter of those on the SFSR could correctly recite the regulations. Anglers with less than five years experience were better at identifying the cutthroat trout on the Teton (58.9%) and SFSR (58.3%). This would suggest that an education campaign should decrease the "years of angling experience" necessary to correctly identify species or recite regulations. Again, however, anglers with less than five years experience only made up 8.5% and 1.4% of the anglers on the Teton and SFSR, respectively. An education campaign targeted at anglers belonging to these

two demographic groups might not, by itself, achieve desired results but could measurably improve overall levels of regulation awareness and identification ability.

One way to potentially improve anglers regulation awareness and their ability to identify cutthroat trout without regard to any demographic group would be to implement a signing program on cutthroat trout waters as discussed by Schill and Lamansky (2000). They found that, of the three educational approaches tested, the most effective method was large 1.6 x 1.6 m signs placed on road corridors so anglers had to drive past at least two signs. On the Middle Fork Boise River, they reported an increase in the ability of anglers to correctly recite the statewide bull trout regulation from 65% to 91%, and ability to correctly identify the bull trout replica increased from 30% to 57%. Such an approach would put an information resource on the stream for anglers and may affect enough anglers to be meaningful from a management perspective. However, based on a second year evaluation of that program (Subproject 2 this report), a more broad-based education program will be needed if long-term angler fish identification rates above 90% are to be consistently achieved.

RECOMMENDATIONS

1.   Erect signs similar to those designed for bull trout, depicting cutthroat trout on waters where they are present, with more intense signing occurring where stocking of sterile hatchery rainbow trout or suspected moderate to high exploitation takes place.

ACKNOWLEDGMENTS

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APPENDICES

Appendix 1. Summary of responses for regulation awareness and trout replica identification ability for each individual section surveyed from May to September 2000.

Section	N	RB	%	CT	%	BK	%	BT	%	BR	%	All Correct	%	None Correct	%	CT Reg Correct	%	Area Reg Correct	%
C1	88	68	77.3%	45	51.1%	39	44.3%	21	23.9%	33	37.5%	9	10.2%	8	9.1%	29	33.0%	27	30.7%
Total Cub	88	68	77.3%	45	51.1%	39	44.3%	21	23.9%	33	37.5%	9	10.2%	8	9.1%	29	33.0%	27	30.7%
P1	36	33	91.7%	20	55.6%	15	41.7%	7	19.4%	17	47.2%	2	5.6%	0	0.0%	11	30.6%	10	27.8%
P2	16	15	93.8%	9	56.3%	6	37.5%	2	12.5%	3	18.8%	0	0.0%	0	0.0%	1	6.3%	5	31.3%
Total Portneuf	52	48	92.3%	29	55.8%	21	40.4%	9	17.3%	20	38.5%	2	3.8%	0	0.0%	12	23.1%	15	28.8%
T1	69	56	81.2%	52	75.4%	37	53.6%	14	20.3%	43	62.3%	9	13.0%	7	10.1%	15	21.7%	16	23.2%
T2	91	76	83.5%	62	68.1%	48	52.7%	24	26.4%	61	67.0%	12	13.2%	2	2.2%	32	35.2%	22	24.2%
T3	180	152	84.4%	140	77.8%	103	57.2%	49	27.2%	122	67.8%	34	18.9%	7	3.9%	45	25.0%	40	22.2%
Total Teton	340	284	83.5%	254	74.7%	188	55.3%	87	25.6%	226	66.5%	55	16.2%	16	4.7%	92	27.1%	78	22.9%
S1	565	542	95.9%	501	88.7%	300	53.1%	103	18.2%	446	78.9%	74	13.1%	12	2.1%	250	44.2%	218	38.6%
S2	122	116	95.1%	110	90.2%	63	51.6%	19	15.6%	93	76.2%	0	0.0%	0	0.0%	66	54.1%	52	42.6%
S3	141	133	94.3%	127	90.1%	77	54.6%	22	15.6%	98	69.5%	0	0.0%	0	0.0%	72	51.1%	66	46.8%
Total SFSR	828	791	95.5%	738	89.1%	440	53.1%	144	17.4%	637	76.9%	74	8.9%	12	1.4%	388	46.9%	336	40.6%

Appendix 2. Summary of responses from anglers for regulation awareness and cutthroat trout identification of different demographic groups on the Cub River and Portneuf River, May to September 2000.

Cub River 2000

	Number of Correct Responses			CT Reg Correct		Area Reg Correct	
	N	CT	%	CT Reg Correct	%	Area Reg Correct	%
Total	88	45	51.1%	29	33.0%	27	30.7%
Sex							
Male	84	45	53.6%	29	34.5%	27	32.1%
Female	4	0	0.0%	0	0.0%	0	0.0%
Resident							
Yes	33	16	48.5%	12	36.4%	8	24.2%
No	55	29	52.7%	17	30.9%	19	34.5%
Gear							
Fly	19	11	57.9%	8	42.1%	9	47.4%
Lure	3	1	33.3%	0	0.0%	0	0.0%
Bait	60	29	48.3%	19	31.7%	16	26.7%
Age							
≤18	19	5	26.3%	4	21.1%	4	21.1%
19-24	10	3	30.0%	0	0.0%	1	10.0%
25-34	18	11	61.1%	4	22.2%	4	22.2%
35-44	19	12	63.2%	12	63.2%	10	52.6%
45-54	11	8	72.7%	5	45.5%	5	45.5%
55+	11	6	54.5%	4	36.4%	3	27.3%
Experience							
<5	12	3	25.0%	1	8.3%	1	8.3%
5-10	14	2	14.3%	3	21.4%	2	14.3%
11-20	18	9	50.0%	6	33.3%	7	38.9%
21-30	16	10	62.5%	7	43.8%	8	50.0%
31-40	12	10	83.3%	5	41.7%	3	25.0%
>40	18	12	66.7%	8	44.4%	7	38.9%

Portneuf River 2000

	Number of Correct Responses			CT Reg Correct		Area Reg Correct	
	N	CT	%	CT Reg Correct	%	Area Reg Correct	%
Total	52	29	55.8%	12	23.1%	15	28.8%
Sex							
Male	43	25	58.1%	11	25.6%	13	30.2%
Female	5	1	20.0%	1	20.0%	2	40.0%
Resident							
Yes	43	26	60.5%	11	25.6%	15	34.9%
No	1	0	0.0%	1	100.0%	0	0.0%
Gear							
Fly	8	5	62.5%	2	25.0%	3	37.5%
Lure	7	3	42.9%	3	42.9%	3	42.9%
Bait	32	18	56.3%	7	21.9%	8	25.0%
Age							
≤18	11	7	63.6%	3	27.3%	5	45.5%
19-24	6	3	50.0%	0	0.0%	0	0.0%
25-34	8	6	75.0%	2	25.0%	2	25.0%
35-44	19	10	52.6%	5	26.3%	7	36.8%
45-54	6	3	50.0%	2	33.3%	1	16.7%
55+	2	0	0.0%	0	0.0%	0	0.0%
Experience							
<5	8	3	37.5%	1	12.5%	1	12.5%
5-10	9	5	55.6%	3	33.3%	3	33.3%
11-20	10	7	70.0%	1	10.0%	3	30.0%
21-30	13	10	76.9%	4	30.8%	3	23.1%
31-40	10	4	40.0%	3	30.0%	5	50.0%
>40	2	0	0.0%	0	0.0%	0	0.0%

Appendix 3.   An example of the survey form used for fish identification data collection.

BODY OF WATER:

DATE:

DAY TYPE:

IDAHO DEPT. OF FISH AND GAME
CREEL SURVEY SYSTEM
INTERVIEW FIELD FORM

CLERK:

SEC	TIME	RES/NRES TOWN STATE	TRIP COMP	HOURS FISHED	BANK BOAT	GEAR F,L,B	NUMBER CAUGHT	NUMBER KEPT & SPECIES	CREEL ID ANG/BIO	SEX	AGE	QUESTIONS 1	2	3	4	FISH ID A	B	C	D	E	QUESTIONS 5	6	7	8
								//																
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QUESTIONS

1 -- HAVE YOU BEEN INTERVIEWED FOR FISH IDENTIFICATION BEFORE? (IF YES, IN 98 OR 99?)
2 -- HOW MANY YEARS OF ANGLING EXPERIENCE DO YOU HAVE?
3 -- CAN YOU RECITE THE REGULATIONS FOR THE AREA WE ARE IN?
4 -- HOW WOULD YOU RATE YOUR ABILITY TO IDENTIFY TROUT ON A SCALE OF 1 TO 5, WITH 5 BEING MOST CONFIDENT?

PERFORM THE IDENTIFICATION EXERCISE

5 -- DO YOU KNOW THE REGULATION FOR CUTTHROAT?
6 -- HOW DID YOU GET YOUR INFORMATION CONCERNING THE CUTTHROAT REGULATION?
7 -- HOW MANY YEARS OF EDUCATION DO YOU HAVE?
8 -- HOW DID YOU GET YOUR INFORMATION ON CUTTHROAT IDENTIFICATION?

S -- SIGN	TV -- TELEVISION	WM -- WORD OF MOUTH
P -- POSTER	FG -- F AND G STAFF	LV -- LICENSE VENDOR
ST -- STICKER	RA -- RADIO	MG -- MAGAZINE
RG --REGS	NP -- NEWSPAPER	EX -- PERSONAL EXPERIENCE

****TAKE LENGTHS ON ALL FISH IN CREEL
****DIFFERENTIATE HATCHERY AND WILD RAINBOW (HRB, WRB) IN CREEL.
****IF USING MORE THAN ONE GEAR TYPE, CIRCLE THE MAIN ONE USED.
**** IF PARTY FISHING (GROUP ALL TOGETHER) BRACKET THE INTERVIEWS OF
        THE PEOPLE IN THE GROUP ON THE FORM.

RAINBOW -- RB   SQUAWFISH -- SQ
CUTTHROAT -- CT   KOKANEE -- KOK
BROOK TROUT -- BK   COHO -- CH
BULL TROUT -- BT   SALMON -- SAL
BROWN TROUT -- BR   DIDNT KNOW -- U
WHITEFISH -- WT   RAINBOW/CUTTHROAT HYB -- RCH
SUCKER -- SU

ANNUAL PERFORMANCE REPORT

SUBPROJECT #2: EFFECTS OF THREE EDUCATION STRATEGIES ON ANGLER ABILITY TO IDENTIFY BULL TROUT AND OTHER SALMONIDS

State of: Idaho

Grant No.: F-73-R-23, Fishery Research

Project No.: 3

Title: Human Dimension Studies

Subproject #2: Effects of Three Education Strategies on Angler Ability to Identify Bull Trout and Other Salmonids

Contract Period: July 1, 2000 to June 30, 2001

ABSTRACT

In 2000, we conducted angler interviews to monitor regulation awareness and trout identification ability on the Middle Fork Boise River (MFBR) and South Fork Boise River (SFBR) during the second year of an educational program. We found that angler ability to correctly recite the statewide no-harvest regulation for bull trout *Salvelinus confluentus* was nearly identical to that in 1999 on both the MFBR (91% in 1999, 90% in 2000) and SFBR (77% in 1999, 78% in 2000). Angler ability to correctly identify the bull trout replica decreased slightly in 2000 from 57% to 48% on the MFBR and 39% to 30% on the SFBR, but these differences were not statistically significant based on overlapping 95% confidence limits. Our results suggest that additional education efforts will be needed if correct bull trout identification rates are to exceed 90%.

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INTRODUCTION

In 1999, the Idaho Department of Fish and Game (IDFG) tested three educational strategies in an effort to increase the ability of southwest Idaho anglers to identify bull trout and their awareness of the statewide no-harvest regulation for bull trout. A survey was conducted of anglers fishing the Middle Fork Boise River (MFBR) and the South Fork Boise River (SFBR) both before and after the educational effort to evaluate the effect of the three strategies (Schill and Lamansky 1999, 2000).

A high intensity approach was used in the MFBR by placing a large number of signs and posters throughout the drainage as compared to a low intensity approach used on the SFBR. The ability of anglers to correctly identify bull trout on the MFBR nearly doubled from 30% in 1998 to 57% in 1999, while their ability to correctly recite the bull trout regulation increased from 65% to 91%. Much smaller gains were seen in correct responses of SFBR anglers, where bull trout identification ability only increased from 33% to 39%, and regulation awareness increased from 58% to 77% (Schill and Lamansky 2000). During the summer of 2001, we performed a reduced intensity follow-up survey on the MFBR and SFBR to track the effects of the educational strategies during their second year. We sought to determine if further improvements could be expected using the same education strategies explored the prior year.

OBJECTIVES

1. To evaluate whether or not angler regulation awareness and angler ability to correctly identify bull trout continues to increase following the initial year of implementation.

STUDY AREA

During the 2000 field season, angler interviews were conducted on seven of nine discrete sections described by Schill and Lamansky (1999, 2000) for the upper Boise River drainage (Figure 10). These sections were characterized by different water types (reservoir or stream) and overall management approaches (stocked/yield or special regulations). We did not perform interviews in sections four and six as designated in the previous efforts because of time and manpower limitations. A detailed description of the study area is provided by Schill and Lamansky (1999).

METHODS

Education Strategies

In 2000, we continued the three-faceted education program on the MFBR and SFBR as described in detail by Schill and Lamansky (2000). We maintained the 1.6 m x 1.6 m signs when necessary and replaced damaged or missing 0.30 X 0.67 m posters each day project personnel drove the survey sections. Unlike 1999, when bull trout stickers were sent only to local license vendors in southwest Idaho, we sent 105,000 stickers with display boxes to license vendors statewide in 2000. This was the only known difference in the three primary education strategies between the 1999 and 2000 fishing seasons. These three education strategies were all tested during the previous year. In addition, a picture of the bull trout along with identifying characteristics was placed on the front cover of the 2000-2001 fishing regulation booklet (IDFG 2000).
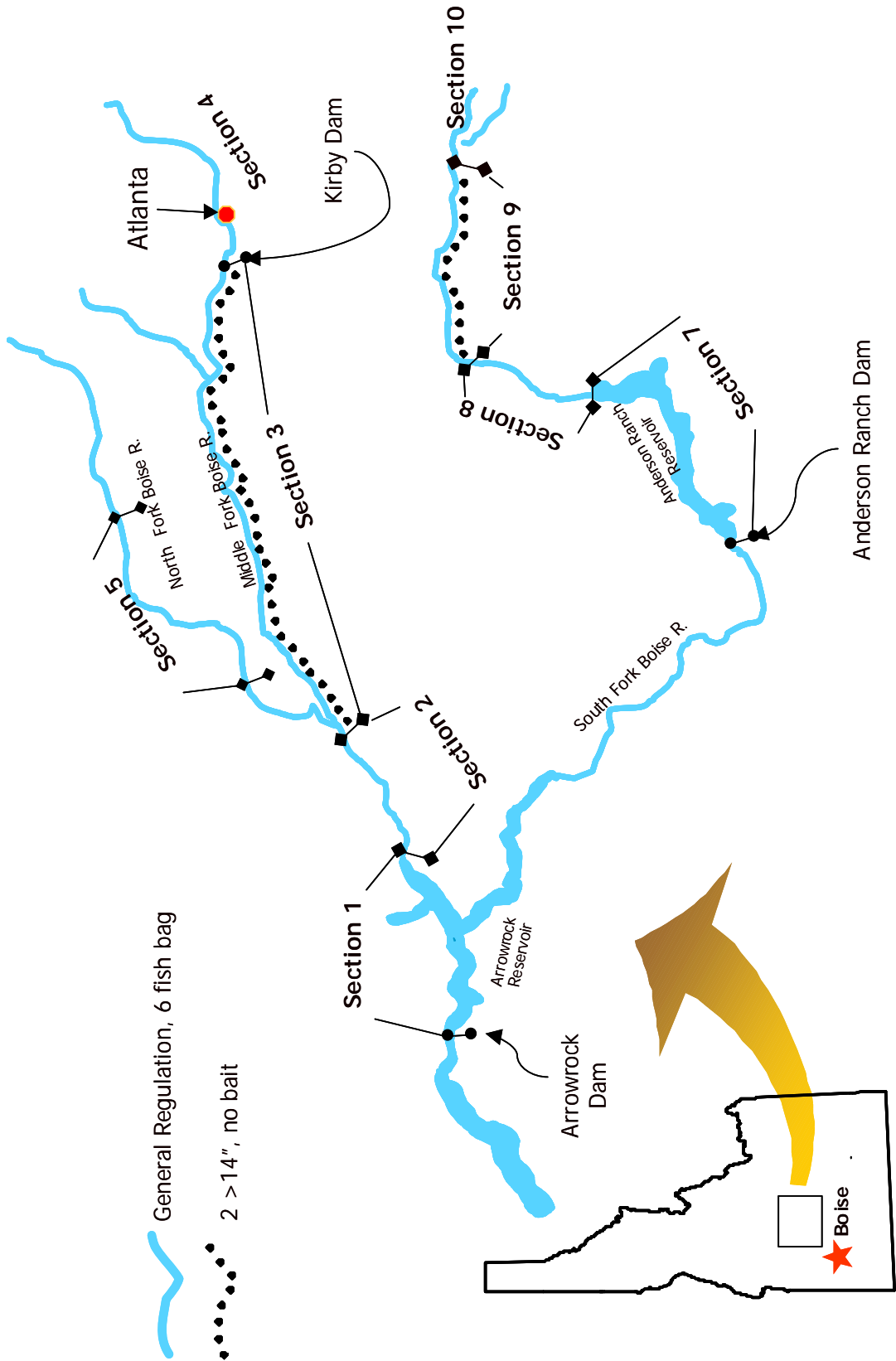
Figure 10. The Middle Fork Boise River and South Fork Boise River drainages and study sections used in the 1999 and 2000 fish identification survey.

Interviews

We used the same interview approach as in the 1998 and 1999 field seasons (Schill and Lamansky 1999, 2000). Interviews were conducted on the MFBR and SFBR from the general fishing season opener on May 27 through September 26, 2000. Angler contacts were made on both waters on randomly chosen days during the entire study period. Our efforts in 2000 were scaled back from the previous two field seasons. One weekday was chosen for each water per week, while either the MFBR or SFBR was selected to be surveyed on one weekend day. This was a 50% reduction in effort from 1998 and 1999.

Anglers were interviewed in the same manner as described in detail by Schill and Lamansky (2000), except that anglers were not asked how many years of education they had completed. In 2000, one new question was added to the survey. Anglers were asked if they had fished on the opposite water (the MFBR or SFBR, depending) in either 1999 or 2000. We inquired if anglers had fished the opposite water to quantify how many anglers were possibly influenced by the different signing strategies in the two drainages. More specifically, we sought to determine if the post-education results reported by Schill and Lamansky (2000) for the SFBR were positively biased because a large number of anglers fishing that water were exposed to the high intensity signing program on the MFBR.

Data Analysis

We summarized angler responses to regulation knowledge and fish identification questions by section and compared results to the immediate post-education results observed in 1999 (Schill and Lamansky 2000). We calculated 95% confidence limits around the proportions of correct answers using the standard binomial approximation (Zar 1974). We also summarized angler responses regarding their primary source of information on the bull trout regulation and bull trout identification.

Results

The proportion of anglers who correctly recited the statewide bull trout no-harvest regulation were virtually identical between 1999 and 2000 on both the MFBR (91% and 90%) and SFBR (77% and 78%) (Figure 11). Angler ability to correctly identify the bull trout replica decreased somewhat between 1999 and 2000 from 57% to 48% on the MFBR and from 39% to 30% on the SFBR. However, in both cases confidence intervals from 2000 overlapped those calculated for 1999 proportions (Figure 11). Confidence intervals calculated for bull trout identification rates in 2000, like 1999, did not overlap those for the pre-education year on the MFBR (Figure 11). However, on the SFBR, bull trout identification rates were not statistically different in either post education year when compared to the pre-education year. When comparing angler responses from 1999 and 2000 by section, confidence intervals overlapped in all sections for both section-specific and bull trout regulation awareness (Table 3). Confidence limits also overlapped for bull trout identification rates in all sections except Section 8 (Table 3).
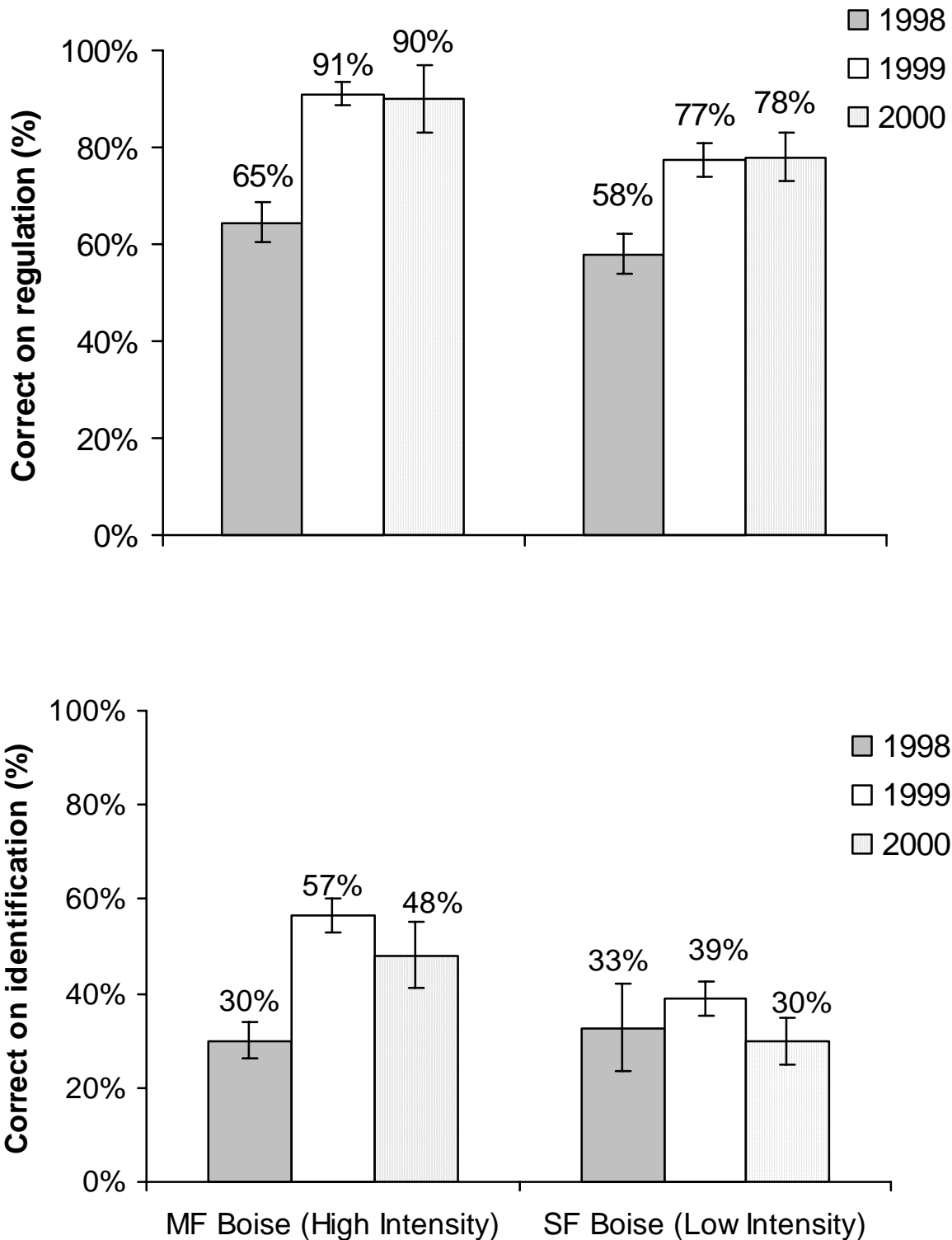
Figure 11. The percent of Middle Fork Boise River anglers and South Fork Boise River anglers that correctly recited the bull trout regulation (top) and identified the bull trout replica (bottom) before (1998) and the two years after (1999 and 2000) education efforts at two intensities. Error bars denote 95% confidence limits.

Table 3. Summary of regulation awareness and angler ability to correctly identify the bull trout replica for anglers in various sections of the Middle Fork Boise River and South Fork Boise River, 1998, 1999, and 2000.

	Middle Fork Boise						South Fork Boise				
Year	All	Sec 1	Sec 2	Sec 3	Sec 4	Sec 5	All	Sec 7	Sec 8	Sec 9	Sec 10
1998				**Correctly recited section-specific regulation**							
Percent	47	38	38	74	54	33	54	53	69	25	0
95% CL	(42-51)	(29-47)	(30-46)	(66-81)	(35-72)	(24-41)	(42-66)	(39-67)	(44-94)	a	a
n	550	114	153	136	28	119	67	49	13	4	1
1999											
Percent	51	32	35	70	20	60	40	24	39	69	44
95% CL	(46-54)	(24-40)	(27-42)	(63-76)	a	(51-70)	(36-44)	(19-30)	(32-46)	(59-78)	(36-52)
n	639	152	153	214	5	115	624	219	200	93	112
2000											
Percent	49	21	54	67	NA	59	37	28	31	47	49
95% CL	(42-56)	(9-33)	(43-65)	(51-83)	-	(40-78)	(31-43)	(18-38)	(22-40)	(31-63)	(35-63)
n	186	43	78	36	-	27	285	81	113	39	51
				Correctly recited statewide bull trout regulation							
1998											
Percent	65	50	66	78	82	57	58	55	62	75	100
95% CL	(60-69)	(41-59)	(58-74)	(70-84)	(62-93)	(48-66)	(46-70)	(41-69)	(36-89)	a	a
n	550	114	153	136	28	119	67	49	13	4	1
1999											
Percent	91	84	88	93	100	99	77	71	78	88	80
95% CL	(88-93)	(76-89)	(82-93)	(88-96)	a	(95-100)	(74-81)	(64-76)	(71-83)	(79-94)	(70-86)
n	639	152	153	214	5	115	624	219	200	93	112
2000											
Percent	90	88	90	92	NA	100	78	79	73	85	82
95% CL	(86-94)	(78-98)	(83-97)	(83-100)	-	-	(73-82)	(70-88)	(65-81)	(73-97)	(71-93)
n	186	43	78	36	-	27	285	81	113	39	51
				Correctly identified bull trout replica							
1998											
Percent	30	18	29	42	39	26	33	27	54	50	0
95% CL	(26-34)	(12-27)	(22-37)	(33-50)	(21-58)	(18-34)	(21-44)	(14-39)	(26-82)	a	a
n	550	114	153	136	28	119	67	49	13	4	1
1999											
Percent	57	43	58	58	40	70	39	30	42	54	37
95% CL	(53-60)	(35-51)	(50-66)	(52-65)	a	(62-79)	(35-43)	(24-36)	(36-48)	(43-64)	(27-45)
n	639	152	153	214	5	115	624	219	200	93	112
2000											
Percent	48	28	49	67	NA	59	30	30	27	41	29
95% CL	(41-56)	(14-42)	(38-60)	(51-83)	-	(40-78)	(25-35)	(20-40)	(19-35)	(25-57)	(16-42)
n	186	43	78	36	-	27	285	81	113	39	51

a = confidence limits not calculated if sample size less than 10

The primary information source for anglers in 2000 regarding the no-harvest regulation for bull trout remained similar to that in 1999 (Table 4). However, the primary source of information identified by anglers with respect to their ability to identify bull trout changed somewhat. Confidence limits overlapped for all information sources between 1999 and 2000 except "word of mouth" and "experience." Anglers who said their primary source of information was "word of mouth" increased from 3% to 22% on the MFBR and from 5% to 23% on the SFBR. At the same time, those who replied that "experience" was their primary source decreased from 32% to 9% on the MFBR and 41% to 3% on the SFBR (Table 4). However, the small number of anglers interviewed for the latter two comparisons (8 and 2, respectively) limit the usefulness of this finding.

We found that there was some overlap of anglers who fished both waters. On the MFBR, 31% of the anglers surveyed said they had fished the SFBR in 1999, while 14% had in 2000. Only 2% stated they had fished the SFBR in 2000 but not in 1999. Conversely, only 6% of the anglers surveyed on the SFBR said they had fished the MFBR in 1999 and 1% in 2000.

Table 4. Primary information source for anglers able to correctly recite bull trout no-harvest regulations or identify the bull trout replica based on field interviews, Middle Fork Boise River and South Fork Boise River, 1999 and 2000. Information sources are represented by: S (signs), R (regulations), P (posters), WM (word of mouth), TV (television), ST (stickers), EX (experience) and O (others).

Water	Year		Total	S	R	P	WM	TV	ST	EX	O
											Information source
							Correctly recited state-wide bull trout regulation				
MFBR	1999	Percent		57	20	5	6	3	1	4	5
		95% CL		(52-61)	(17-24)	(3-5)	(4-8)	(2-4)	(<0-2)	(2-6)	(4-7)
		n	580	328	117	29	34	15	5	22	30
	2000	Percent		46	23	7	20	1			10
		95% CL		(38-54)	(16-30)	(3-11)	(12-28)	(<0-3)			(5-15)
		n	168	78	39	12	17	2	0	0	17
SFBR	1999	Percent		40	31	3	13	4	1	3	5
		95% CL		(36-45)	(27-35)	(1-4)	(10-16)	(2-6)	(<0-3)	(2-6)	(3-8)
		n	477	192	147	12	62	18	5	16	25
	2000	Percent		48	29	2	10	2	3		3
		95% CL		(41-55)	(23-35)	(0-4)	(6-14)	(0-4)	(1-5)		(1-5)
		n	221	106	65	5	23	4	7	0	6
							Correctly identified bull trout replica				
MFBR	1999	Percent		28	19	6	3	1	1	32	11
		95% CL		(23-33)	(14-23)	(4-9)	(2-6)	(<0-2)	(<0-3)	(27-37)	(8-14)
		n	361	101	67	20	12	2	3	116	40
	2000	Percent		26	25	9	22			9	8
		95% CL		(16-36)	(16-34)	(3-15)	(13-31)			(3-15)	(2-14)
		n	85	22	21	8	19	0	0	8	7
SFBR	1999	Percent		16	18	5	5	1	2	41	13
		95% CL		(12-21)	(13-24)	(2-8)	(2-8)	(<0-3)	(1-5)	(35-47)	(8-17)
		n	243	40	43	11	11	2	5	100	31
	2000	Percent		20	34	3	23		5	3	3
		95% CL		(10-30)	(22-46)	(<0-7)	(12-34)		(0-10)	(<0-7)	(<0-7)
		n	64	13	22	2	15	0	3	2	2

DISCUSSION

Although a case can be made that high intensity signing is the single best way to improve anglers' regulation knowledge and fish species identification skill (Schill and Lamansky 2000), it seems that a combination of techniques is likely to be most effective. When both the signs and regulations are taken into account, 69% and 77% of the anglers from the MFBR and SFBR responding correctly to bull trout questions identified them as primary sources of information for the bull trout regulation. Even though year 2000 sample sizes are modest, we observed a 32% and 89% increase in the proportion of anglers relying on the regulation pamphlet when correctly identifying the bull trout for the MFBR and SFBR, respectively (Table 4). It is possible that the added exposure provided by displaying the bull trout information on the regulation cover played a positive role in 2000. Although this is admittedly speculative, costs for this education approach are effectively zero because the front cover of the regulation pamphlet traditionally includes a color image anyway. For this reason, we recommend a continuation of this approach, perhaps with other species, in the future.

During the second year of education efforts, angler ability to correctly recite the statewide no-harvest regulation for bull trout remained the same, and angler ability to identify bull trout actually declined slightly in the two study streams. This suggests that we cannot expect continuing improvement using the same three education approaches tested. In the case of the SFBR, additional signs could be expected to improve angler awareness of the bull trout regulations, perhaps approaching the 90% levels observed on the MFBR. However, after two years of education on both streams, angler ability to correctly identify the bull trout replica remains well below the 90% level for regulation awareness.

Additional aggressive education approaches appear necessary to achieve high rates of correct bull trout identification by anglers. Other options that could be considered include a fish identification sweepstakes, which has been shown to improve bull trout awareness by Alberta anglers (Baayans and Brewin 1998). Distribution of posters to vendors should be continued, and the poster design could be modified to attract additional attention (Schill and Lamansky 2000). Lastly, IDFG should consider incorporating a 5-10 minute fish identification module into existing IDFG-sponsored education programs such as Project Wild and Hunter Education.

RECOMMENDATIONS

1.	Maintain the current level of signing on the MFBR and consider expansion on the SFBR and other systems where bull trout are present.

2.	Continue representing the bull trout prominently on the regulation booklet.

3.	Develop additional educational tools to improve angler regulation awareness and ability to identify bull trout and other salmonids, including a 5-10 minute fish identification module in project wild and hunter education.

ACKNOWLEDGMENTS

Jeff Dillon reviewed and Cheryl Leben finalized the document.

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