FISHERY MANAGEMENT INVESTIGATIONS

FEDERAL AID IN FISH RESTORATION
2002 ANNUAL PERFORMANCE REPORT
Program F-71-R-27

Cal Groen, Director

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
PANHANDLE REGION (Subproject I-G, II-G, III-G)

PROJECT I. SURVEYS AND INVENTORIES
Job a. Panhandle Region Mountain Lakes Investigations
Job b. Panhandle Lowland Lakes Investigations
Job c[1]. Rivers and Streams Investigations
Job c[2]. Little North Fork Clearwater Fishery Assessment
Job c[3]. Middle Fork East River Bull Trout Assessment
PROJECT II. TECHNICAL GUIDANCE
PROJECT III. HABITAT MANAGEMENT

By

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April 2007
IDFG 07-26

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2002 ANNUAL PERFORMANCE REPORT

State of: Idaho   Program: Fisheries Management F-71-R-27

Project: I-Surveys and Inventories   Subproject: I-A Panhandle Region

Job No.: a   Title: Mountain Lakes Investigations

Contract Period: July 1, 2002 to June 30, 2003

ABSTRACT

There were no mountain lake survey related activities in the Panhandle Region during this contract period.

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2002 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-27

Project: I-Surveys and Inventories Subproject: I-A Panhandle Region

Job No.: b Title: Lowland Lake Investigations

Contract Period: July 1, 2002 to June 30, 2003

ABSTRACT

A midwater trawl was used to estimate the kokanee *Oncorhynchus nerka* population in Coeur d'Alene Lake in early August. Trawl results indicated a low number of adult kokanee, with the total population of age-3 fish estimated at 70,800 or 7 fish/ha. We estimated 695,200 age-2, 934,000 age-1, and 3.5 million age-0 kokanee for a total population estimate of 5.2 million fish in 2002. The standing stock of kokanee in Coeur d'Alene Lake was estimated at 26.62 kg/ha. This is a significant improvement over the 2001 estimate of 12.84 kg/ha.

We counted 33 Chinook salmon *O. tshawytscha* redds in the Coeur d'Alene River drainage and 18 in the St. Joe River. All redds were left undisturbed to provide natural production. We stocked 30,000 age-0 Chinook salmon at the Mineral Ridge boat ramp in Wolf Lodge Bay in June 2002.

An additional 82 lake trout *Salvelinus namaycush* were tagged by the Priest Lake volunteer angler. Fish ranged from 300 to 650 mm (TL), with a mean size of 422 mm. All of these fish were tagged near Bartoo Island. A total of 42 tagged lake trout were recaptured in 2002. All had been tagged in Priest Lake between 1986 and 2002. Lake trout were caught from 0 to 24 km from their original capture site, with an average distance from original capture of approximately 4.6 km. Growth, as reported from tag returns, ranged from 0 to 5.7 cm/year, with an average annual growth of 1.8 cm/year.

We used gillnets to capture lake trout from Upper Priest Lake in June, July, and August. We netted and removed a total of 836 lake trout in four netting efforts. Catches ranged from 164 lake trout in our June 24-27 effort to 293 fish in the June 3-6 effort. Standardized catch ranged from 0.77 to 1.49 fish/hr/100 m^2, with no apparent trend or evidence of depletion. Mean catch rate throughout the 2002 effort was 1.01 fish/hr/100 m^2 compared to 1.8 fish/hr/100 m^2, in 2001, 0.95 fish/hr/100 m^2 in 1999 and 1.1 fish/hr/100 m^2 in 1998. Size of lake trout ranged from 175 to 890 mm (TL), with a modal size of 510 mm. We incidentally netted nine bull trout *S. confluentus* during the lake trout netting efforts and no known bull trout mortality occurred. The ratio of lake trout to bull trout was 93:1 compared to 67: 1 in 2001, 21:1 in 1999 and 10:1 in 1997. We obtained funding from the Governor's Office of Species Conservation (OSC) to install and test temporary strobe lights as a technique to repel lake trout from migrating upstream through the Thorofare into Upper Priest Lake. Our results were encouraging, as strobe lights appeared to be at least 75% effective in stopping the upstream movement of lake trout in the Thorofare.

We conducted kokanee spawner counts along the shoreline of Priest Lake in November. A total of 1,825 kokanee spawners were counted at five historic locations in Priest Lake. We were unable to survey Upper Priest Lake as low water levels prevented boat traffic from entering the Thorofare. The number of spawners observed at each of the five sites on Priest

Lake were as follows: Copper Bay 549, Huckleberry Bay 49, Cavanaugh Bay 921, Hunt Creek beach 306, and Indian Creek beach 0.

We tagged 107 black crappie *Pomoxis nigromaculatus* in Hayden Lake in 2002 with reward tags to estimate annual crappie exploitation by anglers. A total of 31 of these tags were returned within one year of initial capture for an uncorrected annual exploitation rate of 29 percent. We assumed minimal tag loss and a non-reporting rate of 25%. Therefore, total exploitation was likely around 36% compared to 30% in 2001.

We conducted standard lake surveys on Upper and Lower Twin Lakes and Gamble (Gamlin) Lake using procedures outlined in the Standard Lowland Lakes Survey Manual. Largemouth bass *Micropterus salmoides* were the most abundant species based on number in Gamble and Upper Twin Lakes, and were the most abundant game species based on sample weight in all three lakes. Game species comprised 98% of the sample in the Gamble Lake survey with the catch consisting of largemouth bass, yellow perch *Perca flavescens*, black crappie, pumpkinseed *Lepomis gibbosus*, brown bullhead *Ictalurus nebulosus* and brook trout Salvelinus *fontinalis.* In Upper Twin Lake, game species comprised 92% of the sample based on number and 72% of the sample based on weight. In Lower Twin Lake, game species comprised 93% of the sample based on number and 61% of the sample based on weight.

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OBJECTIVES

1. Evaluate stock status of kokanee in Coeur d'Alene Lake.

2. Count Chinook salmon redds in the Coeur d'Alene and St. Joe Rivers and estimate production of wild Chinook.

3. Evaluate angler exploitation of lake trout in Priest Lake.

4. Determine stock status of lake trout and bull trout in Upper Priest Lake.

5. Compare gill net catch rates of lake trout in 2002 with catch rates from previous years to provide additional information on the effectiveness of our lake trout suppression efforts in Upper Priest Lake.

6. Evaluate the use of strobe lights as a lake trout migration barrier to reduce immigration from Priest Lake through the Thorofare.

7. Determine shoreline spawning areas used by kokanee and estimate the number of spawners in Priest and Upper Priest Lakes.

8. Estimate exploitation of crappie in Hayden Lake.

9. Conduct standard lake surveys of Gamble Lake and Lower and Upper Twin Lakes.

METHODS

Fish Population Characteristics

Coeur d'Alene Lake

Kokanee Population Estimate - We used a midwater trawl, as described by Bowler et al. (1979), Rieman and Meyers (1990), and Rieman (1992), to estimate the kokanee *Oncorhynchus nerka* population in Coeur d'Alene Lake. Twenty-two transects were trawled during the dark phase of the moon on August 5-6, 2002. Trawl transects were selected using a stratified random sample design and were in identical locations (as near as possible) to those used in previous years (Figure 1). Kokanee were measured and weighed, and scale and otoliths were collected from representative length groups for age analysis.

We used an experimental sinking gillnet to estimate mean length of male and female kokanee spawners. The net was set at depths of 3-5 m near Higgins Point for two hours on December 3, 2002. Potential egg deposition (PED) was estimated as the number of female kokanee spawners (half the mature population based on midwater trawling) multiplied by the average number of eggs produced per female. The average number of eggs produced per female kokanee was calculated using the following length to fecundity regression (Rieman 1992):

$$Y = 3.98x - 544$$

Where: x =mean length of female kokanee spawners (mm)
Y =mean number of eggs per female

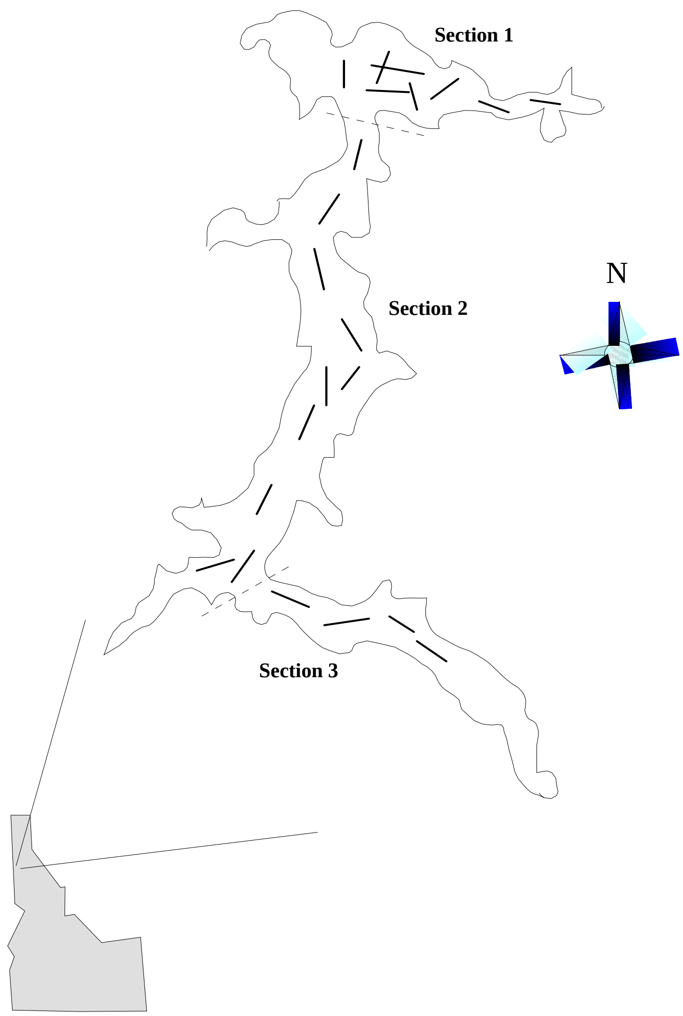

Figure 1. Location of midwater trawling transects in three sections of Coeur d'Alene Lake, Idaho, used to estimate kokanee population abundance.

Chinook Salmon Abundance - Department personnel used a helicopter to conduct Chinook *O. tshawytscha* redd surveys in the Coeur d'Alene River, North Fork Coeur d'Alene River, South Fork Coeur d'Alene River, Little North Fork Coeur d'Alene River and St. Joe River on October 7, 2002. We estimated the natural production using these redd counts, an estimate of 4,000 eggs per redd, and a mean egg-to-smolt survival of 10%.

Spirit Lake

Kokanee population and relative year-class abundance are typically evaluated each year, however, due to low lake levels in 2002 we were unable to launch our 9.12 m trawling boat at Spirit Lake.

Priest Lake

2002 Tagging and Tag Returns. - Lake trout *Salvelinus namaycush* were tagged as part of an ongoing effort to quantify angler exploitation and help define the population dynamics of lake trout in Priest Lake. All fish were caught and tagged by Randy Phelps, a volunteer angler. Spaghetti tags were placed in the dorsal musculature beneath the dorsal fin. Catch location, date, fish length and weight, and any comments regarding the health or release of the fish were recorded at the time of tagging along with the tag number. Fish were released back to the same water from where they were captured.

In addition, we continued to collect information from lake trout reported by anglers in 2002 with tags from previous years. As in past years, we summarized total and annual growth and distance from original capture site.

Kokanee Spawner Counts. Lakeshore areas were surveyed to determine the location of kokanee spawning and to quantify the number of spawners. Kokanee spawner counts were conducted in fives historic spawning areas on Priest Lake on November 13. We were unable to survey Upper Priest Lake as low water levels prevented boat traffic from entering the Thorofare. Surveys were conducted using a boat with two observers standing on the bow while a third person drove the boat contouring the shoreline at a depth of about 3 m. Each observer counted spawners and an average of the two counts was used as the estimate for each of the five sites. Our efforts were concentrated on the area between the Granite Creek delta and Copper Bay, Indian Creek campground and marina, Cavanaugh Bay Marina, Hunt Creek delta and Huckleberry Bay (Figure 2).

Upper Priest Lake

Lake Trout Netting - Lake trout were sampled from Upper Priest Lake using four 91.4 x 2.4 m experimental, monofilament, sinking gillnets with three panels of 2.5, 3.8, and 5.1 cm mesh. Sampling occurred on June 3-6, June 24-27, July 8-10 and August 12-15, 2002. Gillnets were set throughout the lake and were moved based on catch rates at a particular site and the discretion of the netting crew. A concerted effort was made to avoid incidental bull trout *S confluentus* captures. Gillnets were set perpendicular to shore at depths ranging from 20 to 33 m. Nets were set during daylight hours only and were pulled every 45-60 minutes. We standardized catch to a unit of sampling effort (fish/hr/100 m^2 of gillnet) to allow comparison with

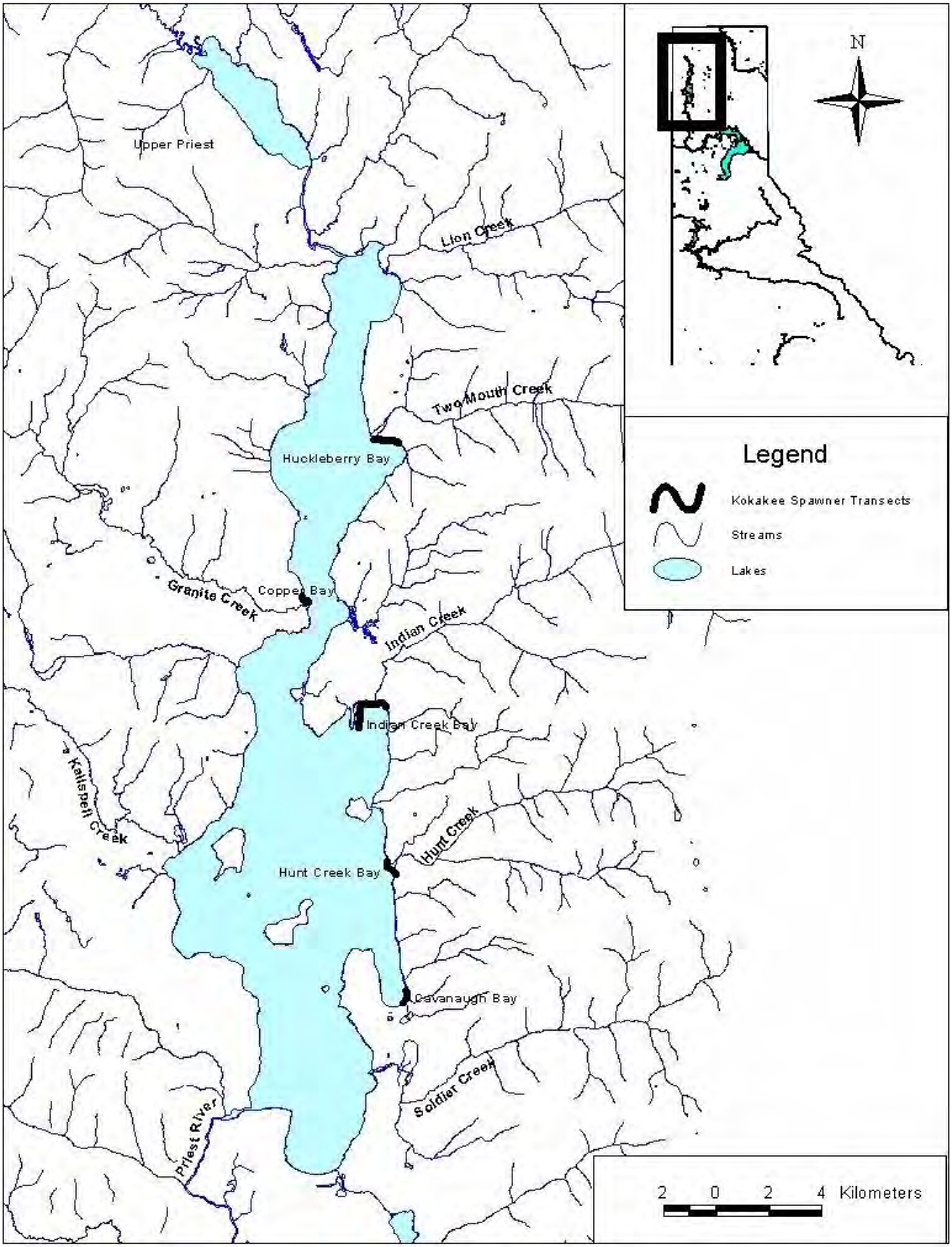

Figure 2. Locations of kokanee spawner counts on Priest Lake, Idaho, November 13, 2002.

previous netting efforts. Netted lake trout were measured, examined for tags and killed. All processed lake trout were filleted and given to various food banks throughout the Idaho panhandle for distribution to the indigent.

Standard Lowland Lake Surveys

We conducted standard lowland lake surveys on Gamble (Gamblin) Lake and Upper and Lower Twin Lakes using procedures outlined in the Standard Lowland Lakes Survey Manual. We used two trap nets, two floating and two sinking gillnets set overnight, and one hour of electrofishing effort on each lake. Gamble Lake was gillnetted on the night of May 31 and electrofishing was conducted on the night of July 16. Upper Twin Lake was netted and electrofished July 17. Lower Twin Lake was netted and electrofished July 18, 2002. We then standardized our catch to a single unit of effort (one trap net, one pair of gillnets, and one hour of electrofishing time).

Hayden Lake

Crappie Exploitation – Black crappie *Pomoxis nigromaculatus* were collected by electrofishing and tagged with Floy T-bar anchor reward tags in 2002 to estimate annual angler exploitation. Tagging occurred on April 29-30, 2002.

RESULTS

Fish Population Characteristics

Coeur d'Alene Lake

Kokanee Abundance - Trawl results indicated a low number of adult kokanee, with the total population of age-3 fish estimated at 70,800 or 7 fish/ha, far below the 23 year mean of 800,000 age-3 kokanee, but a significant improvement over the 25,000 estimate in 2001 (Table 1). We estimated 934,000 age-1 kokanee, slightly higher than the 2001 estimate (Table 1) but well below the 1979-2001 mean of 1.5 million. Age-2 kokanee were estimated at 695,000. This is much improved over the 2001 estimate of 193,100, however, far below the 23-year mean of 1.6 million. The estimated population of age-0 kokanee was 3.5 million slightly higher than the 23-year mean of 3.4 million fish. The standing stock of kokanee in Coeur d'Alene Lake was estimated at 26.62 kg/ha. This is a significant improvement over the 2001 estimate of 12.84 kg/ha. Consistent with previous years, the highest age-0 kokanee densities were in the northern section of the lake (Table 2). Based on the 2001 PED estimate and the 2002 age-0 estimate, egg to fry survival was 34%, which is much higher than previous years (Table 3).

Kokanee fry collected in the trawl ranged from 30 to 59 mm TL. Age-1 kokanee ranged from 90 to 160 mm, with a modal length of around 140 mm. Age-2 fish ranged from 170 to 250 mm, with a modal length of around 200 mm. Size of the age-3 kokanee at the time of trawling ranged from 250 mm to 330 mm, with a modal length of 255 mm (Figure 3). Typical of kokanee in Coeur d'Alene Lake, maturity was primarily at age-3. Seven of 20 age-2 kokanee examined

Table 1. Estimated abundance of kokanee made by midwater trawl in Coeur d'Alene Lake, Idaho, from 1979-2002. To follow a particular year class of kokanee, read up one row and right one column.

Sampling	Age Class				Total	Age
Year	Age 0+	Age 1+	Age 2+	Age 3/4+		3+/ha
2002	3,507,000	934,000	695,200	70,800	5,207,000	7
2001	7,098,700	929,900	193,100	25,300	8,247,00	3
2000	4,184,800	783,700	168,700	75,300	5,212,600	8
1999	4,091,500	973,700	269,800	55,100	5,390,100	6
1998	3,625,000	355,000	87,000	78,000	4,145,000	8
1997	3,001,100	342,500	97,000	242,300	3,682,000	25
1996	4,019,600	30,300	342,400	1,414,100	5,806,400	147
1995	2,000,000	620,000	2,900,000	2,850,000	8,370,000	296
1994	5,950,000	5,400,000	4,900,000	500,000	12,600,000	52
1993	5,570,000	5,230,000	1,420,000	480,000	12,700,000	50
1992	3,020,000	810,000	510,000	980,000	5,320,000	102
1991	4,860,000	540,000	1,820,000	1,280,000	8,500,000	133
1990	3,000,000	590,000	2,480,000	1,320,000	7,390,000	137
1989	3,040,000	750,000	3,950,000	940,000	8,680,000	98
1988	3,420,000	3,060,000	2,810,000	610,000	10,900,000	63
1987	6,880,000	2,380,000	2,920,000	890,000	13,070,000	93
1986	2,170,000	2,590,000	1,830,000	720,000	7,310,000	75
1985	4,130,000	860,000	1,860,000	2,530,000	9,370,000	263
1984	700,000	1,170,000	1,890,000	800,000	4,560,000	83
1983	1,510,000	1,910,000	2,250,000	810,000	6,480,000	84
1982	4,530,000	2,360,000	1,380,000	930,000	9,200,000	97
1981	2,430,000	1,750,000	1,710,000	1,060,000	6,940,000	110
1980	1,860,000	1,680,000	1,950,000	1,060,000	6,500,000	110
1979	1,500,000	2,290,000	1,790,000	450,000	6,040,000	46
Previous	**3,443,908**	**1,533,564**	**1,608,928**	**806,836**	**6,668,513.35**	**80.62**

Table 2. Kokanee population estimates and standing crop (kg/ha) in each section of Coeur d'Alene Lake, Idaho, August 5-6, 2002.

Section	Age 0	Age 1	Age 2	Age 3	Kg/ha
1	3,348,150	170,753	131,479	17,590	8.29
2	158,707	459,599	512,318	31,022	9.76
3	0	303,785	51,398	22,204	8.57
Whole lake	3,506,856	934,137	695,196	70,816	26.62
(90% CI)	3,158,688	413,349	260,575	30,760	

Table 3. Estimates of female kokanee spawning escapement, potential egg deposition, fall abundance of kokanee fry, and their subsequent survival rates in Coeur d'Alene Lake, Idaho, 1979-2002.

Year	Estimated female escapement	Estimated potential number of eggs ($x10^6$)	Fry estimate the following year ($x10^6$)	Percent egg to fry survival
2002	37,672	25		
2001	12,650	10	3.50	34
2000	37,700	32	7.10	22
1999	28,000	19	4.18	22.62
1998	39,000	26	4.09	15.73
1997	90,900	54	3.60	6.67
1996	707,000	358	3.00	0.84
1995	1,425,000	446	4.02	0.90
1994	250,000	64	2.00	0.31
1993	240,000	92	5.95	6.46
1992	488,438	198	5.57	2.81
1991	631,500	167	3.03	1.81
1990	657,777	204	4.86	1.96
1989	516,845	155	3.00	1.94
1988	362,000	119	3.04	2.55
1987	377,746	126	3.42	2.71
1986	368,633	103	6.89	6.68
1985	530,631	167	2.17	1.29
1984	316,829	106	4.13	3.90
1983	441,376	99	0.70	0.71
1982	358,200	120	1.51	1.25
1981	550,000	184	4.54	2.46
1980	501,492	168	2.43	1.45
1979	256,716	86	1.86	2.20

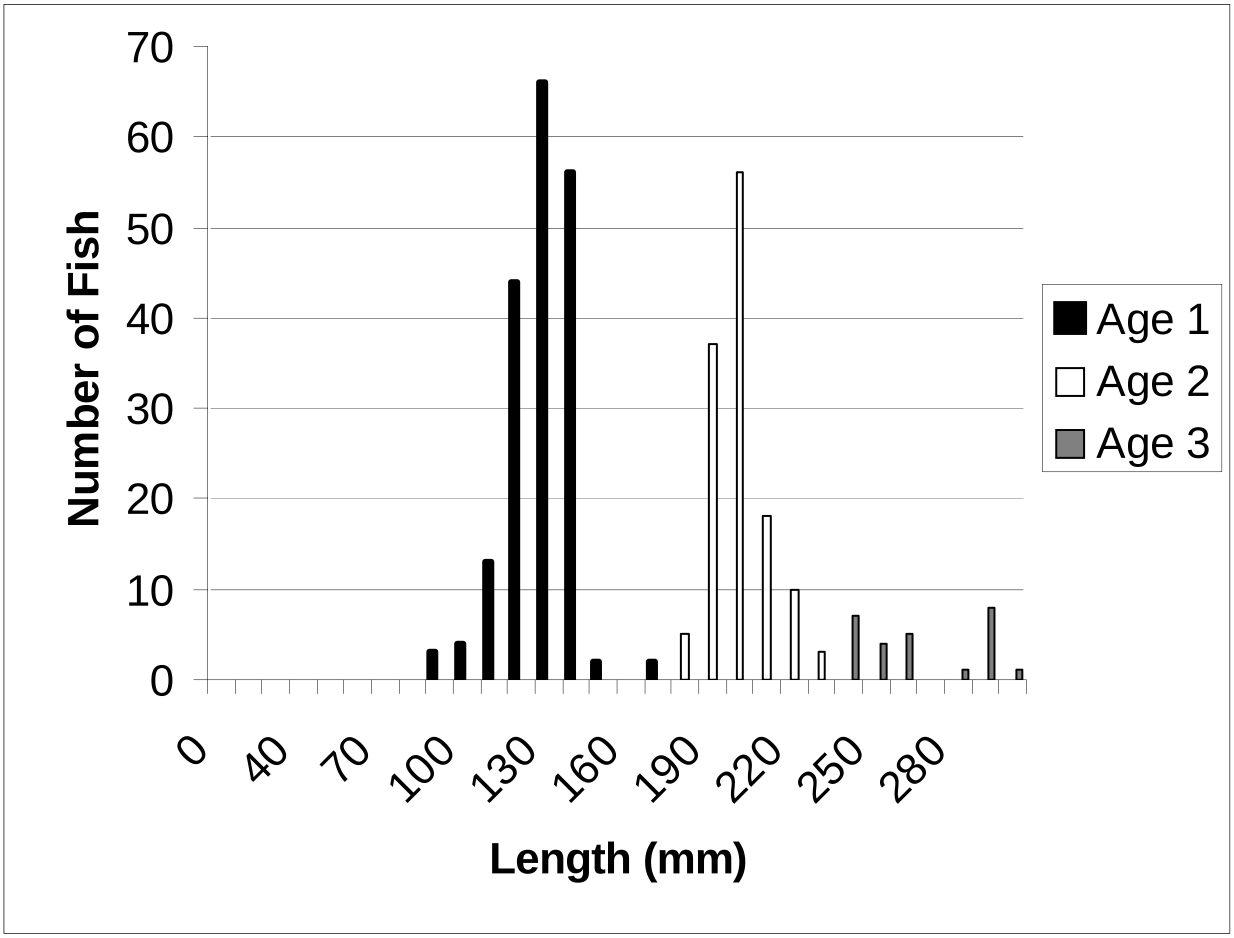

Figure 3. Length frequency and age of kokanee collected by midwater trawling in Coeur d'Alene Lake, Idaho in 2002.

were males, and no mature age-2 fish were found. All of the age-3 kokanee captured were mature.

In a one-hour gillnet set, we collected 126 kokanee spawners near Higgins Point in Wolf Lodge Bay. Males outnumbered females, with only around 18% of the sample being females. Female mean length was 303 mm (TL), (n=19, SD=15.1). Male mean and modal lengths were 332 and 320 mm respectively, (n=107 SD=21.9). Mean length of spawners was comparable to 2001. Spawner length during the past three years was the largest it has been since 1960 (Figure 4). Mean fecundity was estimated at 663 eggs per female based on a mean female spawner length of 303 mm, and potential egg deposition was approximately 25 million eggs (Table 3). This is much higher than the 2001 PED estimate of 10 million eggs, but is still well below the average for the past 23 years (140 million).

Chinook Salmon Abundance - We counted 33 Chinook salmon redds in the Coeur d'Alene River drainage and 18 in the St. Joe River for a total of 51 redds in 2002 (Table 4). All redds were left undisturbed to provide natural production. Conditions for counting were relatively favorable (clear skies and clear water), and we were easily able to see most redds. We estimated the natural production using these redd counts, an estimated 4,000 eggs per redd, and a mean egg-to-smolt survival of 10%. Based on these figures, we estimate smolt production for wild Chinook to be 20,400 fish in 2003.

We stocked 30,000 age-0 Chinook salmon at the Mineral Ridge boat ramp in Wolf Lodge Bay in June 2002. Chinook eggs were collected at Big Springs Hatchery, Oregon, and were reared in the Nampa Hatchery. Mean size was 160 mm, and all fish were marked with a left ventral fin clip. Over the past 21 years we have stocked an average of 30,000 age-0 Chinook salmon in Wolf Lodge Bay (Table 5). The total hatchery and wild Chinook salmon stocking in Coeur d'Alene Lake in 2003 was about 61,000 fish (Table 5).

Priest Lake

2001 Tagging and Tag Returns - An additional 82 lake trout were tagged by the Priest Lake volunteer angler. Fish ranged from 300 to 650 mm (TL), with a mean size of 422 mm. All of these fish were tagged near Bartoo Island.

A total of 42 tagged lake trout were recaptured in 2002. All had been tagged in Priest Lake between 1986 and 2002 (Table 6). Lake trout were caught from 0 to 24 km from their original capture site, with an average distance from original capture of approximately 4.6 km. Growth, as reported in tag returns, ranged from 0 to 5.7 cm/year, with an average annual growth of 1.8 cm/year. This compares to a reported mean annual growth of 3.4 cm/yr in 2001 and 4 cm/year in 2000.

Kokanee Spawner Counts - A total of 1,825 kokanee spawners were counted at five shoreline sites on Priest Lake (Figure 2). No kokanee spawner survey was conducted on Upper Priest Lake as lower than usual water levels prevented us from boating through the Thorofare. Mean lengths of 15 male and seven female kokanee were 378 and 364 mm (TL) respectively compared to 431 and 393 mm in 2001. The majority of the kokanee spawned in water 0.5 m and deeper with redds seen as deep as six m, however, kokanee were observed spawning in water as shallow as 15 cm. Very shallow redds were noted in Cavanaugh and Copper Bay. Redds were dug in combinations of substrate material ranging from sand to stones 7.6 cm in

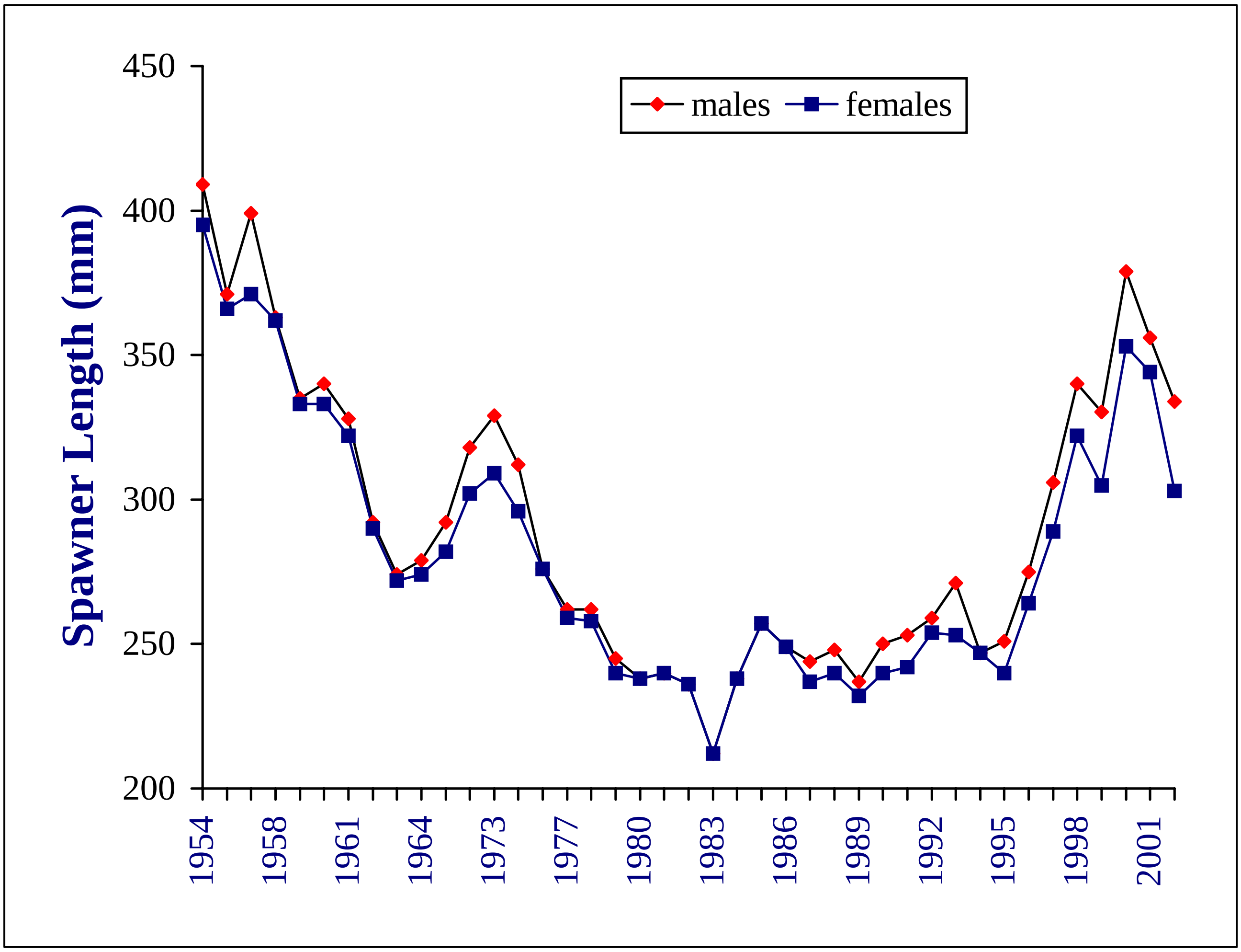

Figure 4. Mean total length of male and female kokanee spawners in Coeur d'Alene Lake, Idaho from1954 to 2002. Years where mean lengths were identical between sexes are a result of averaging male and female lengths.

Table 4. Chinook salmon redd counts in the Coeur d'Alene River drainage, St. Joe River, and Wolf Lodge Creek, Idaho 1990-2002

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Coeur d'Alene River													
Cataldo Mission to S.F. Cd'A River	41	11	29	80	82	45	54	18	11	7	16	18	14
S.F. Cd'A River to L.N.F. Cd'A River	10	0	5	11	14	14	13	5	3	5	20	13	10
L.N.F. Cd'A River to Steamboat Creek	--	2	3	6	1	1	13	6	1	0	3	2	6
Steamboat Creek to steel bridge	--	--	1	0	0	2	0	3	0	0	0	1	0
Steel bridge to Beaver Creek	--	--	--	--	0	0	0	1	0	0	0	0	0
S. F. Cd'A River	--	--	--	--	13	--	4	0	0	0	5	4	3
L.N.F. Cd'A River	--	--	--	--	0	2	0	0	0	0	1	0	0
Coeur d'Alene River Subtotal	51	13	38	97	110	64	84	33	15	12	45	38	33
St. Joe River													
St. Joe City to Calder	4	0	18	20	6	1	59	20	3	0	5	21	14
Calder to Huckleberry C.G.	3	1	1	4	0	0	5	2	1	0	0	15	4
Huckleberry C.G. to Marble Creek	3	0	2	0	1	0	7	2	0	0	0	--	0
Marble Creek to Avery	0	0	0	0	1	0	0	0	2	0	0	--	0
St. Joe River Subtotal	10	1	21	24	8	1	71	24	6	0	5	36	18
Wolf Lodge Creek	--	--	--	--	--	--	--	--	4	5	3	4	0
TOTAL	**66**	**14**	**63**	**121**	**118**	**65**	**155**	**57**	**25**	**17**	**53**	**78**	**51**

Table 5. Number of Chinook salmon stocked and estimated number of naturally produced Chinook salmon entering Coeur d'Alene Lake, Idaho, 1982-2002.

Year	Hatchery Produced				Naturally Produced		
	Number	Stock	Rearing Hatcery	Fin Clip	Redds	Estimated Smolts	Total
1982	34,400	Bonneville	Hagerman	--	--	--	34,400
1983	60,100	Bonneville	Mackay	--	--	--	60,100
1984	10,500	L. Michigan	Mackay	--	--	--	10,500
1985	18,500	L. Michigan	Mackay	Left Ventral	--	--	18,500
1986	29,500	L. Michigan	Mackay	Right Ventral	--	--	29,500
1987	59,400	L. Michigan	Mackay	Adipose	--	--	59,400
1988	44,600	Coeur d'Alene	Mackay	Left Ventral	--	--	44,600
1989	35,400	Coeur d'Alene	Mackay	Right Ventral	--	--	35,400
1990	36,350	Coeur d'Alene	Mackay	Adipose	52	23,400	59,100
1991	42,650	Coeur d'Alene	Mackay	Left Ventral	70	31,500	73,100
1992	10,000	Coeur d'Alene	Mackay	Right Ventral	14	6,300	16,300
1993	0	--	--	--	63	28,350	28,350
1994	17,269	Coeur d'Alene	Nampa	Adipose	100	40,000	57,269
1995	30,200	Coeur d'Alene	Nampa	Left Ventral	100	40,000	70,200
1996	39,700	Coeur d'Alene	Nampa	Right Ventral	65	26,000	65,700
1997	12,100	Coeur d'Alene	Nampa	Adipose	84	33,600	45,700
1998	55,200	Priest Rapids	Cabinet G.	Left Ventral	37	14,800	70,000
1999	25,000	Big Springs	Cabinet G.	Right Ventral	25	10,000	35,000
2000	28,200	Big Springs	Nampa	Adipose	17	6,800	35,000
2001	0	--	--	--	53	21,200	21,200
2002	30,000	Big Springs	Nampa	Left Ventral	78	31,000	61,000

Table 6. Size, growth, and locations of tagged lake trout reported caught by anglers from Priest Lake, Idaho, in 2002.

Tag#/Color		Recapture			Mark			Growth (mm)		Distance (km)
		Date	Length (mm)	Location	Date	Length	Location	Total	Annual	
R1-0334	Blue	8/17/02	381	8 Mile Is	6/24/02	380	NEB	1	1	2.4
R1-052	Blue	4/19/02		SE Bartoo	9/18/95	451	SEB			0
R1-073	Blue	10/18/02	508	Cape Horn	9/20/95	368	8 Mile Is			4
R1-104	Blue	6/2/02	559	Granite Ck.	9/24/95	457	NEB	102	14	8.8
R1-216	Blue	5/12/02		UPL	9/15/99	470	NEB			24.2
R1-258	Blue	6/20/02		W Papoose Is	6/15/97	425	NEB			1.6
R1-262	Blue	7/29/02	533	4 Mile Is	6/15/97	505	NEB	28	5.7	3.2
R-00013	Green	8/2/02	457	Cavanaugh	7/18/98	480	NEB	62	31	3.2
R1-00097	Green	6/21/02		E Kalispel Is	7/9/99	390	NEB			
R1-00123	Green	6/22/02	533	4 Mile Is	7/25/99	475	NEB	48	16	3.2
R1-00170	Green	7/7/02	495	N Bartoo	9/2/99	435	NEB	60	20	0
R1-00177	Green	6/30/02		Pinto Pt.	9/3/99	450	NEB			4.8
R1-00284	Green	11/30/02	483	8 Mile Is	6/7/00	485	NEB	2	1	3.2
R1-00289	Green	7/14/02	533	N Bartoo	6/16/00	510	NEB	23	11.5	0
R1-00312	Green	6/29/02	559	NE Bartoo	6/23/00	485	NEB	74	37	0
R1-00336	Green	6/15/02	564	E Bartoo	6/25/00	450	NEB	114	57	0
R1-00362	Green	7/3/02		Bartoo	6/29/00	505	NEB			
R1-00365	Green	6/13/02	564	N Bartoo	7/3/00	560	NEB	4	2	0
R1-00366	Green	8/8/02	412	W Bartoo	7/3/00	490	NEB			1.6
R1-00394	Green	4/19/02	457	SE Bartoo	7/7/00	470	NEB			0.8
R1-00429	Green	6/24/02	591	N Bartoo	7/11/00	510	NEB	80	40	

Table 6. Continued.

Tag#/Color		Recapture			Mark			Growth (mm)		Distance (km)
		Date	Length (mm)	Location	Date	Length	Location	Total	Annual	
R1-00467	Green	6/10/02	483	Bartoo	7/16/00	480	SEB	3	1.5	0
R1-00470	Green	8/1/02	457	N Bartoo	7/16/00	380	SEB	77	38	1.6
R1-00477	Green	7/17/02	533	Cavanaugh	7/19/00	395	NEB			3.2
R1-00653	Green	12/1/02	457	8 Mile Is	8/6/00	391	NEB	66	33	3.2
R1-00769	Green	6/3/02	502	N/W Pinto Pt.	10/8/00	495	NEB	7	3.5	5.6
R1-00787	Green	6/13/02	533	N Bartoo	6/8/01	555	NEB	22	22	0
R1-00795	Green	8/6/02	660	Bartoo	6/8/01	440	NEB			0
R1-00807	Green	7/7/02	419	SE end	6/16/01	450	NEB	31	31	
R1-00851	Green	6/25/02	411	N Bartoo	7/4/01	405	NEB	6	6	0
R1-00948	Green	7/17/02	559	Cavanaugh	8/27/01	390	NEB			3.2
R1-00958	Green	8/2/02	457	Reeder Bay	9/4/01	525	NEB			7.2
R1-00981	Green	9/15/02			6/20/02	575	NEB			
R1-00993	Green	8/23/02	411	Cavanaugh	6/20/02	420	NEB	9	9	
R1-00995	Green	8/18/02	470	Bartoo	6/21/02	470	NEB	0	0	0
02430	Orange	7/20/02		4 Mile Is	5/24/00	600	UPL outlet			24
02430	Orange	7/4/02		4 Mile Is	5/24/00	600	UPL outlet			24
02507	Orange	5/4/02		N. end	10/5/00	720	UPL			
02528	Orange	4/27/02		UPL	10/12/00	597	UPL			
02539	Orange	5/4/02		N. end	10/5/00	685	UPL			
02955	Red	5/19/02		UPL	8/14/97	630	UPL			
02751	Yellow	7/22/02	813	4 Mile Is	6/4/86	480	Canoe Pt	333	20.8	21

diameter. Number of redds observed at each of the five sites on Priest Lake were as follows; Copper Bay 549, Huckleberry Bay 49, Cavanaugh Bay 921, Hunt Creek beach 306, and Indian Creek beach none (Table 7).

Upper Priest Lake

Lake Trout Netting - We netted and removed a total of 842 lake trout in the four netting efforts in 2002. Catches ranged from 297 lake trout in our June 3-6 effort to 165 fish in our June 24-27 effort. Standardized catch ranged from 0.77 to 1.49 fish/hr/100 m^2. We saw little evidence that the lake trout population had been significantly impacted by the 2001 effort, when nearly 500 lake trout were removed. Gillnet catch rates were comparable to catch rates the past few years, we saw little evidence of shifting size structure due to high exploitation in 2001. Mean catch rate throughout the 2002 effort was 1.02 fish/hr/100 m^2 of gillnet compared to 1.8 fish/hr/100 m^2 in 2001, 0.95 fish/hr/100 m^2 in 1999 and 1.1 fish/hr/100 m^2 in 1998 (Figure 5). Size of lake trout ranged from 175 to 890 mm (TL), with a modal size of 510 mm, which is identical to 2001(Figure 6).

We incidentally netted nine bull trout during the lake trout netting efforts and no known bull trout mortality occurred. Bull trout ranged in size from 426-760 mm. The lake trout:bull trout ratio was not indicative of any lake trout population reduction as the ratio of lake trout to bull trout was 90:1 compared to 67:1 in 2001, 22:1 in 1999 and 10:1 in 1997 (Figure 7).

Standard Lowland Lake Surveys

Upper and Lower Twin Lakes

Lake Characteristics and Management – Upper and Lower Twin Lakes are located in Kootenai County, Idaho, 16 km north of Coeur d'Alene, Idaho (Figure 8 and 9). Upper and Lower Twin Lakes are connected by a shallow channel and three public boat ramps provide access. Lower Twin Lake has a surface area of 158 ha, with a mean depth of 6.9 m and a maximum depth of 19.1 m. Upper Twin is approximately 202 ha with a maximum depth of 18.3 m. Fish Creek is the largest tributary in the system entering Upper Twin Lake on the western shoreline. Water leaves the system through the outlet on the southern end of the Lower Twin Lake forming Rathdrum Creek. Extensive shoreline development including a golf course, two summer camps and nearly 300 lake front homes, many with inadequate sewage systems, has lead to water quality issues in Lower Twin Lake over the years.

The Twin Lakes support two story fisheries for both warm and coldwater species. Warmwater species present include largemouth bass *Micropterus salmoides,* black crappie, yellow perch *Perca flavescens,* pumpkinseed *Lepomis gibbosus,* green sunfish *Lepomis cyanellus,* northern pike *Esox lucius,* brown bullhead *Ameiurus nebulosus and* tench *Tinca tinca*. Green sunfish and northern pike were illegally introduced in the 1980's. Management of the fishery is under general statewide regulations and includes the stocking of both catchable and fingerling trout on an annual basis. The coldwater fishery consists of catchable triploid rainbow trout *Oncorhynchus mykiss*, fingerling westslope cutthroat trout, and kokanee fry stockings. Upper Twin Lake is stocked once annually in the spring with 2,000 catchable rainbow trout to provide a spring fishery. Lower Twin Lake is stocked with 9,000 catchable rainbow trout, 8,500 fingerling cutthroat trout and 60,000 kokanee fry on an annual basis. Kokanee stocking rates and frequency have varied considerably over the last ten years due to availability of

Table 7. Kokanee salmon spawner counts in Priest Lake and Upper Priest Lake, Idaho, 2002-2003.

Location	2002	2003
Priest Lake		
Copper Bay	588	549
Cavanaugh Bay	523	921
Huckleberry Bay	200	49
Indian Creek Bay	222	0
Hunt Creek Mouth	232	306
Upper Priest Lake		
West Shoreline	10	---
Total	1,775	1,825

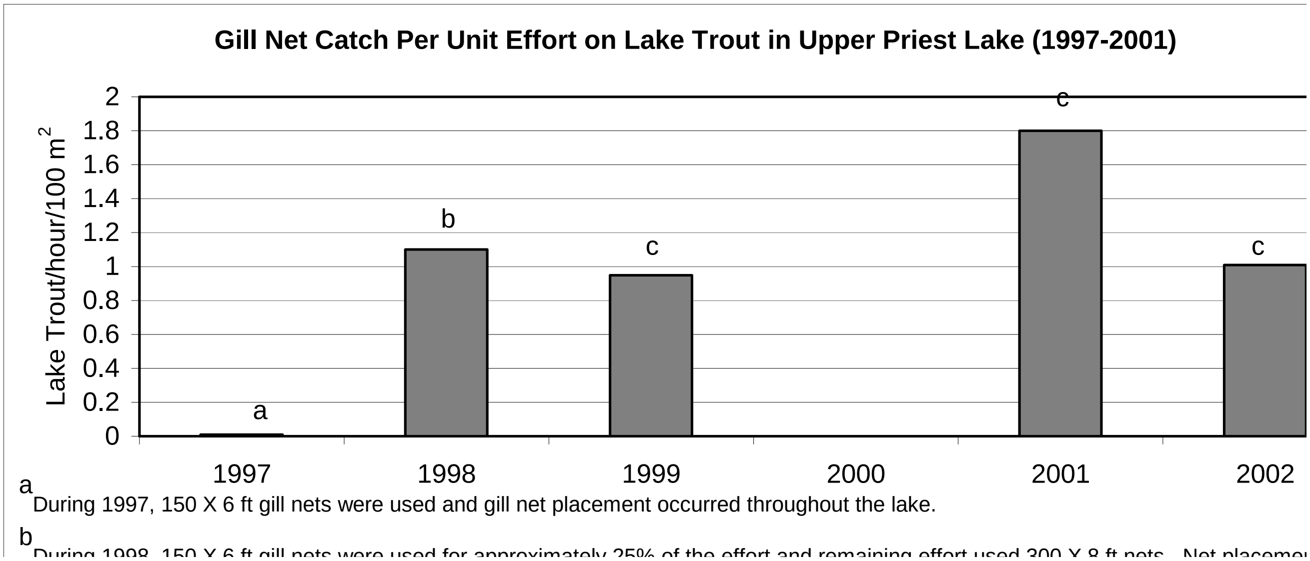

Figure 5. Standardized catch rates (fish/hour/100m^2 of gillnet) of lake trout from Upper Priest Lake, Idaho, 1997-2002.

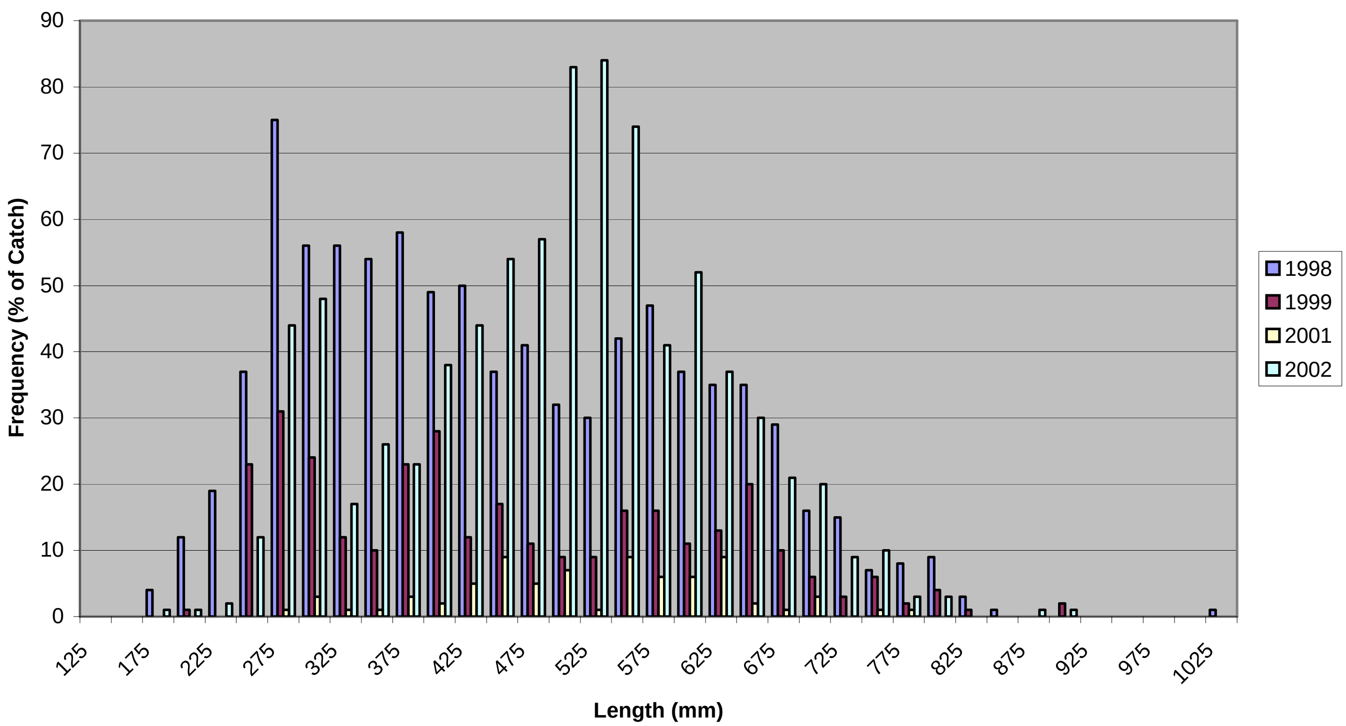

Figure 6. Length frequency of lake trout collected in gillnets in 1998-2002 from Upper Priest Lake, Idaho.

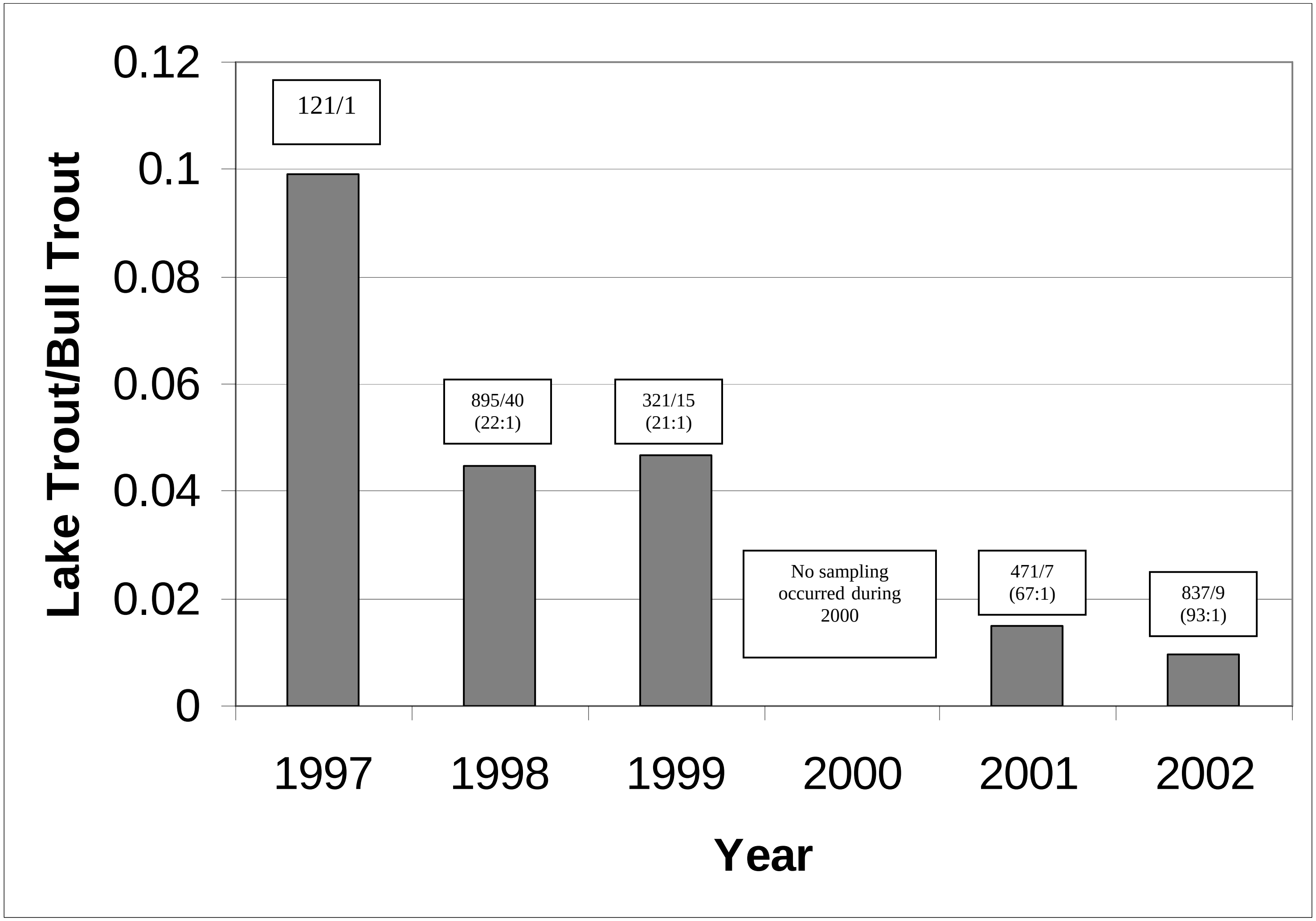

Figure 7. Lake trout to bull trout ratio collected in gillnets in 1997-2002 from Upper Priest Lake, Idaho.

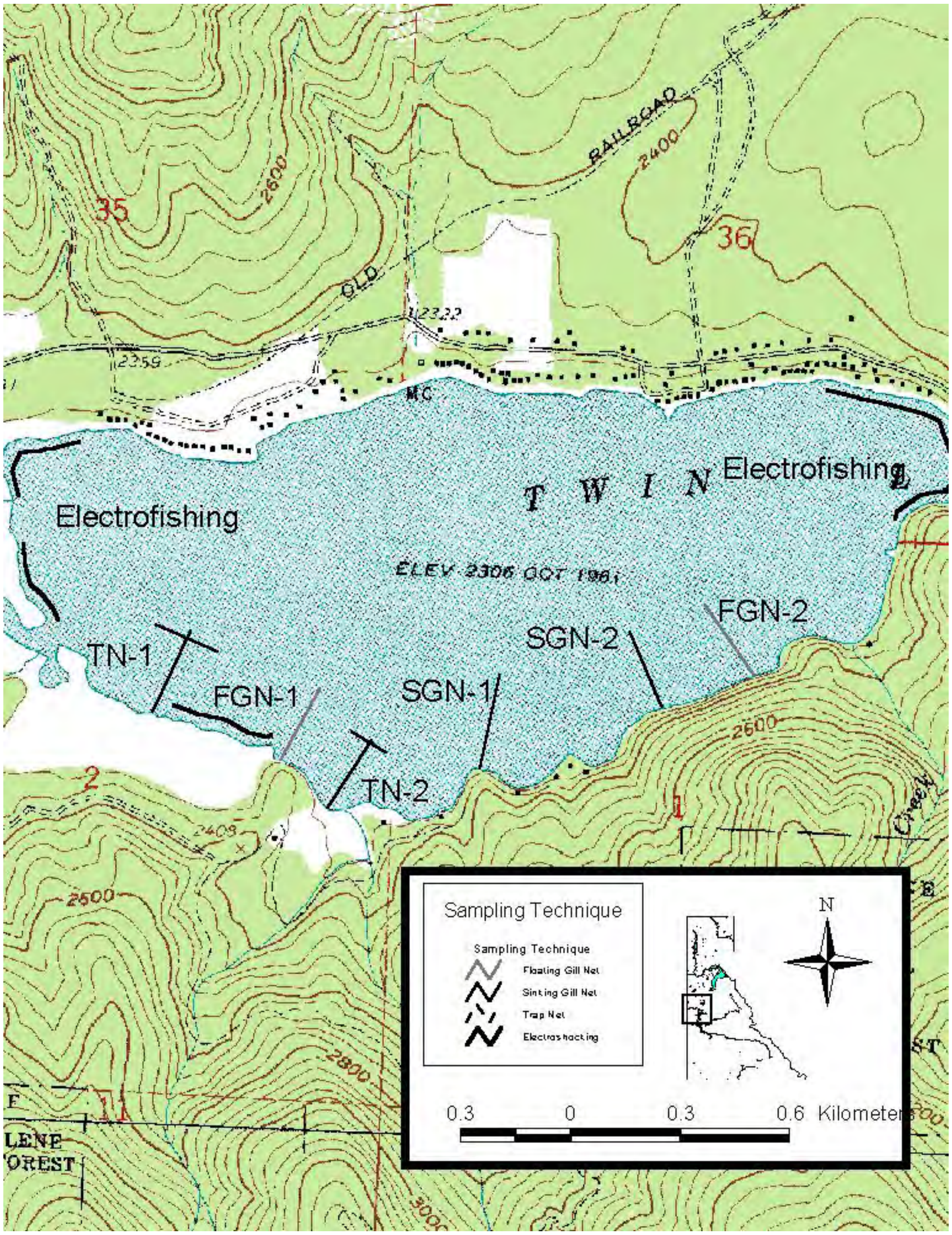

Figure 8. Map of Upper Twin Lake, Idaho, showing gillnet and trapnet locations and electroshocking transects, 2002.

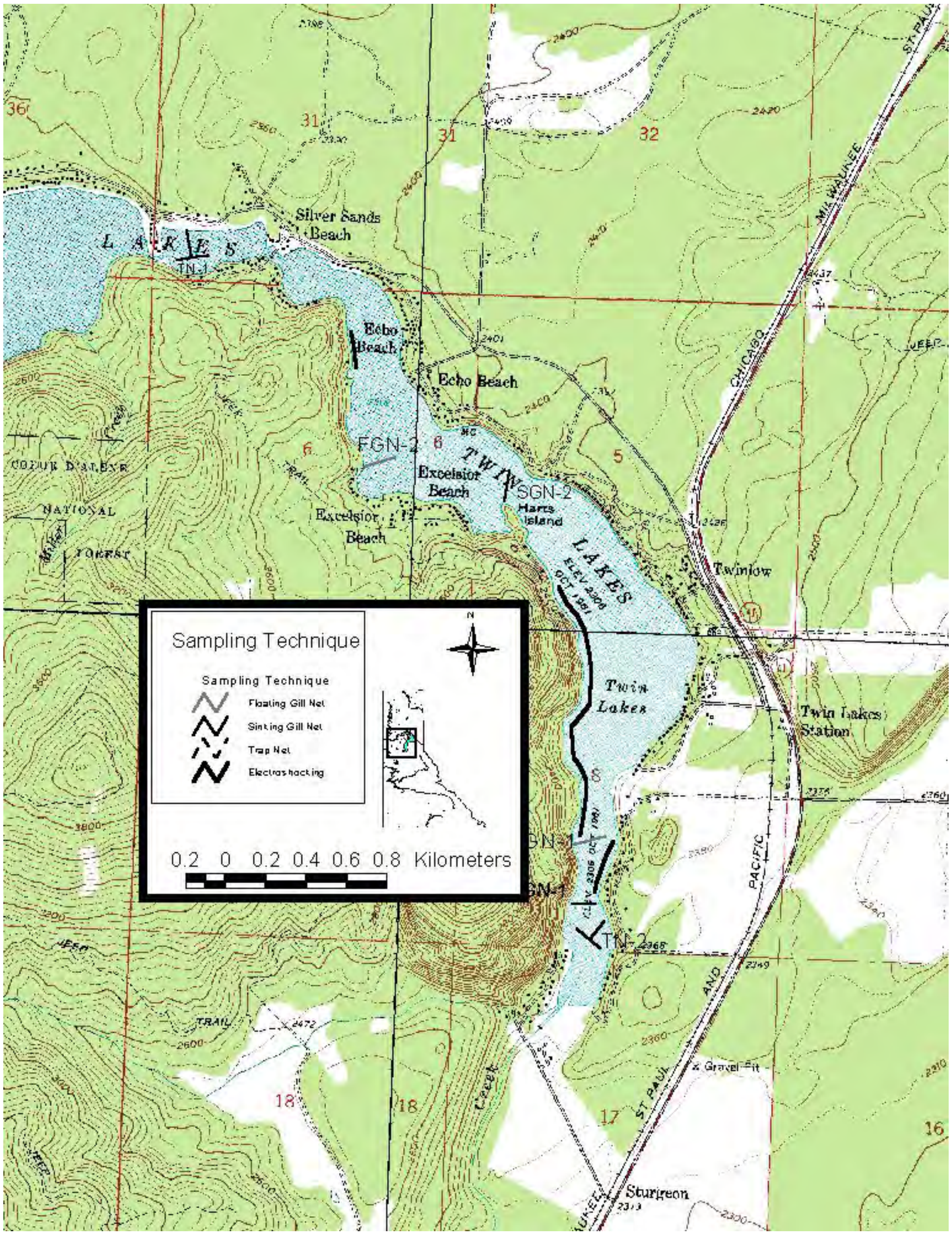

Figure 9. Map of Lower Twin Lake, Idaho, showing gillnet and trapnet locations and electroshocking transects, 2002.

kokanee fry. Upper Twin Lake generally gets too warm by mid summer to maintain a good trout fishery.

Fishery Characteristics

Upper Twin Lake - The 2002 fishery survey of Upper Twin Lake yielded catches of largemouth bass, yellow perch, black crappie, pumpkinseed, green sunfish, rainbow trout, northern pikeminnow *Ptychocheilus oregonensis*, brown bullhead, and tench (Table 8). We collected 296 fish weighing approximately 53 kg per unit of combined gear sampling effort (one hour of electrofishing, one floating and one sinking gillnet, and one trap net set over night). Game species comprised 92% of the sample based on number and 72% of the sample based on weight. Tench and northern pikeminnow were the only non-game species collected comprising 7% of the catch by number and 28% of the catch by weight. Length, weight, catch per unit of effort for individual fish species, and sampling locations of each gear type are detailed in Appendix A.

Largemouth bass were the most abundant species in the sample based on number, and were the most abundant game species based on sample weight. We collected 100 largemouth bass (34% of the total sample) per combined unit of sampling effort, ranging from 70 to 440 mm in length. Sample weight was 25 kg, or 48% of the total sample weight. Proportional stock density (PSD) was 29 and RSD-400 was 2.4, indicating a small number of large fish and suggesting high exploitation of legal size (305 mm) largemouth bass. Relative weight was 95-110, indicating average weight for the Upper Twin Lake population.

We collected 63 black crappie per unit of effort, ranging from 150 to 240 mm long. Black crappie comprised 21% of the sample by number and 12% of the sample by weight. Size structure of black crappie was heavily weighted toward quality-size fish (200 mm) with a PSD of 100.

We collected nine yellow perch ranging from 70 to 200 mm. Yellow perch comprised 3% of the sample by number and one percent of the sample by weight. Eighty-nine pumpkinseed were collected in our combined unit of sampling effort. Pumpkinseed sample weight was 3.8 kg or 7% of the total sample weight (Table 8).

Lower Twin Lake - The 2002 fishery survey of Lower Twin Lake yielded catches of largemouth bass, pumpkinseed, yellow perch, black crappie, green sunfish, kokanee, brown bullhead, tench and northern pikeminnow (Table 8). We collected 151 fish weighing approximately 24 kg per unit of combined gear sampling effort. Game species comprised 93% of the sample based on number and 61% of the sample based on weight. Tench and northern pike minnow were the only non-game species collected comprising 6% of the catch by number and 40% of the catch by weight. Length, weight, catch per unit of effort for individual fish species and sampling locations of each gear type are detailed in Appendix B.

Pumpkinseed were the most abundant species in the sample based on number. We collected 50 pumpkinseed (33% of the total sample). A total of 38 largemouth bass were collected (25% of the total sample) per combined unit of sampling effort, ranging from 70 to 520 mm in length. Largemouth were the most abundant game species based on sample weight comprising 24% of the total sample weight. Proportional stock density was 7.4 and RSD-400 was 3.7, indicating a small number of large fish and suggesting very high exploitation of legal size (305 mm) largemouth bass.

Table 8. Fishery characteristics for game species based on standard lake surveys of Gamble, Upper Twin and Lower Twin lakes, Idaho, in 2002.

Species	Parameter	Gamble Lake	Upper Twin Lake	Lower Twin Lake
Largemouth bass	Number captured	55	104	43
	Range (TL)	124-346 mm	75-443 mm	68-525 mm
	Modal size	315 mm	250 mm	250 mm
	PSD	50	28.6	7.69
Yellow perch	Number captured	30	10	16
	Range (TL)	86-294 mm	46-205 mm	80-213 mm
	Modal size	253 mm		
	PSD	100	20	27.27
Black crappie	Number captured	10	89	20
	Range (TL)	62-325 mm	150-240 mm	173-264 mm
	Modal size	100 mm	180 mm	185 mm
	PSD		28.1	57.89
Rainbow trout	Number captured		2	
	Range (TL)		295-300 mm	
	Modal size			
	PSD		0	
Brown bullhead	Number captured	27	14	26
	Range (TL)	217-398 mm	222-310 mm	228-341 mm
	Modal size	276 mm	250 mm	293 mm
	PSD			
Pumpkinseed	Number captured	23	114	57
	Range (TL)	91-224 mm	77-225 mm	47-242 mm
	Modal size	196 mm	109 mm	132 mm
	PSD	3.8	9.8	27.27
Tench	Number captured	1	36	14
	Range (TL)	587 mm	262-440 mm	432-522 mm
	Modal size		373 mm	450 mm
	PSD			
Northern Pikeminnow	Number captured	1	1	1
	Range (TL)	356 mm	575 mm	510 mm
	Modal size			
	PSD			

Table 8. Continued.

Brook Trout	Number captured	1		
	Range (TL)	290 mm		
	Modal size			
	PSD			
Green Sunfish	Number captured		3	24
	Range (TL)		118-175 mm	78-185 mm
	Modal size			111 mm
	PSD		50	21.73
Kokanee	Number captured			2
	Range (TL)			365-367 mm
	Modal size			
	PSD			

We collected 11 black crappie per unit of effort, ranging from 150 to 260 mm long. Black crappie comprised 7% of the sample by number and 6% of the sample by weight. Size structure of black crappie was heavily weighted toward quality-size fish (200 mm) with a PSD of 100.

We collected 15 yellow perch ranging from 80 to 210 mm. Yellow perch comprised 10% of the sample by number and two percent of the sample by weight. (Table 8).

Gamble Lake

Lake Characteristics and Management

Gamble (Gamlin) Lake is a 50 ha lake located approximately 12 km southeast of Sandpoint, Idaho. Gamble Lake was designated as “Electric Motors Only” for fishing in 1996. In 1999 the Bonner County Commissioners designated the lake as “No gas motors larger than 10 hp for purposes other than fishing” and no jet skies. The Nature Conservancy (TNC) and Bureau of Land Management (BLM) administer 158 ha of property adjacent to the lake. Of this, BLM administers 138 ha and TNC administers 20 acres. The area encompasses the southern three-quarters of Gamble Lake. The purpose of acquiring the property was to preserve and enhance wildlife habitat in the area and to continue the recreational enjoyment of the area by the public. No boat ramps exist on Gamble Lake and boat access is limited to launching directly off the county road. No stocking record exists for the lake on the statewide stocking database, however, Department files indicate Gamble Lake was stocked in the 1950’s with largemouth bass, black crappie and yellow perch. Gamble Lake remains a popular spiny-ray fishery. The lake is too warm to support a salmonid fishery. No fish surveys have been conducted on Gamble Lake in the past.

Fishery Characteristics

The 2002 fishery survey of Gamble Lake yielded catches of largemouth bass, yellow perch, black crappie, pumpkinseed, brown bullhead, brook trout, tench and northern pikeminnow (Table 8). We collected 115 fish weighing approximately 29 kg per unit of combined gear sampling effort (one hour of electrofishing, one floating and one sinking gill net, and one trap net). Game species comprised 98% of the sample. Length, weight, catch per unit of effort for individual fish species, and sampling locations of each gear type are detailed in Appendix C.

Largemouth bass were the most abundant species in the sample based on number, and were the most abundant species based on sample weight. We collected 51 largemouth bass (44% of the total sample) per combined unit of sampling effort, ranging from 120 to 340 mm in length. Sample weight was 14 kg, or 48% of the total sample weight. Proportional stock density was 52 and RSD-400 was 0, suggesting high exploitation of legal size (305 mm) largemouth bass. Relative weight was 79-138, indicating average weight of the Gamble Lake population. Length, weight, and catch per unit of effort for individual fish species and sampling locations of each gear type are detailed in Table 8 and Appendix C.

We collected 18 yellow perch per unit of effort, ranging from 80 to 290 mm. Yellow perch comprised 16% of the sample by number and about 12% of the sample by weight.

We collected six black crappie per unit of effort, ranging from 70 to 320 mm. Black crappie comprised 5% of the sample by number and 7% of the sample by weight.

Tench and northern pikeminnow were the only non-game species collected comprising 2% of the catch by number and 2% of the catch by weight.

Hayden Lake

We implanted 107 $10 reward Floy T-bar tags in black crappie in Hayden Lake on April 29-30 to estimate annual exploitation in 2002. A total of 31 tags were returned within one year of initial capture for an uncorrected annual exploitation rate of 29 percent. We assumed minimal tag loss and a non-reporting rate of 25%. Therefore, total exploitation was likely around 36% compared to 30% in 2001. Eighteen of the 31 crappie tag returns were caught in May and 10 were caught in June. Seventeen anglers were responsible for the 31 crappie tag returns in 2002.

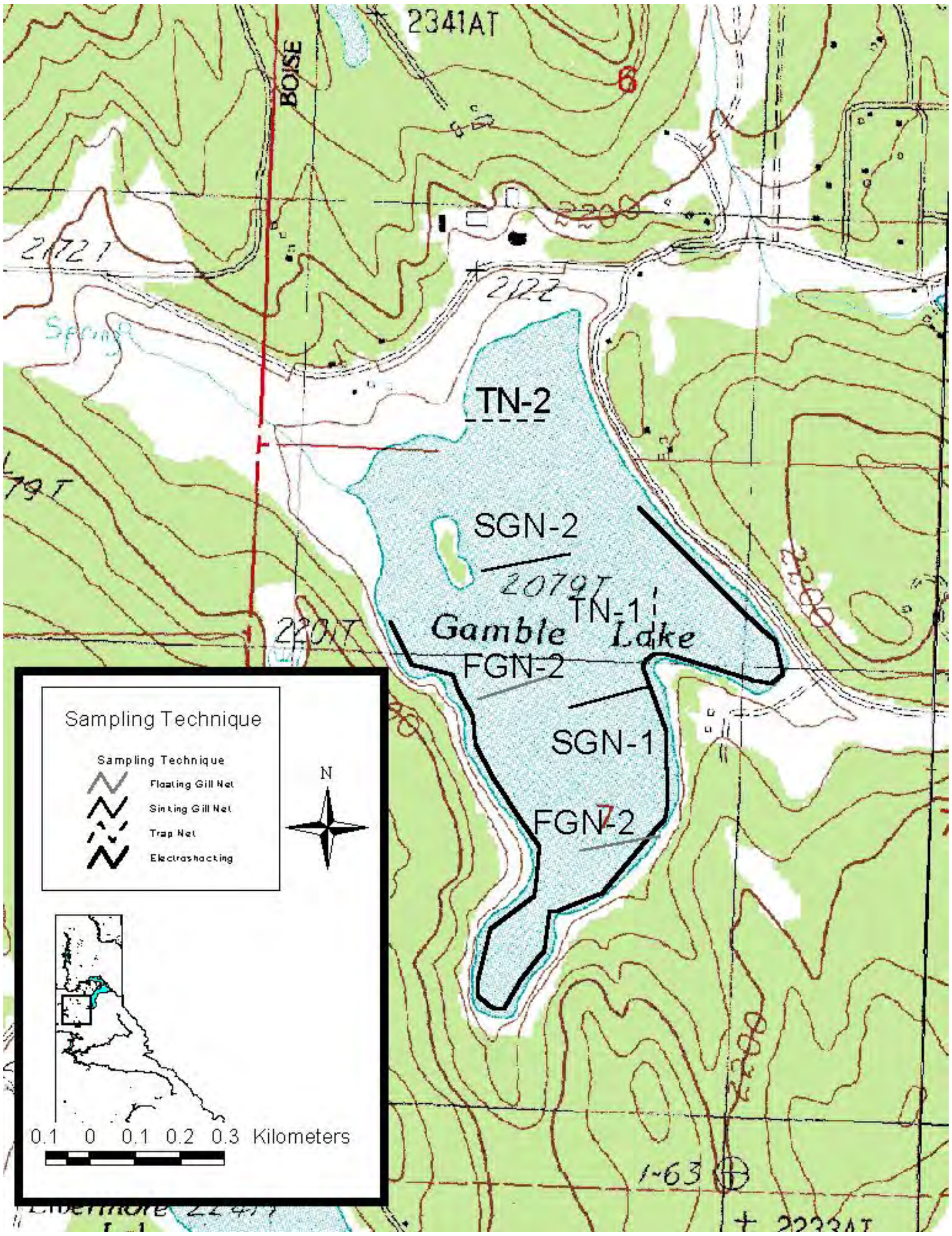

Figure 10. Map of Gamble Lake, Idaho showing gillnet and trapnet locations and electroshocking transects, 2002.

DISCUSSION

Coeur d'Alene Lake Kokanee and Chinook

The kokanee population is still well below the long-term average, but appears to be improving. As in the previous three years, the low densities have resulted in much larger than average kokanee. The age-3 population appears to be similar in size and number to what it was in 2000 and nearly three times as numerous as 2001. The late summer fishery remains very popular due to the size of mature fish.

Age-2 kokanee are still well below average but much improved from the past six years estimates. Age-1 kokanee remain below average despite a record number of age-0 fish from 2001 estimates. Age-0 kokanee estimates were down significantly from 2001, but remain slightly above the 24-year average. The spawning escapement in 2002 was among the weakest since trawling began, but three times the 2001 estimate. Potential number of eggs deposited (PED) was around 25 million eggs. Because of the size of mature kokanee (250-330 mm) in recent trawl efforts, and the decreased capture efficiency with increasing size (Rieman 1992), we most likely underestimated the population of spawners. This suggests escapement of spawners the last four years was greater than trawl-based estimates indicate, and may partially account for the exceptionally high PED to fry survival rates in since 1999.

We stocked 30,000 hatchery juvenile Chinook in Coeur d'Alene Lake in June, 2002. These fish were reared at Nampa Hatchery as they where in 2001. The warmer water temperatures of Nampa Hatchery allowed for accelerated growth resulting in an average size of 160 mm at time of release. The large size of the 2002 hatchery fish is expected to have a positive influence on their survival (Rick Alsager, IDFG Nampa Hatchery Manager, Personal Communication). We counted 78 Chinook redds in 2002 in the Coeur d'Alene and St. Joe River drainages. We estimated natural production should yield 31,000 wild smolts to provide a total stocking of around 61,000 Chinook in 2002. In 2002, we counted 51 redds in the Coeur d'Alene and St. Joe River drainages.

Considering the estimated population of age-0 kokanee was the highest ever recorded in 2001 and above the 24 year average of 3.4 million fish in 2002, Chinook should have a solid forage base to rebuild on.

Recommendations

1. Stock 50,000 age-0 Chinook salmon in Coeur d'Alene Lake in 2003 to supplement the estimated 20,000 naturally produced fish, for a combined total of 70,000 age-0 Chinook salmon smolts.

2. Continue to monitor the recovery of the kokanee population in Coeur d'Alene Lake and adjust age-0 Chinook salmon supplementation accordingly.

Upper Priest Lake

Lake Trout Netting – The 2002 gillnetting results confirm the importance of a lake trout migration barrier in the Thorofare if lake trout reduction efforts are to be effective. Gillnet catch rates were comparable to our previous three year efforts. In 2002, we saw little evidence that the lake trout population had been significantly impacted by our 2001 effort. Gillnet catch rates were comparable to catch rates in 2001 and 2000. We saw no evidence of shifting size structure due to high exploitation the previous years and the lake trout:bull trout ratio continues to worsen. The ratio of lake trout to bull trout comparing 1992,1998, 2001 and 2002 indicate a progressive increase in the relative abundance of lake trout and a decreasing relative abundance of bull trout. The ratio of lake trout to bull trout was 93:1 in 2002 compared to 67: 1 in 2001, 21:1 in 1999 and 10:1 in 1997(Figure 7). We collected nine bull trout in 2002. Bull trout ranged in size from 426 to 760 mm. No juvenile bull trout were collected, and comparison with gillnet data from 1956 indicates this portion of the population is absent (Figure 10).

The increasing lake trout population in Upper Priest Lake and evidence that lake trout contribute to the decline of bull trout and cutthroat populations in other systems, (Donald and Alger 1993) strongly suggest some means of controlling the lake trout population will be necessary to insure the persistence of bull trout. We obtained funding from the Governor's Office of Species Conservation (OSC) to install and test temporary strobe lights as a technique to repel lake trout from upstream migration in the Thorofare. Our results were encouraging, as strobe lights appeared to be at least 75% effective in stopping the upstream movement of lake trout in the Thorofare. Details of this research are contained in a separate report (Appendix E).

Priest Lake and Upper Priest Lake Kokanee Spawner Counts

We counted 1,825 kokanee spawners at five historic sites on Priest Lake in 2002 compared to 1,765 in 2001. It appears a considerable number of beach spawned kokanee eggs are lost each year at Priest Lake because of winter drawdown. It is our observation that the major kokanee spawning areas have a gradually sloping shoreline and early drawdown and stabilization of lake levels at a low level prior to kokanee spawning may enhance egg to fry survival.

Idaho Code 70-507 requires the Idaho Department of Water Resources (IDWR) to maintain Priest Lake at an elevation of 3.0 feet "until the time after the main recreation season". Historically, this was through the Labor Day weekend, but more recently, marina operators around the lake have requested the lake be kept at summer pool level for as long as possible in October to extend boat use at their facilities. The Idaho Water Resources Board (IWRB) and IDFG have proposed several amendments to the 1996 Priest River Basin Plan. A kokanee recovery plan suggesting the lake level be lowered starting October 1 in order to reach the 0.0 feet goal at the outlet gauge by November 1 is being debated at press time. Lower lake levels would ensure a higher success rate for kokanee redds because the water would be at its lowest level before kokanee initiate spawning. In 2002 Priest Lake was drafted to near the 0.0 goal on October 31. The biggest economic impact is the potential lost revenue associated with a reduced operating season for marinas around the lake i.e. resort and marina owners may incur losses as low levels may make their docks and existing boat ramps inaccessible to boaters. The best long-term solution may be to work towards deepening marinas so the fishery management needs are not in direct conflict with those businesses that would directly benefit from an improved fishery. Several marinas on Priest Lake are shallow and a difference of a few inches in water level elevation can negatively affect boat moorage. Funding may be available for marine dredging. The IDFG can assist marina operators in working with the Idaho Department of Lands Navigable Waters Division, U.S. Army Corps of Engineers, and Idaho Department of Environmental Quality to ensure the environmental permitting process for marine dredging goes smoothly.

Recommendations:

1. Continue to monitor kokanee spawner numbers on Priest and Upper Priest Lakes and expand surveys to include lower sections of historic spawning tributaries.

2. Pursue funding for permanent strobe light installation for the Priest Lake Thorofare. A possible site would be near the lower end of the Thorofare close to electrical power, but away from any homes or cabins.

3. Continue annual removal of lake trout from Upper Priest Lake.

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2002 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-27

Project: I-Surveys and Inventories | Subproject: I-A Panhandle Region

Job No.: c-1 | Title: Rivers and Streams Investigations

Contract Period: January 1, 2002 to December 31, 2002

ABSTRACT

In July 2002, a total of 69 transects in the St. Joe and Coeur d'Alene Rivers were snorkeled to estimate trout and whitefish abundance and approximate size distribution. Mean densities of age one and older cutthroat trout *Oncorhynchus clarkii* and mountain whitefish *Prosopium williamsoni* in the St. Joe River transects were 0.64 and 0.68 fish/100 m^2, respectively. Densities in the North Fork Coeur d'Alene River were 0.48 fish/100 m^2 for cutthroat and 2.08 fish/100 m^2 for mountain whitefish. Densities in the Little North Fork Coeur d'Alene River were 0.31 fish/100 m^2 for cutthroat trout and 0.02 fish/100 m^2 for mountain whitefish. Both rivers show increasing trends in abundance of cutthroat trout and mountain whitefish following the declines observed after the 1996 flood event.

We electrofished seven transects on South Fork and North Fork Mica creeks during July 1 and 2, 2002 to assess their fishery and to evaluate the impacts of the highway 95 construction project. Cutthroat trout and torrent sculpin *Cottus rhotheus* were the most abundant fish and were sampled from each transect we electrofished. Brook trout *Salvelinus fontinalis* were the only other fish we sampled. The lower South Fork Mica Creek was found to have the highest density of cutthroat trout and sculpin, despite the ongoing highway construction project that is occurring beside it. However, within the reach of stream that paralleled the highway construction project, the lowest cutthroat trout densities we observed occurred in the transect where noticeable amounts of sediment had been delivered to the stream. Although we can't say for certain that the sediment delivery caused by this highway construction project has seriously depressed the cutthroat trout population, it does appear to have had localized effects.

We electrofished the lower 12 km of Priest River on April 24, 2002. We sampled 287 fishes during 8,321 seconds (138.7 min) of electrofishing time. The most abundant fishes sampled were mountain whitefish (157) and largescale suckers *Catostomus catostomus* (116). Cutthroat trout, rainbow trout *O. mykiss* and brown trout *Salmo trutta* were all sampled from this stretch of river, but only represented 3.1% of the total catch. All the trout we sampled range in size from 272 to 320 mm. The water temperature during this sampling effort was 5°C.

We conducted bull trout *Salvelinus confluentus* redd counts in tributaries of Priest River, Pend Oreille Lake, St. Joe River, and Little North Fork of the Clearwater River in September and October to add to the long-term trend data set. We counted 36 redds in the Priest River drainage, 879 bull trout redds in the Pend Oreille drainage, 54 redds in the St. Joe River drainage, and 36 redds in the Little North Fork of the Clearwater River drainage. Slightly improving trends in bull trout redd abundance was apparent for the Pend Oreille and St. Joe River basins whereas a dramatic decline in redd numbers was apparent in the Priest River basin. Inconsistencies in the stream reaches counted prevent trend evaluation for the Little North Fork Clearwater River. The number of redds counted in the Pend Oreille, Little North

Fork of the Clearwater and St. Joe drainages were above the index stream means, whereas counts in the Priest River drainage were below average.

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INTRODUCTION

This report documents efforts by the Panhandle Region to evaluate the status of fisheries and how they have responded to changes in management, fishing pressure, habitat alterations, and climatic conditions. These findings are instrumental in ensuring proper actions will be taken to protect, preserve, perpetuate and manage the fishes of Idaho.

STUDY SITES

St. Joe River and Coeur d'Alene River Snorkel Surveys

Transect locations in the St Joe River were originally established in 1969 by selecting sites that were considered good cutthroat trout *Oncorhynchus clarkii* habitat (Rankel 1971). Due to changes in stream habitat four of the original transects were either eliminated or combined in 2000. Modified transect boundaries were selected based on fish holding capabilities, access, and permanence for future study. The six transects downstream of Avery that were evaluated during 2001 were not snorkeled during 2002. Instead, we snorkeled the seven transects downstream of Avery that were set up by Davis et al (1996) and were evaluated between 1993 and 1998. By repeating these same sites, it will allow us to more accurately evaluate whether the fishery has changed downstream of Avery. This is increasingly important now as changes in the fishing regulations during 2000 extended the catch and release zone for trout downstream to Avery. This brings the total number of transects that were snorkeled during 2002 in the St Joe River to 35 (Figure 1). Coordinates for the location of each of these transects are displayed in Appendix A.

Snorkel transects in the Coeur d'Alene River system were initially established in 1973 by selecting sites that were considered good cutthroat trout habitat (Bowler 1974). These transect locations have changed somewhat over the years as the river has shifted positions and pools have filled in. Modified transect boundaries were selected based on fish holding capabilities, access, and permanence for future study. During 2002, two additional transects (LNFA & LNF B) were added onto the Little North Fork Coeur d'Alene in the catch-and-release area bringing the number of transects in this area to four. This was accomplished to better evaluate whether differences in fish densities occurred between the catch-and-release and harvest areas of the Little North Fork Coeur d'Alene River. Based on recommendations from the 2001 annual report, six additional transects (JC1-JC6) were snorkeled upstream of the previous most upstream sites. These sites were added to investigate to what extent cutthroat trout longer than 300 mm were using areas outside of past transect locations. Finally two snorkel transects (REHAB1 & REHAB2) were established in the upstream portion of Tepee Creek where the U.S. Forest Service had completed some extensive stream restoration in 2001. These sites were added to evaluate how fish densities respond to this restoration over time. This brings the total number of transects that were snorkeled in the Coeur d'Alene basin to 45 (Figure 2). Eleven sites were on the Little North Fork Coeur d'Alene River; seven were on Tepee Creek and 27 on the North Fork Coeur d'Alene River. Coordinates for the location of each of these transects are displayed in Appendix A and B.

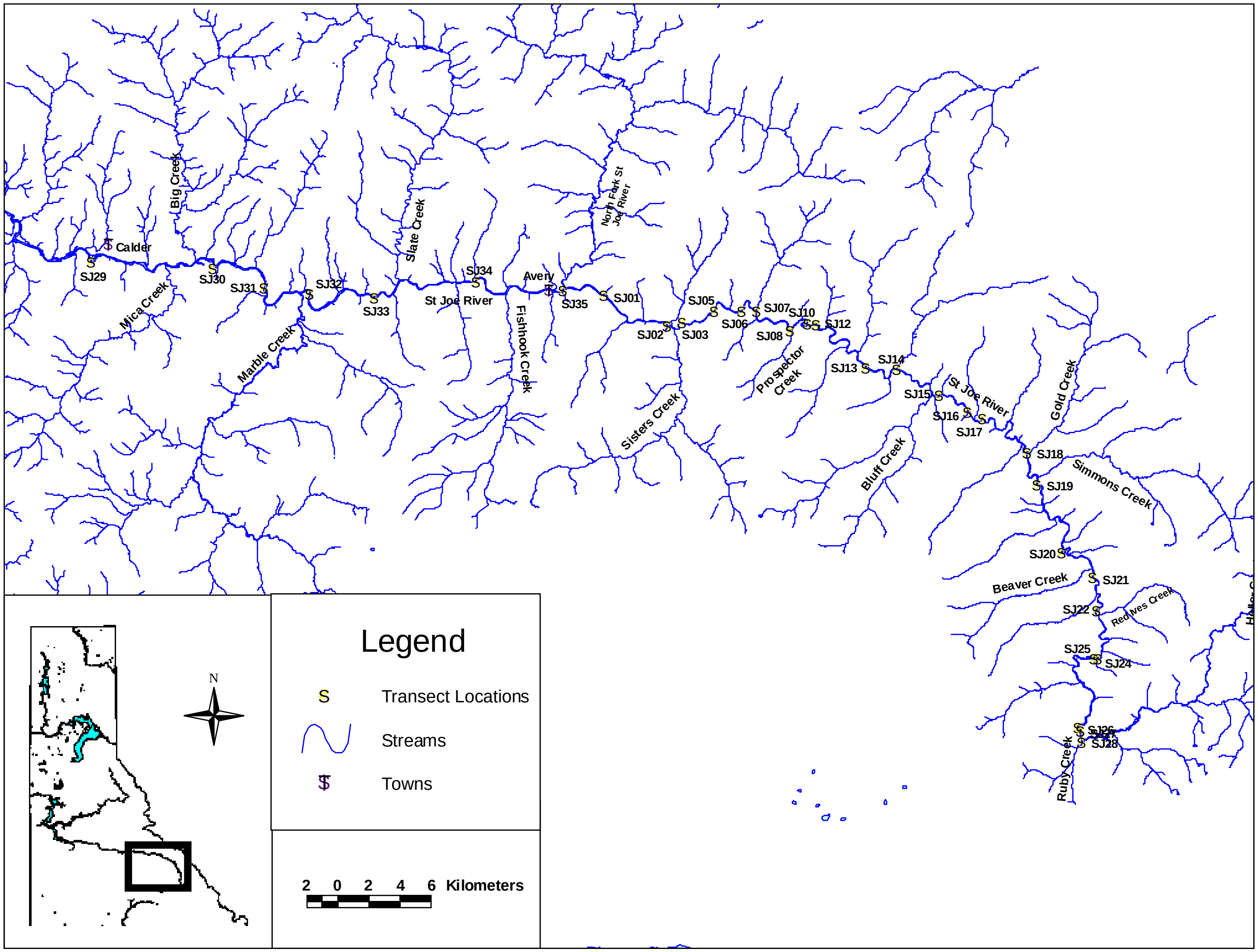

Figure 1. Location of transects snorkeled on the St. Joe River, Idaho, during July 29-31, 2002.

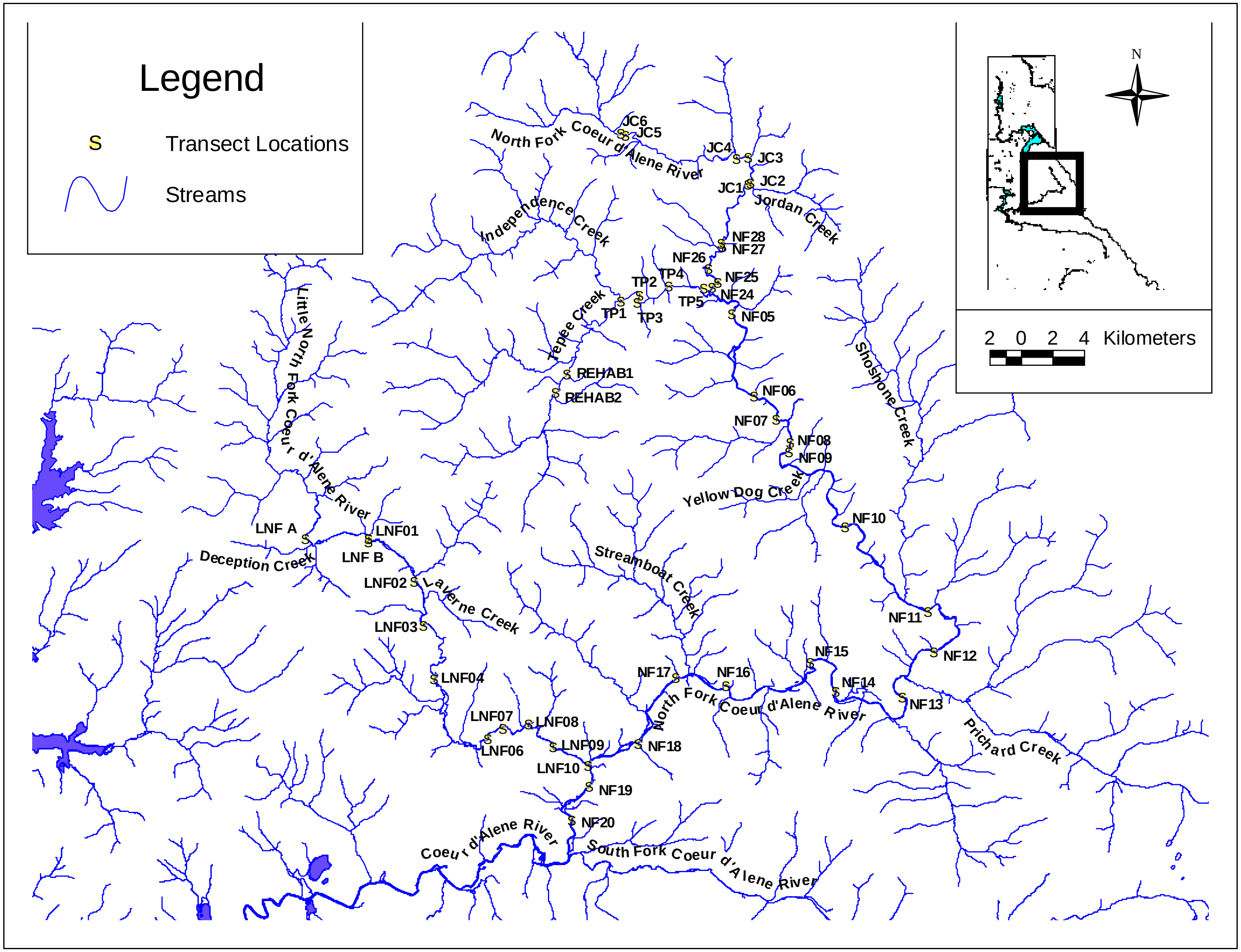

Figure 2. Location of transects snorkeled on the Coeur d'Alene River, Idaho, during July 23-26, 2002.

Mica Creek Fishery Assessment

The Mica Creek watershed is about 5,600 hectares in size and flows easterly into Coeur d'Alene Lake at Mica bay (Figure 3). Mica Creek has two main forks, South Fork Mica Creek, which is just over 2,000 hectares in size and North Fork Mica Creek, which is just over 3,600 hectares in size. Seven stream reaches were surveyed in the Mica Creek watershed in an effort to assess its fishery and to evaluate impacts that may have occurred from the highway construction project that occurred along the lower half of South Fork Mica Creek. Mica Creek is believed to be an important spawning/rearing stream for adfluvial cutthroat trout from Lake Coeur d'Alene.

Lower Priest River Fishery Assessment

The Priest River is located in northern Idaho and flows from Priest Lake to the Pend Oreille River. The Priest River basin is about 250,000 hectares in size and extends into Canada and Washington. Flows between 60 and 150 m^3/sec (2000 to 5000 ft^3/sec) are common in the spring. At the request of the Department of Environmental Quality, we electrofished the lower 12 km of Priest River in an effort to evaluate the fish community that occurs there during spring when water temperatures are more suitable for salmonids (Figure 4).

Bull Trout Spawning Surveys

Bull trout *Salvelinus confluentus* redds were counted in selected tributaries of the Priest, Pend Oreille, St. Joe, and Little North Fork of the Clearwater drainages based on previous surveys (Figures 5-9). Actual streams surveyed were dependent on available time and findings from previous surveys. Streams where no redds had been found over several consecutive years were often not surveyed to save time and/or allow more time to investigate new streams.

Bull Trout Sperm Cryopreservation

We snorkeled Gold Creek, Hughes Fork and Upper Priest River to identify where bull trout were congregating (Figure 10). Areas where bull trout were identified during snorkeling were later electrofished in an attempt to catch fish for the purpose of collecting and cryopreserving sperm (Figure 10).

OBJECTIVES

1. Estimate salmonid density and trends in abundance in snorkeling transects in the St. Joe and Coeur d'Alene rivers.

2. Assess fish species composition and population strength in the North Fork and South Fork of Mica Creek, tributary to Coeur d'Alene Lake, and evaluate whether the highway construction project that occurred along the lower half of South Fork Mica Creek influenced the fishery.

3. Assess game fish species composition and size structure in the lower Priest River during spring when water temperatures are more suitable to salmonids.

4. Estimate bull trout redds and spawning escapement in Priest, Pend Oreille, St. Joe River and Little North Fork Clearwater River drainages.

5. Collect sperm from bull trout from Upper Priest Lake basin to help preserve their genetic makeup and diversity.

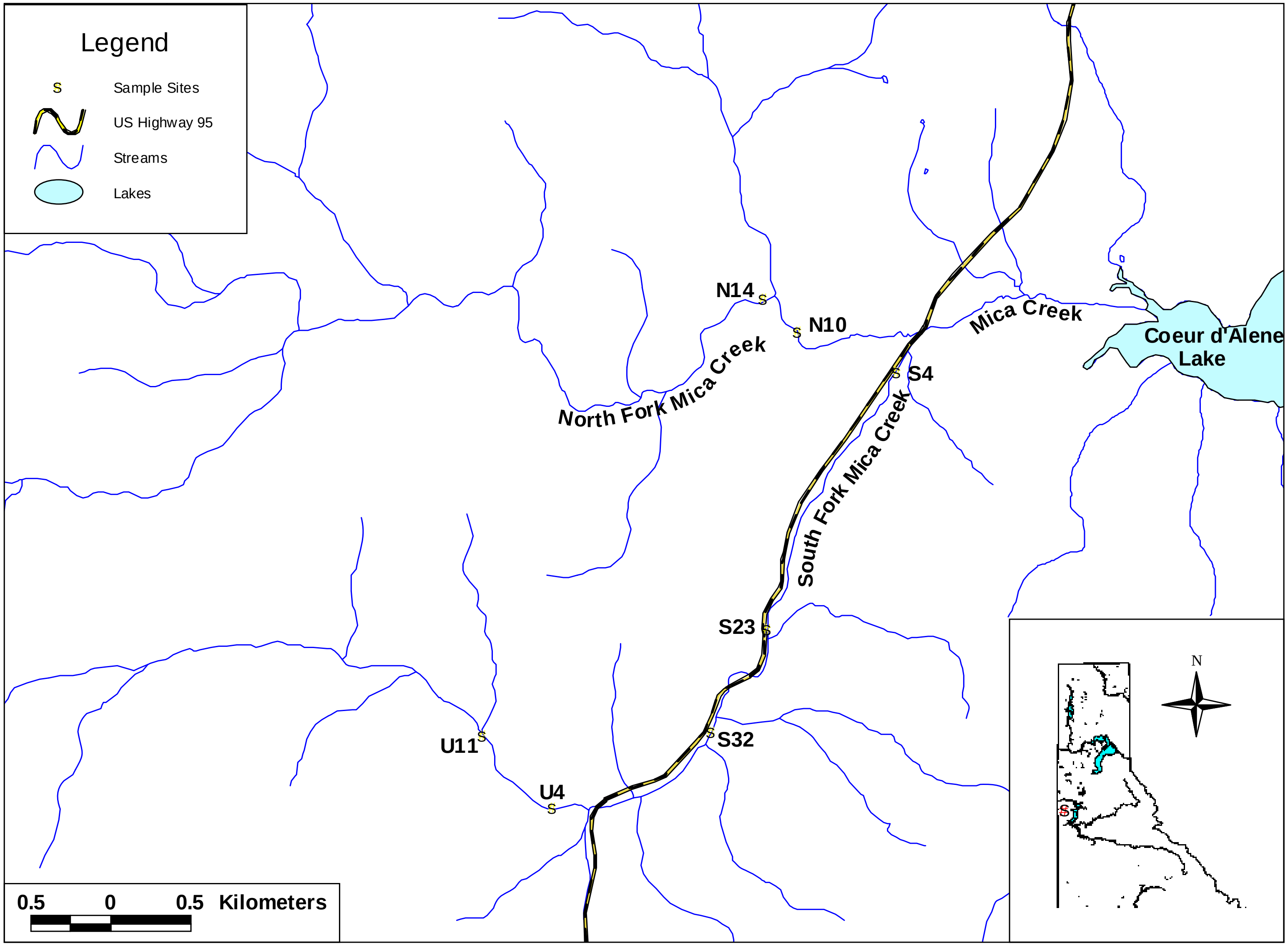

Figure 3. Locations where sampling occurred during 2002 on Mica Creek, Idaho.

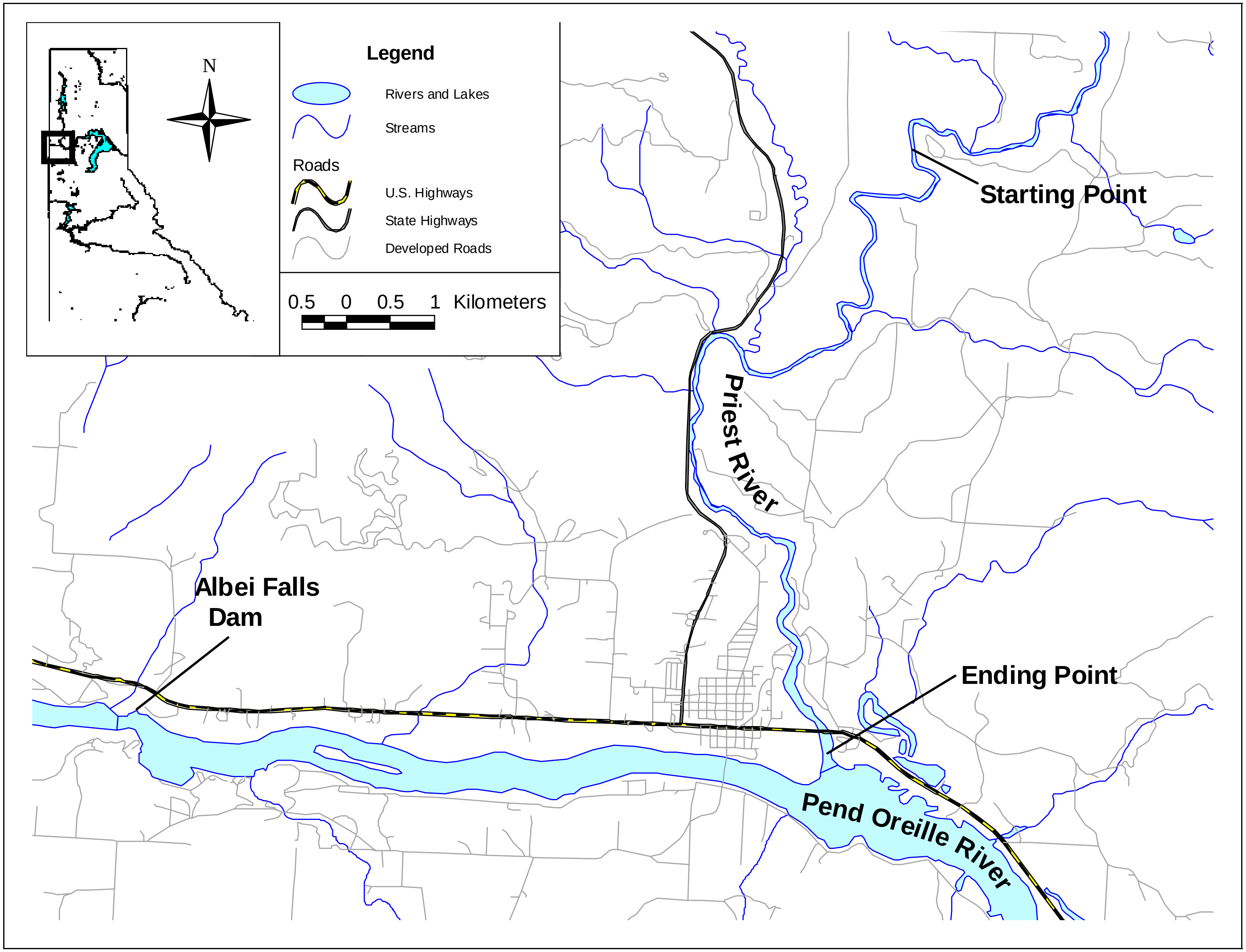

Figure 4. The starting and ending locations of where the Priest River, Idaho was electrofished on April 24, 2002.

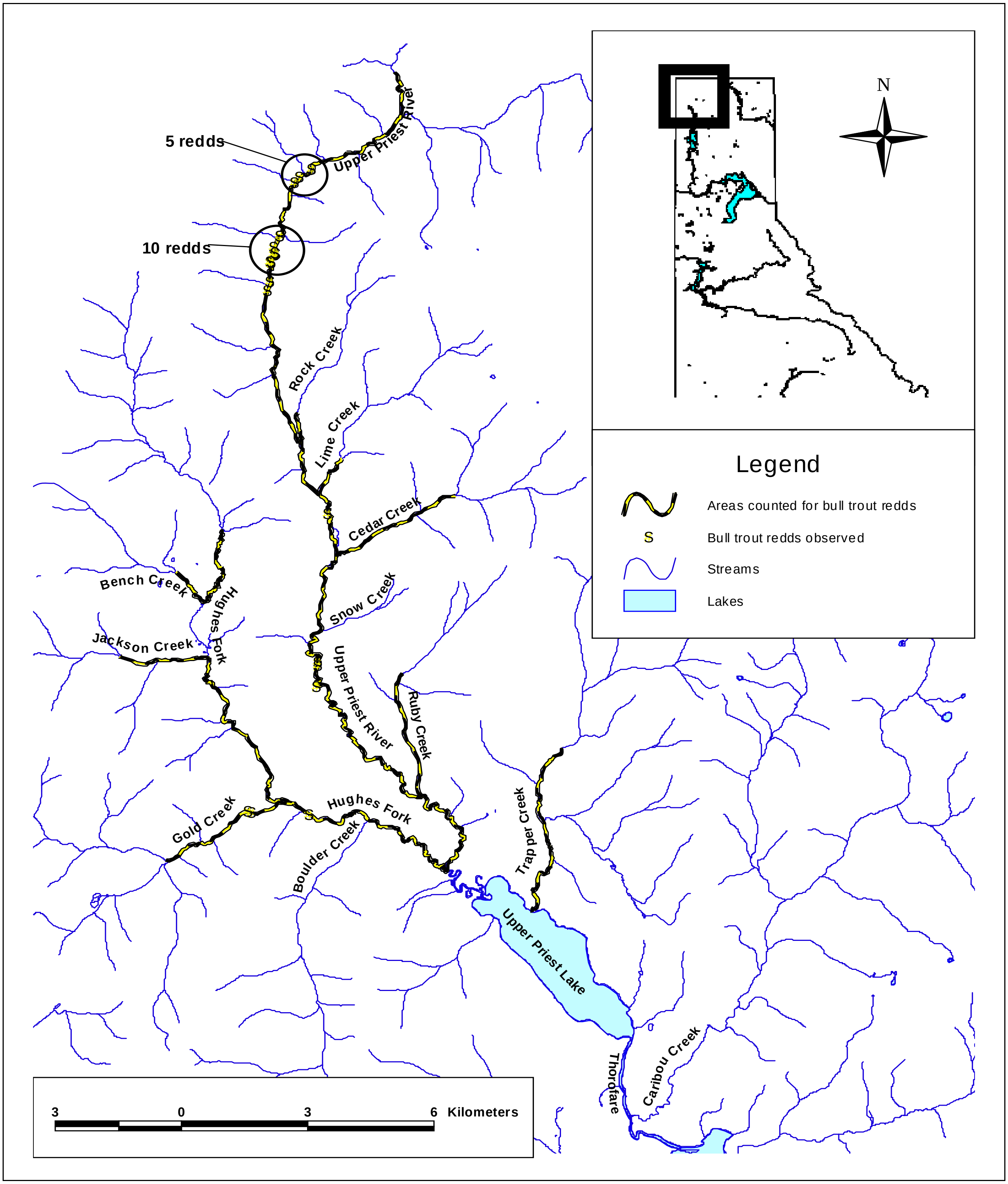

Figure 5. Stream reaches where bull trout redds were counted in the Upper Priest Lake basin, Idaho, during October 2-7, 2002, and the locations of where redds were observed.

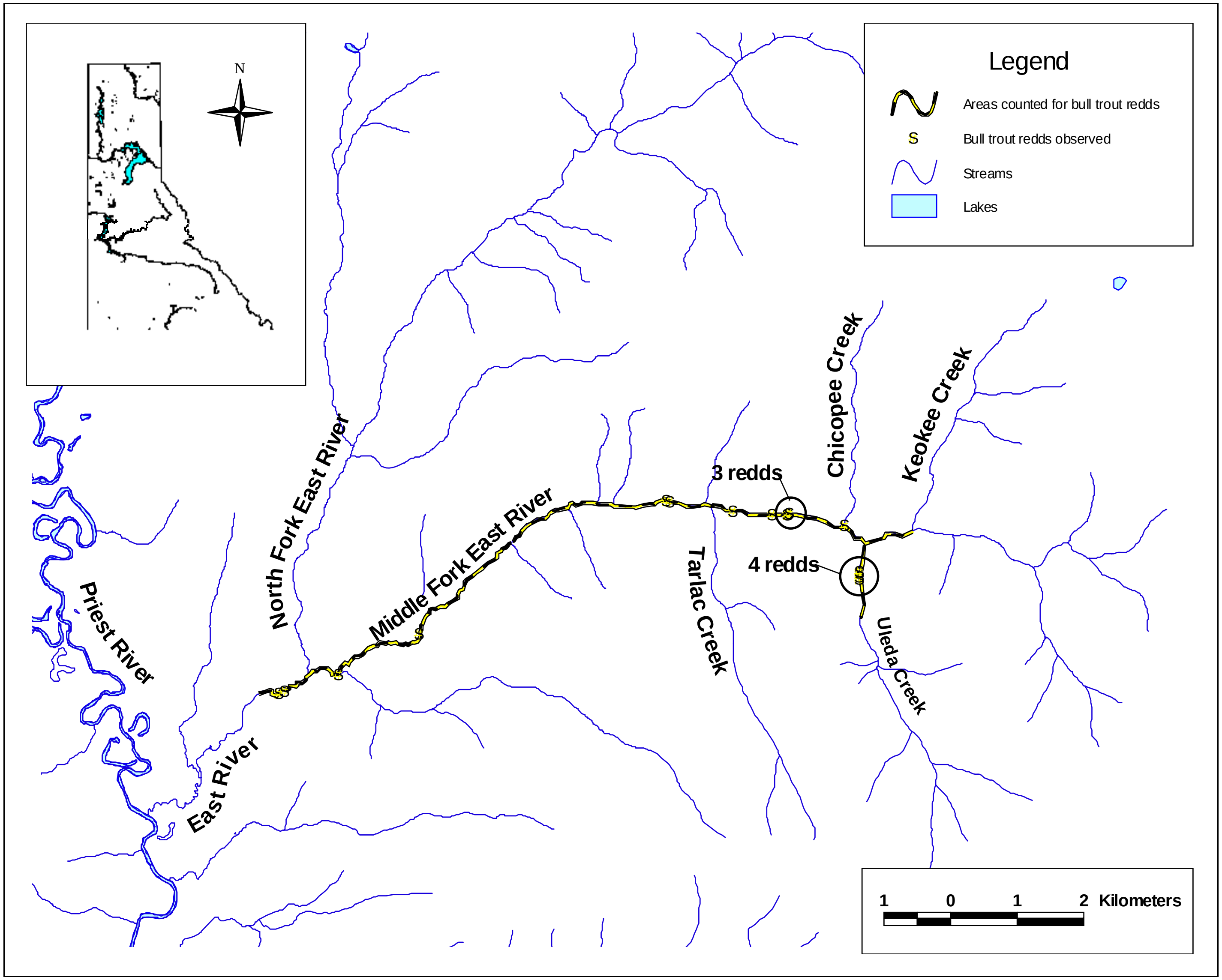

Figure 6. Stream reaches where bull trout redds were counted in the East River, Idaho, on October 22-23, 2002, and the locations of where redds were observed.

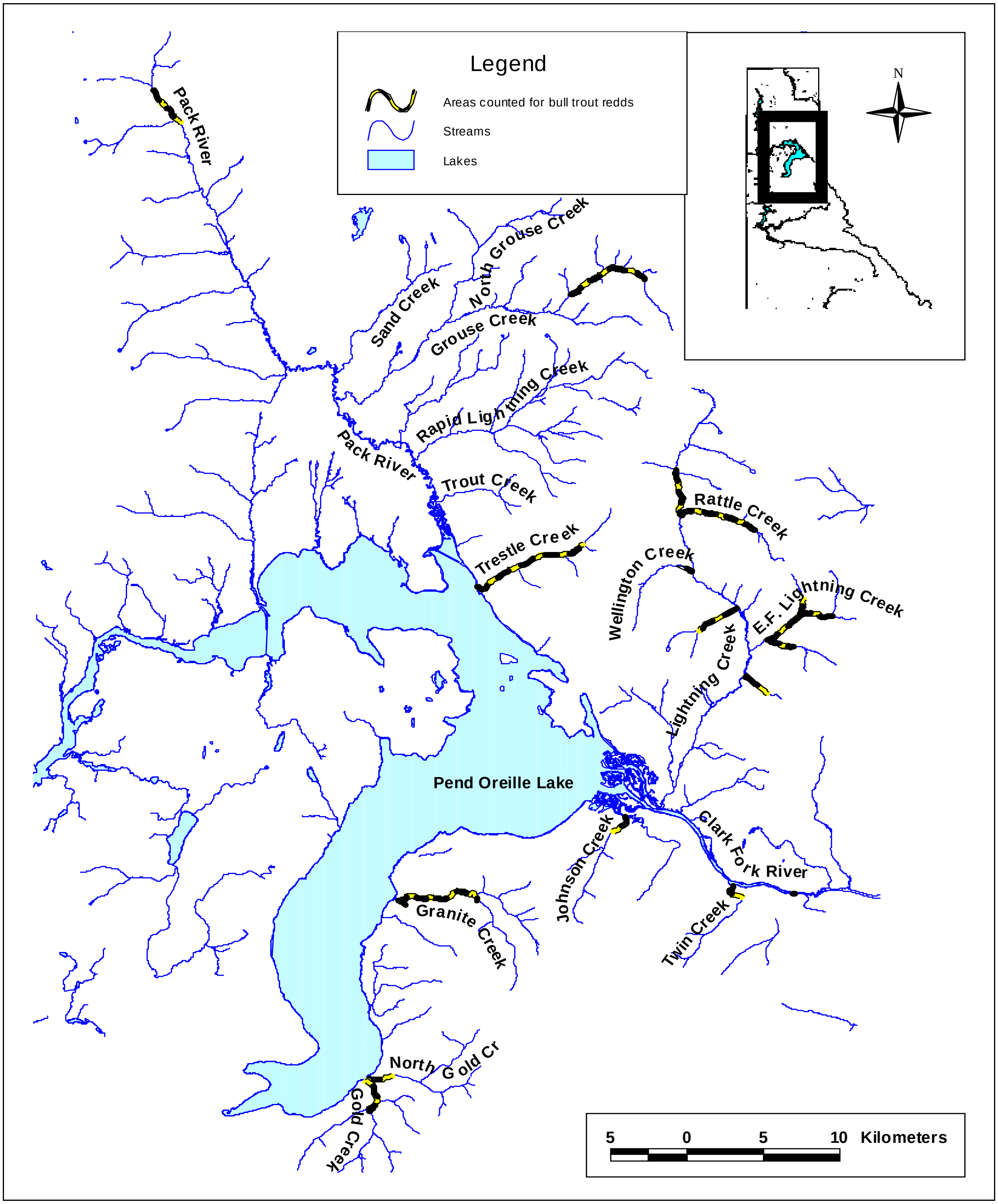

Figure 7. Stream reaches where bull trout redds were counted in Pend Oreille Lake basin, Idaho, on October 11-24, 2002.

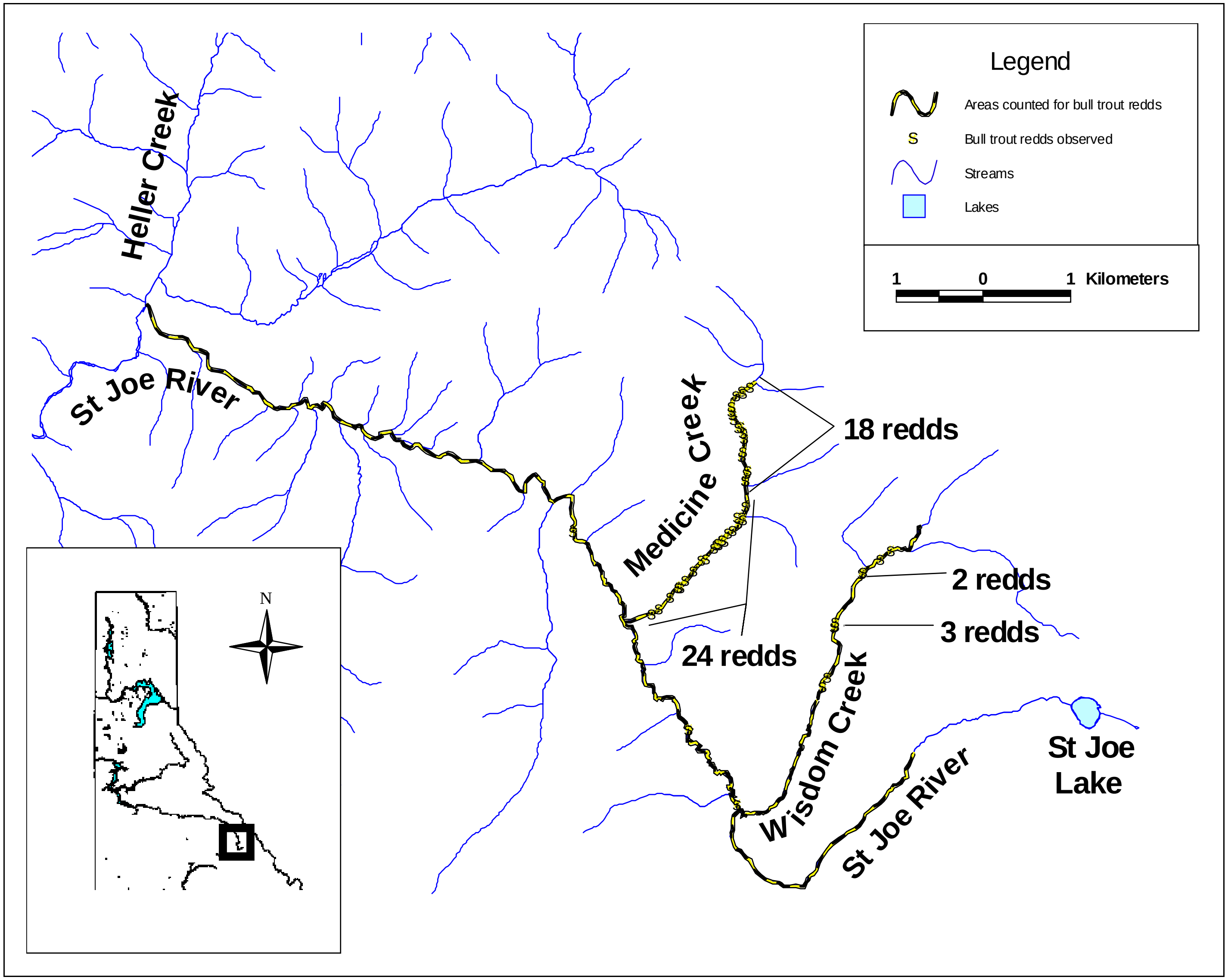

Figure 8. Stream reaches where bull trout redds were counted in the St. Joe River, Idaho, on September 24, 2002, and the locations where redds were observed.

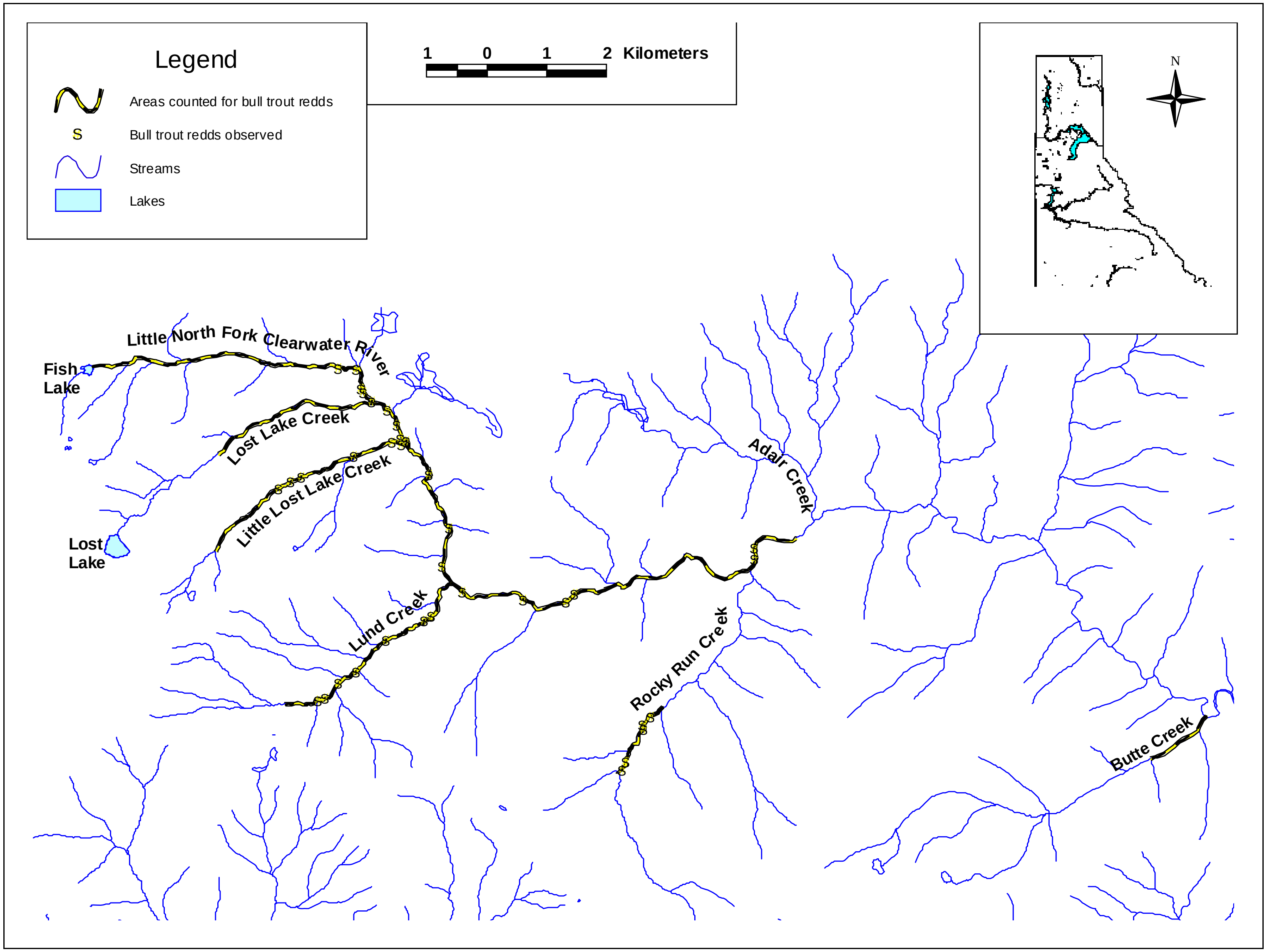

Figure 9. Stream reaches where bull trout redds were counted in the Little North Fork Clearwater River, Idaho, on September 25, 2002, and the locations where redds were observed

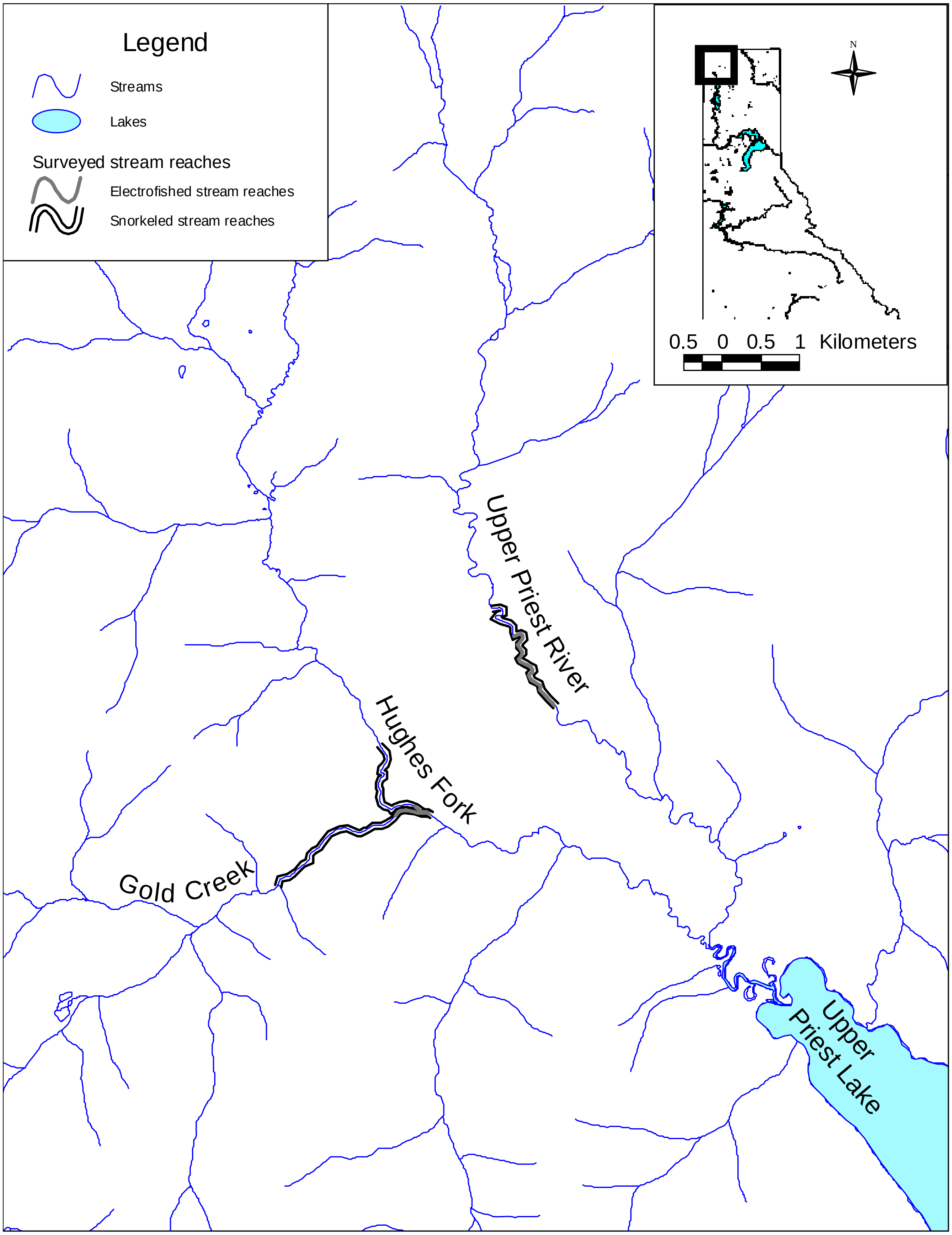

Figure 10. Stream reaches snorkeled and electrofished on September 17, 2002 in an effort to collect bull trout for sperm cryopreservation.

METHODS

St. Joe River and Coeur d'Alene River Snorkel Surveys

We used snorkel surveys to evaluate trends in fish abundance in the St. Joe, Coeur d'Alene and Little North Fork Clearwater rivers. The methodology used for each transect was based on sightability and transect width. Our intent was to be reasonably certain that all fish in the transect were visible to the divers and few or no fish were overlooked. In the wider transects, where one diver could not easily see fish across the river, two divers were used, one on each side of the river. In narrower stream reaches, only one diver was used. We periodically duplicated counts using different divers to check accuracy of counts. Divers began at the upstream end of the transect and snorkeled downstream since the size of the rivers generally precluded upstream counts. In areas where pocket water was the dominate habitat or shallow turbulent water limited visibility, transects were snorkeled upstream.

Estimates of salmonid abundance were limited to age 1+ fish, as summer counts for young of the year cutthroat trout are typically unreliable. Most YOY cutthroat trout will be smaller than 80 mm during surveys in July and occupy the shallow stream margins where snorkeling is less effective (Thurow 1994). All observed fish were recorded for each transect by species in 75 mm length groups.

After completing fish counts, we measured length and width of each transect with a Tasco 800 Lasersite Rangefinder to determine the surface area (m^2) surveyed. Fish counts were converted to density (fish/100 m^2) to standardize the data and make it possible to compare counts to other watersheds. In an effort to accurately locate and duplicate snorkel surveys in the future, transect locations were recorded as waypoints using a Garmin GPSmap76S Global Positioning System (GPS; Appendix A). In addition, photographs of each site were taken with permanent landmarks in the photo including starting and ending points of each transect.

Mica Creek Fishery Assessment

To assess the fishery in Mica Creek we divided the stream into three reaches – lower North Fork Mica Creek, lower South Fork Mica Creek (downstream of U.S. 95) and upper South Fork Mica Creek (upstream of U.S. 95) (Figure 3). Each reach was divided into 100 m sites and three sites from each reach were randomly selected for sampling. Site lengths were measured using ArcView and 7.5 minute U.S. Geological topographic maps. Attempts were made to sample all the selected sites, although the actual number of sites sampled from each stream reach was a factor of time and the ability to effectively sample the selected sites.

At each site selected for sampling, the fish and fauna were collected using a Smith-Root SR 15 backpack electrofisher and a three-person crew. The species and total length of each salmonid captured was recorded. Only the total number of sculpins *Cottus spp.* and other fauna sampled were recorded.

We used a multiple depletion method to acquire a population estimate for one randomly chosen site per stream reach (Zippin 1958; Lobon-Cervia and Utrilla 1993). Block nets were not used to separate sample sites. Capture efficiency was determined for fishes and fauna captured in adequate abundance at each of the sites where multiple passes were conducted using MicroFish 3.0 (Van Deventer and Platts 1985). The capture efficiency was used to estimate the total number of each species of fish and other fauna that occurred at each of the sites where one pass occurred by dividing the number of specimens captured by the capture efficiency calculated in the same stream reach. The estimated total number of fish and fauna that occurred at each site was divided by the area of stream sampled, resulting in an estimated density (number/100 m^2) for each sample site.

To evaluate whether the highway 95 construction project had any impacts on the fishery in South Fork Mica Creek, we compared the average density of fish that occurred in lower South Fork Mica Creek to the average density of fish that occurred in upper South Fork Mica Creek and North Fork Mica Creek. The habitat in upper South Fork Mica Creek and North Fork Mica Creek was not influenced by this highway construction project, and consequently any differences in the density of fish could be explained by sediment delivery that occurred from this highway project. The following assumptions must be made before this analysis could be legitimate.

1. Prior to the highway construction project, densities of fish were similar in all three stream reaches.

2. Any impacts from the highway project would not influence the density of fish in upper South Fork Mica Creek and North Mica Creek.

At each site where sampling occurred, general observations of habitat condition were made, including substrate size, stream grade, stream bank vegetation and overhead cover. Stream temperature was also collected with a hand-held thermometer at each site during the time of sampling. If differences in fish density occurred between the stream reaches, this type of information could be useful in helping to determine why.

To evaluate the genetic purity of cutthroat trout in the Mica Creek drainage, we collected tissue samples from fish we collected. To ensure genetic samples were collected randomly, fin clips were collected from every other *Oncorhynchus spp.* regardless of which species it was. Samples were collected throughout all the transects were surveyed. Small sections of fins (the size of an eraser head) were collected from fish for genetic analysis. Fin clips were placed in vials with a special ethanol preservative. All fin clips were labeled with the suspected species they came from, the date they were sampled, the length of the fish and where they were sampled. These samples are being stored until genetic analysis can occur.

Lower Priest River Fishery Assessment

At the request of the Department of Environmental Quality, we electrofished the lower 12 km of Priest River to evaluate the fish community that occurs there during spring when water temperatures are more suitable to salmonids. We electrofished the lower Priest River using a Coffelt VVP 15 and a 5000 watt generator mounted in drift boat with electrodes suspended from two forward booms. We floated downstream along the shoreline with the current on continuously. Two netters at the front of the boat attempted to collect all fish that were stunned by the electric current. All fish collected were measured to the nearest mm total length and scales were taken on all trout species to evaluate age and growth.

Bull Trout Spawning Surveys

Bull trout redds were counted in selected tributaries of the Priest, Pend Oreille, St. Joe, and Little North Fork of the Clearwater basins. Counts occurred at similar times as had occurred in the past. Survey techniques and identification of bull trout redds followed the methodology described by Pratt (1984). Research has demonstrated the level of observer training and experience may influence the accuracy of redd counts (Bonneau and LaBar 1997; Dunham et al. 2001). To reduce observer variability in bull trout redd counts, only individuals who attended a bull trout redd count training exercise on September 23, 2002 were used to count redds in the established index streams. The location of redds were recorded on maps and/or GPS during redd counts. We estimated the abundance of adult bull trout spawners entering each drainage by applying a low estimate of 2.2 fish/redd (Bonar et al. 1997) and an upper estimate of 3.2 fish/redd (Fraley and Shepherd 1998) to the total number of redds observed.

Bull Trout Sperm Cryopreservation

Preservation of some of the Upper Priest Lake bull trout genetics can be accomplished by collecting milt from some the remaining males in this population and cryopreserving the sperm in liquid nitrogen. Attempts were made to capture male bull trout during their spawning run in areas where past redd counts indicated the highest concentration of spawning fish occurred. Prior to sampling we snorkeled approximately 8 km of stream to help identify where bull trout were located. The location of all observed bull trout was recorded with surveyors tape. To sample bull trout we attempted to drive them downstream to netters or into a blocknet using a backpack electroshocker (Smith-Root SR 15). The voltage of the electroshocker was set at or below 400 volts to reduce chances of injuring any fish.

No male bull trout were captured in this study; however we have documented the methods used to assist others in future collection efforts. If a bull trout was sampled, we would identify its sex and whether it was ripe. Ripe males would be held in tubs where they would be anesthetized with clove oil. Once anesthetized, males would be wiped down with rags or paper towels to ensure water did not get into the milt samples. Water will activate fish sperm and make it unusable for cryopreservation. Once the bull trout is wiped down, milt can be squirted into whirlpack bags by gently squeezing the sides of the fish. Oxygen would then be pumped, using a small bike pump, into the bag until it was full. The whirlpack bags would then be placed in a cooler, on top of newspaper that was laid over an ice bath. Once milt is collected it should be transported to a lab for cryopreservation within a 24-hour period. The milt can be stored longer than this before cryopreservation, but the degree of success could decrease markedly (Joseph Cloud, University of Idaho, personal communication). We made arrangements with the University of Idaho to prepare our milt samples, cryopreserve them and put them into long-term storage. We provided one bubbler package of 25, 10mm goblets (80), white cane tabs (40), canes (100), and labeled semen straws (800) to the University of Idaho to complete this task.

After collecting the milt, the males would be released back into the stream so they could spawn naturally. From each male that milt is collected from, fin clips should be taken for genetic analysis. The type of analysis used should provide enough detail to determine if hybridization with brook trout has occurred and how similar the fish is to other bull trout populations that may be used for supplementation.

RESULTS

St. Joe River and Coeur d'Alene River Snorkel Surveys

St. Joe River

Thirty-five transects were snorkeled in the St. Joe River from July 29 to 31, 2002. A total of 713 cutthroat trout, 19 rainbow trout *Oncorhynchus mykiss*, one bull trout and 761 mountain whitefish *Prosopium williamsoni* were counted (Table 1). Cutthroat trout were observed in all 35 St. Joe River snorkel sites. Densities (all size classes) ranged from 0.05 to 7.58 fish/100 m^2 with an overall average of 0.64 fish/100 m^2 (Table 1). The highest cutthroat densities (1.46 fish/100 m^2) were counted in the reach from Prospector Creek to Spruce Tree Campground (Table 2). Overall densities of cutthroat trout were similar to what was observed in 2001, but are still considerably lower than what was observed between 1982 and 1997 (Table 2 and Figure 11). About 18 percent of the cutthroat trout observed were estimated to be over 300 mm TL. The density (0.19 fish/100 m^2) of these larger cutthroat trout observed between North Fork and Ruby Creek are the highest since the decline after 1996, but are still 40-55% below what was recorded between 1993-1996 (Table 3 and Figure 12).

We observed mountain whitefish in all but one of the transects snorkeled during 2002 (Table 1). The overall mean density of mountain whitefish we observed (0.68 fish/100 m^2) was slightly higher than we observed for cutthroat trout (0.64 fish/100 m^2). We observed the highest density of mountain whitefish (1.22 fish/100 m^2) in the reach between the Prospector Creek and Spruce Tree Campground, the same stream reach where the highest density of cutthroat trout was observed (Table 4). This is the second year in a row mountain whitefish densities have increased since the large decline that occurred after 1996 (Table 4 and Figure 13).

The majority of rainbow trout (17 out of 19) were counted downstream of the North Fork St. Joe River where this species had been stocked (Table 1). Rainbow trout densities have steadily declined since 1969 (Table 5 and Figure 14)

Coeur d'Alene River

Forty-five transects were snorkeled in the Coeur d'Alene River from July 23 to 26, 2002. A total of 615 cutthroat trout, 424 rainbow trout, five brook trout *Salvelinus fontinalis* and 2,396 mountain whitefish were counted (Tables 6 and 7). The average cutthroat trout density (all size classes) for the entire North Fork Coeur d'Alene River during 2002 was 0.48 fish/100 m^2, considerably lower than what was recorded during the record high year of 2001 (0.73 fish/100 m^2). Since 1993, there has been only one other year when lower densities of cutthroat trout were observed (Table 8). Despite this overall decrease in density, an upward trend in cutthroat trout density is still prevalent for the North Fork Coeur d'Alene River (Figure 15). About 14% of the cutthroat trout that were observed during 2002 were over 300 mm in length. If only cutthroat trout > 300 mm are evaluated, no apparent increase in density has occurred over time. However, this is the third consecutive year we have observed an increase in density of cutthroat trout > 300 mm, and the 2002 density of 0.06 fish/100 m^2 is the second highest ever recorded (Table 9 and Figure 16).

The highest density of cutthroat trout (all size classes combined and fish > 300 mm) in the North Fork Coeur d'Alene River was observed in the roadless stream reach between Tepee Creek and Jordan Creek (Table 8). In addition, the average density of cutthroat trout (all size

Table 1. Number and density (fish/100 m^2) of fish observed while snorkeling transects in the St. Joe River, Idaho, during July 29-31, 2002. Calder to N.F. St. Joe River is the only area outside of the catch-and-release regulation zone as of 2000.

						Cutthroat Trout			Rainbow		Mountain Whitefish	
				Average		Number counted		Density	Trout	Bull Trout	Number	Density
Reach	Transect Number	Habitat Type	Length (m)	Width (m)	Area (m^2)	≤300mm	>300mm	(No./100 m^2)	Counted	Counted	Counted	(No./100 m^2)
Calder. to North Fork St. Joe	SJ29	run	200	36.40	7,280	7	0	0.10	0	0	25	0.34
	SJ30	pool	200	37.33	7,467	4	0	0.05	0	0	5	0.07
	SJ31	run	225	38.40	8,640	6	0	0.07	1	0	10	0.12
	SJ32	pool	250	44.00	6,160	7	0	0.11	11	0	17	0.28
	SJ33	run	140	44.00	6,160	3	0	0.05	1	0	5	0.08
	SJ34	run	130	30.40	3,952	7	0	0.18	3	0	25	0.63
	SJ35	run	130	38.80	5,044	13	2	0.30	1	0	60	1.19
NF St Joe (at Avery) to Prospector Ck.	SJ01	run	90	49.00	4,410	4	0	0.09	0	0	1	0.02
	SJ02	pool	140	27.25	3,815	30	1	0.81	2	0	87	2.28
	SJ03	pool	100	19.20	1,920	12	0	0.63	0	0	41	2.14
	SJ05	pool	225	33.80	7,605	19	2	0.28	0	0	18	0.24
	SJ06	pool	200	34.00	6,800	29	15	0.65	0	0	26	0.38
	SJ07	run	140	29.60	4,144	35	2	0.89	0	0	41	0.99
Prospector Creek. To Red Ives Creek	SJ08	pool	130	21.20	2,756	15	2	0.62	0	0	43	1.56
	SJ10	pool/run	250	22.00	5,500	20	11	0.56	0	0	49	0.89
	SJ12	pool/run	111	27.40	3,041	33	8	1.35	0	0	50	1.64
	SJ13	run	115	30.25	3,479	38	15	1.52	0	1	45	1.29
	SJ14	run	104	25.60	2,662	30	7	1.39	0	0	60	2.25
	SJ15	run	106	13.00	1,378	36	7	3.12	0	0	6	0.44
	SJ16	pool/run	174	19.60	3,410	36	11	1.38	0	0	22	0.65
	SJ17	pool/run	158	15.33	2,423	48	3	2.11	0	0	17	0.70
	SJ18	pool/run	49	10.50	515	35	4	7.58	0	0	24	4.66
	SJ19	pool	51	18.50	944	17	4	2.23	0	0	1	0.11
	SJ20	run	64	17.25	1,104	11	7	1.63	0	0	9	0.82
	SJ21	pool	45	22.00	990	13	5	1.82	0	0	13	1.31
	SJ22	pool	81	27.40	2,219	23	6	1.31	0	0	33	1.49
Red Ives to Ruby Ck	SJ24	run	62	21.75	1,349	14	5	1.41	0	0	11	0.82
	SJ25	run	60	20.40	1,224	20	2	1.80	0	0	8	0.65
	SJ26	run	80	26.00	2,080	6	3	0.43	0	0	0	0.00
	SJ27	pool/run	80	26.50	2,120	4	6	0.47	0	0	2	0.09
	SJ28	run	53	13.75	729	8	2	1.37	0	0	7	0.96
Total	35 sites	--	3,943	--	111,320	583	130	0.64	19	1	761	0.68

Table 2. Average density (fish/100 m^2) of all sizes of cutthroat trout counted by reach during snorkel evaluations from 1969 to 2002 in the St. Joe River, Idaho.

Reach	1969	1970	1971	1972	1973	1974	1975	1976	1977	1979	1980	1982	1989	1990	1993	1994	1995	1996	1997	1998	2000	2001	2002
Calder to North Fork St. Joe	--	--	--	--	--	--	--	--	--	--	--	--			0.07	0.23	0.16	0.14	0.15	0.09	--	0.22[c]	0.11
N.F. St. Joe to Prospector Cr.	0.01	0.00	0.07	0.04	0.01	0.11	0.08	--[a]	0.04[b]	0.08	0.12	0.03	0.18	0.22	0.47	0.33	0.79	0.33	0.18	0.12	0.46	0.52	0.52
Prospector Cr. to Spruce Tr.	0.25	0.31	0.58	0.59	0.76	1.40	1.53	3.59[a]	1.72	1.63	1.50	2.93	2.44	2.79	2.13	1.66	2.56	2.42	2.79	1.05	1.11	1.38	1.46
Spruce Tree C.G. to Ruby Cr.	1.38	1.39	2.07	2.63	2.55	5.01	6.12	1.89	4.62	3.14	1.46	3.31	2.41	4.05	1.17	1.39	2.58	2.57	1.13	1.44	1.06	1.19	0.93
All transects - entire river	--	--	--	--	--	--	--	--	--	--	--	--			0.79	0.76	1.19	1.06	1.09	0.50	--	0.80[c]	0.64
Avery to Ruby Creek	0.27	0.29	0.52	0.58	0.63	1.23	1.40	3.10[a]	1.60[b]	1.11	0.88	1.68	1.43	1.82	1.30	1.18	1.99	1.77	1.74	0.79	0.88	1.02	1.00

[a] Transects SJ01-SJ12 were not snorkeled.
[b] Transects SJ01-SJ04 were not snorkeled.
[c] Transect locations differed this year from other years.

Table 3. Average density (fish/100 m^2) of cutthroat trout > 300 mm counted by reach during snorkel evaluations from 1969 to 2002 in the St. Joe River, Idaho.

Reach	1969	1970	1971	1972	1973	1974	1975	1976	1977	1979	1980	1982	1989	1990	1993	1994	1995	1996	1997	1998	2000	2001	2002
Calder to North Fork St. Joe	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.02	0.05	0.02	0.03	0.00	0.01	--	0.02[c]	0.00
N.F. St. Joe to Prospector Cr.	0.01	0.00	0.00	0.00	0.00	0.00	0.00	--[a]	0.00[b]	0.00	0.01	0.00	0.02	0.09	0.08	0.02	0.05	0.07	0.01	0.01	0.12	0.04	0.07
Prospector Cr. to Spruce Tr.	0.02	0.02	0.02	0.00	0.10	0.00	0.00	0.00[a]	0.00	0.07	0.12	0.23	0.44	0.95	0.69	0.46	0.40	0.56	0.16	0.08	0.24	0.20	0.30
Spruce Tree C.G. to Ruby Cr.	0.12	0.11	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.17	0.47	0.40	0.81	0.88	0.72	0.47	0.70	0.76	0.13	0.26	0.18	0.11	0.24
All transects - entire river	--														0.26	0.20	0.19	0.25	0.06	0.05	--	0.10[c]	0.12
Avery to Ruby Creek	0.03	0.02	0.01	0.00	0.06	0.00	0.00	0.00[a]	0.00[b]	0.05	0.11	0.15	0.30	0.57	0.43	0.31	0.33	0.43	0.11	0.08	0.19	0.13	0.19

[a] Transects SJ01-SJ12 were not snorkeled.
[b] Transects SJ01-SJ04 were not snorkeled.
[c] Transect locations differed this year from other years.

Table 4. Average density (fish/100 m^2) of mountain whitefish counted by reach during snorkel evaluations from 1969 to 2002 in the St. Joe River, Idaho.

Reach	1969	1970	1971	1972	1973	1974	1975	1976	1977	1979	1980	1982	1989	1990	1993	1994	1995	1996	1997	1998	2000	2001	2002
Calder to NF St Joe	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.60	0.18	0.34	0.88	0.44	0.10	--	1.25[e]	0.33
NF St Joe to Prospector Creek	0.86	0.90	0.98	0.24	1.09	0.95	1.08	--[a]	--[b]	1.09	0.77	--[d]	0.70	1.13	0.40	2.12	1.29	1.03	0.27	1.39	0.51	0.33	0.75
Prospector Creek to Spruce Tree C.G.	1.24	1.16	1.12	0.82	3.72	1.33	0.97	0.71[a]	0.23[c]	1.69	1.20	--[d]	2.17	2.01	2.11	0.65	1.67	1.02	0.47	0.80	0.55	1.22	1.22
Spruce Tree C.G. to Ruby Cr.	1.83	1.32	1.89	2.26	1.39	2.28	2.45	1.14	1.56	2.79	1.27	0.94[d]	1.32	2.22	0.66	1.03	1.73	1.60	0.35	0.38	0.47	0.56	0.37
Average for all sites	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.95	0.75	1.03	1.01	0.41	0.60	--	0.92[e]	0.68
NF St Joe to Ruby Creek	1.14	1.06	1.14	0.73	2.29	1.27	1.19	0.84[a]	0.34[b,c]	1.54	1.01	0.11[d]	1.42	1.65	1.20	1.19	1.56	1.11	0.39	0.94	0.53	0.79	0.92

[a] Transects SJ01-SJ12 were not snorkeled.
[b] Transects SJ01-SJ04 were not snorkeled.
[c] Transects SJ05-SJ16 were only evaluated for presence/absence.
[d] Transects SJ01-SJ25 were only evaluated for presence/absence.
[e] Transect locations differed this year from other years.

Table 5. Average density (fish/100 m^2) of rainbow trout counted by reach during snorkel evaluations from 1969 to 2002 in the St. Joe River, Idaho.

Reach	1969	1970	1971	1972	1973	1974	1975	1976	1977	1979	1980	1982	1989	1990	1993	1994	1995	1996	1997	1998	2000	2001	2002
Calder to NF St Joe	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.14	0.10	0.21	0.20	0.03	0.15	--	0.23[c]	0.04
NF St Joe to Prospector Creek	0.07	0.13	0.25	0.25	0.16	0.44	0.86	--[a]	0.01[b]	0.14	0.10	0.18	0.28	0.43	0.15	0.10	0.07	0.37	0.06	0.46	0.00	0.00	0.01
Prospector Creek to Spruce Tree C.G.	0.25	0.94	0.82	0.05	0.09	0.18	0.47	0.00[a]	0.04	0.04	0.27	0.01	0.00	0.10	0.01	0.05	0.01	0.03	0.00	0.05	0.00	0.00	0.00
Spruce Tree C.G. to Ruby Cr.	0.11	0.41	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
																					--		
Average for all sites	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	0.08	0.11	0.17	0.02	0.16	0.00	0.06[c]	0.02
NF St Joe to Ruby Creek	0.16	0.52	0.48	0.14	0.11	0.27	0.59	0.00[a]	0.02[b]	0.08	0.16	0.09	0.12	0.23	0.07	0.06	0.03	0.14	0.02	0.17	0.00	0.00	0.00

[a] Transects SJ01-SJ12 were not snorkeled.
[b] Transects SJ01-SJ04 were not snorkeled.
[c] Transect locations differed this year from other years.

Table 6. Number and density (fish/100 m^2) of fish observed while snorkeling transects in the North Fork Coeur d'Alene River, Idaho, during July 23-26 2002.

Reach	Transect Number	Habitat Type	Length (m)	Average Width (m)	Area (m^2)	Cutthroat Trout Number counted <300mm	Cutthroat Trout Number counted >300mm	Cutthroat Trout Density (No./100 m^2)	Rainbow Trout Counted	Brook Trout Counted	Mountain Whitefish Number Counted	Mountain Whitefish Density (No./100 m^2)
Tepee Creek	TP1	Pool	49	23.8	1,164	20	0	1.72	0	0	37	3.18
	TP2	Run	112	10.8	1,210	4	2	0.50	0	0	16	1.32
	TP3	Pool	83	15.2	1,262	8	0	0.63	0	0	8	0.63
	TP4	Run	172	19.5	3,354	2	0	0.06	0	0	0	0.00
	TP5	Run/Pool	106	15.6	1,654	20	17	3.27	0	0	18	1.09
	REHAB1	Run	150	5.8	870	15	0	1.72	0	0	0	0.00
	REHAB2	Run	130	7.5	975	0	1	0.21	0	0	0	0.00
N. F. C d'A (Yellow Dog to Tepee Cr)	NF05	Pool	95	20.8	1,976	15	4	1.16	0	0	120	6.07
	NF06 [1]	Run	190	27.5	5,225	29	9	0.73	0	0	51	0.98
	NF07	Run	150	21.2	3,180	0	0	0.00	0	0	0	0.00
	NF08	Pool	90	32.0	2,880	16	6	0.97	0	0	150	5.21
	NF09	Pool	128	23.2	2,970	8	0	0.27	0	0	24	0.81
North Fork Coeur d'Alene (S.F. Coeur d'Alene to Yellow Dog Cr)	NF10	Run	142	30.0	4,260	1	0	0.02	0	0	0	0.00
	NF11	Run	151	26.6	4,017	33	2	0.92	0	0	20	0.50
	NF12	Pool	155	38.0	5,890	29	4	0.63	0	0	26	0.44
	NF13	Pool	138	37.7	5,198	65	1	1.29	0	0	60	1.15
	NF14	Pool	181	35.7	6,456	19	0	0.29	64	0	450	6.97
	NF15	Pool	172	39.3	6,765	21	0	0.31	31	0	197	2.91
	NF16	Pool	308	36.3	11,191	0	0	0.00	61	0	210	1.88
	NF17	Pool	209	46.8	9,788	2	2	0.04	50	0	367	3.75
	NF18	Pool	182	47.8	8,700	1	0	0.01	34	0	130	1.49
	NF19	Pool	183	52.2	9,547	1	3	0.05	26	0	284	2.97
	NF20	Pool	245	30.5	7,473	67	2	0.95	73	0	198	2.65
N. F. Cd'A (Tepee Cr to Jordan Cr)	NF24	Run	25	17.0	425	3	0	0.71	0	0	9	2.12
	NF25	Pool/run	53	11.3	596	20	3	4.36	0	0	0	0.00
	NF26	Pool	41	18.5	759	23	6	3.82	0	0	0	0.00
	NF27	Pool	72	19.3	1,392	24	7	2.73	0	0	16	1.15
	NF28 [2]	Pool	49	13.4	657	5	1	1.07	0	0	0	0.00
N. F. Cd'A (Upstream of Jordan Cr)	JC1 [4]	Pool/Riffle	110	18.0	1,980	6	3	0.45	0	0	0	0.00
	JC2 [4]	Pool	43	15.4	662	1	0	0.15	0	0	0	0.00
	JC3 [4]	Run	84	13.6	1,142	1	0	0.09	0	0	0	0.00
	JC4 [4]	Pool	46	13.0	598	11	3	2.84	0	0	0	0.00
	JC5 [4]	Run	44	9.3	407	0	1	0.25	0	0	0	0.00
	JC6 [4]	Run	52	10.0	520	0	1	0.19	0	0	0	0.00
Total	34 sites	--	4140	--	115,143	470	78	0.48	339	0	2,391	2.08

Table 7. Number and density of fish (fish/100 m^2) observed while snorkeling transects in the Little North Fork Coeur d'Alene River, Idaho, during July 25-26 2002.

				Average		Cutthroat trout			Rainbow	Brook	Mountain Whitefish	
	Transect	Habitat	Length	Width	Area	Number counted		Density	Trout	Trout	Number	Density
Reach	Number	Type	(m)	(m)	(m^2)	<300mm	>300mm	(No./100 m^2)	Counted	Counted	Counted	(No./100 m^2)
L.N.F. Cd'A (Laverne Cr to Cabin Cr)	LNFA	Pool	50	12.8	640	9	1	1.56	0	0	0	0.00
	LNF01	Riffle/Run	90	15.0	1,350	11	3	1.19	6	0	0	0.00
	LNFB	Pool	110	16.3	1,788	19	1	1.12	0	0	0	0.00
	LNF02	Riffle	41	17.8	728	0	0	0.00	0	0	0	0.00
L.N.F. Cd'A (Mouth to Laverne)	LNF03	Pool	152	45.2	6,865	3	0	0.04	12	4	0	0.00
	LNF04	Pool/Run	74	8.0	592	1	0	0.17	0	0	0	0.00
	LNF06	Pool	88	18.8	1,654	0	0	0.00	0	0	0	0.00
	LNF07	Pool/Riffle	60	12.2	730	8	0	1.10	17	1	0	0.00
	LNF08	Pool	90	23.4	2,106	2	0	0.09	27	0	0	0.00
	LNF09	Pool/Run	60	47.4	2,844	7	0	0.25	8	0	2	0.07
	LNF10	Pool/Run	66	37.0	2,442	2	0	0.08	15	0	3	0.12
Total	11 sites	--	881	--	21,739	62	5	0.31	85	5	5	0.02

Table 8. Average density (fish/100 m^2) of all size classes of cutthroat trout counted in reaches of the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, during snorkel evaluations from 1973 to 2002.

River section	1973	1980	1981	1987	1988	1991	1993	1994	1995	1996	1997	1998	2000	2001	2002
N.F. Cd'A - S. F. Cd'A to Prichard Cr.	0.06	0.02	0.02	--	0.05	0.18	0.56	0.31	0.47	0.51	0.35	0.32	0.41	0.53	0.28
N.F. Cd'A - Prichard Cr to Yellowdog Cr.	0.05	0.00	0.02	--	0.02	0.14	0.08	0.28	0.19	0.06	0.44	0.41	0.13	0.51	0.49
N.F. Cd'A - Yellowdog Cr to Tepee Cr.	0.24	0.31	0.28	1.05	1.10	1.18	0.35	1.70	1.57	1.71	1.70	0.63	0.63	1.74	0.54
N.F. Cd'A - Tepee Cr. to Jordan Cr.	0.86	0.77	0.97	2.34	0.46	0.11	0.27	1.31	0.46	1.17	1.87	1.18	1.49	1.02	2.40
Tepee Creek	0.00	0.14	0.43	0.24	0.12	0.24	0.19	0.12	0.13	0.02	0.45	1.24	0.25	0.24	0.84
L.N.F. Cda - Mouth to Laverne Cr.	0.33	0.04	0.02	--	0.10	0.09	0.18	0.03	0.04	0.12	0.22	0.39	0.36	0.28	0.13
L.N.F. Cda - Laverne Cr. to Burnt Cabin Cr.	0.79	1.03	1.95	--	0.90	0.66	0.03	0.47	0.22	0.90	0.00	0.65	0.79	0.12	0.98
Entire N.F. Cd'A and Tepee Creek	0.16	0.10	0.12	--	0.31	0.32	0.33	0.50	0.49	0.54	0.66	0.51	0.37	0.73	0.47
Entire L.N.F. Cd'A River	0.38	0.15	0.24	--	0.27	0.20	0.15	0.13	0.09	0.35	0.17	0.45	0.45	0.25	0.31
All Transects	0.20	0.11	0.14	--	0.31	0.30	0.31	0.43	0.42	0.50	0.57	0.49	0.38	0.61	0.44
N.F. Cd'A - upstream of Jordan Cr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.51
Tepee Creek rehabilitation area	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.87

Table 9. Average density (fish/100 m^2) of cutthroat trout > 300 mm counted in reaches of the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, during snorkel evaluations from 1973 to 2002.

River section	1973	1980	1981	1987	1988	1991	1993	1994	1995	1996	1997	1998	2000	2001	2002
N.F. Cd'A - S. F. Cd'A to Prichard Cr.	0.00	0.02	0.01	--	0.01	0.01	0.08	0.01	0.01	0.04	0.00	0.00	0.01	0.03	0.01
N.F. Cd'A - Prichard Cr to Yellowdog Cr.	0.00	0.00	0.00	--	0.01	0.03	0.02	0.04	0.01	0.01	0.01	0.03	0.01	0.06	0.04
N.F. Cd'A - Yellowdog Cr to Tepee Cr.	0.02	0.12	0.04	0.12	0.08	0.13	0.04	0.31	0.07	0.14	0.11	0.02	0.07	0.07	0.12
N.F. Cd'A - Tepee Cr. to Jordan Cr.	0.06	0.43	0.26	1.25	0.23	0.06	0.23	0.37	0.29	0.30	0.21	0.18	0.38	0.09	0.44
Tepee Creek	0.00	0.03	0.43	0.20	0.06	0.18	0.08	0.09	0.09	0.00	0.08	0.08	0.05	0.04	0.22
L.N.F. Cda - Mouth to Laverne Cr.	0.02	0.02	0.00	--	0.05	0.05	0.06	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.00
L.N.F. Cda - Laverne Cr. to Burnt Cabin Cr.	0.18	0.37	0.18	--	0.09	0.00	0.03	0.00	0.00	0.05	0.00	0.00	0.06	0.00	0.11
Entire N.F. Cd'A and Tepee Creek	0.01	0.05	0.04	--	0.04	0.05	0.06	0.08	0.04	0.06	0.04	0.03	0.04	0.05	0.06
Entire L.N.F. Cd'A River	0.03	0.05	0.02	--	0.06	0.04	0.06	0.00	0.00	0.02	0.00	0.00	0.04	0.00	0.02
All Transects	0.01	0.05	0.04	--	0.05	0.04	0.06	0.06	0.03	0.06	0.03	0.02	0.04	0.03	0.06
N.F. Cd'A - upstream of Jordan Cr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.15
Tepee Creek rehabilitation area	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05

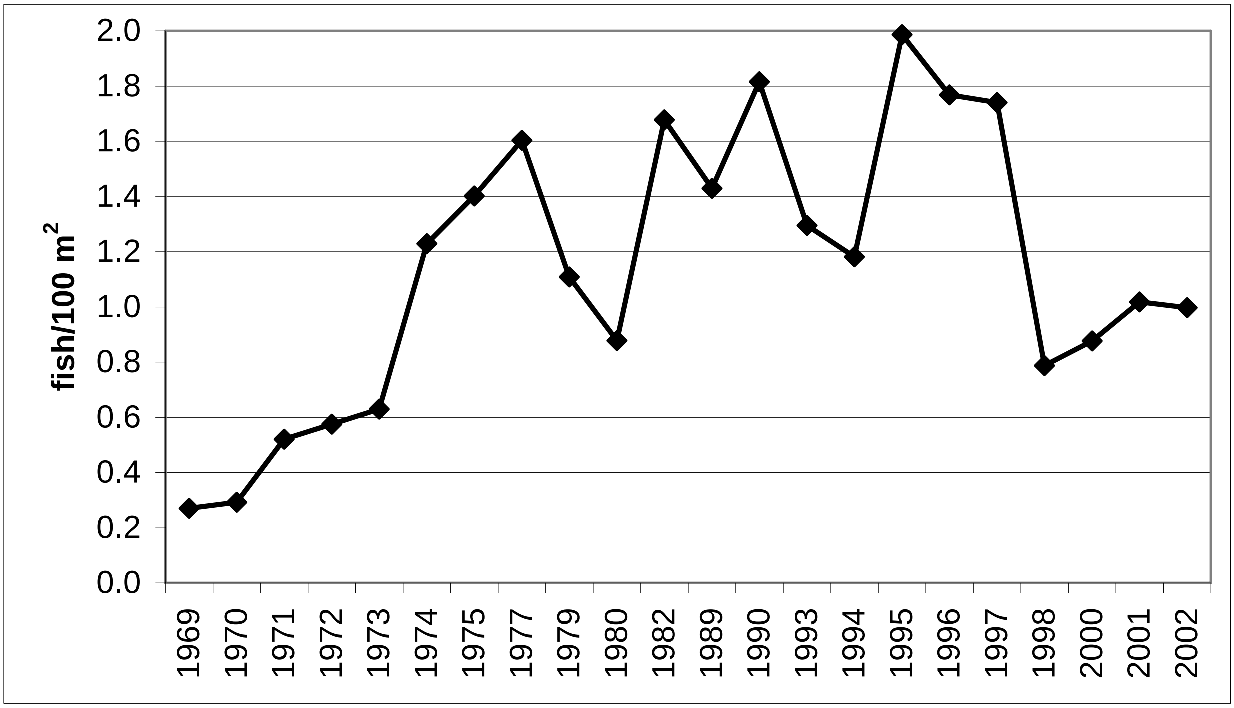

Figure 11. The average density (fish/100 m^2) of all size classes of cutthroat trout observed while snorkeling the St. Joe River, Idaho, between the North Fork St. Joe River and Ruby Creek from 1969 to 2002.

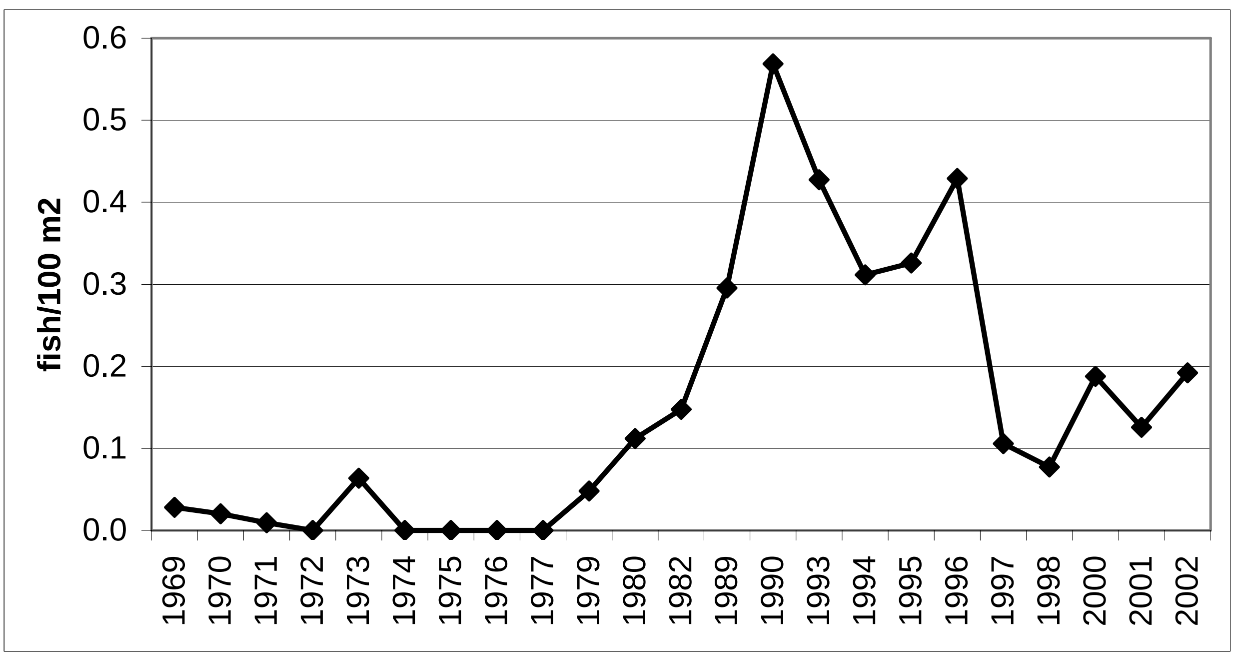

Figure 12. The average density (fish/100 m^2) of cutthroat trout > 300 mm observed while snorkeling the St. Joe River, Idaho between the North Fork St. Joe River and Ruby Creek from 1969 to 2002.

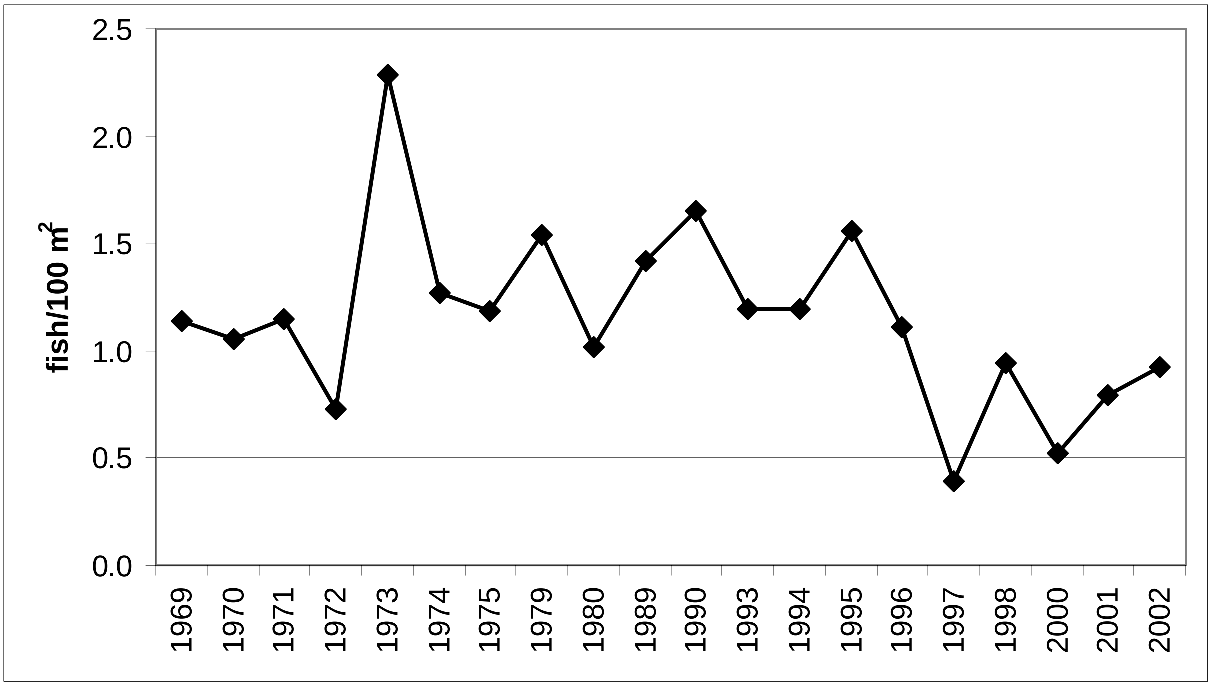

Figure 13. The average density (fish/100 m^2) of mountain whitefish observed while snorkeling the St. Joe River, Idaho, between the North Fork St. Joe River and Ruby Creek from 1969 to 2002.

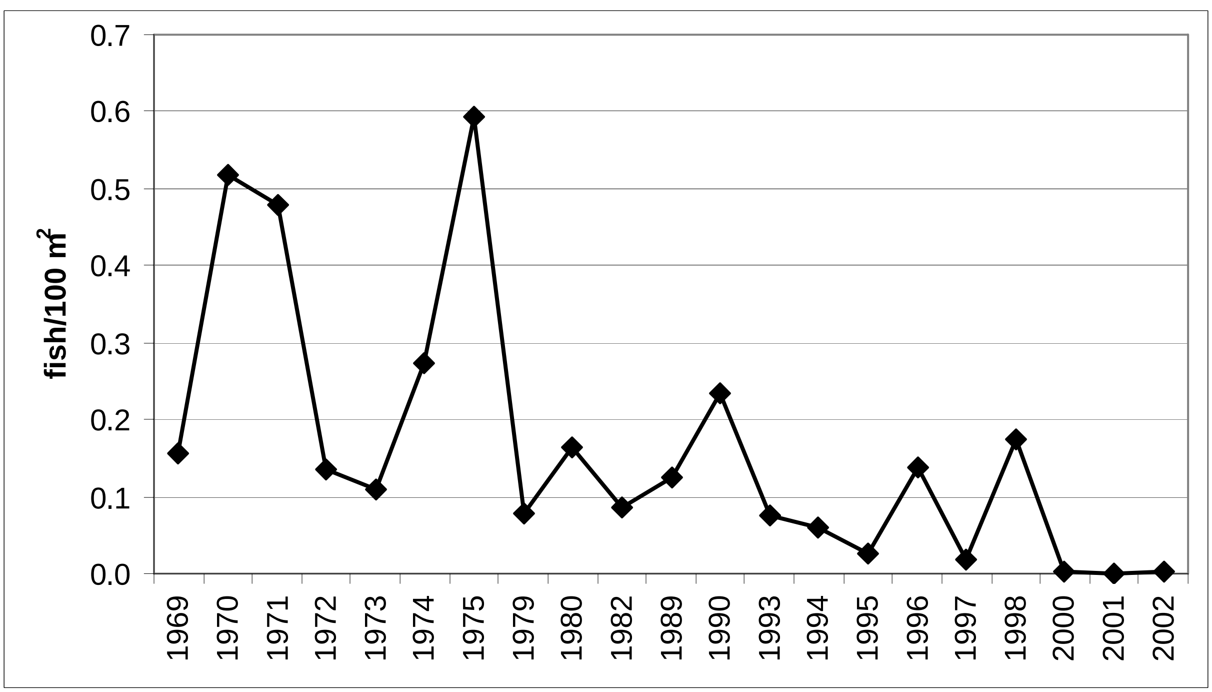

Figure 14. The average density of rainbow trout (fish/100 m^2) observed while snorkeling the St. Joe River, Idaho, between the North Fork St. Joe River and Ruby Creek from 1969 to 2002.

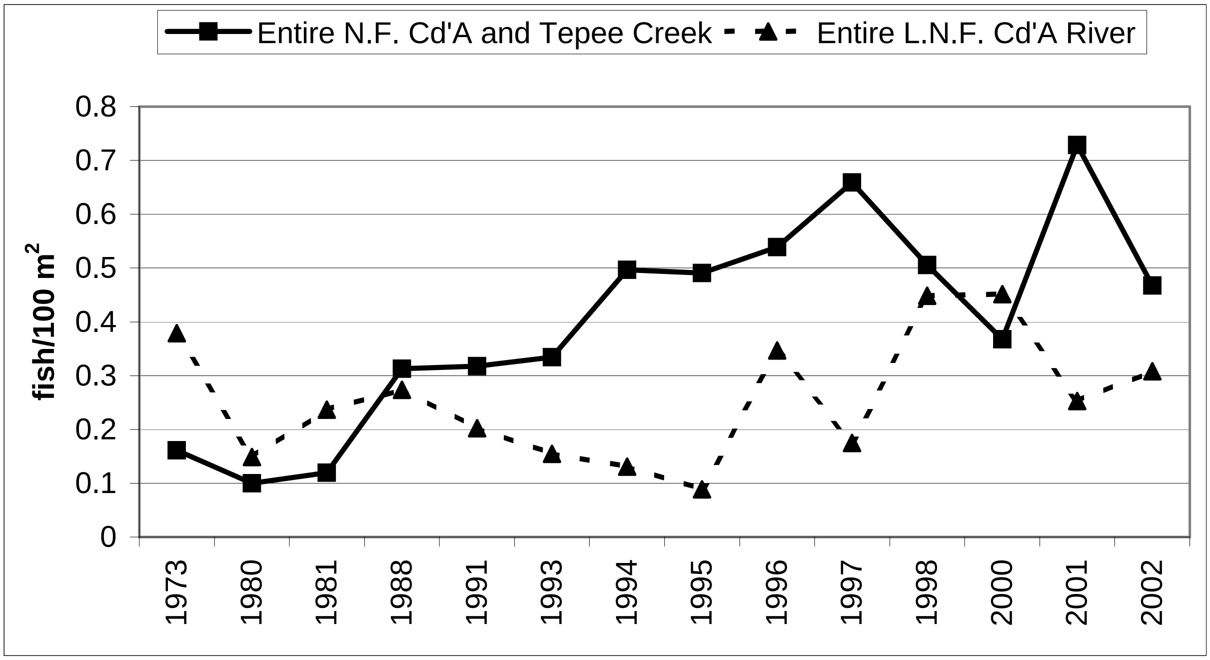

Figure 15. The average density (fish/100 m^2) of cutthroat trout observed while snorkeling the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, from 1973 to 2002.

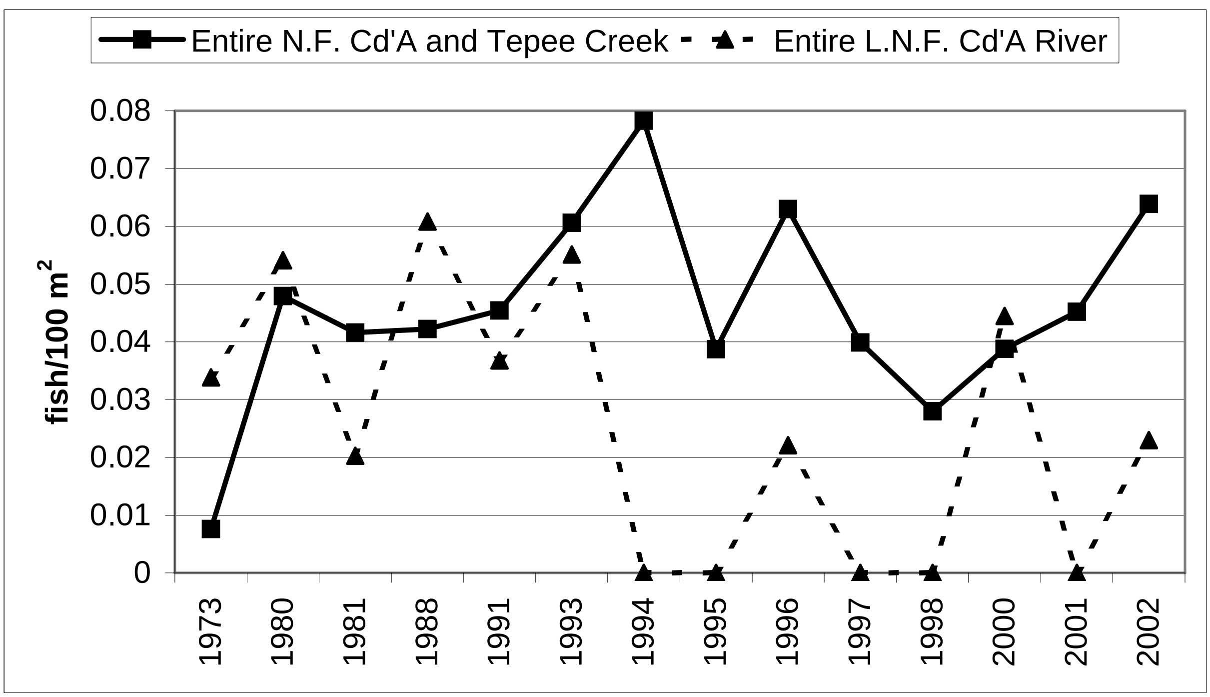

Figure 16. The average density (fish/100 m^2) of cutthroat trout > 300 mm observed while snorkeling the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, from 1973 to 2002.

classes and fish > 300 mm) in the catch and release area was significantly higher (t-test, $P = 0.02$ and $P = 0.01$ respectively) than we observed in the restricted harvest area. We snorkeled six additional transects in the North Fork Coeur d'Alene River at or upstream of Jordan Creek (Figure 2). Through these snorkeling efforts we found the overall densities of cutthroat trout to be 0.51 fish/100 m^2 and 0.15 fish/100 m^2 for cutthroat trout > 300 mm (Tables 8 and 9). These densities are higher than the average density of cutthroat trout observed in the entire North Fork Coeur d'Alene River, although not significantly.

The two transects we snorkeled in the rehabilitation area of Tepee Creek had an average density of 0.87 cutthroat trout/100 m^2 (all size classes combined) and 0.15 cutthroat trout/100 m^2 for fish > 300 mm. These densities are lower than the average density of cutthroat trout observed in the Tepee Creek transects that are evaluated on an annual basis (Tables 8 and 9).

Cutthroat trout densities in the Little North Fork Coeur d'Alene River (0.31 fish/100 m^2) are considerably lower than what was observed in the North Fork Coeur d'Alene River (Table 8). Cutthroat trout densities (all size classes) appear to be increasing in the Little North Fork Coeur d'Alene River if we look at only the data collected after 1994, although no apparent trend in abundance is evident if we evaluate the data since 1973 (Figure 15). About 7% of the cutthroat trout observed in the Little North Fork Coeur d'Alene River during 2002 were over 300 mm in length, and a downward trend is evident if densities are evaluated over time (Figure 16). Cutthroat trout densities (all size classes and fish > 300 mm) were significantly higher (t-test, $P = 0.03$ for all size classes; $P = 0.01$ for fish > 300 mm) in the catch-and-release area upstream of Laverne Creek than in the restricted harvest area.

Mountain whitefish were observed in 22 snorkel transects in the Coeur d'Alene River and densities ranged from 0.00 to 7.0 fish/100 m^2 with a mean density of 1.9 fish/100 m^2. Highest densities of mountain whitefish were in the lower reach of the river, with few mountain whitefish observed upstream of Teepee Creek or in the Little North Fork Coeur d'Alene River (Tables 6 and 7). The average mountain whitefish density observed in the North Fork Coeur d'Alene River has fluctuated greatly since 1973 and a trend over time is not evident (Table 10 and Figure 17).

Rainbow trout were observed in 13 snorkel transects. About 99% of the rainbow trout were observed in the most downstream reaches where harvest is allowed (Tables 6 and 7). These are the same stream reaches where rainbow trout have been stocked in the past. Densities of rainbow trout observed ranged from 0.00 to 2.33 fish/100 m^2, with a mean density of 0.31 fish/100 m^2. Of the 424 rainbow trout observed, 31 (7.3%) were estimated to be over 300 mm in length. Between 1993, and 2002 the average density of rainbow trout has remained relatively constant in the Coeur d'Alene River (Table 11 and Figure 18).

Mica Creek Fishery Assessment

We electrofished seven transects on South Fork and North Fork Mica creeks during July 1 and 2, 2002 to assess their fishery and to evaluate the impacts the Highway 95 construction project had on it (Figure 3 and Table 12). Time limitations and sampling difficulties prevented us from sampling the nine transects we previously planned on. Cutthroat trout and torrent sculpin *Cottus rhotheus* were the most abundant fish and were sampled from every transect we electrofished (Table 12). Two brook trout *Salvelinus fontinalis* were the only other fish we sampled; both came from one transect in upper S.F. Mica Creek where low gradients, fine

Table 10. Average density (fish/100 m^2) of mountain whitefish counted in reaches of the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, during snorkel evaluations from 1973 to 2002.

River section	1973	1980	1981	1987	1988	1991	1993	1994	1995	1996	1997	1998	2000	2001	2002
N.F. Cd'A - S. F. Cd'A to Prichard Cr.	0.75	1.47	0.18	--	3.09	6.59	0.45	2.42	2.53	5.54	0.69	1.05	7.38	4.36	2.91
N.F. Cd'A - Prichard Cr to Yellowdog Cr.	0.46	0.02	0.12	--	0.03	1.25	0.29	0.65	0.11	1.13	0.56	0.58	0.23	0.20	0.32
N.F. Cd'A - Yellowdog Cr to Tepee Cr.	3.19	1.18	1.71	1.34	1.09	5.52	1.07	2.60	1.65	5.05	1.45	3.57	2.90	4.00	2.13
N.F. Cd'A - Tepee Cr. to Jordan Cr.	0.00	0.00	0.00	0.00	0.11	0.00	0.00	1.33	2.41	1.12	0.00	2.80	0.13	0.97	0.65
Tepee Creek	0.00	0.35	0.00	0.00	0.00	0.00	0.06	0.00	0.00	2.68	0.00	0.20	0.36	1.09	0.91
L.N.F. Cda - Mouth to Laverne Cr.	0.59	0.01	0.12	--	0.03	0.00	0.00	0.00	0.00	1.88	0.00	0.02	0.00	0.04	0.03
L.N.F. Cda - Laverne Cr. to Burnt Cabin Cr.	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Entire N.F. Cd'A River and Tepee Creek	0.94	0.77	0.37	--	1.13	3.84	0.43	1.68	1.53	3.40	0.63	1.26	3.21	3.26	2.21
Entire L.N.F. Cd'A River	0.52	0.01	0.11	--	0.02	0.00	0.00	0.00	0.00	1.34	0.00	0.02	0.00	0.03	0.02
All Transects	0.87	0.65	0.33	--	0.96	3.18	0.37	1.35	1.26	3.03	0.52	1.00	2.78	2.49	1.85
N.F. Cd'A - upstream of Jordan Cr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00
Tepee Creek rehabilitation area	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00

Table 11. Average density (fish/100 m^2) of rainbow trout counted in reaches of the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, during snorkel evaluations from 1973 to 2002.

River section	1973	1980	1981	1987	1988	1991	1993	1994	1995	1996	1997	1998	2000	2001	2002
N.F. Cd'A - S. F. Cd'A to Prichard Cr.	0.35	0.45	0.59	--	3.15	0.22	0.04	0.16	0.61	0.50	0.75	0.42	1.06	0.76	0.52
N.F. Cd'A - Prichard Cr to Yellowdog Cr.	0.48	0.12	0.46	--	0.14	0.20	0.01	0.08	0.14	0.02	0.12	0.06	0.03	0.11	0.00
N.F. Cd'A - Yellowdog Cr to Tepee Cr.	0.03	0.21	0.34	0.11	0.03	0.04	0.00	0.00	0.02	0.25	0.01	0.01	0.01	0.14	0.00
N.F. Cd'A - Tepee Cr. to Jordan Cr.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tepee Creek	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L.N.F. Cda - Mouth to Laverne Cr.	1.39	0.55	1.25	--	1.60	0.99	0.22	0.45	0.02	0.09	0.24	0.54	0.35	0.18	0.46
L.N.F. Cda - Laverne Cr. to Burnt Cabin Cr.	0.12	0.06	0.18	--	0.05	0.03	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.13
Entire N.F. Cd'A River and Tepee Creek	0.31	0.25	0.45	--	0.94	0.16	0.02	0.10	0.33	0.21	0.35	0.22	0.40	0.47	0.31
Entire L.N.F. Cd'A River	1.25	0.49	1.13	--	1.27	0.80	0.18	0.34	0.02	0.24	0.19	0.43	0.28	0.15	0.39
All Transects	0.46	0.29	0.56	--	0.99	0.27	0.04	0.14	0.28	0.22	0.32	0.27	0.38	0.39	0.33
N.F. Cd'A - upstream of Jordan Cr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00
Tepee Creek Rehab	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00

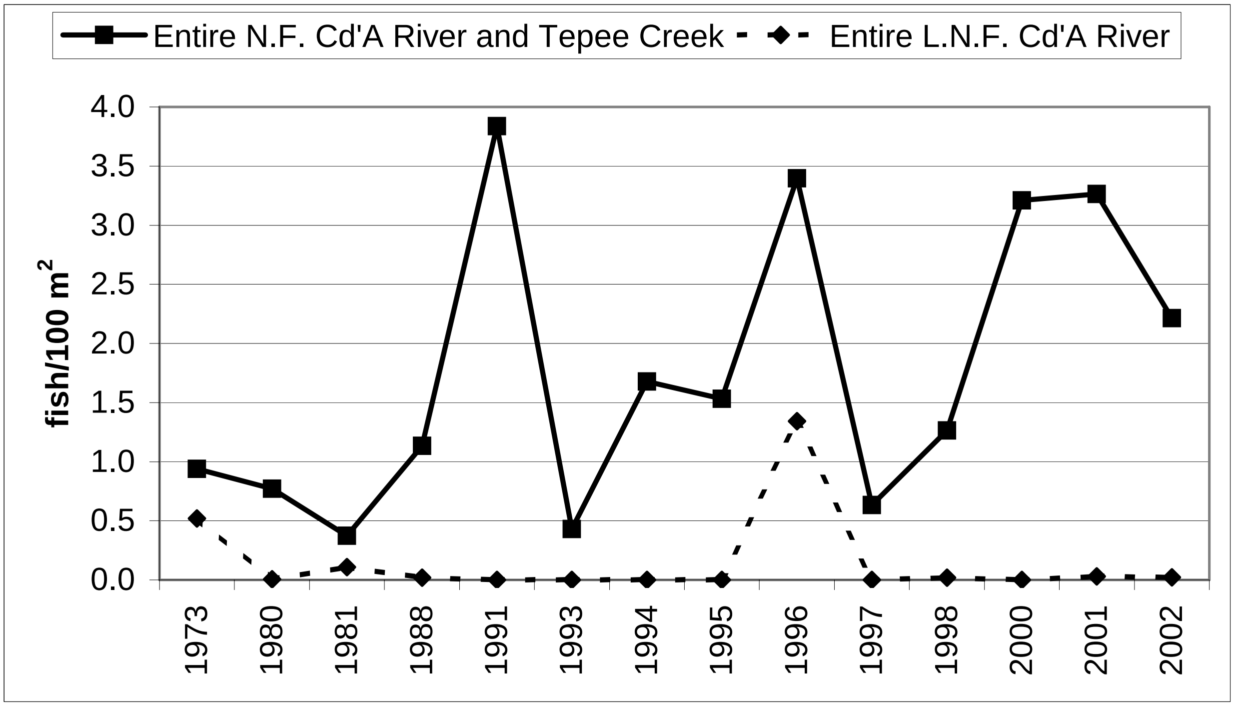

Figure 17. The average density (fish/100 m^2) of mountain whitefish observed while snorkeling the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, from 1973 to 2002.

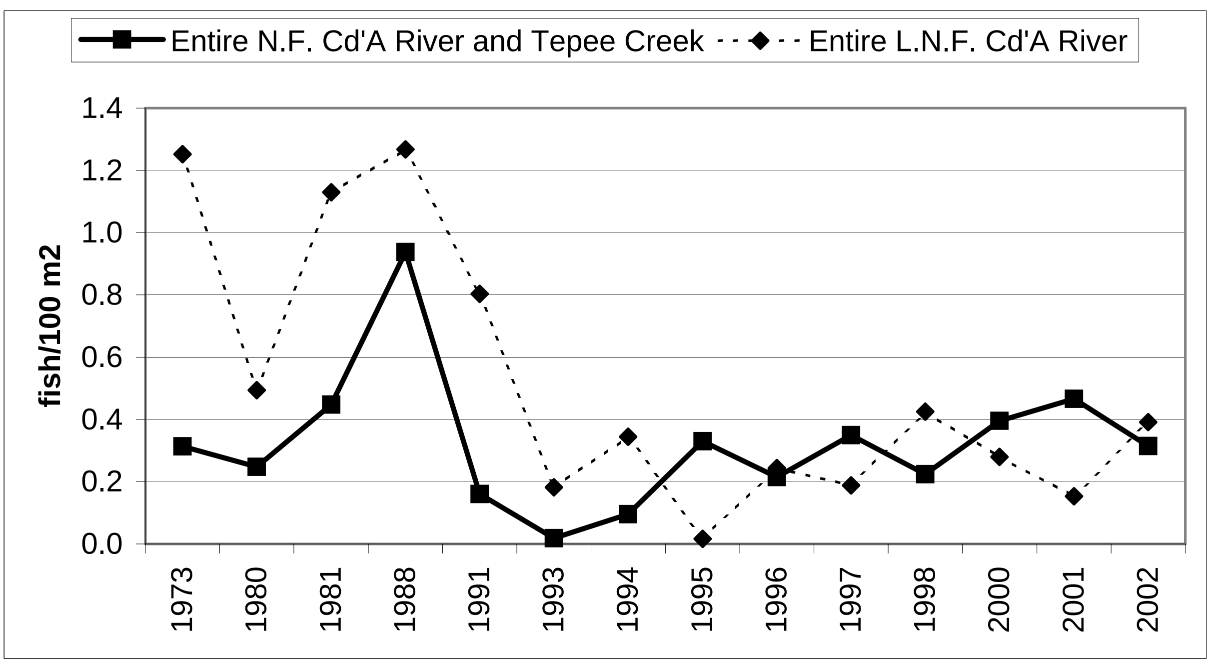

Figure 18. The average density (fish/100 m^2) of rainbow trout observed while snorkeling the North Fork Coeur d'Alene River (N.F. Cd'A) and Little North Fork Coeur d'Alene River (L.N.F. Cd'A), Idaho, from 1973 to 2002.

Table 12. Density (no./100 m^2) of fishes determined from electrofishing on July 1-2, 2002 in the Mica Creek watershed, Coeur d'Alene, Idaho. The lower South Fork Mica Creek was located along the highway 95 construction project whereas upper South Fork Mica Creek and North Fork Mica Creek were not influenced by the highway project.

Stream	Transect	Sampling Date/Time	Temp (°C)	Area (m^2) Sampled	Cutthroat Trout Density (#/100m^2)	Torrent Sculpin Density (#/100m^2)	Brook Trout Density (#/100m^2)
Lower S.F. Mica Creek	S4	7/1/02 12:30	15	330.4	14.9	16.9	0.0
Lower S.F. Mica Creek	S23	7/1/02 13:40	15	358.6	30.4	5.6	0.0
Lower S.F. Mica Creek	S32	7/2/02 8:30	12	187.8	9.2	10.6	0.0
Lower S.F. Mica Creek	All	-	-	876.9	20.0	10.9	0.0
Upper S.F. Mica Creek	U4	7/2/02 16:00	13	178.8	4.2	8.4	2.8
Upper S.F. Mica Creek	U11	7/2/02 14:30	12	105.8	15.1	3.8	0.0
Upper S.F. Mica Creek	All	-	-	284.6	8.3	6.7	1.8
N.F. Mica Creek	N10	7/2/02 10:00	12	550.8	0.3	9.2	0.0
N.F. Mica Creek	N14	7/2/02 10:50	13	510.4	2.9	11.6	0.0
N.F. Mica Creek	All	-	-	1061.2	1.5	10.3	0.0

substrates and beaver ponds were common. Crayfish *Astacidae spp* were also sampled from most transects in both the South Fork and North Fork. The 146 cutthroat trout we sampled during this survey ranged in size from 70-195 mm in length with only four of these fish (3%) being over 146 mm in length (Figure 19). Cutthroat trout in this size rage would be characteristic of an adfluvial population. The two brook trout we sampled were 235 and 266 mm in length - the two largest fish sampled during this survey.

Habitat conditions in the three stream reaches we surveyed varied quite extensively (Table 13). Based on these wide differences in habitat, we can't conclude that the fish densities were similar in all three stream reaches prior to the highway construction project. This is a violation of one of our assumptions, which restricts us from evaluating what impact the highway construction project may have had on the fishery by comparing the density of fishes between the stream reaches we sampled.

The highest density of cutthroat trout was actually found in lower South Fork Mica Creek ($20.0/100m^2$), which parallels the highway construction project. However, within this reach of stream, the lowest cutthroat trout densities occurred in the transect where noticeable amounts of sediment had been delivered to the stream from the highway project (Tables 12 and 13). The lowest density of cutthroat trout occurred in North Fork Mica Creek ($1.5\ 100/m^2$), which was impacted by years of cattle grazing.

We collected tissue samples from 39 cutthroat throughout the transects we surveyed. Due to time limitations in the lab, our tissue samples were not genetically evaluated to determine the purity of the cutthroat trout we sampled. Our tissue samples are scheduled for analysis later this year. Findings will be reported in next year's annual report.

Lower Priest River Fishery Assessment

We electrofished the lower 12 km of Priest River on April 24, 2002 (Figure 4). We sampled 287 fishes during 8,321 seconds (138.7 min) of shock time. The most abundant fishes sampled were mountain whitefish (157) and largescale suckers *Catostomus catostomus* (116) (Table 14). Cutthroat trout, rainbow trout and brown trout *Salmo trutta* were all sampled from this stretch of river, but only represented 3.1% of the total catch. All the trout we sampled ranged in size from 272 to 320 mm. The water temperature during this sampling effort was 5°C.

Bull Trout Spawning Surveys

Priest River Basin

Twenty-four bull trout redds were counted in the Upper Priest River basin from October 1-7, 2002 (Figure 5 and Table 15). The majority of these redds were counted in Upper Priest River (21 out of 24). The number of redds counted in 2002 is the second lowest since we started counting the entire Upper Priest River in 1996. If we evaluate only those stream reaches in the Upper Priest Lake basin that were counted during 1985 and 1986, this year is the lowest we have ever seen and is 5% of what was counted in 1985 (Table 15). Redd counts on the East River (Middle Fork East River and Uleda Creek) occurred on October 22, 2002. During this survey we counted 16 redds that were large enough to be made by bull trout (Figure 6). Four of these redds were found in the East River and the lower 2 km of Middle Fork East River. Bull trout do not appear to use this section of stream during the spawning season (DuPont and

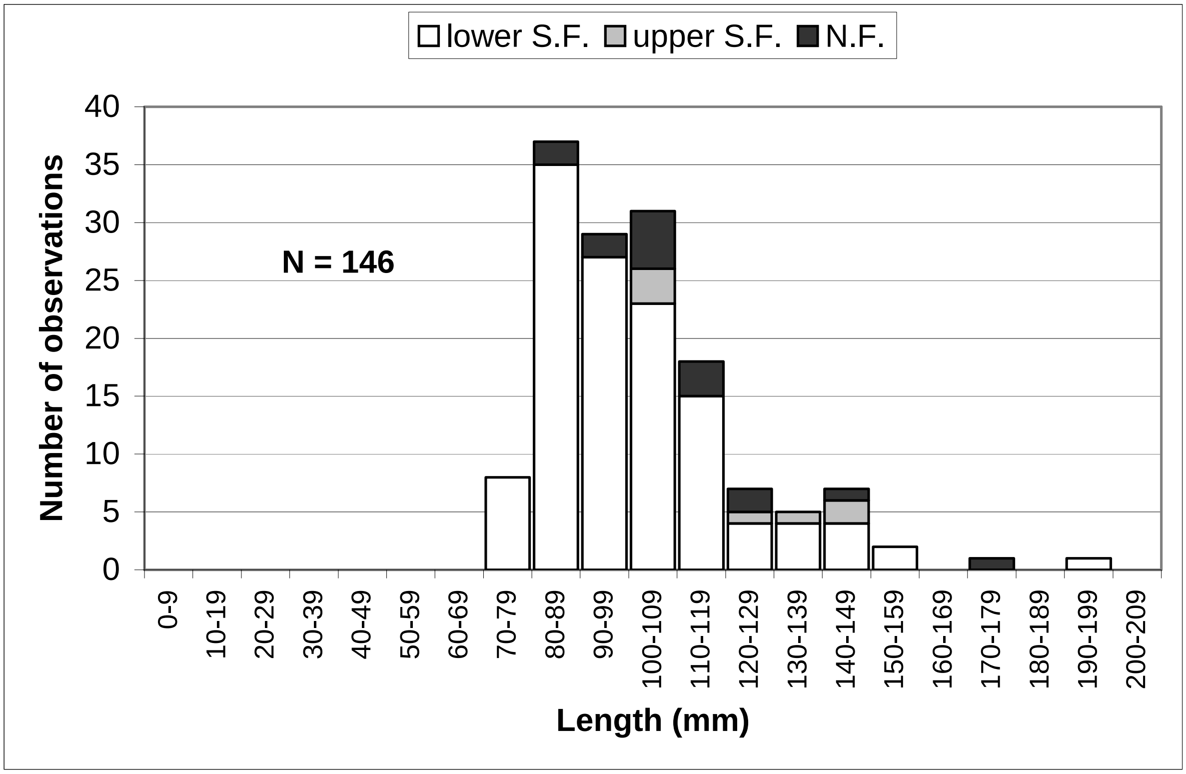

Figure 19. Length frequency histogram of cutthroat trout caught in lower South Fork Mica Creek (lower S.F.), upper South Fork Mica Creek (upper S.F.) and North Fork Mica Creek (N.F.), Coeur d'Alene Lake, Idaho during July 1-2, 2002.

Table 13. General habitat conditions observed at transects electrofished in the Mica Creek watershed, Coeur d'Alene Lake, Idaho, on July 1-2, 2002.

Stream	Transect	Stream Grade (%)	LOD[a] Quantities	Beaver Ponds	Dominant Substrates	Noticeable impacts
Lower S.F. Mica Creek	S4	2	Low	No	Gravel and sand	Some reduction in riparian vegetation from grazing
Lower S.F. Mica Creek	S23	4	Moderate	No	Cobble and Gravel	
Lower S.F. Mica Creek	S32	3	Moderate	No	Cobble and Silt	Sediment delivery from highway project
Upper S.F. Mica Creek	U4	2	Moderate	Yes	Gravel and sand	
Upper S.F. Mica Creek	U11	1	Moderate	Yes	Sand and gravel	Some riparian clearing from old homestead
N.F. Mica Creek	N10	2	Low	No	Gravel and sand	Reduction in riparian vegetation and LOD from grazing
N.F. Mica Creek	N14	4	Low	No	Cobble and boulder	Reduction in riparian vegetation and LOD from grazing

[a]LOD – large organic debris.

Table 14. Fishes collected by electrofishing from the lower 12 km of Priest River, Idaho, on April 24, 2002.

	Total	%	Length (mm)		
Species	Sampled	Comp	Min	Max	Average
Cutthroat trout	7	2.4	272	320	293
Rainbow trout	1	0.3	312	312	312
Brown Trout	1	0.3	310	310	310
Moutain Whitefish	157	54.7	100	330	242
Sculpin species	3	1.0	-	-	-
Largescale Sucker	116	40.4	75	510	421
Northern pikeminnow	2	0.7	350	455	403
Grand Total	287	99.8			

Table 15. Description of bull trout redd count transect locations, distance surveyed and number of redds counted in the Priest River drainage, Idaho, from 1985 to 2002.

Stream	Transect Description	Length (km)	1985	1986	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Upper Priest River	Falls to Rock Cr.	12.5	--	--	--	--	--	--	15	4	15	33	7	7	17
	Rock Cr. to Lime Cr.	1.6	--	--	--	2	1	1	2	0	3	7	0	2	0
	Lime Cr. to Snow Cr.	4.2	12[a]	5[a]	--	3	4	2	8	1	10	9	9	5	1
	Snow Cr. to Hughes Cr.	11.0	--	--	--	0	0	--	0	3	7	4	2	8	3
	Hughes Cr. to Priest Lake	2.3	--	--	--	0	0	--	0	--	--	0	0	--	--
Rock Cr.	Mouth to F.S. trail 308	0.8	--	--	0	0	--	--	2	1	0	--	0	0	0
Lime Cr.	Mouth upstream 0.8 km	1.2	4[b]	1[b]	0	0	--	--	0	2	0	1	0	0	0
Cedar Cr.	Mouth upstream 1.6 km	3.4	--	--	--	0	2	1	0	1	0	0	0	0	0
Ruby Cr.	Mouth to waterfall	3.4	--	--	0	0	--	--	--	0	0	--	--	--	0
Hughes Cr.	Trail 312 to trail 311	2.5	1	17	7	3	2	0	1	4	0	1	0	0	0
	Trail 311 to F.S. road 622	4.0	35[c]	2[c]	2	0	7	1	2	0	0	0	0	0	0
	F.S. road 622 to mouth	7.1	4[d]	0[d]	--	1	--	--	2	3	1	0	2	6	1
Bench Cr.	Mouth upstream 0.8 km	1.1	1	2	0	2	2	0	1	0	0	0	0	0	0
Jackson Cr.	Mouth to F.S. trail 311	2.2	--	--	4	0	0	0	0	0	0	--	--	--	0
Gold Cr.	Mouth to culvert	3.7	24	23	5	2	6	5	3	0	1	1	9	5	2
Boulder Cr.	Mouth to waterfall	2.3	--	--	0	0	0	--	0	0	0	--	0	--	--
Trapper Cr.	Mouth upstream 5.0 km	5.0	--	--	--	4	4	2	5	3	8	2	0	1	0
Caribou Cr.	Mouth to old road crossing	2.6	--	--	--	1	0	0	0	0	0	--	--	--	--
MF East River	Tarlac Cr. to Keokee Cr.	11.8	--	--	--	--	--	--	--	--	--	--	--	4	8
Uleda Creek	Mouth upstream 3.0 km	1.1	--	--	--	--	--	--	--	--	--	--	--	3	4
All stream reaches combined		83.8	80[e]	48[e]	18	18	28	12[f]	41	22	45	58	29	41	36
Only those stream reaches evaluated during 1985-6		23.8[g]	80	48	14[h]	11	21[h]	8[f]	17	10	12	12	20	16	4

[a] Redds were counted from Lime Creek to Cedar Creek, which is about half the distance that is currently counted.
[b] Redds were counted from the mouth to FS road 1013, which is about 1/4 of the distance that is currently counted.
[c] About 2/3 of the distance was counted in 1985 and 1986 that is currently counted.
[d] Redds were counted from FS road 622 to the FS Road 1013, which is about 1/3 of the distance that is currently counted.
[e] Redds were counted in about 20% of the stream reaches where they are currently counted.
[f] Observation conditions impaired by high runoff.
[g] During 1985 and 1986 about 15 km of stream was counted.
[h] Two of the sites were not counted

Horner in Press); consequently, we believe these four redds were made by brown trout which frequent this area. This brings the total number of bull trout redds counted in Middle Fork East River and Uleda Creek to 12 (Table 15). Many of the bull trout redds we observed were covered in algae, which made their identification difficult. It is likely redds were missed due to our late sampling date. The 12 redds we counted this year are more than what we counted during 2001 (7) when considerably less stream was walked. Expanding the number of redds observed by 2.2 and 3.2 fish/redd, an estimated range of 53-77 bull trout entered streams from the Upper Priest Lake basin and 26 to 38 bull trout entered the East River to spawn in 2002.

Pend Oreille Lake Basin

A total of 879 bull trout redds were counted in the Pend Oreille Lake drainage, of which 692 (79%) were in the six index streams (Trestle, East Fork Lightning, Gold, North Gold, Johnson, and Grouse creeks) (Figure 7 and Table 16). All redds were counted between October 11 and October 24. As is typical, the most redds were counted in Trestle Creek (333), followed by Gold Creek (204), East Fork of Lightning Creek (58), Granite Creek (57) and Grouse Creek (42) (Table 10). The total number of redds counted in 2002 were second only to 1984 when 881 redds were counted. The number of redds counted in the six index streams is the highest ever counted by nearly 70 redds. This can be attributed largely to the record high numbers of redds counted in Trestle Creek and Gold Creek. If the number of redds counted in the six index streams are evaluated from 1983 to 2002, a relatively flat trend is observed. However, if only the last ten years are evaluated an increasing trend is evident. Expanding the number of redds observed by 2.2 and 3.2 fish/redd, an estimated range of 1,934-2,813 bull trout entered the Pend Oreille Lake tributaries to spawn in 2002.

St. Joe River

We counted 54 redds in the three index streams (Medicine Creek, Wisdom Creek, and upper St. Joe River) of the St. Joe River drainage on September 24, 2002 (Figure 8 and Table 17). This is the third highest number of redds counted in these streams since counts began in 1992. The 42 redds counted in Medicine Creek represent 78% of all the redds counted during 2002. If the number of redds counted in the three index streams are evaluated from 1992 to 2002, an increasing trend is observed. Expanding the number of redds observed by 2.2 and 3.2 fish/redd, an estimated range of 119-173 bull trout entered the St. Joe drainage index stream reaches to spawn in 2002.

Little North Fork Clearwater River

Bull trout redd surveys were conducted on September 25, 2002 in the upper Little North Fork Clearwater River drainage. During this survey 36 redds were counted, which is double what we have ever counted (Figure 9 and Table 18). During 2002, we counted 10 km more stream then we had in the past. The number of redds we counted in 2002 is similar to the 39 redds Region 2 counted during 2001 in the upper Little North Fork Clearwater. During 2002, six of the observed redds were about 250 mm in diameter, which may have been constructed by resident bull trout (Table 18). Bull trout about 250-300 mm in length were seen constructing one of these redds (Danielle Schiff, IDFG, personal communication). This is the first time we have counted this size of redd in the upper Little North Fork Clearwater River basin. It is unclear if this size of redd has been seen in the past but not counted. It is difficult to evaluate the trend in the number or redds counted in these streams. This difficulty stems from the inconsistency in counting the same stream reaches throughout the years, adding new reaches and counting

Table 16. Number of bull trout redds counted per stream in the Lake Pend Oreille basin, Idaho, from 1983 to 2002.

Stream	1983	1984	1985	1986	1987	1988	1989	1990	1991[a]	1992	1993	1994	1995[b]	1996	1997	1998	1999	2000	2001	2002
CLARK FORK R.	--	--	--	--	--	--	--	--	--	2	8	17	18	3	7	8	5	5	6	7
Lightning Cr.	28	9	46	14	4	--	--	--	--	11	2	5	0	6	0	3	16	4	7	8
E. F. Lightning Cr.	110	24	132	8	59	79	100	29	--	32	27	28	3	49	22	64	44	54	36	58
Savage Cr.	36	12	29	--	0	--	--	--	--	1	6	6	0	0	0	0	4	2	4	15
Char Cr.	18	9	11	0	2	--	--	--	--	9	37	13	2	14	1	16	17	11	2	8
Porcupine Cr.	37	52	32	1	9	--	--	--	--	4	6	1	2	0	0	0	4	4	0	0
Wellington Cr.	21	18	15	7	2	--	--	--	--	9	4	9	1	5	2	1	22	8	7	7
Rattle Cr.	51	32	21	10	35	--	--	--	--	10	8	0	1	10	2	15	13	12	67	33
Johnson Cr.	13	33	23	36	10	4	17	33	25	16	23	3	4	5	27	17	31	4	34	31
Twin Cr.	7	25	5	28	0	--	--	--	--	3	4	0	5	16	6	10	19	10	1	8
Morris Cr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	0	7
Strong Cr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
NORTH SHORE																				
Trestle Cr.	298	272	298	147	230	236	217	274	220	134	304	276	140	243	221	330	253	301	331	333
Pack River	34	37	49	25	14	--	--	--	--	65	21	22	0	6	4	17	0	8	28	22
Grouse Cr.	2	108	55	13	56	24	50	48	33	17	23	18	0	50	8	44	50	77	18	42
EAST SHORE																				
Granite Cr.	3	81	37	37	30	--	--	--	--	0	7	11	9	47	90	49	41	25	7	57
Sullivan Springs	9	8	14	--	6	--	--	--	--	0	24	31	9	15	42	10	22	19	8	15
North Gold Cr.	16	37	52	8	36	24	37	35	41	41	32	27	31	39	19	22	16	19	16	24
Gold Cr.	131	124	11	78	62	111	122	84	104	93	120	164	95	100	76	120	147	168	127	204
Total 6 index streams	570	598	571	290	453	478	543	503	423	333	529	516	273	486	373	597	541	623	562	692
Total of all streams	814	881	830	412	555	478	543	503	423	447	656	631	320	608	527	726	705	732	699	879

[a] Represents partial counts due to early snow fall.
[b] Observation conditions impaired by high runoff.
[c] Index streams include Trestle, East Fork Lightning, Gold, North Gold, Johnson, and Grouse creeks.
[d] Includes an additional reach immediately upstream of index reach on Trestle Creek, which accounted for 4 additional redds.

Table 17. Number of bull trout redds counted per stream in the St. Joe River basin, Idaho, from 1992 to 2002.

Stream	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
St. Joe R.- Heller Cr. to Lake[a]	10	14	3	20	14	6	0	10	2	11	3
Beaver Cr. and Bad Bear Cr.	2	2	0	0	0	0	1	--	--	--	--
Fly Cr.	--	--	--	0	0	--	2	--	--	--	--
Heller Cr.	0	0	--	0	--	1	0	--	0	--	--
Medicine Cr.[a]	11	33	48	26	23	13	11	48	43	16	42
Mosquito Cr.	--	--	--	0	4	--	2	--	--	--	--
Red Ives Cr.	--	0	--	1	0	1	0	--	0	--	--
Sherlock Cr.	0	3	--	2	1	1	0	--	0	--	--
Simmons Cr.	--	7	5	0	--	0	1	--	--	--	--
Wisdom Cr.[a]	1	1	4	5	1	0	4	11	3	13	9
Total (index streams)	22	48	55	51	38	19	15	69	48	40	54
Total (all streams)	24	60	60	54	43	22	21	69	48	40	54

[a] Bull trout index streams for the St. Joe River.

Table 18. Number of bull trout redds counted per stream in the Little North Fork Clearwater River basin, Idaho, from 1994 to 2002. During 2001, IDFG Clearwater Region fisheries personnel also surveyed some of the same stream reaches as the Panhandle Region. Redd counts numbers from the Clearwater Region are in parentheses.

Stream	Length (km)	1994	1996	1997	1998	1999	2000	2001	2002
Butte Creek	1.2	--	--	--	--	--	--	(5)	0
Rocky Run Creek	1.5	--	--	--	--	--	--	--	5
Lund Creek	3.9	0	7	2	2	1	1	13 (5)	7
Little Lost Lake Creek	3.9	0	1	1	1	7	3	1	6[a]
Lost Lake Creek	3.0	0	0	0	0	--	1	--	0
Little North Fork Clearwater River									
1268 Bridge to Lund Cr.	7.0	--	--	--	--	--	--	(17)	6
Lund Cr. to Lost Lake Cr.	3.8	--	--	3	1	9	8	3 (12)	7[b]
Lost Lake Cr. to headwaters	5.4	0	2	0	0	--	5	1	5
Total	29.7	0	10	6	4	17	18	18 (39)	36

[a] Four of these redds were about 250 mm in diameter and likely constructed by resident fish.
[b] Two of these redds were about 250 mm in diameter and likely constructed by resident fish.

redds that were created by resident fish. If we only look at those stream reaches that we have counted since 1997, the number of redds we observed in 2002 (25) were the most we have seen. Expanding the number of redds observed by 2.2 and 3.2 fish/redd, an estimated range of 79 - 115 bull trout entered the upper Little North Fork Clearwater River to spawn in 2002.

Bull Trout Milt Cryopreservation

We electrofished a total of 2 km of Gold Creek, Hughes Fork and Upper Priest River on September 17, 2002 in an effort to collect bull trout for sperm cryopreservation (Figure 10). Through this sampling we captured three adult bull trout. Two were sampled in Gold Creek and one was sampled in Hughes Fork. All the adult bull trout we sampled were females that ranged in size between 450 and 660 mm. We did see one adult male bull trout in Upper Priest River, but it managed to escape our capture. Due to our inability to capture any male bull trout, no sperm was cryopreserved.

DISCUSSION

St. Joe and Coeur d'Alene River Snorkel Surveys

Cutthroat Trout

Densities of cutthroat trout in the St. Joe River have been increasing since the dramatic decline that was observed in 1998. Despite this increase, we have not observed densities of cutthroat trout lower that what has been observed in 1998-2002 since before 1973. The density of cutthroat trout is significantly lower than what was documented in 1995 and 1996 (t-test, $P < 0.05$). In all likelihood, the decrease in cutthroat trout density in 1998 was a delayed response to the large flood event that occurred during the winter of 1996-1997 and not a factor of changes in fishing pressure or a change in fishing regulations. Floods have been found to impact fish populations through increases in bedload movement, changes in channel morphology, silting of spawning gravel and scouring or filling of pools and riffles (Swanston 1991; Pearson et al. 1992; Abbott 2000). Large swings in cutthroat trout densities are not uncommon in Idaho rivers and have even been documented in wilderness rivers (Selway & Middle Fork Salmon) where fishing pressure and habitat degradation are usually not issues (Dan Schill, IDFG, Personal Communication). The decline in cutthroat trout abundance following the flood is just as pronounced for cutthroat trout > 300 mm as densities were about twice as high prior to the flood as they were in 2002. The abundance of fish > 300 mm also appears to be increasing, but were significantly lower that what occurred in 1993-1996, prior to the flood (t-test, $P < 0.05$). If favorable climatic conditions occur, we should continue to see increases in the abundance of cutthroat trout in the St. Joe River.

Changes in the fishing regulations for the St. Joe River in 2000 increased the catch-and-release zone by about 20 km so that it now extends from the confluence of the North Fork St. Joe River to the headwaters. The remainder of the river was managed with a slot limit where all cutthroat trout between 203 and 406 mm (8 and 16 in) must be released. Previously fish over 356 mm (14 in) could be harvested. These more restrictive regulations should speed up the recovery of the cutthroat trout following the flood.

An increasing trend in cutthroat trout density is apparent in the Coeur d'Alene River despite the decline in abundance observed in 2002. However, if only cutthroat trout greater than 300 mm are evaluated in the Coeur d'Alene River, no apparent increase in density has occurred over time. The density of cutthroat trout > 300 mm in the Coeur d'Alene River (0.06 fish/100 m^2) was significantly lower (t-test, $P < 0.05$) than what we observed in the St. Joe River (0.18 fish/100 m^2) in 2002. Several theories may explain why densities of cutthroat trout > 300 mm were not increasing in the Coeur d'Alene River whereas juvenile fish densities were: 1) Habitat for juvenile trout (tributary habitat) was improving whereas habitat important for larger cutthroat trout (deep, slow velocity pools) is not; 2) High incidental mortality and/or poaching is cropping off the larger fish; 3) As cutthroat trout in the Coeur d'Alene River increase in size, they move downstream or upstream to areas where snorkel transects are not located; 4) A large proportion of this cutthroat trout population is made up of adfluvial fish – the larger fish would therefore have migrated down to the lake by the time the snorkeling was conducted; and 5) Some combination of the above. A telemetry study on cutthroat trout in the Coeur d'Alene River Basin will be occurring in 2003 to help answer these questions.

The highest density of cutthroat trout in the Coeur d'Alene River continued to be observed in the catch-and-release area upstream of Yellow Dog Creek. It was unclear whether these higher densities were a result of lower fishing mortality or differences in habitat condition. Habitat work in the Coeur d'Alene River by Hunt and Bjornn (1995) found a greater percentage of pool and run habitat occurred upstream of Yellow Dog Creek than downstream of it. Studies in the St. Joe River (Hunt and Bjornn 1992; Davis 2002) found that cutthroat trout tend to move upstream during summer, likely in search of cooler water temperatures. However, Horner and Liter (2002) and Liter et al. (in press) estimated the number of cutthroat trout > 100 mm downstream of the South Fork Coeur d'Alene River to range between 521 and 444 fish/km. About half of these fish were over 250 mm. Although these studies were conducted in late May to early June, recaptured fish from this study indicated they remained within 6 km of the capture site throughout the summer. These findings indicated that high numbers of cutthroat trout utilized the lower reaches of the Coeur d'Alene River throughout the summer unlike what occurs in the St. Joe River.

It is believed that angling pressure has increased on the Coeur d'Alene River, and it is possible that fishing mortality on cutthroat trout is higher downstream of Yellow Dog Creek. New fishing regulations implemented in 2000 (release all cutthroat trout between 203 and 406 mm where previously fish over 356 mm could be harvested) should limit the impacts that fishing would have on this fishery. Our snorkeling surveys showed that 6.0% of the fish upstream of Yellow Dog Creek are > 15 inches whereas 1.6% of the fish downstream of Yellow Dog Creek were > 15 inches. This difference in abundance may indicate these larger fish were being cropped off downstream of Yellow Dog Creek. Increases in fishing pressure can have positive aspects, as it can result in increased compliance with fishing regulations through self-policing. Lewynsky (1986) believed non-compliance helped explain why cutthroat trout densities did not increase in the Coeur d'Alene River after more restrictive fishing regulations were applied in 1975.

Recommendations from the 2001 annual report suggested that efforts be made to evaluate if cutthroat trout > 300 mm were congregating in areas outside where our snorkel transects are conducted. For this reason, we snorkeled six new transects on the North Fork Coeur d'Alene River upstream of Jordan Creek. The average density of cutthroat trout > 300 mm in these six transects was 0.15 fish/100 m^2. Although, this density was more than double the average density of the entire North Fork Coeur d'Alene River, we observed higher densities in two of the reaches downstream of Jordan Creek that we annually surveyed. Based on these findings, it does not appear that cutthroat trout > 300 are congregating upstream of Jordan Creek, and snorkeling sites upstream of Jordan Creek are not necessary to portray the status of the Coeur d'Alene River cutthroat trout population.

Mountain Whitefish

Our snorkel surveys showed that mountain whitefish densities had remained fairly steady in the St. Joe River until 1997 when we documented a fairly significant decline. In all likelihood, the decrease in mountain whitefish density in 1997 were a response to the large flood event that occurred during the winter of 1996-1997. Since this flood event, mountain whitefish seemed to be rebounding, but were still below pre-flood densities. Bag limits for mountain whitefish were reduced from 50 fish to 25 fish in 2000. These more restrictive regulations may help speed up the recovery of this fishery.

Based on our snorkel surveys, the density of mountain whitefish in the Coeur d'Alene River had gone through a series of ups and downs since 1973. A significant decline in mountain whitefish density in the Coeur d'Alene River was also observed following the 1996-1997 flood, although densities rebounded within a couple years. Reasons for these up and down cycles in density are not clear.

Snorkel observations indicated that mountain whitefish were more abundant in the Coeur d'Alene River than the St. Joe River. However, comparisons between the two systems may not be entirely valid because much of the lower St. Joe River was not snorkeled. Most mountain whitefish in the North Fork of the Coeur d'Alene River were observed in the large, deep pools and runs in the lower section of river, similar to the habitat that occurs in the lower St. Joe River.

Rainbow Trout

Rainbow trout were observed almost exclusively from those snorkel transects where put-and-take stocking occurred in both the St. Joe and Coeur d'Alene rivers. Every rainbow trout in the St. Joe River we observed was between 150 and 300 mm, the same size range these fish were stocked at. These findings suggest that little natural reproduction is occurring and over-winter survival is low for hatchery reared rainbow trout in the St. Joe River. In the Coeur d'Alene River, 67% of the rainbow trout we observed were between 150 and 300 mm. About 26% of the rainbow trout were < 150 mm in size, which indicates that natural recruitment were occurring in the Coeur d'Alene River basin. Starting in 2003, no rainbow trout will be stocked into any river or stream in the Panhandle Region. Snorkel findings from 2003 will give us a better idea of how much natural rainbow trout recruitment is occurring.

Rainbow trout were far more abundant in the Coeur d'Alene River system than in the St. Joe River. Two explanations help explain for this difference: 1) More natural recruitment and higher survival of hatchery-raised rainbow trout occurred in the Coeur d'Alene River, and 2) More transects in the Coeur d'Alene River occurred in areas where rainbow trout stocking occurred.

Mica Creek Fishery Assessment

Our sampling efforts indicated that cutthroat trout and torrent sculpin were the most common fish in the Mica Creek watershed. The lower South Fork Mica Creek was found to have the highest density of cutthroat trout and sculpin, despite the ongoing highway construction project that is occurring beside it. However, within the reach of stream that paralleled the highway construction project, the lowest cutthroat trout densities we observed occurred in the transect where noticeable amounts of sediment had been delivered to the stream. Although we can't say for certain that the sediment delivery caused by this highway construction project has seriously depressed the cutthroat trout population, it did appear to have had localized effects.

Habitat conditions in the lower South Fork Mica Creek appeared to be more suitable to cutthroat trout than the other stream reaches we sampled and may help explain why higher densities of fish were found to occur there. Low densities of cutthroat trout in the upper South Fork Mica Creek may be explained by the small stream size, low gradient and abundance of fine sediment. The lowest density of cutthroat trout occurred in North Fork Mica Creek (1.5 100/m^2). This stream reach had been impacted by years of cattle grazing. Stream shading, large organic debris and pools were all lacking in the reach of stream we evaluated. The current landowners were in the process of fencing off sections of this stream to cattle in an effort to improve habitat conditions. With these efforts, the density of cutthroat trout in North Fork Mica Creek should improve in the future. Stream fencing has consistently proven effective in improving stream habitat and fish populations (Platts 1991).

The presence of brook trout in upper South Fork Mica Creek may be a serious issue. Brook trout have been found to out-compete and exclude cutthroat trout from many stream environments (Rieman and Apperson 1989; Behnke 1992; Dunham et al. 1999; Adams et al. 2002). Evidence suggests that degraded stream conditions (high amounts of fines, warmer water temperatures) especially when combined with lower gradient streams (<2%) give a competitive advantage to brook trout over cutthroat trout (Rieman and Apperson 1989; Behnke 1992; Adams et al. 2002). For these reasons it is important to maintain high quality habitat in the Mica Creek watershed. Increases in sediment delivery and/or losses of stream shading could tip the scale to favor brook trout. The two brook trout that we sampled appeared to be mature adults (235 and 266 mm). In fact, these were the two largest fish we collected in all of our sampling. The absence of juvenile brook trout may indicate this is either a newly founded population or one that is barely persisting.

About 97% of the cutthroat trout we sampled were < 150 mm in length. This size distribution suggests that a large portion of these cutthroat trout are adfluvial and migrate to Lake Coeur d'Alene after one to three years of rearing in Mica Creek (Lukens 1978). Streams the size of Mica Creek that have resident fisheries, typically have a higher percentage of fish over 150 mm in length such as we saw in the sampling we did in the Middle Fork East River during 2002 (see Job No. c-3).

Lower Priest River Fishery Assessment

Our electrofishing efforts in the lower Priest River found that cutthroat trout, rainbow trout and brown trout occurred in Priest River when cooler water temperatures occur. Water temperatures during our sampling efforts were around 5°C. Past fishery surveys of the Priest River have not sampled or observed any trout species (Brennan et al. 2000, Ned Horner, IDFG, Personal Communication). These surveys occurred in July and August when water temperatures in Priest River typically range between 20°C and 26°C (Brennan et al. 1999; Brennan et al. 2001). Cutthroat trout, rainbow trout and brown trout have been found to avoid water temperatures in excess of 20°C (Hunt and Bjornn 1992; Garrett and Bennett 1995). Thermographs placed in the Priest River show that water temperatures were below 17°C for about 10 months of the year, temperatures where all three species of trout are known to thrive (Scott and Crossman 1973;Bjornn and Reiser 1991; Hunt and Bjornn 1992). Some locals have claimed that trout fishing in Priest River can be good in the spring and fall. It is possible that trout species occupy the Priest River system for ten months of the year and migrate upstream into tributaries during July and August in search of preferred water temperatures. This type of behavior is not unlike what occurs in many other rivers in the northwest (Bjornn and Reiser 1991; Hunt and Bjornn 1992; Garrett and Bennett 1995).

Priest River could provide only a migratory corridor for trout as they migrate between Lake Pend Oreille and tributaries of Priest River. Bull trout that spawn in the East River appear to only use Priest River as a migratory corridor (DuPont and Horner, in Press). If this is the case, you would expect the fish we sampled to be large, lake reared adults. None of the trout we sampled exceeded 370 mm, which suggests that they are not adfluvial fish. Good rainbow trout and cutthroat trout fishing in the fall claimed by some of the locals also does not support that Priest River provides only a migratory corridor for adfluvial cutthroat trout and rainbow trout. Typically adfluvial spring spawners migrate back to lakes before summer water temperatures peak.

Our electrofishing efforts in the lower Priest River found that all trout species combined represented about 3% of the catch. Although this relative abundance was considerably lower than what occurs in the popular fishing reaches of the St. Joe and Coeur d'Alene rivers (> 40% trout), this was not considerably lower than what we observed in 2002 in the St. Joe River downstream of Avery (6%). These comparisons are not entirely straight forward as the data from Priest River was collected through electrofishing during April whereas the data from the St. Joe and Coeur d'Alene rivers was collected through snorkeling during late July. In addition, research has show that cutthroat trout do move downstream into the lower reaches of the St. Joe River during winter (Hunt 1992; Davis 2002) and it is likely the trout relative abundance is much higher in April.

In summary, the Priest River did appear to support trout during months when water temperatures are cooler, but the densities appear to be far below what we saw in our more popular trout fisheries. Limited tributary spawning and summer rearing habitat and/or river overwinter habitat were possible reasons for the low trout densities that occurred in the Priest River.

Bull Trout Spawning Surveys

Priest River Basin

Bull trout redd counts from 1992 to 2002 suggested the bull trout population in the Upper Priest Lake basin was relatively stable and possibly increasing in abundance. However, this data was misleading as new sites were added to the surveys in 1996 and again in 2001. After adding the redd counts conducted by Mauser (1988) in 1985 and 1986 to this trend set it becomes evident that the number of spawning bull trout in the Upper Priest Lake basin in 2002 was a fraction of what it once used to be. This information supports work conducted on Upper Priest Lake where bull trout numbers appear to be dropping significantly and only larger bull trout remain. It seems evident that the expanding population of lake trout in Upper Priest Lake poses an increasing threat to the adfluvial bull trout population (Fredericks and Horner 2000; Donald and Alger 1993). If this is true, a dramatic drop in the number of bull trout redds may be observed in the near future. Bull trout redd counts by Mauser (1986) document this very thing on tributaries of Priest Lake where the number of redds observed in tributaries declined from double digits to zero from 1983 to 1985. This decline in redds occurred several years after a crash in the bull trout population was noticed in Priest Lake. These findings add to the urgency for correcting the lake trout problem in Upper Priest Lake. Delays in correcting this problem could result in significant losses to this bull trout population.

Pend Oreille Lake Basin

Redd counts in the Pend Oreille Lake basin indicated this system had the most abundant and stable bull trout population in northern Idaho and possibly the state. Evaluation of the six index streams since 1983 showed the trend in bull trout redds counted is fairly stable, although, if we evaluated only those redds counted since 1995, an increasing trend was evident. The 879 redds counted in 2002 was the second highest ever recorded and exceeds redd counts anywhere else in the state. Redd counts in Trestle Creek and Gold Creek consistently produced the highest counts and have remained relatively stable over time. Redd counts in other streams such as Rattle Creek, Grouse Creek, Johnson Creek and the Pack River have fluctuated widely over the years. Those streams having high variability in their redd counts typically have unstable habitat conditions. However, periodic increases in the number of redds counted from them indicate these streams have the potential to support strong bull trout populations once improvements occur. Those streams where consistently low redd counts have occurred (Lightning Creek, Savage Creek, Morris Creek and Porcupine Creek) may require considerable time and money to recover the population and/or these streams may have little potential to support high numbers of bull trout.

The increasing trend in the number of redds counted since 1995 are believed to be a response to changes in fishing regulations that occurred in 1994 (1 fish) and 1996 (catch-and-release). Significant efforts have also been put into protecting and restoring habitat in tributaries of Lake Pend Oreille. These types of efforts are necessary to ensure bull trout populations will continue to increase.

It is believed that the lake trout population in Lake Pend Oreille is expanding rapidly (Fredericks and Horner, in press). Continuing increases in this lake trout population may jeopardize the bull trout population that occurs in the lake. Findings from Donald and Alger (1993) suggests that over the long run bull trout will not persist in the presence of lake trout. Priest Lake and Flathead Lake, Montana have experience dramatic declines in bull trout numbers as lake trout numbers have continued to increase. Regular evaluations of the lake trout abundance in Pend Oreille Lake should be monitored to evaluate how great a threat they are to the bull trout population.

St. Joe River

The number of redds counted (54) in the three index streams (Medicine Creek, Wisdom Creek, and upper St. Joe River) of the St. Joe River during 2002 were above the 11 year average (42), and is the third highest ever recorded. Evaluation of the bull trout redds counted in the three index streams since 1992 showed a slightly increasing trend.

Redd counts in Medicine Creek have consistently produced the highest counts in the St. Joe River and the 42 redds counted in 2002 represented about 78% of all the redds counted. It is believed that Medicine Creek is critical to the persistence of bull trout in the Spokane River drainage. Ironically, Medicine Creek is not an unaltered habitat. Much of the stream was channelized in the early 1900's for mining and provides poor spawning or rearing habitat. The potential for habitat restoration in Medicine Creek should be investigated with the U.S. Forest Service. Additionally, the concentrated reproduction in Medicine Creek represents a risk to the population, and the potential to increase production in other tributaries, particularly Wisdom Creek should also be evaluated.

The three reference streams where bull trout redds are annually counted are believed to be the only streams that support relatively strong bull trout populations in the entire Spokane River drainage. This is an alarming fact as in the 1930's most of the major tributaries in the St. Joe River and some in the St. Maries Rivers were documented to have bull trout in them (IDFG 1933). Studies need to be designed that evaluate bull trout survival so that limiting factors can be identified and corrected.

Little North Fork Clearwater River

The 36 bull trout redds counted in the Little North Fork Clearwater drainage during 2002 was double the previous high since counts began in 1994. The increase in redds counted in 2002 can be attributed to the additional 9.7 km of stream we surveyed and because we counted what we believe were redds from resident bull trout for the first time. The inconsistency in our redd count transects and methods for counting redds makes is difficult to evaluate trends in the bull trout population in the Little North Fork Clearwater River. Nevertheless, the high count in 2002 was encouraging and reflected a much higher escapement than was estimated in 1994-2000.

Bull Trout Milt Cryopreservation

Unfortunately, we did not capture any adult male bull trout in the Upper Priest River system to cryopreserve their sperm. It appeared that our sampling effort occurred at the right time as we did manage to capture both ripe and spent females. It is possible that some of the males were farther upstream than where we conducted our sampling. Telemetry studies on bull trout have shown that males often migrate earlier and farther upstream than females (Elle 1995; DuPont and Horner, in press). Our redd count surveys showed that the majority of the bull trout spawning that occurred was in the upper reaches of Upper Priest River. These redds were upstream of where we attempted to capture bull trout for cryopreservation.

RECOMMENDATIONS

1. Continue to monitor cutthroat trout abundance in the St. Joe and Coeur d'Alene Rivers through snorkel surveys. Discontinue snorkel counts in Coeur d'Alene River upstream of Jordan Creek.

2. Attempt to conduct snorkel surveys in the St. Joe and Coeur d'Alene rivers at the original transects and properly document these locations. Protocols should be developed on how to select new transects when channel changes cause previous sites to drastically change or disappear.

3. Negotiate with the Idaho Department of Transportation on possible mitigation for sediment delivery to Mica Creek.

4. Continue to monitor bull trout spawning escapement through redd counts in the Pend Oreille, St. Joe, Upper Priest, and Little North Fork Clearwater drainages.

5. Investigate new streams/stream reaches where bull trout spawning may be occurring.

6. Continue to provide annual training to all people who will be conducting redd counts in the Panhandle Region.

7. Discuss with the U.S. Forest Service the feasibility of habitat restoration in Medicine Creek and/or Wisdom Creek.

8. Conduct a survival study on bull trout in the St. Joe River basin to better evaluate what the major limiting factors are.

9. Future efforts to capture bull trout for cryopreservation of their sperm should occur in the upstream reaches of Upper Priest River.

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2002 ANNUAL PERFORMANCE REPORT

State of: Idaho — Program: Fisheries Management F-71-R-27

Project: I-Surveys and Inventories — Subproject: I-A Panhandle Region

Job No.: c-2 — Title: Little North Fork Clearwater Fishery Assessment

Contract Period: January 1, 2002 to December 31, 2002

ABSTRACT

We snorkeled 48 transects to evaluate trends in fish abundance in the Little North Fork Clearwater River. The density of cutthroat trout *Oncorhynchus clarkii* (1.7 fish/100 m^2), rainbow trout *Oncorhynchus mykiss* (0.8 fish/100 m^2), mountain whitefish *Prosopium williamsoni* (0.9 fish/100 m^2) and bull trout *Salvelinus confluentus* (0.1 fish/100 m^2) in the Little North Fork Clearwater River was higher in 2002 than what was observed in 1997. The density of cutthroat trout (all size classes and fish > 300 mm) we observed was greater than trout densities found in the St. Joe River and the Coeur d'Alene River and could only be matched by observations in the St. Joe River when it was at its peak in the early and mid 1990's.

We tagged 67 cutthroat trout > 275 mm in length in the Little North Fork Clearwater River with Floy T-bar anchor reward tags to evaluate angler exploitation. We found that about 32% of the fish we marked were recaptured and 11% were harvested. In 1997 annual exploitation of cutthroat trout on the Little North Fork Clearwater River was estimated to be 13%. Despite the improvements in the trail system, annual exploitation did not appear to be increase in the Little North Fork Clearwater River. In addition, the marked improvement in cutthroat trout densities that have occurred since 1997 indicates fishing pressure is not suppressing this fishery in 2002.

We collected tissue samples from 60 cutthroat trout and rainbow trout from the Little North Fork Clearwater River during 2002. Due to time limitations in the lab, our tissue samples were not genetically evaluated to determine the purity and amount of introgression that has occurred between cutthroat trout and rainbow trout in the Little North Fork Clearwater River. Our tissue samples are scheduled for analysis later this year. Findings will be reported in next year's annual report.

During our snorkel surveys we observed 28 bull trout > 300 mm in length (the size of fish with radio transmitters), three of which had radio transmitters in them. It is estimated that while we conducted our survey there were 18 or 19 bull trout with transmitters in the section of stream we snorkeled. Based on these numbers, we estimated that 140 bull trout occurred in the Little North Fork Clearwater River between Foehl Creek and Lund Creek. In addition, we counted 36 bull trout redds during our redd surveys, which indicates between 79 to 115 bull trout spawned in the upper Little North Fork Clearwater River.

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INTRODUCTION

The Little North Fork Clearwater River is one of the most remote rivers in the Panhandle Region. This river provides an important fishery for cutthroat trout *Oncorhynchus clarkii* and also supports an apparently good bull trout *Salvelinus confluentus* population. The Little North Fork Clearwater River is often a destination for individuals who want to get away from it all and experience quality trout fishing. During 2001 the U.S. Forest Service began upgrading the trail system that provides access to the Little North Fork Clearwater River. These upgrades have improved access to this river, especially to motorcycle traffic. Concerns have risen that this improved trail system may increase fishing pressure in the Little North Fork Clearwater River and possibly degrade the quality of this wild cutthroat trout fishery. High fishing pressure has been found to suppress wild cutthroat trout fisheries in Idaho (Rankel 1971; Bowler 1974).

Bull trout within the Klamath and Columbia River Basins are currently listed as threatened under the Endangered Species Act of 1973 (effective July 1998). Fish surveys and redd counts have documented bull trout in much of the Little North Fork Clearwater River basin (Watson and Hillman 1997; Davis et al. 2000); however, the distribution and population size of bull trout still remains unknown due to its remote location and difficult access (CBBTTAT 1998). Recovery of bull trout in the North Fork Clearwater River requires that over 5,000 individuals and a stable or increasing population occur (U.S. Fish and Wildlife Service 2002). Efforts to enumerate the bull trout population and evaluate the trend in abundance in the Little North Fork Clearwater River is vital if bull trout are to be delisted under the Endangered Species Act.

This study focused on evaluating the population strength and angler exploitation of cutthroat trout on the Little North Fork Clearwater River. It also attempted to conduct a population estimate of bull trout using the river as well as add to the long-term data set that evaluate trends in bull trout abundance.

STUDY SITES

The Little North Fork Clearwater River is located in the southern portion of the Panhandle Region (Figure 1). Our study area covers about 45 km of river, extending 1 km downstream from Foehl Creek upstream to the headwaters, and is about 53,000 hectares in size. The majority of the study area is managed by the U.S. Forest Service. Other land managers in the basin are located in the upper third of this watershed and include the Bureau of Land Management, the Idaho Department of Fish and Game and Forest Capital Partners. Road access to the Little North Fork Clearwater River is limited to the upper portion of the Little North Fork Clearwater River, with over 35 km of the river accessible only by trail.

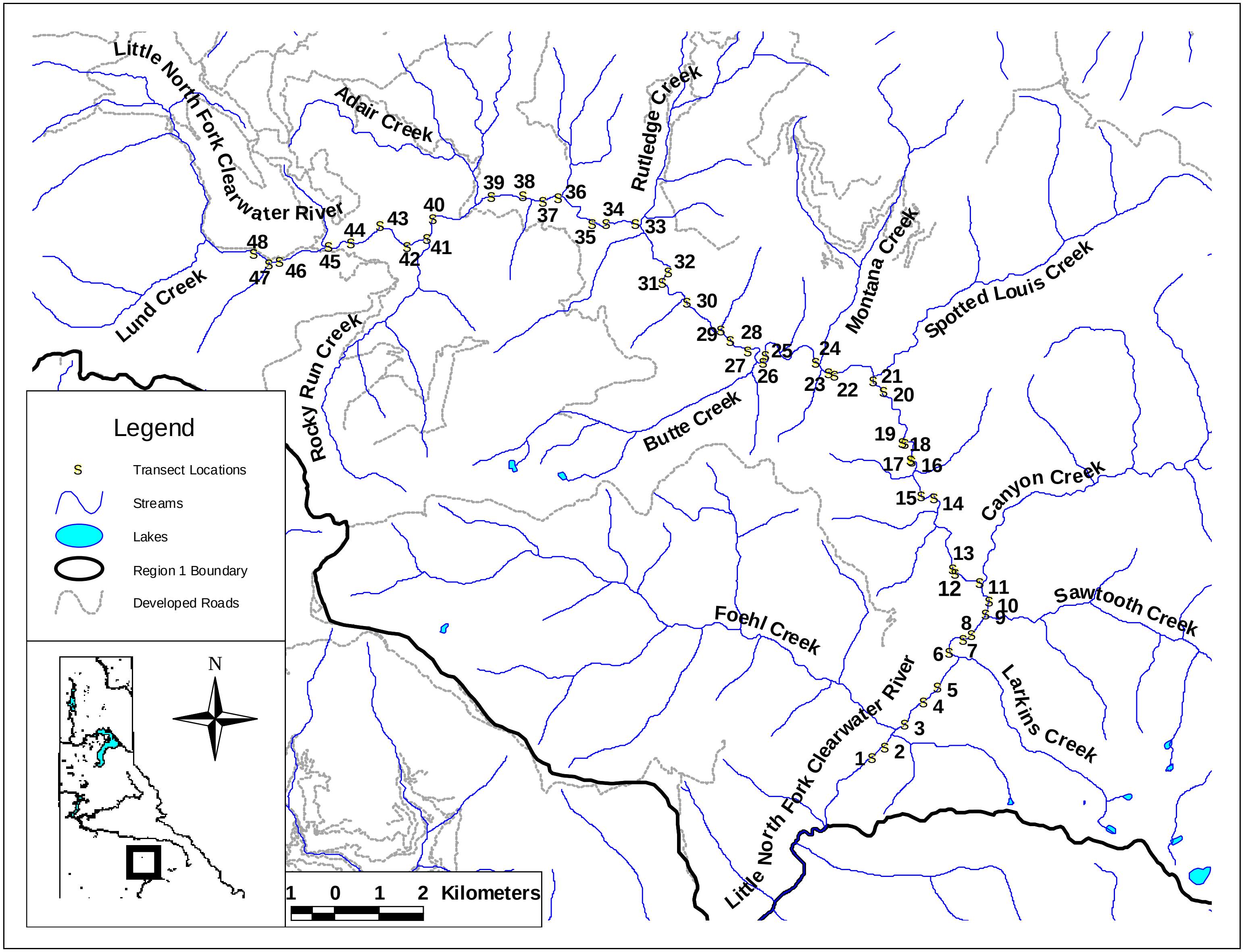

Figure 1. Location of transects snorkeled in the Little North Fork Clearwater River, Idaho, on August 19-22, 2002.

OBJECTIVES

1. Estimate salmonid density and trends in abundance in snorkeling transects in the Little North Fork Clearwater River.

2. Evaluate angler exploitation of cutthroat trout in the Little North Fork Clearwater River.

3. Determine genetic purity of westslope cutthroat trout.

4. Conduct a population estimate of bull trout in the Little North Fork Clearwater River.

5. Estimate bull trout spawning escapement in the Little North Fork Clearwater River through redd counts.

METHODS

Little North Fork Clearwater River Snorkel Surveys

We used snorkel surveys to evaluate trends in fish abundance in the Little North Fork Clearwater Rivers. Our intent when snorkeling a transect was to locate and identify all fishes more than one year in age. We periodically duplicated counts to check for accuracy. Typically, the snorkeler began at the upstream end of the transect and snorkeled downstream, as the size and depth of the river generally precluded upstream counts. Often the snorkeler would have to swim back and forth across the river to look under logs or behind boulders. In areas where pocket water was the dominant habitat or shallow turbulent water limited visibility, transects were snorkeled upstream.

Thirty-five snorkel transects were initially established in the Little North Fork Clearwater River in 1997 by systematically selecting reaches at approximately 800 m intervals (Davis et al. 2000). During 2002 an additional 13 transects were added to better evaluate the bull trout population and the fishery in the more roaded section of the Little North Fork Clearwater River (upstream of Adair Creek). These 13 sites were selected based on what was considered good habitat for bull trout and cutthroat trout. The total number of transects that were snorkeled during 2002 was 48 (Figure 1).

Estimates of salmonid abundance were limited to age 1+ fish, as summer counts for young-of-the-year (YOY) cutthroat and rainbow trout are typically unreliable. Most YOY cutthroat trout would be smaller than 80 mm during surveys in August and occupy the shallow stream margins where snorkeling is less effective (Thurow 1994). Fish observations were recorded for each transect by species in 75 mm length groups.

After completing fish counts, we measured length and width of each transect with a rangefinder or by tape to determine the surface area (m^2) surveyed. Fish counts were converted to density (fish/100 m^2) to standardize the data and make it possible to compare counts to other watersheds. In an effort to accurately locate and duplicate snorkel transects in the future, photos, written descriptions and GPS (Global Positioning System) coordinates were taken of each of the transect locations. Coordinates for the location of each of these transects are displayed in Appendix A.

Angler Exploitation

We tagged cutthroat trout in the Little North Fork Clearwater River with Floy T-bar anchor reward tags to evaluate angler exploitation. Cutthroat trout were captured by rod and reel (fly fishing) and tags were placed in all fish > 275 mm. Initial efforts were made to place 100 tags throughout the basin from July 15-19, 2002. However, physical limitations prevented us from reaching this goal. Consequently, additional tagging efforts occurred on July 31 and August 19-23. Repeat tagging efforts focused in areas we had previously not tagged fish. Unfortunately, few fish were marked in the upstream portion of the watershed where road access occurs. To determine angler exploitation, the number of fish harvested by anglers (determined by tags returns) was divided by the number of fish we tagged. We assumed a 60% reporting rate, which is typical of $10 reward tags (Nichols et al. 1991), and adjusted the return rate accordingly to provide an exploitation estimate. No adjustments were made for tag retention based on work by Fredericks and Horner (In Press).

While capturing fish to put reward tags in, three fishermen kept track of the size and species of all the fish they caught. These fishermen used fly rods and a variety of dry flies and nymphs, techniques commonly used by anglers in this river system. These data will give us an idea of what other anglers may catch while fishing and what size classes and species of fish are vulnerable to angling.

Genetic Analysis

To evaluate the genetic purity of cutthroat trout and rainbow trout *Oncorhynchus mykiss* in the Little North Fork Clearwater River, we collected tissue samples from fish captured by rod and reel. Small sections of fins (the size of an eraser head) were collected from fish for genetic analysis. Fin clips were placed in vials with an ethanol preservative. All fin clips were labeled with the suspected species they came from, the date they were sampled, the length of the fish and where they were sampled. To ensure genetic samples were collected randomly, fin clips were collected from every other *Oncorhynchus spp.* regardless of which species it was. Efforts were made to distribute the samples from Foehl Creek to Lund Creek, a 35 km stretch of river. These samples are being stored until genetic analysis can occur.

Bull Trout Population Estimate

A telemetry study on bull trout in the North Fork Clearwater River basin (Schiff and Schriever, In Press) provided us an opportunity to conduct a population estimate on bull trout in the Little North Fork Clearwater River. Because of this telemetry study, a known number of bull trout with surgically inserted transmitters occurred in the Little North Fork Clearwater River while we were conducting our snorkel surveys. Bull trout with these surgically inserted transmitters could easily be identified by a ~300 mm wire (antennae) hanging from their belly. While snorkeling, every bull trout we saw was looked over closely to determine if it had transmitter in it. Using the Adjusted Peterson Mark-and-Recapture Strategy (Ricker 1975) these data could be used to estimate the population of bull trout in the Little North Fork Clearwater River between Foehl Creek and Lund Creek.

Bull trout spawner escapement was also evaluated for the Little North Fork Clearwater River by applying a low estimate of 2.2 fish/redd (Bonar et al. 1997) and an upper estimate of 3.2 fish/redd (Fraley and Shepherd 1998) to the total number of redds observed. Bull trout redds were counted in tributaries of the Little North Fork of the Clearwater where bull trout spawning was believed to occur. Survey techniques and identification of bull trout redds followed methodology described by Pratt (1984). Research has demonstrated the level of observer training and experience may influence the accuracy redd counts (Bonneau and LaBar 1997; Dunham et al. 2001); consequently, only experienced biologists or technicians counted bull trout redds.

RESULTS

Little North Fork Clearwater River Snorkel Surveys

We snorkeled 48 transects in the Little North Fork Clearwater River during August 19-22, 2002 (Figure 1). A total of 454 cutthroat trout, 211 rainbow trout, 244 mountain whitefish *Prosopium williamsoni*, and 33 bull trout were counted during this survey (Table 1). Cutthroat trout were observed in every transect we snorkeled. Significantly higher (t-test; $p = 0.004$) densities of cutthroat trout were observed in the upstream reaches where the most road access occurs (3.06 fish/100 m^2) than in the lower reaches (1.51 fish/100 m^2), which must be accessed by trail (Table 2). The same trend was observed for cutthroat trout > 300 mm, although the difference was not significantly different (t-test; $p = 0.22$). The overall density of cutthroat trout observed in 2002 was about four to six times higher than what was observed during 1997 when most of these same transects were snorkeled (Table 2). These differences are significant (paired t-test; $p = 0.002$). When compared to similar reaches in the St. Joe River and North Fork Coeur d'Alene River, we found that the density of cutthroat trout in the Little North Fork Clearwater was considerably higher, regardless if we evaluated all size classes of fish or just those > 300 mm (Table 3).

The overall density of rainbow trout, mountain whitefish and bull trout were all higher in 2002 than in 1997 (Table 2). Rainbow trout were observed in 39 of the 48 transects we snorkeled, and densities were higher in the most upstream reaches, although not significantly (Tables 1 and 2). Mountain whitefish were observed in 36 of the 48 transects we snorkeled, and densities were significantly higher (t-test; $p = 0.04$) in the downstream reaches. Bull trout were observed in 12 of the 48 transects we snorkeled, and densities were significantly higher (t-test; $p = 0.05$) in the most upstream reaches (Tables 1 and 2).

Table 1. Number and density (fish/100 m^2) of fishes observed while snorkeling transects in the Little North Fork Clearwater River, Idaho, during August 19-22, 2002.

		Characteristics of Transect				Cutthroat trout			Mountain whitefish		Rainbow trout		Bull trout
	Transect	Habitat		Average		Number counted		Density	Number	Density	Number	Density	Number
Reach	Number	Type	Length (m)	Width (m)	Area (m2)	<300mm	>300mm	(No./100 m2)	counted	(No./100 m2)	counted	(No./100 m2)	counted
Downstream of Canyon Creek	1	Pool	83	23	1,909	16	6	1.2	21	1.1	4	0.2	0
	2	Pool	48	29	1,373	13	7	1.5	6	0.4	7	0.5	0
	3	Pool	53	19	1,021	11	1	1.0	22	1.8	4	0.3	0
	4	Pool	53	20	1,029	14	0	1.1	8	0.6	7	0.6	0
	5	Pool	30	19	572	4	0	0.6	0	0.0	10	1.5	0
	6	Run	52	27	1,410	12	3	0.9	2	0.1	0	0.0	0
	7	Pool	41	17	699	22	1	2.8	40	4.9	0	0.0	2
	8	Run	78	17	1,342	1	3	0.3	8	0.6	1	0.1	1
	9	Pool	32	16	512	1	2	0.6	1	0.2	6	1.2	0
	10	Pool	70	17	1,204	11	6	1.4	15	1.2	3	0.2	0
Canyon Creek to Spotted Louis Creek	11	Pool	35	14	499	10	16	4.4	2	0.3	0	0.0	0
	12	Pool/Run	51	11	566	6	1	1.0	0	0.0	0	0.0	0
	13	Run	58	15	841	10	4	1.4	6	0.6	0	0.0	2
	14	Pool/Run	37	10	353	10	3	3.1	8	1.9	4	1.0	0
	15	Pool/Run	30	10	302	19	4	7.6	3	1.0	4	1.3	0
	16	Pool	30	10	294	4	9	3.8	20	5.9	5	1.5	2
	17	Pocket water	46	10	465	2	1	0.5	1	0.2	1	0.2	1
	18	Pool/Run	36	12	422	15	6	4.2	9	1.8	1	0.2	0
	19	Pocket water	30	10	288	3	0	0.9	0	0.0	1	0.3	0
	20	Pool	51	11	571	9	2	1.9	2	0.4	10	1.8	0
	21	Pool	37	13	481	6	2	1.7	10	2.1	6	1.2	1
Spotted Louis Creek to Rutledge Creek	22	Pocket water	42	18	748	3	0	0.4	0	0.0	11	1.5	0
	23	Pool	110	10	1,063	9	5	1.6	9	1.0	19	2.1	0
	24	Pool	24	14	346	6	2	2.3	2	0.6	9	2.6	0
	25	Pool	31	15	465	4	4	1.7	12	2.6	7	1.5	0
	26	Pool	30	14	414	2	3	1.2	2	0.5	3	0.7	0
	27	Pool	52	13	655	4	1	0.8	2	0.3	6	0.9	0
	28	Pool	52	13	686	0	2	0.3	3	0.4	5	0.7	0
	29	Pool	60	8	468	5	1	1.5	5	1.3	11	2.8	0
	30	Pool	39	9	343	1	1	0.6	1	0.3	5	1.5	0
	31	Pool	29	15	423	2	0	0.5	11	2.6	12	2.8	2
	32	Run	39	7	265	1	0	0.4	1	0.4	9	3.4	0

Table 1 (continued).

Reach	Transect Number	Habitat Type	Length (m)	Average Width (m)	Area (m2)	Cutthroat trout Number counted <300mm	Cutthroat trout Number counted >300mm	Cutthroat trout Density (No./100 m2)	Mountain whitefish Number counted	Mountain whitefish Density (No./100 m2)	Rainbow trout Number counted	Rainbow trout Density (No./100 m2)	Bull trout Number counted
Rutledge Creek to F.S. Road 1268	33	Run	44	15.2	674	3	0	0.4	0	0.0	0	0.0	0
	34	Run	25	5.2	131	4	1	2.7	6	3.3	8	4.4	0
	35	Run	26	11.0	286	4	1	1.5	0	0.0	0	0.0	0
	36	Run	34	5.8	194	3	3	2.6	0	0.0	4	1.7	0
	37	Pool	15	10.7	164	4	2	3.0	0	0.0	2	1.0	2
	38	Run	18	6.9	125	7	2	6.0	1	0.7	0	0.0	5
	39	Run	15	4.3	65	14	0	17.6	0	0.0	4	5.0	0
Upstream of F.S. Road 1268	40	Pool	12	11.4	143	2	0	1.1	0	0.0	2	1.1	0
	41	Pool	27	10.6	283	2	6	2.4	1	0.3	1	0.3	13
	42	Pool	20	8.0	157	6	3	4.8	0	0.0	1	0.5	0
	43	Run	75	8.2	620	16	2	2.4	3	0.4	7	0.9	1
	44	Pool	43	5.8	251	4	0	1.7	0	0.0	1	0.4	0
	45	Pool	32	5.8	186	7	0	3.8	0	0.0	3	1.6	0
	46	Pool	25	7.0	175	6	2	4.6	0	0.0	3	1.7	0
	47	Pool	38	8.0	304	6	2	2.6	1	0.3	4	1.3	0
	48	Pool	25	9.0	225	10	0	4.4	0	0.0	0	0.0	1
otal	48 sites		1,963		26,012	334	120	1.7	244	0.9	211	0.8	33

Table 2. Average density (fish/100 m^2) of fishes counted by snorkeling during 1997 and 2002 in specific reaches of the Little North Fork Clearwater River, Idaho.

Stream Reach	Transect Number	Cutthroat trout (all sizes) 1997	Cutthroat trout (all sizes) 2002	Cutthroat trout > 300 mm 1997	Cutthroat trout > 300 mm 2002	Rainbow Trout 1997	Rainbow Trout 2002	Mountain Whitefish 1997	Mountain Whitefish 2002	Bull Trout 1997	Bull Trout 2002
Downstream of Canyon Creek	1-10	0.3	1.2	0.1	0.3	0.1	0.4	1.0	1.1	0.0	0.0
Canyon Creek to Spotted Louis Creek	11-21	0.6	2.8	0.1	0.9	1.0	0.6	0.8	1.2	0.0	0.1
Spotted Louis Creek to Rutledge Creek	22-32	0.4	1.0	0.1	0.3	0.6	1.7	0.3	0.8	0.0	0.0
Rutledge Creek to F.S. Road 1268	33-39	0.5	2.9	0.3	0.5	1.0	1.1	0.4	0.4	0.0	0.4
Upstream of F.S. Road 1268	40-48	--	3.2	--	0.6	--	0.9	--	0.2	--	0.6
Roaded	33-48	0.5	3.1	0.3	0.6	1.0	1.0	0.4	0.3	<0.1	0.6
Unroaded	1-32	0.4	1.5	0.1	0.4	0.5	0.8	0.8	1.1	0.0	<0.1
All Sites	1-48	0.4	1.7	0.1	0.5	0.5	0.8	0.8	0.9	<0.1	0.1

Table 3. Average density (fish/100 m^2) of cutthroat trout observed while snorkeling the Little North Fork Clearwater River (LNFCW), St. Joe River (St Joe) and North Fork Coeur d'Alene River (NFCdA), Idaho, during 2002.

	All size classes			> 300 mm		
Stream Reach	LNFCW	St Joe	NFCdA	LNFCW	St Joe	NFCdA
Roaded	3.06	1.00	0.40	0.60	0.19	0.05
Unroaded	1.51	0.93	1.30	0.44	0.24	0.27
All Transects	1.75	1.00	0.47	0.46	0.19	0.06

Angler Exploitation

We marked 67 cutthroat trout with reward tags between July 15 and August 23, 2002 in the Little North Fork Clearwater River (Table 4). All but two of these fish were marked downstream of Rutledge Creek (trail access only); consequently, this evaluation is mostly a measure of angler exploitation in the roadless section of the Little North Fork Clearwater River. Anglers reported recapturing seven of these fish although only two were harvested. Seven of the recaptured fish were caught in July whereas the other two fish were caught in August. Based on these tag returns and our experience in the field, we believe the majority of fishing pressure on the Little North Fork Clearwater occurred from mid-July through August. Little fishing pressure is believed to have occurred before mid-July during 2002 as high water made fishing difficult. Because of the apparent fishing pressure that occurs in July, annual exploitation should only be calculated using those fish tagged on July 15-18, 2002. We marked 31 fish during this time period, six of them were recaptured and of these six, only two were harvested. Using a 60% reporting rate, about 32% of the marked cutthroat trout were recaptured whereas 11% were harvested. Annual recapture rates and harvest rates using all the marked fish will occur next year after they have been exposed to fishing pressure for an entire fishing season. The only two fish we marked upstream of Rutledge Creek (they were marked near F.S. road 1268) were both recaptured and released.

Table 4. Number of cutthroat trout tagged, recaptured and harvested on the Little North Fork Clearwater River, Idaho during 2002. Percent recaptured and angler exploitation were calculated based on a 60% reporting rate.

Date	Number Tagged	Number Recaptured	Percent Recaptured	Number Harvested	Angler Exploitation
July 15-18, 2002	31	6	32.3%	2	10.8%
July 31, 2002	7	0	0.0%	0	0.0%
August 19-23, 2002	29	1	5.7%	0	0.0%
All dates	67	7	17.4%	2	5.0%

During August 20-22, 2002, three fishermen caught 85 cutthroat trout, 28 rainbow trout, and four mountain whitefish. The cutthroat trout and rainbow trout ranged in size from 125 mm to 425 mm (Figure 2). About 38% of the cutthroat trout we caught were > 275 mm in length whereas only about 4% (1 fish) of the rainbow trout were > 275 mm in length.

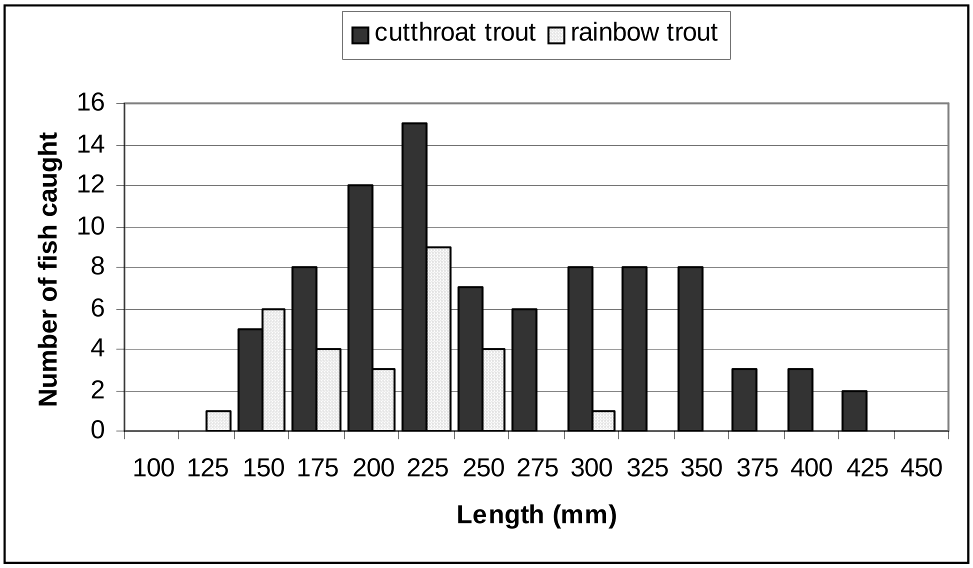

Figure 2. Numbers and lengths of cutthroat trout and rainbow trout caught by three fishermen over a three day period (August 20-22, 2002) in the Little North Fork Clearwater River, Idaho.

Genetic Analysis

We collected tissue samples from 60 cutthroat trout and rainbow trout from the Little North Fork Clearwater River during 2002. Due to time limitations in the lab, our tissue samples were not evaluated to determine the genetic purity and amount of introgression that has occurred between cutthroat trout and rainbow trout in the Little North Fork Clearwater River. Our tissue samples are scheduled for analysis later this year. Findings will be reported in next year's annual report.

Bull Trout Population Estimate

During our snorkel surveys we observed 28 bull trout > 300 mm in length (the size of fish with radio transmitters), three of which had radio transmitters in them. It is estimated that while we conducted our survey there were 18 or 19 bull trout with transmitters in the section of stream we snorkeled. Based on these numbers, we estimated that 140 bull trout occurred in the Little North Fork Clearwater River between Foehl Creek and Lund Creek. It should be noted that because we had only three recaptures (fish observed with radio transmitters), the variance (3,375) around this population estimate is considerably greater than the actual population estimate.

Bull trout redd surveys were conducted on September 25, 2002 in the upper Little North Fork Clearwater River drainage. During this survey we counted 36 redds, which is double what we have ever counted (Table 5 and Figure 3). Expanding the number of redds observed by 2.2 and 3.2 fish/redd, an estimated range of 79 to 115 bull trout spawned in the upper Little North Fork Clearwater River. During 2002, we counted 10 km more stream than we had in the past, and for the first time we counted redds that appeared to made by resident fish. Region 2 used a similar strategy to count redds in the upper Little North Fork Clearwater River during 2001 and counted 39 redds. It is difficult to evaluate the trend in the number or redds counted in these streams due to the inconsistency in counting the same stream reaches throughout the years and counting redds that were created by resident fish. If we only look at those stream reaches that we have counted since 1997, the number of redds we observed in 2002 (25) were the most we have seen.

Table 5. Number of bull trout redds counted in tributaries of the Little North Fork Clearwater River basin, Idaho, from 1994 to 2002. During 2001, IDFG Clearwater Region fisheries personnel also surveyed some of the same stream reaches as Region 1. Redd counts numbers from Region 2 are in parentheses.

Stream	Length (km)	1994	1996	1997	1998	1999	2000	2001	2002
Butte Creek	1.2	--	--	--	--	--	--	(5)	0
Rocky Run Creek	1.5	--	--	--	--	--	--	--	5
Lund Creek	3.9	0	7	2	2	1	1	13 (5)	7
Little Lost Lake Creek	3.9	0	1	1	1	7	3	1	6[a]
Lost Lake Creek	3.0	0	0	0	0	--	1	--	0
Little North Fork Clearwater River									
1268 Bridge to Lund Cr.	7.0	--	--	--	--	--	--	(17)	6
Lund Cr. to Lost Lake Cr.	3.8	--	--	3	1	9	8	3 (12)	7[b]
Lost Lake Cr. to headwaters	5.4	0	2	0	0	--	5	1	5
Total	29.7	0	10	6	4	17	18	18 (39)	36

[a] Four of these redds were about 250 mm in diameter and likely constructed by resident fish.
[b] Two of these redds were about 250 mm in diameter and likely constructed by resident fish.

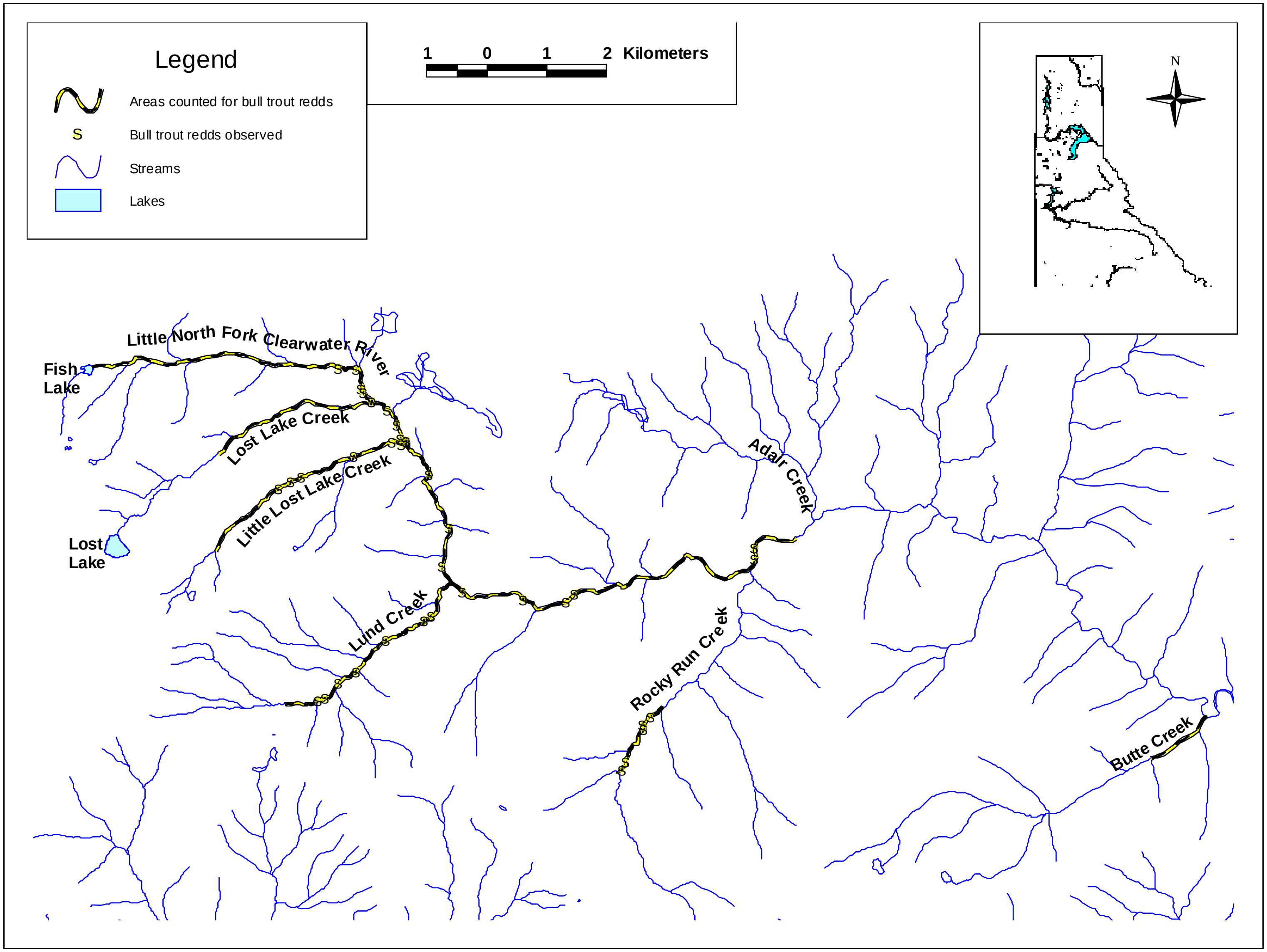

Figure 3. Streams reaches where bull trout redds were counted in the Little North Fork Clearwater River, Idaho, on September 25, 2002, and the locations of where redds were observed.

DISCUSSION

Little North Fork Clearwater River Snorkel Surveys

The density of cutthroat trout, rainbow trout, mountain whitefish and bull trout in the Little North Fork Clearwater River was higher in 2002 than what was observed in 1997. The density of cutthroat trout (all size classes and fish > 300 mm) we observed was greater than trout densities found in the St. Joe River and the Coeur d'Alene River. In fact, the density of cutthroat trout we observed in the Little North Fork Clearwater River can only be matched by the St. Joe River when it was at its recent peak in the early and mid 1990's.

During the winter of 1996, much of northern Idaho experienced a significant rain-on-snow flood event. Following this flood event, a dramatic drop in the density of fishes was observed in the St. Joe and Coeur d'Alene Rivers. More than likely, a similar decline also occurred in the Little North Fork Clearwater River and is why fish density was so much lower in 1997 than what we observed in 2002. The rapid improvement in fish densities between these two dates is likely a testament to the good habitat conditions and low fishing pressure that occurs on this river.

Higher densities of cutthroat trout and rainbow trout were observed in the most upstream reaches of the Little North Fork Clearwater River (upstream of Rutledge Creek), where the most road access occurs. It is not clear why higher densities of cutthroat trout and rainbow trout occur in the upstream reaches, especially since there is some indication that angler exploitation may be higher in this area. Three possibilities for why higher densities occur upstream of Rutledge Creek are as follows: 1). About 44% of the transects upstream of Rutledge Creek had large woody debris as a major structure component whereas only 9% of the downstream transects had this type of structure. Densities of trout species have been found to increase with increasing amounts of large woody debris (Salo and Cundy 1987; Dunnigan 1997; DuPont et al. In Press). 2). Many salmonid species have been found to move upstream during warm summer months in search of cooler waters temperatures (Bjornn and Reiser 1991; Hunt and Bjornn 1992; Garrett and Bennett 1995). 3). Juvenile fish often congregate in smaller streams because rearing conditions are often more desirable due to fewer predators and less flushing flows (Meehan and Bjornn 1991).

It's important to realize that just because the highest densities of trout were observed upstream of Rutledge Creek, it doesn't mean this is where the most fish occur. Larger waters tend to support more and bigger fish, although their densities may be lower than what occurs in smaller streams (Lewynsky 1986; Dunnigan 1997). However, when we convert our data to fish/km we see that more cutthroat trout occur in the upstream reach (roaded) than the downstream reach (Table 6). If we look only at cutthroat trout > 300 mm the trend changes. More rainbow trout and mountain whitefish were found to occur in the downstream unroaded reach (Table 6).

Table 6. The number of fish (fish/km) observed while snorkeling different reaches of the Little North Fork Clearwater River, Idaho during, August 19-22, 2002.

Stream Reach	Transect Number	Cutthroat trout All sizes	Cutthroat trout > 300 mm	Rainbow trout	Bull trout	Mountain whitefish	All trout	All fish
Roaded	33-48	257	51	84	46	25	388	413
Unroaded	1-32	223	64	115	7	156	345	501
All Sites	1-48	231	61	107	17	124	355	480

Bull trout densities and numbers were higher in the upstream reaches. This most likely is because this is where the coolest water temperatures occured and because this is where most of the known spawning tributaries were. Measured stream temperatures upstream of Rutledge Creek ranged between 9-14°C, 3-5°C cooler than what was measured downstream of Rutledge Creek. Bull trout spawning typically begins in early September in north Idaho (DuPont and Horner, In Press), two weeks after we conducted our survey.

The highest densities and numbers of mountain whitefish were observed in the most downstream reaches. This is typical with other rivers in north Idaho where mountain whitefish congregate in stream reaches with the largest pools and warmer water temperatures (DuPont and Horner, In Press).

Angler Exploitation

The fishing regulations for cutthroat trout in the Little North Fork Clearwater River are two fish of any size; the statewide “Wild Trout Water” fishing regulations. The other rivers in the Panhandle Region with wild cutthroat trout include the Coeur d’Alene, St. Joe River and Priest River systems and are either catch-and-release or allow harvest of two fish, none between 8-16 inches. The reason for the more liberal regulations on the Little North Fork Clearwater River is fishing pressure is typically low due to its remote location, with most of the river accessed by trail only. During 2001 and 2002, the U.S. Forest Service began upgrading the trail system that provides access to the Little North Fork Clearwater River. These upgrades improved access, especially for motorcycle traffic. This improved trail system has increased our concern that fishing pressure may increase in the Little North Fork Clearwater River and possibly degrade the quality of this wild cutthroat trout fishery.

Our angler exploitation study found that about 32% of the fish we marked were recaptured and 11% were harvested. Davis (2002) found that annual exploitation of cutthroat trout on the Little North Fork Clearwater River in 1997 was 8% or 13% if you consider a 60% reporting rate. Despite the improvements in the trail system, annual exploitation did not appear to increase in the Little North Fork Clearwater River between 1997 and 2002. In addition, the marked improvement in cutthroat trout densities that have occurred since 1997 indicates fishing pressure is not suppressing this fishery. Unfortunately, our study was not able to differentiate angler exploitation between the upper (roaded) and lower (unroaded) sections of the river. There is some indication that angler exploitation is higher in the upstream reach as the only two fish we tagged in this area were both caught and released by anglers. Future efforts should ensure reward tags are more evenly distributed throughout the basin so angler exploitation can be compared between different stream reaches.

The trail improvements that occurred along the Little North Fork Clearwater River were quite dramatic, as it appeared that you could drive a four-wheeler down much of the new construction. However, the trails that were upgraded in 2001 were already beginning to decrease in width as vegetation had begun to grow back along the edges. These trails will likely continue to degrade over time making motorcycle access more difficult until we get to the point where the trails will be upgraded again. Marked improvements in the trail system followed by gradual degradation may be what we can expect along the Little North Fork Clearwater River in the future, pending changes in USFS management direction. Exploitation of cutthroat trout may increase after trail improvements, but more than likely it will be short term and not have large impacts on this fishery. If the dramatic increase in off road vehicle ownership and use continues, heavy trail use could keep trails more accessible for longer periods of time. Currently, it appears that factors such severe climatic events (floods or droughts) and possibly catastrophic fires may have the most impact on this fishery.

Changes in the catch-and-release fishing practices in the Little North Fork Clearwater River could also have an impact on this fishery. We found that the majority (71%) of our marked fish that were recaptured by anglers were released. Without catch-and-release practices it is likely this fishery could not be maintained at its current level. In the Coeur d'Alene River, Horner and Liter (2002) and Liter et al. (In Press) found that anglers killed between 65-80% of the cutthroat trout they captured. These angling practices in the Coeur d'Alene River resulted in annual angler exploitation rates on cutthroat trout > 350 mm of 28-30%. Annual angler exploitation rates on cutthroat trout > 350 mm in the Little North Fork Clearwater River was about 8%. We believe this information helps explain why high densities of larger cutthroat trout occur in the Little North Fork Clearwater River.

Bull Trout Population Estimate

Our population estimate of bull trout > 300 mm in the Little North Fork Clearwater River from Foehl Creek to Lund Creek was 140 fish. In addition, we counted 36 bull trout redds during our redd surveys, which indicates between 79 to 115 bull trout spawned in the upper Little North Fork Clearwater River. Our population estimate of 140 bull trout suggests that either we are not counting all the bull trout that are spawning in the Little North Fork Clearwater River or that some of the bull trout we observed did not spawn. The variance around our population estimate was very large; consequently, caution should be used when viewing this estimate. Schiff and Schriever (In Press) conducted a population estimate on bull trout in the Little North Fork Clearwater River and estimated 250 bull trout > 350 mm occurred from Adair Creek to Little Lost Lake Creek, a 12.5 km reach in the upper portions of the river. The techniques used for this population estimate (snorkel in areas where bull trout with transmitters are known to occur and assume areas not snorkeled had similar densities) probably would result in an unusually high population estimates and may help explain why their estimate was so much higher than ours.

According to the Federal Draft Bull Trout Recovery Plan (U.S. Fish and Wildlife Service 2002), a total of at least 5,000 bull trout must occur in the North Fork Clearwater River basin before recovery can be considered complete. For this reason, it is important to calculate population abundance of bull trout in the different watersheds they occur in. Unfortunately, our population estimate did not consider juvenile fish, which typically are far more abundant than adults. As we learn more about the survival of different age classes of bull trout, we may be able to back calculate the number of juvenile fish from the number of adult fish that we believe are present.

Another recovery goal required by the U.S. Fish and Wildlife Service is stable or increasing trends in adult bull trout abundance must be documented over a 15 year period (U.S. Fish and Wildlife Service 2002). The 36 bull trout redds counted in the Little North Fork

Clearwater drainage during 2002 was double the previous high since counts began in 1994. The increase in redds counted in 2002 can be attributed to the additional 9.7 km of stream we surveyed and because we counted what we believe were redds from resident bull trout for the first time. The inconsistency in our methods for counting redds makes is difficult to evaluate trends in the bull trout population in the Little North Fork Clearwater River. Nevertheless, the high count in 2002 is encouraging and reflects a much higher escapement than was estimated for 1994-2000.

RECOMMENDATIONS

1. Monitor fish abundance in the Little North Fork Clearwater River through snorkel surveys every 3 years.

2. Efforts to evaluate angler exploitation in the future should ensure reward tags are more evenly distributed throughout the basin so comparisons can be made between the roaded and unroaded stream reaches.

3. Maintain current fishing regulations on Little North Fork Clearwater River.

4. Report findings of genetic evaluation on cutthroat trout and rainbow trout in next year's annual report.

5. Investigate other streams/stream reaches in the Little North Fork Clearwater River to determine if bull trout spawning and rearing is occurring in areas we currently don't evaluate.

6. Periodically, attempt to conduct a population estimate of all bull trout in the Little North Fork Clearwater River.

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2002 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-27

Project: I-Surveys and Inventories Subproject: I-A Panhandle Region

Job No.: c-3 Title: Middle Fork East River Bull Trout Assessment

Contract Period: January 1, 2002 to December 31, 2002

ABSTRACT

Based on our electrofishing efforts in the Middle Fork East River basin during 2002, 2001 and 1986, it appears that juvenile bull trout *Salvelinus confluentus* rear in about 8 km of stream, with the majority of use occurring in about 3 km of stream. Brook trout *Salvelinus fontinalis* are in sympatry with bull trout in all these stream reaches except for Uleda Creek (0.6 km reach) where the highest bull trout densities were found. The highest brook trout densities tend to occur in the lower reaches of the Middle Fork East River and in the smaller tributaries – areas where few or no bull trout occur. The presence of brook trout in this system is a concern as brook trout have been found to displace bull trout from watersheds through hybridization and competition.

Stream temperature may play a role in the distribution of bull trout and brook trout in the Middle Fork East River. Our stream temperature data suggests that water temperatures in all areas we evaluated are within or below the bull trout's thermal optimum (< 13°C). Uleda Creek, which supports the highest density of bull trout and does not support brook trout, was the only stream reach we evaluated where the daily average temperature did not exceed 10°C. Many of the surrounding streams had daily average water temperatures only 1°C warmer than Uleda Creek, and brook trout were present. Tarlac Creek, which is about 1°C warmer than Uleda Creek, was dominated by bull trout in 1986 and now has only brook trout. It's difficult to say for sure that these small differences in stream temperature play such a large role in fish distribution. Other factors such as stream grade, size and habitat condition may play a role. More in depth evaluations of the stream habitat is required before we can say for certain that stream temperature is the major controller in bull trout and brook trout distribution in the Middle Fork East River basin.

During our electrofishing survey we identified a man made barrier in Uleda Creek about 0.6 km upstream from its mouth. Uleda Creek appears to be the most important stream in the Middle Fork East River to bull trout. Removing this barrier would increase the amount of habitat available to bull trout by at about 5 km.

Twenty radio transmitters were surgically inserted in bull trout (400-752 mm in length) located in Middle Fork East River to evaluate their movement and habitat use. Attempts were made to locate these fish every week. Based on our tracking results, bull trout from the Middle Fork East River have an adfluvial life cycle where the adults migrate to either Lake Pend Oreille or Pend Oreille River. Movement patterns in the Middle Fork East River basin can be characterized by little movement the month prior to spawning (no fish moved more than 1 km), followed by increased movement during the spawning period (several fish have movements over 6 km). Following spawning, a gradual downstream movement was documented with most fish congregating in beaver ponds. Only three bull trout were found to migrate out of East River

prior to November. Within the Middle Fork East River, the radio tagged bull trout were found associated with various forms of cover including large organic debris, boulder, undercut stream banks, overhead cover and pools. One ½ km section of stream that appears to be avoided by the radio tagged bull trout was absent of large woody debris. Bull trout movement through the Priest River is rapid and does not appear to provide more than just migratory habitat.

Between October 3 and November 13 we documented 11 different dead bull trout in the Middle Fork East River. One to three other bull trout died in the Priest River bringing the post-spawn mortality to 60-70%. This mortality rate is not unusual for post-spawn bull trout, especially for the low water conditions these fish encountered during the fall of 2002. The death of these bull trout is believed to be from natural causes (post-spawn stress, lack of feed and predation), although we can not rule out poaching.

Through redd surveys we identified 12 bull trout redds, with most being located in Uleda Creek and the Middle Fork East River between Uleda Creek and Tarlac Creek. Based the number of redds observed, electrofishing results and observations made during radio tracking, it appears that the bull trout spawning escapement for the Middle Fork East River was between 30 and 40 fish.

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INTRODUCTION

The Middle Fork East River is the only tributary of Priest River that is known to support a bull trout *Salvelinus confluentus* population. Robertson and Horner (1987) first reported this bull trout population in 1986 and found them to occur throughout much of the Middle Fork East River. Adults up to 541 mm were sampled during this survey, indicating that at least some this population had an adfluvial or fluvial life cycle. The Middle Fork East River was electrofished in 2000 (Idaho Department of Lands 2000a) and 2001 (DuPont and Horner, In Press; Rothrock 2003) to evaluate the status of the fishery. Based on these findings, the bull trout population still exists, although its distribution appears to have diminished. One tributary was found to still support high densities of bull trout (> 10/100 m^2), with adults ranging up to 700 mm in length.

The bull trout that utilize Middle Fork East River have a couple attributes that make them unique from other populations in the Idaho Panhandle. First, this population is relatively isolated. This population appears to use about 10 km of the Middle Fork East River for spawning and rearing and no other bull trout population is know to occur within 50 stream km of this population. Second, it is believed their life history includes a fluvial life cycle or an adfluvial life cycle where the fish must swim downstream from a lake (either Lake Pend Oreille or Priest Lake) before they turn upstream into the East River to spawn (Figure 1). No other bull trout population in the Pend Oreille River basin of Idaho is known to have either of these life cycles.

The Middle Fork East River watershed has been managed intensively for timber for nearly a century. Road densities exceed 5 miles/$mile^2$ within the watershed; the main haul road parallels the Middle Fork East River; and several historic clearcuts encompassed sections of the river as well as some of the major tributaries (Panhandle Bull Trout Technical Advisory Team 1998). Intensive timber management will continue in the watershed, although efforts are being made to close roads. The impact timber management has had on this bull trout population is unknown.

The invasion or introduction of exotic fish into the Middle Fork East River may also have impacted this bull trout population. The Middle Fork East River supports what appears to be a thriving brook trout *Salvelinus fontinalis* population. Based on electrofishing findings during 2001, brook trout appear to be increasing in numbers and expanding their range and may have displaced bull trout (out competed and/or hybridized with) from some of the tributaries (DuPont and Horner, In Press). The Idaho Department of Fish and Game introduced brown trout *Salmo trutta* into this system in 1976 and 1978 and they currently utilize the lower reaches of the Middle Fork East River. The impact brown trout have on this bull trout population is unknown, although introductions of brown trout have been associated with the decline of bull trout populations (Mullan et al. 1992; Rieman and McIntyre 1993).

Despite invasions by brook trout, introductions of brown trout, and intensive timber management within this watershed, bull trout have managed to persist in the Middle Fork East River. These risks, coupled with the uniqueness of this population and the small area they appear to occur in puts this population at risk of extinction. Understanding the movement patterns and habitat use of this bull trout population will add to our knowledge and help ensure proper actions are taken in the future to protect and restore it. We decided that a radio-telemetry study would be the best way to collect this type of information.

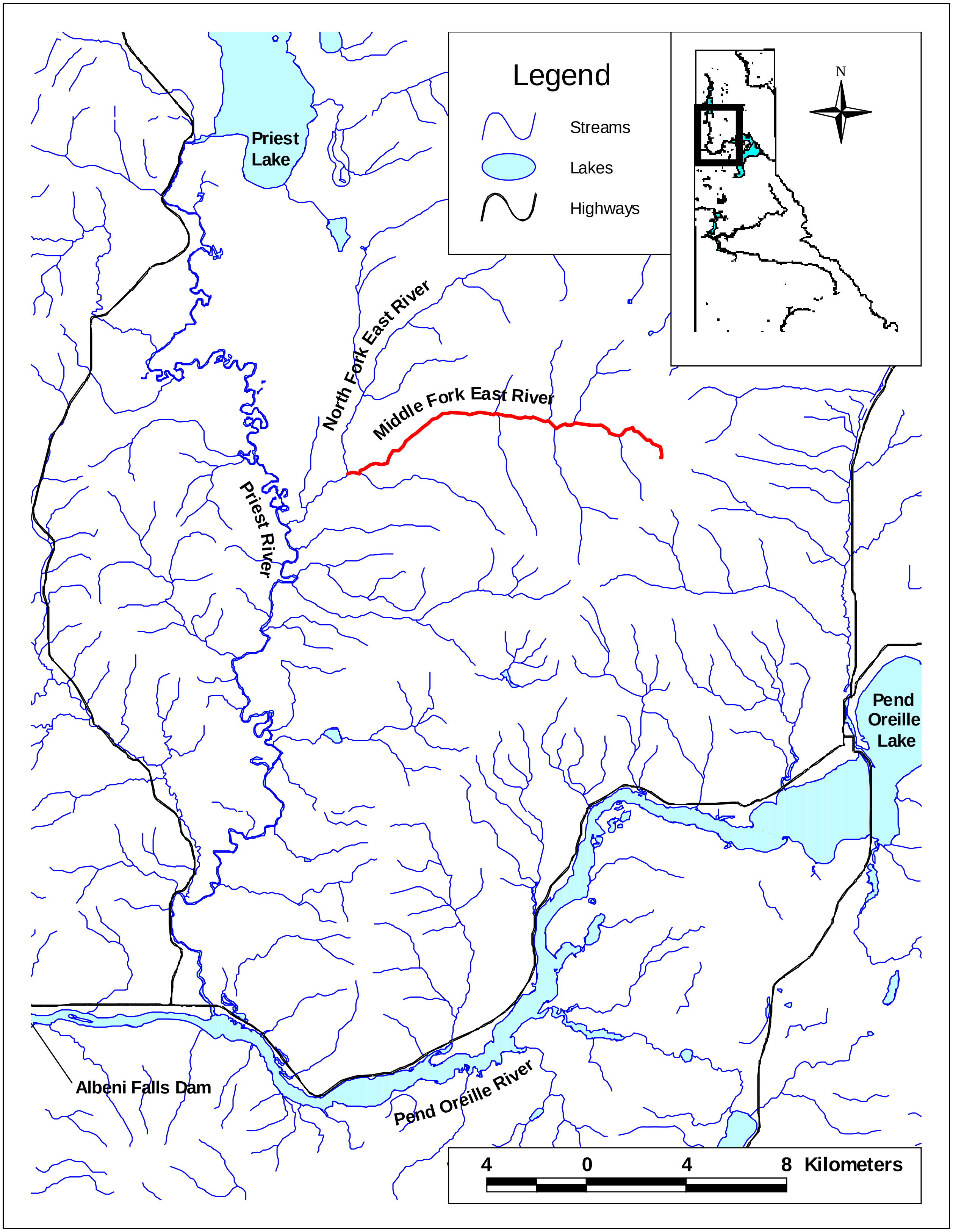


Figure 1. Location of Middle Fork East River, Idaho.

STUDY SITES

The Middle Fork East River is located in the Panhandle of Idaho (Figure 1). This small river occurs in a watershed about 8,750 hectares in size and flows about 15 km from the headwaters to where it joins the North Fork East River to form the East River. The East River flows about 4 km to where it enters Priest River. Priest Lake is located about 37 river km upstream from this confluence and the Pend Oreille River is located about 34 river km downstream. A dam (operated by AVISTA Corp.) is located at the mouth of Priest Lake and is a barrier to fish passage the majority of the time. Albeni Falls Dam (operated by the Corps of Engineers) is located about 7 river km downstream of the confluence of the Pend Oreille River and Priest River and is a permanent barrier to fish passage. Lake Pend Oreille is located about 37 river km upstream of the confluence of the Pend Oreille River and Priest River and no barriers to fish migration exists between these points.

The Middle Fork East River is about 6-8 m wide near the mouth and about 3 m wide near the upstream limits of where bull trout have been identified. The stream grade near the mouth of the Middle Fork East River is about 2-4%, hardwoods dominate the riparian vegetation, and beaver ponds are common. Moving upstream, especially in the areas the bull trout are located, the gradient increases (> 4%), the riparian area becomes dominated by conifers and beaver activity is uncommon. Major tributaries of the Middle Fork East River include Tarlac Creek, Chicopee Creek, Uleda Creek and Keokee Creek. The gradient in these streams is typically > 6% and conifers dominate the riparian area.

About 90% of the Middle Fork East River watershed occurs on land managed by the Idaho Department of Lands. The remaining 10% is private and U.S. Forest Service. The majority of this watershed is timbered and only small clearings occur because of fires, logging and rock outcrops. Logging, grazing and clearing for development has impacted this area. The East River is currently considered a water quality limited stream and is on the Idaho 303(d) list.

OBJECTIVES

1. Assess the distribution of bull trout and brook trout in the Middle Fork East River.

2. Determine movement and habitat use of adult bull trout captured from Middle Fork East River.

3. Evaluate what influence stream temperature has on bull trout distribution and movement.

4. Conduct bull trout redd counts and estimate the spawning escapement on the Middle Fork East River.

METHODS

Bull Trout and Brook Trout Distribution

To collect bull trout for our radio telemetry study we electrofished those areas where past surveys indicated the highest densities of bull trout would occur (Tarlac Creek to Uleda Creek). In order to better evaluate the distribution of juvenile bull trout and brook trout, we also electrofished upstream and downstream of this area. Electrofishing was conducted using a Smith-Root SR 15 backpack electrofisher and a three-person crew. While electrofishing we periodically collected and measured all fish we captured over a known stream length to help evaluate fish densities and the size distribution of fish.

Our fish distribution data was combined with past studies (Robertson and Horner 1987; DuPont and Horner, In Press) to help determine where the primary bull trout rearing areas are as well as maximum upstream and downstream use areas of bull trout and brook trout. While electrofishing we also recorded where potential barriers to fish migration occurred and documented whether bull trout or brook trout were located above these places.

Movement and Mortality

To determine movement of bull trout we placed radio transmitters inside all adult bull trout captured through our electrofishing efforts. When we captured an adult bull trout we immediately set up for surgery as we carried all the necessary supplies with us. During surgery the fish was placed in a "V" shaped cradle constructed out of a rubberized wire mesh and a wood frame. The cradle was designed so that when it was placed in a tub filled with water, the fish's gills would be submerged, and its abdomen would be out of water. This would allow the fish to breath while we inserted the radio transmitter through a 20-30 mm incision placed in its abdomen. The radio transmitter was inserted in the fish using a modification of the shielded needle technique (Ross and Kleiner 1982; Rich 1992). Three to four interrupted stitches using a ½ curved needle and 2-0 chromic gut suture were used to close the incision. Betadyne was rubbed over the incision area and at the antenna exit site both before and after the surgery. During surgery, we used sterile rubber gloves or our hands were rubbed down with betadyne.

No anesthetic was used during the surgery, as once upside down the fish would remain stationary through the entire process. The key to using this strategy is ensuring the gills are submerged in water. Because no anesthetic was used, the bull trout were released back to the same place they were captured immediately after surgery.

The transmitters placed into the bull trout were pulsed radio transmitters (Lotek model MBFT-5, 8.9 g air, 4.3 g water, 26 bpm) that had a life expectancy 290 days. The weight of the transmitter did not exceed 2% of the body weight of the bull trout it was inserted in based on recommendations from Winter (1983). Using the 2% rule we could put transmitters in bull trout down to 445 g in weight.

After the bull trout were released back to the stream, attempts were made to track each fish once a week. Fish were tracked on ground (car, foot and raft) using an SRX-400 Lotek receiver with an "H" antennae. With a little practice we were able to track fish to their exact location. Often, the fish we were tracking were visually identified. The coordinates of where each of the bull trout were located were recorded with a Global Positioning Unit (Garmin Map76S). The Global Positioning Units also recorded the elevation and time. When the Global

Positioning Units could not communicate with a sufficient number of satellites to record a fish's location, we marked the location down on a U.S.G.S. topographic map.

We set up a fixed receiving station just upstream from the mouth of Priest River. This fixed station would tell us if and when bull migrated to Pend Oreille River. Battelle, a consulting firm that is evaluating entrainment of bull trout over Albeni Falls Dam, also set up fixed stations at Albeni Falls Dam and Dover (2 km downstream of Lake Pend Oreille). The combination of these fixed sites enabled us to determine whether fish that enter the Pend Oreille River go downstream over the dam, upstream to the lake or stay in the river. Each station consists of an SRX-400 radio receiver connected to aerial Yagi antennas. The receivers are supplied with either AC or DC power, and solar panels are used to recharge the DC power systems. To aide the ground radio tracking and recordings at the fixed stations, Battelle conducted occasional aerial surveys for fish that entered Priest River or Pend Oreille River.

Habitat Use

Each time a radio tagged bull trout was accurately located in the Middle Fork East River, the habitat characteristics of where that fish was located were recorded. Our ability to track these fish to their exact location allowed us to accurately describe the characteristics of the habitat they occurred in. Attributes we collected included depth, temperature, type of cover, and habitat type (pool, riffle, run). We originally planned to collect velocity measurements, but many of the bull trout were located in logjams and under boulders making this measurement impossible to take. Habitat use was summarized temporally (pre-spawn, spawn, post spawn and overwinter) to evaluate whether certain attributes were selected during different periods of these fish's lives. Once these fish left the East River we did not collect detailed habitat characteristics because of our inability to identify their exact location.

Temperature Effects

To help determine if water temperature played a role in fish distribution or movement patterns we collected temperatures, hourly, at five locations on the Middle Fork East River (Figure 2). Stream temperatures were collected with Onset Tidbit Temperature Loggers. These temperature loggers were placed on the stream bottom, in shaded areas, where we believed the stream would flow year round. In addition, the temperature loggers were housed in 50 mm sections of 32 mm (1 ¼ in) copper pipe to protect them from debris and moving substrate.

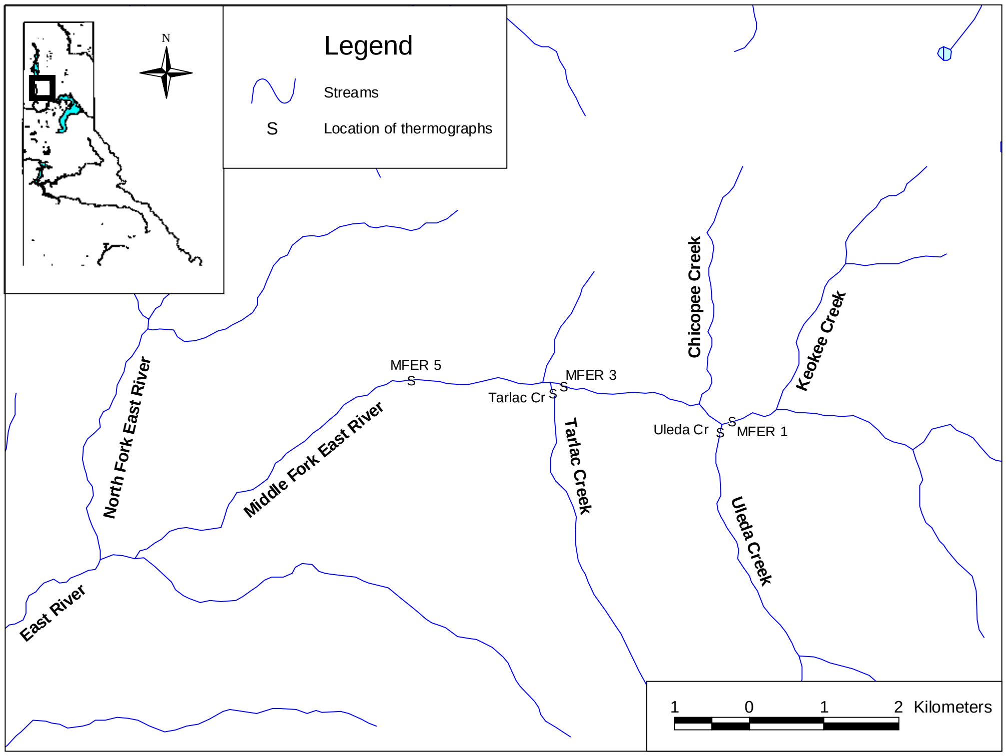


Figure 2. Locations of where thermographs were placed in the Middle Fork East River basin during 2002.

Bull Trout Spawning Surveys

All areas of the East River drainage where we believed bull trout may spawn were walked in mid October to evaluate if any spawning activity had occurred (presence of redds). Survey techniques and identification of bull trout redds followed the methodology described by Pratt (1984). Research has demonstrated the level of observer training and experience may influence the accuracy of redd counts (Bonneau and LaBar 1997; Dunham et al. 2001). To reduce observer variability in bull trout redd counts, only individuals who attended a bull trout redd count training exercise on September 23, 2002 were used to count redds in the Middle Fork East River. The location of redds were recorded on maps and/or GPS units during redd counts. Any redds smaller than 500 mm in diameter were considered to be constructed by brook trout or small brown trout. To verify if redds were made by bull trout or large brown trout, we overlayed the location of where the radio tagged bull trout were during the spawning season with where we identified redds. Redds that occurred outside the area these bull trout were located were considered to be made by brown trout. We estimated the abundance of adult bull trout spawners entering each drainage by applying a low estimate of 2.2 fish/redd (Bonar et al. 1997) and an upper estimate of 3.2 fish/redd (Fraley and Shepherd 1998) to the total number of redds observed.

Genetics

To evaluate whether Middle Fork East River bull trout were hybridizing with brook trout and to help determine their similarity with fish from Lake Pend Oreille and Priest Lake, we took tissue samples from fish we collected for genetic analysis. Small sections of fins (the size of an eraser head) were collected from 50 bull trout located throughout all surveyed transects. Fin clips were placed in vials with a 95% ethanol preservative. All fin clips were labeled with the suspected species they came from, the date they were sampled, the length of the fish and where they were sampled. These samples are being stored until genetic analysis can occur.

RESULTS

Bull Trout and Brook Trout Distribution

We electrofished the Middle Fork East River during August 12-13, 2002 to capture adult bull trout to surgically insert radio transmitters. During this survey we periodically collected and measured all fish we electrofished. Through this periodic sampling, we captured 24 bull trout, 13 brook trout, nine cutthroat trout *Oncorhynchus clarki*, one brown trout and 18 slimy sculpin *Cottus cognatus*. We also sampled what appeared to be two bull trout/brook trout hybrids. Most of these fish ranged between 40 and 270 mm, although three adult bull trout were captured that were over 540 mm in length (Figure 3). The sizes of bull trout we captured indicate there are four age classes of juvenile fish and at least three age classes of adult fish.

Based on our electrofishing efforts during 2002, 2001 and 1986, it appeared that juvenile bull trout reared in about 8 km of stream in the Middle Fork East River basin, with the majority of use occurring in about 3 km of stream (Figure 4). Brook trout were in sympatry with bull trout in all these stream reaches except for Uleda Creek (0.6 km reach) where the highest bull trout densities were found. The highest brook trout densities tended to occur in the lower reaches of the Middle Fork East River and in the smaller tributaries – areas where few or no bull trout occurred.

Uleda Creek, the only stream reach where bull trout and no brook trout were found to occur, has the coldest water temperature of the different sites we monitored (Table 1 and Figure 5). Bull trout and brook trout densities were similar at the MFER 3 site where the maximum water temperature was about 1°C warmer than what occurred in Uleda Creek. The maximum temperature of the most downstream reach we monitored (MFER 5) was about 2° warmer than what occurred in Uleda Creek. High densities of brook trout and only occasional bull trout occurred downstream of MFER5.

Table 1. Water temperature collected from various sites in the Middle Fork East River, Idaho from August 16, 2002 to November 18, 2002.

Temperature variable	MFER 1	Uleda Cr	MFER 3	Tarlac Cr	MFER 5
Maximum instantaneous	11.2	10.6	11.3	11.4	12.5
7-day maximum instantaneous	11.1	10.3	11.2	11.1	12.2
Maximum daily average	10.6	9.8	10.9	10.8	11.4
7-day maximum daily average	10.3	9.5	10.6	10.6	11.2

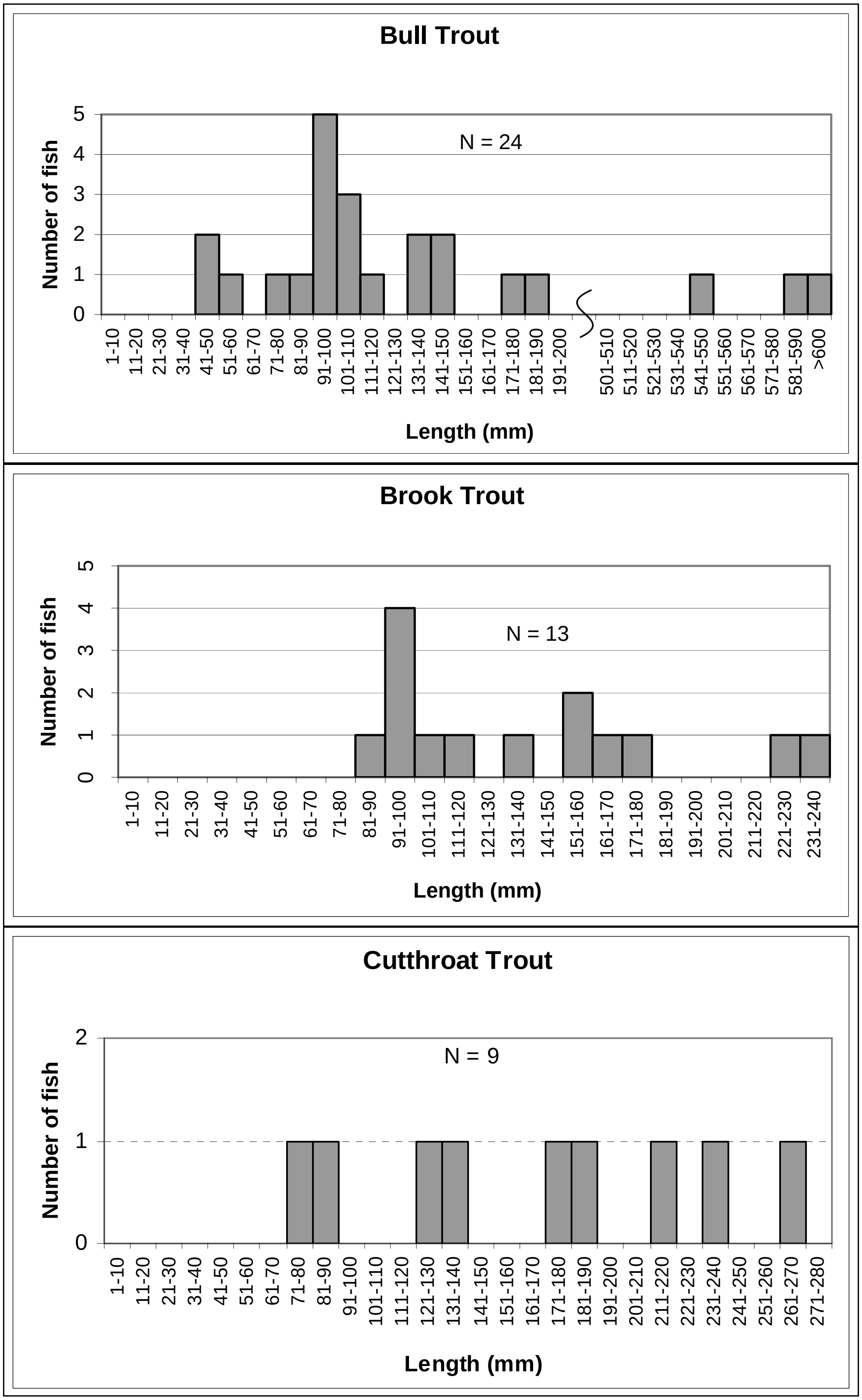


Figure 3. Length frequency histogram of bull trout, brook trout and cutthroat trout collected by electrofishing the Middle Fork East River, Idaho, during August 14-16, 2002.

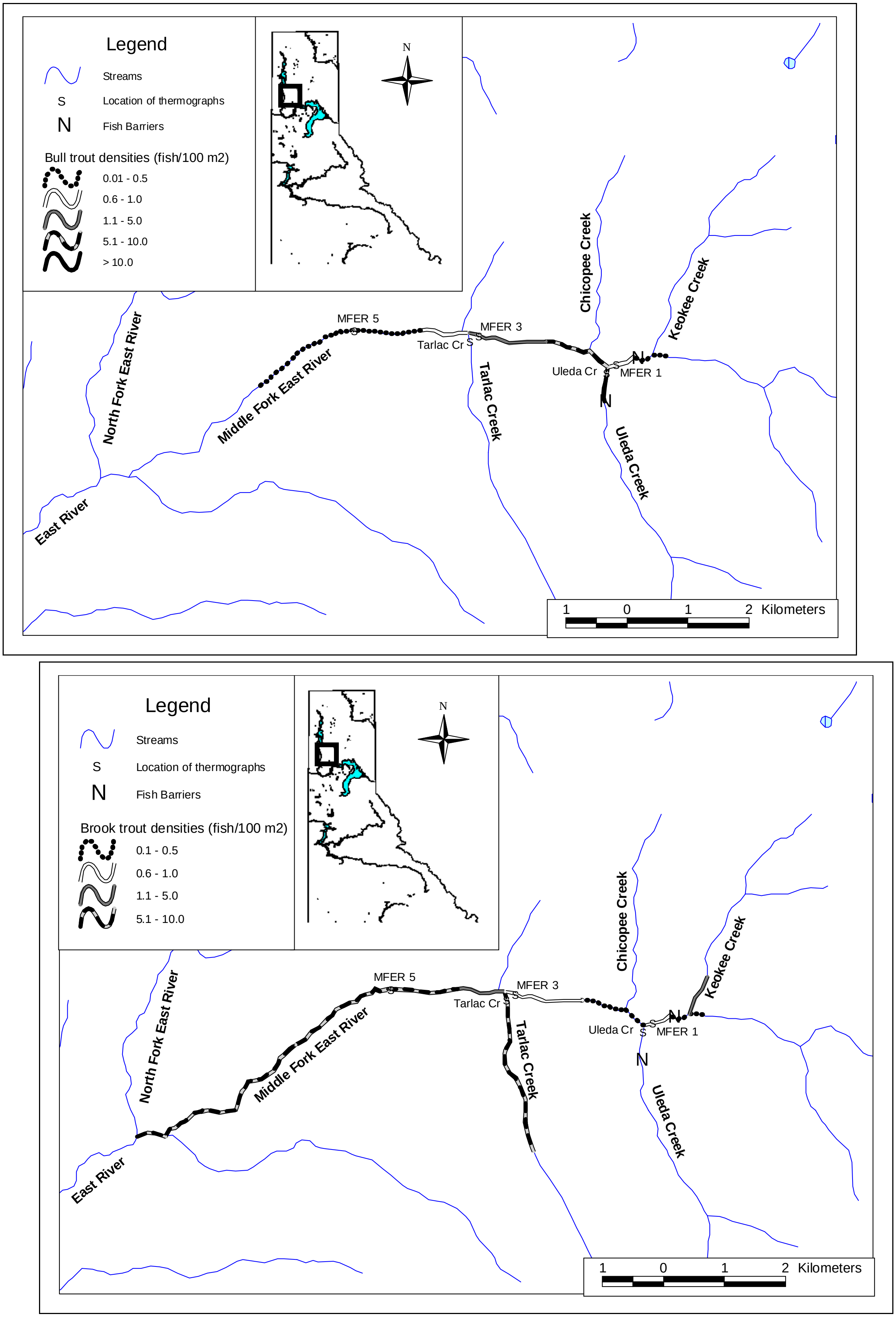
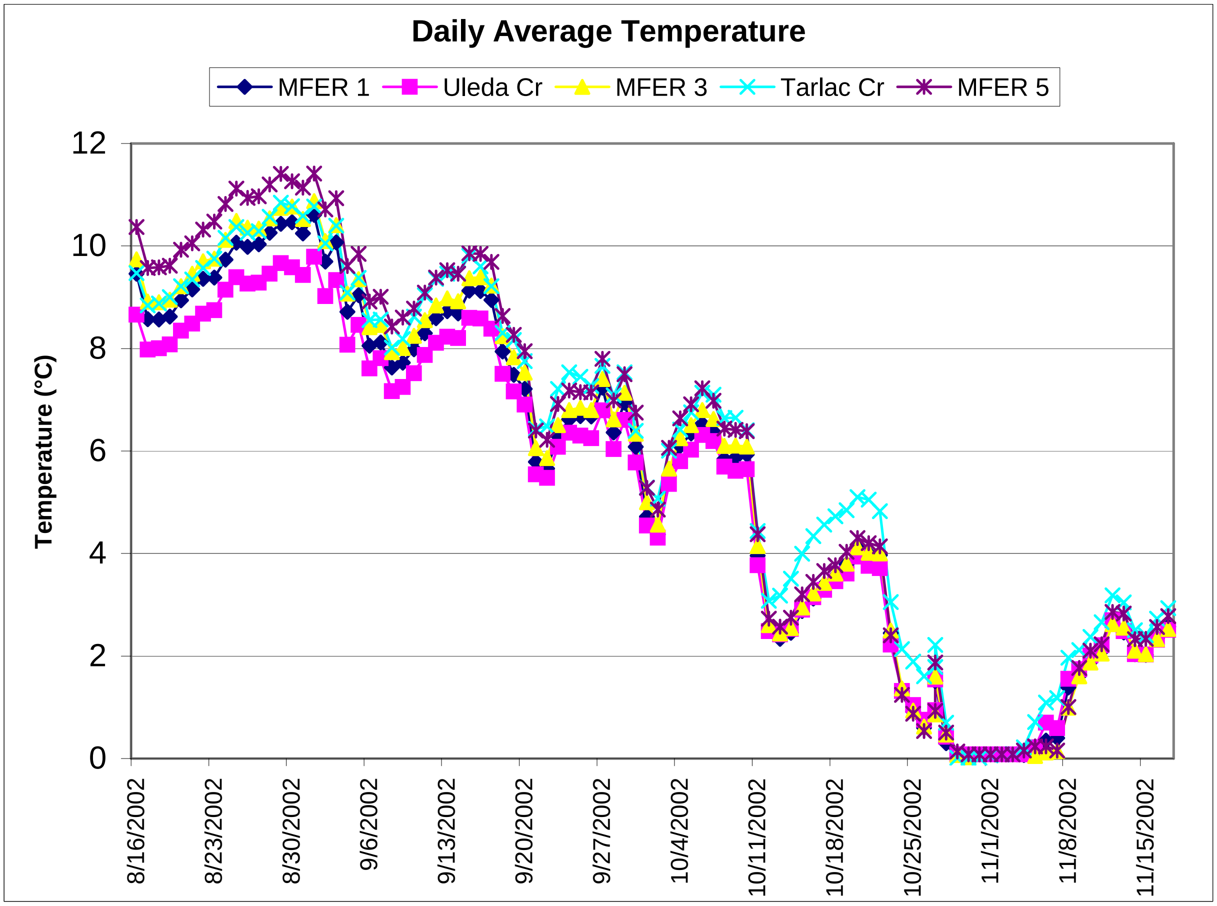


Figure 4. Estimated distribution and density of bull trout and brook trout in the Middle Fork East River, Idaho, based on sampling during 1986, 2001 and 2002.



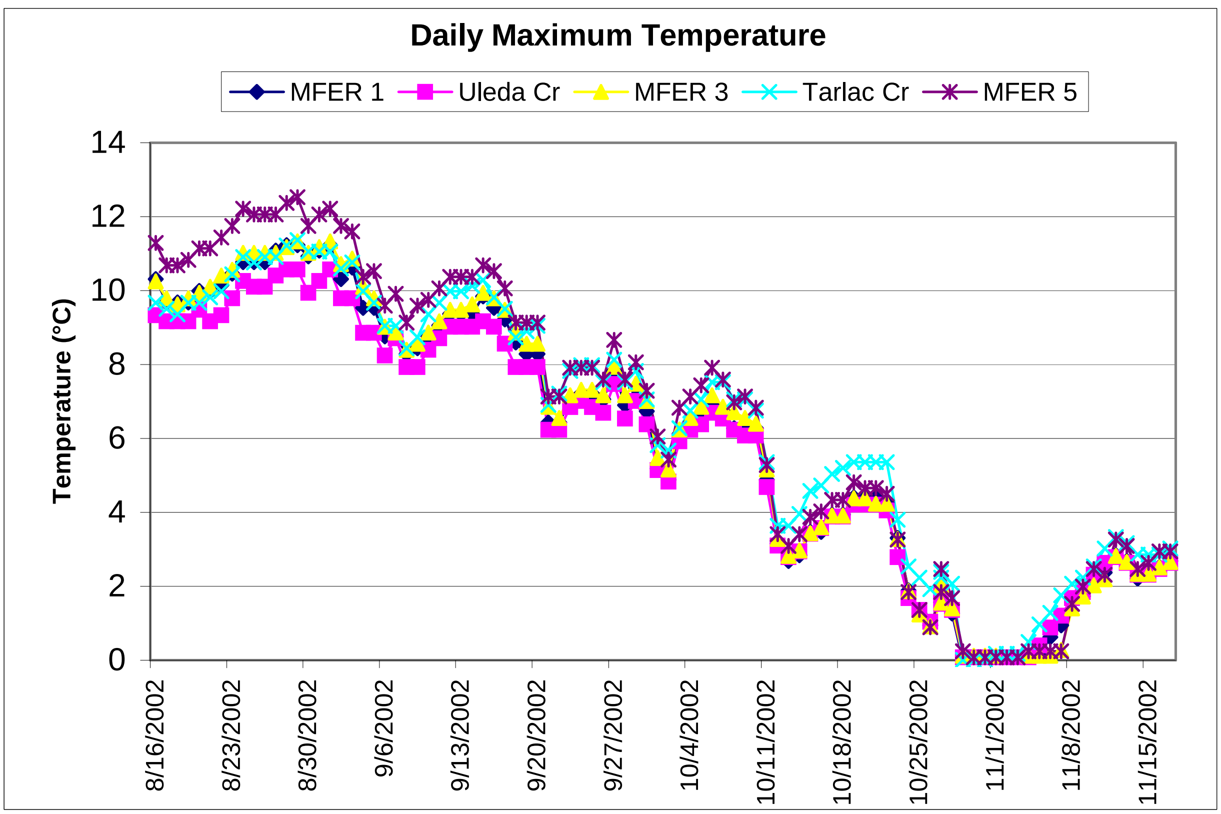


Figure 5. Daily maximum and daily average temperatures collected at various sites in the Middle Fork East River, Idaho, during 2002.

A complete man-made barrier (old stream crossing) was identified in Uleda Creek about 0.6 km upstream from the mouth. No bull trout were electrofished or observed upstream of this point (Figure 4). Habitat appears good upstream of this blockage, and no other barriers were identified in the 1 km we surveyed upstream of this point. A partial and temporary natural barrier (log jam – series of 3 ft drops) was also identified in the Middle Fork East River about 0.6 km upstream of Uleda Creek. No juvenile bull trout were electrofished or observed upstream of this barrier although we did electrofish and radio tag one adult bull trout (400 mm) above this point.

Movement and Mortality

We surgically inserted transmitters in 20 bull trout we captured in the Middle Fork East River between Tarlac Creek and Keokee Creek during August (Appendix A – August 15, 2002). These bull trout ranged in size from 400 mm to 752 mm (Figure 6). In our attempts to capture adult bull trout we probably saw another 12 to14 fish we were not able to capture. We were able to relocate the majority of radio tagged bull trout every week through radio tracking until December 2002. After December we monitored these fish less frequently. The weekly locations of these fish are displayed in Appendix. A.

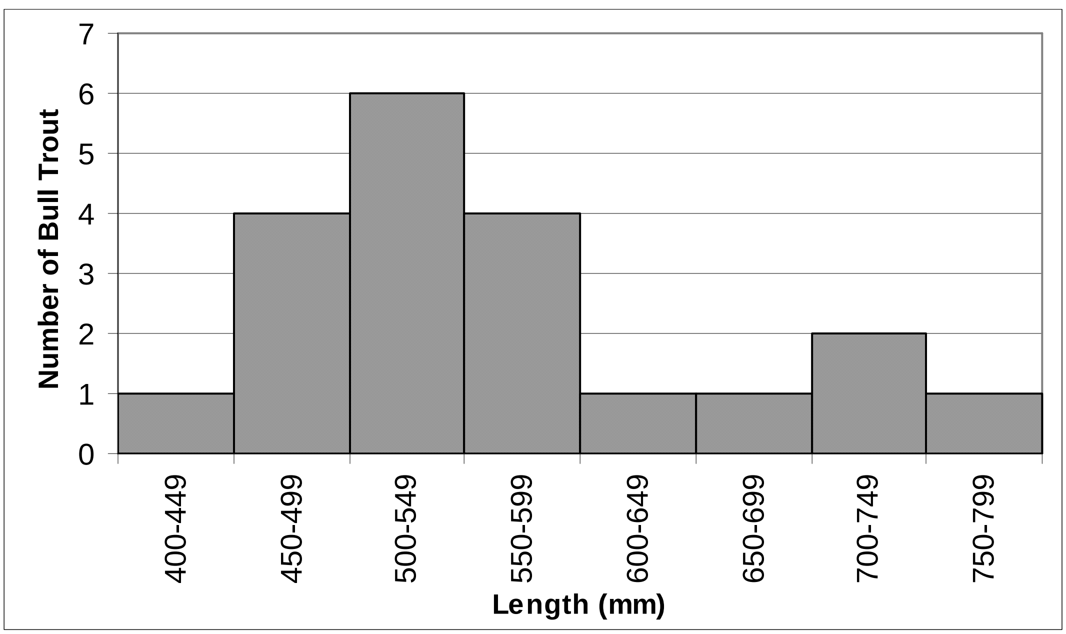


Figure 6. The lengths of bull trout that we placed radio transmitters in on the Middle Fork East River, Idaho, during August 14-16, 2002.

Very little bull trout movement occurred during the first month of this radio telemetry study (8/15/02 to 9/11/02). Only one bull trout moved more than 1 km and many of the fish were tracked to the exact same location throughout this period. The first spawning activity (digging a redd) was observed on 9/5/02 and between 9/11/02 and 9/19/02 many of the fish made movements > 1 km and spawning behavior (grouping up and redd construction) was commonly observed. Spawning activity seemed to begin when maximum water temperatures dropped below 10°C. By 10/3/02 spawning appeared over and most fish had moved downstream of the spawning areas, including three fish that we suspected had entered the

Priest River. These three fish made downstream migrations of 7-11 km during a week's period. We floated the Priest River on 10/10/02 from about 5 km upstream of its confluence with the East River to its mouth and did not find any of these three fish. Unfortunately, the fixed receiver was not set up properly and we were not able to determine if these fish made it to the Pend Oreille River. Further searches for these fish found that two of them migrated to Lake Pend Oreille and the transmitter of one was found on the bank near the mouth of Priest River.

Between October 3 and November 13, a gradual downstream movement of bull trout was noted in Middle Fork East River, although no fish made it to Priest River and only one fish moved downstream of a beaver dam complex located about 1 km upstream of North Fork East River. During this period, bull trout began congregating in two different beaver ponds, and at one time, at least 10 bull trout (some without transmitters) were seen swimming together.

After October 3, we began seeing significant numbers of what we assumed to be post-spawn mortality of bull trout. Between October 3 and November 13 we documented 11 different dead bull trout. We didn't find the actual fish in many circumstances, just a radio transmitter located up on the bank or a signal that stopped moving. On October 13 we documented three dead bull trout. This was a time when flows increased (rains) following a period when intense cold caused the river to freeze completely over. It is believed these fish became stranded on the ice when attempting to migrate downstream with increasing flows. It is unclear why the radio tagged bull trout did not try to migrate downstream of these beaver ponds, as obvious flow did occur over the dams in places. We believe that every fish that did try to migrate downstream of the beaver ponds after September died before ever reaching Pend Oreille River. It should be noted that during this study this region was experiencing a drought and the tributaries were extremely low.

By December, we were concerned that the remaining four bull trout in Middle Fork East River would die before making it out of the beaver ponds. So, on December 9, 2002 we captured all four fish through electrofishing and moved them to the Priest River (Appendix A – December 5, 2002). We also captured two other adult bull trout without radio tags. Once moved to the Priest River, it took less than12 hours before the first fish passed the fixed station at the mouth of Priest River (17 km migration). Within 40 hours all four fish had passed this fixed site. On December 11 one of these fish had passed the fixed site at Dover (32 km upstream from Priest River) and another passed it on December 13. These two fish were not located again and presumably entered Lake Pend Oreille. The other two fish that made it to Lake Pend Oreille most likely migrated at a similar speed, as they entered Priest River in late-September and made in to Lake Pend Oreille before the Dover fixed receiving station was set up in mid-October.

We believe that as of March 24, 2002, six of the bull trout were still alive, the fate of two was unknown, and 12 died (Table 2 and Figure 7). Four of the living bull trout migrated to Lake Pend Oreille and two were in the Pend Oreille River. Two of the bull that entered the lake and the two in Pend Oreille River were regularly tracked. They moved relatively little throughout the winter. During this study, all nine bull trout that made it to Priest River migrated downstream towards Pend Oreille River. No attempts to migrate upstream towards Priest Lake were documented. The radio transmitters in the six living bull trout should last until June 2003. We will continue tracking these fish through this period and report the findings next year.

Table 2. The status of bull trout, as of March 24, 2003, that were radio tagged on Middle Fork East River, Idaho, during August 14-16, 2002.

Frequency	Length (mm)	Status	Date of death	Date Last Located
148280	521	Dead – tag found on bank	11/13/2002	11/13/2002
148299	584	Dead – tag found on bank	9/19/2002	9/19/2002
148730	752	Dead – tag found on bank	10/3/2002	10/3/2002
148750	400	Dead – fish stopped moving	11/6/2002	11/6/2002
148770	530	Dead – tag found on bank	10/25/2002	10/25/2002
148960	590	Dead – tag found on bank	10/8/2002	10/8/2002
148979	650	Dead – dead fish found	10/8/2002	10/8/2002
149020	497	Alive – in Lake Pend Oreille	--	12/14/2002
149100	545	Dead – fish stopped moving	10/8/2002	10/8/2002
149297	480	Dead – tag found on bank	11/13/2002	11/13/2002
149430	615	Dead – tag found on bank	10/15/2002	10/15/2002
149629	732	Alive – in Pend Oreille River	--	3/24/2003
149658	485	Dead – tag fond on bank	10/23/2002	10/23/2002
149690	722	Alive – in Lake Pend Oreille	--	12/11/2002
150179	590	Alive – in Lake Pend Oreille	--	3/24/2003
150210	515	Dead – dead fish found	11/13/2002	11/13/2002
150442	545	Unknown – lost in Priest River	--	11/19/2002
150860	550	Alive – in Lake Pend Oreille	--	2/4/2003
151000	450	Alive – in Pend Oreille River	--	3/24/2003
151889	540	Unknown – no movement in Priest Riv.	--	3/24/2003

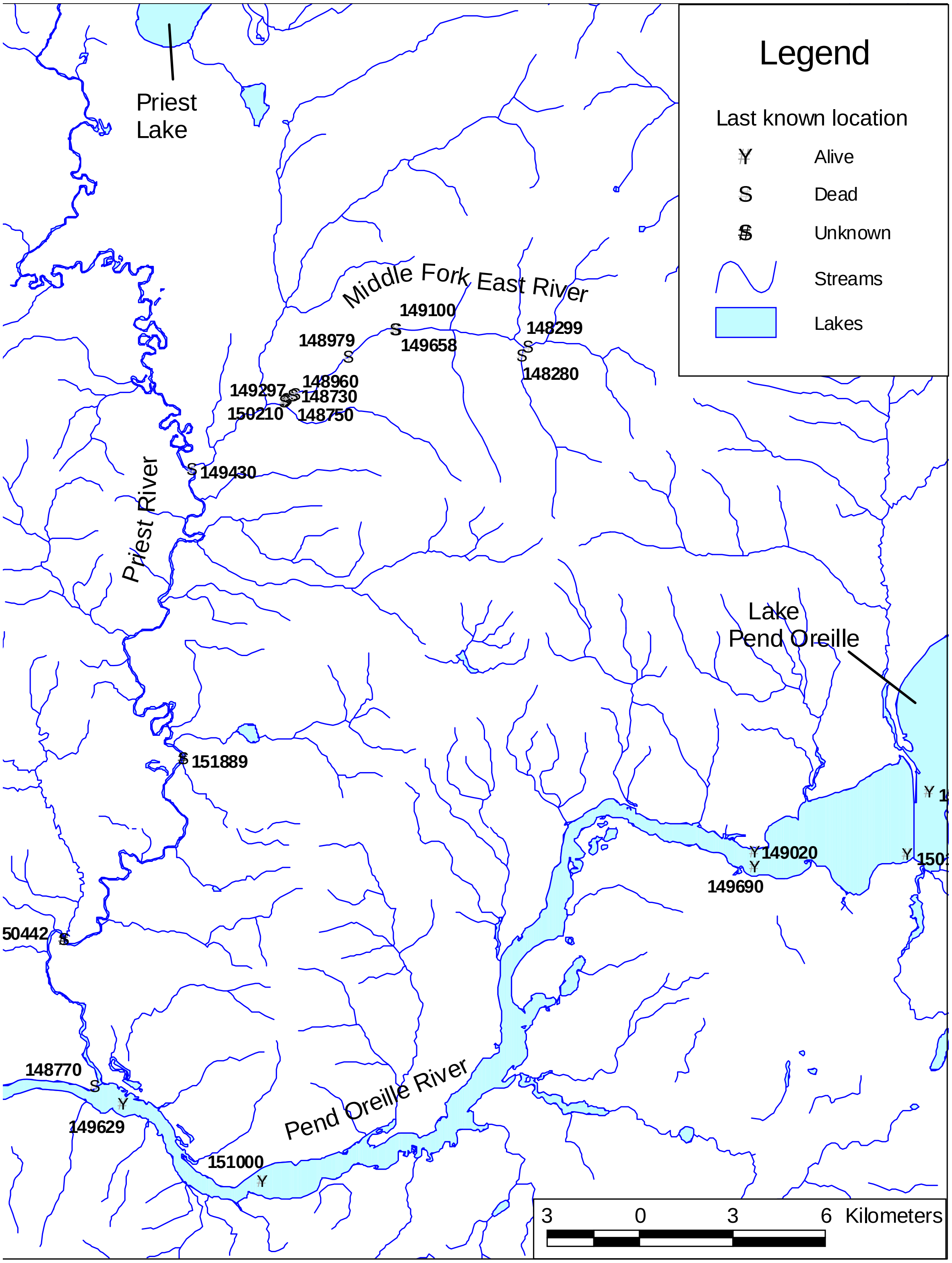


Figure 7. The last known location and fate of bull trout as of March 24, 2003 that were radio tagged on the Middle Fork East River, Idaho, during August 14-16, 2002.

Habitat Use

Habitat use of radio tagged bull trout in Middle Fork East River was evaluated in four different periods – pre-spawn (8/15/02 to 9/05/02), spawn (9/11/02 to 9/24/02), post spawn (10/3/02 to 12/09/02) and overwinter (12/13/02 to 3/24/03). All the radio tagged bull trout had died or entered the Priest River, Pend Oreille River or Lake Pend Oreille by December 9, and detailed habitat measurements were not taken after this point.

During the pre-spawn period, the radio tagged bull trout were identified most commonly in pool habitat types where boulders and/or large organic debris (LOD) were available as cover and in water < 0.6 m deep (Figure 8). Although most of the pools the bull trout were located in had depths > 0.6 m, the bull trout were typically located along the pool margins where cover was available and slower water velocities occurred. A 0.5 km stream segment of the Middle Fork East River (downstream of Chicopee Creek) had a noticeable absence of LOD. Not once during the pre-spawn period did we locate a bull trout in this reach. In fact, during the entire study only once was a bull trout tracked to this reach of stream.

The pre-spawn period occurs during the warmest time of the year when water temperature may have an influence on bull trout distribution. Based on our thermograph data (Figure 4), none of the radio tagged bull trout were located in areas where the daily average temperature exceeded 11°C.

During the spawning season, bull trout were found mostly in pool and run habitat types (Figure 8). These are the same habitat types where we saw most of the spawning activity (pool tail outs and margins along runs). Bull trout were found to use overhead cover, boulders and LOD as cover. The increase in use of overhead cover was probably because some of the spawning bull trout were located along the stream margins where overhanging vegetation was common. Over 70% of the time we located bull trout they were in water depths < 0.6 m, similar to what we saw during the pre-spawn period.

During the post-spawn period, habitat use of radio tagged bull trout changed considerably. The use of beaver ponds changed from the least common habitat type used to the most common habitat type used. Over 71% of the time that we located a fish during the post-spawn period, it was in a beaver pond (Figure 8). The type of cover used and the water depths these fish were located in are a reflection of what occurs in these ponds. During the post-spawn period, 95% of the time the radio tagged bull trout were found using LOD, overhanging vegetation and undercut banks for cover and were found 77% of the time in water depths between 0.3 and 0.9 m.

During the overwinter period all the radio tagged bull trout had died or moved (voluntarily or relocated) out of the East River basin. Throughout the winter the remaining living fish occurred either in Lake Pend Oreille (four fish) or in Pend Oreille River (two fish). Water depths often exceeded 15 m in the areas these fish occurred. However, we were able to pick up strong signal on four of these fish, during many of the winter flights, which indicates they were in water < 7 m deep. We were not able to locate two of the fish that entered Lake Pend Oreille, which indicates they were probably in water deeper than 15 m.

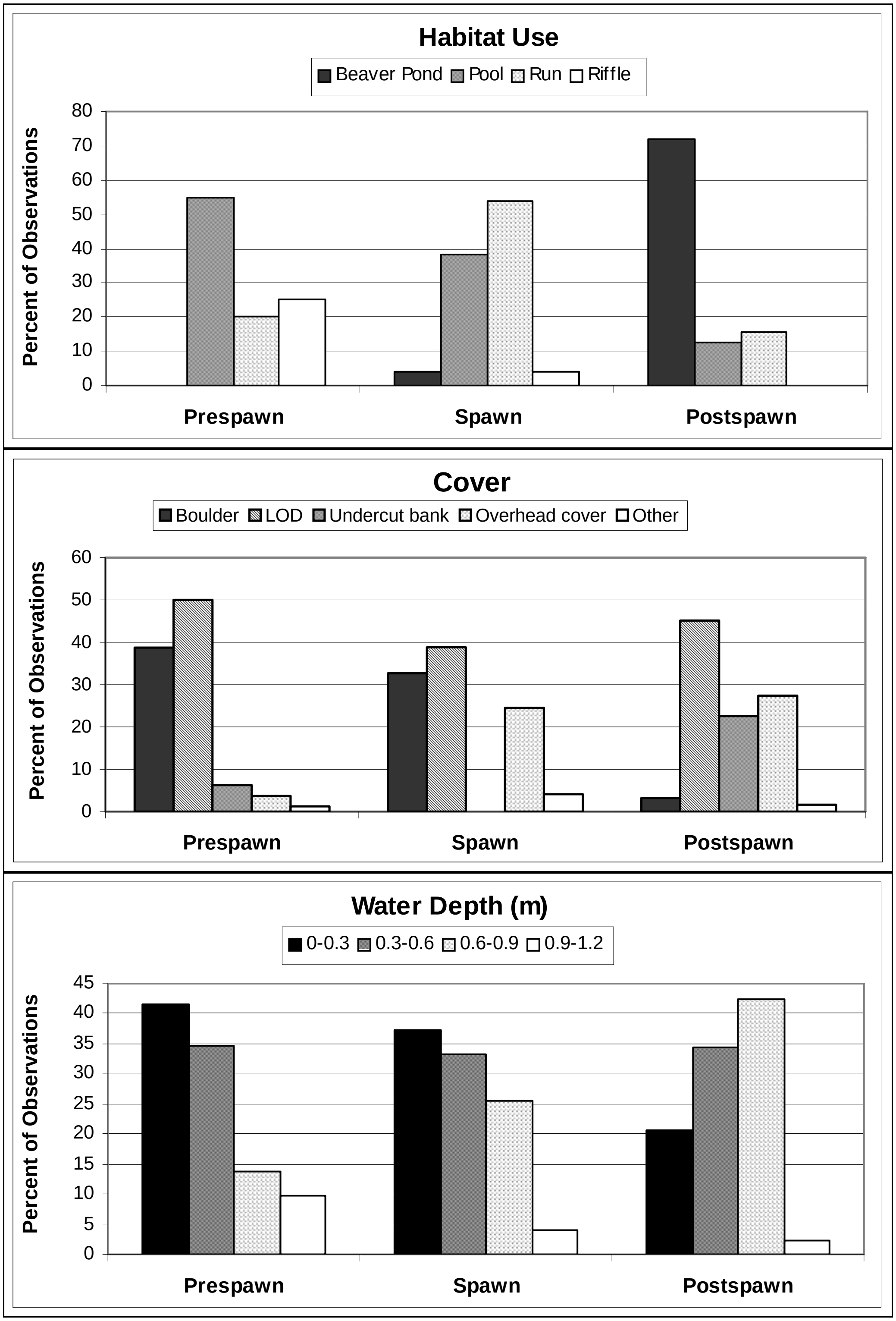


Figure 8. Use of habitat, cover and water depth by radio tagged bull trout in the East River basin, Idaho, during 2002.

Bull Trout Spawning Surveys

We walked sections of East River, Middle Fork East River and Uleda Creek to determine where bull trout were spawning in this basin (Figure 9). We conducted this redd survey on October 22 and 23, 2002. During this survey, we counted 16 redds > 500 mm in diameter (Figure 9). Numerous redds smaller than this were observed, which we considered to be constructed by brook trout, especially since brook trout were observed on many of them. When we overlayed the location of the radio tagged bull trout during the spawning season with the location of the redds we observed, the three most downstream redds do not appear to be constructed by bull trout. No bull trout were located in this area during the spawning period; consequently, it is believed these redds were constructed by large brown trout. The fourth redd up from the downstream point was located near where one radio tagged bull trout was located. However, we believe this bull trout was migrating from the system and this redd was smaller than the bull trout redds we observed. Based on this information we determined this was probably a brown trout redd. If you subtract these four redds from the total, we counted 12 bull trout redds.

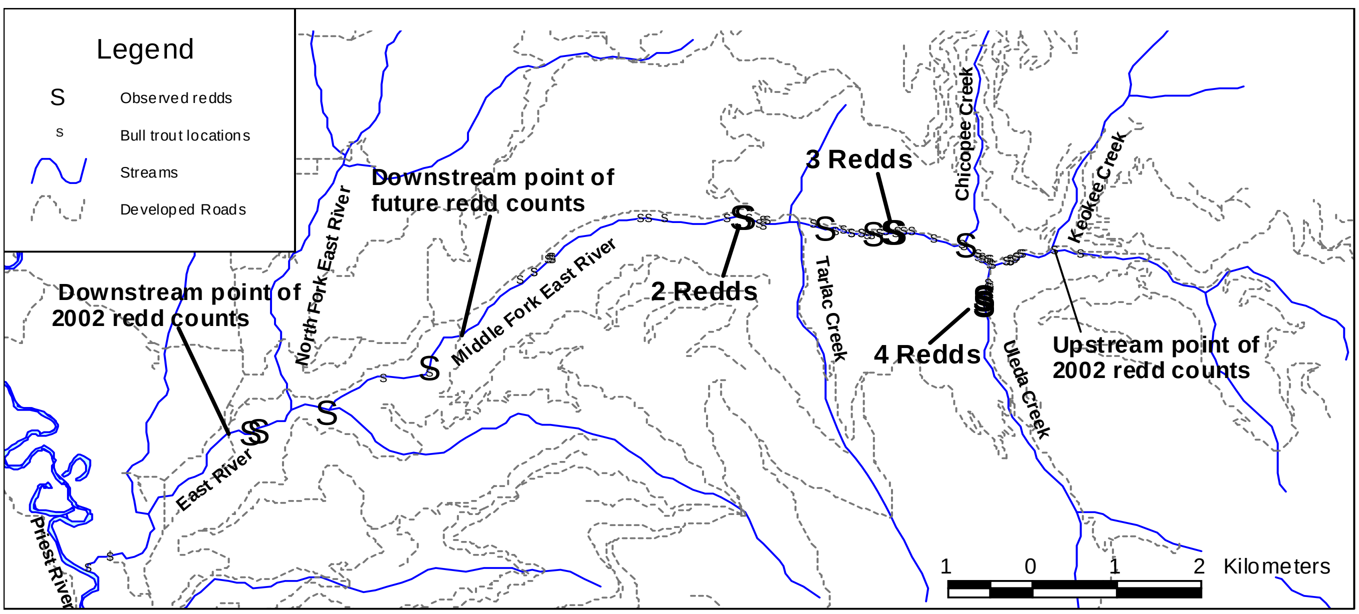


Figure 9. The location of redds > 500 mm in diameter and radio tagged bull trout during the spawning season in the East River basin, Idaho, during October 22-23, 2002.

This redd survey occurred at least one month after bull trout had finished spawning. Conducting counts this late in the season created several problems in identifying bull trout redds. First, algae was beginning to grow over the bull trout redds we were seeing and may have led to missed observations. Second, brook trout and brown trout began spawning in October, which adds to the difficulty in determining which redds were created by bull trout. Finally, the brook and brown trout may have spawned over the top of bull trout redds making them impossible to identify.

The late date we conducted our spawning surveys gives us a conservative bull trout redd count estimate. Expanding the number of redds observed (12) by 2.2 and 3.2 fish/redd, the spawning escapement of adult bull trout in the East River ranged between 26-38 fish.

Genetics

We collected tissue samples from 50 bull trout and/or bull trout/brook trout hybrids from Middle Fork East River and Uleda Creek. Due to time limitations in the lab, our tissue samples were not genetically evaluated to determine whether introgression with brook trout had occurred and the genetic similarity that occurs between these bull trout and fish from Lake Pend Oreille and Priest Lake. Our tissue samples are scheduled for analysis later this year. Findings will be reported in next year's annual report.

DISCUSSION

Bull Trout and Brook Trout Distribution

Based on our electrofishing efforts during 2000-2002, it appears the majority of juvenile bull trout in the Middle Fork East River rear in 3 km of stream. Juvenile bull trout do occur in another 5 km of stream, but densities are low (< 1 fish/ 100 m^2). The small area this bull trout population uses for juvenile rearing is troubling. Typically, bull trout populations with a high probability of persistence have over 100 spawning adults (Rieman and Allendorf 2001; USFWS 2002), are spread over a wide area (USFWS 2002) and have other populations in close proximity where straying can bolster a declining population and increase genetics vigor (Spruell et al. 1999). This bull trout population does not have any of these characteristics, which puts it in a high risk category for extinction.

Brook trout occur in all the same stream reaches bull trout occur in except for Uleda Creek (0.6 km reach), where the highest bull trout densities were found. The presence of brook trout in this system also increases the probability of extinction for this bull trout population. Brook trout have been found to displace bull trout from watersheds through hybridization and competition (Dambacher et al. 1992; Mullan et al. 1992; Leary et al. 1993). It is believed that the competitive advantage that brook trout have over bull trout increases as habitat becomes degraded or stream temperature is elevated (Dambacher et al. 1992; Leary et al. 1993; McMahon et al. 1999; Gammett 2002). For these reasons it is important to maintain high quality habitat in the Middle Fork East River basin. Increases in sediment delivery and/or losses of stream shading could increase the spread and density of brook trout in the basin.

Based on general observations, habitat conditions did not appear to be degraded (more fine sediment or less in-stream cover) where low bull trout densities and high brook trout densities occurred. Our stream temperature data suggests that water temperatures in all areas we evaluated are within or below the bull trout's thermal optimum (12 -16°C) as determined by McMahon et al. (1999). However, those stream reaches that had the highest densities of brook trout had the warmest water temperatures. Research and surveys suggest that where stream temperatures exceed 10-12°C brook trout have a competitive advantage over bull trout (Dambacher et al. 1992; Riehle 1993; McMahon et al. 1999). Uleda Creek, which does not support brook trout, was the only stream reach we evaluated where the daily average temperature did not exceed 10°C. Many of the surrounding streams had daily average water temperatures only 1°C warmer than Uleda Creek, and brook trout were present. Tarlac Creek, which is about 1°C warmer than Uleda Creek, was dominated by bull trout in 1986 and now has only brook trout. It's difficult to say for sure that these small differences in stream temperature play such a large role in fish distribution. Other factors such as stream grade, size, and habitat condition may have an influence. More in depth evaluations of the stream habitat is required before we can say for certain that stream temperature is the major controller in bull trout and brook trout distribution in the Middle Fork East River basin.

Opportunities exist to increase the distribution and/or population strength of bull trout in the Middle Fork East River basin. A man-made barrier (historic stream crossing) occurs about 0.6 km upstream from the mouth of Uleda Creek. Removing this barrier would increase the amount of high quality habitat by at least 1 km. We did not survey more than 1 km past this barrier to see exactly how much available habitat actually exists. While electrofishing and conducting redd counts on Uleda Creek several adult bull trout and four redds were found congregated just below this barrier, and no bull trout occurred upstream of it. Uleda Creek is probably the most important stream reach in the basin to this bull trout population as the highest densities of bull trout and no brook trout were found to occur there.

We may be able to increase the distribution and/or population strength of bull trout in the Middle Fork East River basin by encouraging cooler stream temperatures. The Idaho Department of Lands has developed a correlation matrix that can be used to help evaluate stream temperature based on canopy cover (stream shading) and elevation (Idaho Department of Lands 2000b). This correlation matrix indicates that by increasing canopy closure over streams by 10% may result in a approximately 1°C decline in stream temperature. Increases in canopy cover over the Middle Fork East River may not have this much effect on water temperature as our data suggest that ground water has a large influence on temperature. However, managing riparian vegetation to encourage dense canopy cover with few breaks will help buffer the stream from solar radiation, hot air temperatures, and other factors that have a tendency to increase downstream temperatures. Historic clearcuts encompassed sections of the Middle Fork East River and some of its major tributaries. As these cuts continue to grow and increase canopy cover over the stream, water temperatures could decline. Every effort should be made to increase canopy cover over the river and major tributaries, as it appears that small changes in water temperature may play a large role in bull trout and brook trout distribution.

The close proximity of the main haul road to the Middle Fork East River causes a permanent loss in stream shading and makes it impossible to prevent sediment delivery to the river in places. Improvements in this road system could alleviate these problems.

Movement and Mortality

Our radio telemetry findings combined with our length frequency data shows that bull trout from the Middle Fork East River have an adfluvial life cycle. All six known surviving bull trout either migrated to Lake Pend Oreille (four fish) or Pend Oreille River (two fish), which is more like a reservoir than a river. In addition, all the bull trout we sampled from the Middle Fork East River were either < 200 mm or > 400 mm. If this was a fluvial or resident population, you would expect to see bull trout between 200 and 400 mm (Schill et al. 1994; Adams and Bjornn 1997; Schiff and Schriever In Press). The size structure of this bull trout population is very similar to the adfluvial population in Trestle Creek of Lake Pend Oreille (Downs and Jakubowski, In Press).

For juvenile bull trout from the Middle Fork East River to make it to Lake Pend Oreille they must make an unusual migration. After juvenile bull trout outmigrate from East River, they must swim 34 river km down Priest River to where it joins Pend Oreille River. From the Pend

Oreille River they must turn upstream and migrate 37 km to Lake Pend Oreille. If any juvenile bull trout swim downstream when they enter Pend Oreille River, they have 7 km before they will pass over Albeni Falls Dam. Because this will be the first time these fish make this migration they can't rely on imprinted chemical cues to assist in their migration. This type of migration must be genetically coded. Additional radio telemetry studies by Battelle are planned for the spring of 2003 to determine how juvenile bull trout make this migration and whether entrainment over Albeni Falls Dam is a problem.

Other bull trout populations are known to have an outlet spawning lifecycle similar to the Middle Fork East River fish (Thomas 1992; Herman 1997; Ringel and DeLaVergne 2000; Scott Deeds, USFWS, personal communication, Wade Fredenberg, USFWS, personal communication). However, none of these populations are believed to migrate more than 10 km downstream from the lake outlet and all spawn directly in the outlet stream or a short distance up a side tributary. The unique migratory behavior the Middle Fork East River bull trout display may make it difficult to find fish from another system that could be successfully introduced to this system if the Middle Fork East River population were ever to go extinct. Based on ethnographic reports, bull trout populations with a similar outlet spawning life cycle may have existed in tributaries downstream of Albeni Falls before its construction (Smith 1936). The Middle Fork East River bull trout population may be the best hope of reestablishing runs downstream of the Albeni Falls Dam if upstream fish passage can be provided.

Studies on bull trout in southern Idaho found that populations composed of adfluvial fish had a much higher probability of persistence than resident populations (Dave Burns, USFS, personal communication). The thought is that not all adfluvial fish are in tributaries at once making them less susceptible to extinction from catastrophic events. For example, stream reaches where bull trout were eradicated by intense fires in the Boise River basin were found to be repopulated several years later (Burton 2000). Large bull trout were observed in these streams following the fires suggesting that re-population was facilitated by migratory fish.

One of the adult bull trout we captured while sampling the Middle Fork East River had a missing adipose fin. Research conducted in 1998 (Dunham et al. 2001) and 2002 (Downs et al. 2003) clipped the adipose fins of 779 bull trout in tributaries of Lake Pend Oreille to conduct population estimates. We are unaware of how often bull trout lose adipose fins naturally; however, all fisheries biologists we have talked to believe it is a rare occurrence. Straying of bull trout from Lake Pend Oreille may play an important role in maintaining the bull trout population in the Middle Fork East River, despite its relatively isolated nature.

During our study, none of the radio tagged bull trout attempted to migrate upstream from East River towards Priest Lake. It is possible that historically bull trout from both Priest and Pend Oreille lakes utilized the East River. Hopefully, future genetic analysis will shed some light on this issue. Locals have commented (Frank Waterman, Local, Personal Communication) on how they used to catch numerous bull trout at the outlet of Priest Lake. Since the construction of a dam at the outlet of Priest Lake in 1948, any outlet spawning populations that may have been present were eliminated.

The movement patterns our radio transmitter-equipped fish displayed during August and Early September was similar to what has been seen in studies (Fraley and Shepard 1989; Schiff and Schriever, In Press). Prior to spawning there is little movement and once spawning begins movement picks up. However, after the spawning period the movement patterns of our fish versus other studies differed. Other studies show that shortly after spawning bull trout quickly return to where they overwinter (Schill et al. 1994; Elle et al. 1994; Jakober 1995) – Lake Pend Oreille or Pend Oreille River in our case. Only three of our fish displayed this pattern (two of these fish are now in Lake Pend Oreille). The remaining fish moved most of the way down the Middle Fork East River until they encountered one of two beaver dam complexes, and once there they tended to stay. By mid-November most of the fish that remained in the Middle Fork East River had died (11 out of 20 fish). Similar behaviors have been seen in other systems. For example, over 20 bull trout were seen congregating upstream of a beaver dam in upper St. Joe River during the last week of September (Ned Horner, IDFG, personal communication). Elle (1995) reported that over 50 bull trout migrating out of Rapid River began congregating upstream of the weir where they trapped fish even though there was a path to get past it. Others have also reported this behavior with bull trout around weirs (Ratliff et al. 1994; Stelfox 1995). When high flows jeopardized the weir at Rapid River and eight pickets were pulled to increase flow, most of the bull trout moved past the weir (Elle 1995).

Based on this information, it is possible that the bull trout were holding in the beaver ponds, waiting for higher flows to assist in their downstream migration. The fall of 2002 was very dry, and fall rains did not come until Mid December, after we caught and moved the remaining four fish. The most downstream beaver pond complex where most of the bull trout were congregated had direct flow that passed over or around these ponds. However, the bull trout still did not migrate downstream. During October and November, five bull trout migrated past these beaver ponds and all died before they made it to the Pend Oreille River. On the other hand all the bull trout that remained in the ponds may have died if we didn't capture and move them.

We observed a 60-70% post-spawn mortality of bull trout we radio tagged. This mortality could have been even higher if we didn't capture and move four of the fish, which are all still living. Other studies have seen similar post spawn mortalities especially during drought years. Schill et al. (1994) reported 67% post-spawn mortality for bull trout in Rapid River during 1992, a drought year. The following year the post-spawn mortality for bull trout was 47% (Elle et al. 1994). Schriever and Schiff (2002) reported a 60% mortality or tag loss on bull trout in North Fork Clearwater. In Trestle Creek, where bull trout migrate < 10 km upstream from Lake Pend Oreille to spawning areas, the annual mortality was estimated at 40% (Downs and Jakubowski, In Press).

The reason these fish died is not entirely clear. All the radio tags were recovered downstream of the spawning areas or were found up on the bank indicating they were not expelled during spawning as Schriever and Schiff (2002) believed occurred with some of their bull trout. We were able to find three radio tagged bull trout that had died and the incisions had healed well, and there did not appear to be any serious infections. The four bull trout we recaptured and moved all were very thin and had loose skin suggesting that serious weight loss had occurred since they had entered Middle Fork East River. It is likely these fish entered Middle Fork East River in June and had little opportunity to feed since then. This lack of feeding coupled with the stress of spawning may be the reason for the high post-spawn mortality.

For eight of the bull trout that we assumed had died, the radio transmitters were found 3 m to 60 m from the water. We were able to recover six of these tags and only one of them had indications that an animal had eaten this fish (chew marks on antenna). The remaining five transmitters we recovered did not have chew marks on them and no fish parts or animal scat was located nearby. Based on these observations we questioned whether these fish were killed from poaching, with the radio transmitters thrown up on the bank. After discussing this with others, it appears this phenomenon was observed in other studies (Schill et al. 1994, Elle et al 1994; Elle 1995; Schriever and Schiff 2002). Elle (1995) reported losing 22 bull trout from their weir trap on Rapid River over a week period. After removing two mink these mortalities stopped. It is possible that the large bull trout in the Middle Fork East River were vulnerable to predators such as mink or otters. Or these fish may have died from natural causes and washed up on the stream bank where animals dragged them inland to feed upon them.

If fish are dying from poaching, changes in the fishing regulations may reduce this source of mortality. Closing the fishing season would make this river easier to patrol and prevent bull trout poaching. However, we have no proof that fishermen killed any of the radio tagged fish. If fishermen were killing these fish, you would expect some of these transmitters to disappear. We can account for every radio tag but one, and this transmitter was last heard in Priest River. Fishing pressure does appear to be heavy on the Middle Fork East River at times. Trails are worn down between the road and many of the deeper pools, and fishing supplies including bait containers were commonly found at these sites. Many of the radio tagged bull trout were located in these pools, yet none of our fish were found dead or disappeared from these popular fishing sites. Two of the adult fish we captured had hook scars, although it is possible these fish were caught and released from Lake Pend Oreille before they entered the Middle Fork East River. Because we are not aware of any bull trout that were killed by fisherman, it is difficult to warrant a change in the fishing regulations. However, this is a unique bull trout population that needs to be protected. Increases in mortality may cause undue harm to this population. Now that the Idaho Department of Fish and Game is aware of this bull trout population and its uniqueness, increased patrols by conservation officers should occur to keep poaching to a minimum.

Habitat Use

The habitat selected by radio tagged bull trout during the pre-spawn and spawning period agrees with other research, which states that all bull trout life stages are associated with various forms of cover including LOD, boulder, undercut stream banks, overhead cover and pools (Fraley and Shepard 1989; Hoelscher and Bjornn 1989; Pratt 1984, 1992; Thomas 1992). Large woody debris was the dominant cover type utilized by radio tagged bull trout during this study. A 0.5 km reach of stream located just downstream of Chicopee Creek appeared to be avoided by the bull trout we radio tagged. Upon closer inspection of this area, it appeared to have low quantities of LOD and may explain the apparent avoidance of this area. Additions of LOD to this area could improve bull trout habitat and increase the carrying capacity of the river.

During post-spawn, bull trout were located in beaver ponds over 71% of the time. We believed these bull trout congregated in these ponds waiting for higher flows to assist in their downstream migration. It’s difficult to say for certain if beaver dams were a benefit or detriment to adult bull trout as every bull trout that remained behind the beaver dam died, unless we moved it. On the other hand every bull trout that did migrate past the beaver ponds after September did not make it to Pend Oreille River. During normal precipitation, rain showers and higher stream flows typically occur in October/November. If this type of precipitation had occurred during 2002, it is likely the bull trout would have migrated downstream and mortality would have been much lower.

Jakober (1995) found that juvenile and resident bull trout seek out beaver ponds for over-wintering. The slow water velocities, deeper depths and large amount of structure in these ponds make them ideal for over-wintering. Numerous cutthroat trout and brook trout (some may have been juvenile bull trout) were seen in these ponds during November and December. The importance of these ponds to over-wintering fish should preclude anyone from destroying them.

Priest River does not appear to provide over-winter habitat to bull trout. All bull trout appeared to move quickly through this habitat (or died trying) on their way to the Pend Oreille River or Lake Pend Oreille. Questions have been asked how increased flows in the Priest River would effect bull trout survival. Based on our information, increased flows should speed up the downstream migration of bull trout and possibly improve survival.

Bull Trout Spawning Surveys

We counted 12 bull trout redds on Middle Fork East River and Uleda Creek on October 22-23, 2002. Using these redd counts, the spawning escapement for the Middle Fork East River was estimated between 26-38 fish. This estimate is conservative as we probably did not count some of the redds. By the time we conducted our redd survey most of the spawning had finished five weeks earlier. As a result, algae had begun growing back over the redds making them difficult to see. Three of the redds we witnessed being constructed during the spawning season were missed the first time we conducted the counts (Oct 21). A follow up survey was conducted on October 22, 2002, which located two additional redds. The late survey date also occurred after brook trout and brown trout began spawning. In areas, brook trout redds covered large areas of the shoreline making it difficult to tell if bull trout had previously spawned there. No brook trout or brown trout were seen spawning while we witnessed the bull trout spawning. To improve the accuracy in the bull trout redd counts of the Middle Fork East River, they should be conducted during the first week of October when tributaries of Upper Priest Lake are being counted. This will help prevent problems with algae growth and brook trout and brown trout spawning.

Redd counts conducted this year included areas where we believe large brown trout were spawning. To avoid this confusion, future redd counts should begin where a bridge crosses the Middle Fork East River about 2.5 km upstream of North Fork East River and extend up to Keokee Creek (Figure 8). These points are easy to find, will avoid those areas where large brown trout are believed to spawn, and will include the area where we believe bull trout are spawning.

Despite what we believed to be a conservative estimate on the spawning escapement (26-38 fish) in Middle Fork East River, we believe this estimate is fairly accurate. During our electrofishing effort to collect bull trout to put radio transmitters in, we captured 20 fish and saw another 12-14 we did not capture. Add to that another four to eight fish that we may not have seen and we come up with a total of 36-42 adult sized fish. In addition, when the radio tagged bull trout were tracked to areas where they congregated, such as the beaver ponds, about one third of the fish we visually observed did not have radio tags. This suggests that there were around 30 adult bull trout in the Middle Fork East River. Although these techniques are all rough estimates of the bull trout spawning escapement in Middle Fork East River, they all suggest that between 30 and 40 adult bull trout entered Middle Fork East River during 2002.

No bull trout redds were identified upstream of Uleda Creek, although seven adult bull trout were located in this area from August to early September. It's unclear why spawning did not occur in this section of stream. Water temperatures were 1°C warmer than what occurred in Uleda Creek, although spawning was document farther downstream where water temperatures were similar. Differences in ground water or habitat variables such as fine sediment may explain why spawning didn't occur in this area. More detailed surveys are needed to answer this question.

RECOMMENDATIONS

1. Partner with the Idaho Department of Lands and the United States Fish and Wildlife Service to secure funds in an effort to remove the existing barriers to migration within the Middle Fork East River basin especially Uleda Creek. (Note: This work is already in process and there are plans to remove the Uleda Creek barrier next year).

2. Discuss with the Idaho Department of Lands the apparent importance that subtle changes in stream temperature have on bull trout and brook trout densities and distribution in the Middle Fork East River, and help develop a management strategy designed to encourage cooler downstream temperatures.

3. Report findings of genetic evaluation on bull trout in next year's annual report, including similarities to bull trout from Lake Pend Oreille Lake and Priest Lake.

4. Maintain current fishing regulations on Middle Fork East River.

5. Increase patrols by conservation officers to evaluate potential poaching activity.

6. Conduct redd counts during the first week of October to enumerate the spawning run of bull trout in the Middle Fork East River. These redd counts should occur from Keokee Creek downstream to the bridge that crosses Middle Fork East River about 2.5 km upstream of North Fork East River (see Figure 8 for details).

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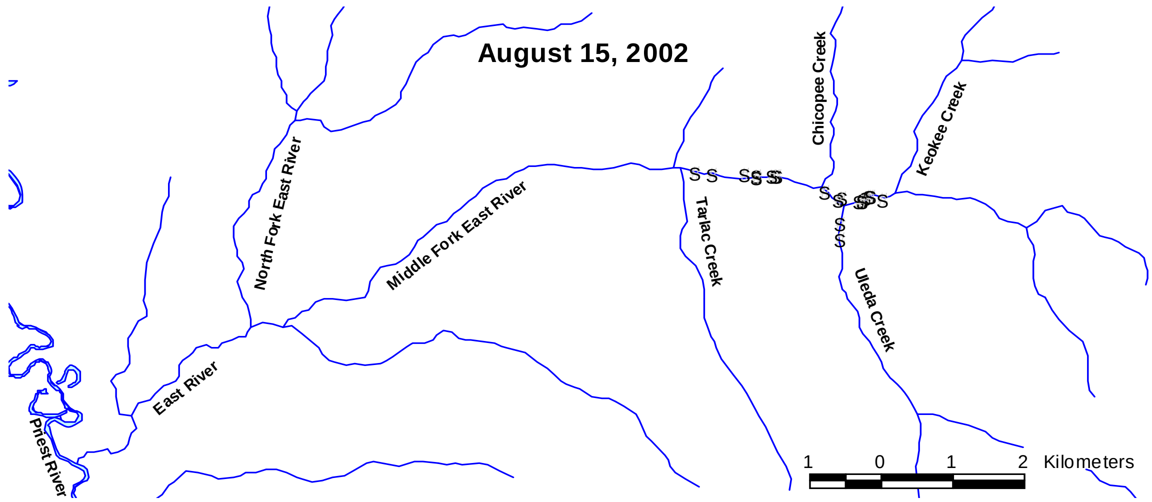
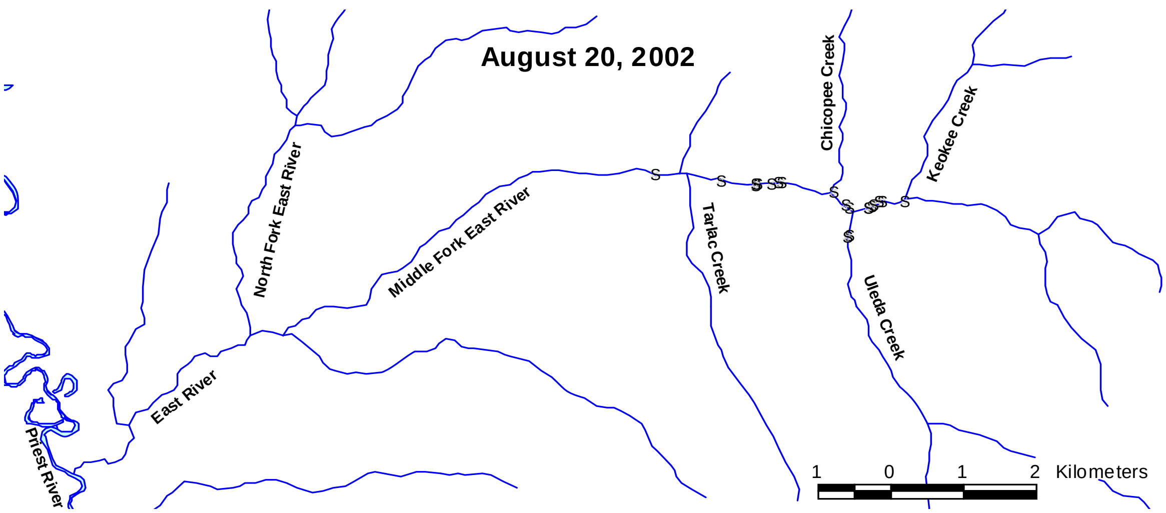
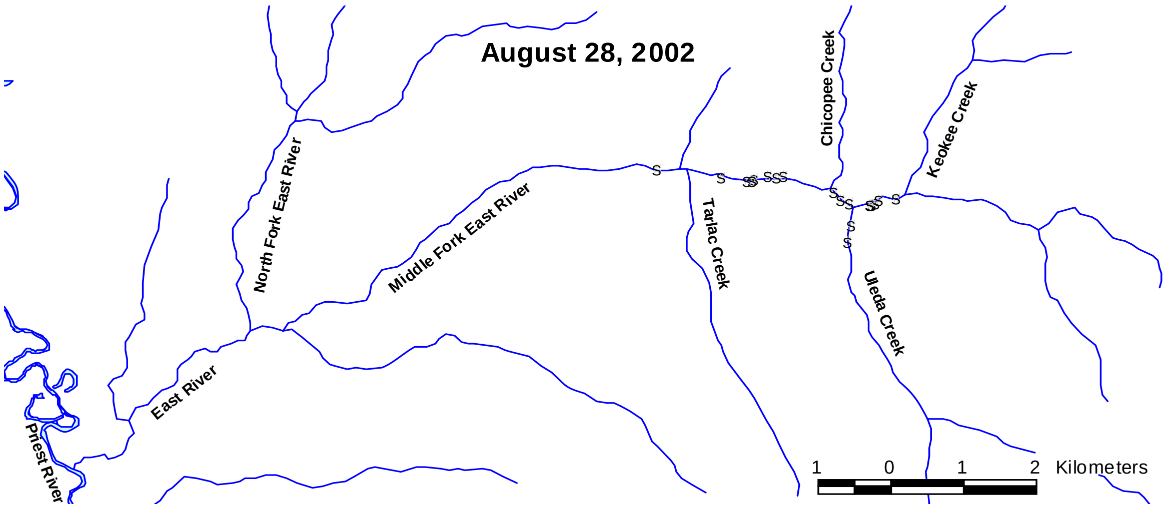
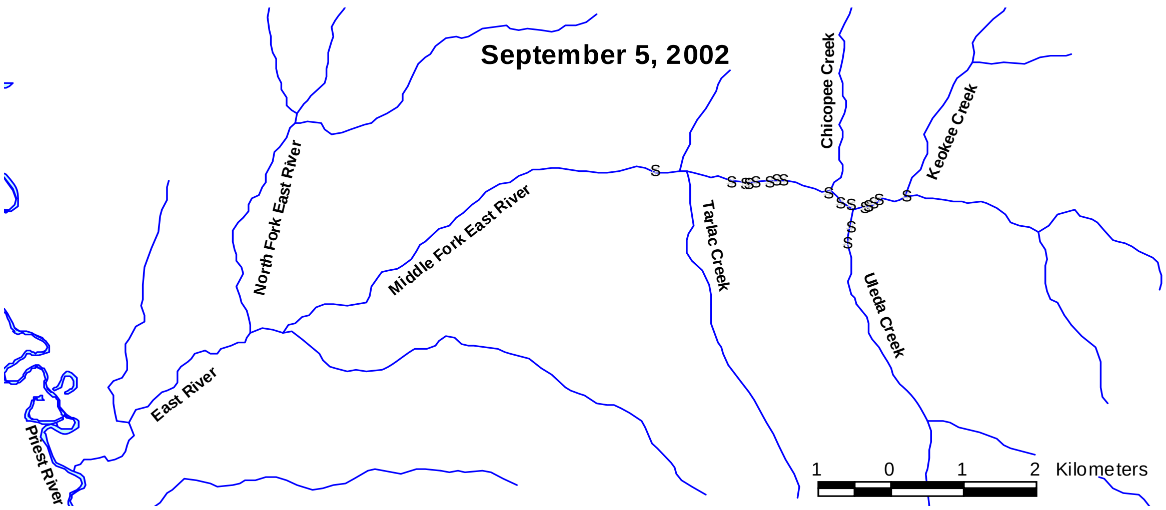
APPENDIX

Appendix A. Locations of radio tagged bull trout in the Middle Fork East River, Idaho during 2002. Circles in black indicate the date a particular fish was believed to have died.









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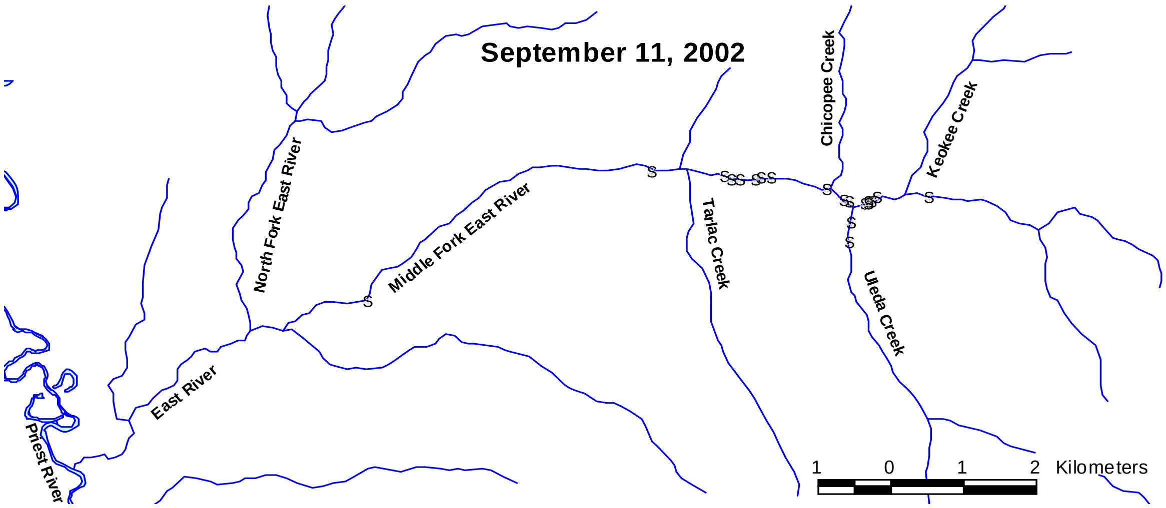

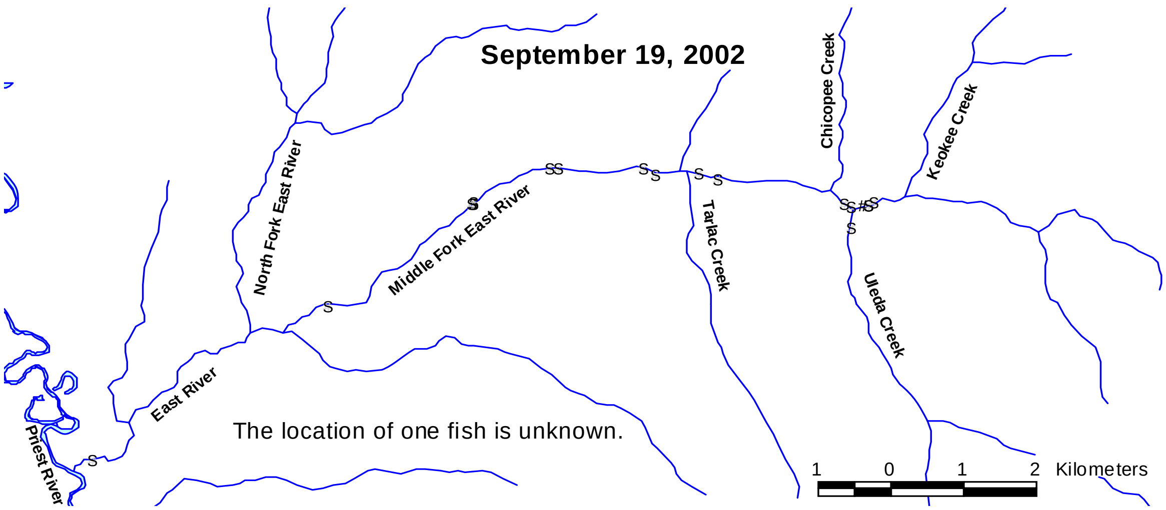

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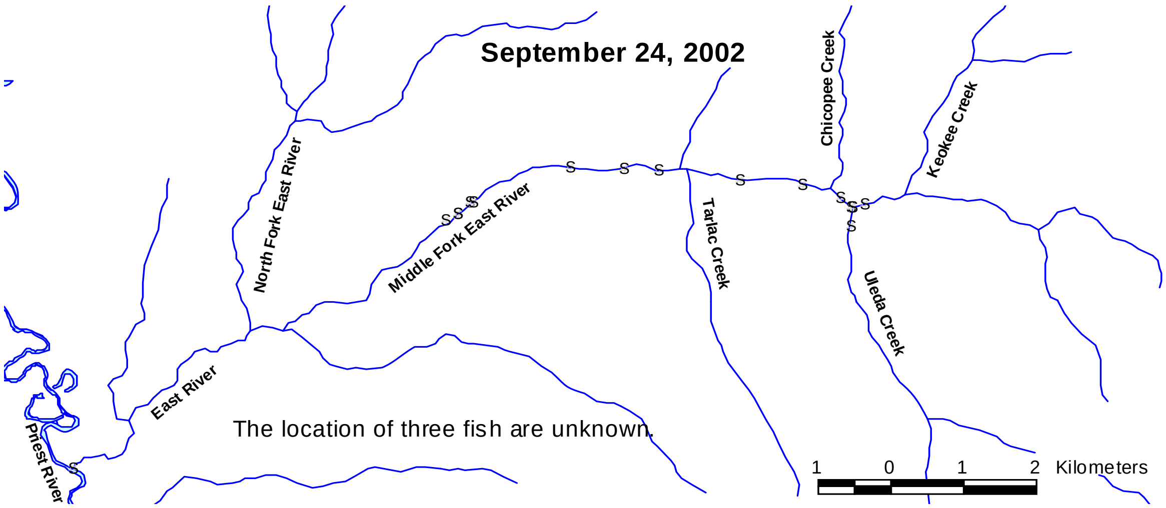

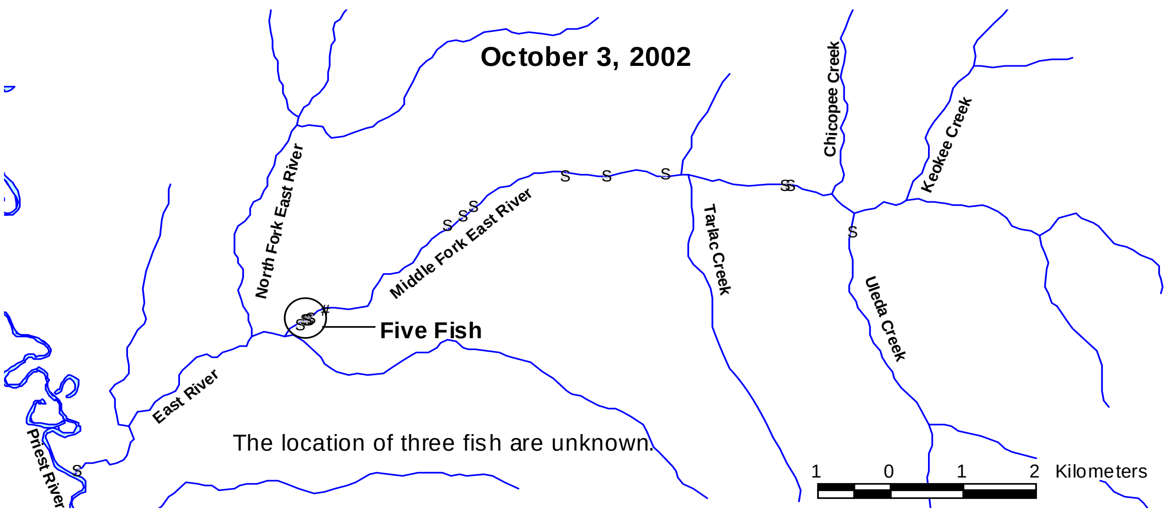

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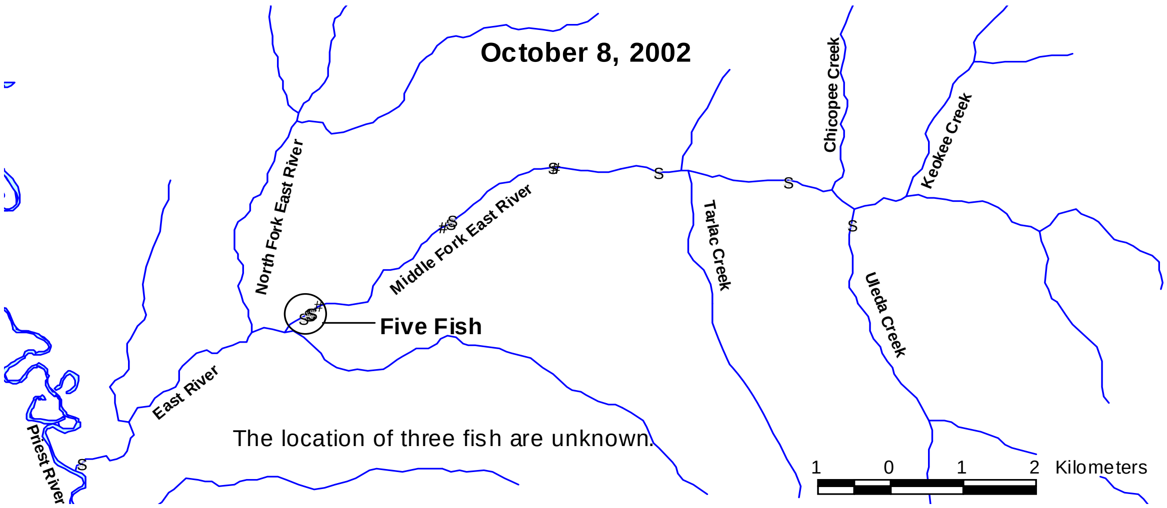

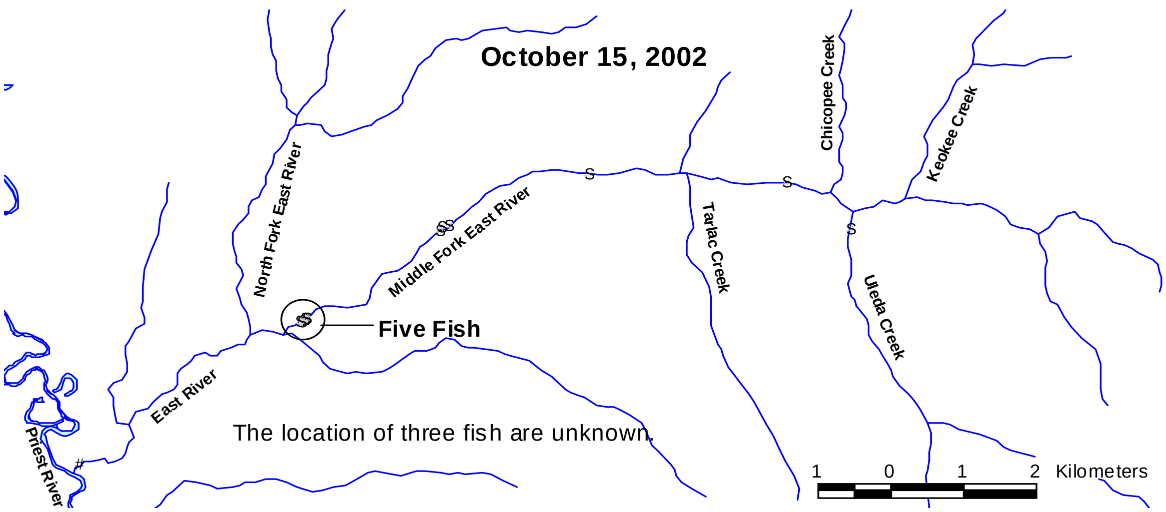

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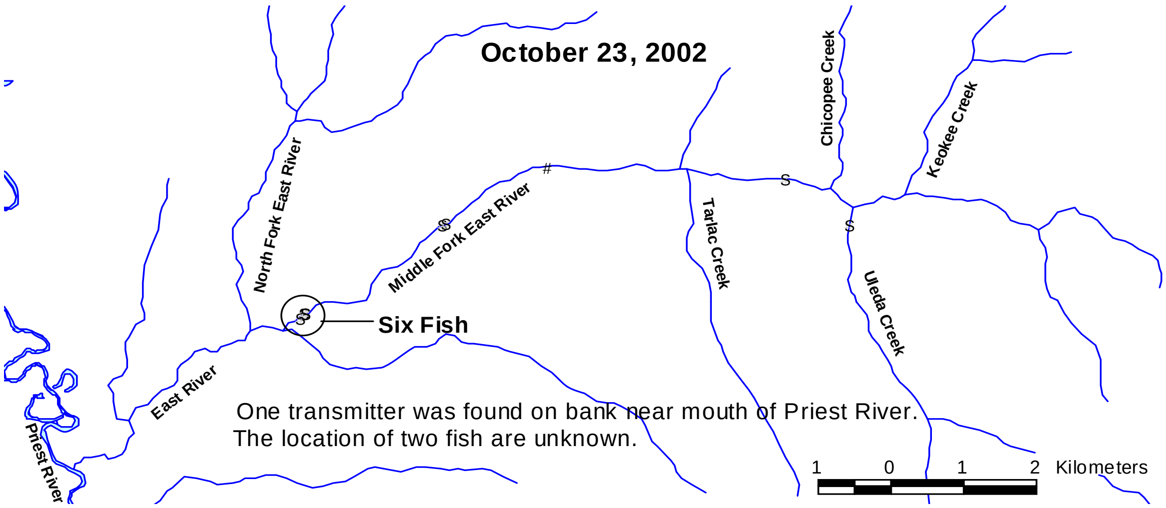

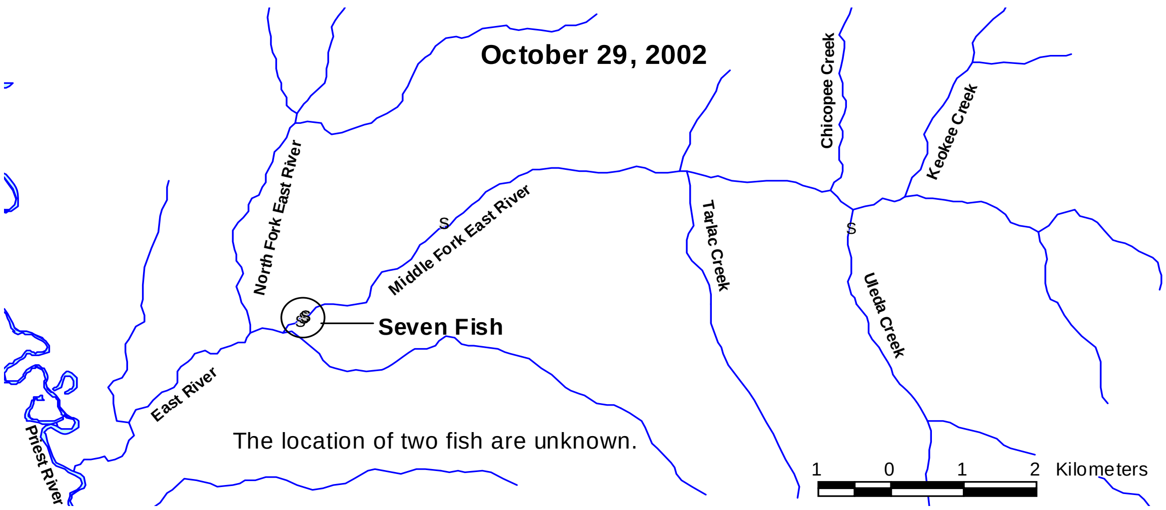

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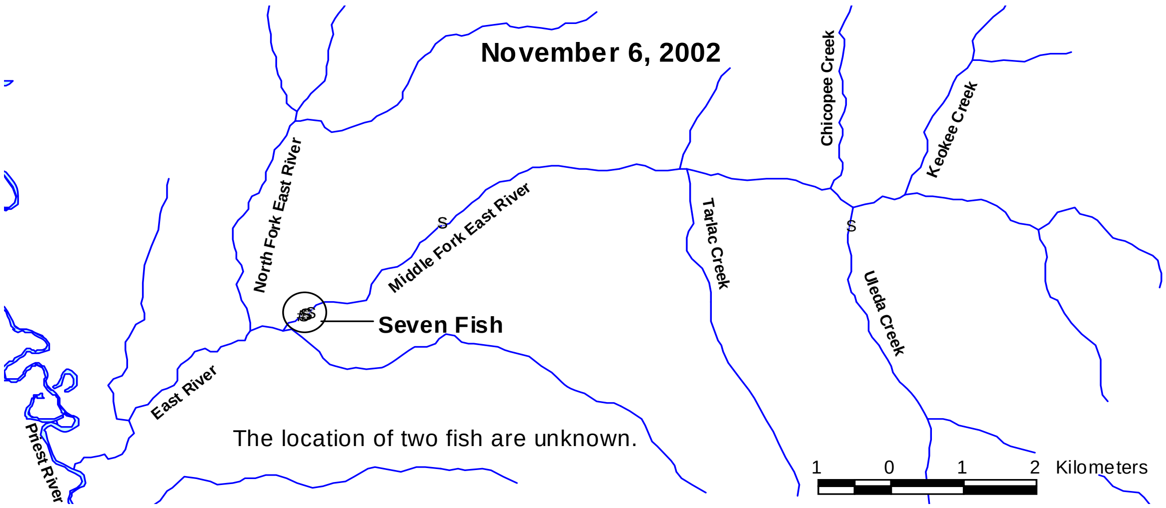

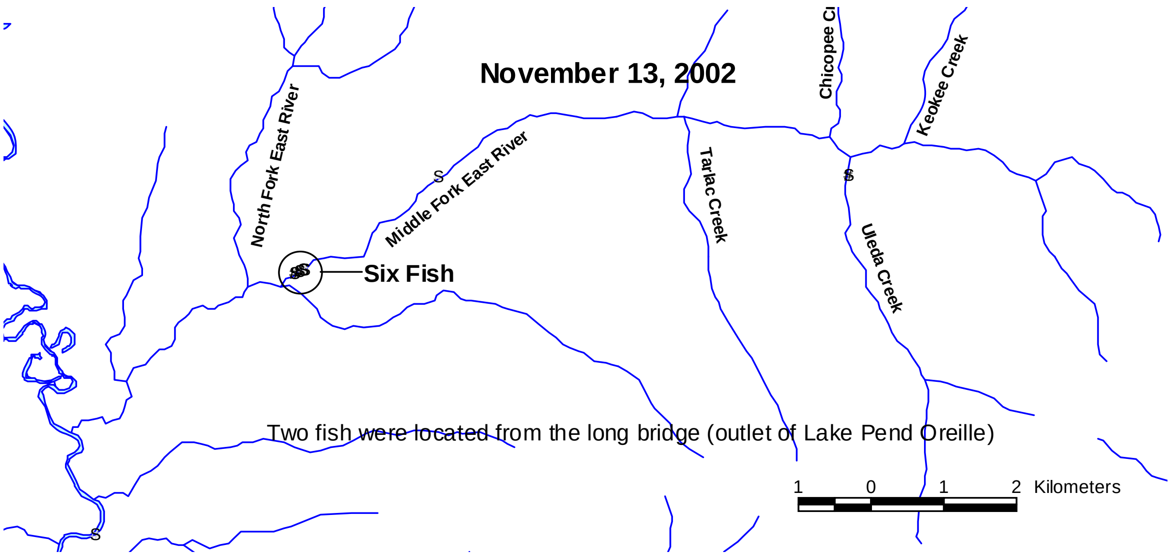

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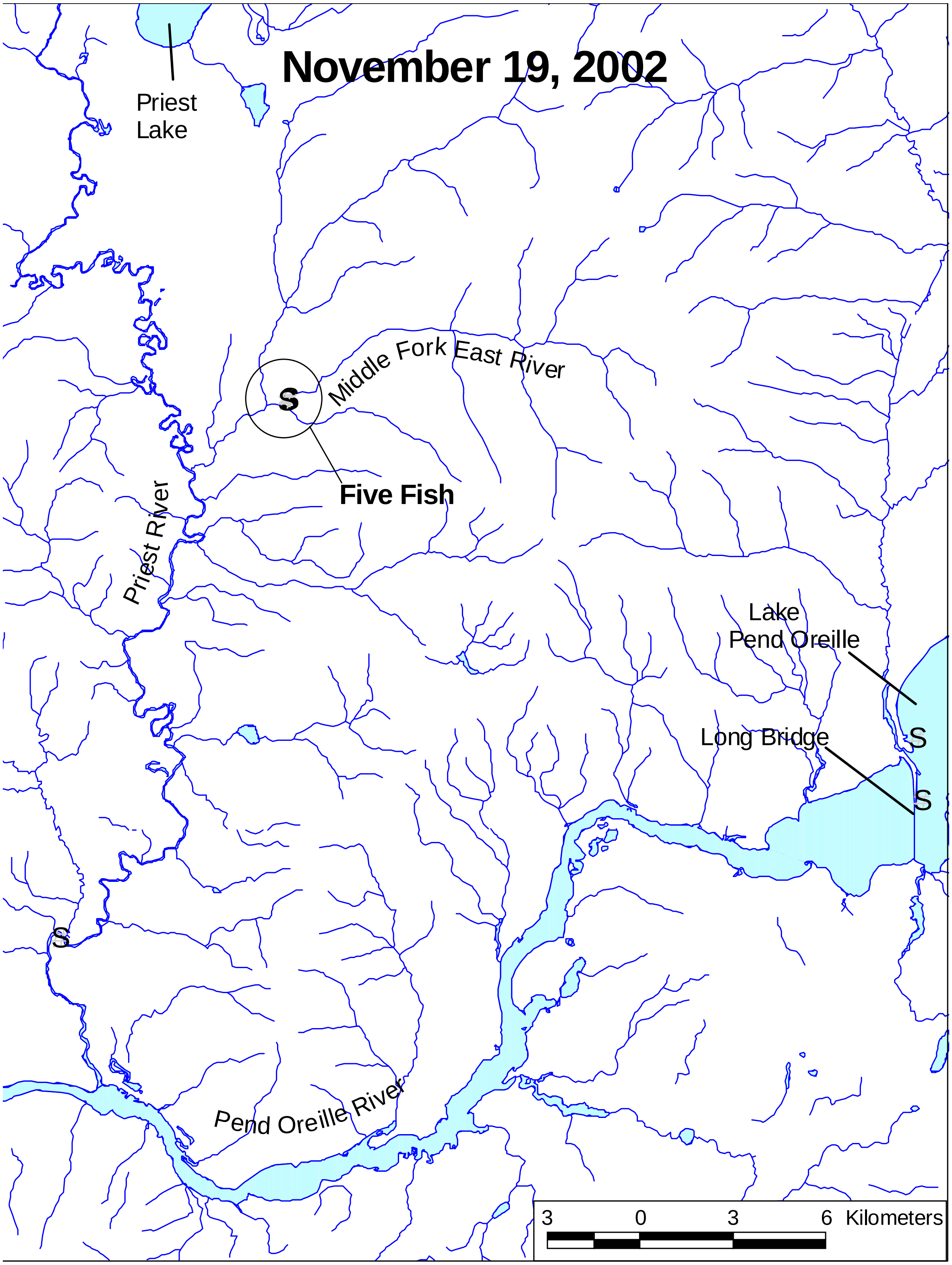

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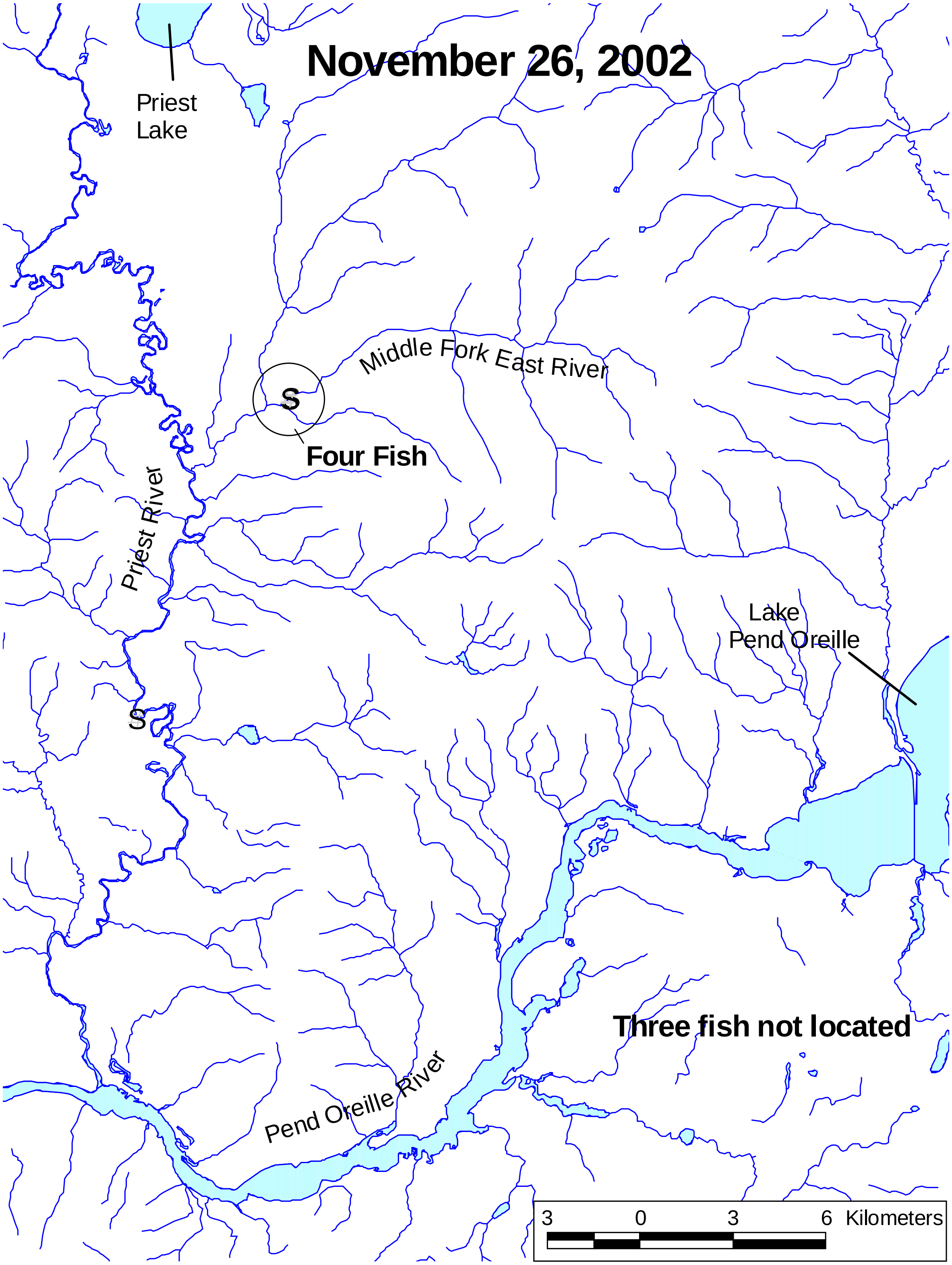

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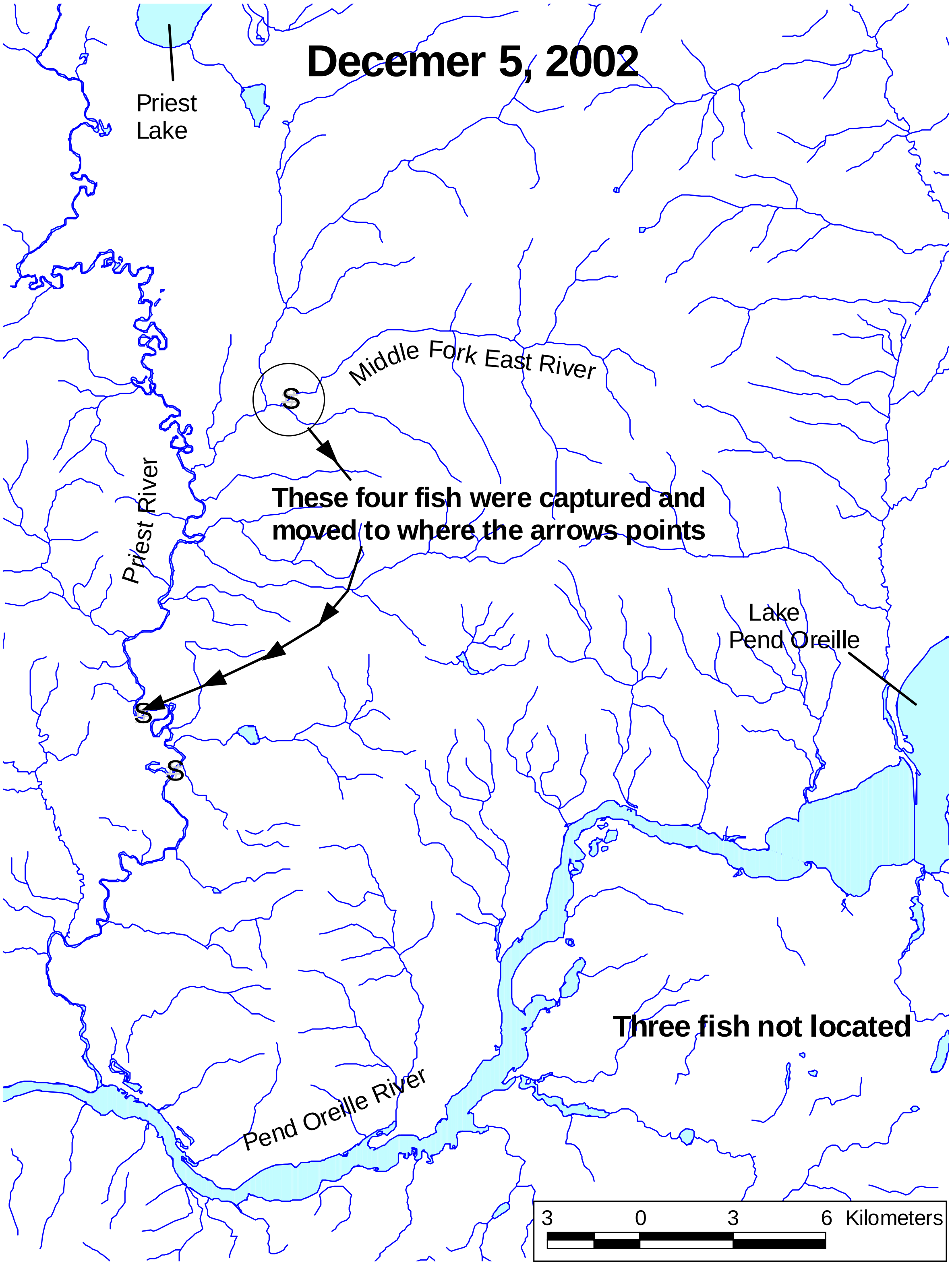

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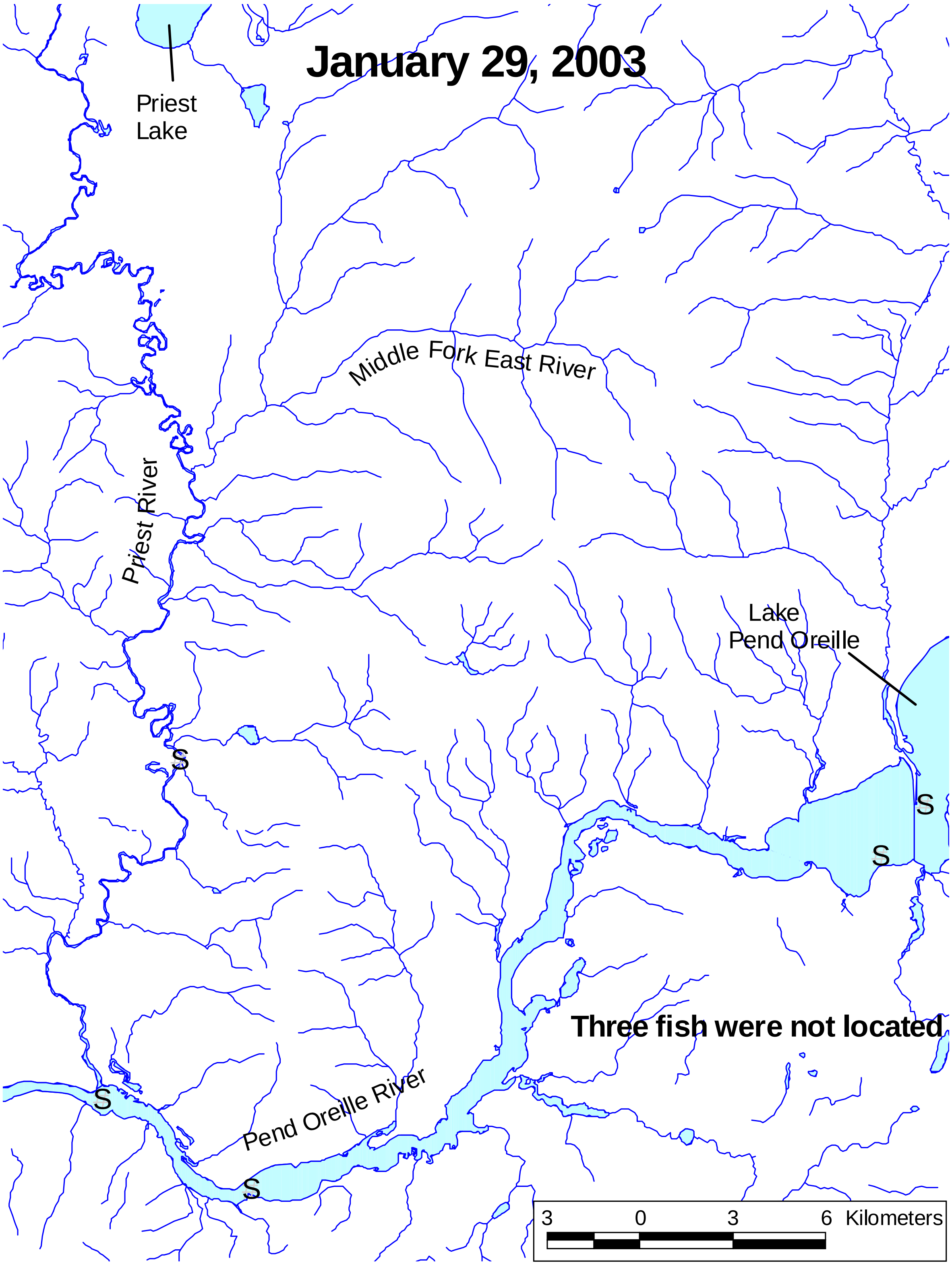

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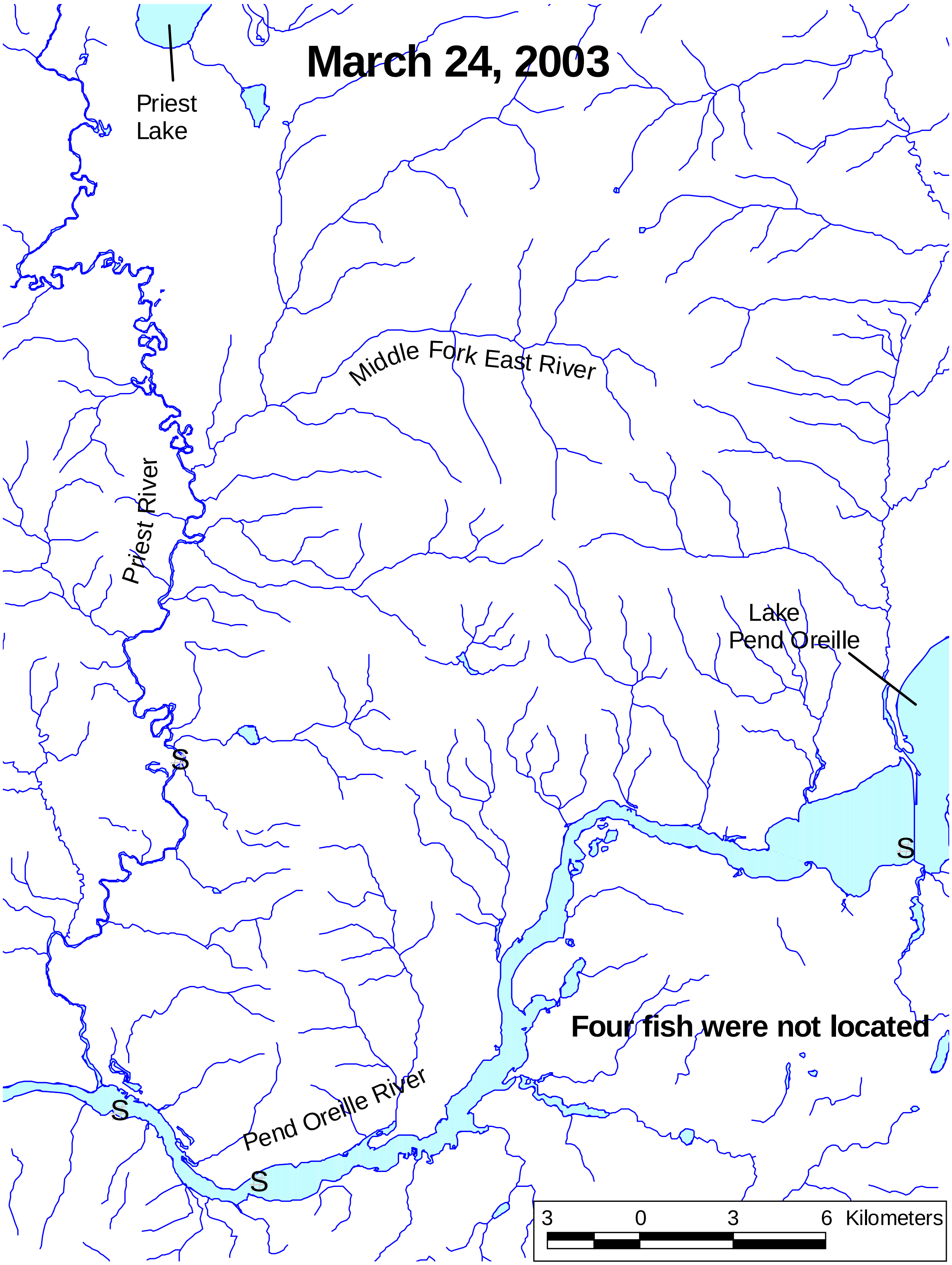

2002 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-27

Project: II - Technical Guidance Subproject: I-A Panhandle Region

Contract Period: July 1, 2002 to June 30, 2003

ABSTRACT

Panhandle Region fisheries management personnel provided private individuals, organizations, public schools, and state and federal agencies with technical review and advice on various projects and activities that affect the fishery resources in northern Idaho. Technical guidance also included numerous angler informational meetings, presentations, and letters, continuation of the Panhandle Region portion of the Idaho Fish and Game 1-800-ASKFISH and website fishing report program, and fishing clinics.

Author:

Ned Horner
Regional Fishery Manager

OBJECTIVES

1. To furnish technical assistance, advice and comments to other agencies, organizations, or individuals regarding projects that affect fishery resources in northern Idaho.

2. To promote the understanding of fish biology and fish habitat needs and the ethical use of the fishery resource through individual contact, public school curriculum, club meetings, public presentations, informational brochures and fishing clinics.

METHODS

Regional fisheries management personnel provided both written and oral technical guidance.

RESULTS AND DISCUSSION

The technical guidance provided by Panhandle Region fish management personnel focused on activities that directly affected fishery resources or resource users in north Idaho. Numerous presentations and programs were made to civic and sportsmen's groups throughout the year. Letters were sent to numerous individuals and organizations in response to specific questions about the fisheries in northern Idaho.

Fishing Clinics

Regional fishery management personnel coordinated with the Panhandle Region Reservist/Volunteer Coordinator, regional conservation officers, fish hatchery personnel, people from other state and federal agencies and sportsmen's groups to offer eight Free Fishing Day fishing clinics in the Panhandle Region. Department-sponsored clinics were held in Bonners Ferry at the Lions Club Snow Creek Pond, Post Falls at the Post FallsPark Pond, Coeur d'Alene at Ponderosa Golf Course, Rathdrum in Rathdrum Creek flowing through city park, at Round Lake State Park near Sandpoint, at the Clark Fork Fish Hatchery and at Steamboat Pond on the North Fork Coeur d'Alene River. We also provided fish and guidance for a clinic at the Priest Lake Golf Course sponsored by the US Forest Service. The clinics were geared toward teaching young anglers how to fish (casting, baiting hooks, etc.), fish identification, the reasons for regulations, fishing ethics and how to clean fish. The emphasis was on education and not competition.

Fishing Reports

Regional fishery management personnel provided information on Panhandle Region fishing opportunities for the 1-800-ASK-FISH and Idaho Fish and Game Internet Web Page angler information program. Knowledge of regional fisheries programs combined with input from tackle shops, local fishing experts and conservation officers were used to provide information on fishing opportunities.

Endangered Fish Species Issues

The Regional Fishery Manager provided information on the abundance and status of bull trout and westslope cutthroat trout populations in Panhandle Region waters to numerous individuals, organizations and personnel from state and federal agencies working on issues related to bull trout listing and the petition to list westslope cutthroat trout. The Regional Fisheries Manager coordinated with the Kootenai River sturgeon/burbot/trout research team, Kootenai Tribe, US Fish and Wildlife Service, British Columbia Ministry on Environment and the Fisheries Bureau to review and comment on issues related to white sturgeon *Acipenser transmontanus* flow requests, conservation culture, ecosystem (nutrient) issues, and transboundary management programs. Additional discussions were held with the research staff, State of Idaho Office of Species Conservation, U.S. Army Corps of Engineers, Bonneville Power Administration, U.S. Fish and Wildlife Service, Kootenai Tribe of Idaho and British Columbia Ministry of Environment on the depressed status of Kootenai River burbot *Lota lota* and possible changes in water management in the Kootenai River system to hopefully avoid another ESA listing.

Pend Oreille Lake Water Management

Fishery research personnel were responsible for completing all field activities, while the Fisheries Manager kept the public informed and involved in efforts to change lake level management on Lake Pend Oreille. Several sportsmen meetings were attended, articles were written and interviews were given to newspapers and the radio.

Fall population estimates for kokanee in 2002 indicated that the age 1-3 fish are at moderate levels, but both fry and age 4 kokanee were at record lows. Fry numbers in 2002 reflect record low spawning escapement for wild fish in 2001. Survival rates for age 1 to 2 kokanee have improved to 45%, but the predator bottleneck was still present despite nearly three years of liberal fishing regulations aimed at reducing the predator population.

The US Fish and Wildlife Service Biological Opinion on bull trout in Pend Oreille Lake called for a continuation of the winter lake elevation/kokanee egg-to-fry survival study for the next six years, a winter pool elevation of 2055 during the winter of 2002-2003, and an independent scientific review and recommendation for holding the lake at elevation 2055 for one to three consecutive years during the fall/winter operations of 2003 to 2006. The Pend Oreille Utility District #1 (PUD) sued the Corps of Engineers and USFWS over the requirement in the BiOp that would result in higher winter pool levels in future winters. The suit was unsuccessful. The biggest challenge now facing Lake Pend Oreille water management are downstream requests for water to meet chum salmon spawning and incubation flow requests below Bonneville Dam.

Deep Water Trap Net Evaluation – Lake Pend Oreille

A Lake Pend Oreille Citizens Advisory Committee (CAC) was formed to better define and prioritize social issues related to fishery recovery efforts, specifically coming to grips with the difficult issue of reducing predation to prevent a kokanee collapse. The CAC met from May through September 2002 and completed a 106 page final report with five recommendations and 16 findings. The CAC recommended that a commercial rod-and-reel fishery be established for lake trout *Salvelinus namaycush* and that live entrapment gear be evaluated as a tool to reduce the lake trout population. The Idaho Fish and Game Commission approved commercial fishing for lake trout in December 2002 and a limited entry rod-and-reel fishery for 10 anglers was established by March 2002. Funding was also obtained to evaluate a deep water trap net fishery similar to what is currently being fished in Lake Michigan. Eight deep water trap nets were built and a three man crew with two boats will begin the evaluation during the winter of 2003.

Box Canyon Dam Relicensing

The Regional Fishery Manager reviewed and commented on fisheries related issues associated with the relicensing of the Box Canyon Dam operated by the Pend Oreille Utility District of Newport, Washington. The PUD was a major opponent of higher winter pool levels in Lake Pend Oreille, saying the shift in the timing of water coming down the Pend Oreille River caused a loss of revenue.

Miscellaneous

Coordination meetings were held with hatchery, research, enforcement and Fisheries Bureau personnel to insure management goals were achieved. Private pond permits, transport permits, requests for grass carp importation and fish tournament applications were reviewed and forwarded. Requests for commercial guiding activities were reviewed and commented on. Anglers were kept informed of regional fishing opportunities and management programs at club meetings, monthly Sportsmen Breakfasts, through informational articles written for Panhandle Region newspapers, and numerous interviews with television, newspaper and radio reporters. The Regional Fisheries Management staff presented several programs to Panhandle Region schools on cutthroat trout and participated in other Water Awareness Week activities.

2002 ANNUAL PERFORMANCE REPORT

State of: Idaho   Program: Fisheries Management F-71-R-27

Project: III - Habitat Management   Subproject: I-A - Panhandle Region

Contract Period: July 1, 2002 to June 30, 2003

ABSTRACT

There were no habitat management related projects completed in the Panhandle Region during this reporting period.

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