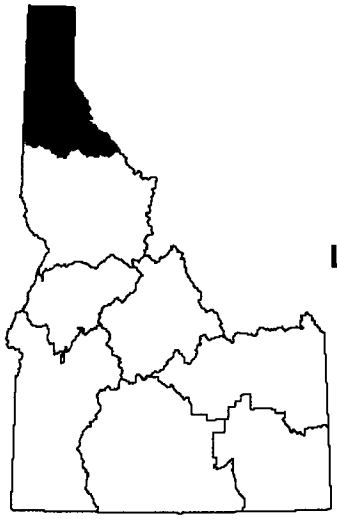
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME
FISHERY MANAGEMENT ANNUAL REPORT

Calvin L. Groen, Director



PANHANDLE REGION
LAKE INVESTIGATIONS
2004

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COEUR D'ALENE DRAINAGE CHINOOK SALMON STUDIES

ABSTRACT

We counted 71 Chinook salmon *Oncorhynchus 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 46,000 age-0 Chinook salmon at the Carlin Bay Cafe boat ramp in June 2004. Chinook salmon eggs were collected at Big Springs Hatchery, Oregon, hatched at Cabinet Gorge Hatchery, and reared at the Nampa Hatchery. All fish were marked with an adipose fin clip.

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INTRODUCTION

Fall Chinook salmon *Oncorhynchus tshawytscha* were introduced into Coeur d'Alene Lake in 1982 as a biological tool to help manage the kokanee *O. nerka* population to provide a yield fishery. The kokanee fishery peaked in 1979 with 578,000 fish harvested, but then quickly collapsed by the early 1980s when kokanee became too numerous and stunted. Fall Chinook salmon were chosen as the preferred predator to reduce kokanee numbers for a variety of reasons: Their relatively short and determined lifecycle compared to other species (lake trout *Salvelinus namaycush*, Kamloops rainbow trout *Oncorhynchus mykiss*, walleye *Sander vitreus*, brown trout *Salmo trutta*); ability to manage predator/prey numbers; and the benefit provided by a Chinook salmon fishery. Kokanee densities of 30-50 age-3 kokanee/ha provide the highest catch rates for desirable size (280 mm) fish. Chinook salmon management goals call for greater catches of 1.5-9 kg fish rather than fewer but bigger fish. A mix of hatchery and wild Chinook salmon are used to achieve management goals.

OBJECTIVES

1. Estimate production of wild Chinook salmon by counting Chinook salmon redds in the Coeur d'Alene and St. Joe rivers.

METHODS

Idaho Department of Fish and Game personnel used a helicopter to conduct Chinook salmon redd surveys in the Coeur d'Alene, North Fork Coeur d'Alene, South Fork Coeur d'Alene, Little North Fork Coeur d'Alene, and St. Joe rivers on October 4, 2004. 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%.

RESULTS

We counted 71 Chinook salmon redds in the Coeur d'Alene River drainage and 18 in the St. Joe River. We estimated one additional redd in Wolf Lodge Creek based on Conservation Officer observations of two Chinook salmon upstream of the Interstate bridge for a total of 90 redds in 2004 (Table 1). All redds were left undisturbed to provide natural production. Conditions for counting were relatively favorable (clear skies and clear water), and we were able to see most redds easily. We estimated 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 salmon to be 36,000 fish in 2005.

We stocked 46,000 age-0 Chinook salmon at the Carlin Bay boat ramp in May 2004. Chinook salmon eggs were collected at Big Springs Hatchery, Oregon, hatched at Cabinet Gorge Hatchery, and reared at the Nampa Hatchery. Mean size at stocking was 160 mm, and all fish were marked with an adipose fin clip. The total age-0 hatchery and wild Chinook salmon entering Coeur d'Alene Lake in 2004 was estimated to be about 77,000 fish (Table 2). We counted 78 Chinook salmon redds in 2003 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 77,000 Chinook salmon in 2004.

Table 1. Chinook salmon redd counts in the Coeur d'Alene River drainage, St. Joe River, and Wolf Lodge Creek, Idaho, 1990-2004.

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
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	27	24
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	17	36
L.N.F. Cd'A River to Steamboat Creek	—	2	3	6	1	1	13	6	1	0	3	2	6	2	4
Steamboat Creek to Steel Bridge	—	—	1	0	0	2	0	3	0	0	0	1	0	0	2
Steel Bridge to Beaver Creek	—	—	—	—	0	0	0	1	0	0	0	0	0	0	0
S. F. Cd'A River	—	—	—	—	13	—	4	0	0	0	5	4	3	5	4
L.N.F. Cd'A River	—	—	—	—	0	2	0	0	0	0	1	0	0	0	1
Subtotal	51	13	38	97	110	64	84	33	15	12	45	38	33	51	71
St. Joe River															
St. Joe City to Calder	4	0	18	20	6	1	59	20	3	0	5	21	14	15	15
Calder to Huckleberry C.G.	3	1	1	4	0	0	5	2	1	0	0	15	4	9	3
Huckleberry C.G. to Marble Crk	3	0	2	0	1	0	7	2	0	0	0	—	0	3	0
Marble Creek to Avery	0	0	0	0	1	0	0	0	2	0	0	—	0	0	0
Subtotal	10	1	21	24	8	1	71	24	6	0	5	36	18	27	18
Wolf Lodge Creek	—	—	—	—	—	—	—	—	4	5	3	4	0	0	1
Total	**66**	**14**	**63**	**121**	**118**	**65**	**155**	**57**	**25**	**17**	**53**	**78**	**51**	**78**	**90**

Table 2. Number of Chinook salmon stocked and estimated number of naturally produced Chinook salmon entering Coeur d'Alene Lake, Idaho, 1982-2004. The number of Chinook salmon redds is the count from the previous fall.

	Hatchery Produced				Naturally Produced		
Year	Number	Stock	Rearing Hatchery	Fin Clip	Previous Year Redd Counts	Estimated Smolts	Total
1982	34,396	Bonneville	Hagerman	—	—	—	34,400
1983	60,134	Bonneville	Mackay	—	—	—	60,100
1984	10,496	L. Michigan	Mackay	—	—	—	10,500
1985	18,300	L. Michigan	Mackay	Left Ventral	—	—	18,500
1986	30,030	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	35,420	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	17,267	Coeur d'Alene	Nampa	Adipose	100	40,000	57,269
1995	30,198	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	12,650	Coeur d'Alene	Nampa	Adipose	84	33,600	45,700
1998	52,300	Priest Rapids	Cabinet G.	Left Ventral	37	14,800	70,000
1999	25,527	Big Springs	Cabinet G.	Right Ventral	25	10,000	35,000
2000	28,019	Big Springs	Nampa	Adipose	17	6,800	35,000
2001	0	—	—	—	53	21,200	21,200
2002	40,986	Big Springs	Nampa	Left Ventral	78	31,000	61,000
2003	44,832	Big Springs	Nampa	Right Ventral	51	20,400	62,400
2004	46,047	Big Springs	Nampa	Adipose	78	31,000	77,000

DISCUSSION

The 46,000 hatchery Chinook salmon stocked in Coeur d'Alene Lake in 2004 were hatched at Cabinet Gorge Hatchery and reared at the Nampa Hatchery as they were in 2003. The warmer water temperatures of Nampa Hatchery allows for accelerated growth resulting in an average size of 160 mm at time of release. Over the past 21 years, we have stocked an average of 31,000 age-0 Chinook salmon in Coeur d'Alene Lake (Table 2). Since 1999, we have obtained Chinook salmon eggs from Big Springs Hatchery, Oregon. Despite being reared to a mean size of 160 mm at Nampa Hatchery, this stock of fish continues to perform poorly relative to returning to the creel.

Angler reports indicate wild Chinook salmon continue to make up the majority of Chinook salmon caught in Coeur d'Alene Lake. During the Lake Coeur d'Alene Anglers Association-sponsored Big One Derby, 90% of the fish caught were reported to be of wild origin. An alternate source of Chinook salmon eggs has been located and in June 2005, we will stock juvenile Chinook salmon from Lake Sacagawea, North Dakota. These fish have no known disease problems and were stocks obtained from Lake Michigan. The goal is to stock fish that hopefully have more of an innate tendency to spend their entire lifecycle in freshwater as opposed to their ocean dwelling counterparts that have a strong desire to migrate to the ocean as smolts.

RECOMMENDATIONS

1. Stock 45,000 age-0 Chinook salmon in 2005 to supplement the estimated 36,000 naturally produced fish, for a combined total of 81,000 age-0 Chinook salmon smolts.

2. Continue to monitor the recovery of the kokanee population and adjust age-0 Chinook salmon supplementation accordingly.

3. Continue to encourage catch-and-keep Chinook salmon fishing.

KOKANEE POPULATION STUDIES

ABSTRACT

A midwater trawl was used to estimate the kokanee *Oncorhynchus nerka* population in Coeur d'Alene Lake in late July. Trawl results indicated a low number of adult kokanee, with the total population of age-3 fish estimated at 202,000 or 21 fish/ha. We estimated 141,000 age-2, 1,060,000 age-1, and 7.3 million age-0 kokanee for a total population estimate of 8.7 million fish in 2004. The standing stock of kokanee in Coeur d'Alene Lake was estimated at 23.77 kg/ha. This is down slightly from the 2003 estimate of 27.66 kg/ha.

Spirit Lake kokanee population and relative year-class abundance are typically evaluated each year. However, due to low lake levels in 2004, we were unable to launch our 9.12 m trawling boat at Spirit Lake and no estimate was made.

We counted 6,117 kokanee spawners at five historic locations along the shoreline of Priest Lake in November. We were unable to survey Upper Priest Lake as low water levels prevented boat traffic from entering the Thorofare. The number of kokanee spawners observed at each of the five sites on Priest Lake was as follows: Copper Bay 1,584, Huckleberry Bay 359, Cavanaugh Bay 1,673, Hunt Creek beach 2,060, and Indian Creek beach 441.

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OBJECTIVES

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

2. Evaluate stock status of kokanee in Spirit Lake.

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

METHODS

Coeur d'Alene Lake

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 July 19-20, 2004. 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.

Kokanee spawner lengths were determined by collecting a sample of fish by experimental gill nets on December 1, 2004. The net was set at depths of 3-5 m near Higgins Point for approximately one hour. 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), and
Y = mean number of eggs per female.

Spirit Lake

Kokanee population and relative year-class abundance are typically evaluated each year. However, due to low lake levels in 2004, we were unable to launch our 9.12 m trawling boat at Spirit Lake and no estimate was made.

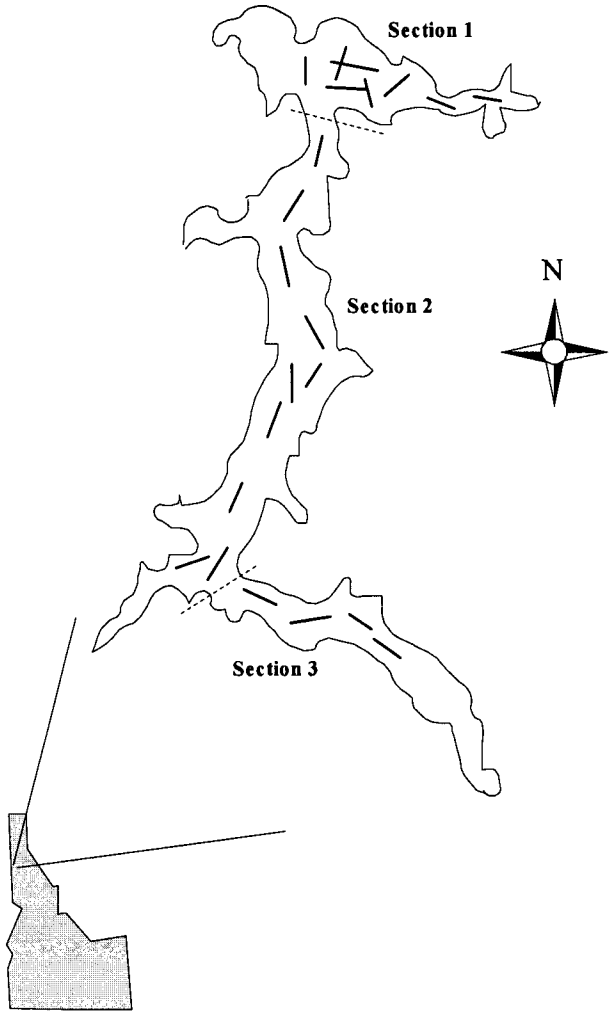

Figure 1. Location of 22 midwater trawling transects in three sections of Coeur d'Alene Lake, Idaho, used to estimate kokanee population abundance in 2004.

Priest Lake 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 five historic spawning areas on Priest Lake on November 8. 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).

RESULTS

Coeur d'Alene Lake

Trawl results indicated a low number of adult kokanee, with the total population of age-3 fish estimated at 202,000 or 21 fish/ha, far below the 25 year mean of 814,000 and the 10 year mean of 549,000 age-3 kokanee, but a slight improvement over the 182,000 estimate in 2003 (Table 1). We estimated 1,064,000 age-1 kokanee, slightly higher than the 2003 estimate (Table 1) and comparable to the 1979-2003 mean of 1.1 million. Age-2 kokanee were estimated at 141,000, far below the 25- and 10-year means of 1.6 million and 1.01 million, respectively. The estimated population of age-0 kokanee was 7.4 million, significantly higher than the 25-year mean of 3.5 million fish. The standing stock of kokanee in Coeur d'Alene Lake was estimated at 23.77 kg/ha, a slight decrease from the 2003 estimate of 27.66 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 2003 PED estimate and the 2004 age-0 estimate, egg to fry survival was 12%, comparable to the previous years' estimate of 13.2% (Table 3).

Kokanee fry collected in the trawl ranged from 30 to 60 mm TL. Age-1 kokanee ranged from 110 to 159 mm, with a modal length of around 135 mm. Age-2 fish ranged from 170 to 250 mm, with a modal length of around 190 mm. Size of the age-3 kokanee at the time of trawling ranged from 250 mm to 310 mm, with a modal length of 255 mm (Figure 3). Typical of kokanee in Coeur d'Alene Lake, maturity was primarily at age-3 and all of the age-3 kokanee captured were mature.

In a 50 minute gillnet set on December 1, 2004, we collected 147 kokanee spawners near Higgins Point in Wolf Lodge Bay. Males outnumbered females, with around 44% of the sample being females. Female mean length was 325 mm (TL) (n = 456, SD = 11.7 mm). Male mean and modal lengths were 353 and 350 mm, respectively (n = 102 SD = 9.9 mm). Mean length of spawners was comparable to last year. Kokanee spawner length in Coeur d'Alene Lake during the past seven years has been larger than they have been since the late 1950s (Figure 4). Mean fecundity was estimated at 752 eggs per female based on a mean female spawner length of 325 mm, and potential egg deposition was approximately 76 million eggs (Table 3). This is slightly higher than the 2003 PED estimate of 62 million eggs, but is still well below the average for the past 25 years (125 million). The average PED for the past 10 years is 110 million eggs.

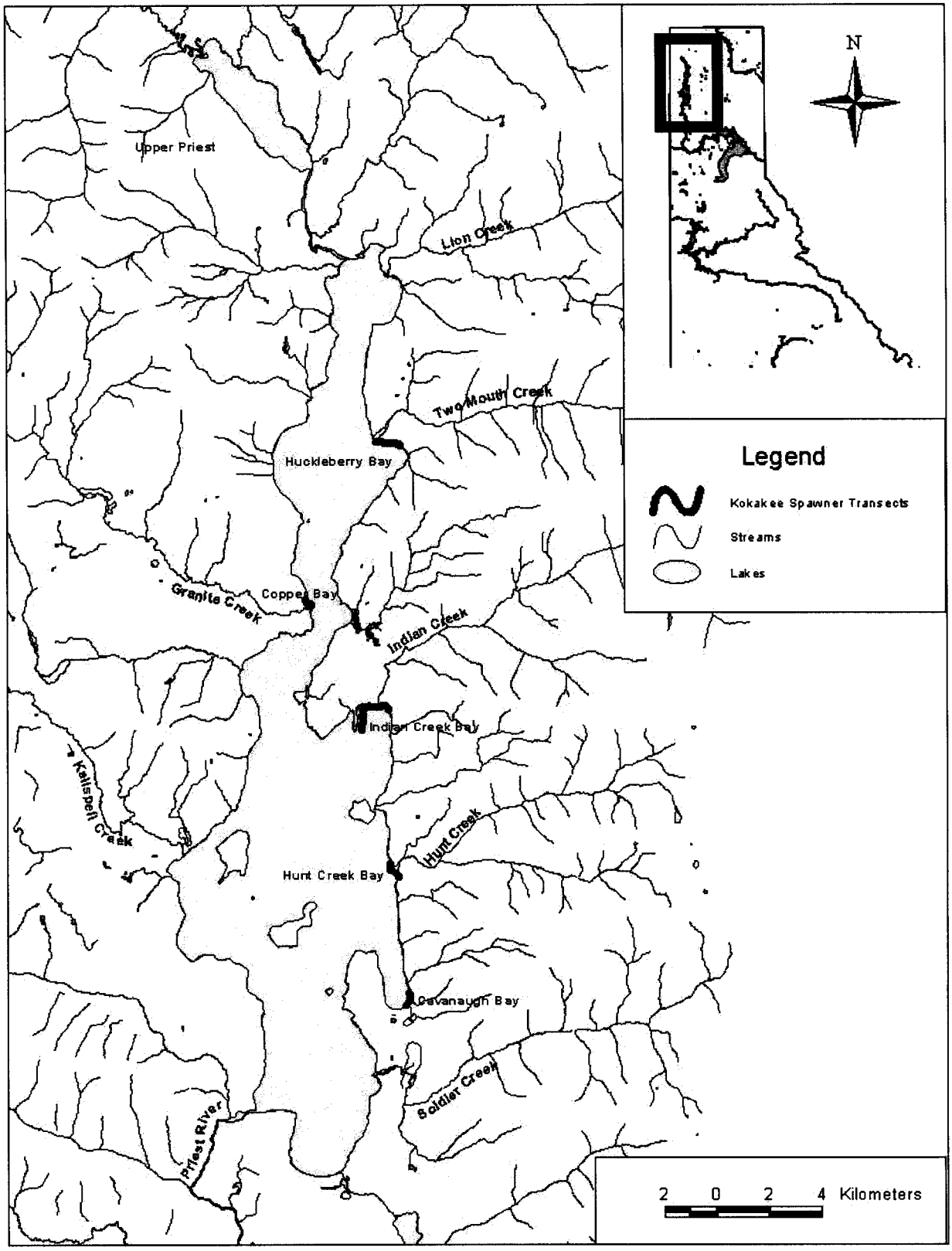

Figure 2. Location of kokanee spawner counts on Priest Lake, Idaho, 2004.

Table 1. Estimated abundance of kokanee made by midwater trawl in Coeur d'Alene Lake, Idaho from 1979-2004. To follow a particular year class of kokanee, read up one row and right one column.

Sampling Year	Age Class				Total	Age-3+/ha
	Age-0+	Age-1+	Age-2+	Age-3/4+		
2004	7,379,000	1,064,000	141,500	202,400	8,787,000	21
2003	3,300,000	971,000	501,400	182,300	4,955,000	19
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 x	**3,576,000**	**1,572,000**	**1,629,000**	**814,000**	**7,644,000**	**85**

Table 2. Kokanee population estimates and standing crop (kg/ha) in each section of Coeur d'Alene Lake, Idaho, July 19-20, 2004.

Section	Age-0	Age-1	Age-2	Age-3	Kg/ha
1	6,595,760	267,596	17,083	15,458	5.63
2	775,610	304,115	90,651	159,231	7.61
3	7,828	492,045	33,745	27,721	10.53
Whole lake	7,379,198	1,063,756	141,478	202,410	
(90% CI)	4,479,162	301,590	43,560	81,553	23.77

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, 1979-2004.

Year	Estimated Female Escapement	Estimated Potential Number of Eggs ($x10^6$)	Fry Estimate the Following Year ($x10^6$)	Percent Egg to Fry Survival
2004	101,000	76		
2003	91,000	62	7.38	12.0
2002	35,000	25	3.30	13.2
2001	12,650	10	3.50	34.0
2000	37,700	32	7.10	22.2
1999	28,000	19	4.18	22.6
1998	39,000	25	4.09	15.7
1997	90,000	54	3.60	6.7
1996	707,000	358	3.00	0.8
1995	1,425,000	446	4.02	0.9
1994	250,000	64	2.00	0.3
1993	240,000	92	5.95	6.5
1992	488,438	198	5.57	2.8
1991	631,500	167	3.03	1.8
1990	657,777	204	4.86	2.0
1989	516,845	155	3.00	1.9
1988	362,000	119	3.04	2.6
1987	377,746	126	3.42	2.7
1986	368,633	103	6.89	6.7
1985	530,631	167	2.17	1.3
1984	316,829	106	4.13	3.9
1983	441,376	99	0.70	0.7
1982	358,200	120	1.51	1.3
1981	550,000	184	4.54	2.5
1980	501,492	168	2.43	1.5
1979	256,716	86	1.86	2.2

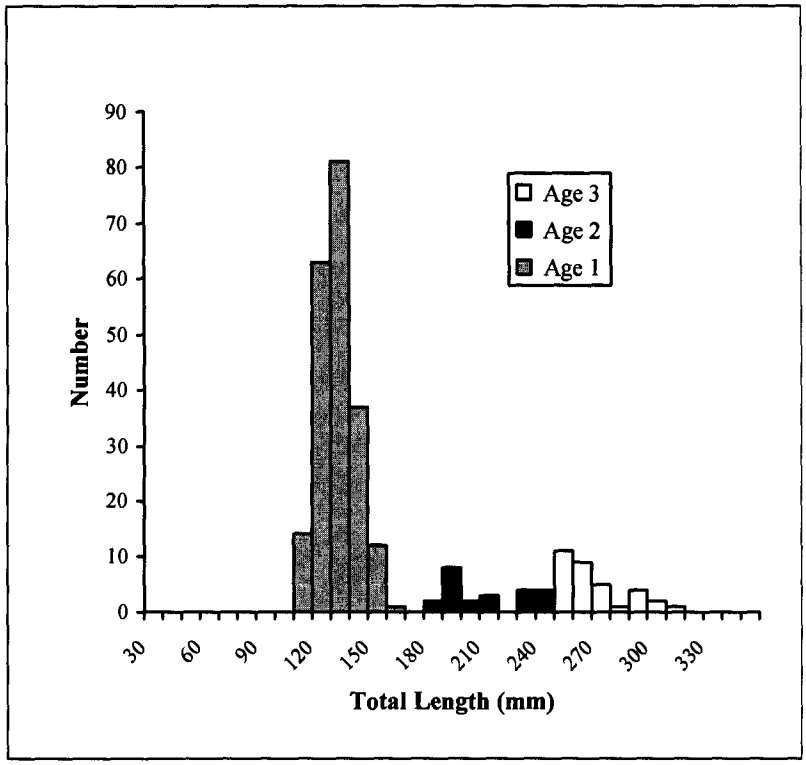

Figure 3. Length frequency and age of kokanee collected by midwater trawling in Coeur d'Alene Lake, Idaho in 2004.

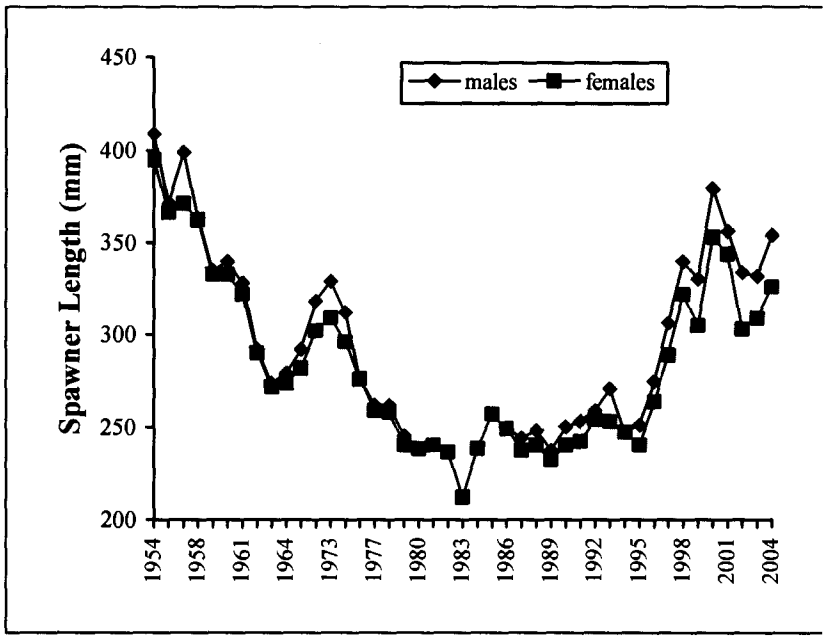

Figure 4. Mean total length of male and female kokanee spawners in Coeur d'Alene Lake, Idaho from 1954 to 2004. Year where mean lengths were identical between sexes are a result of averaging male and female lengths.

Priest Lake

A total of 6,117 kokanee spawners were counted at five shoreline sites in Priest Lake (Table 4). 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 (TL) of 20 male and 11 female kokanee were 367 and 360 mm (TL), respectively, compared to 398 and 384 mm in 2003 and 378 and 364 mm in 2002 (Figure 5). No significant change in mean length has been observed in Priest Lake adult kokanee over the past four years.

Number of redds observed at each of the five sites on Priest Lake were as follows: Copper Bay 1584, Huckleberry Bay 359, Cavanaugh Bay 1,673, Hunt Creek beach 2,060, and Indian Creek beach 441 (Table 4). No kokanee spawners were observed around Indian Creek in 2002 or 2003. In November 2002, Idaho Department of Parks and Recreation renovated the Indian Creek boat ramp. We speculate that this activity may have caused kokanee spawners to relocate.

DISCUSSION

Coeur d'Alene Lake

The kokanee population in Coeur d'Alene Lake is still well below the long-term average but continues to improve. As in the previous three years, the low densities have resulted in much larger than average kokanee. Fish from the age-3 population appear to be similar in length and number to what they were in 2003 and three times as numerous as 2002. Despite the low abundance, the late summer fishery remains very popular due to the size of mature fish.

Age-2 kokanee estimates are among the lowest on record and the lowest they have been since 1998. Age-1 kokanee remain slightly below average while age-0 kokanee estimates are at an all-time high and twice the 26-year average. The spawning escapement in 2004 was among the weakest since trawling began, but up slightly from 2003 and the best it has been since 1996. Potential number of eggs deposited (PED) was around 76 million eggs. Because of the size of mature kokanee (323-376 mm) in 2004 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 few years was greater than trawl-based estimates indicate, and may partially account for the exceptionally high PED to fry survival rates in since 1999.

Priest Lake

Priest Lake spawning kokanee numbers improved for the fourth consecutive year. We counted 6,117 kokanee spawners at five historic sites on Priest Lake compared to 2,832 in 2003, 1,825 in 2002, and 1,765 in 2001. This increase is attributed to a change in water level management. In the past, timing of winter drawdown has adversely affected spawning success and survival of beach spawned eggs and fry in redds. In 2001 Idaho Water Resources Board (IWRB) and IDFG proposed several amendments to the 1996 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. Lower lake levels ensure a higher success rate for kokanee redds because the water is at its lowest level before kokanee initiate spawning. Kokanee spawning activity in Priest Lake peaks in mid-November. Since 2002 Priest Lake has been drafted to near the 0.0 goal on October 31.

Table 4. Counts of shoreline spawning kokanee in Priest Lake and Upper Priest Lake, Idaho 2001- 2004.

Location	2001	2002	2003	2004
Priest Lake				
Copper Bay	588	549	1,237	1,584
Cavanaugh Bay	523	921	933	1,673
Huckleberry Bay	200	49	38	359
Indian Creek Bay	222	0	0	441
Hunt Creek Mouth	232	306	624	2,060
Upper Priest Lake				
West Shoreline	10	—[a]	—[a]	—[a]
Total	**1,775**	**1,825**	**2,832**	**6,117**

[a] Upper Priest Lake was not included in the spawner counts due to low water in the Thorofare and no access to Upper Priest Lake.

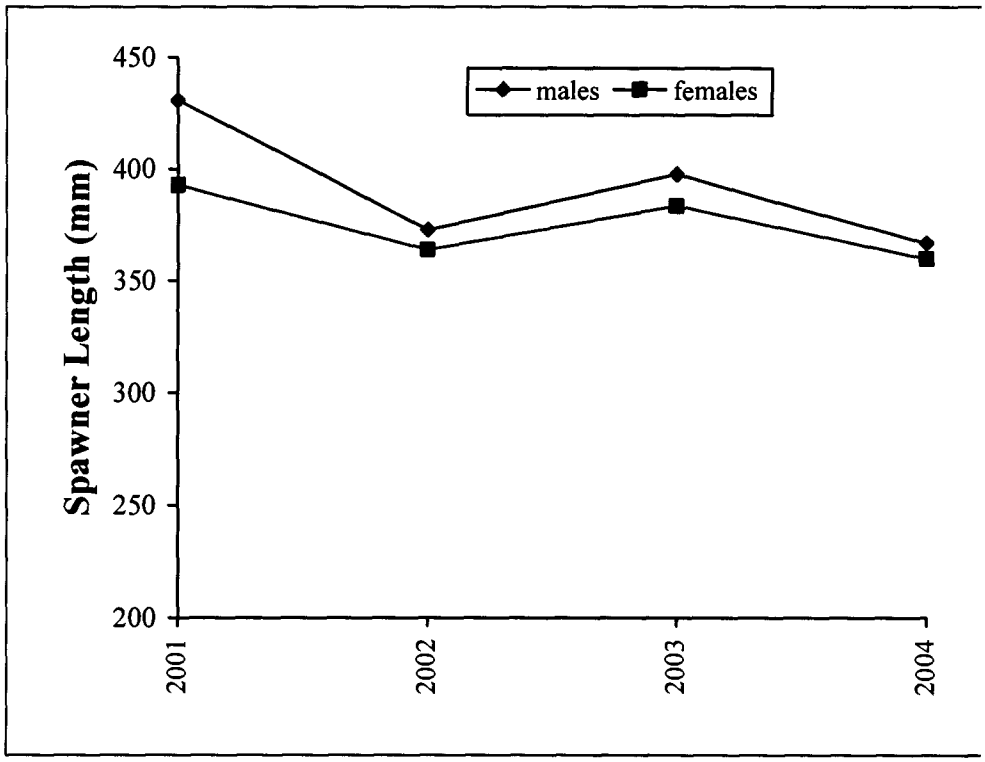

Figure 5. Mean total length of male and female kokanee spawners in Priest Lake, Idaho from 2001 to 2004.

From the early 1950s to the early 1970s, kokanee provided most of the fishing in Priest Lake with an annual harvest of 30,000-100,000 fish. The introduction of opossum shrimp *Mysis relicta* in the early 1960s led to dramatic increases in lake trout numbers and elimination of the popular kokanee fishery in the late 1970s. In 1978 only 4,500 kokanee were harvested in Priest Lake. Based on trawling estimates the population of age 3+ kokanee in Priest Lake in 1987 was only 2,776 fish (Mauser and Ellis 1985).

Until recently, the Priest Lake kokanee population has been considered all but extirpated. Changes in water level management seem to have resulted in a rebounding kokanee population as our kokanee spawner count data suggests there are more kokanee today in Priest Lake than there has been in 20 years. Granted, these spawner counts are not the most accurate way to evaluate the population, and perhaps it is time to re-implement yearly kokanee trawling.

Estimates of kokanee number, density, and standing crop would be useful in making comparisons to populations in Lake Pend Oreille and Coeur d'Alene Lake and to evaluate future management changes within the Priest Lake population. By re-establishing the long-term population-monitoring program (midwater trawling) and with some adaptive management, we may be able to offer anglers limited kokanee angling opportunity again on Priest Lake.

RECOMMENDATIONS

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

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

3. Re-establish a long-term kokanee population monitoring program on Priest Lake with yearly midwater trawling.

LITERATURE CITED

Bowler, B., B. E. Rieman, and V. L. Ellis. 1979. Pend Oreille Lake fisheries investigations. Idaho Department of Fish and Game, Job Performance Report, Project F-73-R-1, Boise.

Mauser, G. R., and V. Ellis. 1985. Enhancement of trout in large North Idaho lakes. Idaho Department of Fish and Game, Job Performance Report, Project F-73-R-6, Boise.

Rieman, B. E., and D. Meyers. 1990. Idaho Department of Fish and Game. Job Performance Report. F-73-R-12. Boise.

Rieman, B. E. 1992. Status and analysis of salmonid fisheries: kokanee salmon population dynamics and kokanee salmon monitoring guidelines, Idaho Department of Fish and Game. F-73-R-14, Subproject II, Study II. Boise.

LAKE PEND OREILLE CREEL SURVEY

ABSTRACT

We conducted low intensity creel surveys during the two major fishing derbies held on Lake Pend Oreille each year: the K&K Derby April 24-May 2 and the Fall Challenge Derby November 20-28, 2004. The Lake Pend Oreille Idaho Club sponsored derbies were monitored to compare lake trout *Salvelinus namaycush* catch between the rod-and-reel fishery and the trap net fishery and to evaluate the potential for monetary incentives to increase lake trout harvest. We interviewed 1,145 anglers during the spring K&K Derby and 511 anglers during the Fall Derby. Harvest rates on lake trout and rainbow trout *Oncorhynchus mykiss* were 87% and 52% during the K&K Derby and 89% and 33% during the Fall Derby, respectively.

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OBJECTIVES

1. Conduct low intensity creel surveys during the two major fishing derbies held on Lake Pend Oreille—the spring K&K and the Fall Derby—to compare lake trout catch data between the rod-and-reel fishery and the trap net fishery and to evaluate the potential for monetary angler incentives to increase harvest of lake trout.

METHODS

We conducted low intensity creel surveys during the two major fishing derbies held on Lake Pend Oreille each year: the K&K Derby April 24-May 2 and the Fall Challenge Derby November 20-28, 2004. The Lake Pend Oreille Idaho Club sponsored derbies were monitored to compare lake trout *Salvelinus namaycush* catch data between the rod-and-reel fishery and the trap net fishery and to evaluate the potential for monetary angler incentives to increase harvest of lake trout.

Idaho Department of Fish and Game personnel and volunteers were assigned to major access points (primarily Holiday Shores Marina, Hudson Bay Resort, and Garfield Bay). Interviews consisted of asking how many hours anglers fished; how many anglers per boat; Idaho resident or nonresident; how many rods were used, and the number of each species caught, kept, or released. Lake trout were examined for spaghetti tags and or fin clips.

RESULTS

We interviewed 1,145 anglers during the spring K&K Derby with some anglers being interviewed more than once. Resident anglers comprised 70% of the anglers interviewed. Nearly 60% of the effort was targeted toward rainbow trout *Oncorhynchus mykiss.* Around 11% of the effort during the derby was for lake trout and 29% of the anglers indicated they were fishing for "anything." Interviewed anglers caught 562 rainbow trout with 295, or 52%, being harvested. Interviewed derby anglers caught 268 lake trout with 87% being harvested. During the K&K Derby, 50 bull trout *Salvelinus confluentus* were caught and released by interviewed anglers.

During the Pend Oreille Lake Fall Derby, 511 anglers were interviewed of which 71% were residents. Interviewed derby anglers caught 237 lake trout and 414 rainbow trout. Of these, 199 (89%) of the lake trout and 138 (33%) of the rainbow trout were harvested. During the Fall Derby, 18 bull trout were caught and released by interviewed anglers.

DISCUSSION

We interviewed 1,145 anglers during the spring K&K Derby. Nearly 60% of the effort was targeted toward rainbow trout compared to 86% in 2000 (Fredericks et al. 2000). Around 11% of the effort during the derby was for lake trout compared to 8% in 2000.

Interviewed anglers caught 562 rainbow trout with 295, or 52%, being harvested. During the entire year 2000, 40% of the rainbow trout were harvested (Fredericks et al. 2000).

Interviewed derby anglers caught 268 lake trout with 87% being harvested. During the 2000 creel survey, 78% of the lake trout were harvested.

During the Pend Oreille Lake Fall Derby, 511 anglers were interviewed. Interviewed derby anglers caught 237 lake trout and 414 rainbow trout. Of these, 199 (89%) of the lake trout and 138 (33%) of the rainbows were harvested.

Participation in the Lake Pend Oreille Idaho Club sponsored derbies is high. Fredericks et al. 2000 reported the nine-day K&K Derby contributed almost one fourth of the total fishing effort on Pend Oreille Lake for the entire year. Higher harvest rates for both rainbow and lake trout during the 2004 derby were not surprising due to the cash rewards offered for harvested fish. Creel survey effort was comparable between the two derbies in 2004. Assuming lake trout are as easy to catch in April as they are in November, it appears that the enhanced prizes resulted in increased lake trout harvest. In 18 days of derby fishing, anglers harvested over 400 lake trout. In reality, we probably interviewed half of all anglers participating in each derby. Based on the 2004 trap netting effort and the 2004 Pend Oreille Lake derby monetary incentives, it appears that it is not unrealistic to say that anglers can have as big an impact on lake trout numbers as trap netting.

RECOMMENDATIONS

We recommend that monetary incentives be used in conjunction with trap nets to suppress lake trout in Pend Oreille Lake as long as funding is available.

LITERATURE CITED

Fredericks, J. P., M. Liter, N. J. Horner, and C. E. Corsi. 2000. Regional fisheries management investigations. Idaho Department of Fish and Game. Job 1-b, Job Performance Report. F-71-R-25. Boise.

LOWLAND LAKE INVESTIGATIONS

ABSTRACT

We conducted a lowland lake survey on Bonner Lake to evaluate the status of the trout population and determine if Bonner Lake needed to be chemically treated to improve the trout fishery. The survey yielded catches of largemouth bass *Micropterus salmoides*, pumpkinseed *Lepomis gibbosus*, rainbow trout *Oncorhynchus mykiss*, and northern pike *Esox lucius*. Largemouth bass were the dominant species collected, comprising 52% of the sample. Three large northern pike were captured during our survey. The northern pike ranged from 805-910 mm and were a recent, illegal introduction.

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INTRODUCTION

The Panhandle Region has over 50 lowland lakes that support a variety of warmwater and coldwater fisheries. Most of these lakes are managed with general regulations or as "Family Fishing Waters" for consumptive oriented anglers. Bonner Lake is currently the only small lowland lake in the Panhandle Region managed as a "Quality Trout Fishery" with restrictive regulations. Hayden Lake has similar trout regulations, but its size is not suitable for float tubes and kick boats. The presence of warmwater species in Bonner Lake (largemouth bass *Micropterus salmoides*, pumpkinseed *Lepomis gibbosus*, and northern pike *Esox lucius*, a recent illegal introduction) is compromising the quality trout management goal. A fish population survey was conducted in Bonner Lake in 2004 to evaluate the status of the trout population and determine if a chemical treatment is needed to restore the trout fishery.

Bonner Lake is located in Boundary County, Idaho, 14 km east of Bonners Ferry, Idaho (Figure 1). The 9.7 ha lake has a mean depth of 6.7 m and a maximum depth of 18 m. A single landowner privately owns most of the land surrounding the lake. IDFG maintains an access area on the west end of the lake consisting of a primitive boat ramp, outhouses, and a camping site. Bonner Lake has been managed as a Quality Trout Fishery since 2000 with a trout limit of two fish, 14 inch minimum size, and only single barbless hooks with no bait allowed. The lake is also under the "Electric Motors Only" restriction.

METHODS

We conducted a lowland lake survey on Bonner Lake with the primary objective being to evaluate the status of the trout population and determine if Bonner Lake needs to be chemically treated again to improve the trout fishery. The lake was netted with gill and trap nets on October 5-6 and electrofished on October 5, 2004. Bonner Lake has been managed as a quality trout fishery, but an increase in warmwater species may be compromising this management goal.

RESULTS

The 2004 fishery survey of Bonner Lake yielded catches of largemouth bass, pumpkinseed, rainbow trout *Oncorhynchus mykiss,* and northern pike. We collected 473 fish in our combined gear sampling effort (one hour of electrofishing, two floating and two sinking gill nets, and two trap nets set overnight). Game species comprised 100% of the sample (Table 1). Largemouth bass were the dominant species collected in Bonner Lake, comprising 52% of the sample. Largemouth bass ranged in total length from 73-392 mm with a mean length of 144 mm. Pumpkinseed comprised 44% (N = 210) of the catch. Pumpkinseed were also small with a mean length of 108 mm. Only 14 rainbow trout were captured during the survey. Rainbow trout ranged from 305-380 mm total length with a mean length of 352 mm. Three large northern pike were captured during our survey. The northern pike are a recent, illegally introduced species and were not known to be in Bonner Lake before our survey. The pike ranged from 805-910 mm.

Table 1. Fishery characteristics for game species based on lake survey of Bonner Lake, Idaho in 2004.

Species	Parameter	Bonner Lake
Largemouth bass	Number Captured	246
	Range (TL)	73-392 mm
	Mean Length	144 mm
Northern pike	Number Captured	3
	Range (TL)	805-910 mm
	Mean Length	873 mm
Rainbow trout	Number captured	14
	Range (TL)	305-380 mm
	Mean length	352 mm
Pumpkinseed	Number Captured	210
	Range (TL)	65-190 mm
	Mean Length	108 mm

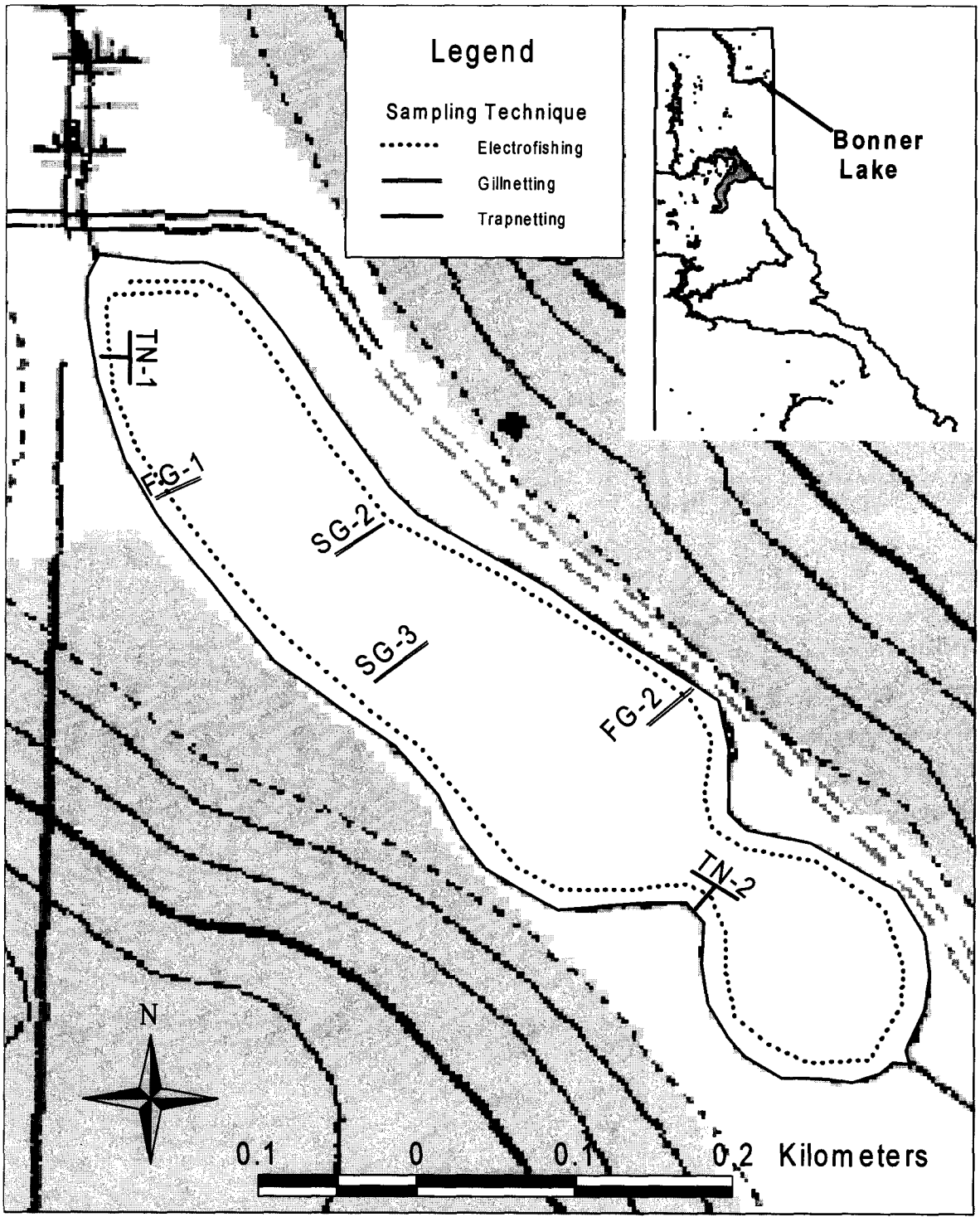

Figure 1. Map of Bonner Lake, Idaho showing 2004 gill net and trap net locations and electrofishing transects.

DISCUSSION

Bonner Lake has been chemically treated three times in the past, the most recent of which was on October 7, 1998, to eradicate warmwater species prior to quality trout management. The lake was also treated in 1972 and 1955 to eradicate pumpkinseed and small largemouth bass. None of these treatments has resulted in complete kills. Largemouth bass and black crappie *Pomoxis nigromaculatus* were introduced in 1988 by IDFG. It appears that the black crappie stocking was a failure as none has been observed since. Following the 1998 treatment Bonner Lake has been stocked with 2,000 fry or fingerling Kamloops rainbow trout each year except for 2004 when no fish were stocked. The lack of stocking in 2004 was an oversight by the IDFG hatchery program.

Several possibilities may explain the failure of past chemical treatments to achieve a 100% fish kill in Bonner Lake. The failure of the most recent attempt, in 1998, may have been the result of poor quality Chem-Fish. Fredericks et al. 1998 reported the chemical used was outdated and had been stored outdoors in freezing temperatures, which is against the manufacture's recommendation and may have reduced the effectiveness of the active ingredients. However, IDFG did evaluate the integrity of the rotenone and determine the application rate during the 1998 treatment. Bioassays were conducted and the quality of the product was not the reason for failing to kill pumpkinseed (J. Fredericks, Idaho Department of Fish and Game, Personal Communication).

Another possible, and more likely, explanation for repeated failures to achieve a complete fish kill in Bonner Lake may be refuges of nontoxic water. Areas of Bonner Lake have a dense vegetative mat ranging from one-half to more than one meter thick covering the lake bottom. It may be that these areas provide a physical and/or chemical impediment to thorough mixing of the toxicant. Sies (1965) described Bonner Lake as "at the proposed boat ramp, it was possible to stand on the dock and in two feet of water push a 12 foot pole out of sight in the peat or quicksand type bottom." Additionally, Fredericks et al. 1998 reported a difference between inflow and outflow to Bonner Lake (greater outflow than inflow), suggesting there are upwelling springs which could be providing refuges of nontoxic water.

With our recent discovery of northern pike in Bonner Lake and a report from the local conservation officer that northern pike are also present in Perkins Lake, we will conduct numerous lake surveys this spring to determine the extent of illegal northern pike introductions in the area. Numerous other lakes, including Perkins, Brush, Dawson, Smith, and Robinson, are all less than 15 km from Bonner Lake and will be surveyed in April. After we determine the extent of northern pike introductions, we can assess the feasibility and cost of chemically treating the lakes to remove northern pike. If it is determined that northern pike are only in Bonner and Perkins lakes, a cost analysis and public meetings will determine what steps to take.

If chemical treatment is determined to be feasible, lakes scheduled for treatment would be conducted this fall when the lakes are isothermic but yet as warm as possible. We will be soliciting public input regarding future management of the lakes. Mail out questionnaires as well as public meetings in several cities will provide input relative to future management direction.

RECOMMENDATIONS

1. Conduct lake surveys on all lowland lakes in the area to determine extent of illegal northern pike introductions.

2. Seek public input on desired future management direction of Bonner Lake.

LITERATURE CITED

Fredericks, J. P., J. A. Davis, N. J. Horner, and C. E. Corsi. 1998. Regional fisheries management investigations. Idaho Department of Fish and Game. Federal Aid in Fish and Wildlife Restoration, F-71-R-23, Job 1-b, Job Performance Report. Boise.

Sies, I. 1965. State of Idaho. Federal Aid in Fish and Wildlife Restoration Act. Public access development – Boundary County, Bonner Lake and Moyie River Segment, Project APW-F-4-D-1. Final Segment Report. Boise.

PRIEST LAKE LAKE TROUT TAGGING

ABSTRACT

A total of 143 lake trout *Salvelinus namaycush* were tagged by the Priest Lake volunteer angler in 2004. Fish ranged from 310 to 670 mm (TL), with a mean size of 424 mm. All of these fish were tagged near Bartoo Island. Twenty-eight tagged lake trout were recaptured by anglers in 2004. All had been tagged in Priest Lake between 1995 and 2004. Lake trout were caught from zero to 19 km from their original capture site, with an average distance from original capture of approximately 3.1 km. Growth, as reported from tag returns, ranged from zero to 6.7 cm/year, with an average annual growth of 1.7 cm/year.

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METHODS

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 lake in the same area in which they were captured.

We continued to collect information from lake trout reported captured by anglers in 2004 with tags from previous years. As in past years, we summarized total and annual growth and distance from original capture site.

RESULTS

A total of 143 lake trout were tagged by Randy Phelps, the Priest Lake volunteer angler in 2004. Fish ranged from 310 to 670 mm (TL), with a mean size of 424 mm. All of these fish were tagged near Bartoo Island.

Twenty-eight tagged lake trout were recaptured in 2004 compared to 34 in 2003. All fish had been tagged in Priest Lake between 1995 and 2004 (Table 1). Lake trout were caught from zero to 19 km from their original capture site, with an average distance from original capture of approximately 3.1 km compared to 3 km in 2003. Growth, as reported in tag returns, ranged from zero to 67 mm/year, with an average annual growth of 17 mm/year. This compares to a reported mean annual growth of 21 mm/yr in 2003 and 18 mm/year in 2002.

DISCUSSION

Volunteer anglers have been tagging lake trout in Priest Lake since 1995 and have tagged over 1,200 lake trout. This effort has allowed us to get some understanding of lake trout movement and growth. Lake trout in Priest Lake seem to travel widely, moving throughout Priest and Upper Priest lakes with no strong affinity to a particular area. Growth of lake trout in Priest Lake as reported by tag returns is around 18 mm/year. This is probably an accurate estimate of growth for younger age classes, as the mean length of lake trout tagged from 2000-2005 was 441 mm.

RECOMMENDATIONS

We recommend exploring the possibility of expanding the tagging program to include older age class fish and fish captured at locations other than Bartoo Island.

Table 1. Size, growth, and location of tagged lake trout reported caught by anglers from Priest Lake, Idaho in 2004.

		Recapture				Mark			Growth (mm)		
Color	Tag#	Date	Length (mm)	Weight (kg)	Location	Date	Length (mm)	Location	Total growth	Annual growth	Distance from original capture site (km)
Blue	R1-124	03/21/04	562	1.6	—	10/04/95	475	NEB	87	10	—
Blue	R1-151	02/16/04	625	2.3	Grandview	10/07/95	481	NEB	144	17	6.4
Green	R1-00783	07/18/04	—	1	—	06/08/01	445	NEB	—	—	—
Green	R1-00669	08/29/04	—	1.4	Cav. Bay	08/14/00	480	NEB	—	—	0
Green	R1-00355	09/07/04	600	1.8	Pinto Pt	06/29/00	455	NEB	152	67	4.8
Green	R1-00598	08/08/04	—	1.1	8 Mile Is	07/26/03	445	NEB	—	—	2
Green	R1-00402	07/28/04	487	—	S. of Bartoo	07/07/00	445	NEB	50	25	0
Green	R1-01023	09/01/04	387	—	8 Mile Is	06/20/04	387	NEB	0	0	2
Green	R1-00442	08/10/04	387	—	Cape Horn	07/12/00	455	NEB	68	15	6.4
Green	R1-01061	09/26/04	600	—	Pinto Pt	07/04/04	—	NEB	—	—	6
Green	R1-00685	05/31/04	400	—	Bartoo	08/24/00	407	SEB*	7	—	0.5
Green	R1-00638	06/16/04	450	1.4	Bartoo	05/25/04	400	NEB	—	—	0
Green	R1-00895	06/23/04	550	—	Pinto Pt	07/22/01	537	NEB	13	5	6
Green	R1-00688	06/23/04	550	—	Pinto Pt	08/24/00	450	SEB	100	25	6
Green	R1-00614	06/27/04	—	1	Bartoo	07/27/03	445	NEB	—	—	0
Green	R1-00008	07/19/04	525		Bartoo	08/02/98	480	NEB	45	9	0
Green	R1-00736	07/19/04	512		N. of Bartoo	09/15/00	512	NEB	0	0	0
Green	R1-00049	07/04/04	—		Kalispell	09/27/98	550	NEB	—	—	1
Green	R1-00875	10/08/04	—	1.5	Cav. Bay	07/19/01	535	NEB	10	3.3	3
Green	R1-00213	10/06/04	—	—	S. of Bartoo	09/15/99	455	NEB	24	5	1
Green	R1-00460	08/08/04	525	1.8	N. of Bartoo	07/16/00	427	NEB	98	24	0
Green	R1-00982	05/15/04	425	0.9	Bartoo	06/20/02	355	NEB	70	35	0
Green	R1-00442	08/11/04	—	—	Pinto Pt	07/12/00	447	NEB	—	—	6.4
Orange	R1-02588	08/04/04	—	1.8	Tripod Pt	11/06/00	584	Thorofare	—	—	3.2
Yellow	R1-01367	10/09/04	662	3	Kalispell Is	07/21/96	555	NEB	107	13	1.5
Red	0202603	04/17/04	887	7	Kalispell Is	06/03/97	695	Upper Lk	192	27	19

UPPER PRIEST LAKE BULL TROUT RESTORATION

ABSTRACT

We used gill nets to capture and remove lake trout *Salvelinus namaycush* from Upper Priest Lake in June and August 2004. A total of 843 lake trout were removed in two netting efforts. Standardized catch ranged from 0.74 to 1.31 fish/hr/100 m^2 of net with no apparent trend or evidence of depletion. Mean catch rate throughout the 2004 effort was 1.08 fish/hr/100 m^2 compared to 0.98 fish/hr/100 m^2 in 2003, 1.02 fish/hr/100 m^2 in 2002, and 1.8 fish/hr/100 m^2 in 2001. Size of lake trout ranged from 266 to 855 mm (TL) with a modal size of 580 mm. We incidentally netted 17 bull trout *Salvelinus confluentus* during the lake trout netting efforts and two known bull trout mortalities occurred. The ratio of bull trout to lake trout was 1:50 in 2004 compared to 1:41 in 2003.

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METHODS

Lake trout *Salvelinus namaycush* were removed from Upper Priest Lake using eight 91.4 x 2.4 m experimental, monofilament, sinking gill nets with three panels of 2.5, 3.8, and 5.1 cm mesh. Sampling occurred on June 22-24 and August 24-26, 2004. Gill nets were set throughout the lake and were moved based on catch rates at a particular site and the discretion of the netting crew. Nets were set during daylight hours only and were pulled every 45-60 minutes in a concerted effort to avoid incidental bull trout *S. confluentus* captures. Gill nets were set perpendicular to shore at depths ranging from 20 to 33 m. We standardized catch to a unit of sampling effort (fish/hr/100 m^2 of gillnet) to allow comparison with 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.

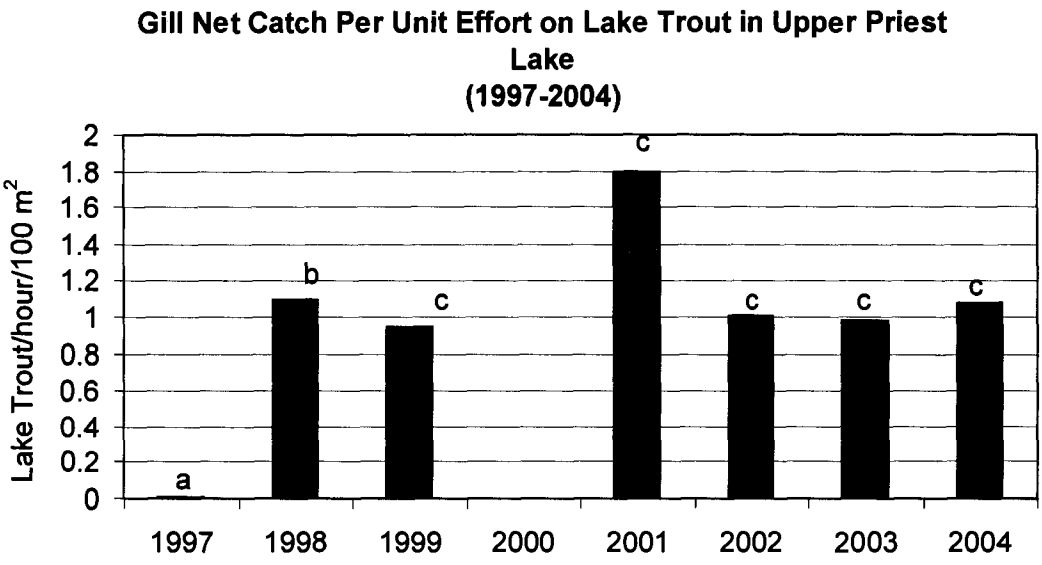
RESULTS

We netted and removed 843 lake trout in the two gillnetting efforts in 2004. We saw little evidence that the lake trout population had been significantly reduced by past gill net efforts as catch rates were comparable to catch rates the past few years. Standardized catch ranged from 0.74 to 1.31 fish/hr/100 m^2 during the June and August efforts, respectively. Mean catch rate throughout the 2004 effort was 1.08 fish/hr/100 m^2 of gill net compared to 0.98 fish/hr/100 m^2 in 2003, 1.02 fish/hr/100 m^2 in 2002, and 1.8 fish/hr/100 m^2 in 2001 (Figure 1). Size of lake trout ranged from 266 to 855 mm (TL), with a modal size of 580 mm, compared to 515 in 2003 and 510 in 2002 (Figure 2).

We incidentally netted 17 bull trout during the two lake trout netting efforts with two known bull trout mortalities occurring. Bull trout ranged in size from 400-765 mm. The bull trout:lake trout ratio was 1:50, comparable to 2003 and significantly better than 2002 or 2001 when the ratio was 1:90 and 1:67, respectively (Figure 3).

DISCUSSION

In 2004, we saw little evidence that the lake trout population had been significantly reduced by our previous efforts. Gill net catch rates in 2004 were comparable to catch rates in 2003 and 2002. We saw no evidence of shifting size structure due to high exploitation the previous years; however, the bull trout:lake trout ratio was 1:50, comparable to 2003 and significantly better than 2002 or 2001 when the ratio was 1:90 and 1:67, respectively. It appears that our yearly gillnetting efforts are not reducing the lake trout population in Upper Priest Lake; however, gillnetting seems to be preventing the lake trout population from increasing and it is encouraging to see the bull trout:lake trout ratio improve or at least remain stable. We continue to explore funding options for permanent installation of strobe lights to reduce upstream migration of lake trout from Priest Lake to Upper Priest Lake and recommend annual removal of lake trout until such funding is available or until it is determined that the bull trout population has reached a level where it is no longer threatened.



[a] During 1997, 45.7 X 1.8 m gill nets were used and gill net placement occurred throughout the lake.

[b] During 1998, 45.7 X 1.8 m gill nets were used for approximately 25% of the effort and

[c] remaining effort used 90 X 2.4 m nets. Net placement occurred throughtout the lake.
During 1999 through 2004, all gill nets were 90 x 2.4 m and gill net placement was standardized in areas where higher catch rates occurred.

Figure 1. Standardized catch rates (fish/hour/100m^2 of gill net) for lake trout from Upper Priest Lake, Idaho, 1997-2004.

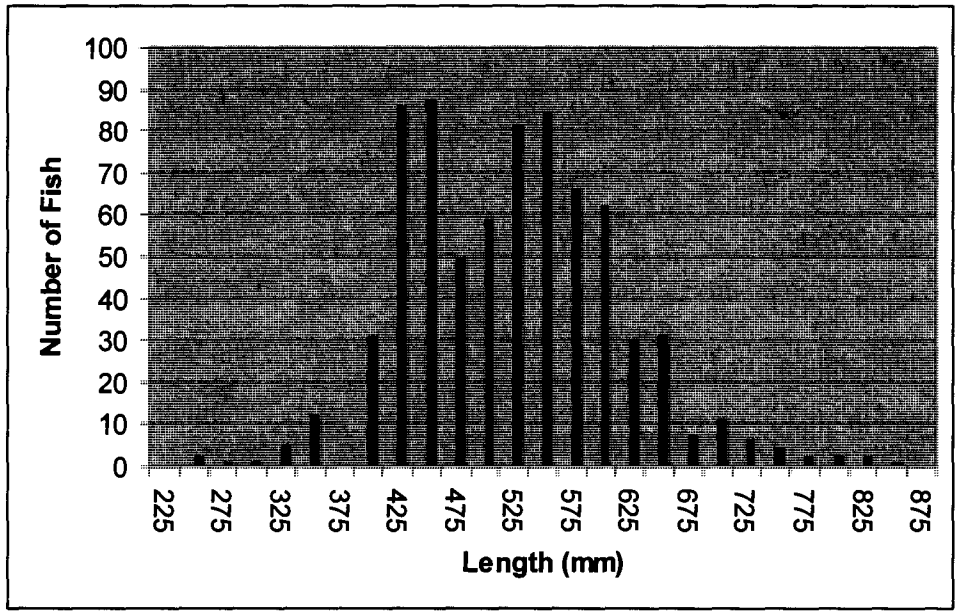


Figure 2. Length frequency of lake trout collected in gill nets from Upper Priest Lake, Idaho, 2004.

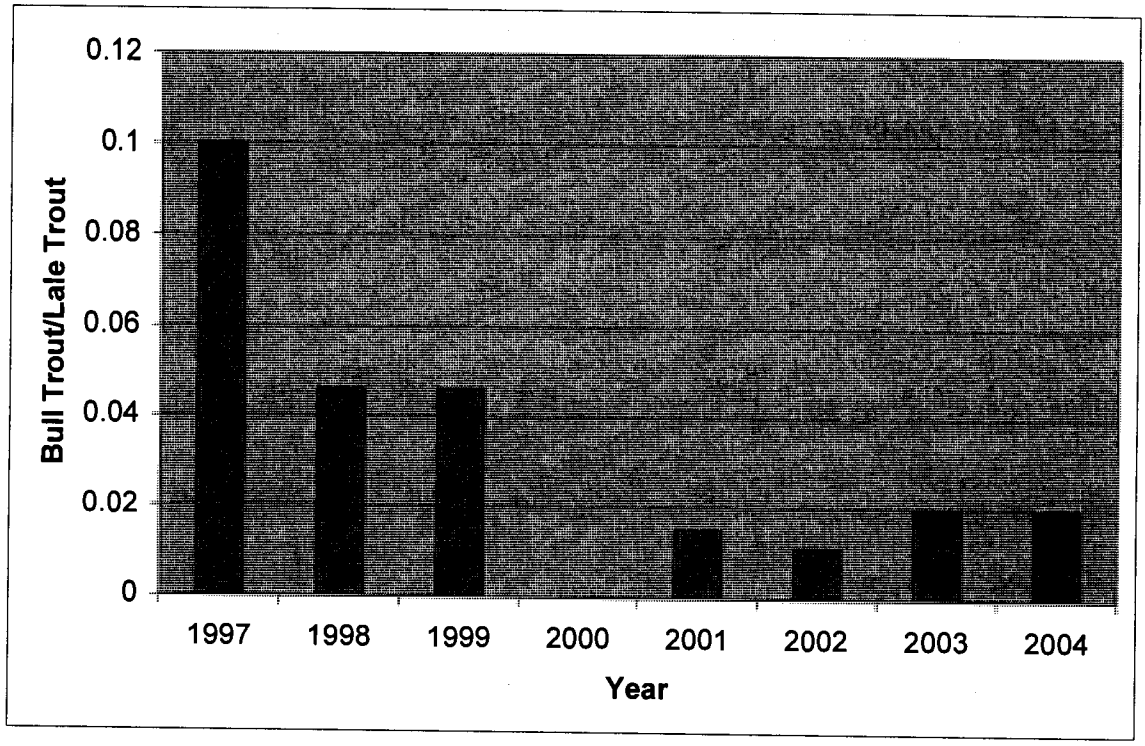


Figure 3. Lake trout to bull trout ratio collected in gill nets from Upper Priest Lake, Idaho, 1997-2004.

RECOMMENDATIONS

1. Pursue funding for permanent strobe light installation for the Priest Lake Thorofare.

2. Work with the U.S. Forest Service and Idaho Department of Lands to define permitting and public concern.

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

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