

**LAKE KOOCANUSA CREEL SURVEY**

**1996**

**prepared by:**

**Shane C. Parnell**

**for:**

**Columbia Basin Fish and Wildlife Compensation Program  
B.C. Hydro/B.C. Environment  
Nelson, B.C.**

**March, 1997**

## SUMMARY

The Columbia Basin Fish & Wildlife Compensation Program (CBFWCP) funded a summer creel survey on Lake Koocanusa during 1996 to determine angling effort and catch success associated with the reservoir. Anglers fishing on Lake Koocanusa were interviewed from June through September to determine anglers place of residence, hours fished and number of fish caught and released by species. In addition, scale samples were collected from sport fish for age determination and total angling effort was estimated from aerial boat counts.

## STUDY AREA

The Libby Dam was constructed on the Kootenay River, approximately 27 km upstream from the city of Libby, Montana, as part of the Columbia River Treaty between the United States and Canada. The purpose of the dam was to provide hydroelectric power and flood control for the Kootenay and Columbia river basins (Columbia River Treaty 1961). Construction began in 1966, impoundment was first achieved in March, 1972 and the reservoir (Lake Koocanusa) reached full pool for the first time in July, 1974 (Shepard 1984).

At the full pool elevation of 749.5 m ( 2459 feet), the reservoir extends 145 km northward with 68 km of its length located in south-east British Columbia (Fig. 1). Lake Koocanusa has a maximum surface area of 18,801 hectares and a volume of 7.16 cubic kilometres (5.869 million acre-feet). Average reservoir depth is 38.5 m with a maximum depth of 107 m (Chisholm and Hamlin, 1987).

There are two main access routes to Lake Koocanusa (Jaffrey/Baynes Lake Road and Highway #93), both of which head south from Highway #3 near Jaffrey and Elko, respectively. The Gold Creek logging road, south of Cranbrook, also provides access to the west side of the reservoir. A Bailey Bridge is centrally located south of Kikomun Creek, and at the northern end of the reservoir, the Trans Canada Highway crosses at Wardner. On the west side of the lake, the Newgate road extends from the Bailey Bridge south to the community of Newgate, near the Canada/U.S. border. A number of old access roads branch off the Newgate road and provide access to the reservoir. This is similar to the east side of the Reservoir, where a number of access roads branch off Highway #93 to provide access to Lake Koocanusa (Fig. 1).

On the west side of the reservoir, anglers mainly access Lake Koocanusa from one of three commercial operations (Sunrise R.V. and Marina, Ostreich R.V. and/or Mercer R.V.) or the Forestry Sites located at Englishman, Gold Creek and Newgate. Strauss Road is also used by anglers. Kikomun Creek Provincial Park is the main access point on the east side, however, anglers also use Door and Jack-eye roads.

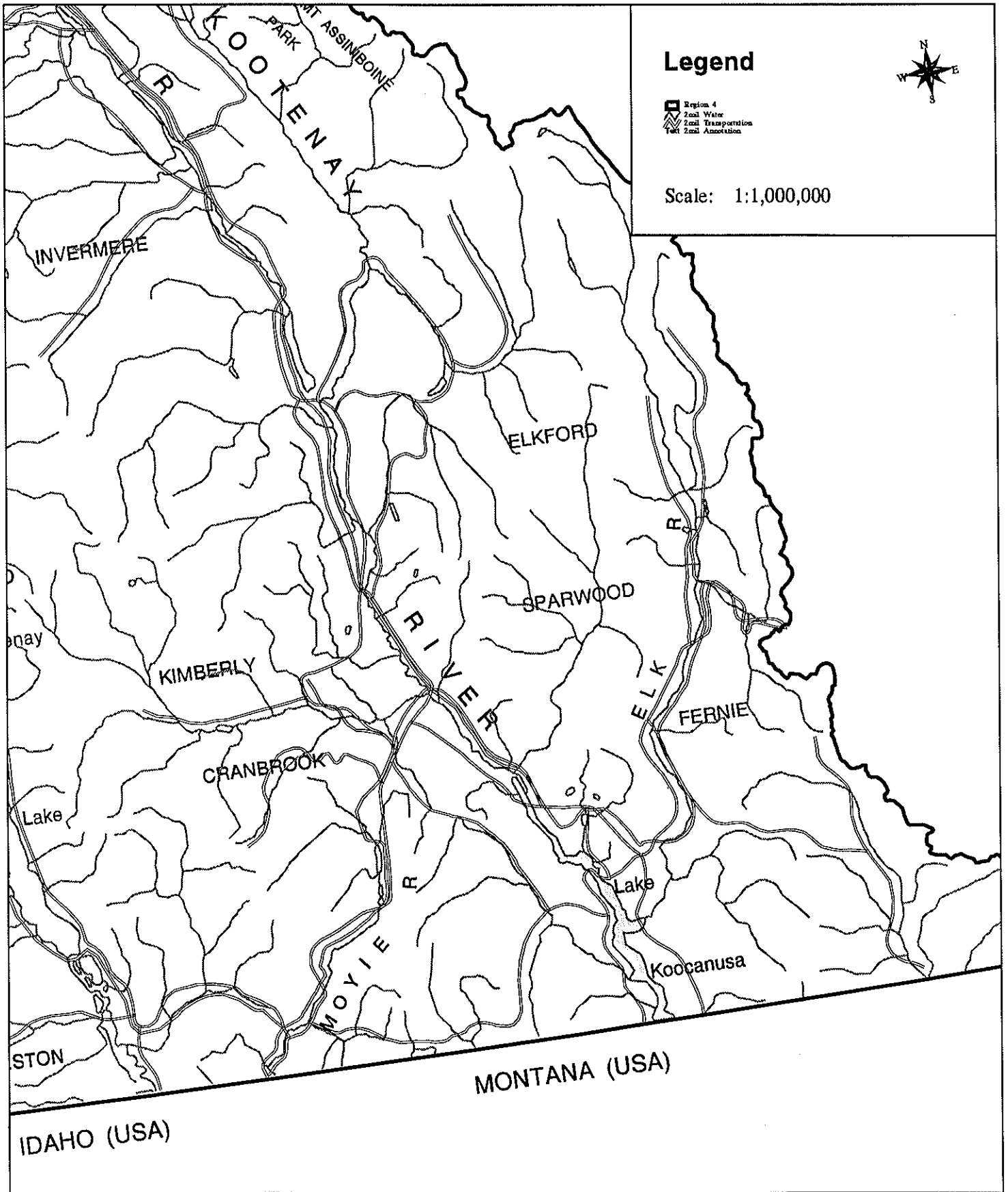


Figure 1. Location of study area.

## INTRODUCTION

Fishing opportunities on the Canadian portion of Lake Koochanusa are dependent on water levels in the reservoir. In the past, the normal operation of the reservoir involved storing spring run off water as part of its mandate for downstream flood control. Lake Koochanusa would remain at or near full pool over the summer months and be drawn down over the course of the winter to provide power. This operational regime generally resulted in a three month fishing season in British Columbia from approximately mid-June to mid-September. The operation of the Libby Dam has recently been altered to provide additional downstream flows for Kootenay River sturgeon and endangered salmon in the lower Columbia River.

Lake Koochanusa is known to support at least seventeen fish species (Table 1, Chisholm and Fraley, 1985). Fisheries staff in the Kootenays have not been able to verify the presence of lake trout in the reservoir, however, two adult northern pike (*Esox lucius*) were recently captured in Lake Koochanusa by Montana Department of Fish, Wildlife and Parks. One was captured in 1994 and the other in 1995 at Rexford, Montana during annual spring gill netting of Lake Koochanusa (Mike Hensler, MDFWP, pers. comm.). Both fish were approximately 10 pounds. Chisholm and Fraley (1985) also reports five white sturgeon were relocated from below Libby Dam to the reservoir. At least one of these fish moved up river out of the reservoir and two were reported caught by anglers.

**Table 1. Fish species present in Lake Koochanusa (Chisholm and Fraley, 1985).**

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Common Name	Scientific name
<u>Gamefish species</u>	
westslope cutthroat trout	<u>Salmo clarki lewisi</u>
rainbow trout	<u>Salmo mykiss</u>
bull trout	<u>Salvelinus confluentus</u>
brook trout	<u>Salvelinus fontinalis</u>
lake trout	<u>Salvelinus namaycush</u>
kokanee salmon	<u>Oncorhynchus nerka</u>
mountain whitefish	<u>Prosopium williamsoni</u>
burbot	<u>Lota lota</u>
largemouth bass	<u>Micropterus salmoides</u>
white sturgeon	<u>Acipenser transmontanus</u>
yellow perch	<u>Perca flavescens</u>
<u>Nongame fish species</u>	
pumpkinseed	<u>Lepomis gibbosus</u>
reidside shiner	<u>Richardsonius balteaus</u>
peamouth	<u>Mylocheilus caurinus</u>
northern squawfish	<u>Ptychocheilus oregonensis</u>
largescale sucker	<u>Catostomus macrocheilus</u>
longnose sucker	<u>Catostomus catostomus</u>

Kokanee salmon (*Oncorhynchus nerka*) were accidentally released from the Kootenay Trout Hatchery at Wardner between 1970 and 1974. At that time, it was common practice at the hatchery to remove the rear screens from the troughs and flush moribund fish down the drain into Norbury Creek ( a tributary to the Kootenay River). An estimated 1.22 million dead and weak kokanee were disposed of in this manner during the early 1970's (Brown, 1993). By the early 1980's, kokanee were well established in Lake Kooconusa and now are highly sought after during the summer months by anglers.

Daily catch quotas and possession limits for sport fish on Lake Kooconusa during the 1996 creel survey are shown in Table 2.

**Table 2. Daily catch quotas and possession limits for sport fish on Lake Kooconusa.**

Species	Daily Quota	Possession Limit
trout/char	6*	12
kokanee	15	30
whitefish	15	30
bass	4	8
burbot	5	10

\*Only 1 trout/char may be over 50 cm and only 1 may be a bull trout of any size.

## METHODS

### Creel Survey

The creel survey on Lake Kooconusa began on June 1 and ended on September 21, 1996. Angler interviews were conducted on 42 days during this time period (10 days in June, 12 days in July, 16 days in August and 4 days in September). All interviews occurred on shore with the following information being collected from each angler: place of residence, area fished, hours fished and number of fish kept and released by species (Appendix 1). In order to maximize angler interviews it was necessary to move about the reservoir with changing water levels and fishing conditions.

Length (mm), weight (g) and scale samples were collected from all trout and char inspected and from a representative sample of kokanee. Lengths were measured to the nearest millimetre and weights recorded to the nearest gram using an Ohaus portable scale. A minimum of ten scales were taken from the preferred area on either side of the lateral line and placed in scale envelopes. Trout and char scales were read by Fisheries Branch staff in Cranbrook, while kokanee scales were read by Fisheries Branch staff in Nelson, Cranbrook and staff from Montana Department of Fish, Wildlife and Parks.

## **Aerial Boat Counts**

Aerial boat counts on Lake Koochanusa during 1996 were part of a larger Forest Renewal B.C. project which involved counting boats on 70 small lakes in the Kootenay Region in order to estimate angling effort using a regression formula developed by the provincial Small Lakes Index Management (SLIM) program. Similar flights occurred over a three year period between 1989 and 1991 as part of the provincial SLIM program and involved counting boats on approximately 400 lakes in south central British Columbia on 20 weekend days over the summer fishing season (W.T. Westover, MOE, pers. comm.)

Boats on Lake Koochanusa were counted from a fixed wing aeroplane on 32 days (6 weekdays, 20 weekend days and 6 long weekend days) between May 11 and September 21, 1996. All flights left the Cranbrook airport at 10:00 a.m. and, depending on which direction the plane went, arrived over Lake Koochanusa and began counting boats between 10:15 and 11:45 a.m.

Angling effort estimates were provided by the Ministry of Environment and were generated using aerial boat counts data. The 1996 boat count data for Lake Koochanusa were compared to a creel survey conducted on Lake Koochanusa by Hartman and Martin (1987) which also used boat counts to determine angling effort (W.T. Westover, MOE, pers. comm.).

Hartman and Martin (1987) estimated 22,370 anglers days on Lake Koochanusa during the summer fishery for that year. Their calculations are described in detail and involved instantaneous boat counts every three hours between 0900 and 1800 hours. For this report, Hartman and Martin's 0900 and 1200 hour raw weekend boat counts (between mid June and mid September) were averaged to provide a mean noon weekend boat count. Mean noon weekend boat counts were also available for this same time period for the years 1989, 1990, 1991 and 1996 and were related to Hartman and Martin (1987) estimate of angling effort (Appendix II).

Effort estimates for 1996 were then combined with creel survey results to provide catch statistics for the summer fishery on Lake Koochanusa.

## **Reservoir water levels**

Water levels in Lake Koochanusa fluctuate throughout the year in response to flood control and power generation. Reservoir water levels are also manipulated for downstream Kootenay River sturgeon and endangered salmon in the lower Columbia River.

The US Army Corps of Engineers record daily water levels at the forebay of the Libby Dam and the May to October data for 1996 have been summarized in this report.

## **RESULTS**

### **Reservoir water levels**

Water levels for Lake Koochanusa between May 1 and October 31, 1996 are shown in Figure 2. When the creel survey began on June 1, 1996, reservoir elevation was 2391.05 feet and the

# Lake Koocanusa

## Water Levels (1996)

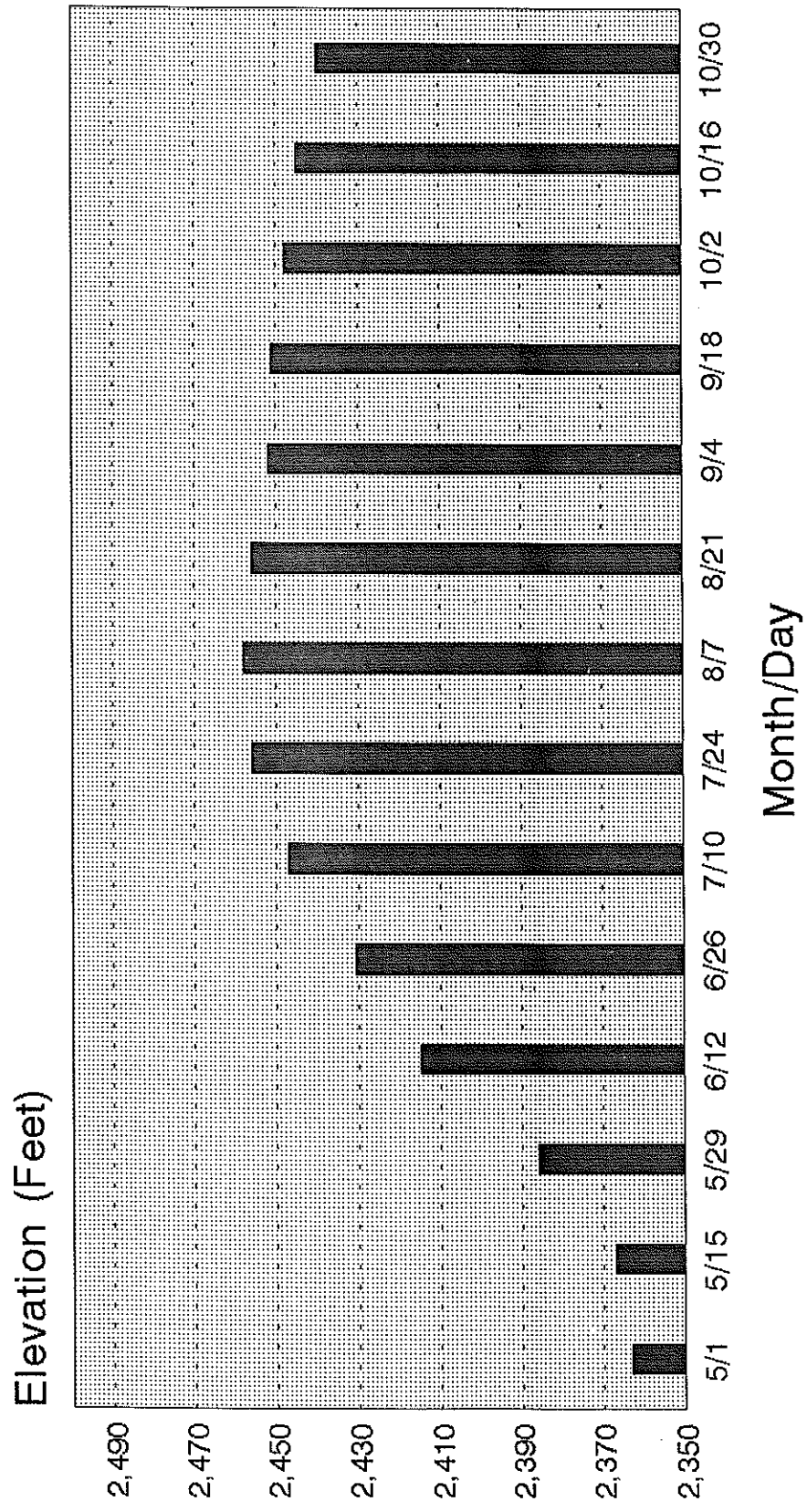


Figure 2. Lake Koocanusa Water Levels May 1 - October 31, 1996  
 Data from US Army Corps of Engineers, Libby MT 59923

reservoir was not fishable in British Columbia as the Kootenay River was flowing through mud flats at the British Columbia/Montana border. The first anglers interviewed during the 1996 creel survey were at Newgate on June 16 when the reservoir elevation was at 2421.78 feet. The reservoir, however, was still not fishable because of silt from the mainstem Kootenay and Elk rivers settling out in the reservoir. Tremendous amounts of silt were also generated by the increasing level of the reservoir inundating adjacent mud flats.

Lake Koocanusa was first fishable at Newgate at the end of June when reservoir levels were at 2435 feet. By July 21, 1996, water clarity downstream of the Kikomun Bridge improved to permit fishing in this area. Reservoir levels peaked at 2458.96 feet on August 1, 1996. By September 21, water levels had dropped 8.39 feet to a level of 2450.57 feet, but this elevation did not interfere with fishing opportunities.

### **Angling effort and success**

Although the creel survey began on June 1, the first anglers were not interviewed until June 16, 1996. Creel survey data are shown in Appendix III and have been extrapolated in Table 3. Between June 1 and September 21, 1996 an estimated 26,928 anglers fished 80,429 hours and caught 130,659 fish for an overall catch per rod hour (CPUE) of 1.62 (Table 3). Sport fish comprised 89% of the total catch and accounted for a CPUE of 1.45 fish per rod hour. Due to the nature of the reservoir, angling from boats accounted for virtually all angling effort. No attempt was made to include persons fishing from shore in the survey.

Anglers caught an estimated 113,792 kokanee of which 103,066 were harvested and 10,726 released (Table 3). The kokanee catch represents 97.8% of all sport fish caught. Rainbow trout, whitefish, yellow perch, bull trout and cutthroat trout made up the remaining 2.2% of the sport catch.

A total of 14,297 non-sport fish were caught which represents 10.9% of the total catch. Squawfish comprised 79.3% of the non-sport fish catch while 20.7% were peamouth chub (Table 3).

### **Length, Weight and Age**

Length (mm) and weight (g) for sampled kokanee, bull trout, rainbow trout, mountain whitefish and yellow perch are shown in Appendix IV to VIII respectively and have been summarized in Table 4.

Two age classes of rainbow trout were harvested by anglers. Age 2+ rainbow trout ranged in length from 235 - 266 mm (n = 3) while age 3+ rainbow trout ranged in length from 289 - 326 mm (n = 4). There was considerable variation in the ages of kokanee as determined by fisheries staff from British Columbia and Montana. Kokanee ages were determined to ranged from all 2+ to 19%--2+, 67%--3+ and 14 %--4+ years of age. Scales samples were collected from one bull trout, however, the scales were regenerated and could not be aged (W.T. Westover, pers. comm.).



Table 3: Summary of Extrapolated Angling Effort and Catch Success by Month for Lake Koocanusa, 1996.

Time Period	Angler Days	Hours Fished	Kokanee		Rainbow		Bull Trout		Whitefish		Cutthroat		Yellow Perch		Non-Sport Fish*		Sport Fish/Rod Hour	
			H	R	H	R	H	R	H	R	H	R	H	R	H	R	Fish/Rod Hour	
June 1-30	539	1160	984	-	47	23	23	-	47	47	-	-	-	-	23	23	1.01	1.05
July 1-31	6840	20896	29654	949	198	119	-	-	119	455	-	-	39	20	4171	2095	1.51	1.81
Aug 1-31	13760	41911	59122	6561	430	297	-	-	15	267	-	15	30	15	4824	1633	1.59	1.75
Sep 1-21	5789	16462	13306	3216	281	80	-	-	-	-	-	-	-	-	965	563	1.03	1.12
Total	26928	80429	103066	10726	956	519	23	-	181	769	-	15	69	35	9983	4314	1.45	1.62

\*11338 Squawfish (79.3%) and 2959 Peamouth chub (20.7%)

H - Harvest

R - Release

**Table 4. Range and mean of lengths and weights for sports fish harvested from Lake Koochanusa during 1996.**

Species	n	Length (mm)		Weight (g)	
		Range	Mean	Range	Mean
Kokanee	303	175-326	267	75-353	215
Rainbow	11	235-315	272	113-276	189
Bull Trout	1	--	394	--	490
Whitefish	2	235-241	238	104-111	108
Yellow Perch	2	205-210	208	83-88	86

### Angler Residence

Angler effort was greatest during August when 13,760 angler days (51% of total effort) were recorded, followed by July, September and June which had 6,840 (25.5%), 5,789 (21.5%) and 539 (2%) angler days, respectively (Table 3).

A total of 1440 anglers were interviewed during the creel survey. The Lake Koochanusa fishery was utilized primarily by local anglers with residents of the East Kootenays comprising 71.3% of all anglers. Canadian residents made up 25.3% of the fishery with the majority of these anglers residing in Alberta. Other residents of British Columbia accounted for 2.7% of the angling effort while non-Canadian residents contributed 0.7% (Table 5 and Appendix IX).

**Table 5. Place of residence for anglers fishing Koochanusa between June 1 and September 21, 1996.**

Place of Residence	Number of Anglers	%
East Kootenay	1027	71.3
Other Kootenay	12	0.8
Other British Columbian	27	1.9
Alberta	361	25.1
Other Canadian	3	0.2
Non-Canadian	10	0.7

### Economic Value of the Fishery

Average expenditures per angling day, based on the draft copy of Fresh Water Sport Fishing In British Columbia: Results of the 1990 National Survey of Sport Fishing (May, 1995) were \$77.77 for BC residents, \$98.27 for Canadian residents and \$121.44 for non-Canadian residents.

Angler residence categories were estimated for the entire summer fishery (June 1 - September 21) for Lake Koochanusa. Total expenditures by anglers fishing Lake Koochanusa during 1996 were calculated at \$2.2 million in 1990 Canadian dollars (Table 6).

**Table 6: Estimated Expenditures by Anglers Fishing Lake Koochanusa (1996).**

Place of Residence	Angler Days	Average expenditure/ Angling Day*	Total Expenditure
British Columbia	19,934	\$77.77	\$1,550,267
Canadian	6,807	98.27	668,924
Non-Canadian	187	121.44	22,709
Total	26,928		\$2,241,900

\* Direct and indirect cost taken from "Results of the 1990 National Survey of Sports Fishing" (May 1995) and reported in 1990 Canadian dollars.

## DISCUSSION

Results of past creel surveys conducted on Lake Koochanusa are shown in Table 7 and Figure 3. Surveys conducted in 1976 by Ringstad and Phillips (1978) and 1979 by Oliver (1980) were prior to kokanee becoming established in the reservoir. Oliver's 1979 survey was conducted over a three month period (June - August) and estimated that 1,764 anglers fished 5,500 hours to catch 971 cutthroat trout, 210 rainbow trout, 127 bull trout and 2,996 whitefish.

A more comprehensive survey was conducted on Lake Koochanusa by Chisholm and Hamlin (1987) between May 13 and October 31, 1985. This survey concentrated on the American portion of the reservoir, although angling effort was also determined for the Canadian portion. An estimated 7,436 angler days were reported on Lake Koochanusa in British Columbia. Anglers fished 31,484 hours and caught 12,323 kokanee which represented 96.8% of the total catch. Other sport fish species present in the creel and their percentage of the total catch were rainbow trout (1.3%), cutthroat trout (0.7%), rainbow x cutthroat hybrids (0.4%), mountain whitefish (0.2%) and bull trout (0.1%). Brook trout and yellow perch each made up less than 0.1% of the total catch. Non-sport fish species made up approximately 0.6% of the total catch.

# Lake Koochanusa

## Angling Effort

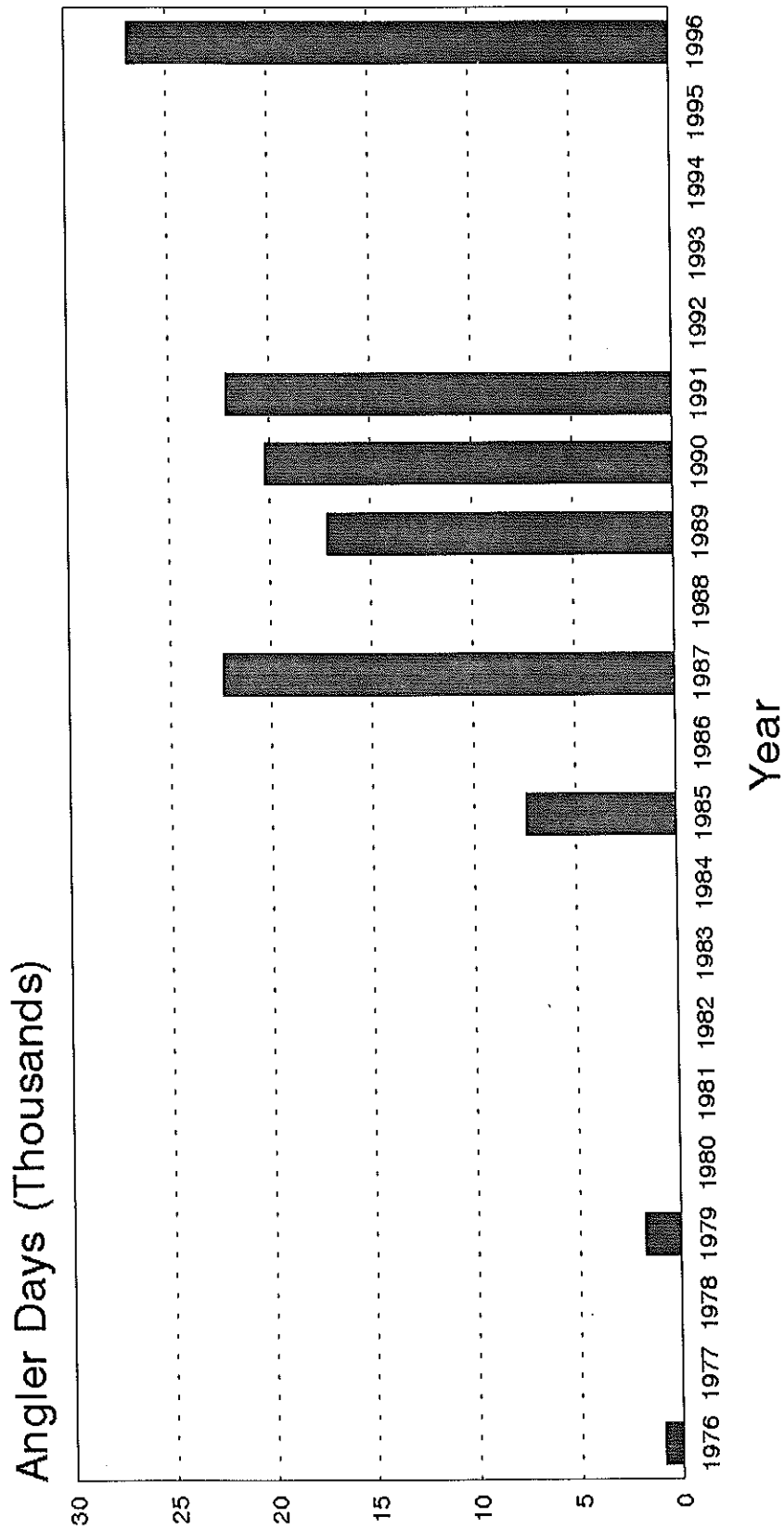


Figure 3. Angling effort on Lake Koochanusa. -1987 effort from Hartman and Martin (1987) -1989, 1990, 1991 and 1996 effort from noon boat count data and related to 1987 noon boat counts.

**Table 7: Summary of Creel Surveys on Lake Koochanusa (1979-1996)**

Year	Time Period	Angler Days
1976 <sup>1</sup>	July-August	890
1979 <sup>2</sup>	June - August	1,764
1985 <sup>3</sup>	June - October	7,436
1987 <sup>4</sup>	June - September	22,370
1989 <sup>5</sup>	June - September	17,123
1990 <sup>5</sup>	June - September	20,274
1991 <sup>5</sup>	June - September	22,181
1996 <sup>5</sup>	June - September	26,928

<sup>1</sup> Sportfish Creel Census, Gold Creek and Lake Koochanusa, 1976 (Ringstad and Phillips 1978)

<sup>2</sup> Sportfish Creel Census, Libby Reservoir, 1979 (Oliver 1980)

<sup>3</sup> 1985 Libby Reservoir Angler Census, May 13 - October 31, 1985 (Chisholm and Hamlin 1987)

<sup>4</sup> Lake Koochanusa Creel Census, 1987 (Hartman and Martin 1987)

<sup>5</sup> Effort based on noon boat count data and related to 1987 noon boat counts conducted by Hartman and Martin (1987)

Lake Koochanusa has developed into a popular summer (mid-June to mid-September) fishery, with anglers mainly targeting kokanee. Summer angling effort in 1996 was estimated to be 26,928 angler days which resulted in a catch of 113,792 kokanee.

Westslope cutthroat trout and native stocks of rainbow trout do not appear to be doing well in the reservoir environment and this probably can be attributed to fluctuating water levels. Marked Gerrard rainbow trout yearlings have been stocked annually in Kikomun Creek since 1986. Adult spawners up to 12 pounds have been caught in the Kootenay River during April and May, however, anglers do not seem to target these fish on the Canadian portion of the reservoir. Bull trout populations in Koochanusa appear to be stable; but again, anglers do not seem to target these fish in the reservoir (W.T. Westover, MOE, pers. comm.).

Lake Koochanusa supports a major fishery for south-eastern British Columbia with the economic value of the fishery (direct and indirect cost) estimated at \$2.2 million in 1990 Canadian dollars. However, the opportunity to fish on Lake Koochanusa in British Columbia is largely dependent on the operation of the Libby Dam.

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**Appendix II: Raw mean weekend boat count data for Lake Kocanusa and estimated angling effort for 1987, 1989, 1990, 1991 and 1996.**

Year	Number of Counts	Mean Weekend Boat Count	Angler Days
1987	8	65.43	22,370
1989	12	50.08	17,123
1990	10	59.30	20,274
1991	8	64.87	22,181
1996	17	78.76	26,928



Appendix III: Kooicanusa creel data for June, 1996.

Date	No. of Anglers	Hours Fished	Kokanee		Rainbow		Bull trout		Whitefish		Non-Sport Fish		Sport Fish/Rod Hour	Fish/Rod Hour
			H	R	H	R	H	R	H	R	H	R		
June 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	3	5	5	-	-	-	-	-	-	-	-	-	1.00	1.00
22	1	1.5	-	-	-	-	-	-	-	-	-	-	-	-
23	2	2	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	7	15.5	12	-	1	-	1	-	2	2	-	1**	1.16	1.23
30	10	25.5	25	-	1	1	-	-	-	-	1*	-	1.06	1.10
Total	23	49.5	42	-	2	1	1	-	2	2	1	1	1.01	1.05

\* Peamouth chub

\*\* Squawfish

H - Harvest

R - Release

Appendix III cont'd.: Koocanusa creel data for July, 1996.

Date	No. of Anglers	Hours Fished	Kokanee		Rainbow		Yellow Perch		Whitefish		Non-Sport Fish		Sport Fish/Rod Hour	
			H	R	H	R	H	R	H	R	H	R	Hour	Hour
July 5	21	84.5	54	-	1	-	2	1	1	6	12	6	0.77	0.98
6	29	150	103	2	1	2	-	-	3	6	11	7	0.78	0.90
7	12	28.5	48	1	-	-	-	-	-	1	1	1	1.75	1.82
12	15	46.5	35	2	-	-	-	-	-	-	14	11	0.80	1.33
13	14	34.5	32	-	-	-	-	-	1	-	11	3	0.96	1.36
14	34	82	112	3	2	-	-	-	-	5	1	11	1.49	1.63
19	41	83.5	272	12	2	-	-	-	-	-	6	6	3.42	3.57
20	22	64.5	101	1	3	2	-	-	-	4	30	-	1.72	2.19
21	62	191	351	17	1	1	-	-	1	-	71	37	1.94	2.50
26	25	68.5	107	-	-	1	-	-	-	-	-	10	1.58	1.72
27	45	162	234	7	-	-	-	-	-	-	39	8	1.49	1.78
28	26	61.5	51	3	-	-	-	-	-	1	15	6	0.89	1.24
Total	346	1057	1500	48	10	6	2	1	6	23	211	106	1.51	1.81

Non-sport fish consisted of 234 squawfish and 83 peamouth chub H - Harvest R - Release

Appendix III cont'd: Kooacanusa Creel Data for August, 1996

Date	No. of Anglers	Hours Fished	Kokanee		Rainbow		Yellow Perch		Whitefish		Cutthroat		Non-Sport Fish		Sport Fish/Rod Hour		Fish/Rod Hour
			H	R	H	R	H	R	H	R	H	R	H	R	Hour		
Aug 2	56	145	259	61	1	-	2	1	-	-	-	1	5	1	2.24	2.28	
3	29	80	68	5	2	-	-	-	-	-	-	-	41	11	0.93	1.59	
4	84	208.5	396	31	2	5	-	-	-	-	-	-	105	11	2.08	2.64	
10	114	404	673	36	5	3	-	-	8	-	-	-	13	34	1.79	1.91	
11	43	132.5	194	6	-	-	-	-	1	-	-	-	17	10	1.52	1.72	
16	58	195.5	264	52	7	1	-	-	-	-	-	-	5	1	1.66	1.69	
17	47	126	271	41	2	1	-	-	-	-	-	-	4	2	2.50	2.55	
18	57	158.5	198	6	-	1	-	-	1	-	-	-	17	5	1.30	1.44	
19	15	38	56	2	-	-	-	-	4	-	-	-	3	-	1.63	1.71	
23	23	74.5	183	46	-	2	-	-	-	-	-	-	-	1	3.10	3.11	
24	70	216	234	25	-	1	-	-	2	-	-	-	7	4	1.21	1.26	
25	115	360	456	65	-	5	-	-	1	-	-	-	26	12	1.46	1.57	
26	26	116	113	1	1	-	-	-	-	-	-	-	21	1	0.99	1.18	
28	41	144.5	186	44	5	1	-	-	-	-	-	-	11	-	1.63	1.71	
30	42	110.5	153	21	2	-	-	-	1	-	-	-	18	5	1.60	1.80	
31	107	314	279	-	2	-	-	-	1	-	-	-	32	12	0.90	1.04	
Total	927	2823.5	3983	442	29	20	2	1	1	1	18	-	1	325	110	1.59	1.75

Non-sport fish consisted of 364 squawfish and 71 peamouth chub.

H - Harvest

R - Release

**Appendix III cont'd: Kooconusa Creel Data for September, 1996**

Date	No. of Anglers	Hours Fished	Kokanee		Rainbow		Non-Sport Fish		Sport Fish/Rod Hour	Fish/Rod Hour
			H	R	H	R	H	R		
Sept. 1	76	237	192	43	5	1	11	4	1.01	1.08
2	24	54	56	13	2	1	2	4	1.33	1.44
7	19	58.5	44	12	-	-	4	1	0.96	1.04
8	25	60	39	12	-	-	7	5	0.85	1.05
<b>TOTAL</b>	<b>144</b>	<b>409.5</b>	<b>331</b>	<b>80</b>	<b>7</b>	<b>2</b>	<b>24</b>	<b>14</b>	<b>1.03</b>	<b>1.12</b>

Non-sport fish consisted of 32 squawfish and 6 peamouth chub.

H - Harvest

R - Release

**Appendix IV: Length and weight of angler caught kokanee from Lake Kocanusa (1996).**

Date	Length (mm)	Weight (g)	Sex	Age	Comments
16-Jun	267	150			gutted
	241	175			gutted
	238	150			gutted
	203	75			gutted
	241	75			gutted
28-Jun	241	115			gutted
	235	109			gutted
	248	136			gutted
	254	154			gutted
	254	153			gutted
	241	121			gutted
	248	134			gutted
	260	148			gutted
	241	135			gutted
	254	149			gutted
	241	135			gutted
	254	150			gutted
30-Jun	241	143			gutted
	229	112			gutted
	254	155			gutted
	235	122			gutted
	248	154			gutted
	235	120			gutted
	254	127			gutted
	229	99			gutted
5-Jul	260	140			
	240	133			
	242	136			
6-Jul	282	239			
	267	191			
	259	187			
	280	211			
	278	195			
	301	245			
	255	157			
	275	219			
	258	164			
	239	165			
	256	169			
	271	207			
	251	160			
	255	163			
	248	164			
	261	164			
	292	250			
	246	153			
	273	193			

Date	Length (mm)	Weight (g)	Sex	Age	Comments
	247	153			
7-Jul	246	142			
	265	194			
	241	151			
	239	137			
	252	166			
14-Jul	291	250			
	254	171			
	266	181			
	253	168			
	243	147			
19-Jul	311	319			
	249	175			
	269	214			
	256	185			
	245	178			
	255	199			
	244	180			
	242	180			
	240	167			
	246	172			
	240	166			
	252	190			
	252	180			
	239	159			
	250	176			
	252	200			
	244	196			
	255	200			
	255	173			
	260	214			
	271	241			
	269	204			
	255	200			
	241	168			
	251	184			
	256	168			
	259	183			
	249	178			
	245	156			
	255	175			
	260	186			
	250	163			
	261	190			
	246	184			
	249	178			
	269	198			
	260	198			
	241	154			
	245	166			

Date	Length (mm)	Weight (g)	Sex	Age	Comments
	260	191			
	285	269			
	265	204			
	250	180			
	242	153			
	256	179			
	259	206			
20-Jul	301	294			
	296	269			
	270	200			
	264	190			
21-Jul	291	260			
	281	240			
	175	232			
	311	302			
	285	262			
	254	207			
	255	209			
	240	169			
	277	244			
	271	232			
	254	187			
	247	194			
	269	230			
	269	213			
	261	224			
	280	252			
	289	279			
	300	281			
	263	208			
	280	238			
	277	234			
	258	201			
	302	301			
	286	263			
	286	271			
	259	196			
	274	253			
	275	227			
	236	177			
	289	273			
	256	201			
	281	284			
	249	172			
	275	248			
	287	260			
	254	196			
	294	228			
	260	207			
	265	232			

Date	Length (mm)	Weight (g)	Sex	Age	Comments
	250	190			
	269	215			
	256	195			
	265	223			
	260	209			
	287	250			
	270	220			
	298	236			
	262	218			
	287	268			
	314	290			
	279	249			
	249	176			
	285	262			
	275	240			
	280	251			
	261	195			
	287	261			
	272	242			
	280	237			
	266	231			
	284	237			
	261	213			
	275	242			
	290	265			
	259	209			
	285	249			
	267	214			
	250	185			
	235	163			
	285	265			
	260	222			
	271	240			
	266	226			
	277	262			
	269	208			
	287	289			
	265	227			
	270	221			
	291	301			
	276	229			
	249	187			
	255	201			
	290	255			
	285	278			
	287	271			
	277	251			
	276	244			
	254	195			
	305	297			



Date	Length (mm)	Weight (g)	Sex	Age	Comments
	307	293			
	304	313			
	284	281			
	274	255			
	280	234			
	279	251			
	243	177			
	256	214			
	295	282			
	260	209			
	270	224			
	276	246			
	289	267			
	280	282			
	288	274			
	290	271			
	268	215			
	237	175			
	255	197			
	304	288			
	295	310			
	260	197			
	260	194			
	253	184			
	296	259			
	259	199			
	275	247			
	280	242			
	285	256			
	296	269			
	260	224			
	300	286			
	260	213			
	276	247			
	252	198			
	274	222			
	251	198			
	274	239			
	251	188			
	294	254			
	266	224			
	246	179			
	276	236			
	265	218			
	246	174			
	254	186			
	276	256			
	251	191			
	261	201			
3-Aug	317	353			

Date	Length (mm)	Weight (g)	Sex	Age	Comments
	272	261			
	298	314			
	283	254			
	254	223			
	296	282			
	273	235			
	291	278			
	262	209			
4-Aug	289	285			
	265	219			
	287	263			
	283	239			
	286	254			
	284	248			
	260	203			
	265	215			
	326	307			
	266	206			
17-Aug	265	238			
	292	264			
	294	309			
	265	235			
	294	296			
	282	247			
	260	202			
	263	206			
	300	313			
	264	209			
24-Aug	271	249			
	291	290			
	270	213			
	275	253			
	264	225			
	269	232			
	290	296			
	264	222			
	260	216			
	296	318			
	296	283			
	276	246			
25-Aug	290	291			
	273	220			
	274	205			
	283	254			
	256	191			
	307	320			
	268	216			
	303	286			
	291	263			
	279	230			

Date	Length (mm)	Weight (g)	Sex	Age	Comments
2-Sep	256	179			
	257	182			
	263	181			
	265	181			
	259	183			
	263	179			

**Appendix V: Length and weight of angler caught bull trout from Lake Koocanusa (1996)**

Date	Length (mm)	Weight (g)	Sex	Age	Comments
28-Jun	394	490			gutted

**Appendix VI: Length and weight of angler caught rainbow trout from Lake Koccanusa (1996).**

Date	Length (mm)	Weight (g)	Sex	Age	Comments
28-Jun	235	113			gutted
30-Jun	248	132			gutted
5-Jul	275	197			
6-Jul	247	164			
19-Jul	280	192			gutted
20-Jul	277	167			gutted
	301	220			gutted
	266	148			gutted
3-Aug	315	276			gutted
24-Aug	260	212			
2-Sep	289	259			

**Appendix VII: Length and weight of angler caught mountain whitefish from Lake Koochanusa (1996).**

<b>Date</b>	<b>Length (mm)</b>	<b>Weight (g)</b>	<b>Sex</b>	<b>Age</b>	<b>Comments</b>
28-Jun	241	111			gutted
	235	104			gutted
	238				

**Appendix VIII: Length and weight of angler caught yellow perch from Lake Koochanusa (1996).**

<b>Date</b>	<b>Length (mm)</b>	<b>Weight (g)</b>	<b>Sex</b>	<b>Age</b>	<b>Comments</b>
5-Jul	205	83			
	210	88			