KOOTENAI FALLS AQUATIC ENVIRONMENT MONITORING STUDY

Fourth Annual Report
for the period
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Submitted by:

Montana Department Fish, Wildlife and Parks

and

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INTRODUCTION

Northern Lights, Inc. (NLI), a rural electric cooperative based in Sandpoint, Idaho, submitted an application to the Montana Department of Natural Resources and Conservation (DNRC) in 1980 to build the Kootenai River Hydroelectric Project in the Kootenai Falls area of Lincoln County, Montana. In preparation, NLI contracted with DNRC in 1978 to conduct baseline studies of the aquatic environment in the project area. The results of that study were completed in 1979 (Graham 1979).

To keep the data base current and to gather additional information on year-to-year variations in the parameters studied, NLI contracted with DNRC in 1979 to monitor certain aquatic resources in the study area on a continuing basis. Results of the first three years' monitoring efforts have been presented by Huston (1979, 1981, 1982).

This fourth annual report presents monitoring results from 1982. Data reported here were gathered by the Montana Department of Fish, Wildlife and Parks (MDFWP) under contract to DNRC. Joe Huston of MDFWP authored the report, and technical editing was done by Bill Phippen, Pat Nichols, and Larry Thompson, all of DNRC.

METHODS

White Sturgeon Sampling

From July 13 through July 16, 1982, MDFWP sampled pools in the river below Kootenai Falls for white sturgeon. Sampling locations were near river mile 192 (Antlers Hole), river mile 190 (Sturgeon Hole), river mile 189 (Throops Landing),

river mile 188 (mouth of O'Brien Creek), river mile 177 (near the mouth of the Yaak River), and river mile 175 (near the mouth of Pine Creek) (Figure 1). Sampling gear used included experimental gill nets, 3-inch and 5-inch bar measure gill nets, and set lines baited with liver and nightcrawlers. The sampling period followed by two months the first sturgeon catch by the Idaho Department of Fish and Game in the Idaho portion of the Kootenai River.

Population Trend Sampling

Graham (1979) proposed that fish population estimates be obtained from the impoundment area of the proposed Kootenai River Hydroelectric Project in late August or September each year. Huston (1981) recommended that fish population work be limited to collection of trend information from the upper two-thirds of the Kootenai Falls-China Rapids section.

Trend sampling using boat-mounted electrofishing gear was conducted September 17 and 18, 1982, in the upper two-thirds of the Kootenai Falls-China Rapids section (Figure 1). Fish captured included rainbow trout, mountain whitefish, bull trout, largescale and longnose suckers, and redside shiners. Electrofishing crews were instructed to capture all available fish species to provide a measure of the relative abundance of gamefish and nongame fish. Because of gear limitations, only fish five inches or longer were captured.

Fish captured were held overnight in live boxes, and data were recorded the next morning. These data included the lengths of all fish, weights of most rainbow trout and mountain whitefish, and tag information from tagged fish. A representative

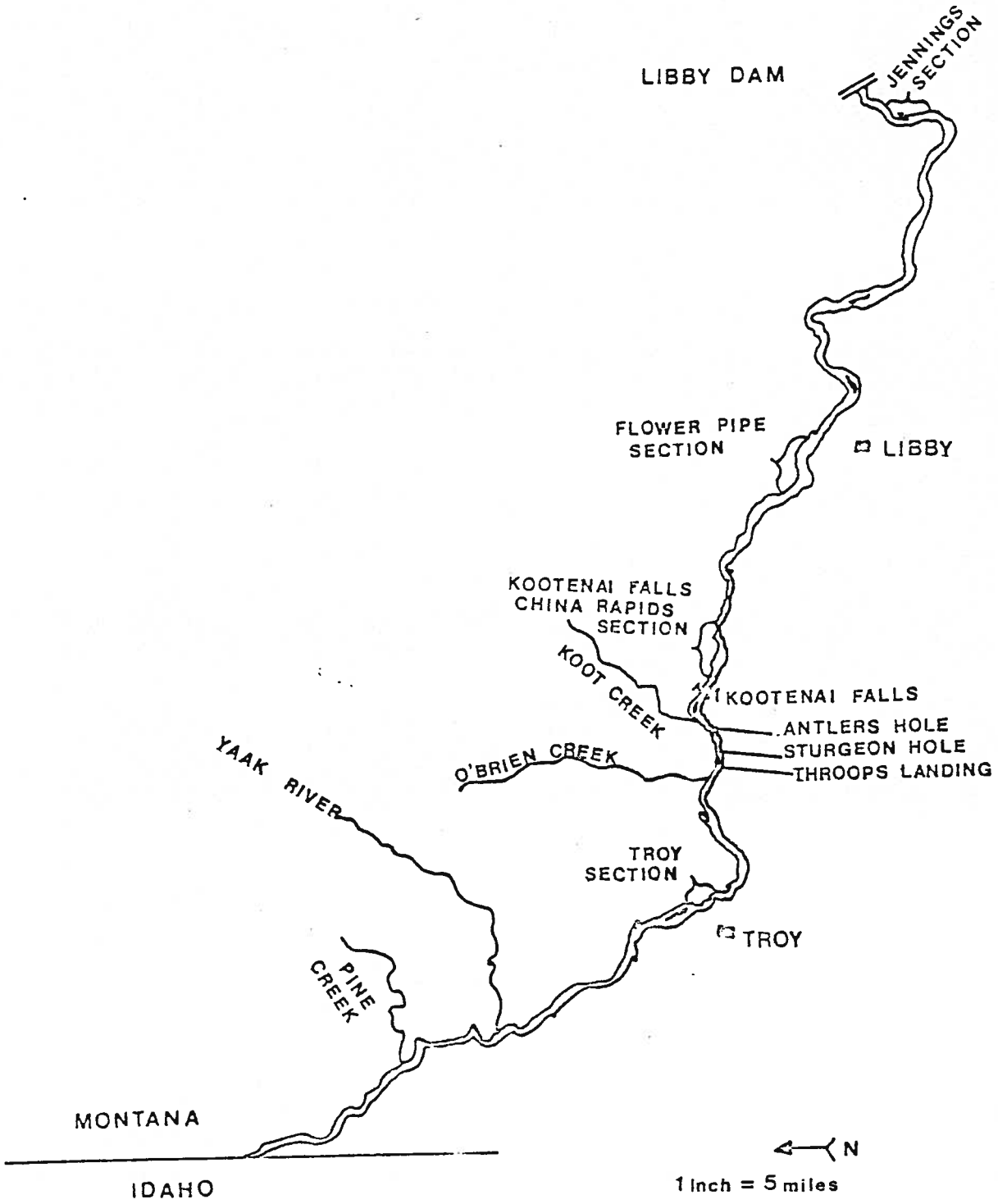

Figure 1. Map of Kootenai River in Montana from Libby Dam to Idaho border showing fish sampling sections and sturgeon sampling sites

sample of scales for age and growth determination was taken from rainbow trout and mountain whitefish. Fish were released after data were collected.

During sampling, the river's flow was regulated at Libby Dam to about 8,000 cfs by the U.S. Army Corps of Engineers. This flow was similar to that which occurred throughout most of the summer prior to sampling.

RESULTS AND DISCUSSION

White Sturgeon Sampling

No sturgeon were caught during the white sturgeon sampling period—July 13 through July 16, 1982. Of those species that were caught, the most numerous were largescale suckers, peamouth, mountain whitefish, and rainbow trout. The total numbers of fish caught during the period are shown, by species, in Table 1. Sampling sites are shown on Figure 1.

Population Trend Sampling

The upper two pools and runs of the Kootenai Falls-China Rapids study section were electrofished on the nights of September 17 and 18, 1982. The total catch included 464 rainbow trout, 432 mountain whitefish, one bull trout, 25 largescale suckers, 20 longnose suckers, and one redside shiner. Equal catch effort was placed on all species to obtain a ratio of gamefish to nongame fish in the sampling area. The ratio of gamefish (rainbow trout and mountain whitefish) to nongame fish (largescale and longnose suckers) in the Kootenai Falls-China Rapids section is

shown in Table 2, where this ratio is compared to ratios for both the Troy and Jennings sample sections (Figure 1).

Table 1. Numbers of fish caught by species and gear type, Kootenai River, July 13-16, 1982.

Sample site	Type gear[1]	Hours fished	Catch by species[2]							
			RB	CT	MWF	DV	CRC	SQ	CSU	FSU
Antlers Hole River Mile 192	A-1	84	6	0	0	0	1	0	0	0
	C-1	46	0	0	0	0	0	0	0	0
	E-1	90	0	0	0	0	0	4	0	0
Sturgeon Hole River Mile 190	A-3	144	7	2	0	0	6	1	2	0
	B-2	128	7	2	10	1	9	1	32	2
	D-2	136	0	0	0	0	0	0	0	0
Throops Landing River Mile 189	A-2	30	0	1	0	0	3	0	0	0
O'Brien Creek River Mile 188	E-1	86	0	0	0	0	0	0	0	0
Yaak River River Mile 177	B-1	76	0	0	1	0	0	1	2	0
	E-1	73	0	0	0	0	0	0	0	0
Pine Creek River Mile 175	B-1	45	0	0	0	0	0	0	8	0

1 Gear types are : A = floating experimental gill net; B = sinking experimental gill net (experimental gill nets are 125 x 6 feet with 25-foot-long sections of 3/4-, 1-, 1 1/4-, 1 1/2-, and 2-inch bar measure mesh); C = 3-inch bar measure mesh gill net; D = 5-inch bar measure mesh gill net; and E = set line with 8 hooks. Number after each letter is number of individual nets or set lines.

2 Fish species abbreviations are: RB = rainbow trout; CT = cutthroat trout, MWF = mountain whitefish, DV = bull trout, CRC = peamouth, SQ = squawfish, CSU = largescale sucker, FSU = longnose sucker.

Data for the Flower–Pipe, Jennings, and Troy sections, presented in Tables 2 and 3, were obtained from May et al. (MS. in prep; Section C).

Table 2. Ratio of game to nongame fish in Jennings, Kootenai Falls–China Rapids, and Troy sections of the Kootenai River.

Section	Year	Game fish:Nongame fish ratio
Jennings	1975	0.7:1.0
Kootenai Falls–China Rapids	1982	19.9:1.0
Troy	1981	1.6:1.0

Ratios of rainbow trout to mountain whitefish for the Flower–Pipe Section and the Kootenai Falls–China Rapids sections for the years 1978, 1980, and 1982 are shown in Table 3.

Table 3. Ratio of rainbow trout to mountain whitefish in Flower–Pipe and Kootenai Falls–China Rapids sections of the Kootenai River, 1978, 1980, and 1982.

	Rainbow trout:mountain whitefish ratio		
Section	1978	1980	1982
Kootenai Falls–China Rapids	1:4.3	1:1.7	1:0.9
Flower–Pipe	1:5.4	1:5.1	1:2.1

Ratios of game to nongame fish and of rainbow trout to mountain whitefish were considerably higher in the Kootenai Falls–China Rapids section than in the Flower–Pipe, Troy, or Jennings sections. The data presented in Tables 2 and 3 show

that the Kootenai Falls-China Rapids section provides better habitat for rainbow trout and other gamefish than the other sampling sections in the Kootenai River.

Catch-per-boat-night of sampling effort results for rainbow trout and mountain whitefish in the Kootenai Falls-China Rapids section for the years 1978 through 1982 are listed in Table 4. These figures are listed according to the river subsection in which the sampling took place; subsections 1 and 2 correspond to pools 1 and 2 and to runs 1 and 2, respectively, which are near the upper end of the Kootenai Falls-China Rapids section downstream from China Rapids.

Data presented in Table 4 show that catch rates vary greatly from year to year. Huston (1982) indicated that catch rates were probably not a good measure of fish population densities since they appear to be related to electrofishing conditions and river flow. River flows prior to and during the 1982 sampling were stable, and electrofishing was done during the "light of the moon" phase with adequate natural light for efficient night-time work. Although numbers of fish caught each year have not yielded reliable fish population trend data, age and growth statistics obtained from fish caught will provide information upon which to measure changes that may occur in the future.

Table 4. Catch-per-boat night of rainbow trout and mountain whitefish, subsections 1 and 2, Kootenai Falls-China Rapids section of the Kootenai River, Montana, 1978-1982.

	Catch-per-boat-night					
	Subsection 1			Subsection 2		
Sampling period	Boat-nights	RB	MWF[1]	Boat-nights	RB	MWF
August 1978	2	94	401	2	48	212
October 1979	2	25	35	2	14	12
September 1980	2	84	169	2	62	80
September 1981	1	13	89	1	30	210
September 1982	1	286	217	1	178	215

[1] Abbreviations are: RB = rainbow trout, MWF = mountain whitefish

The age structure of the rainbow trout caught in 1978, 1980, and 1982 is presented in Table 5. Age data from fish caught in 1979 and 1981 were omitted because the small number of rainbow trout caught during each of these two years did not provide sufficient data.

Table 5. Age distribution of rainbow trout caught by electrofishing in the Kootenai Falls-China Rapids section of the Kootenai River, 1978, 1980, and 1982.

	1978 catch		1980 catch		1982 catch	
Age class	Number	Percent	Number	Percent	Number	Percent
1	210	45.7	210	57.4	216	46.6
2	217	47.3	125	34.1	202	43.5
3	26	5.7	22	6.0	46	9.9
4	4	0.9	9	2.5	0	0.0
5	2	0.4	0	0.0	0	0.0

The age structure of rainbow trout caught in the Kootenai Falls-China Rapids section has changed since 1978; the most notable change is indicated by the absence

of 4- and 5-year-old fish in the 1982 sample. These older fish are usually the largest and most sought-after by anglers. It is possible that anglers are harvesting too many older-aged rainbow trout from the Kootenai Falls-China Rapids section, thereby eliminating them from the population. It does appear, however, that numbers and percentage of 3-year-old fish was higher in 1982 than in both 1978 and 1980. Survival of these 3-year-old fish should be determined by future sampling.

The age of juvenile fish emigrating downstream from natal tributaries into the Kootenai River also changed between 1978 and 1982 (Table 6). Rainbow trout emigrate into the river as young-of-the year (X_0), as 1-year-old fish (X_1), and as 2-year-old fish (X_2). In the age-migration class designations used in the following tables, X represents the age of the fish, while the subscript represents the age at which it emigrated. A fish designated by 3_0, therefore, is 3 years old and emigrated as a young-of-the-year fish.

Table 6. Migration class structure of rainbow trout caught in the Kootenai Falls-China Rapids section of the Kootenai River, Montana, 1978, 1980, and 1982.

Migration Class	Year of Sample		
	1978	1980	1982
X_0	1.1%	5.5%	9.5%
X_1	76.4%	79.8%	71.3%
X_2	22.5%	14.7%	19.3%

Numbers of young-of-the-year emigrants increased markedly from 1978 (1.1%) through 1982 (9.5%). This increase in young-of-the-year emigrants is due to an increase in spawning runs and, therefore, an increase in fish densities in spawning

streams, which results in earlier emigration of juvenile fish. May et al. (1982) reported that about 70 percent of the rainbow trout emigrants from Bobtail Creek were young-of-the-year fish and 30 percent were 1- and 2-year-old fish. Survival of young-of-the-year emigrants is much lower than it is for older emigrants after they enter the Kootenai River.

An analysis of growth rates of rainbow trout captured in the Kootenai Falls-China Rapids section is presented in Table 7. Data from fish captured in 1978, 1980, and 1982 are shown by migration class and year of capture.

Age and growth data for mountain whitefish collected in 1980, 1981, and 1982 are shown in Table 8. Whitefish scale samples for age-growth determinations were not collected in 1978, and too few fish were caught in 1979 to allow interpretation of results.

Table 7. Growth of X_0, X_1, and X_2 migration class rainbow trout captured in the Kootenai Falls-China Rapids section of the Kootenai River, 1978, 1980, and 1982.

Year of migration	Capture and class	Length in inches at annulus I	II	III	IV	V
1978	X_0	6.2(5)*	14.4(2)			
1980	X_0	4.4(20)	10.5(5)	16.0(1)		
1982	X_0	4.0(17)	10.9(5)			
1978	X_1	2.4(346)	9.4(139)	14.9(6)	19.3(3)	24.1(2)
1980	X_1	2.7(292)	9.1(96)	13.8(15)	16.3(6)	
1982	X_1	2.7(131)	9.1(69)	11.8(12)		
1978	X_2	2.2(192)	4.2(102)	12.1(20)	14.6(2)	
1980	X_2	2.4(54)	4.4(54)	11.5(13)	13.6(3)	
1982	X_2	2.0(32)	4.7(32)	10.3(13)		

* Number in parentheses is sample size.

Table 8. Age and growth of mountain whitefish collected in the Kootenai Falls–China Rapids Section of the Kootenai River, Montana, in 1980, 1981, and 1982.

Year collected	Length in inches at annulus					
	I	II	III	IV	V	VI
1980	4.4(65)*	9.8(43)	12.3(37)	14.0(13)		
1981	4.4(113)	9.8(86)	12.3(21)	13.8(21)	15.9(8)	16.6(1)
1982	4.5(152)	9.5(136)	12.0(88)	13.7(37)	14.9(4)	

Growth rates of mountain whitefish have remained stable during the three years for which data are presented. Growth rates of rainbow trout after they emigrated to the river appear to have slowed; this decrease is most noticeable between 1978 and 1980. Growth rates of juvenile rainbow trout in natal streams, except for young-of-the-year emigrants, remained constant between 1978 and 1980. Reduced growth rates of X_0 rainbow trout between 1978 and 1980 may be related to the small sample size in 1978 or to increased fish densities in the natal streams.

Tag Returns

During calendar year 1982, no tags from rainbow trout or mountain whitefish tagged in the Kootenai Falls–China Rapids section prior to 1982 were returned. However, when this section of the river was electrofished in September 1982, two rainbow trout with tags were recaptured. One fish had been tagged in 1980, while the other had been tagged in 1981. Four mountain whitefish tagged in 1981 also were recaptured during the 1982 electrofishing sessions. Don Chapman Consultants, Inc. tagged about 2,000 rainbow trout in the Kootenai River, most of which were between

Kootenai Falls and China Rapids, during the spring and summer of 1982. Fifty-two of these fish were recaptured in September 1982.

RECOMMENDATIONS

An attempt should be made in 1983 or 1984 to obtain population estimates of rainbow trout, mountain whitefish, and suckers in the Kootenai Falls-China Rapids section of the Kootenai River. These population estimates should be further refined to present estimates of the number of these species in each of the three pools and runs comprising this river section. These three pools and runs would be affected to different degrees by reduced water velocities resulting from the proposed Kootenai River hydroelectric impoundment.

The success or failure of any attempted population estimation effort depends on the level of river flows prior to and during electrofishing sessions. The decision to attempt a population estimate will depend on the stability of releases from Libby Dam from June through August and the possibility of obtaining a stable flow of 6,000 to 9,000 cfs for a two-week period during the September sampling period.

Sturgeon sampling should be continued using passive sampling methods and/or actual techniques, such as searches of the pools with SCUBA gear.

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