

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB PROGRESS REPORT
RESEARCH PROJECT SEGMENT

State Montana

Project No. F-34-R-5

Name Reservoir Investigations

Job No. IV-a

Title Kootenai River Study

Period Covered July 1, 1970 through June 30, 1971

ABSTRACT

Boat-mounted electrofishing gear was used to sample four sections of the Kootenai River. Two sections were within the area to be flooded by the Libby dam impoundment and two were below the dam construction area. Mountain whitefish (Prosopium williamsoni) were the most abundant fish taken in the areas above the dam followed by largescale suckers (Catostomus macrochelys) and trout (Salmo sp.). Largescale suckers were the most abundant fish taken in the two areas below Libby dam followed by mountain whitefish and trout.

A rough estimate of cutthroat trout (Salmo clarki), mountain whitefish and largescale suckers for the Jennings area (3 miles below Libby dam) indicated a population of 9,341 fish weighing 2,510 pounds per 1,000 feet of river.

BACKGROUND

Kootenai River is one of Montana's largest rivers with average peak flows of about 65,000 cfs and average lows of about 3,000 cfs. It has provided a good sport fishery for mountain whitefish, rainbow trout (Salmo gairdneri), cutthroat trout, Dolly Varden (Salvelinus malma), and burbot (Lota lota).

Libby dam, under construction by the Corps of Engineers, will cause the formation of Lake Koocanusa and will drastically change the Kootenai River through inundation, water release patterns, temperatures and water chemistry. These changes will require pre and post-impoundment fish sampling and will necessitate development of suitable sampling gear. Boat mounted electrofishing gear has been constructed which has proved to be satisfactory.

OBJECTIVES

The objectives of this job were: (1) collect fish population data for species composition, age and growth, and standing crop from several sections of the Kootenai River; and (2) mark mature mountain whitefish from areas above and below Libby dam to aid in determination of the source of the whitefish spawning run from Kootenai River into Fisher River. Fisher River is a major tributary of Kootenai River entering about two miles below Libby Dam.

PROCEDURES

Four sections of the Kootenai River were sampled, each about 1.5 miles long. The location of sampling areas are shown in Figure 1. The Rexford section is 46 miles above the dam and 2 miles below the Canadian border and the Warland section is 12 miles above the dam. The Jennings and Elkhorn sections are 3 and 9 miles, respectively, below Libby dam.

An 18-foot flatbottom boat powered by a 55 HP outboard jet engine carried boom electrodes attached to the bow. These were energized with either half wave or full wave direct current electricity. Underwater lights attached to the bottom of the boat near the bow provided illumination. Fish were netted from the electrical field and held in a tank in the boat until they were taken to live cars on the river's edge. The crew consisted of the boat driver, two dip-netters and a handyman for tending the electrical gear, emptying nets and miscellaneous jobs. A complete description of gear and crew make-up was given by Huston in an earlier report.^{1/} The electrofishing was done at night usually between the hours of 9 p.m. and 4 a.m. Work done developing gear and methods indicated that atmospheric light affected catch-rate; the lighter the night the better the catch. Time of sampling was scheduled for late summer when river flows are generally less than 7,500 cfs and during periods of moonlight.

Information collected from the two sections above Libby dam (Rexford and Warland) included species composition and age and growth of the major fish species caught. Mature mountain whitefish taken at the Warland section were marked by fin removal since these fish might move downstream and then up into Fisher River for spawning. The Elkhorn section located immediately below the proposed site for the Libby dam reregulatory reservoir was sampled for the sole purpose of marking mature whitefish to determine if these fish moved upstream into Fisher River for spawning. Visual observations were to be made on the relative abundance of the other fish species.

The Jennings section located three miles below Libby dam was the area of greatest fishing effort. Data were collected on species, composition, age and growth of major fish species, and an attempt was made to obtain a reliable standing crop estimate from a mark and recapture program. Three marking trips were made throughout the entire section, followed by two trips to recapture and mark fish.

Lengths, weights and scales were taken from all game fish captured and some non-game fish. Individual weights were recorded to the nearest 0.01 pounds and total lengths to the nearest 0.1 inch. All fish were marked and released alive. Fish recaptured were recorded by species and type of mark.

Whitefish 8 inches in length or longer captured for marking and release at the Warland and Elkhorn stations were judged to be mature based on examination of spawning whitefish entering Fisher River in 1969.

^{1/} Huston, Joe E. 1971. Kootenai River Study, Job Progress Report, Federal Aid to Fish Restoration, Project F-34-R-4, Job IV-a, Montana Fish and Game Department, 6 pp. mimeo.

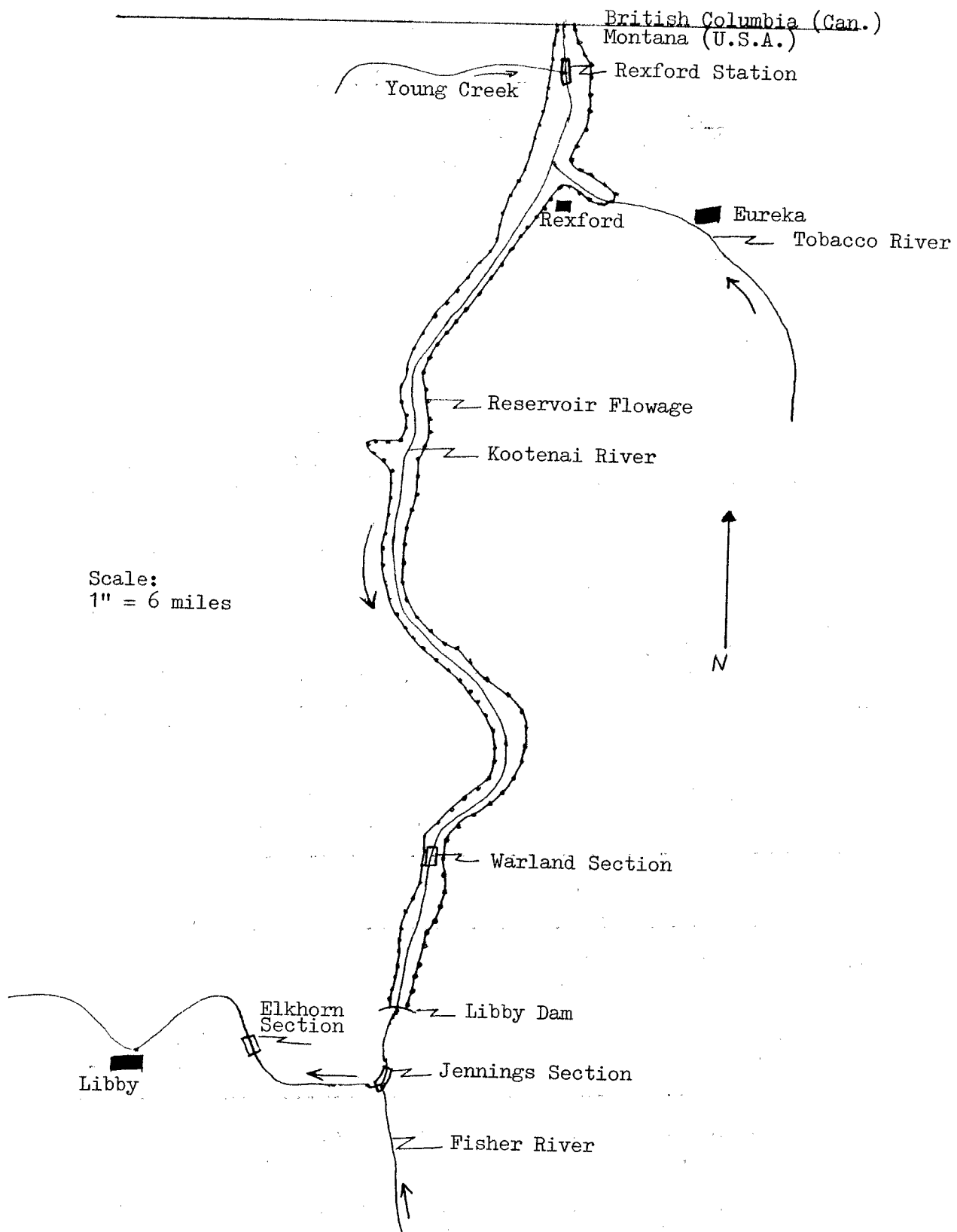


Figure 1. Location of sampling areas, 1971, Kootenai River.

FINDINGS

Population Composition

Rexford Section - The sample area included about 1.5 miles of the Kootenai River above the mouth of Young Creek and a large bay or backwater estuary of Young Creek. The average width of the river in this section was about 150 feet with flows of about 4,000 cfs. Average water velocity of the area was 2.5 feet per second or more.

Conditions were poor for night fishing. Cloud cover and smoke from two large forest fires obscured the light from the stars and moon. It was so dark that the boat crew could not see the skyline or river bank except with the aid of a spotlight.

The numbers of fish observed within the electrical field and numbers of fish netted were low. Many fish, particularly large suckers, were able to break out of the electrical field and escape capture. This sampling was the first of the year and the dip-netters' reaction times were slower than for later samplings. Fish were commonly seen in swift water over riffles 4 to 6 feet deep where it was most difficult to effectively net fish and maneuver the boat.

Three nights were spent sampling the Rexford section. Dip-netters concentrated their efforts to catch fish estimated 6 inches long or longer. Smaller fish were taken incidental to catching larger fish or when no larger fish were available. Species caught included mountain whitefish, cutthroat trout, Dolly Varden, largescale suckers, longnose suckers (Catostomus catastomus), sculpins (Cottus sp.), and reidside shiners (Richardsonius balteatus). The latter two species were small sized and their relative abundance was estimated visually. The catch by species is given in Table 1.

Table 1. Catch by species, average size and range of size, Kootenai River near Rexford, Montana, August 1970

	Number caught	Percent of total	Average total length (inches)	Total length range (inches)
Mountain whitefish	347	72	10.2	3.3-18.8
Cutthroat trout	8	2	7.8	6.3- 9.3
Dolly Varden	2	1	13.0	7.8-18.3
Largescale suckers	102	21	14.3	4.0-23.5
Longnose suckers	25	5	9.5	4.8-18.2

The reidside shiner was very abundant throughout the area especially in very slow waters. The sculpins were abundant in shallow riffle areas.

It is believed that the catch data presented in Table 1 are a reasonable image of the population of fish present in the sampling area. Numbers of trout captured are probably low since they were most commonly found in swift riffles most difficult to sample. Whitefish were of about equal abundance throughout the area while suckers were most common in slow moving waters and the Young Creek backwater.

The same Rexford station was sampled in December 1969 and the catch was 95 percent whitefish, 4 percent suckers and 1 percent salmonids.^{2/} December water temperatures were about 35° F. and probably decreased the catch of suckers more than other species. August river temperatures were about 65° F. which may have decreased the catch of salmonids more than catostomids.

Warland Section - The Warland section included about 1.5 miles of the Kootenai River near the town of Warland, Montana. Average width was about 250 feet and the section consisted of three large pools with extensive shallows along both banks connecting riffle areas and one long very swift rapids. River flows were about 4,000 cfs and average velocity was not as great as the Rexford section. Areas less than 6 feet deep were more extensive.

Conditions were very poor for electrofishing during two of the three nights worked. Cloud cover was 100 percent on September 2nd and it rained all night September 3rd. The third night of sampling was done September 14th during a full moon when cloud cover was absent. Fish capture rates were so low the first two nights that efforts to obtain population composition were terminated. Fish caught were weighed, measured and scales taken. Efforts of September 14th were limited to catching mature mountain whitefish, marked by fin removal and released.

Average hourly catches for different nights are presented in Table 2 and show the effects of atmospheric conditions upon catch of fish by night-time electrofishing. September 2nd was rated as poor conditions with 100 percent cloud cover, September 3rd as very poor conditions and September 14th was rated as good. Catch rates were adversely affected by degree of crew efficiency being positively correlated to atmospheric conditions and distribution of fish in the shallow water. As a general rule, the more night-light the shallower the fish were found and therefore obtainable by electrofishing.

Table 2. Catch per hour of effort, Warland section of Kootenai River, September 2, (poor conditions), September 3 (very poor conditions), and September 14 (good conditions)

Date	Immature whitefish	Mature whitefish	Rainbow trout	Cutthroat trout	Suckers	Total
September 2	22.8	26.4	0.8	0.4	29.0	79.4
September 3	0.0	7.0	0.2	0.0	10.8	18.0
September 14	-. -	46.4	0.4	1.8	-. -	48.6

It is thought that the average catch would have been about 200 per hour September 14th if efforts had been made to capture all fish equally. Capture was limited to mature whitefish and trout.

Jennings Section - The Jennings section was 1.5 miles long, extended 1.3 miles upstream from the Montana Highway 37 bridge and 0.2 miles below. Fisher River enters the Kootenai River immediately below this bridge. The Kootenai River averaged about 300 feet wide and volume was about 4,500 cfs. Velocity was moderate, averaging between 1.5 and 2.0 feet per second. The sample section consisted of three large pools, connecting riffles and 0.3 mile long

rapids at the lower end of the section. Water less than 6 feet deep was extensive in the rapids, riffles, and along both banks of the pools.

In addition to population composition and age and growth information, a standing crop estimate was planned for this section. Plans were to capture, mark and release all species throughout the section for three nights. Recapture efforts were to be conducted over the entire area for two nights. The boat hit a mid-river boulder during the first recapture effort which resulted in broken electrodes and smashed underwater lights. Only one recapture run throughout the entire section was made after equipment repair.

Data on catch by species for all fishing effort are given in Table 3 and includes only fish captured one time. Sculpins were uncommon and reidside shiners were abundant but no effort was made to collect them. A single largemouth bass (Micropterus salmoides) and northern squawfish (Ptychocheilus oregonis) were caught which were thought to be migrants from headwater lakes 35 miles up the Fisher River.

Table 3. Catch by species, average size and range of size, Jennings section of Kootenai River, 1970

	Number caught	Percent of total	Average total length (inches)	Total length range (inches)
Mountain whitefish	1,121	46.7	9.0	4.0-21.5
Rainbow trout	15	0.6	10.6	8.0-20.2
Cutthroat trout	25	1.0	8.8	7.5-10.4
Burbot	3	0.1	21.6	18.2-24.0
Largescale suckers	1,234	51.4	9.7	4.2-24.8
Longnose suckers	3	0.1	11.6	10.0-12.6
Northern squawfish	1	0.1	17.8	
Largemouth bass	1	0.1	10.2	

There were 2,403 fish caught and marked plus 40 recaptures in 25 hours of night electrofishing. Average catch per hour of effort was 94 fish. The number of fish netted was low and estimated to be about 5 percent of the number of fish observed in the electric fields.

Tremendous numbers of whitefish, 6 inches or less, were observed in the upper end of the section while larger whitefish were most common in the lower half-mile of the section. Suckers were found equally in all parts of the section and most common in shallow slow-moving water. Trout were found in and around large boulder cover and in swift riffles. Three burbot were caught; one in each of three different habitat types.

Data from the mark and recapture are given in Table 4. Burbot, longnose suckers, squawfish and largemouth bass are not included in the estimate because of small number of fish collected. Mountain whitefish are divided into two groups based on their length at maturity with those less than 8 inches being considered immature.

Table 4. Number of fish marked for recapture and number of unmarked and marked fish caught during the recapture effort

	Immature whitefish	Mature whitefish	Cutthroat trout	Rainbow trout	Largescale suckers
Marking runs (3) number marked	389	284	20	12	794
Recapture (1) number recaptured	2	21	1	0	16
Number unmarked fish captured	250	199	5	0	456

The data presented in Table 4 show that the ratio of unmarked fish to marked fish caught during the recapture effort is too low to obtain reliable population estimates. Gross estimates are given in Table 5 for cutthroat trout, mountain whitefish and largescale suckers per 1,000 feet of river.

Table 5. Estimate of number and weight of mountain whitefish, cutthroat trout and largescale suckers per 1,000 feet of Kootenai River, Jennings section, 1970

	Species				
	Immature whitefish	Mature whitefish	Cutthroat trout	Largescale suckers	Total
Number of fish	6,127	370	15	2,829	9,341
Pounds of fish	613	252	4	1,641	2,510

The estimate of numbers of fish present in the Jennings section is known to be invalid statistically since the estimate is based upon too few recaptured fish. The data are of value for future planning. It is estimated that to have obtained a reliable estimate about 5,000 fish would have had to have been marked and available for recapture. About 3,000 fish would have had to have been captured on recapture runs to obtain adequate recaptures of marked fish.

Elkhorn Section - The Elkhorn section lies immediately below the proposed site for the reregulatory reservoir and 7 miles below the Fisher River mouth. This area was sampled to capture, mark and release mature whitefish to help determine possible fish movement into Fisher River for spawning. Other species of fish were not captured and only casual observations were made of their abundance.

Two nights were spent electrofishing the Elkhorn section and 61 mature mountain whitefish were caught, marked and released. River and atmospheric conditions were considered good for night sampling. Largescale suckers were observed in abundant numbers and individuals of 15 to 25 inches in length were very abundant while immature whitefish and other salmonid species were scarce. It is possible that mature whitefish from this section may have moved upstream as sampling was done about two weeks after mature whitefish had started movement into Fisher River.

Spawning movements of marked whitefish - Mature mountain whitefish were captured, marked by fin-removal and released at the Warland and Elkhorn sections of the Kootenai River. The Warland section is 14 miles above and the Elkhorn section 6 miles below the mouth of the Fisher River. None of the 61 whitefish marked at the Elkhorn section were recovered in the fish traps in the mouth of Fisher River, but 3 of 372 whitefish marked at Warland were caught.

These data do show that some mountain whitefish move down the Kootenai River from areas above Libby Dam into Fisher River for spawning. The whitefish marked at the Elkhorn section were captured about two weeks after the spawning run into Fisher River had started and the lack of recovery in the Fisher River traps may or may not indicate movement of fish into Fisher River.

FINDINGS

Age and Growth

Scale samples were collected from the major fish species caught at the Rexford, Warland, and Jennings Sections. Age and growth data for large-scale suckers and mountain whitefish from all three sections are presented in Table 6. Insufficient numbers of samples of other species were collected, therefore these data are not presented.

Table 6. Age and growth rates of mountain whitefish and largescale suckers from Kootenai River near Rexford, Warland and Jennings, 1970

Species and Location	<u>Length in Inches at Annulus</u>										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
<u>Suckers</u>											
Rexford	2.5 (36)*	4.5 (32)	7.1 (25)	9.9 (22)	12.5 (16)	14.8 (13)	16.3 (8)	18.2 (4)	19.3 (3)	22.3 (2)	
Warland	3.4 (63)	5.7 (40)	8.3 (24)	10.1 (16)	11.7 (12)	14.2 (11)	16.4 (6)	18.1 (3)	19.1 (2)		
Jennings	2.7 (88)	5.9 (77)	9.2 (42)	11.1 (17)	12.7 (8)	14.8 (5)	16.6 (4)	18.3 (2)	21.0 (1)	22.4 (1)	23.9 (1)
<u>Whitefish</u>											
Rexford	3.8 (102)	6.8 (77)	9.4 (70)	11.4 (39)	12.9 (19)	14.8 (10)	16.5 (2)				
Warland	4.0 (61)	6.9 (38)	9.5 (32)	11.5 (23)	13.3 (18)	15.7 (4)					
Jennings	4.1 (77)	6.9 (62)	9.3 (58)	11.2 (35)	12.6 (12)	14.5 (6)	16.3 (3)	17.8 (2)	19.7 (1)	20.8 (1)	

RECOMMENDATIONS

Intensive night-time electrofishing has not been practiced in Montana prior to sampling the Kootenai River in 1970. Many problems with equipment

and personnel were encountred. Chief among personnel problems is physical and metal exhaustion from extensive night work leading to decreased crew efficiency and increased accident potential.

Sampling of fish populations of the Kootenai River should be intensified downstream from Libby Dam to the Idaho-Montana border. This sampling should consist of electrofishing in the main river and trapping of spawning fish entering tributaries. A reliable standing crop estimate should be obtained if possible from the river near the Libby Dam-site.

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Waters referred to:

11-3500-1

11-2320-1