Ref ID: 71128

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB PROGRESS REPORT
RESEARCH PROJECT SEGMENT

State Montana

Project No. F-34-R-4 Title Reservoir Investigations

Job No. IV-a Title Kootenai River Study

Period Covered July 1, 1969 - June 30, 1970

ABSTRACT

Boat mounted direct current electro-fishing gear was tested on the Kootenai River. Sampling efforts were conducted during daylight and night hours. Average catch rate for daylight hours was one fish per hour while catch rate for night work was 60 fish per hour. Sampling was done in November and early December when river flows were near minimum and air temperature near or below freezing. Freezing and icing of equipment and discomfort to crew members increased the risk of accidents and decreased efficiency of fish recovery.

BACKGROUND

Kootenai River is one of Montana's largest rivers. Average high flows are about 65,000 cfs occurring in June and average low flows are about 3,000 cfs in January - February. This river has provided a good sport fishery for mountain whitefish (Prosopium williamsoni), cutthroat trout (Salmo clarki), rainbow trout (Salmo gairdneri), Dolly Varden (Salvelinus malma), and burbot (Lota lota). Fisheries management and research activities have been minimum because of the good self-sustaining game fish populations. Construction and operation of Libby Dam will drastically change this river through inundation of the reservoir area above the dam and the water release patterns and temperatures of released water below the dam.

OBJECTIVES

The objectives of this job were: (1) develop and test fish sampling gear that would effectively collect fish from the Kootenai River, the preferred method should be to collect live fish and, (2) locate sampling stations above and below Libby Dam that could be effectively worked with the sampling gear and that would be representative of the various habitat types in the river.

PROCEDURES

It was considered that the best way to collect live fish from Kootenai River would be by electro-fishing. All gear would have to be boat-mounted. Review of boat-mounted electro-fishing equipment indicated that a double boom support system with 3 positive and 2 negative electrodes suspended into the water would be best. The boat would have to be large enough to provide space for generators, transformers, live car, and personnel. A double boom electrodes support system with five electrodes was constructed and mounted on an 18-foot flat bottom boat. The boat was powered with a 35 hp outboard engine, propellor type. Lights were attached to the bow of the boat underneath the water line for illumination during night work.

Four sections of the Kootenai River were chosen as sampling stations. These stations were located near Rexford, Warland, Jennings and Libby, Montana. The sections were selected to represent the habitat types found in Kootenai River above and below Libby Dam. The shallow shoreline of each mile-long section was worked by slowly driving the boat against the current or by drifting with the flow. Fish netted from the electric field were placed in the live car and then taken to shore where data were collected. Information taken from each fish included species, total length and weight. A three or four man boat crew was used during electro-fishing, 2 netters, a driver and a handy-man.

FINDINGS

The primary purpose of this job was to develop and test electrical gear to determine its effectiveness in collecting live fish from the Kootenai River. Findings will be presented by the piece of gear or situation encountered.

Boat

The boat was an 18-foot long john boat which proved adequate for the sampling. It provided ample room for a 4 man crew, a live car, electrical transformers, and two generators. The boat was stable and easy to handle in both swift and slow water current.

Motor

The motor used to propel the boat was a 35 hp long shaft propellor outboard engine. The motor provided adequate power but the shaft and propellor did limit the electro-fishing operations to water 2 feet deep or deeper. Fish observed in water less than 2 feet deep were only partially vulnerable.

It is anticipated that an outboard jet engine would be more suitable to river work because of less draft; however, some forward power and almost all backward thrust would be lost because of lower jet efficiency.

Electrode System

The electrode support system consisted of a 16 foot-long, 1 $\frac{1}{4}$ inch diameter fiberglass bonded thinwall conduit pipe. These were attached to each side of the boat bow so that 12 feet of pipe extended in front of the boat. One-eighth inch wire rope guy wires on these pipes provided tension to reduce bending and flop of the booms. Cross pipes of the same thinwall conduit were attached to the booms 5 feet and 10 feet in front of the boat. Rubberized 14/2 electrical wire was run through one boom and into the cross pipes to energize the electrodes.

The electrodes were suspended down into the water by chain attached to the cross pieces. Electrodes were 18 inches long by 5/8 inch diameter copper pipe filled with lead. The length of electrode could be changed by attaching or removing additional electrode sections.

The electrode support system worked very good. The bend of the booms could be adjusted by tightening or loosening tension of the guy wires. The booms would return to near original shape even after the electrodes had been caught on an obstruction and bent almost 90 degrees.

Weighted electrodes are needed to keep them vertical in the water when moving against or faster than the water flow. The leaded pipe did not weigh enough to keep a vertical position. Sweep-back of the electrodes could lead to problems if two electrodes touched or an electrode hit the boat. Leaded copper tubing is inflexible and catches on rough bottom material. Several electrode sections had to be broken off and lost to free the boat and unnecessary strain was put on the support system.

Flexible electrodes exhibiting good electrical conductivity should be developed. Heavy duty chain or wire cable with copper wire woven in or around will be tested at a later date.

Crew

Electro-fishing operations were carried out with a three and four man crew. A three man crew is minimum; two netters and a boat operator. Four crew members would be most desirable for night work with the fourth man tending the electrical equipment inside the boat, assisting the netters, and keeping track of the condition of the fish in the live car. A two-man crew should also be stationed on shore to collect data on the catch and mark fish.

Time of Sampling

Sampling was done in daylight and darkness. Rate of catch was about 1 fish per hour for daylight sampling and about 60 fish per hour for night sampling. The number of fish shocked and seen by the netters during daylight was small. The number of fish shocked and seen by the netters during night work was high although recovery rate was estimated

to be less than 10 percent of the fish observed due to the fast river current. It is believed that the greater catch rate at night is due to two factors; (1) more fish are in shallower water where the electrical gear is most effective and, (2) fish do not flee from a lighted boat at night as much as a boat casting a dark shadow in daylight.

The electrical gear was tested in November and December during low stream flows and when air temperatures were near or below freezing. Personnel efficiency was greatly reduced by the cold working conditions. Dip nets were extremely hard to use since the net bag would freeze. Water sloshed into the boat froze making footing treacherous. It was concluded that the risks involved in late fall and winter sampling are not worth the potentially high catch rate due to low river flow. Further sampling should be done when air temperatures are above freezing in September and October.

Findings, Biological Information

Four sections of the Kootenai River were electro-fished in November and December 1969. The catch-rate per hour of night effort, average size of fish caught, and range of sizes for each station sampled are given Table 1. Station location is related to distance from Libby Dam.

No fish were captured and few were observed at the Libby station. Fishing conditions were very poor, slush ice was abundant in the river and visibility was poor from suspended material in the water and falling snow. This station also lies below an out-fall of a mine-mill operation which contributes large amounts of silts and slime waste material to the river. This pollution undoubtedly depresses the fish life. This area was also demonstrated to be considerably lower in insect fauna as reported by the U. S. Army Corps of Engineers (Mimeo).

It appears that suckers were most numerous at the Jennings area below Libby Dam. The average size of whitefish taken at this station was considerably smaller than at the other two upstream stations. Fisher River, a major whitefish spawning stream enters the Kootenai River near Jennings station and likely many of the mature larger whitefish that normally inhabitat this stretch of Kootenai River were in Fisher River spawning. Almost all of the whitefish taken at the Jenning area were immature fish whereas many of the whitefish taken at the Rexford and Warland stations were mature fish.

RECOMMENDATIONS

The purpose of this job was to develop and test gear that would collect live fish in Kootenai River. It is believed that the electrofishing gear developed and tested will perform this task. Minor changes in electrode design should be made and the boat should be powered with an outboard jet unit. Sampling should be done earlier in the fall season when air temperatures are above freezing.

TABLE 1. Catch per hour of night effort, average size and range in inches by species, at various stations on Kootenai River, 1969.

	LOCATION OF SAMPLING AREA			
	Rexford - 46 miles above dam	Warland - 12 miles above dam	Jennings - 2 miles below dam	Libby - 17 miles below dam
Date of sampling	12/3/69	11/4/69	11/5/69	12/4/69
Number per hour				
Mountain whitefish	53	51	32	NO FISH CAPTURED
Average size	12.3	12.2	7.3	
Range	3.7-19.9	5.2-17.8	3.9-19.2	
Dolly Varden	1	0	0	
Average size	16.1			
Range				
Cutthroat trout	0	1	0	
Average size		10.7		
Range				
Rainbow trout	0	1	0	
Average size		10.0		
Largescale suckers	1	5	30	FEW SEEN
Average size	16.5	10.8	11.8	
Range		5.7-15.2	4.7-22.5	
Longnose suckers	1	1	0	
Average size	15.6	14.9		
Range				

It is believed that this electrical gear will give fishery personnel the equipment to collect good reliable statistics on the fish inhabiting Kootenai River.

Prepared by Joe Huston

Date March 16, 1971

Waters referred to:

11-3500-1
11-2320-1