

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB PROGRESS REPORT

State MontanaProject No. F-33-R-5Title Flathead Lake Fisheries StudyJob No. I-cTitle Develop Techniques for Sampling Juvenile
Kokanee and Determine Trends in Kokanee
PopulationPeriod Covered July 1, 1970 through June 30, 1971

ABSTRACT

An experimental purse seine 560 feet long was designed and built to collect juvenile kokanee to depths of 48 feet in Flathead Lake. The net was constructed of 3/8-inch square-measure knotless nylon and incorporated the latest modifications in purse seine design. The net was not completed for testing during the report period. This net will be fished off a 12' x 20' barge and pursed with power aboard the "Dolly Varden."

BACKGROUND

Flathead Lake in northwest Montana is the state's largest and one of the most important fishing lakes. The fishery almost entirely depends on natural reproduction and recruitment from the lake and tributary system. This drainage system is a part of the Clark Fork River, and joins the Columbia River via the Pend Oreille River. It is an area that is rapidly changing due to the development of its more important natural resources: water, land, timber and recreation.

This large lake contains 20 fish species. Knowledge of their habitats and the relationships that exist between them are essential to programs to maintain the fisheries resource.

Specially designed gill nets have been used to collect fish samples on this lake. This sampling does not provide an effective method of catching small sized open water fish such as kokanee. Data on young year classes are essential in making management recommendations for the fisheries resources of this lake.

OBJECTIVE

It is the objective of this job to develop a method of estimating year to year population trends of the kokanee in Flathead Lake. An effective method of capturing large numbers of juvenile kokanee is needed for use in a marking and recapture program. A statistical model will have to be developed using estimates of year-class strength, mortality rates, growth rates and migratory patterns-which will show the effect of these variables on population density and individual fish size.

PROCEDURES

Sampling of large numbers of juvenile fish in lakes is a problem to the fisheries worker. Each species has specific habitat requirements which vary during the numerous life stages. If all stages are to be sampled special sampling techniques and gear are required. The species of immediate concern is the kokanee. Kokanee are generally known to occupy the limnetic zone of a lake, an area from which it has been difficult to obtain adequate samples of young fish.

A review of the fishing techniques used on similar studies of kokanee and other salmon along the Pacific Coast, indicated small meshed experimental purse seine would yield satisfactory catches of young salmon in the limnetic zone. A purse seine of this type is described by Durkin and Park (1967). Floating traps and mid-water trawls either failed to collect adequate numbers of fish or caused fish to be in such poor condition that they could not be used in marking programs.

Plans were made to purchase a net similar to the type described by Durkin and Park (1967).

FINDINGS

The development of special fishing gear requires knowledge of habits of the species sought. The distribution of the juvenile kokanee was determined during the fish survey started on this lake in 1967 (Hanzel, 1970). Seasonal netting, sonar recordings and the stomachs of the larger piscivorous fish indicate juvenile kokanee in Flathead Lake are concentrated in the larger southern bay areas during the winter and spring months. These fish were found to be at depths from the surface to 30 feet below the surface but nearer the surface during the early hours of the dawn and dusk. Winter concentrations appeared to disperse over the entire lake during the early summer months. When the thermocline became firmly established and the surface waters warmed the salmon schools preferred deeper water and temperatures of 43° to 60° F. as described by Fulton (1963). In late summer, kokanee schools have been recorded at depths of 90 feet below the surface.

A net that was capable of collecting the shallow, early spring concentrations of kokanee was sought.

Net building companies have a general purse seine designed for large tuna or a smaller meshed herring bait seine; both are used along the Pacific Coast. Neither of these designs could be used satisfactorily on Flathead Lake. New developments in the design of tuna purse seines in California (Ben Yami and Green, 1968) prompted the author to include the latest modifications of a new hybrid type seine into a smaller meshed experimental seine for kokanee. This modified seine differs from the straight seines as built by Durkin and Park, (1967) and contains more netting causing the net to form a natural scoop which bellies when placed in the water. (insert Figure 1).

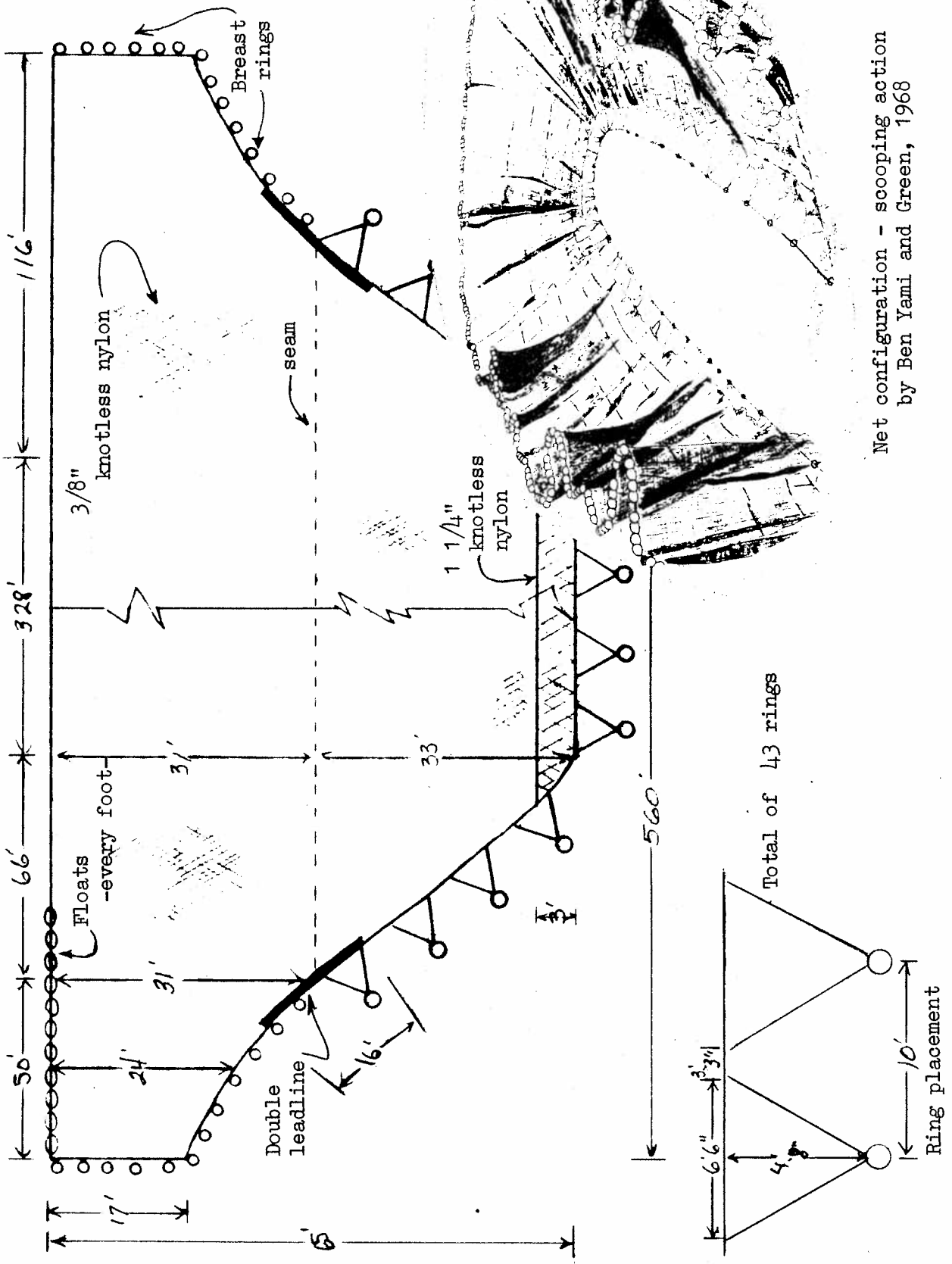
The new design has four major advantages over the older straight seine: 1) faster sinking time; 2) deeper working depth for the amount of mesh; 3) quicker pursing time and 4) better net conformation. All of these advantages work toward a more efficient net. The new net conformation is of particular advantage for its scoop forms a barrier with the bottom section that prevents fish from sounding and escaping during the closing and pursing of the net.

The net designed for the Flathead Lake Study (Figure 1) was built by a Seattle net firm for approximately \$4,000 during the spring of 1970, and incorporates the latest modifications suggested by gear specialists of the National Marine Fisheries Service, Seattle, Washington. (Jerry Jurkovich, personal communications). Net specifications are summarized in Table 1.

Table 1. Specifications of experimental "hybrid seine" built to catch juvenile salmon in Flathead Lake

Overall length	560 feet
Maximum depth	65 feet
Fishable depth	48 feet
Diameter of net when closed	178 feet
Purse rings, spacing	every 10 feet on 4 feet droppers
Net material	
Body	3/8" square measure - knotless nylon
Bottom-guarding or sewage	1 1/4" square measure - knotless nylon
Floats-expanded polystyrene, 4-inch diameter, every foot along float line	
Float line	560 feet 9/16" twisted polypropylene
Lead line	450 feet - 9/16" braided lead core -
	(20% hang in) 1.2#/fathom
Purse line	575 feet 1/2" braided nylon
Overall weight (dry)	1000 pounds

The net was not completed in time to fish for the kokanee during the spring season of 1971, the end of this report period. A wooden net barge, 12 feet wide and 20 feet long was constructed during this spring season and was similar in design as that described by Durkin and Park (1967). This barge is powered by a 40-hp outboard engine but was not equipped with the power winches. The barge will be used to arrange and carry the bulk of netting. The power for pursing will be provided by the Flathead Project Research vessel, a 35-foot,



Net configuration - scooping action
by Ben Yami and Green, 1968

Figure 1. Drawing and specifications of hybrid-type purse seine for Flathead Lake.
Inserts illustrate ring placement and net configuration.

seiner type commercial fishing boat that was modified to handle special fishing gear. It is rigged with a gill net reel, boom and hydraulic powered seine winch and is equipped with a recording sonar capable of locating fish and recording their depth and area distribution.

RECOMMENDATIONS

It is recommended that as soon as the net is completed project personnel become familiar with its capabilities, the fishing techniques involved develop an effective program to sample juvenile kokanee.

Prepared by Delano A. Hanzel

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Water referred to:

7-6400

LITERATURE CITED

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- Durkin, Joseph T. and Donn L. Park. 1967. A purse seine for sampling juvenile salmonids. Pro. Fish Cult. 29(1):56-59.
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