MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-33-R-1 Name: Flathead Lake Fishery Study

Job No. 1 Title: Flathead Lake Investigations of the Fish Population and its Chemical and Physical Characteristics

Period: July 1, 1966 to June 30, 1967

ABSTRACT:

A used 35-foot commercial fishing boat, purchased on the Pacific Coast, was transported and put into operation on Flathead Lake as a research vessel. Power equipment on the boat and sampling techniques are described.

Major emphasis was placed on testing, adapting and perfecting of sampling equipment and procedures to be used on the boat in sampling this large, deep lake. Various sizes and depths of gill nets were tested. Standard meshes, used in Montana, were found to yield the best catches, variety of species and variations of sizes. These meshes are as follows: 1-1/2, 2, 2-1/2, 3 and 4 inches stretched mesh. Special fry meshes, 5/8 and 1-1/4 inches stretched mesh, were added to the standard experimental net. The use of the depth recorder proved to be a valuable tool in determining precise bottom measurement, locating fish, recording their depth and area distribution. It also assisted in evaluating the placement and alignment of the gill net sets.

The basic plan of the Fish and Game Department's investigation was discussed with personnel of the University of Montana and Montana State University. Cooperative efforts were made on projects already in progress and discussions were held on future fields of study where cooperation is needed.

RECOMMENDATIONS:

This year's work enabled the personnel to become acquainted with the use of the boat and sampling equipment and to develop techniques for year around sampling. The findings of the initial work suggests that the objectives can be reached. Therefore, it is recommended that the seasonal sampling of the basic fisheries and limnological characteristics of Flathead Lake be initiated and continued for two years.

OBJECTIVE:

It will be the objective of this study, through development of techniques and specialized equipment, to determine the relative abundance of the various species of fish in the lake, their seasonal and depth distribution, and to establish criteria for measuring year to year trends in the populations.

TECHNIQUES USED:

A 35-foot Alaskan Beach Seiner that had been adapted for gill netting was selected as the work boat for the lake study. This boat was chosen from fourteen similar commercial fishing boats that have been actively engaged in the salmon fishery along the West Coast and in Alaska.

The boat is of a seiner type, of wood construction and has a beam of 11.6 feet. It is 9 years old, built in Bellingham, Washington. It has a draft of 5.6 feet, with gross and net tonnage of 14.5 and 10.0 tons respectively. It is powered by a 160 H.P. Chrysler marine gas engine that was completely overhauled in the spring of 1966. It has a 12-volt D.C. electrical system.

The boat is equipped with a hydraulically powered net reel and fiber glass stern rollers. The hydraulically powered "Rowe" long liner winch swings in a complete circle. It is adaptable to either a seine winch with gypsy heads or to a utility power head and a hand controlled hydrographic sampling line that has inter-changeable reels.

The boat has a steel mast that has ample capacity for our planned work. There are three sets of steering controls; one in the cabin, one on the flying bridge and one in the stern area near the gill net reel controls. The boat is rigged with stabilizing poles that smooth the craft's motions in rough water. It is equipped with a Model 200 A "Ross" finline depth recorder. The boat has a "Bendix" (non-hunting) auto pilot and has an electric anchor winch. The cabin is provided with a propane heater and stove. There is a sink and faucet connected with a fresh water pump and a 100 gallon storage tank. The forward hold can sleep two men and has some limited storage.

Marker floats were made by inserting bamboo poles, 12 to 16 feet in length, through styrofoam blocks, 6x6x20 inches. The blocks were held in place on the pole by large washers and clamps. Holes in the styrofoam were punched with a hot pipe. A three foot length of 1-1/2 inch pipe was bolted to the pole which acted as the counter-weight holding the pole upright. The float lines were then tied to a short length of chain that was attached to the pipe. Small white flags were attached to the pole.

All fish collected were measured to the nearest on-tenth of an inch (total length), weighed to the nearest one one-hundredth of a pound and a scale sample extracted and stored in individual envelopes. A cursory examination was made in the abdominal cavity for sex determination of gonadal development. While the fish were open, notes were made on stomach contents and visible parasites. Numerous specimens were preserved in 10 percent formalin for future investigations.

Surface plankton collections were made by dragging a fine mesh (12 cm) Wisconsin net for three minutes. Microplankton collections were made by concentrating 1,000 ml water samples (from the surface and 50-foot levels) in a Foerst centrifuge. The plankton were preserved in a solution containing 60 percent distilled water, 30 percent ethyl alcohol and 10 percent formalin.

Water quality measurements, based on "Standard Methods for the Examination of Water and Sewage" were made on the following characteristics: total alkalinity, dissolved oxygen, pH and standard conductance. Analysis was made on samples collected from the surface and 50-foot levels. Seechi disc readings were made concurrent to the water sampling. Temperature profiles were made with the aid of a resistance thermometer on 100 feet of line. The Kemmerer and thermometer probe were lowered on a weighted vertical guide cable to minimize the effect of wind, drift and currents.

FINDINGS:

One of the intial goals of the project was to select and put into operation a basic experimental fishing boat. Project personnel were fortunate to make contact with an exploratory fisherman, Cleave Vandersluys, with whom they discussed the basic needs of the Flathead Lake study. Mr. Vandersluys has had over 20 years of experience as a commercial fisherman in the Puget Sound area and has spent 8 years experimentally fishing for the University of Washington on various research studies conducted at their Friday Harbor laboratory. His advice, like that of most persons contacted, was to purchase a used boat that had already been tried and tested and on which most of the common running faults had been corrected. The boat should be of material that can readily be modified for the various types of sampling proposed. He further recommended at least a 35-foot boat of a type primarily designed for seining along Alaskan beaces. This type of boat is seaworthy, has ample aft deck space and can be equipped with the necessary power equipment for dragging trawls and dredges. Mr. Ora Kerns, Fisheries Reasearch Institute (University of Washington, selected a similar type boat for a study in a large Alaskan lake. He strongly recommended this type of boat after five years of experience on their study.

Fourteen boats of this type were inspected in January 1966 when the major portion of the Pacific fishing fleet was in at Salmon Bay, Seattle. These boats were made available because of recent fishing gear restrictions in the Alaskan waters. The majority of these boats had been modified for gill netting and were rigged with power reels for the nets. Bids were received on five boats that did not require major modifications to meet our specifications. One boat was selected and a professional marine surveyor (assessor) was contracted to inspect and prepare a condition report for the State Purchasing Department. Upon approval, minor changes were made in Washington prior to shipment by truck trailer to Montana. The boat was launched in Flathead Lake on October 28, 1966.

Test netting began as soon as the boat was assembled and the two-man crew became familiar with the operation of the boat and its equipment. During this adjustment period, the depth recorder was found to be a valuable tool in giving precise bottom measurements, in locating fish, and in recording their depth and area distribution. It assisted in evaluating the placement and alignment of the gill net sets. A beginner in interpreting depth records can find assistance in "The Uses of Echo Sounding for Fishermen" by D. H. Cushing 1963 1/

Fish species in Flathead Lake include: lake trout, Salvelinus namaycush; Dolly Varden, Salvelinus malma; cutthroat trout, Salmo clarki; rainbow trout, Salmo gairdneri; brook trout, Salvelinus fontinalis; kokanee, Oncorhynchus nerka; mountain whitefish, Prosopium williamsoni; lake whitefish, Coregonus clupeaformis; largemouth bass, Micropterus salmoides; yellow perch, Perca flavescens; northern squawfish, Ptychocheilus oregonensis; peamouth, Mylocheilus caurinus; pumpkinseed, Lepomis gibbosus; largescale sucker, Catostomus macrocheilus; longnose sucker, Catostomus catostomus; and redside shiner, Richardsonius balteatus.

The powered net reel assisted in the handling and hauling of greater amounts of netting. The hauling of nets 24 and 40 feet deep was as easy as handling the conventional nets 8 feet deep. The horizontal lines (3/16-inch) on the nets greater than 8 feet deep strengthens the nets as most of the pulling pressure was then placed on the horizontal lines rather than on the weaker small meshes of the nets. They also acted as a permanent guide in determining the depth of the catch. Two disadvantages were found in using the power reel; fish have to be picked as the net is being hauled, and the net freezes to the power reel during cold weather. A portable catylytic heater was used to thaw the net from the reel, but often it took from two to three days to prepare the net for the next set. Nets also had to be kept in good repair to avoid rips that would occur at broken strains when pressure was placed on the net during the handling.

Test netting results and the records of the fish made by the depth recorder illustrated that the fish populations in Flathead Lake tend to limit themselves to three general areas: 1) bottom 8 feet; 2) surface 8 feet; and 3) an area betweeen 30 and 60 feet below the surface. After three months of test netting with eleven mesh sizes and four different net depths a standard gang of nets was ordered that would sample the three general areas fish were found to frequent and that would be capable of catching juvenile and adult fish. A standard gang consists of: 1) a 100-foot by 8-foot net, with 50-foot sections of 5/8 and 1-1/4 inch stretched mesh (fry net); 2) a 250-foot by 8-foot net, with 50-foot sections of 1-1/2, 2, 2-1/2, 3 and 4 inches stretched mesh; and 3) a 250-foot by 24-foot deep net, with 50-foot sections of the same mesh sizes as net No. 2. A special order of "Grilon" monofilament nylon net was ordered. It was 250 feet by 25 feet deep, with 50-foot sections of the same mesh sizes as the other 250-foot nets. This net will be used specifically for fishing the waters from 30 to 60 feet below the surface. This net does not have the horizontal lines and has to be hauled by hand.

1/ Cushing, D. H. - 1963. The use of echo sounding for fishermen. Her Majesty's Stationery Office, Lond 11 p.-58 figures.

Microplankton sampling was accomplished in coordination with studies already in progress on the lake. They are under the direction of the staff at the Yellow Bay Laboratory, University of Montana. Prior work on the lake reflected only a portion of the plankton production because collections were limited to the summer school sessions (Mid-June through Mid-August). The present coordinated program enables year long sampling of the entire lake with specific work concentrated to small areas during the summer school sessions. The findings of this work coupled with concurrent fish sampling will provide valuable information for interpreting the effects of the plankton production in relation to the movement and distribution of fish in the lake. The sampling techniques used in the present study are those established by Dr. Arden R. Gaufin. The analysis and findings of all the plankton work for this report period will be made by University staff personnel.

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