MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-7-R-13 Name: Northwest Montana Fishery Study

Job No. I Title: Inventory of Waters of the Project Area

Period Covered: July 1, 1963 to June 30, 1964

Abstract: A total of 14 lakes were surveyed in the district to determine physical, chemical and biological qualities of the water involved. Initial surveys were conducted on nine high mountain lakes and follow-up surveys were made on the remaining five lakes. Mountain lake surveys were accomplished by use of a helicopter.

Information on productivity of various waters in the area was measured by conductivity readings converted to total dissolved solids.

The Lauri Lake oxygen-temperature series was continued during the winter months. A mechanical aeration system was employed to increase oxygen concentration when oxygen levels began to decline. After aeration, an increase in mid-depth and bottom oxygen concentration was noted, however, the dissolved oxygen near the surface declined.

Recommendations: Management recommendations have been recorded on lake survey cards. It is recommended that this project be continued to obtain further information relating to the physical, chemical and biological characteristics of water in the project area for future management needs.

Objectives: The objective of this job is to obtain basic biological, chemical and physical data where information is needed and to prescribe management practices where needed.

Techniques Used: Experimental gill nets, 125 feet in length, of graduated mesh size from 1/2 inches to 2 inches (square mesh). were used to sample fish populations. Total lengths and weights of fish were recorded and scale samples were taken for age analysis. Lake depths were determined by the use of an echo sounder. Outline maps of lakes were traced from aerial photographs from which acreages were computed with the aid of plainimeter. Conductance readings were converted to total dissolved solids.

Findings: Initial surveys were conducted on nine mountain lakes in July 1963 by the use of a helicopter. These lakes were located at the headwaters of the Jocko, South Fork and Swan River drainages and range in size from 15 to 348 acres. The species of fish found in these waters were cutthroat, (Yellowstone and Westslope), rainbow, Dolly Varden, and whitefish. Survey information for each lake has been recorded on 6 x 9 file index cards and kept on file at the district and Helena offices. A summary of the gill net catch data are presented in Table 1.

As determined by the gill net data, seven of the nine lakes have established fish populations. Because of their relative inaccessability, little fishing pressure has been exerted on these lakes and the present fish populations are considered to be adequate or are overpopulated. No fish were taken from the remaining two lakes, Sal-ol-sooth and Lick Lake, and it is believed these lakes are barren of fish.

No management changes are recommended for these lakes at the present time. When fishing pressure increases in this area and westslope cutthroat become available for stocking, this species should be introduced into Sal-ol-sooth and Lick Lakes. Additional information regarding fish populations in some of the larger mountain lakes is desired. Follow-up gill net sampling is needed to obtain a larger sample size of fish populations in Doctor, George, Kœssler, and Gray Wolf Lakes.

Table 1. Summary of gill net catches from mountain lakes surveyed in District #1 July, 1963.

Lake	Acreage	Species	No. Caught	Ave. Lgth. (Inches)	Ave. Wt. (Pounds)	Size Range (Inches)
Jocko River Drainage						
Crazy Fish	15 (est.)	Ct	47	8.6	0.20	(6.5-10.1)
Sal-ol-sooth	15 (est.)	none	--	---	----	----------
Summit	15 (est.)	Rb	4	13.5	1.13	(8.5-16.2)
Whitehorse	15 (est.)	*Ct	5	22.5	4.68	(19.8-24.8)
South Fork Drainage						
Doctor	52.6	*Ct	13	16.6	1.70	(10.2-24.0)
		Dv	28	10.1	0.35	(7.2-12.1)
		Wf	57	7.6	0.15	(3.8-16.0)
George	128	*Ct	25	17.7	2.51	(14.5-20.6)
Koessler	83.9	Ct	36	9.8	0.37	(3.5-13.5)
Lick	15.5	--	--	---	----	----------
Swan Drainage						
Gray Wolf	348	*Ct	10	8.2	0.19	(7.0-10.0)

*--Yellowstone Cutthroat

Follow-up surveys were conducted for Dog, Swan, Dickey, Spencer and Bailey Lakes as part of the general survey program for District One. The following species of fish collected were: Rainbow trout, brook trout, Dolly Varden, whitefish, pumpkinseed, yellow perch, longnose sucker, largescale sucker, Northern squawfish and peamouth. In addition, soundings were taken and water volumes computed for Dog, Spencer, Dickey and Bailey Lakes. The data pertaining to these lakes is kept on file at the district headquarters.

Conductivity readings were taken at 16 lakes and converted to total dissolved solids. A wide variety of T. D. S. readings were recorded ranging from 63 to 3200 ppm.

Lauri Lake, one of the present supplies for Westslope cutthroat brood stock was mechanically aerated during the winter of 1961-1962, in an attempt to increase dissolved oxygen concentrations and prevent a winter fish mortality. During the succeeding winter of 1962-1963, oxygen concentrations remained adequate for sustaining fish life and aeration of the lake was not necessary.

Lake levels are presently at an all time low. The lake is being used as a source of irrigation and water levels dropped 8 to 10 feet during the summer of 1963.

On January 20, 1964, an oxygen temperature series was initiated and continued through March 6th (Table 2.). A decrease in dissolved oxygen concentration at the 9 foot level was evident on February 17. Although oxygen levels had not decreased significantly, precautionary measures were taken to prevent a possible fish mortality and the aeration system was put into operation on February 20th. During the operation of the aerator, dissolved oxygen concentration increased at the mid-depth and bottom levels and decreased at the surface. At the time the final oxygen temperature series was taken (March 5.) dissolved oxygen concentrations and water temperatures had become relatively uniform throughout the entire lake basin. At this time, oxygen concentrations ranged from 9.3 ppm. at the surface to 9.1 ppm. at the lake bottom. Water temperatures cooled off considerably with a temperature span of only 2^{o}F. from top to bottom. Due to the high oxygen levels, further sampling was discontinued and aeration of the lake was discontinued on the 2nd of April.

Table 2. Summary of Lauri Lake oxygen-temperature determinations taken during the winter months of 1964.

Date	SURFACE Water Temp. (°F)	SURFACE Oxygen (ppm)	MID-DEPTH (9 FT.) Water Temp. (°F	MID-DEPTH (9 FT.) Oxygen (ppm)	BOTTOM (18 FT.) Water Temp. (°F)	BOTTOM (18 FT.) Oxygen (ppm)
1-20-64	32.5	12.3	39	10.6	41	4.5
1-30-64	----	12.5	--	10.2	--	4.9
2-17-64	33	11.6	39	7.0	41	8.7
2-24-64	32	11.6	40	7.8	40	5.1
3-6-64	33	9.3	35	9.2	35	9.1

Consideration is now being given to abandon Lauri Lake as a cutthroat brood station. Due to irrigation, constant water levels cannot be maintained. In addition, the brood stock is of poor quality, being infected with I. P. N. (infectious pancreatic necrosis) and should eventually be discontinued. Present recommendations are to continue the oxygen-temperature measurements during the period of ice cover in the winter of 1964-1965 and aerate the lake in the event of low oxygen concentrations.

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Date: February 15, 1965