MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-32-R-4 Name Helicopter Mountain Lake Survey

Job. No. I Title Survey of Mission Mountain and Jewel Basin Area Lakes

Period Covered: July 1, 1967 to March 31, 1968

ABSTRACT:

Fish population surveys of 25 Mission Mountain lakes outside the Mission Mountain Primitive Area and 15 lakes in the Jewel Basin area of the Swan Mountain range were conducted in August 1967. Trout populations were present in 7 of the lakes surveyed in the Mission Mountains and 10 of the lakes surveyed in the Jewel Basin area. Trout species collected include: cutthroat trout (Salmo clarki), rainbow trout (Salmo gairdneri), and brook trout, (Salvelinus fontinalis). Physical and chemical data (depth soundings, water temperatures, specific conductance, pH, and total alkalinity) were collected in conjunction with the fish population data.

An additional 33 small lakes in the Mission Mountains and 7 lakes in the Jewel Basin area were closely observed from the air and were designated too shallow for fish management.

RECOMMENDATIONS:

Management recommendations made for lakes surveyed are presented in tabular form (see Tables 3 and 6). Air plants of westslope cutthroat trout fry were recommended for 17 Mission Mountain lakes and 6 Jewel Basin area Lakes.

OBJECTIVES:

The purpose of this survey is to inventory fish populations of mountain lakes inaccessible to wheeled vehicle travel but outside wilderness and primitive area boundaries. This is a continuing project.

TECHNIQUES USED:

A two-man helicopter crew conducted the lake surveys. Monofilament gill nets, 125 feet in length with a graduated mesh size of 3/4 to 2 inches square, were used to sample fish populations. Gill nets were set from the pontoons of the helicopter as it taxied across the surface of the water. Total lengths of all fish collected were

recorded. Scale samples were collected for age and growth analysis. Outline maps of most lakes were traced from U. S. Forest Service maps and surface areas were traced with a planimeter. Some lake maps were not available for tracing; therefore, surfaces acres were estimated. Lake depths were recorded with an echo sounder. temperature profile data were recorded with a thermister thermometer. Data for all lakes surveyed were recorded on index file cards and kept on file at the district and Helena offices. Lakes too shallow for fish management were identified by location (township, range and section).

FINDINGS:

Mission Mountain Lakes: The Mission Mountain lake survey was conducted in Lake County, west of the Mission Mountain Primitive Area boundary. These lakes are in the lower Flathead River Drainage and lie at elevations ranging from 5,200 feet to 7,600 feet mean sea level (MSL). Maximum lake depths ranged from 25 to 150 feet. Horse trails provide access to lakes at lower elevations while lakes at higher elevations were accessibly only by foot.

Biological, physical and chemical data were collected for 25 lakes. An additional 33 small headwater lakes, in which the entire lake bottom could be observed by air, were considered too shallow for fish managment. No other data were collected from these lakes.

In general, these lakes are of low chemical fertility, typical of headwater mountain lakes. Surface temperatures ranged from a maximum of 63° to a minimum of 42° F. Thermal stratification was more prominent in lakes that had a southwest exposure to sunlight. Ice floes were still present on lakes at higher elevations having a northeast exposure. A summary of the physical and chemical data collected for the Mission Mountain lakes is presented in Table 1.

Fish populations were present in 7 of the 25 lakes sampled with gill nets. Adequate or overabundant populations of game fish were found in 4 lakes and remnant trout populations were found in 3 lakes. A summary of the gill net sampling data for the Mission Mountain lakes is shown in Table 2.

Seventeen lakes were recommended for stocking. Air plants of westslope cutthroat trout fry are scheduled in the summer of 1968. Management recommendations for the Mission Mountain lakes are presented in Table 3.

Jewel Basin Lakes: The Jewel Basin area lake survey was conducted in Flathead County approximately 18 air miles east of Kalispell. These are headwater lakes of the upper Flathead Drainage situated in the Swan Mountain Range and lie at elevations ranging from 5,475 to 6,300 feet (MSL). Maximum lake depths ranged from 22 to 135 feet. Most of the lakes in this area are accessible by horse trail, but some of the more remote lakes are accessible only by foot.

Table 1. Summary of physical and chemical data collected for 25 Mission Mountain lakes, August, 1967

Lake	Location T	R	S	Elevation (feet MSL)	Surface area (acres)	Maximum depth (feet)	Surface temp. (degrees F.)	pH units	Standard conductance (micromhos/cm)	Total alkalinity (p.p.m.)
Mud #1	21	19	1	6500	10.0*	34	64	6.9	5	15
Mud #2	21	19	1	6300	20.0*	115	63	6.9	15	9
Mud #3	21	19	2	5750	10.0*	70	63	7.0	18	10
Mud #4	22	19	35	5500	15.0*	145	66	6.9	16	9
Pablo	21	19	12	6550	30.0*	45	64	6.9	15	7
Upper Morigeau	20	19	31	6200	15.0*	36	60	7.4	49	28
Lower Morigeau	20	19	36	5800	8.0*	65	66	7.3	47	27
So. Crow Cr. #2	20	18	6	6500	55.3	110	63	7.4	85	48
So. Crow Cr. #3	20	18	8	6500	10.8	35	62	7.3	100	58
So. Crow Cr. #4	20	18	7	5900	36.0	105	59	7.3	86	47
So. Crow #5	20	18	7	6350	32.5	65	63	7.4	103	58
Summit	20	18	31	6400	67.6	50	61	7.9	103	61
Long	19	18	4	5800	30.0*	47	59	7.9	127	70
Lake of the Clouds	19	18	33	7600	41.4	67	42	7.3	40	24
Ice Flow	19	18	28	7400	14.6	40	42	7.9	68	37
Cliff	19	18	27	7200	45.0	150	50	7.3	50	33
Disappointment	19	18	22	6700	14.6	50	54	7.3	59	34
First	19	18	16	6400	57.8	65	57	7.3	78	36
Duncan	19	18	30	7200	9.9	47	57	7.3	90	50
Ashley	19	19	25	5200	30.0*	68	62	7.4	121	55
Picture	18	18	4	6450	20.4	50	57	7.4	125	42
Lucifer	18	18	5	6600	41.4	110	55	7.3	99	54
Senielem	18	18	18	6700	20.0*	40	53	7.1	58	33
Dry	17	18	22	7200	8.0*	25	43	7.0	31	19
No Fish	18	18	27	7400	18.8	170	47	6.9	26	18

*Estimated acreage
MSL=mean sea level

Table 2. Summary of fish collected by overnight gill net sets in 25 Mission Mountain Lakes, August, 1967

Lake	Immediate drainage	Number net sets	Trout per net	Species 1/ (number)	Average length (inches)	Size range (inches)
Mud #1	Mud Cr.	1	0.0			
Mud #2	Mud Cr.	1	19.0	Rb (19)	Rb (9.2)	Rb (6.2-11.5)
Mud #3	Mud Cr.	1	19.0	Rb (17)	Rb (8.6)	Rb (6.7-12.5)
				Yct (2)	Yct (10.5)	Yct (9.5-11.6)
Mud #4	Mud Cr.	1	28.0	Eb (23)	Eb (7.5)	Eb (4.3-10.4)
				Rb (5)	Rb (10.3)	Rb (6.8-14.5)
Pablo	Unnamed	1	0.0			
Upper Morigeau	Morigeau Cr.	1	0.0			
Lower Morigeau	Morigeau Cr.	1	0.0			
So. Crow Cr. #2	So. Crow Cr.	1	4.0	Rb (3)	Rb (16.0)	Rb (12.8-20.5)
				Yct (1)	Yct (10.3)	Yct (10.3)
So. Crow Cr. #3	So. Crow Cr.	1	0.0			
So. Crow Cr. #4	So. Crow Cr.	2	13.5	Yct (27)	Yct (11.8)	Yct (7.8-14.5)
So. Crow Cr. #5	So. Crow Cr.	1	0.0			
Summit	No. Fk. Post Cr.	2	3.0	Rb (6)	Rb (13.7)	Rb (10.8-16.4)
Long	No. Fk. Post Cr.	3	1.0	Rb (3)	Rb (14.5)	Rb (12.7-15.6)
Lake of the Clouds	So. Fk. Post Cr.	1	0.0			
Ice Flow	So. Fk. Post Cr.	1	0.0			
Cliff	So. Fk. Post Cr.	2	0.0			
Disappointment	So. Fk. Post Cr.	1	0.0			
First	So. Fk. Post Cr.	2	0.0			
Duncan	Ashley Cr.	1	0.0			
Ashley	Ashley Cr.	1	0.0			
Picture	Mission Cr.	1	0.0			
Lucifer	Mission Cr.	1	0.0			
Senielem	Mission Cr.	1	0.0			
Dry	Dry Cr.	1	0.0			
No Fish	Dry Cr.	1	0.0			

1/ Rb=rainbow trout, Eb=brook trout, Yct=Yellowstone cutthroat trout

Table 3. Management recommendations for Mission Mountain lakes surveyed by helicopter, August, 1967

Lake	Code number	Recommendations for stocking
Mud #1	7-8020	Stock Wct. fry.
Mud #2	7-8021	None, adequate population of Rb.
Mud #3	7-8022	None, adequate population of Rb. and Yct.
Mud #4	7-8023	None, lake over populated with Eb.
Pablo	7-8155	Stock Wct. fry.
Upper Morigeau	7-9415	Stock Wct. fry.
Lower Morigeau	7-7570	Stock Wct. fry.
So. Crow Cr. #2	7-8751	Remnant population Rb., Yct. stock Wct.fry.
So. Crow Cr. #3	7-8752	Stock Wct. fry.
So. Crow Cr. #4	7-8753	None, adequate population of Yct.
So. Crow Cr. #5	7-8754	Stock Wct. fry.
Summit	7-8970	Remnant population of Rb. stock Wct. fry.
Long	7-7378	Remnant population of Rb. stock Wct. fry.
Lake of the Clouds	7-7140	None, remote access, slow fish growth.
Ice Flow	7-6860	None, remote access, slow fish growth.
Cliff	7-5780	Stock Wct. fry.
Disappointment	7-5960	Stock Wct. fry.
First	7-6380	Stock Wct. fry.
Duncan	7-6080	Stock Wct. fry.
Ashley	7-5222	Stock Wct. fry.
Picture	7-8260	Stock Wct. fry.
Lucifer	7-7620	Stock Wct. fry.
Senielem	7-8590	Stock Wct. fry.
Dry	7-6048	None, remote access, slow fish growth.
No Fish	7-8120	None, remote access, slow fish growth.

Rb=rainbow trout, Wct=westslope cutthroat, Eb=brook trout

Table 4. Summary of physical and chemical data collected for 15 mountain lakes in the Jewel Basin area, August, 1967

Lake	Location T	R	S	Elevation (feet MSL)	Surface area (acres)	Maximum depth (feet)	Surface temperature (degrees F.)	pH (units)	Standard conductance (micromhos/cm)	Total alkalinity (p.p.m.)
Strawberry	28	19	11	5500	12.8	24	64	7.9	154	84
Clayton	28	18	17	5900	62.8	100	63	7.4	109	59
Blackfoot	28	18	18	5500	17.3	22	64	7.5	147	78
Cliff	28	18	20	5550	20.6	74	61	7.4	97	59
Lower 7 Acres	28	18	27	5475	11.9	76	63	7.3	78	38
Birch	28	18	32	6000	27.9	105	64	7.7	122	65
Crater	27	18	8	5650	23.5	75	63	7.3	54	29
Upper 3 Eagles	27	18	10	6175	6.3	78	60	7.7	102	57
Lower 3 Eagles	27	18	10	5500	10.1	82	61	7.6	106	59
Lower Pilgrim	27	18	15	6180	32.9	135	58	7.7	107	60
Upper Big Hawk	27	18	14	6300	4.0*	32	63	7.5	94	50
Lower Big Hawk	27	18	15	5800	30.1	35	60	7.5	117	61
Margaret	27	17	19	5575	64.0	76	62	7.9	168	95
Tom Tom	27	18	27	5700	8.0	33	63	7.1	26	15
North Biglow	27	18	36	6000	24.0	33	59	7.7	151	77

*Estimated acreage

Table 5. Summary of fish collected by overnight gill net sets in 15 mountain lakes in the Jewel Basin area, August, 1967

Lake	Immediate drainage	Number net sets	Catch per net	Species 1/ (number)	Average length (inches)	Size range (inches)
Strawberry	Krause Cr.	1	20.0	*Rb (20)	Rb (10.4)	Rb (8.2-11.8)
Clayton	Clayton Cr.	2	7.0	*Ct (14)	Ct (10.3)	Ct (8.5-13.8
Blackfoot	Graves Cr.	1	13.0	Rb (12)	Rb (10.8)	Rb (6.5-13.9)
				Wct (1)	Wct (11.7)	Wct (11.7)
Cliff	Graves Cr.	1	0.0			
Lower 7 Acres	Graves Cr.	1	0.0			
Birch	Birch Cr.	1	7.0	*Ct (6)	Ct (10.2)	Ct (7.2-13.5)
				Rb (1)	Rb (7.3)	Rb (7.3)
Crater	Aeneas Cr.	1	0.0			
Upper 3 Eagles	Aeneas Cr.	1	0.0			
Lower 3 Eagles	Aeneas Cr.	1	0.0			
Lower Pilgrim	Jones Cr.	1	30.0	Yct (30)	Yct (8.8)	Yct (6.4-13.2)
Upper Big Hawk	Jones Cr.	1	1.0	Wct (1)	Wct (21.5)	Wct (21.5)
Lower Big Hawk	Jones Cr.	1	31.0	Yct (31)	Yct (8.7)	Yct (5.4-18.5)
Margaret	Forest Cr.	1	7.0	Yct (7)	Yct (14.1)	Yct (11.4-16.2)
Tom Tom	Wheeler Cr.	1	21.0	Yct (21)	Yct (10.3)	Yct (7.3-13.3)
North Biglow	Biglow Cr.	1	4.0	Wct (4)	Wct (12.1)	Wct (10.3-13.4

*Includes RbxCT hybrids

1/ Rb=rainbow trout, Yct=Yellowstone cutthroat trout, Wct=westslope cutthroat, Ct=cutthroat trout

Table 6. Management recommendations for Jewel Basin area lakes surveyed by helicopter, August, 1967

Lake	Code number	Recommendations for stocking
Strawberry	7-8920	None, adequate population of Rb.
Clayton	8-8340	None, adequate population of Ct.
Blackfoot	8-8180	None, adequate population of Rb.
Cliff	8-8380	Stock Wct. fry.
Lower 7 Acres	8-9630	Stock Wct. fry.
Birch	7-5320	None, adequate population of Ct.
Crater	8-8400	Stock Wct. fry.
Upper 3 Eagles	8-9958	Stock Wct. fry.
Lower 3 Eagles	8-9175	Stock Wct. fry.
Lower Pilgrim	8-9460	None, abundant population of Yct.
Upper Big Hawk	8-9955	Remnant population of Wct.,stock Wct.fry.
Margaret	8-9180	None, adequate population of Yct.
Tom Tom	8-9860	None, abundant population of Yct.
North Biglow	8-8080	None, fair population of Wct.

Rb=rainbow trout, Wct=westslope cutthroat, Yct=yellowstone cutthroat, Ct-cutthroat, parentage uncertain

The U. S. Forest Service has recently considered the Jewel Basin area for wilderness status and a concerted effort was made to survey as many of these lakes as possible. Once designated as wilderness area, lake surveys could be conducted by the slower means of horseback travel.

Biological, physical and chemical data were collected for 16 lakes. An additional 7 lakes observed from the air were determined too shallow to sustain fish life and no other data were collected from these lakes.

With the exception of Tom Tom Lake, these lakes are of moderate chemical fertility. Thermal stratification was evident in most lakes with the thermocline area beginning at 15 to 25 feet below the surface. Surface water temperatures were generally higher than those reported for the Mission Mountain lakes, ranging from 58° to 64° F. The physical and chemical data collected for the Jewel Basin area lakes are presented in Table 4.

Fish populations were found in 10 of the 15 lakes sampled with gill nets. Adequate or abundant fish populations were present in nine lakes. One lake, Upper Big Hawk Lake, had a remnant population of cutthroat trout. A summary of the population samples collected for the Jewel Basin area lakes is presented in Table 5.

Six Jewel Basin area lakes were recommended for stocking. Westslope cutthroat trout fry were air dropped into these lakes in September 1967. Management recommendations for all lakes surveyed are presented in Table 6.

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