MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB PROGRESS REPORT

State Montana

Project No. F-32-R-8 Title Helicopter Mountain Lake Survey

Job No. I-a Title Kootenai and Clark Fork River Drainages - District One

Period Covered July 1, 1971 to June 30, 1972


## ABSTRACT

Fish population surveys of 28 mountain lakes outside wilderness areas in the Kootenai and Clark Fork River drainages were conducted July 12 through July 20, 1971. Trout populations were present in 3 lakes in the Kootenai River drainage and 9 lakes in the Clark Fork River drainage. Measurements of physical and chemical data (depth soundings, water temperature profiles, specific conductance, pH and total alkalinity) were collected in conjunction with fish population data.

An additional 20 small lakes in the Kootenai River drainage and 52 lakes in the Clark Fork River drainage were closely observed from the air and were designated as being too shallow for fish management.


## BACKGROUND

The helicopter has become a useful management tool for transporting men and equipment to survey and inventory fish populations in high mountain lakes. It has all but replaced the conventional method of conducting lake surveys in remote mountain areas with pack animals. Since 1966, 126 lakes have been surveyed in District One outside wilderness area boundaries with the use of a helicopter. During this period an additional 255 lakes were observed from the air and were classified as being too shallow for fish management.

## OBJECTIVES

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

## PROCEDURES

A two-man helicopter crew conducted the lake surveys. Monofilament gill nets, 125 feet by 5 feet in depth with graduated mesh size of 3/4 to 2 inches square, were used to sample fish populations. Gill nets were set from pontoons

of the helicopter as it taxied across the water. Total lengths and weights of all fish collected were recorded. Scale samples were collected for age and growth analysis. Outline maps of lakes were traced from U. S. Forest Service or U. S. Geological Survey Maps and surface areas were determined with a planimeter. Lake depths were recorded with a Lowrance Fish Lo-K-Tor or a Recording Bendix Echo Sounder. Temperature profile data were recorded with a thermister thermometer. Lake elevations were recorded from altimeter readings. Cursory observations were made of inlet tributary streams to evaluate their spawning potential. 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) and are shown in Table 1.

## FINDINGS

The mountain lakes surveyed in the summer of 1971 include 13 lakes in the Kootenai River drainage and 15 lakes in the Clark Fork River drainage. The elevation (MSL) of lakes surveyed ranged from 2,520 to 6,774 feet. The majority of lakes surveyed with the exception of Little Spar, were relatively small, ranging in size from 1.6 to 24.0 acres. Little Spar Lake has an area of 50.6 surface acres. Surface temperatures ranged from a low of 41° F. to a high of 64°. Maximum depths ranged from 5 to over 90 feet for Little Spar Lake. Because of a partial ice cover on Little Spar Lake, sounding transects were not completed.

Water chemistry data collected include pH, alkalinity and standard conductance. A wide range in pH values was found in these lakes ranging from 6.2 to 8.6, with several lakes being in the 6.2 to 6.4 range. With the exception of a few lakes, total alkalinity and specific conductance values were relatively low indicating low basic fertility. A summary of the physical and chemical data collected from lake surveys is presented in Table 2.

Lakes in which the entire lake basin could be observed by air were designated as being too shallow for fish management and were identified by location (township, range and section). No other data were collected from these lakes.

Fish populations were found to be present in 13 of the 28 lakes surveyed. Five lakes, all in the Kootenai drainage, were found to be unsuitable to support fish life either because they are too shallow or the lake levels dropped significantly by late fall to sustain fish through the winter. Adequate or self sustaining populations of game fish were found in 10 lakes and remnant populations of game fish were found present in 2 lakes. Non-game fish (pumpkinseed) was the only species collected from one lake (Shannon). A summary of fish population data is presented in Table 3.

A total of 12 lakes were recommended for stocking with westslope cutthroat trout fry. These include 4 lakes in the Kootenai River drainage and 8 lakes in the Clark Fork River drainage.

## RECOMMENDATIONS

Management recommendations made for mountain lakes surveyed by helicopter in 1971 are presented in Table 4. Air drops of westslope cutthroat fry were made in late August of 1971.

Table 1. Mountain lakes observed by helicopter considered too shallow for fish management, July 12 through July 21, 1971

| Lake | Immediate drainage | No. of lakes | Locations T | R | S |
|---|---|---|---|---|---|
| Kootenai River drainage | | | | | |
| Hidden | Hidden Cr. | 1 | 36 | 34 | 8 |
| Unnamed | Aster Cr. | 1 | 37 | 34 | 24 |
| Unnamed | S. Kelly Cr. | 1 | 37 | 34 | 13 |
| Unnamed | S. Fk. Hawkins Cr. | 1 | 37 | 33 | 18 |
| Unnamed | Hartman Cr. | 2 | 35 | 31 | 34 |
| Unnamed | O'Brien Cr. | 1 | 32 | 33 | 23 |
| Unnamed | Pipe Cr. | 1 | 32 | 31 | 25 |
| Unnamed | Blue Cr. | 1 | 32 | 31 | 14 |
| China | W. Fk. Quartz Cr. | 1 | 32 | 33 | 30 |
| Unnamed | Doak Cr. | 1 | 31 | 30 | 1 |
| Unnamed | Copper Cr. | 1 | 30 | 34 | 1 |
| Unnamed | Keeler Cr. | 1 | 30 | 34 | 32 |
| Unnamed | S. Fk. Keeler Cr. | 2 | 29 | 34 | 5, 8 |
| Unnamed | Drift Cr. | 1 | 29 | 34 | 18 |
| Unnamed | Iron Meadow Cr. | 2 | 26 | 30 | 31 |
| Unnamed | Trail Cr. | 1 | 26 | 30 | 31 |
| Unnamed | Stanley Cr. | 1 | 29 | 34 | 35 |
| | TOTAL | 20 | | | |
| Clark Fork River drainage | | | | | |
| Unnamed | Beaver Cr. | 6 | 26 | 34 | 4, 5 |
| Unnamed | N. Fk. Bull R. | 2 | 28 | 33 | 11, 15 |
| 93 Mile | S. Branch Trout Cr. | 1 | 23 | 33 | 9, 16 |
| Berry | Attlebury Cr. | 1 | 23 | 33 | 13 |
| East | E. Fk. Trout Cr. | 1 | 23 | 33 | 24 |
| Beaver | S. Branch Beaver Cr. | 1 | 22 | 32 | 34 |
| Unnamed | S. Branch Beaver Cr. | 1 | 22 | 32 | 34 |
| Unnamed | Glidden Cr. | 1 | 21 | 32 | 32 |
| Unnamed | Cooper Gulch | 1 | 20 | 32 | 5 |
| Goat | Goat Cr. | 2 | 22 | 29 | 26 |
| Honeymoon | Spruce Cr. | 1 | 22 | 29 | 12 |
| Knowles | Four Lakes Cr. | 1 | 22 | 29 | 2 |
| Grass | Four Lakes Cr. | 1 | 22 | 29 | 2 |
| Frog | Four Lakes Cr. | 2 | 22 | 29 | 2 |
| Porcupine | Four Lakes Cr. | 1 | 22 | 29 | 2 |
| Graves | Graves Cr. | 1 | 23 | 29 | 26 |
| Winniemuck | Winniemuck Cr. | 1 | 22 | 29 | 27 |
| Unnamed | Graves Cr. | 2 | 23 | 29 | 28 |
| Unnamed | Irus Cr. | 1 | 23 | 29 | 7 |

Table 1. cont'd

| Lake | Immediate drainage | No. of lakes | Locations T | R | S |
|---|---|---|---|---|---|
| Unnamed | Control Cr. | 1 | 23 | 29 | 5 |
| Unnamed | W. Fk. Fishtrap Cr. | 1 | 23 | 29 | 13 |
| Unnamed | W. Fk. Thompson R. | 1 | 23 | 29 | 13 |
| Unnamed | W. Fk. Fishtrap Cr. | 1 | 23 | 29 | 1 |
| Unnamed | W. Fk. Fishtrap Cr. | 1 | 23 | 29 | 12 |
| Sylvan | Miller Cr. | 2 | 24 | 29 | 30 |
| Marmot | Miller Cr. | 4 | 24 | 29 | 30 |
| | | | 24 | 30 | 24, 25 |
| Bear | Grouse Cr. | 1 | 24 | 30 | 24 |
| Rush | Miller Cr. | 1 | 24 | 29 | 19 |
| Imagine | Freezeout Cr. | 1 | 23 | 29 | 10 |
| Unnamed | Malone Cr. | 3 | 21 | 28 | 33, 34 |
| Quail | Malone Cr. | 1 | 21 | 28 | 34 |
| Unnamed | Quartz Cr. | 2 | 20 | 28 | 3, 4 |
| Acorn | Eddy Cr. | 1 | 20 | 28 | 27 |
| Unnamed | W. Fk. Lyons Cr. | 1 | 25 | 30 | 28 |
| Unnamed | W. Fk. Lyons Cr. | 1 | 25 | 30 | 22 |
| | TOTAL | 52 | | | |

Table 2. Summary of physical and chemical data collected for mountain lakes surveyed by helicopter July 12 through July 20, 1971

| Lake | Location T | R | S | Elevation (feet MSL) | Surface area (acres) | Maximum depth (feet) | Surface temp. (F°) | pH units | Standard conductance (micromhos/cm) | Total alkalinity (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Kootenai River drainage | | | | | | | | | | |
| Blue, Upper | 32 | 30 | 16 | 3960 | 2.8 | 10 | 57 | 6.5 | 31 | 23 |
| Blue, Lower | 32 | 30 | 16 | 3975 | 3.0* | 20 | 53 | 6.7 | 41 | 24 |
| Border | 37 | 33 | 7 | 6136 | 11.9 | 40 | 48 | 6.4 | 21 | 11 |
| Lake Florence | 37 | 34 | 35 | 6275 | 3.3 | 5 | - | - | - | - |
| Flower | 30 | 31 | 13, 24 | 3830 | 1.6 | 25 | 64 | 6.45 | 25 | 15 |
| Hawkins, Upper | 37 | 34 | 13 | 6774 | 4.2 | 20 | 41 | 6.2 | 23 | 8 |
| Hawkins, Lower | 37 | 33 | 18 | 6564 | 12.9 | 38 | 43 | 6.45 | 22 | 13 |
| Honey | 37 | 34 | 27 | 6275 | 1.7 | 5 | - | 6.45 | 18 | 10 |
| Spar, Little | 28 | 34 | 5, 6 | 5160 | 50.6 | 90+ | 41 | 6.4 | 22 | 13 |
| Shannon | 31 | 33 | 14, 23 | 2520 | 1.9 | 19 | 63 | 8.6 | 174 | 103 |
| Spruce | 29 | 34 | 6, 78 | 4100 | 11.6 | 10 | 52 | 6.75 | 21 | 11 |
| Tom Poole | 33 | 31 | 28 | 3400 | 6.8 | 15 | 64 | 7.85 | 295 | 173 |
| Wee | 33 | 33 | 13 24 | 5320 | 5.1 | 27 | 59 | 6.3 | 21 | 10 |
| Clark Fork River drainage | | | | | | | | | | |
| Arrow Head | 22 | 29 | 12 | 5850 | 12.5 | 37 | 57 | 6.3 | 15 | 9 |
| Blossom, Lower | 21 | 32 | 30 | 5550 | 24.0 | 75 | 53 | 6.5 | 23 | 14 |
| Blossom, Upper | 21 | 32 | 30 | 5750 | 6.9 | 17 | 51 | 6.5 | 25 | 11 |
| Cabin | 23 | 29 | 35 | 5825 | 13.8 | 40 | 52 | 7.1 | 24 | 20 |
| Carbine | 23 | 29 | 23 | 5900 | 1.6 | 19 | 67 | 6.3 | 22 | 9 |
| Deer | 22 | 29 | 24 | 5800 | 6.4 | 23 | 57 | 7.3 | 29 | 17 |

Table 2. Cont'd

| Lake | T | R | S | Elevation (feet MSL) | Surface area (acres) | Maximum depth (feet) | Surface temp. ($F^{o}$) | pH units | Standard conductance (micromhos/cm) | Total alkalinity (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Clark Fork River drainage cont'd | | | | | | | | | | |
| Duckhead | 22 | 29 | 13 | 6000 | 8.0 | 27 | 57 | 6.3 | 15 | 9 |
| Elk | 25 | 30 | 25 | 4125 | 14.1 | 45 | 67 | 6.6 | 25 | 14 |
| Evans | 21 | 32 | 34 | 5350 | 10.4 | 34 | 56 | 6.55 | 24 | 12 |
| Lawn | 23 | 29 | 27 | 6000 | 4.8 | 36 | 55 | 6.7 | 19 | 14 |
| Outlaw | 21 | 28 | 28 | 6320 | 4.8 | 45 | 60 | 6.9 | 37 | 26 |
| Stony | 23 | 29 | 1 | 5390 | 8.6 | 7 | 64 | 6.55 | 25 | 25 |
| Terrace | 23 | 29 | 12 | 5500 | 16.0 | 160 | 64 | 7.95 | 38 | 21 |
| Terrace, Little | 23 | 29 | 12 | 5600 | 7.7 | 24 | 60 | 6.05 | 20 | 8 |
| Poacher | 20 | 28 | 3, 4 | 5600 | 8.3 | 34 | 61 | 6.80 | 32 | 15 |
| Upper Fish Trap | 25 | 28 | 33, 34 | 4000 | 6.9 | 6 | 62 | 6.55 | 24 | 12 |

* Estimated acreage.

Table 3. Summary of fish collected by one overnight gill net from mountain lakes surveyed by helicopter July 12, through July 20, 1971

| Lake | Immediate drainage | Species 1/ number caught in parentheses | Game species average length (inches) | Game species size range (inches) |
|---|---|---|---|---|
| **Kootenai River drainage** | | | | |
| Blue, Upper | Blue Cr. | None | --- | --- |
| Blue, Lower | Blue Cr. | None | --- | --- |
| Border | So. Fk. Hawkins Cr. | Eb(16) | Eb(9.6) | Eb(8.0-10.7) |
| Florence | American Cr. | None | --- | --- |
| Flower * | Flower Cr. | None | --- | --- |
| Hawkins, Upper | So. Fk. Hawkins Cr. | None | --- | --- |
| Hawkins, Lower | So. Fk. Hawkins Cr. | None | --- | --- |
| Honey | Honey Cr. | None | --- | --- |
| Spar, Little | Spar Cr. | Eb(28) | Eb(9.9) | Eb(7.0-12.4) |
| Shannon | Kootenai R. | PS(31) | --- | --- |
| Spruce | S. Fk. Keeler Cr. | None | --- | --- |
| Tom Poole | Pipe Cr. | None | --- | --- |
| Wee | Arbo Cr. | Rb(6) | Rb(10.9) | Rb(9.7-12.0) |
| **Clark Fork River drainage** | | | | |
| Arrowhead | Spruce Cr. | Wct(14) | Wct(9.0) | Wct(6.4-13.9) |
| | | Rb x Ct(4) | Rb x Ct(10.3) | Rb x Ct(6.3-13.6) |
| Blossom, Lower | Glidden Gulch | Eb(26) | Eb(7.0) | Eb(6.5-7.5) |
| Blossom, Upper | Glidden Gulch | Eb(11) | Eb(7.2) | Eb(6.5-7.9) |
| Cabin | Four Lakes Cr. | Yct(5) | Yct(14.0) | Yct(13.0-14.8) |
| Carbine | Graves Cr. | None | --- | --- |
| Deer | Honeymoon Cr. | None | --- | --- |
| Duckhead | Spruce Cr. | Wct(9) | Wct(8.5) | Wct(6.0-8.9) |
| | | Rb x Ct(3) | Rb x Ct(13.8) | Rb x Ct(13.1-14.4) |
| Elk | Sims Cr. | Wct(12) | Wct(10.8) | Wct(9.9-12.0) |
| Evans | Evans Gulch | Eb(7) | Eb(7.4) | Eb(6.8-7.4) |
| Lawn | Winniemuck Cr. | None | --- | --- |

Table 3. cont'd

| Lake | Immediate drainage | Species 1/ number caught in parentheses | Game species average length (inches) | Game species size range (inches) |
|---|---|---|---|---|
| Outlaw | Outlaw Cr. | None | --- | --- |
| Poacher | Quartz Gulch | None | --- | --- |
| Stony | W. Fk. Fish Trap Cr. | Wct(21) | Wct(8.7) | Wct(6.1-11.8) |
| Terrace | W. Fk. Fish Trap Cr. | Yct(4) | Yct(15.0) | Yct(14.2-16.0) |
| Terrace, Little | W. Fk. Fish Trap Cr. | None | --- | --- |

1/ Eb= brook trout, Wct= westslope cutthroat, Yct= yellowstone cutthroat, Rb= rainbow trout, Rb x Ct= rainbow x cutthroat hybrid trout, PS= pumpkinseed.

* 12 hour net set.

Table 4. Management recommendations for mountain lakes surveyed by helicopter July 19 through July 23, 1970

| Lake | Code number | Recommendations for stocking |
|---|---|---|
| **Kootenai River drainage** | | |
| Blue, Upper | No code | None, too shallow for fish management |
| Blue, Lower | No code | None, too shallow for fish management |
| Border | 11-7990-03 | None, adequate population of Eb present |
| Florence | No code | None, too shallow for fish management |
| Flower | 11-8320-03 | Stock Wct fry |
| Hawkins, Upper | 11-8471-03 | Stock Wct fry |
| Hawkins, Lower | 11-8470-03 | Stock Wct fry |
| Honey | No code | None, too shallow for fish management |
| Spar, Little | 11-8900-03 | None, adequate population of Eb present |
| Shannon | 11-9540-03 | None, rehabilitate to eliminate PS |
| Spruce | 11-9660-20 | None, too shallow for fish management |
| Tom Poole | 11-9380-03 | Stock Wct fry |
| Wee | 11-9980-03 | None, adequate population of Rb |
| **Clark Fork River drainage** | | |
| Arrowhead | 5-8384-03 | None, adequate population of Ct present |
| Blossom, Upper | 5-8449-03 | None, adequate population of Eb present |
| Blossom, Lower | 5-8448-03 | None, adequate population of Eb present |
| Cabin | 5-8496-03 | Stock Wct fry, remnant population of Yct |
| Carbine | 5-8528-03 | Stock Wct fry |
| Deer | 5-8704-03 | Stock Wct fry |
| Duckhead | 5-8736-03 | None, adequate population of Ct present |
| Elk | 5-8768-03 | None, adequate population of Ct present |
| Evans | 5-8790-03 | None, adequate population of Eb |
| Lawn | 5-9085-03 | Stock Wct fry |
| Outlaw | 5-9350-03 | Stock Wct fry |
| Poacher | 5-9370-03 | Stock Wct fry |
| Stony | 5-9584-03 | Stock Wct fry |
| Terrace | 5-9648-03 | Stock Wct fry, remnant population of Yct |
| Terrace, Little | 5-9099-03 | Stock Wct fry |

Eb= brook trout, Ct= cutthroat trout, Rb= rainbow trout,
PS= pumpkinseed, Wct= westslope cutthroat, Yct= yellowstone cutthroat.

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Code numbers of waters referred to are listed in Table 4.