

JOB COMPLETION REPORT
INVESTIGATIONS PROJECT

State of Montana
Project No. F-12-R-6 Name Western Montana Fishery Study
Job No. I Title Inventory of Waters of the Project Area
Period Covered May 1, 1959 - April 30, 1960

ABSTRACT:

Twenty-five streams and fifteen lakes were surveyed during the summer of 1959. Locations of waters, population sampling effort, fish captured, and age and growth data are recorded in the district and Helena lake and stream survey files. These data are presented in tabular form for the waters for which specific management recommendations are made.

The results of the investigation of the effects of the U.S. Forest Service spruce budworm control program on aquatic life will be covered in a supplemental report.

OBJECTIVES:

To catalog some of the waters of the project area and to determine their value to the overall fishery management picture. The stream survey consisted of five parts: first, to catalog and determine the fishery value of the tributaries of Rock Creek within the Rock Creek Creel Census Study Area; second, to survey streams where requests for management of some type arose during the period covered by this report; third, to sample the population of a small stream that has been closed to fishing for several years; fourth, to survey outlet streams of the mountain lakes that were surveyed; and fifth, a continuation of a population inventory of the Little Blackfoot River to determine the effects of the cessation of a brown trout (Salmo trutta) planting program.

The objective of the high mountain lake survey was to determine the gross physical, chemical, and biological characteristics of each body of water. From the information gathered, previous management practices could be evaluated and future management recommendations made.

STREAM SURVEY:

Techniques Used:

Nineteen tributary streams of Rock Creek within the Rock Creek Creel Census Study Area were surveyed during June, 1959. One or more sections of each stream was sampled by electrofishing with a 220-volt A.C. generator. Shocked fish were captured with dip nets. Weights, total lengths, and species were recorded for each fish. Scale samples for age and growth data were taken only from streams that received fishing pressure, as denoted by the Rock Creek Creel Census Study. Other physical features of each stream were recorded on the Montana Fish and Game Department's standard stream survey form. Fisherman use was determined from the Rock Creek Creel Census data.

Acting on a request for hatchery trout, Ninemile Creek was surveyed. Three sections, comprising 850 feet of the stream, were electrofished. Fish captured were recorded by length, weight, and species. Other features of the stream were noted and recorded on the Montana Fish and Game Department's standard stream survey form.

Miller Creek, a small stream on the outskirts of Missoula, was sampled by electrofishing to determine the population level of a water that had been closed to fishing for several years. Two sections, comprising 425 feet, were fished. Fish collected were recorded by species, length, and weight. Scale samples were taken and forwarded to the department's fishery laboratory for age and growth analysis.

Three streams, Tin Cup Creek, Boulder Creek, and Ringeye Creek, were surveyed in conjunction with the mountain lake surveys. Only the gross physical factors, in addition to visual observations of fish life, were recorded on the stream survey form for each of these streams.

Seventeen 300-foot sample sections were electrofished in a 37-mile stretch of the Little Blackfoot River between Garrison, Montana and 15 miles upstream from Elliston, Montana. The four uppermost sample sections were electrofished with a 220-volt A. C. shocker, the remaining sections with a 220-volt D. C. shocker. Each section was blocked off with a net at the lower end and an electrical seine at the upper end. The section was further divided into two sub-sections, by placing a block net in the middle of the 300-foot section. Each sub-section was worked until all, or nearly all, fish were captured. All of the fish were recorded by length, weight, and species. Scale samples were taken from a representative sample of the whitefish and trout, and were forwarded to the department's fishery laboratory for age and growth analysis.

All twelve lower sections were electrofished during 1956 and 1959. Two of these 12 sections were omitted in 1957; one being completely de-watered by irrigation demands and the other dropped because of time limitations. A statistical comparison of the three years' catch data has been made for the lower twelve sections. The uppermost five sections were first electrofished in 1959.

Findings:

Of the streams surveyed in the Rock Creek Creel Census Study Area, six streams were found to contribute to the Rock Creek fishery. Seven additional streams were found to contain fish populations, but did not contribute to the Rock Creek fishery. Six streams were found to be ephemeral and of no fishery value.

The survey of Ninemile Creek showed that there were low numbers of catchable-size trout. Apparently, this stream's production and/or reproduction cannot keep up with the adult removal by fishermen and other causes. Possible contributing factors could be: (1) impaired spawning success due to siltation from an old dredge mine on this creek; (2) impaired natural productivity from the same cause; (3) low basic productivity of the stream.

Since old-timers report good fishing in this area before the dredge mining operation, and further, since even small-sized fish were scarce in our samples, we believe factor No. 1 above is the most likely cause.

The survey of Miller Creek, a stream closed to fishing, showed an abundant population of cutthroat trout and brook trout were present. Many of the fish captured were of a catchable-size, six inches or longer in length.

Table 1 gives a summary of the results of the surveys of Ninemile and Miller Creeks.

Figure 1 shows a comparison of the numbers of cutthroat trout, eastern brook trout, and whitefish taken from these streams. No whitefish were taken in Miller Creek. Numbers of fish are grouped by two-inch length intervals and have been computed by 100 feet of stream in order to make the data more readily comparable between the two streams. Note from Table 1 that Ninemile Creek has twice the flow of Miller Creek. Thus, if the numbers of fish per 100 feet of stream could be equitably adjusted to the difference in stream sizes, Figure 1 would show an even more marked difference between the populations of the two streams.

The statistical analysis of the Little Blackfoot River population inventory for the years 1956, 1957, and 1959 is presented in Table 2. Confidence limits for the average number of fish taken per section for each year and for each species are given. The confidence limits are given for all species of fish at the 80 percent level and also for brown trout and whitefish at the 95 percent level.

These statistics indicate a reduction in the average number of whitefish and brown trout per section from 1956 and 1957 to 1959 at the 80 percent confidence level. At the 95 percent level of confidence, there was a significant reduction in the number of brown trout per section from 1956 and 1957 to 1959.

Table 1. Summary of survey data from Miller Creek and Ninemile Creek.

Stream	Location	Flow cfs	Length Sampled	Species* Collected	Number Collected
Ninemile	T15N R23W Sec. 28 Missoula Co.	20 ⁺	850 ft.	Wf	14
				Ct	46
				Eb	14
				DV	1
Miller	T12N R20W Sec. 14 Missoula Co.	10 ⁺	425 ft.	Ct	54
				Eb	130

* The abbreviations are: Wf - whitefish; Ct - cutthroat trout; Eb - eastern brook trout; DV - Dolly Varden trout.

Recommendations:

1. The remaining tributaries of Rock Creek within the Rock Creek Creel Census Study Area should be surveyed as soon as possible.
2. Ninemile Creek should be placed on a planting schedule as an experimental stream. Two thousand 2-3 inch cutthroat trout should be planted within the vicinity of the Thisted Ranch for three years. The same three study sections should be inventoried each year to determine the effects of these plantings.
3. The Little Blackfoot River population inventory should be conducted again in 1961.

Figure 1. Number of fish by two-inch length intervals per 100 feet of stream, Miller Creek and Ninemile Creek.

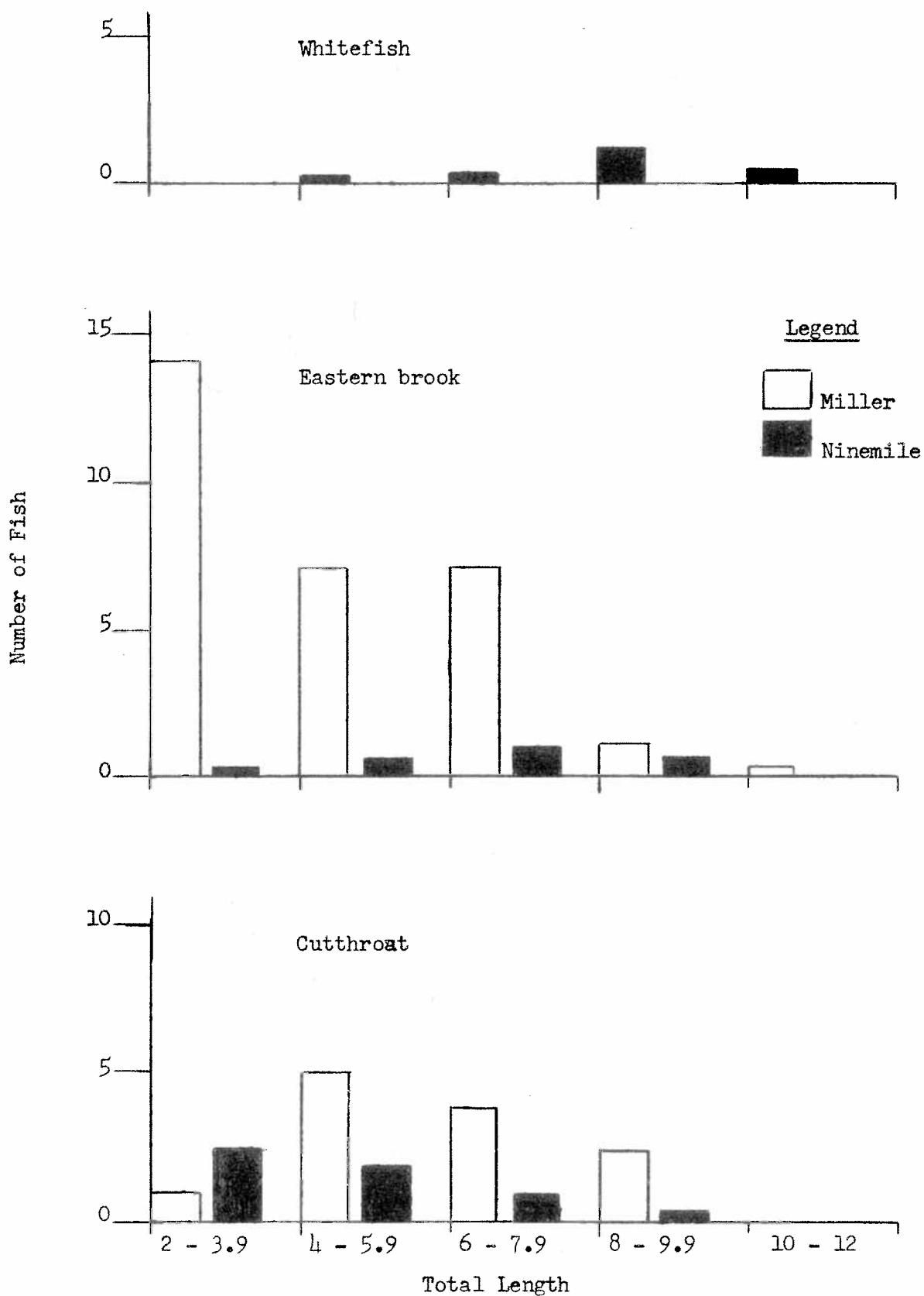


Table 2. Average catch per section from the Little Blackfoot River for the years of 1956, 1957, and 1959 with confidence limits of 80 and 95 percent.

Species	Year	Mean 80% Limits	Mean 95% Limits
Brown trout	1956	77.0	77.0
		60.6 - 93.4	51.0 - 103.0
	1957	87.4	87.4
		62.9 - 111.9	46.6 - 127.4
	1959	33.7	33.7
		25.9 - 41.5	21.2 - 46.2
Whitefish	1956	97.0	97.0
		65.5 - 128.5	46.0 - 148.0
	1957	89.0	89.0
		62.1 - 115.9	45.0 - 133.0
	1959	46.0	46.0
		35.4 - 56.6	29.0 - 63.0
Cutthroat trout	1956	4.2	
		0.0 - 8.7	
	1957	1.0	
		0.2 - 1.8	
	1959	5.0	
		0.0 - 10.3	
Rainbow trout	1956	0.2	
		0.1 - 0.3	
	1957	0.7	
		0.3 - 1.1	
	1959	0.4	
		0.0 - 0.8	
Eastern brook trout	1956	1.8	
		0.5 - 3.1	
	1957	2.4	
		0.7 - 4.1	
	1959	2.8	
		0.0 - 6.2	
Suckers	1956	4.0	
		1.7 - 6.3	
	1957	7.5	
		1.0 - 14.0	
	1959	3.4	
		1.0 - 6.8	
Dace	1956	6.4	
		0.5 - 12.3	
	1957	6.2	
		0.9 - 11.5	
	1959	4.6	
		0.3 - 8.9	
Sculpins	1956	42.0	
		29.4 - 54.6	
	1957	98.3	
		50.7 - 145.9	
	1959	36.0	
		16.5 - 55.5	

LAKE SURVEY

Techniques Used:

During August and September, 1959, 15 high mountain lakes were surveyed by project personnel. All were accessible only by 4-wheel drive vehicles or by pack stock. Nine of the lakes are in the Bitterroot River drainage, three are in the Blackfoot River drainage, and three are in the Clark Fork River drainage.

Prior to the ground survey, aerial photographs were taken of all lakes to be surveyed (with two exceptions). Maps were drawn from these photographs. Depths, contours, aquatic plant beds, inlets, outlets, and other important physical factors were recorded on these maps. Lake acreages were planimetered from the aerial photos, for which scale determinations had been made by ground measurements. Sketch maps, containing the same information were drawn for the two lakes not photographed and their acreages were estimated.

The lakes were gill netted with 125-foot graduated gill nets with five mesh sizes of 3/4" to 2" bar-measure. The nets were fished from 24 to 48 hours in each lake. Fish collected were recorded by length, weight, and species. Scale samples were taken from all fish. The scale samples from four lakes were sent to the department's fishery laboratory for age and growth analysis; the remainder were analyzed by project personnel.

The data gathered from each lake were recorded on Montana Fish and Game standard lake survey forms.

Findings:

Table 3 lists the 15 mountain lakes surveyed during 1959. Their location, size, and a summary of the net catch data are given. Age and growth data are given for the lakes in Tables 4a and 4b.

Two of the nine lakes surveyed in the Bitterroot River drainage, and two of the three lakes in the Clark Fork River drainage are impounded for irrigation. Two of the three lakes surveyed in the Blackfoot River drainage are impounded by beaver dams in their outlets.

Three of the 14 lakes surveyed were sterile of fish life. The remaining lakes contained populations of cutthroat trout, with one (Heart Lake) containing a combination of cutthroat trout and grayling.

Upper Elliot Lake was surveyed as part of an investigation of the probable effects upon the fish population of a proposed raising of the impoundment structure an additional two feet. Lower Elliot Lake, also impounded, was surveyed at the same time. The age and growth data and net-catch data is presented in Tables 3 and 4a and shows that fish growth is slow for both lakes. It was concluded that an additional two feet fluctuation in an already fluctuating lake would compound the ills already present in Upper Elliot Lake.

A comparison of the age and growth data and net-catch data for the lakes surveyed in the Bitterroot River drainage is given in Tables 3 and 4a. The basic productivity of all of these Bitterroot lakes is low. From these data it was concluded that Crystal Lake is the only lake that needs a planting of hatchery trout in the immediate future to maintain trout fishing.

The data from Heart Lake in the Blackfoot River drainage is also presented in Tables 3, 4a, and 4b. These data indicate a lake that contains a fast growing fish population. It was found that spawning facilities were very limited and it is recommended that this lake be planted with both grayling and cutthroat trout.

Recommendations:

1. Howard's Lake, in the Bitterroot River drainage, should be planted with cutthroat trout on an experimental basis. It is suspected that these fish will winter-kill, but the information gained should be useful in the management of fish in lakes similar to Howard's Lake.
2. Only two lakes, Crystal Lake in the Bitterroot drainage and Heart Lake in the Blackfoot drainage, are recommended for planting at this time. All of the lakes surveyed in the Bitterroot drainage should be planted only once every four or five years, because they have low fishing pressure due to poor accessibility.
3. The three lakes surveyed in the Clark Fork drainage are not recommended for planting at this time. It was recommended to the U.S. Forest Service that raising the dam on Upper Elliot Lake would be harmful to the future fish production of this lake.
4. No lake should be added to the planting program without first being surveyed.
5. Lakes that are impounded should either be surveyed during the time of greatest drawdown, or re-checked again at that time.

Prepared by Joe E. Huston

Approved by George D. Holton

Date May 17, 1960

Table 3. List of high mountain lakes surveyed.

Lake and Drainage ¹		Location	Size (acres)	Net sets and hours	Species ² Collected	Number Collected
Boulder ³	3	T1N R23W S1 Ravalli Co.	20.0	4 92	Ct	33
Crystal	3	T1N R23W S6 Ravalli Co.	8.4	2 90	Ct	5
Dollar	3	T1N R23W S6 Ravalli Co.	5.0	Hook & line 8	Ct	30
Howard's	3	T11N R22W S28 Missoula Co.	1.8	2 96	No fish taken	
Piquette	3	T1S R21W S20 Ravalli Co.	6.5	2 52	Ct	13
Shelf	3	T1S R21W S20 Ravalli Co.	10.4	2 42	Ct	13
Slate	3	T1S R21W S22 Ravalli Co.	4.7	2 80	No fish taken	
Turbid	3	T1N R23W S6 Ravalli Co.	10.0	2 90	No fish taken	
Tin Cup ³	3	T2N R23W S1 Ravalli Co.	127.0	-- --	(Reported by F.S. trail crew) Ct	
Heart	4	T16N R8W S17 Lewis & Clark Co.	32.0	4 88	Gr Ct	10 4
Parker	4	T16N R9W S9 Lewis & Clark Co.	12.3	4 85	Ct	86
Webb	4	T16N R9W S14 Lewis & Clark Co.	10.0(est)	2 26	Ct	31
Elliot, Lower ³	5	T7N R11W S10 Powell Co.	31.0	2 32	Ct	77
Elliot, Upper ³	5	T7N R11W S21 Powell Co.	67.0	2 41	Ct	96
Medicine	5	T4N R17W S2 Granite Co.	45.0(est)	3 60	Ct	28

1 Drainages are coded to conform with the statewide breakdown. 3 is the Bitterroot drainage, 4 is the Blackfoot drainage, and 5 is the Clark Fork drainage above the mouth of the Bitterroot.

2 Abbreviations are: Ct - cutthroat trout, Gr - grayling.

3 Lakes impounded for irrigation.

Table 4a. Age and growth of cutthroat trout from 11 lakes.

Lake and Drainage*		Length in Inches at Annulus					
		I	II	III	IV	V	VI
Boulder	3	4.2*(32)**	8.1(31)	11.6(20)	15.0(4)		
Crystal	3	4.5(5)	7.3(4)	9.4(4)	11.8(3)		
Dollar	3	3.4(16)	7.4(16)	10.4(13)			
Piquette	3	3.2(11)	5.5(11)	7.2(11)	8.7(11)	10.2(7)	11.2(1)
Shelf	3	4.3(13)	9.0(13)	11.2(11)	12.8(4)		
Heart	4	4.9(4)					
Parker	4	3.0(58)	6.7(57)	10.2(39)	12.7(1)	17.2(1)	
Webb	4	3.3(31)	7.6(31)	10.0(16)	13.5(7)		
Elliot, Lower	5	2.8(23)	5.1(23)	6.8(16)	8.5(3)		
Elliot, Upper	5	2.7(49)	4.9(49)	6.6(25)	8.8(2)		
Medicine	5	4.9(28)	8.5(21)	11.6(8)			

Table 4b. Age and growth of grayling from Heart Lake.

Lake and Drainage*		Length in Inches at Annulus					
		I	II	III	IV	V	VI
Heart	4	4.7*(10)**	11.3(10)	13.9(9)	15.0(8)	16.2(4)	

* Code for drainage is: 1 - Bitterroot, 2 - Clark Fork above the mouth of the Bitterroot, 3 - Blackfoot.

** Figures in parenthesis denote sample size.