MONTANA STATE DEPARTMENT OF FISH AND GAME
FEDERAL AID IN FISH RESTORATION SECTION

HELENA, MONTANA

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-12-R-4 Name Western Montana Fisheries Study

Job No. III Title Cost Estimate Survey for Ninemile Prairie Rehabilitation Project

Period Covered: May 1, 1957 to November 30, 1957

Abstract: All major lakes and streams above the proposed Ninemile Prairie damsite have been mapped and surveyed for a rehabilitation project. Stream flows and lengths, lake areas and volumes, toxicant amounts, and a three-year trout re-stocking program are given. A recommendation is made for the construction of two fish barriers below the Clearwater Lakes. A complete cost estimate for rehabilitation, re-stocking, barrier construction and future survey work is presented.

Objectives: The objectives of this job were: to locate, map, sound and compute water volumes for all major lakes above the proposed Ninemile Prairie project; to compute water volumes, stream lengths, and upstream range of yellow perch, squawfish and Columbia River chub in the main stream drainages above the proposed project site; to locate portions of the drainage isolated by natural barriers, if any; to compute toxicant amounts, and rehabilitation costs for all waters above the proposed project site that contain populations of one or more of the above listed fish species; and to estimate the number of trout required to re-stock the area, along with the cost of this re-stocking.

Techniques Used: All major waters above the proposed Ninemile Prairie damsite were surveyed by the Project Leader, the Project Biologist, and two summer employees.

Large scale outline maps of the major lakes in the area were pantographed from aerial photographs. Soundings on all lakes were made with a Bendix Depth Recorder, mounted on an outboard motor boat. From the sounding data thus collected, contour lines were drawn on the outline maps.

A polar planimeter was used to obtain the area enclosed by

each contour line. The volume of water between each contour line was computed by the formula: $V = (A_1 - A_2) \frac{1}{2} SD$; where V = volume, A_1 = area of one contour line, A_2 = area of next inner contour, and SD = summation of the depths of the two contour intervals.

An aerial survey of the area was made in an effort to locate other streams and lakes, that by their size and drainage characteristics, should be considered for rehabilitation. Lakes that appeared over 25 acres in size were photographed from the air, and an effort was made to survey these lakes from the ground.

The upstream ranges of yellow perch, squawfish and Columbia River chub, in the major stream drainages, was determined by blasting, angler reports, visual observation and electrical shocking. Due to its inaccessibility by road, the Clearwater River was surveyed from Rainy Lake to Seeley Lake by use of a rubber raft. A sketch map showing tributary stream locations, backwaters, and beaver dams was drawn.

Pro-Noxfish was chosen as the toxicant for the streams. Because of the excessive depths encountered, a special deep water toxicant, Pro-Noxfish formula 56 was chosen for the lakes. The above toxicants are the most economical of the rotenone emulsives and will break down rapidly, allowing the lakes to be re-stocked the following year. Toxicant requirements were computed by volume, at one part per million toxicant to water.

Estimates were made for the cost of rehabilitation, trout re-stocking and barrier construction for all water which have been surveyed and found to contain squawfish, yellow perch or Columbia River chub, above the proposed project site. Estimates were also made for: (1) the cost of surveying the remaining waters in the drainage, and (2) the cost of the toxicant which would be required if it should be found necessary to rehabilitate all the waters which are yet to be surveyed.

A trout re-stocking program was planned for a three year period, so that spawning fish will be evident before planting operations stop. Numbers of fish needed were based on the total surface acres for the lakes, and water volumes for the streams. The total re-stocking cost was based on numbers and sizes of fish to be planted.

Findings:

An outline map of the area is shown in Figure 1.

The survey revealed that there are seven major lakes in the area that contain populations of yellow perch, squawfish,

Columbia River chub or combinations of the above fish species. Six of these lakes are on the main Clearwater River drainage, and one (Coopers) drains into the North Fork of the Blackfoot River.

Table 1 lists the above mentioned lakes along with their size, toxicant amounts, and toxicant cost for rehabilitation. Two barriers were found in the entire drainage. These were: a State Water Board dam on Nevada Creek, and a road culvert in the Bull Creek drainage. No squawfish, Columbia River chub, or yellow perch were found above the Nevada Creek dam. Yellow perch were found in the Bull Creek drainage, and that drainage was rehabilitated in the fall of 1957, under project F-24-D-9. Except for these two barriers, unrestricted fish movement is possible from one part of the drainage to another. The Clearwater River drainage, which contains six of the seven major lakes in the area, contains three possible barrier sites. One of these is below Rainy Lake, on the Clearwater River; one is below Salmon Lake, on the Clearwater River; and one is below Placid Lake, on Owl Creek. A barrier was constructed at the Rainy Lake outlet in the fall of 1957 (under project F-25-D-9) and the drainage portion above it will be rehabilitated in the fall of 1958.

The cost estimate for the construction of the other two barriers is listed in Table 6. By constructing these two barriers, the Clearwater River drainage could be rehabilitated by sections before the main Blackfoot drainage. A more thorough final rehabilitation job could be accomplished if these barriers are constructed, than could be done without them.

Table 2 lists the six main stream drainages above the proposed project site, along with the length, flow, toxicant amount and toxicant cost for each stream.

The upstream range of squawfish and Columbia River chub was found to be at the town of Lincoln, Montana for the Big Blackfoot River; Rainy Lake and Summit Lake for the Clearwater River; and the State Water Board dam on Nevada Creek. Owl Creek, outlet stream of Placid Lake, contains the above fish species along its entire length. The West Fork of the Clearwater River and the North Fork of the Blackfoot River do not contain the above fish species, at points five and ten miles respectively, upstream from their mouths.

Access points are not available along the entire length of any of the streams. However, the survey revealed that there are enough access points to insure adequate toxification of all waters. It will be necessary for personnel to walk along the streams after toxicant has been applied to observe its effect on fish life and to locate the next downstream point where toxicant should be applied.

In addition to the toxicant required for the major lakes and streams, another 15 drums (825 gallons) will be required for the smaller tributary streams flowing into the main drainages. The cost of this toxicant is included with the total toxicant cost. Table 6 gives the total cost of all toxicant, along with the cost of personnel and equipment needed to rehabilitate all major waters above the proposed Ninemile Prairie damsite.

Rainbow trout were chosen as the fish species to be used for re-stocking the rehabilitated waters. Re-stocking data for all lakes and streams previously mentioned is given in Tables 3 and 4. These tables list the re-stocking needs over a three year period. By stocking for three years, the initial plant will have reached sexual maturity during the same year the last plant is liberated. The plant for the lakes is given as 500 two inch fish per surface acre for the initial plant, and 50 four inch fish per surface acre for the second and third years. The planting of larger fish during the second and third year is recommended so that predation by the initial plant upon subsequent plants will be at a minimum. It is felt that fish growth in the streams will be slower than in the lakes. Thus, re-stocking in the streams is based on two inch fish for the initial and second year plants, and four inch fish for the third year plant.

The total number of fish to be planted in the streams is based upon water volume and stream miles per stream or stream section. Table 5 lists all the streams and/or stream sections along with the amount of fish to be planted per stream mile. The total cost of re-stocking the rehabilitated waters with trout is given in Table 6.

There are a minimum of 15 lakes in the area, of which aerial photographs have been taken, and which should be surveyed to determine the present fish species. Additional time also needs to be spent on some of the smaller stream tributaries to determine their importance in the overall rehabilitation program. Althought these unsurveyed lakes and streams are numerous, they are small in size. It is apparent, from our survey information to date and from a gross aerial observation of the area, that all together these unsurveyed waters comprise less than ten percent of the total water volume in this drainage. Therefore, an additional ten percent of toxicant was allowed in the estimate on Table 6. Thus, even if it is found necessary to rehabilitate all of these waters, the total project cost will not have to be increased.

Table 6 lists the total cost breakdown for rehabilitation, fish re-stocking, barrier construction and future survey work. The total cost of the entire operation is estimated at $1,125,000.00. A contingency fund of 9.6 percent is included in this figure.

Recommendations:

In the event Ninemile Prairie Dam is constructed, the following recommendations are presented:

1. All waters above the proposed damsite, that contain populations of yellow perch, squawfish, Columbia River chub or combinations of these species, should be rehabilitated.

2. In order to insure a successful, closely timed, rehabilitation program on all major streams above the proposed damsite, fish barriers should be constructed on the Clearwater River below Salmon Lake and on Owl Creek, below Placid Lake. After construction of these barriers, the Clearwater drainage above the Salmon Lake barrier, should be rehabilitated before the main Blackfoot drainage.

3. All lakes and streams listed on Tables 1 and 2 should be re-stocked with rainbow trout over a three year period, after rehabilitation. Recommended re-stocking rates are given in Tables 3 and 4.

Additional survey work must be carried on to determine if any of the numerous smaller waters in the area contain populations of yellow perch, squawfish, or Columbia River chub. Any waters, wherein these species are located, must be included in the overall rehabilitation program. Additional survey work is also required, in order to draw up the final operation plan for this rehabilitation project.

5. The cost of rehabilitating and re-stocking all the waters under consideration in this report would be prohibitive for the State Fish and Game Department. It is recommended that all cost relating to rehabilitation, fish planting, barrier constructing and future survey work be borne by the agency constructing Ninemile Prairie Dam.

Prepared by Robert C. Averett & Arthur N. Whitney Approved by George D. Holton

Date April 14, 1958

TABLE NO. I

Toxicant Amounts and Cost for Major Lakes Above Ninemile Prairie

Lake	Surface Acres	Acre Feet	Gallons	Cost
Salmon	613	19,480	7,029	$30,154.41
Seeley	863	51,763	18,675	80,115.75
Placid	1,110	58,076	20,954	89,892.66
Inez	286	10,628	3,835	16,452.15
Alva	292	14,782	5,333	22,878.57
Millpond	16	320	114	489.06
Coopers	182	7,364	2,657	11,398.53

TABLE NO. 2

Toxicant Amounts and Cost for Major Streams Above Ninemile Prairie

Stream	Miles of Stream to be Toxified	Expected Autumn Flow (cfs)	Gallons	Cost
Nevada Creek	20	20	110	$ 448.80
Clearwater River	25	200	242	987.36
Big Blackfoot River	70	500	2,200	8,976.00
West Fork Clearwater River	5	20	110	448.80
Owl Creek	4	15	60.5	246.84
North Fork Blackfoot River	10	200	242	987.36

TABLE NO. 3

Planting Rates for Major Lakes and Reservoir

Lake	Surface Acres	Initial Plant @ 500 fish/acre (2 inch fish)	Initial Plant Cost	2nd Year Plant @ 50 fish/acre (4 inch fish)	2nd Year Plant Cost	3rd Year Plant @ 50 fish/acre (4 inch fish)	3rd Year Plant Cost
Salmon	613	306,500	$3,678.00	30,650	$3,678.00	30,650	$3,678.00
Seeley	863	431,500	5,178.00	43,150	5,178.00	43,150	5,178.00
Placid	1,110	555,000	6,660.00	55,500	6,660.00	55,500	6,660.00
Inez	286	143,000	1,716.00	14,300	1,716.00	14,300	1,716.00
Alva	292	146,000	1,752.00	14,600	1,752.00	14,600	1,752.00
Millpond	16	8,000	96.00	800	96.00	800	96.00
Coopers	182	91,000	1,092.00	9,100	1,092.00	9,100	1,092.00
Ninemile Prairie Reservoir	12,000	6,000,000	75,000.00	600,000	75,000.00	600,000	75,000.00

TABLE NO. 4

Planting Rates for Major Streams Above Ninemile Prairie

Stream	Miles	Initial Plant (2 inch fish)	Cost Initial Plant	2nd Year Plant (2 inch fish)	Cost 2nd Year Plant	3rd Year Plant (4 inch fish)	Cost 3rd Year Plant
Nevada Creek	20	40,000	$ 480.00	40,000	$ 480.00	4,000	$ 480.00
W. Fork Clearwater River	5	10,000	120.00	10,000	120.00	1,000	120.00
N. Fork Blackfoot River	10	75,000	900.00	75,000	900.00	7,500	900.00
Owl Creek	4	8,000	96.00	8,000	96.00	800	96.00
Clearwater River	25	130,000	1,560.00	130,000	1,560.00	13,000	1,560.00
Big Blackfoot River	100	870,000	10,440.00	870,000	10,440.00	87,000	10,440.00

TABLE NO. 5

Planting Rates for Stream Sections Above Ninemile Prairie

Stream	Section Location	Stream Miles	FISH PER STREAM MILE		
			Initial Plant (2 inch fish)	Second Year (2 inch fish)	Third Year (4 inch fish)
Nevada Creek	From mouth to State Water Board dam	20	2,000	2,000	200
Clearwater River	Mouth to Salmon Lake	8	7,500	7,500	750
	Salmon Lake to confluence with West Fork Clearwater River	12	5,000	5,000	500
	Confluence West Fork to Rainy Lake	5	2,000	2,000	200
Big Blackfoot River	Mouth to confluence with Clearwater River	30	15,000	15,000	1,500
	Confluence with Clearwater to confluence with North Fork Blackfoot River	18	10,000	10,000	1,000
	Confluence with North Fork to confluence with Nevada Creek	12	7,500	7,500	750
	Confluence Nevada Creek to Lincoln, Montana	30	5,000	5,000	500
W. Fork Clearwater River	From mouth to confluence with Marshall Creek	5	2,000	2,000	200
Owl Creek	Mouth upstream to Placid Lake	4	2,000	2,000	200
N. Fork Blackfoot River	Mouth to Spring Creek	10	7,500	7,500	750

TABLE NO. 6

Total estimated cost for rehabilitation, re-stocking and barrier construction for all waters above the proposed Ninemile Prairie Dam Project

Rehabilitation	
Toxicant	
Waters Surveyed - - - - - - - - - - - - -	$ 266,842.29
Waters Not Surveyed - - - - - - - - - - -	26,684.22
Personnel	
Salary and Wages - - - - - - - - - - - -	36,960.00
Subsistence - - - - - - - - - - - - - -	7,560.00
Equipment	
Vehicle Mileage - - - - - - - - - - - -	19,870.00
Rentals - - - - - - - - - - - - - - - -	12,000.00
Rehabilitation Equipment - - - - - - - -	20,000.00
Fish Re-stocking - - - - - - - - - - - - - - - - -	326,304.00
Miscellaneous Expenditures	
Barriers - - - - - - - - - - - - - - - - -	300,000.00
Future Survey Work - - - - - - - - - - - -	10,000.00
Cost of Work Summarized Above - - - - - - - - -	1,026,220.51
Contingency Fund 9.6% - - - - - - - - - - - -	98,779.49
Total Estimated Cost - - - - - - - - - - - - - - -	1,125,000.00

Figure 1. Outline Map Showing Main Drainages Above Proposed Ninemile Prairie Dam.