MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No.: F-12-R-9 Name Western Montana Fishery Study

Job No.: IV Title Habitat Destruction Survey

Period Covered: July 1, 1962 through June 30, 1963

Abstract:

Man-made channel alterations were measured on the St. Regis River and Ninemile Creek. A total of 22.38 miles, or 60.3 per cent, of the present 37.1 miles of St. Regis River channel had one or both banks altered. One-hundred and twenty-one alterations were measured. The total loss of natural stream from channel relocation was 6.39 miles. Fish samples from 4,000 square feet each, of natural and altered stream sections, showed that the natural section had over five times as many game fish as did the altered section.

Activities of man on Ninemile Creek resulted in 7.1 miles of channel with one or both banks altered. This is 29.7 per cent of the stream's present 23.9 miles of length. One-hundred and thirty individual alterations were found and measured within this 7.1 miles. Fish samples from equal areas of stream showed that the natural area had over five times as many fish as did the altered section, which is similar to findings of the St. Regis River.

Recommendations:

Data in this report should be used to help inform the public of the severity and extent of stream habitat destruction in Montana.

Objectives:

The objective of this project was to measure and record the man-made

alterations to the bed and banks of the St. Regis River (Mineral County) and Ninemile Creek (Missoula County).

Techniques Used:

The St. Regis River is a rapid, clear, mountain stream flowing through a narrow valley which seldom exceeds one-half mile in width. Coniferous forests descend to the stream bank in undisturbed areas. Where flood plains exist, deciduous trees and brush are the predominant types of vegetation. The Milwaukee and Northern Pacific railroads, and U. S. Highway 10, parallel the stream for most of its length.

United States Forest Service aerial photographs, taken in 1958, were used as guide maps for locating alterations, and highway and railroad construction blueprints were used to aid in establishing responsibility of channel alterations on the St. Regis River.

The upper six miles of Ninemile Creek exhibit the characteristics of a mountain stream, with coniferous vegetation and brush along the stream banks. The rest of the stream flows through a relatively broad valley which has been developed for agricultural practices. Stream banks of this portion are vegetated primarily by deciduous trees.

Forest Service aerial photos and maps of the Ninemile Creek area were used as guides in locating alterations and making measurements.

A two-man survey crew inspected the streams on-the-ground to locate alterations, and these alterations were either measured on-the ground, or measurements were taken from an aerial photo if alterations were visible and clear-cut on the photo. River mile measurements were taken from the aerial photographs.

The number of each channel alteration was recorded on the aerial photo at the appropriate location. Data and remarks specific to each alteration were recorded on a field form to aid in correctly categorizing each alteration.

All alterations observed were put into one of the following four categories of activity; (1) railroad construction, (2) road or highway construction, (3) urban and industrial development, and (4) agricultural practices. Agricultural activities included those carried out by farmers or ranchers acting independently or on a cost-sharing basis with a government agency.

Four types of man-made channel alteration were defined to include all types of alterations encountered. These were:

(1) Relocated channels. These replace natural stream meanders. Recent work of this type was readily recognized by straight stream channels that lacked the vegetation normally found on the stream banks and the lack of well defined areas of erosion and deposition associated with a meandering stream. Older channel relocations were difficult to distinguish from naturally cut-off meanders. The history of old channel changes was determined by (a) asking local people, (b) consulting railroad and road construction blueprints, and (c) studying aerial photographs and comparing physical characteristics of the stream above, in, and below the area where a man-made change was suspected.

(2) Riprap. This included areas where trees, shrubs, boulders and/or car bodies were placed on the stream bank. Occasionally, these materials were anchored on the bank to hinder erosion. Roadbed fill and bridge riprapping were included in this category.

(3) Channel clearance. Accomplished by removing obstructions from the natural stream channel and filling pools with stream bed material, usually with little alteration of the stream bank.

(4) Diking. Bulldozing out the stream channel and building a dike of the bed material within the channel or on the stream bank.

To obtain fish population data in portions of stream which had been altered versus natural stream habitat areas, 4,000 square feet of stream in each category were electrofished on the St. Regis and Ninemile Creek. Standard block nets were used to delineate areas. A Variable Voltage Pulsator (Pikes Peak Electronic Co., Littleton, Colorado) energized by a 110-volt Master generator, was used as the electrofishing unit. Captured fish were recorded by species, and lengths and weights were taken.

Findings:

St. Regis River

Three of the four general types of channel alteration described were found and measured on the St. Regis River. No specific instance of channel clearance was found, although it is likely that some channel clearance took place in riprapping during highway and/or railroad construction. The three types found and measured were, (1) channel relocations that cut off natural stream meanders, (2) riprapping, and, (3) diking. The numbers and total lengths of each type of alteration are presented in Table 1. In some instances, alterations were encountered on stream sections which had been previously altered. The numbers of these alterations are included in Table 1, but the lengths of these alterations are not. For instance, a case of riprapping on a new channel was counted as an additional alteration, but only the length of the new channel is included for length of stream altered.

The majority in both number and length of alterations was due to highway and railroad bed fill. While roadbeds are not placed for the specific purpose of riprapping, the effect on the stream is identical to riprapping. Generally speaking, because of the narrow valley through which the stream flows, roadbeds constricted the flow of the St. Regis River into narrow, straight passages which, for all practical purposes, ruined these areas

Table 1. DISTANCE AND NUMBER OF MAN-MADE CHANNEL ALTERATIONS RECOGNIZED ON THE ST. REGIS RIVER, MONTANA, 1962.

Type of alteration	Railroad construction		Road construction		Urban and industrial development		Agricultural activities		Total	
	Feet* altered	No. of alterations	Feet* altered	No. of alterations	Feet* altered	No. of alterations	Feet* altered	No. of alterations	Feet and miles altered	No. of alterations
Relocated channel	19,805	17	8,934	6	0	0	0	0	28,739 5.44 Mi.**	23
Riprapping	43,888	34	35,996	49	4,039	4	0	1***	83,923 15.89 mi.	88
Channel clearance	0	0	0	0	0	0	0	0	0	0
Diking	370	3	824	5	4,355	2	0	0	5,549 1.05 mi.	10
Total	64,063 12.13 mi.	54	45,754 8.66 mi.	60	8,394 1.59 mi.	6	0	1	118,211 22.38 mi.	121

*This is the net amount of channel altered. In some instances the same footage was altered more than once.
**This 5.44 miles of relocated channel resulted in the loss of 6.39 miles of natural stream. The stream was reduced in length by .95 miles.
***This 168 foot alteration occurred in an area which had been riprapped previously.

for stream fishing. The resultant increased rate of flow in the altered sections has likely had an effect on the remaining natural sections, through increased velocities and flows during periods of high runoff.

A total of 121 alterations were found and measured on 22.38 miles of the stream's 37.1 miles of existing channel. The unaltered, or natural, portion of the present St. Regis River is presently 14.72 miles.

A total of 33,745 feet of natural stream meanders were cut off by channel relocation and replaced by 28,739 feet of new channel. The total loss of natural channel was then 6.39 miles, which was replaced with 5.44 miles of straightened, artificial channel.

Railroad construction resulted in the greatest amount of all alteration types, totaling 12.13 miles in length. Road construction accounted for 8.66 miles of alteration, and urban and industrial development for 1.59 miles.

Electrofishing equal areas of stream, representative of altered and natural areas, showed that of the sections sampled, the natural area had over five times as many game fish as did the altered section. Numbers of fish captured and average lengths of these fish are recorded in Table 2.

Table 2. NUMBERS AND AVERAGE LENGTHS OF FISH, BY SPECIES, FROM 4,000 SQUARE FEET EACH, OF NATURAL AND ALTERED STREAM BED, ST. REGIS RIVER AND NINEMILE CREEK, MONTANA, 1962.

	Number and length							
St. Regis River Species	Cutthroat trout	Brook trout	Brown trout	White-fish	Dolly Varden	Cottus	Longnose Sucker	White Sucker
Sec. 1 (Natural)	13 (5.4)*	7 (5.9)	2 (13.7)	35 (11.7)	0	18	1	0
Sec. 2 (Altered)	1 (5.4)	3 (6.7)	2 (7.2)	5 (9.3)	0	38	0	1
Ninemile Creek								
Sec. 1 (Natural)	49 (5.2)	16 (5.0)	0	0	3 (4.8)	8	0	0
Sec. 2 (Altered)	6 (4.9)	6 (4.8)	0	0	1 (5.6)	14	0	0

*Average total length in inches.

Ninemile Creek

The major type of alteration encountered on Ninemile Creek was of a nature which did not allow measurements to be included with any of the previously defined types of alteration. This alteration was damage to stream banks by domestic stock. Habitat damage is evidenced by the trampled down condition of banks, with resultant erosion of these banks, and exposure of bare gravel bars. This is actually a secondary effect of man's agricultural practices, but it is felt that the severity and extent of this practice on Ninemile Creek warrants the inclusion of these measurements with other primary types.

Forty-nine instances of bank damage, totaling 2.41 miles, were measured. Including this amount with amounts of defined types of alteration, a total of 130 individual alterations were located on Ninemile Creek. These alterations occurred on 7.14 miles, (or 29.8 per cent), of the stream's present 23.9 miles of length. The number and length of alterations are presented in Table 3.

Table 3. DISTANCE AND NUMBER OF MAN-MADE CHANNEL ALTERATIONS RECOGNIZED ON NINEMILE CREEK, MONTANA, 1962.

Type of alteration	Railroad construction		Road construction		Urban and industrial development		Agricultural activities		Total	
	Feet* altered	No. of alterations	Feet* altered	No. of alterations	Feet* altered	No. of alterations	Feet* altered	No. of alterations	Feet and miles altered	No. of alterations
Channel relocation	0	0	0	0	0	0	3,497	6	3,497 0.66 mi.**	6
Riprapping	379	5	2,886	24	0	0	5,711	24	8,976 1.70 mi.	53
Channel clearance	0	0	0	0	0	0	0	0	0	0
Diking	0	0	0	0	9,989	4	2,551	18	12,540 2.37 mi.	22
Bank alteration*	0	0	0	0	0	0	12,713	49	12,713 2.41 mi.	49
Total	379 0.07 mi.	5	2,886 0.55 mi.	24	9,989 1.89 mi.	4	24,472 4.63 mi.	97	37,726 7.14 mi.	130

*This is not a standard category; see text.
**This 0.66 miles of relocated channel resulted in the loss of 0.88 miles of natural stream.

Diking was the most prevalent type of defined alteration found, totaling 2.37 miles. Diking was primarily due to dredge-mining operations, which had the effect of channel clearance in addition to diking. Amounts of riprapping and channel relocation were 1.70 and 0.66 miles respectively. In the channel relocation category, 0.88 miles of natural stream channel were replaced by 0.66 miles of new and straightened channel. No channel clearance, other than that which occurred in conjunction with dredge-mining and diking was observed.

Sampling of the fish population contained in both natural and altered sections of stream, showed that the number of game fish in the natural section was again five times more than in the altered section. (Table 2).

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