MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-5-R-12 Name Central Montana Fisheries Study

Job No. I Title Inventory of Waters of the Project Area

Period Covered July 1, 1962 - June 30, 1963

Abstract:

Gill netting disclosed good populations of rainbow trout in both Upper and Lower Carter Ponds, near Lewistown, Fergus County. The ease in travel and fisherman success make the ponds popular with the citizens of Lewistown and surrounding area. Both ponds were roughly mapped, but only the upper pond was sounded.

Surprise Creek Reservoir, located in Judith Basin Co., near Stanford, was sampled with gill nets in April 1963. The length range of rainbow trout was 11.5-13.1 inches. Native cutthroat trout and white suckers were also netted.

Mill Coulee Creek, a tributary of Sun River, located near the town of Sun River, Cascade Co., was rehabilitated May 4, 1961. On May 26, 1961 2-inch brook trout were stocked. The creek was electrofished on two sections on September 11, 1962. The brook trout had attained an average growth of 9.5 inches in length in approximately 16 months.

Logging Creek, Cascade Co., was electrofished in two 300-foot sections on August 15, 1962. Nineteen catchable sized brook and rainbow trout were taken. The average length and weight were 9.9 inches and 0.4 of a pound. Forty-one smaller brook and rainbow trout were also taken. Stream improvements were carried out in an area that had been altered by flooding in 1953. These improvements were planted with catchable-sized rainbow trout June 12, 1963.

A fish tagging study was initiated in the spring of 1963 on the Missouri River and several of its tributaries. Sauger and goldeye were the primary species of interest, although other species were also caught. Fish movements, spawning areas, abundance and growth characteristics were studied. Federal dams have been proposed for

the Missouri River from Morony Dam to Fort Peck Reservoir. Information on the present fish population is needed so the impact of proposed federal dams on the fish population of the area can be predicted.

Recommendations:

Only through a continual study of an area's resources, whether physical or biological, can man attain a sound management program, therefore, it is recommended this inventory of waters be continued.

Objectives:

The purpose of this investigation is to determine the physical, chemical and biological characteristics of the waters of highest importance to the recreational fisheries of the project area.

Techniques Used:

Samples of fish were collected by using a 110-220 volt electric shocker, 125-foot experimental gill nets, bag and minnow seines and fish traps. Information was obtained from photographs and plat maps at Soil Conservation Service and Bureau of Land Management offices. On some lakes soundings were taken to establish approximate contour lines, and measurements made for estimates of surface acres.

Findings:

Upper and Lower Carter Ponds near Lewistown, Fergus County, were investigated. An experimental 125-foot gill net was set overnight in each pond and lifted on March 27, 1963. The net in Upper Carter Pond was set for a total of 12 hours. Twenty-seven rainbow trout were taken; they averaged 9.9 inches total length and 0.42 pound. The net in Lower Carter Pond was set for a total of 24 hours. Thirty-four rainbow were taken; they averaged 9.9 inches and 0.39 pound. Both Carter Ponds are fished heavily during the spring, summer and fall months, and there is some fishing in winter. The ponds are readily accessible by State Highway 19, and, are but 14 miles from Lewistown. Both ponds were roughly measured, depths were taken in Upper Carter Pond. Rainbow trout are stocked from the State fish hatchery in Lewistown.

Surprise Creek Reservoir, Judith Basin County, near Stanford, Montana was rehabilitated, and then stocked in 1961 with 3,066 rainbow trout 6 inches in length. Approximately 3,000 2-3 inch fingerlings were stocked in 1962.

Two 125-foot experimental gill nets were each fished for a total of five daylight hours on April 5, 1963. Two native cutthroat trout averaging 17.9 inches and 2.21 pounds were caught. Thirty rainbow trout were also taken. A random sample of 14 rainbow had lengths and weights ranging from 11.5 inches and 0.64 of a pound to 13.1 inches and 0.99 of a pound. Nineteen white suckers were taken; 15 of these suckers ranged in total length from 8.6-13.4 inches, and 0.25-0.92 of a pound in weight.

Mill Coulee Creek, a tributary of Sun River, near the town of Sun River, Cascade County, was treated with a rotenone-based fish toxicant May 4, 1961, and on May 26, 1961 two-inch brook trout were stocked. The creek was electrofished on September 11, 1962 in a 300-foot and a 150-foot section. Seven brook trout were taken with an average length and weight of 11.5 inches and 0.80 of a pound; "C" factor 51.9. Thus, these brook trout had attained an average growth of 9.5 inches in length in approximately 16 months. Other species of fish samples were rainbow trout (1), brown trout (1), mountain sucker (5), longnose sucker (1), white sucker (2), longnose dace (14) and chub (6).

Two, 300-foot sections of Logging Creek, Cascade County, were electrofished on August 15, 1962. Nineteen catchable-size brook and rainbow trout, average length 9.9 inches; average weight 0.4 pound, and 41 smaller brook and rainbow trout were taken. Stream improvements were subsequently carried out as a cooperative project by the U.S. Forest Service, Cascade County Wildlife Association and the Montana Fish and Game Department. In a section of the stream where flood waters had straightened out much of the channel in 1953, a gabion was installed to divert the stream flow into an old meander. Upstream, oblique-angled rock jetties were built, holes dug and cover established over the holes. The entire stream improvement section was planted with catchable-sized rainbow trout June 12, 1963.

A fish tagging program, employing dart tags, was begun in the spring of 1963 in the Missouri River from Morony Dam to Loma; in Belt Creek, Cascade County; and in the Marias and Teton Rivers, Chouteau County. The species of fish sought were sauger and goldeye. These fish, and other species of fish, were caught in wire traps with chicken-wire wings. Both sauger and goldeye appeared to be very abundant in the Missouri River Drainage. The sauger is popular because of his excellent eating qualities. The goldeye, because of his small size (maximum in these waters about 15 inches and one pound) and abundance is considered a nuisance. Sauger were first trapped in the Marias River on March 18, 1963. The first goldeye was trapped in the Missouri River, above Loma, on March 20, 1963. Data are being compiled on the movements of sauger, goldeye and other species of fish to gain knowledge on their life history, e.g., seasonal movements, spawning areas, abundance and growth. Several federal dams are proposed on the Missouri River between Morony Dam and Fort Peck Reservoir. The proposed impoundments could affect the existing populations of fish in the Missouri River and its tributaries.

Information gained will be a basis for the future management of the Missouri River, its impoundments and tributaries.

Fish populations in several other waters were also sampled with gill nets and electric shockers during the report period. The data obtained have been recorded in the District stream and lake survey file.

Prepared by Steve E. Swedberg Approved by George D. Holton

Date November 15, 1963

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-5-R-12 Name Central Montana Fisheries Study

Job No. IIa Title Evaluation of Fish Habitat Destruction in Prickly Pear Creek due to Construction of Interstate Highway 15.

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

Abstract:

Temperature, water quality and quantity, bottom fauna and fish were sampled at several stations on Little Prickly Pear Creek. Analysis of data consisted of presenting material by tabular, graphic and other methods. The USGS collected and analyzed the water quality and quantity information, other data were collected and presented by fisheries personnel. Similar analyses will be performed in 1964 and 1965.

Recommendations:

It is recommended this study be continued. The plans for stream measurements should be reviewed to insure sufficient data to fulfill project objectives.

Objectives:

The purpose of this investigation is to determine the extent of trout habitat destruction caused by construction of Interstate Highway 15 along Prickly Pear Creek and obtain information concerning its effect on the fish and aquatic insect populations.

Techniques Used:

Temperature, water quality and quantity, bottom fauna and fish were collected by the following methods: Temperatures were recorded with two Minicorders. One recorder was installed above construction activities at Sieben Ranch, and the other beneath State Highway Bridge 287 at Wolf Creek (Figure 1). Water quality and quantity samples were collected and analyzed by personnel from the U.S. Geological Survey-Water Resources Division. Water analysis consisted of determining:

(A) Mean discharge (cfs)

(B) Suspended sediment:
a. Mean concentration (ppm)
b. Tons per day

(C) Parts per million of elements, compounds and dissolved solids

(D) Specific conductance, pH and color

The USGS collected water data at 5 stations located from Sieben Ranch downstream to the town of Wolf Creek. Bottom fauna were collected with a Surber sampler utilizing a 1-square foot frame. Three 4-square foot samples were taken at each of 5 stations (A, B, C. D, E, Figure 1). Organisms were identified to order. Fish were collected at 7 stations (1 through 7, Figure 1) with a 110-220-volt alternating-current generator. Station number 2 consisted of two stations, 2 and 2a. The 2a station is an area which will be a preserved meander. Highway 91 will cut this meander off from the main creek, but will have culverts connecting the upper and lower portions with Prickly Pear Creek. Section 2a is not an annual sampling station.

Each station was divided into a. b. c. and d. subdivisions, with each subdivision 150 feet in length. Blocknets were affixed at each end of a section just prior to electrofishing. Numbers, weights, lengths, and scale samples were taken from fish that had been anesthetized with MS-222 (Cottus sp. were not accounted for, although abundant).

Physical measurements of the streambed were made as specified in Montana's stream survey instructions, but not completed.

Data is presented in tabular and graphic forms, but comparisons or detailed analysis will not be made at this time. Similar surveys are planned for years 1964 and 1965 at which time comparisons will be made.

Findings:

Temperature

Two Minicorders were installed in Little Prickly Pear Creek in 1962; one was located at Sieben Ranch and the other at Wolf Creek. The recorders plotted temperatures for 7 to 14 day periods. When recorder sheets were changed, both air and water temperatures were taken with a thermometer. Any necessary adjustments in the operation of the Minicorder were made at this time. Daily temperatures are presented in Figures 2 and 3, with means for each monthly series included.

Water Analysis

Water quality and quantity information was collected by U. S. Geological Survey personnel at 5 stations located from Sieben Ranch downstream to the town of Wolf Creek. Suspended sediment data (tons per day) and total mean discharge (cfs) are presented in Table 1, and suspended sediment (mean concentration - ppm) is described graphically in Figure 4. Dissolved solids for the 5 stations ranged from 142 ppm. to 265 ppm., on April 4 and 29, 1962.

Bottom Fauna

Bottom fauna were collected with a Surber sampler having a 1 square foot frame. Three 4-square foot samples were taken at each of 5 stations. Table 2 summarizes this data by order and numbers of organisms.

Fish

Seven stations were sampled in 1962. Table 3 illustrates the results of electrofishing these 7 stations. Chart 1 presents percentage diagrams of fish collected by number and weight. Age and growth of fish collected in 1962 are depicted in Table 4.

Prepared by Steve E. Swedberg

Approved by George D Holton

Date June 11, 1964

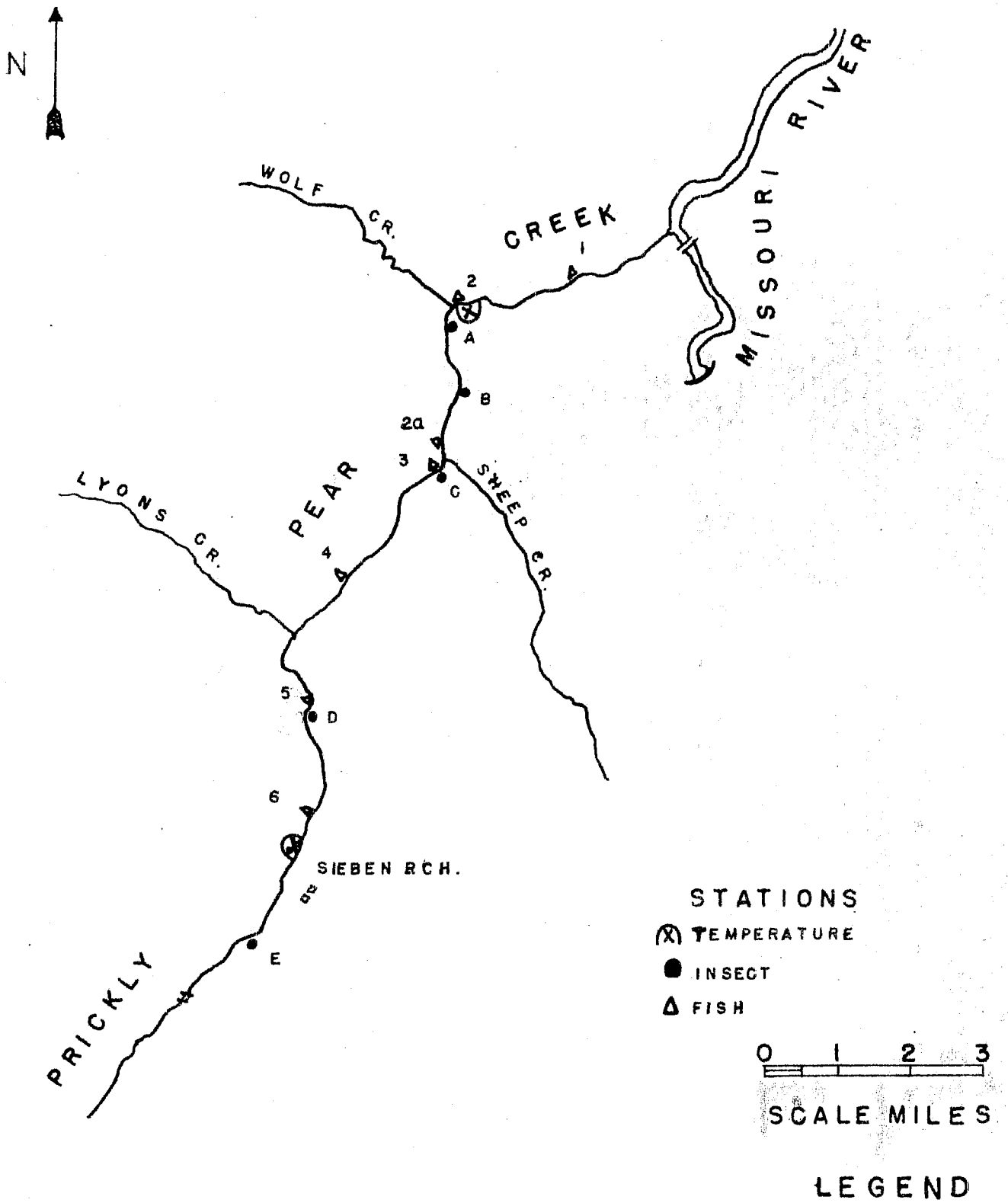

N
WOLF CR.
CREEK
MISSOURI RIVER
2
A
B
2a
3
C
PEAR
SHEEP CR.
LYONS CR.
4
5
D
6
SIEBEN RCH.
E
PRICKLY
STATIONS
TEMPERATURE
INSECT
FISH
0 1 2 3
SCALE MILES
LEGEND

Figure 1. Map

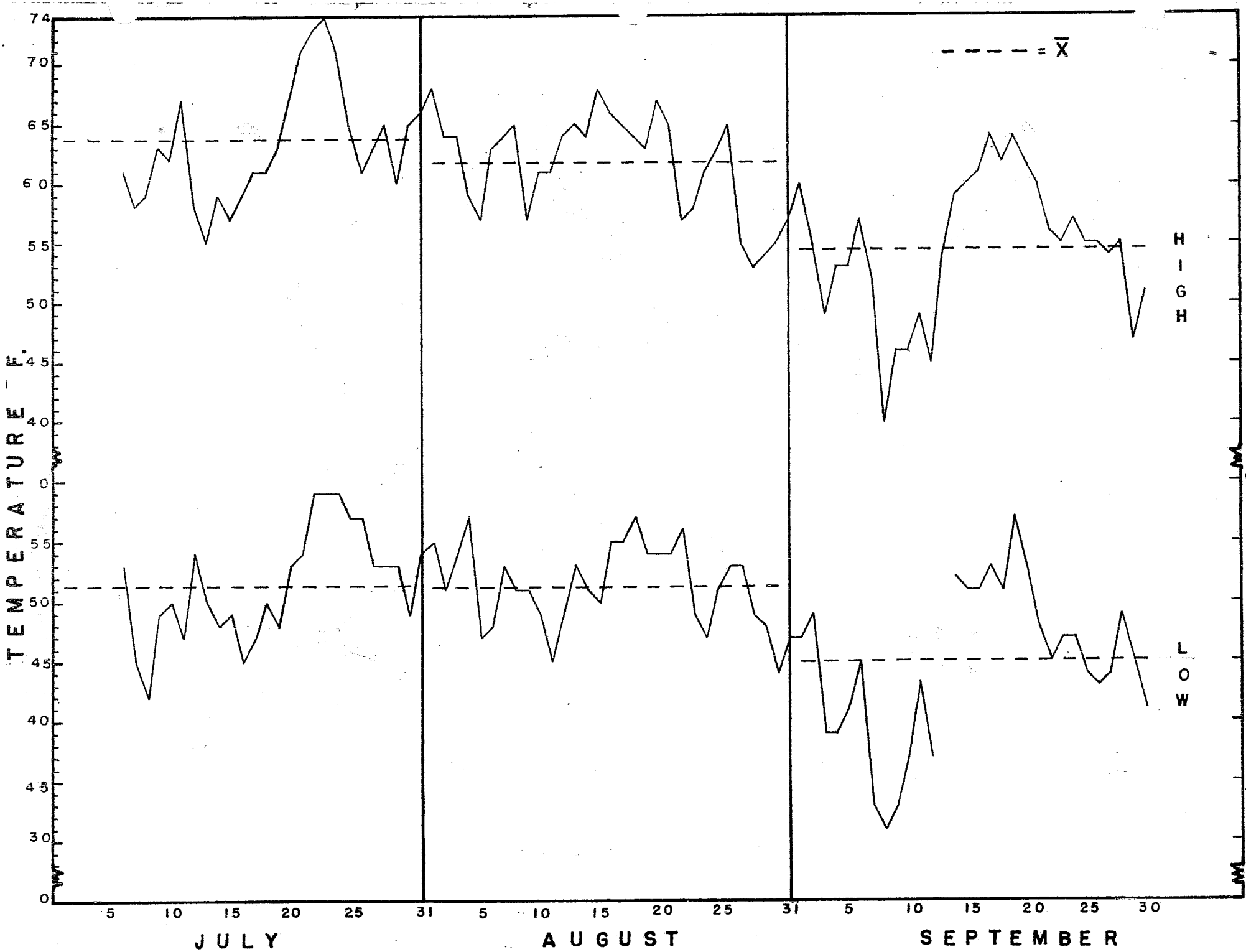


Figure 2. Temperature Sieben

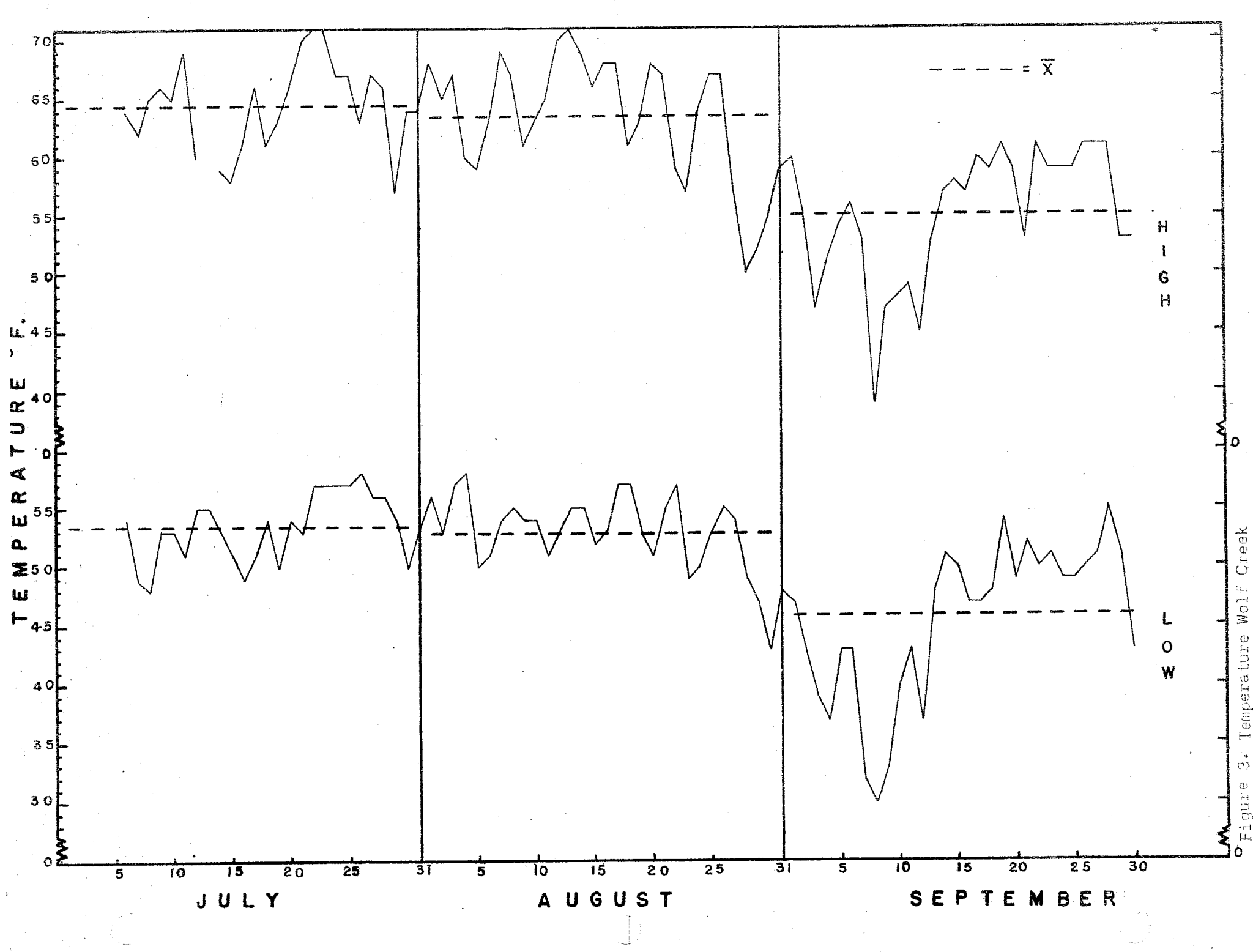


Figure 3. Temperature Wolf Creek

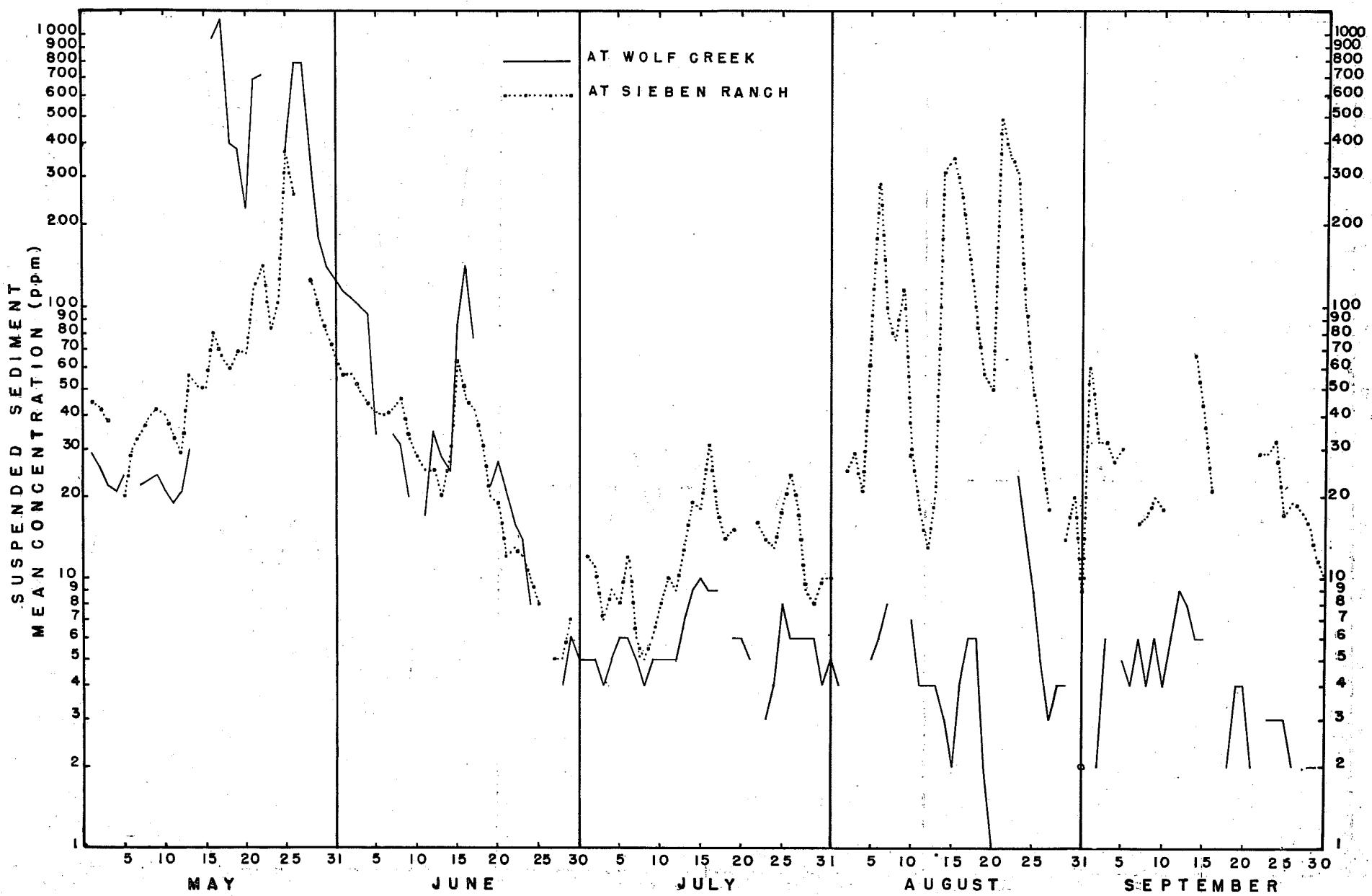


Figure 4. Suspended Sediment Graph

Table 1. Little Prickly Pear Creek at Sieben Ranch and Wolf Creek, Montana. Suspended sediment, May to September 1962. 1/

Station	Month	Total mean discharge (cfs)	Suspended sediment (tons per day)
Sieben Ranch	May	5,426	1,590.5
	June	3,088	295.7
	July	1,220	45.6
	August	703	212.1
	September	1,101	79.9
Total for period		11,538	2,223.8
Wolf Creek	May	11,329	12,306.1
	June	6,415	854.1
	July	2,667	43.0
	August	1,641	25.6
	September	1,686	18.7
Total for period		23,738	13,247.5

1/ Source: United States Department of Interior Geological Survey-Water Resources Division.

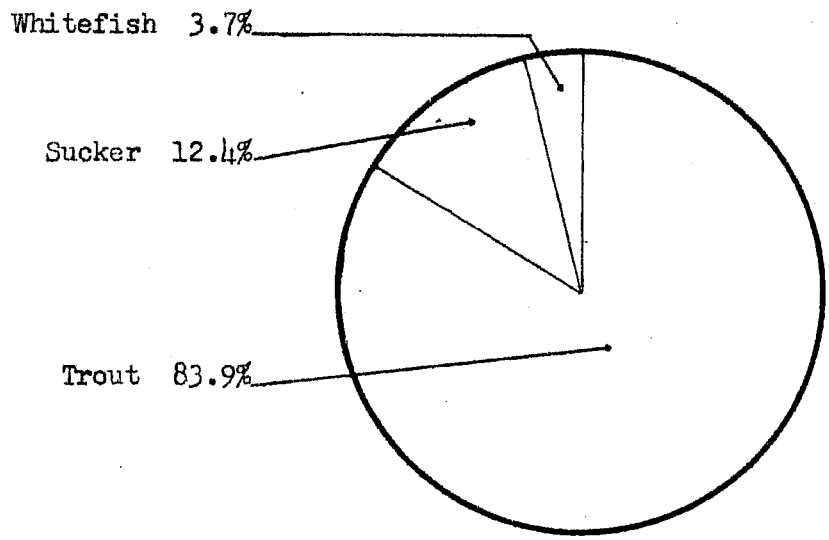
Table 2. Summarization of bottom fauna samples collected in 1961 and 1962 in Prickly Pear Creek.

Station	Date	Average number of organisms per square foot							
		Ephemeroptera	Plecoptera	Trichoptera	Coleoptera	Diptera	Oligochaeta	Gastropoda	Total Numbers
I	9-14-61	3.8	6.3	69.9	17.0	10.0	.1	4.3	111.4
I	6-27-62	23.9	2.4	44.7	15.7	3.0	.1	.6	90.4
I	9-14-62	9.0	2.5	42.3	2.5	9.8	-.-	.1	66.2
II	9-14-61	7.6	15.9	135.8	41.7	24.6	2.9	2.7	231.2
II	6-27-62	9.3	1.7	9.8	6.5	7.8	.1	.6	35.8
II	9-14-62	34.9	5.3	63.8	14.7	31.3	.6	.4	151.0
III	9-14-61	4.6	6.8	65.3	110.8	4.9	.3	2.9	195.6
III	6-28-62	11.3	1.0	28.2	5.4	18.5	.1	.5	65.0
III	9-13-62	14.0	5.3	53.1	8.2	27.3	-.-	.7	108.6
IV	9-15-61	5.7	8.3	127.3	135.4	4.2	1.0	59.3	341.2
IV	6-28-62	38.4	4.8	21.1	6.4	3.7	.1	-.-	74.5
IV	9-13-62	10.8	5.1	65.0	23.3	6.8	-.-	4.7	115.7
V	9-15-61	16.7	19.0	439.8	85.4	33.2	.3	70.0	664.4
V	6-28-62	49.8	2.5	32.1	10.3	8.0	.2	.1	103.0
V	9-21-62	17.6	6.8	29.7	24.0	58.9	.1	.8	137.9

Table 3. Electrofishing data collected at seven stations in Prickly Pear Creek in August 1-3 and September 21, 1962.

Figure	Species: Rainbow Trout — Total length	Rainbow Trout — Total weight	Rainbow Trout — "C" factor	Brown Trout — Total length	Brown Trout — Total weight	Brown Trout — "C" factor
Total	1,790.90	42.98	10,021.20	1,782.80	67.58	10,152.70
Number	258	257	249	269	269	268
Average	6.94	0.17	40.24	6.62	0.25	37.88
	Brook Trout			Mountain whitefish		
Total	245.00	4.94	1,412.00	206.30	13.22	790.00
Number	36	36	36	22	22	22
Average	6.80	0.14	39.22	9.38	0.60	35.91
	Longnose sucker			White sucker		
Total	450.70	13.12	2,515.50	118.80	7.14	653.00
Number	66	66	66	14	14	14
Average	6.83	0.20	38.01	8.50	0.51	46.60

Number



Weight

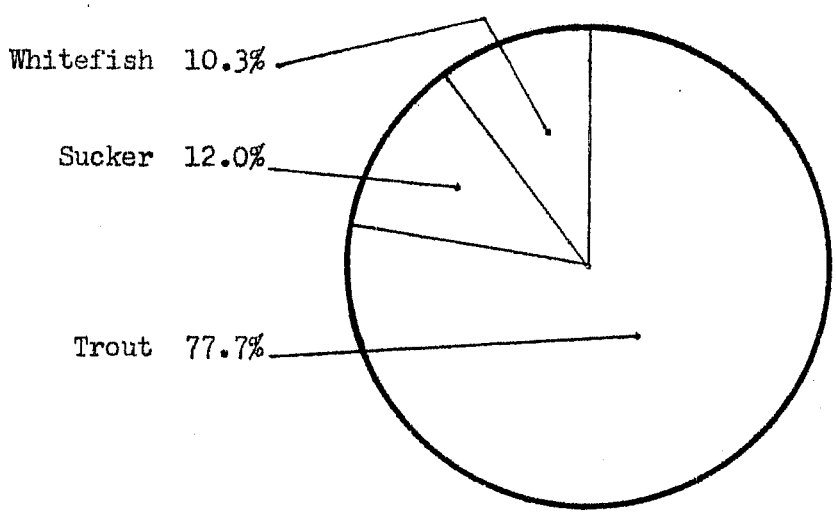


Chart 1. Percentage composition by number and weight of trout (rainbow, brown and brook), suckers (white and longnose), and mountain whitefish collected in electrofishing sections II-VI of Little Prickly Pear Creek, August and September 1962.

Table 4. Summary of age and growth studies. Fish were collected in Prickly Pear Creek in August 1-3 and September 21, 1962.

Species	I	II	III	IV	V	VI
Rainbow trout *Salmo gairdneri*	2.8(147)	5.5(35)	8.5(4)	12.7(2)		
Increment (Inches):		2.7	3.0	4.2		
Brown trout *Salmo trutta*	3.0(81)	7.1(34)	11.7(18)	14.6(7)	16.5(5)	
Increment (Inches):		4.1	4.6	2.9	1.9	
Brook trout *Salvelinus fontinalis*	2.3(2)*					
Increment (Inches):						
Mountain whitefish *Prosopium williamsoni*	3.6(6)	6.5(5)	9.5(5)	11.0(3)	13.5(1)	15.1(1)
Increment (Inches):		2.9	3.0	1.5	2.5	1.6
Longnose sucker *Catostomus catostomus*	1.4(53)	4.1(44)	6.9(16)	10.3(5)	13.6(2)	
Increment (Inches):		2.7	2.8	3.4	3.3	
Mountain sucker *Pantosteus platyrhynchus*	2.6(1)					
Increment (Inches):						
White sucker *Catostomus commersoni*	1.1(14)	2.7(10)	4.9(8)	8.1(6)	10.1(4)	11.5(3)
Increment (Inches):		1.6	2.2	3.2	2.0	1.4

VII	VIII	IX	X
12.9(3)	13.5(1)	14.9(1)	15.5(1)
1.4	.6	1.4	.6

* An additional 31 trout exhibited a retarded scale growth; so much, that the scale lengths at the magnification used would not fit the nomograph, even though all fish were aged I+ and ranged in total length from 5.7 to 10.8 inches.

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-5-R-12 Name Central Montana Fisheries Study

Job No. IIb Title Stream Channel Alteration Inventory

Period Covered July 1, 1962 - June 30, 1963

Abstract:

Three streams, Belt, Otter and Sheep Creek were surveyed for man-made channel alterations in the summer of 1962. Each of these three streams were also electrofished in 300-foot sections, and comparisons were made between unaltered and altered sections as to their respective fish populations. Alterations were measured in Belt Creek from the head of the stream to its mouth: In the 81 miles of Belt Creek, 21 miles, or 26 per cent was altered. No rainbow trout or whitefish were collected by electrofishing in the altered section, but were obtained in the unaltered sections. Man-made stream alterations were surveyed from about two miles below the headwaters of Otter Creek to its mouth. Man-made alterations in 34.5 miles amointed to 8 miles or 23 per cent. Twenty trout were collected in the unaltered section as compared to only two trout collected in the altered section. In the 12.4 miles of Sheep Creek from upper Sheep Creek Camp to Cook Ranch 3.8 miles, or 31 per cent, of the stream was altered. In the unaltered section 100 fish were collected by electrofishing, but only one rainbow trout was collected in the altered section. Summarizing data for the three streams, 32.81 miles of stream alterations were attributed to the following causes: Railroad construction 1.2 miles, road construction 17.8 miles, urban and industrial development 4.41 miles and agricultural activities 9.4 miles. Electrofishing disclosed that the unaltered sections contained a much larger population of trout and whitefish than did the altered sections.

Recommendations:

This study, and other similar studies, as compiled by Alvord and Peters (1963), have indicated a marked difference in the fish population between unaltered and altered stream sections. Such information should be brought to the attention of individuals and agencies whose projects affect stream channels.

Objectives:

The purpose of this investigation was to locate the original course of three streams, Belt, Otter and Sheep Creeks, and to determine the extent and cause of subsequent channel alterations. Furthermore, to examine the unaltered and altered portions of each stream and compare the differences, if any, in the fish population.

Techniques Used:

During the summer of 1962 a stream alteration survey was made on Belt, Otter and Sheep Creeks. The original courses of the creeks were determined from the earliest aerial photos and construction blueprints available. The present course of these streams were determined from recent photos and field inspection. Extent of the channel alterations were measured on aerial photos and blueprints with a map measurer and in the field with a 100-foot tape where the original channel was visible. The fish population in 300-foot sections of altered and unaltered portions of the three streams were sampled with the aid of 110-220 volt AC electrofishing gear. Each section was blocked with nets prior to electrofishing, and fish caught were anesthetized, counted, weighed, measured, and then released.

Findings:

First, each stream will be taken as a separate entity, and then all three streams and their respective data will be discussed.

Belt Creek

Belt Creek, a tributary to the Missouri River, heads in the Little Belt Mountains of the Lewis and Clark National Forest. It flows through Cascade County, forming part of the boundary between Cascade and Chouteau Counties near its mouth. U.S. Highway 89 parallels and traverses Belt Creek from about three miles above the town of Neihart to just above the town of Armington. State and county roads also bridge and parallel Belt Creek. A railroad used to operate along Belt Creek, but is no longer in operation. The lower portion of Belt Creek, below the town of Monarch, flows through and drains agricultural and grazing land. Alterations were measured from the head of the stream to its mouth. In 81 miles of Belt Creek, 21 miles, or 26 per cent, of the stream was found to be altered 159 times and its natural stream length reduced by 1.4 miles (Table 1). Of all man-made stream alterations in Belt Creek, road construction constituted 9.3 miles, agricultural activities 6.1 miles, urban and industrial development 4.4 miles and railroad construction 1.2 miles.

Fish population data from altered and unaltered stream sections are presented in Table 2. By purusing Table 2 one can see that rainbow trout and whitefish were not collected in the altered section, whereas, in both unaltered sections rainbow trout were present. Whitefish only occurred in one unaltered section.

Table 1. MILES AND NUMBER OF MAN-MADE CHANNEL ALTERATIONS RECOGNIZED IN 81 MILES OF BELT CREEK, MONTANA

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 altered	No. of alterations
Channel Relocation										
Old Channel	3,766	3	27,726	25	1,325	1	12,678	7	45,495	36
New Channel	3,070		25,681		1,127		8,336		38,214	
Lost	696'		2,045		198		4,342		7,281'	
Riprapping	2,521'	7	13,575	38	1,706	7	255	3	18,057	55
Channel Clearance			1,200	2					1,200	2
Diking			6,463	9	20,100	20	19,490	37	46,053	66
Total	6,287	10	48,964	74	23,131	28	32,423	47	110,805	159

Table 2. AVERAGE LENGTH AND WEIGHT OF FISH TAKEN IN 300-FOOT SECTIONS IN BELT CREEK, MONTANA

	Species 1/							
	Rb	WF	MSu	FSu	CSu	Dace	Sculpins	Chub
Altered Section								
No. Fish	-	-	60	-	2	Numerous	Numerous	-
Average Length	-	-	5.0	-	4.3	-	-	-
Average Weight	-	-	.06	-	.03	-	-	-
Unaltered Sections								
#1 No. Fish	2	-	20	14	-	5	0	1
Average Length	4.5	-	5.7	5.4	-	-	-	3.8
Average Weight	.05	-	.08	.06	-	-	-	.01
#2 No. Fish	8	11	23	-	-	-	Few	-
Average Length	6.4	13.4	6.7	-	-	-	-	-
Average Weight	.12	.87	.13	-	-	-	-	-

1/ Abbreviations
Rb - rainbow trout
WF - mountain whitefish
MSu - mountain sucker
FSu - longnose sucker
CSu - white sucker

Otter Creek

Otter Creek, a tributary to Belt Creek, is located in Judith Basin and Cascade Counties. U.S. Highway 87 parallels and crosses Otter Creek frequently. The creek flows through agricultural and grazing land, and only parts of this stream still retain the natural meanders, the holes, and good cover that is once had. Man-made stream alterations were surveyed from Township 16 North, Range 9 East, Section 5, which is about two miles below the headwaters of the Creek, to the mouth of the creek. The number of miles that were altered within 34.5 miles of Otter Creek were 8 miles or 23 per cent. Fifty-three channel alterations were made and the original stream length was reduced by 3.8 miles (Table 3). Activities attributed to causing alterations were: Road construction 4.7 miles, urban and industrial development .01 miles and agricultural activities 3.29 miles. Differences between unaltered and altered 300-foot sections, as to their respective fish populations, were evaluated by electrofishing (Table 4). In all, 20 rainbow and brown trout were collected in the unaltered section, but only two brown trout were obtained in the altered section. Other species of fish were found to be far more numerous in the unaltered section than in the altered section of stream. This information on Otter Creek was obtained during the summer of 1962. Construction on U.S. Highway 87 is once again altering parts of Otter Creek in 1963.

Sheep Creek

Sheep Creek is located in Meagher County and is a tributary to the Smith River. Road construction was found to be the only significant factor involved in man-made channel alterations in 12.4 miles of Sheep Creek, or from upper Sheep Creek Camp Township 12 North, Range 8 East, Section 15, to Cook Ranch, Township 12 North, Range 8 East, Section 28. The number of alterations within this 12.4 mile stretch of stream was 25, with 15 of these changes resulting in new channel formations (Table 5). Three and eight-tenths miles or 31 per cent of 12.4 stream miles were altered, with a reduction in stream length of 1.6 miles. Electrofishing within 300-foot sections of unaltered and altered sections were carried out. Once again, trout and whitefish were used as indices to evaluate both the direct and indirect effects of stream channel alterations upon fish populations. The number of trout and whitefish sampled in the unaltered section was 100 fish. The altered section contained only one rainbow trout, a few dace and numerous sculpins (Table 6).

Table 3. MILES AND NUMBER OF MAN-MADE CHANNEL ALTERATIONS RECOGNIZED IN 34.5 MILES OF OTTER CREEK, MONTANA

Type of alteration	Railroad construction		Road construction		Urban and industrial development		Agricultural activities		Total	
	Feet altered	No. of alter-ations	Feet altered	No. of alter-ations	Feet altered	No. of alter-ations	Feet altered	No. of alter-ations	Feet altered	No. of alter-ations
Channel Relocation										
Old Channel		0	17,971	15		0	17,181	8	35,152	23
New Channel			11,091				4,134		15,225	
Lost			6,881				7,047		19,927	
Riprapping		0	3,865	17		0	27	1	3,892	18
Channel Clearance		0	2,709	9		0	0	0	2,709	9
Diking		0	0	0	61	1	181	2	242	3
Total			24,545	41	61	1	17,389	11	41,995	53

Table 4. AVERAGE LENGTH AND WEIGHT OF FISH TAKEN IN 300-FOOT SECTIONS, OTTER CREEK, MONTANA

	Species 1/						
	Rb	LL	FSu	CSU	JSu	Dace	Chubs
Altered Section							
No. Fish	-	2	2	16	1	1	-
Average Length	-	8.5	6.0	8.8	4.1	3.1	-
Average Weight	-	.28	.09	.32	.02	.01	-
Unaltered Section							
No. Fish	1	19	15	77	1	-	2
Average Length	8.3	10.1	10.2	8.5	3.8	-	4.2
Average Weight	.22	.56	.49	.27	.02	-	.02

1/ See Table 2 for explanation of abbreviations.

Table 5. MILES AND NUMBER OF MAN-MADE CHANNEL ALTERATIONS RECOGNIZED IN 12.4 MILES OF SHEEP CREEK, MONTANA

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 altered	No. of alterations
Channel Relocation										
Old Channel	0		19,071'		0		0		19,071'	
New Channel	0	0	10,686'	15	0	0	0	0	10,686'	15
Lost	0		8,385'		0		0		8,385'	
Riprapping	0	0	988'	9	0	0	0		988'	9
Channel Clearance	0	0	111'	1	0	0	0	0	111'	1
Diking	0	0	0	0	0	0	0	0	0	0
Total			20,170	25					20,170	25

Table 6. AVERAGE LENGTH AND WEIGHT OF FISH TAKEN IN 300-FOOT SECTIONS, SHEEP CREEK, MONTANA

	Species 1/				
	Rb	Eb	WF	Dace	Sculpins
Altered Section					
No. Fish	1	-	-	6	Numerous
Average Length	5.1	-	-	-	
Average Weight	.04	-	-	-	
Unaltered Section					
No. Fish	18	29	53	-	Numerous
Average Length	5.4	5.2	7.2	-	
Average Weight	.08	.06	.12	-	

1/ See Table 2 for explanation of abbreviations.

Discussion:

When all three streams were assessed together, there were 127.9 miles of stream evaluated. Of this 127.9 miles, 32.81 miles or 26 per cent were recognized as being man-made channel alterations. The streams were shortened 6.8 miles. The causes for man-made channel alterations in the three streams were summed, the totals were: Road construction 17.8 miles, agricultural activities 9.4 miles, urban and industrial development 4.41 miles and railroad construction 1.2 miles. Electrofishing disclosed that the unaltered sections contained a much larger population of trout and whitefish than did the altered sections.

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Prepared by Steve E. Swedberg

Approved by George D. Holton

Date November 15, 1963

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-5-R-12 Name Central Montana Fisheries Study

Job No. III Title Investigation of Previously Rehabilitated Waters with Regard to Fish Growth and Optimum Size to Use in Successive Plants

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

Abstract:

The fish populations of Ackley, Eureka, Willow Creek, Bynum and Martinsdale Reservoirs were sampled by angler creel census, gillnetting and seining.

Ackley Lake was the only impoundment where a definite marking system was used to identify plants of trout. In Ackley, various plants of rainbow trout were marked by fin-clipping. Of seven plants, two plants, one in April 1959 and the other in late March 1961 were ineffective, for few trout were ever caught by anglers or gill nets. So far, two plants have shown up very well in the samples collected; a brook trout plant in September 1959 and a rainbow trout plant in June 1961. The average length-weight gain per month for Ackley Lake was poor compared to the gains made by trout in the four other reservoirs. Creel census in 1962 showed that 244 anglers fished 949.5 hours and caught 465 rainbow trout and 35 brook trout. The catch per man was 1.9 and the catch per hour was .5.

Two plants of rainbow trout in Eureka Reservoir exhibited the following growth rates: (a) The June 1962 plant of 4-inch rainbow averaged 9.5 inches in total length and 0.30 of a pound after nine months. (b) The April 1961 plant of 3-inch rainbow averaged 18.6 inches in total length and 2.36 pounds after 23 months. In 1962, 61 fishermen caught 37 rainbow trout in 206 hours for a catch per man of .6 and a catch per hour of .2.

Insufficient numbers of trout were gill netted in Willow Creek Reservoir in 1962 to adequately assess growth rate. In 1962, 77 fishermen caught 117 rainbow trout (average length of 15 inches) and one cutthroat trout in 249 hours, for a catch per man of 1.5 and a catch per hour of .5.

Rainbow trout stocked for five months in Bynum Reservoir attained an average length of 10.2 inches and 0.44 of a pound. The average gain per month was 1.24 inches and 0.08 of a pound. This was the largest average gain in length on a per month basis of trout in any of the five reservoirs reported upon. Due to a heavy irrigation demand for water, the water level in Bynum was dropping rapidly at the end of the report period.

Five months after the initial plants, Martinsdale Reservoir produced rainbow trout averaging 9.4 inches in total length and weighing 0.31 of a pound. This was a growth of 5.4-6.4 inches in length.

Recommendations:

It is recommended that the study on the five reservoirs covered by this report be continued. Sampling dates should be more firm and more fish collected in each sample, so that more substantial information can be obtained.

Objectives:

To collect and analyze sufficient data from major reservoirs in the project area in order to affect a sound fishery management program. Needed information includes: (1) The status of game and rough fish populations. (2) Growth rate of game fish. (3) Game fish catch per hour.

Techniques Used:

Fish samples were obtained through the use of angler creel census, experimental gill nets 125-foot in length and with the aid of a bag seine. All fish planted in Ackley Lake since 1960 were fin clipped.

An improved method of handling fish when planting large reservoirs was employed by Lewistown Fish hatchery men and District Four fisheries personnel. Nylon mesh was built into the form of a rectangular holding box about 8 feet x 3 feet x 4 feet. Snaps, sewn into the eight corners could be attached to rings welded to 3/8-inch iron rods. The rods in turn were driven into the reservoir bottom in such a way as to stretch out the holding box.

Findings:

Five reservoirs were sampled during the report period, they were: Ackley Lake, Eureka, Willow Creek, Bynum and Martinsdale Reservoirs. Each rehabilitated reservoir will be reported on separately.

Welch (1961) and Posewitz (1962) followed the different phases of the mark-recapture program since Ackley Lake was rehabilitated in 1958. Except for the fish plants in April and September 1959, all plants were fin-clipped, (Tables 1 and 2).

Mr. Nels Thoreson, Fish Manager for District Four, Great Falls, Montana, made both vertical and horizontal plankton tows in Ackely Lake March 10, 1959. He concluded there was insufficient plankton and recommended that the fish plant scheduled for that time be postponed until the fish food organisms recovered. On April 13, 1959, 90,000 3-inch rainbow trout were planted, they were planted earlier than recommended due to crowded conditions at the hatchery.

Creel census and gill net samples collected between August 1959 and March 1961 produced only 31 of these trout (Table 1). The sample taken on November 1961 included none of the 1959 plant, nor has any subsequent sampling.

About 43,000 brook trout were planted as unmarked 5-inch fish on September 3, 1959. When a comparison is made, using months between the plant and samples (Table 1), the brook trout, over a period of 20-22 months provided far more fish and comprised a larger portion of trout sampled than has any of the rainbow plants for a comparable period. Of course, the stocking rate was only exceeded by the rainbow plant of 1959. No brook trout were known to have been taken by either anglers or gill nets in the spring of 1963.

The 25,000 rainbow trout that were stocked on May 27, 1960 as 4-inch fish continued to appear in the sample of 1963, furnishing 9 fish or 11 per cent of the 84 fish taken (Table 1). One trout from the 1960 plant was caught by an angler on November 13, 1962 and was 22½ inches long and weighed 7 pounds. The average length and weight for 4 trout that were sampled in 1963 was 14.4 inches and 0.96 of a pound (Table 2).

On March 27, 1961, 12,500 2-inch rainbow trout were introduced into Ackley Lake, but this plant has not shown up well in any of the samples taken.

The June 1961 plant of 12,500, 5-inch rainbow trout made quite a good showing (Table 1). Of 75 trout taken November 1961 with gill nets 56 per cent, or 42 rainbow trout, were from this plant.

There were two individual plants of rainbow trout in 1962, one in May and the other in July; both plants were 4-inch fish and a stocking rate of 12,500 fish. The samples in Table 1 indicates that the May plant was more abundant than the July plant in 1963.

There were also 18 unmarked rainbow trout taken in the samples of April and May 1963. These fish ranged in length from 10.5-15.3 inches. The inflow to the reservoir heads in the Judith River, and thence flows through an irrigation system into Ackley Lake. It is believed these fish reached the reservoir through this means.

The average length-weight gain per month for trout in Ackley Lake does not compare well with the gain for trout in other reservoirs that have been rehabilitated (Table 3). Creel census in 1962 showed that 244 anglers fished 949.5 hours and caught 465 rainbow trout (clipped fins were not recorded) and 35 brook trout. The catch per man was 1.9 and the catch per hour was .5. The anglers also caught 192 suckers and 5 carp. At a fish derby in the spring of 1963, so many suckers and so few trout were caught (the largest trout taken weighed about 1½-pounds) that the derby will not be held next spring (1964).

Eureka Reservoir

The data sheet, Table 3, was continued from the reports of Welch (1961) and Posewitz (1962), with data from the current period added. There was only one large sample taken during the report period. The sample was obtained by seining both rainbow and brook trout in the intake canal on March 8, 1963 as they congregated below a diversion dam, approximately one-half mile above the reservoir. The trout were anesthetized and lengths, weights and scale samples taken. The fish were then released. Three brook trout were sampled and they averaged 7.3 inches and 0.14 of a pound; they apparently came down this canal from the Teton River. There were two sizes of rainbow trout present. The smaller group of fish ranged from 8.0 inches and 0.19 of a pound to 11.5 inches and 0.75 of a pound; they averaged 9.5 inches and 0.30 of a pound after nine months. This was an average monthly increment of 0.61 inches in length and 0.03 of a pound. This group consisted of 49 fish and were assumed to have been representatives of the plant of 4-inch rainbow in June 1962. The other group of rainbow were assumed to be from those fish planted in April 1961 as 3-inch fish. There were 21, and they ranged from 16.4 inches and 1.8 pounds to 21.4 inches and 2.7 pounds. Some 20 to 21-inch fish weighed slightly over three pounds. The group averaged 18.6 inches and 2.36 pounds after 23 months. These trout had an average monthly gain of 0.68 inches in length and 0.10 of a pound. The figures for Eureka Reservoir rainbow in Table 3 give the average values for both groups taken as a whole. In comparing these data to other data it should be remembered these fish were taken by seining when on their spawning run and that small size fish predominated.

The following creel census information for 1962 was derived from fishermens' logs, wardens and fisheries personnel: Sixty-one fishermen caught 37 rainbow trout in 206 hours for a catch per man of .6 and a catch per hour of .2.

Table 1. Data on Individual Trout Plants in Ackley Lake from Gill Netting and Creel Census, 1959-1963

Species	Date planted and dates sampled	Months between plant and sample	Marked fin	Number of fish	Per Cent composition
Rb 1/	Planted 4/59		None		
	Sampled 8/59 2/	4	"	2	100
	" 12/59	8	"	16	9
	" 6/30- 3/61 3/	14-23	"	13	10
	" 11/61- 5/63	31-49	"	0	0
Eb 1/	Planted 9/59		None		
	Sampled 12/59	3	"	157	91
	" 6/60- 3/61 3/	9-18	"	82	60
	" 5/61- 7/61 4/	20-22	"	23	37
	" 11/61 5/	26	"	17	23
	" 5/62 6/	32	"	16	6
	" 4&5/63 7/	43-44	"	0	0
Rb	Planted 5/60		Right		
	Sampled 6/60- 3/61 3/	1-10	pectoral	41	30
	" 11/61 5/	18	"	3	4
	" 6/62 8/	25	"	4	27
	4&5/63 7/	35-36	"	9	11
Rb	Planted 3/61		Left		
	Sampled 11/61 5/	8	pelvic	13	17
	" 4&5/63 7/	25-26	"	2	2
Rb	Planted 6/61		Adipose		
	Sampled 11/61 5/	5	"	42	56
	" 4&5/63 7/	22-23	"	17	20
Rb	Planted 5/62		Anal		
	Sampled 4&5/63 7/	11-12	"	26	31
Rb	Planted 7/62		Left		
	Sampled 4&5/63 7/	9-10	pectoral	12	14
Rb	Sampled 4&5/63 7/, 9/	?	None	18	21

1/ Rb is the abbreviation for rainbow trout, Eb for brook trout.
2/ All samples were by gill netting unless otherwise indicated.
3/ Fifteen sampling days data from date of planting to this date were summed.
4/ Warden creel census, six sampling days, 40 Rb or 63% were not differentiate as to fin clips.
5/ Gill net sets only.
6/ Creel census only, the Rb were not separated as to marks, but composed 290 or 94% of the sample.
7/ Both gill netting and creel census.
/ Creel census only, all fish differentiated as to fin clips.
9/ Believe that these trout came into Ackley through an irrigation system which heads in the Judith River.

Table 2. A resume of marked fish that were planted and sampled by gill netting, Ackley Lake 1959-1963

Species	Date planted and size	Number	Date sampled	Marked fin	Number caught	Average length	Average weight	Average gain/mo. Length	Average gain/mo. Weight
Rb 1/	4/59-3"	365	11/61	None	None	-	-	-	-
Eb 1/	9/59-5"	175	11/61	None	17	13.0	0.80	0.31	0.03
Rb	5/60-4"	101	11/61	R. pectoral	3	13.6	0.94	0.53	0.05
Rb	3/61-2"	51	11/61	L. pelvic	13	9.3	0.37	0.79	0.05
Rb	6/61-5"	51	11/61	Adipose	42	8.9	0.28	0.58	0.06
Rb	5/60-4"	101	4/63	R. pectoral	1	14.8	1.00	0.31	0.03
Rb	3/61-2"	51	4/63	L. pelvic	None	-	-	-	-
Rb	6/61-5"	51	4/63	Adipose	1	12.3	0.62	0.33	0.03
Rb	5/62-4"	51	4/63	Anal	2	10.5	0.41	0.59	0.03
Rb	7/62-4"	51	4/63	L. pectoral	2	8.4	0.19	0.49	0.02
Rb	------		4/63	Unmarked	4	-	-	-	-
Rb	5/60-4"	101	5/63	R. pectoral	3	14.1	0.92	0.28	0.02
Rb	3/61-2"	51	5/63	L. pelvic	2	12.4	0.72	0.40	0.03
Rb	6/61-5"	51	5/63	Adipose	11	12.1	0.63	0.31	0.03
Rb	5/62-4"	51	5/63	Anal	19	10.9	0.50	0.58	0.04
Rb	7/62-4"	51	5/63	L. pectoral	5	10.2	0.40	0.62	0.04
Rb	------		5/61	Unmarked	14	11.8	0.62	-	-

1/ Rb is the abbreviation for rainbow trout, Eb for brook trout.

Table 3. A summary of fish planted and sampled from rehabilitated waters from 1959-1963

Reservoir	Rehabilitated	Fish Plants No/Acre	Date	Sp.	Size	Date sampled	No.	Aver. length	Aver. weight	Aver. Gain/mo. Length	Weight
Ackley	1958	365	4/59	Rb 1/	3	11/61	-	-	-	-	-
		175	9/59	Eb 1/	5	11/61	17	13.0	0.80	0.31	0.03
247 Surface Acres		101	5/60	Rb	4	11/61	58	9.3	0.32	0.31	0.02
		51	3/61	Rb	2	4/63	6 2/	10.8	0.47	0.19	0.01
		51	6/61	Rb	5	5/63	54	11.6	0.58	0.21	0.02
		51	5/62	Rb	4						
		51	7/62	Rb	4						
Eureka	1958	322	5/59	Rb	3	10/60	56	19.9	4.05	0.99	0.24
	1960	522	4/61	Rb	3	2/62	20	12.4	0.92	0.94	0.09
367 Surface Acres		290	6/62	Rb	4	5/62	19	15.3	1.56	0.95	0.12
						3/63	70	12.2	0.92	0.39	0.04
Willow Creek	1959	81	4/60	Rb	3	2/61	9	12.9	0.89	0.99	0.09
		279	5/60	Rb	3	6/61	20	15.9	2.02	0.92	0.14
662 Surface Acres		137	4/61	Rb	3	4/62	8	18.7	2.49	0.65	0.10
		152	5/61	Rb	3	11/62	2	19.5	3.55	0.53	0.11
Bynum	1961	221	6/62	Rb	4	11/62	14	10.2	0.44	1.24	0.08
3,300 Surface Acres											
Martinsdale	1961	236	5/62	Rb	4	10/62	31	9.4	0.31	1.18	0.06
		125	5/62	Rb	3						
1,005 Surface Acres		106	6/62	Rb	4						
		40	7/62	Rb	4						
		39	9/62	Ct	2						

1/ Rb is the abbreviation for rainbow trout, Eb for brook trout.
2/ Four rainbow unmarked and 13 other rainbow were caught, but lengths and weights were not taken.

Willow Creek Reservoir

Details concerning the number of fish planted and sampled from Willow Creek Reservoir were covered by Welch (1961) and Posewitz (1962); Table 3 illustrates the data obtained during these planting and sampling periods. No plants of rainbow trout were made in 1962. In 1963 there were 365,000 3-inch rainbow trout spread over the reservoir by planting boat.

Two overnight experimental gill nets were lifted on November 16, 1962. Only two rainbow trout were caught in the nets (Table 3), one almost five pounds in weight. The nets were torn badly in several places, indicating that large fish had been gilled but had broken free. Two cutthroat trout taken averaged 16.4 inches and 1.8 pounds. Insufficient numbers of trout were taken in gill nets in 1962 to assess growth.

Creel census data for 1962 was derived from fishermen logs and wardens. Seventy-seven fishermen fished for 249 hours and caught 117 rainbow trout (average length of 15 inches) and one cutthroat trout 17 inches in length. The trout were caught at a rate of 1.5 per man and .5 per hour. Eleven suckers were also taken and they averaged 7.8 inches in length.

Bynum Reservoir

Bynum Reservoir is located in Teton County, near the towns of Bynum and Choteau. When the reservoir is full it contains approximately 3,300 surface acres. Bynum was treated with toxaphene and Pro-Nox Fish in October 1961. Live suckers were still present in May 1962, but the yellow perch were apparently killed. In June 1962 a total of 727,700 4-inch rainbow trout were planted (221 fish per acre). Additional plants of trout were scheduled, but at the time of stocking the water level was dropping due to irrigation demands, therefore, other trout plants were deleted from Bynum in 1962.

On November 9, 1962 two experimental gill nets were set. Twenty-eight rainbow trout were taken, 14 of these fish averaged 10.2 inches and 0.44 of a pound. The average gain per month was 1.24 inches and 0.08 of a pound (Table 3). This length gain was the highest for any of the rehabilitated waters reported upon in Table 3. The weight gain was slightly less than either Eureka or Willow Creek Reservoirs at the first sampling period after the initial plant. The first sampling periods for Eureka (in 1962) and Willow Creek (in 1961) were made 10 months after the initial plant. Four white suckers were also taken in the gill nets and they averaged 15.3 inches in length and 1.6 pounds. Department wardens reported excellent fishing in May and the first half of June 1963. Water levels were dropping rapidly in the latter part of June due to irrigation demands.

Martinsdale Reservoir

Martinsdale Reservoir, 1005 surface acres, is located near the town of Martinsdale in Meagher County. Martinsdale was rehabilitated in September 1961 and the first plants of trout were made in May 1962 (Table 3). A total of 547,934 trout were planted in 1962 (545 trout per surface acre). All were rainbow except for 39,600 cutthroat trout 2-inches in length. Brown trout were reported to have been caught by anglers in the spring of 1963, no doubt having entered Martinsdale through the irrigation canal which feeds the reservoir.

On October 1, 1962, five months after the initial plants, a sample was taken with two experimental gill nets. Fifteen rainbow trout were gilled in 90 minutes. An additional 16 rainbow were checked in the same day in a catch made by two anglers. The 31 rainbow trout averaged 9.4 inches in total length and weighed 0.31 of a pound. The average length and weight gain per month was 1.18 inches and 0.06 of a pound (a growth of 5.4-6.4 inches in length). After five months Bynum Reservoir showed a greater average increase in length and weight gain per month, however, Martinsdale Reservoir was stocked with a larger number of fish per surface acre. Martinsdale was reported to have been furnishing excellent angling in the spring of 1963, and in June 1963, the water level was still up.

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Prepared by Steve E. Swedberg Approved by George D Holton

Date November 15, 1963

MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-5-R-12 Name Central Montana Fisheries Study

Job No. IV Title Investigation of Fisherman Use and the Contribution to the Creel by Hatchery Trout in the Upper Teton River

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

Abstract:

In 1961 the North Fork of the Teton River received 2,450 fin-clipped catchable rainbow trout, and the South Fork received 1,020 unmarked catchable rainbow trout. Those trout which were unmarked could be recognized later by fin deformities characteristic of hatchery trout. In July 1962, 1,000-1,100 unmarked catchable rainbow trout were planted in each of these waters. The infertile watershed, high elevation, snow melt, cold springs and short growing season contribute to poor fish production in these waters. Angling pressure in the area was light.

Fishing success increased from 2.2 fish per man day in 1961 to 2.9 in 1962. As in 1961, creel census figures for 1962 indicated the bulk of trout caught were hatchery fish. Only two fin-clipped trout from the 1961 plant were recorded as caught by fishermen in 1962.

Electrofishing results indicated little carry-over of fin-clipped rainbow trout from 1961 to 1962. Only two trout were taken in 1962 which were thought to be of those fish which were fin-clipped in 1961. Hatchery rainbow trout made up most of the trout taken by electrofishing.

Recommendations:

Information obtained from this study indicates there was little carry-over of catchable hatchery rainbow trout from June 27, 1961 to September 19, 1962. Planted trout made up the bulk of those taken by anglers or by electrofishing. However, due to the low fishing pressure, the cost-benefit ratio of these particular fish plants is unfavorable. The following alternatives should be con-

sidered: (1) Stock fewer trout, and place these in beaver ponds, only in the best holes, or at well used public access sites. (2) Undertake stream improvement if improvements recently started proves feasible. It is recommended that this project be discontinued as a separate entity, and further investigation be carried out under Job I, "Inventory of Waters of the Project Area".

Objectives:

The purpose of this investigation was to determine the contribution of hatchery trout and wild trout to angler catch, to determine angler success, and fisherman use.

Techniques Used:

On June 27, 1961, the North Fork of the Teton River received 2,450 fin-clipped catchable hatchery rainbow trout weighing 658 pounds. On July 17, 1961, the South Fork received 1,020 unmarked catchable rainbow trout weighing 300 pounds. Those trout which were unmarked could be recognized later by fin deformities characteristic of hatchery trout. The intent of the study was to plant no trout the second year. However, inadvertently in July 1962, 1,000-1,100 unmarked catchable rainbow trout were planted in each of these waters (a total of 2,160 trout weighing 400 pounds).

Most fisherman contacts were made on week-ends due to the small amount of fishing pressure during the week.

Three-hundred-foot sections of the North and South Forks of the Teton River were electrofished in September 1961 and in March and September 1962. During electrofishing operations each end of the section was blocked with a seine.

Findings:

The upper Teton River is a product of several tributaries, the North Fork, West Fork, Middle Fork and the South Fork (Figure 1). All of these tributaries head in the mountains of the Lewis and Clark National Forest, and thence flow in an easterly direction forming the main Teton River. The infertile watershed, high elevation, snow melt, cold springs and short growing season contribute to poor fish production within these waters.

Creel census effort was much less in 1962 than in 1961, for only 9 days were censused in 1962 as compared to 17 days in 1961 (Table 1). Also, only 34 fishermen were checked in 1962 compared to 46 fishermen in 1961. The catch increased from 2.2 fish per man day in 1961 to 2.9 fish per man day in 1962. As in 1961, creel census figures for 1962 indicated the bulk of the trout caught were hatchery fish. Only two fin-clipped trout from the 1961 plant were recorded as caught by fishermen in 1962.

The electrofishing sections (Figure 1) were areas where fish had previously been planted in June and July of 1961 or in July of

1962. As already indicated, those fish which were planted in the North Fork in June 1961 were fin-clipped. The other plants of rainbow trout consisted of unmarked fish.

Some electrofishing sections were described by Posewitz (1962). Posewitz included data from five shocking sections on the North Fork and one section on the South Fork. Section I on the North Fork consisted mostly of riffle area with the exception of one pool having excellent overhanging brush cover. Section II on the North Fork was similar to Section I, except that the pool was considerably larger and deeper, and was without overhead cover. Section III (Section III here, is not the same Section III described by Posewitz) on the North Fork was located just above the junction of the Middle and North Forks. It contained two pools, one was deep, with a log jam for cover, and the other contained several logs lying along the bank and in the water. Between these two pools was a long riffle area. The section on the South Fork contained similar amounts of pool and riffle area with some overhanging brush and a few large undercut boulders. Table 2 gives the results of electrofishing 300-foot sections where fish had previously been planted.

Sixty-six hatchery rainbow trout were taken by electrofishing September 12, 1962 in Section I of the North Fork, but only one of these was identified as a marked fish from the 1961 plant. This indicated the 57 marked rainbow trout shocked one year earlier had been caught, died, or moved out of the section (Table 2).

Shocking of Section II on the North Fork in 1962 (Table 2) showed little change in the abundance of trout from 1961 to 1962. The only fish found in Section II in 1962 were believed to be planted rainbow trout, but in 1961 other species of trout were present in small numbers.

Section III on the North Fork contained several different kinds of trout, with 26 brook trout being the largest number of a particular species taken in 1962. One rainbow trout was possibly a marked fish from the 1961 plant. Section I on the South Fork, planted with rainbow trout, showed a decrease from 24 fish in March to 3 fish in September 1962.

Discussion:

Prior to initiation of this study, the North and South Forks of the Teton River were known to be relatively infertile and to carry only small numbers of desirable-size wild trout. Fishing pressure was low. It was thought planting catchable-size hatchery rainbow might attract sufficient fishermen to be economically feasible.

Over the two-year period of this study, 5,630 hatchery rainbow trout weighing a total of 1,358 pounds were planted. Estimating the cost of hatchery catchable trout to be $1.00 a pound, this is an expenditure of $1,358.00.

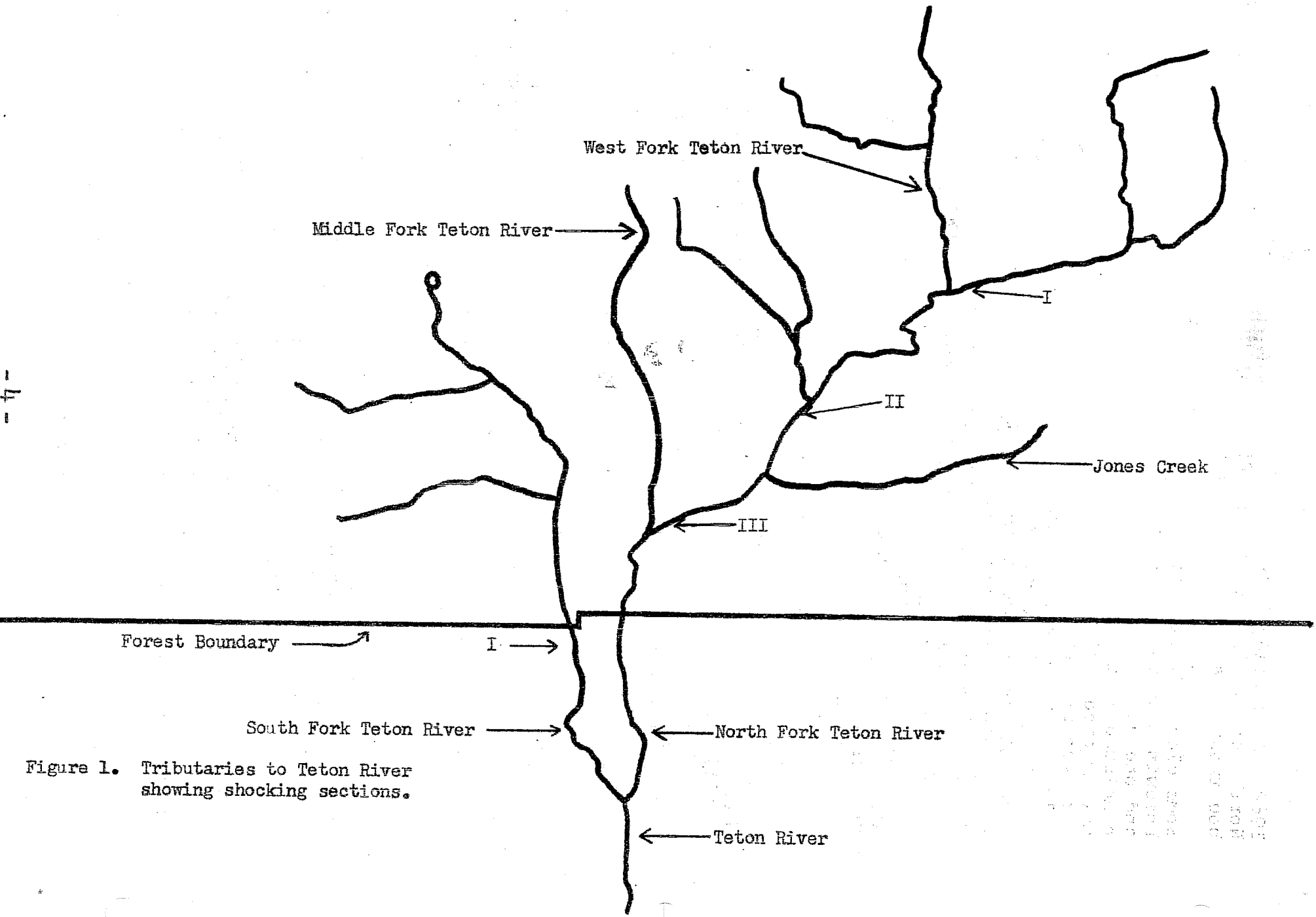

Figure 1. Tributaries to Teton River showing shocking sections.

Table 1. Teton River creel census--a comparison between 1961 and 1962

Item	Statistics 1961	1962
Angling Days Censused	17	9
Number of Fishermen	46	34
Number of Hours Fished	123	36.5
Number of Fish Caught	38	26
Fish per Hour	0.31	0.71
Hours Fished per Man Day	7.24	4.06
Catch per Man Day	2.23	2.89
Percentage by Species Making up the Catch:		
Natural Reared Rainbow Trout	1 fish (2.6%)	2 fish (7.7%)
Hatchery Rainbow Trout	24 fish (64.0%)	13 fish 1/ (50.0%)
Rainbow x Cutthroat Trout		1 fish (3.8%)
Cutthroat Trout	2 fish (5.3%)	1 fish (3.8%)
Brook Trout	11 fish (29.0%)	9 fish (34.6%)

1/ Only two of these fish were the fin-clipped fish from the 1961 plant.

Table 2. A comparison between 300-foot electrofishing sections, North and South Fork of the Teton River, 1961-1962

Section	Date	Species	Number	Average length	Average weight
North Fork	9/15/61	Marked hatchery rainbow trout	57	8.57	0.24
I.		Cutthroat trout	1	3.50	0.01
		Brook trout	1	9.00	0.31
I.	9/12/62	Hatchery rainbow trout	66 1/	10.09	0.41
II.	9/15/61	Natural reared rainbow trout	1	3.20	0.01
		Rainbow x cutthroat trout	2	8.60	0.25
		Brook trout	1	10.10	0.44
II.	9/12/62	Hatchery or natural reared rainbow?	3	2/	2/
North Fork	9/19/62	Natural reared rainbow trout	5	6.68	0.15
III.		Hatchery rainbow trout	4 1/	10.58	0.50
		Rainbow x cutthroat trout	1	6.80	0.11
		Brook trout	26	6.14	0.14
South Fork	3/26/62	Hatchery rainbow trout	24	9.14	0.26
I.		Brook trout	1	6.80	0.08
		Whitefish	1	5.90	0.06
I.	9/12/63	Natural reared rainbow trout	2	9.90	0.42
		Hatchery rainbow trout	3	10.63	0.52

1/ One of these fish was from the fin-clipped fish from the 1961 plant.
2/ Size recorded only as catchable-size.

In other words, over the two years an expenditure of $1,358.00 attracted only about 400 fishermen days.1/ This is a cost of over $3.00 per fisherman-day and raises the question of the economic feasibility of planting these streams.

1/ Considering the difficulty of contacting fishermen even on week-ends, the allowance of 200 fishermen days per year for the study area is liberal.

References Cited:

Posewitz, James A.
1962. Investigations of fisherman use and the contribution to the creel by hatchery trout in the upper Teton River. Montana State Department of Fish and Game. Completion Report, Dingell-Johnson Project F-5-R-11, Job No. IV, 4 p. (mimeo).

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