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-5-R-9 Name Central Montana Fishery Study

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

Period Covered May 1, 1959 - April 30, 1960

Abstract:

The major portion of surveys conducted on waters in the project area consisted of fish population sampling and mapping the larger lakes and impoundments. Two mountain lakes were surveyed and recommended for planting. Two large irrigational impoundments and one large natural lake were sounded with an echo sounder and the volumes calculated for future rehabilitation. Four smaller impoundments were investigated for future development projects. Follow-up population investigations were made on three previously rehabilitated impoundments. Eight stations were set up on a stream threatened with mine-mill pollution to establish a water quality standard to quantitatively measure the effect of mine-mill waste on the physical, chemical and biological properties of the stream. A limited amount of sampling was carried out on six other streams of major importance to establish an index of productivity.

Objectives:

The purpose of this project is to determine the physical, chemical, and biological characteristics of the waters of highest importance to the total recreational fisheries picture of the project area, and where practicable to obtain estimates of existing or potential fishermen use.

Techniques Used:

Fish samples were collected with 125-foot experimental gill nets. Scale samples were sent to the Fisheries Laboratory at Montana State College where age and growth determinations were made.

Lake mapping was accomplished by the use of vertical aerial photographs and a pantograph to enlarge the lake outline. A planimeter was used to calculate lake volume.

Turbidity readings were made with a Hellige Turbidimeter.

Total dissolved solids were determined by the gravimetric analysis at the State Board of Health Laboratory, Helena, Montana.

Periphyton production was determined by the Chlorophyll extraction method (Grzenda and Brehmer, 1960) as follows:

1. Plexiglass slides of a known surface area were placed in the stream for a definite sampling period to collect periphyton growth.

2. Material was scraped from the slides and the chlorophyll extracted with 95% ethyl alcohol.

3. A 50 ml. chlorophyll-ethanol solution was then read in a colorimeter at 660 mu. wave length to obtain optical density of chlorophyll.

4. A relative production value was then obtained in optical density or phyto-pigment units/dm^2/day.

Standard methods were used for general water chemistry determinations.

Other agencies were contacted to obtain additional information on waters in question.

Findings:

Mountain Lake Surveys

The two mountain lakes surveyed were Hidden (26 acres) in the South Fork Teton River drainage and Sock (5 acres) in the North Fork Sun River drainage. Gill nets in both lakes produced no fish. Cottus sp. were abundant in Hidden Lake. Plankton and bottom fauna were moderately abundant in both lakes. Scale measurements were obtained on both lakes for purposes of mapping from aerial photos. Cutthroat trout furnished a good fishery in Hidden Lake through the early 1950's, but no fish have been observed or caught since that time. Hidden Lake was planted with native cutthroat trout late in the summer of 1959. From all reports, Sock Lake has never contained trout. A golden trout plant is scheduled for Sock Lake during the spring of 1960.

Large Impoundments Surveyed

Lebo and Martinsdale Reservoirs in the Musselshell River drainage and Bean Lake in the Dearborn River drainage were sounded with an echo sounder. The sounding data were transferred to an outline drawing of the lake, prepared by means of an aerial photograph, and the volume was calculated. It was essential to obtain this data

since these waters represent possibilities for future rehabilitation. Rehabilitation projects were approved for Bean and Lebo, however, failure of the land owners to grant permanent easements prevented the completion of these projects.

Two overnight gill net sets were made in Lake Francis in Pondera County. The catch was comprised of common and longnose suckers (89%), kokanee salmon (3%), rainbow trout (3%), whitefish (3%) and ling (2%). Four gill net sets were made in 1955 and the total catch was comprised of common suckers (93%), whitefish (1%) and rainbow trout (6%).

Rehabilitation would be desirable if this lake is expected to produce anything more than a mediocre trout fishery. Chemical treatment of this 4,000 acre lake is not recommended with Pro-Nox Fish due to the expense. Toxophene can not be recommended since the lake is the water supply for the city of Conrad. Also, the dead fish would be undesirable with respect to the water supply.

The sportsmen of the area have wanted northern pike planted in the lake, but the Fish and Game Department has not recommeded this because the catch per hour of pike is generally slow and suckers have been found to be unimportant in the diet of pike (correspondence Minn. Dept. of Conservation).

Our present plan is to plant large numbers of small kokanee salmon and rainbow trout in an attempt to sustain a fishery. Snagging of kokanee salmon in the inlet canal is legal and has been quite successful.

Small Impoundments Surveyed

Finley and Stafford Reservoirs in Fergus County, Lower Kolar Reservoir in Judith Basin County and Gypsy Lake in Meagher County were investigated for possible development projects.

A map was constructed of Lower Kolar Reservoir and the volume was calculated. It was rehabilitated on October 14, 1959 under F-24-D-24. A completion report has been prepared and submitted for this project. A gill net was set under the ice in December. The net was left for a week and no fish were caught. It was assumed a complete kill was obtained. The reservoir is set up for a fingerling rainbow trout plant in the spring.

The outline of Finley Reservoir was constructed from an aerial photograph, however, thin ice prevented sounding so volume is as yet unknown. Trout fishing has been extremely poor, probably due to the extensive sucker population. Rehabilitation has been recommended under a separate development project.

Stafford Reservoir supports a bass and bluegill population as well as a rainbow trout population. It covers 35 acres and has depths up to 20 feet. According to sportsmen, trout fishing has been good. Rehabilitation of this reservoir has been postponed until more catch information can be gathered on trout. Rainbow trout plants will be continued through 1960.

In cooperation with Forest Service personnel of the Helena National Forest, development of Gypsy Lake for suitable trout habitat will be carried out. An addition to the present dam will be constructed by Forest Service engineers to increase the depth and surface area. The Forest Service anticipated a demand on this water for irrigational purposes, therefore, quick action was necessary to secure this water for recreational use.

Previously Rehabilitated Impoundments

Fish population samples were taken on Four previously rehabilitated waters in the project area. Table 1 is a summary of fish planting and sampling that has been carried on in Ackley, Kipp and Eureka Reservoirs and Tunnel Lake since rehabilitation.

Ackley Reservoir, in Judith Basin County, was rehabilitated in 1958. Rainbow trout fingerlings were planted in the spring of 1959. An additional plant of eastern brook trout was made in the fall of the same year. The growth rate of the trout has been excellent as shown by samples taken in August and December, 1959 (Table 1).

The rainbow plant was made early in April before the water had a chance to warm up. Crowded hatchery conditions prevented holding the fish until conditions for planting were optimum. Sampling, carried out by the Fisheries Manager preceeding the fish plant, failed to reveal any plankton concentrations. Bottom samples were not taken since a dredge was not available, so it is possible the fish came through on benthos. The extent of survival is not known. Gill nets produced few rainbow in comparison to brook trout, however, the thick, deep body of the rainbow render them difficult to catch in a net.

There have been reports of fish taken from Ackley by warden creel census and personal contract, however, the catch has been low. The reservoir was planted in excess of 580 fish per acre, the maximum allowed by the lake planting table. It is possible fish should be planted at a greater rate, in water as productive as Ackley, to obtain a substantial harvest.

Ackley is set up for a three year study to compare the survival of fingerling and catchable trout in successive plants made in rehabilitated waters.

Kipp Reservoir, in Glacier County, was rehabilitated in 1955 and has been planted each spring since 1956 with fingerling rainbow trout. The fish population was sampled by means of two overnight gill net sets on November 24, 1960 (Table 1). The age and growth data from the fish caught were combined with data taken from fish trapped during the spring spawn taking operation in April, 1959 (Table 2). Kipp appears to have a growth rate similar to that of Duck Lake. Age group III, which comprised the bulk of the total number sampled, shows a close growth rate relation between the two lakes (Figure 1). Age group I (1959 plant) comprised 84 percent of the gill net catch by numbers, even though the 1959 plant was 14 percent as large as the 1958 plant. The larger fish are considerably more difficult to catch, however.

Table 1. A Summary of Fish Planted and Sampled from Rehabilitated Waters.

Lake or Reservoir	Rehab-ilitated	Fingerlings Planted Yr.	No.	Sp.	Sampled	No. Nets	Trout No.	Sp.	$\bar{X}$ Lth In.	$\bar{X}$ Wt. Lbs.	Length (Inches) Range	Weight (Pounds) Range
Ackley	1958	'59	90,048	Rb	8/8/59	2	2	Rb	10.9	.62	-	-
		'59	52,147	Eb	12/1/59	2	2	Rb	12.8	1.09	-	-
							19	Eb	6.9	.10	7.7- 6.0	.14- .06
					12/11/59	2	14	Rb	13.2	1.13	13.9-11.9	1.38- .74
							138	Eb	7.3	.16	8.8- 6.3	.28- .10
Eureka	1958	'59	64,480	Rb	12/7/59	1	5	Rb	12.2	.68	11.3-12.9	.59- .83
					3/16/60	1	3	Rb	13.6	1.19	12.4-14.5	.87-1.46
Kipp	1955	'56	507,598	Rb	11/24/59	2	19	Rb	15.9	2.02	11.3-24.2	.58-6.+
		'57	498,962	Rb	11/24/59	2	2	Eb	18.0	2.60	16.9-19.0	2.22-2.96
		'58	389,213	Rb								
		'59	58,000	Rb								
Tunnel	1956	'57	39,216	Ct	6/19/59	2	10	Ct	8.1	.16	7.0- 9.5	.10- .24
		'58	6,600	Ct	3/30/60	1	16	Ct	10.6	.42	8.6-12.1	.22- .64

TABLE 2. Average Calculated Lengths, Actual Increment and Percent Increment at Each Year of Life for Rainbow Trout from Kipp and Duck Lake.

Age Group	No. of Fish	Mean TL at Capture	Year of Life 1 TL	1 Inc	1 %	2 TL	2 Inc	2 %	3 TL	3 Inc	3 %	4 TL	4 Inc	4 %
Kipp Lake (1959-60)														
I	14	13.7	4.1											
II	5	17.3	4.4	8.5	193	12.9								
III	24	22.1	5.1	10.6	208	15.7	5.1	33	21.8					
IV	3	22.3	4.9	6.5	133	11.4	6.7	59	18.1	3.9	22	22.0		
Duck (1958)														
III	25	22.1	5.3	11.4	215	16.7	5.3	32	22.0					
IV	1	25.5	5.3	13.9	262	19.2	4.2	22	23.4	2.1	9	25.5		

Eureka Reservoir, in Teton County, was rehabilitated in 1958 and planted with fingerling rainbow trout in the spring of 1959. The fish population was sampled in December, 1959 and again in March, 1960. The numbers and size of fish taken is shown in Table 1. The growth rate seems to be good, but not quite up to that of Ackley Reservoir. There was a very definite increase in condition factor, in the Eureka rainbow, between the first and second sampling dates. The mean condition factor in December was 38 and in March it was 46. Stomach samples suggest they changed their food habits to a piscivorous diet.

Tunnel Lake, in Teton County, was rehabilitated in 1956. The high stocking rate created a slow growth rate in the trout, however, fishing success has been good. The fish population was sampled in June, 1959 and in March, 1960. The mean condition factor was 19 for the June catch and 34 for the March catch. The increased plumpness of the fish could be a result of harvesting.

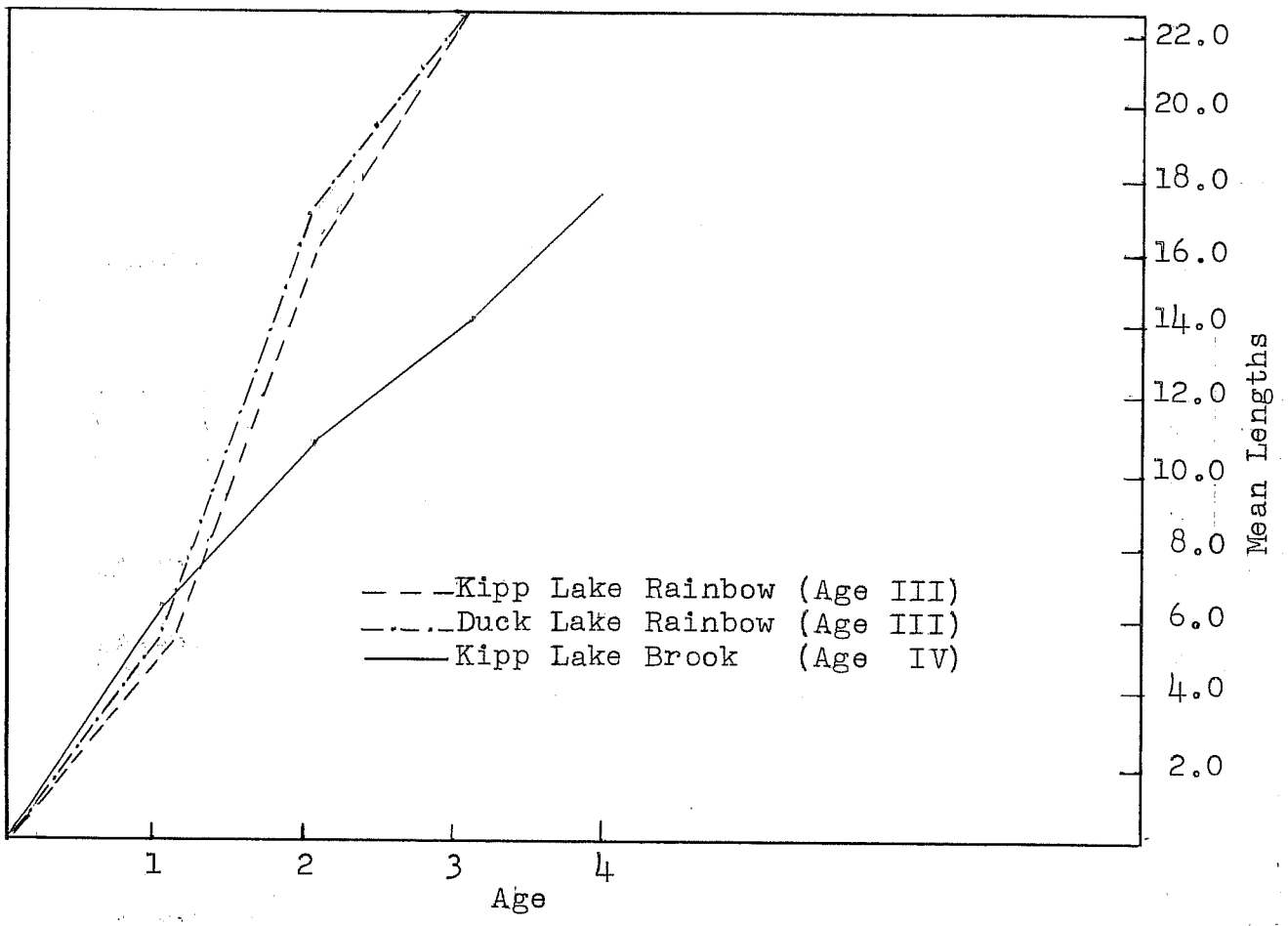
Belt Creek Water Quality

Belt Creek, in Cascade County, was subjected to continuous mine-mill pollution for a period of ten years. The primary source was a mill located in the Carpenter Creek area. There has been no serious influx of mine-mill waste since 1950, but a strong threat persists. The low price of metal is the primary factor curtailing operation at the present time. The result of mine-mill pollution was a drastic increase in the sediment load of the stream. There appeared to be no toxic effects of the waste. In an attempt to establish a water quality standard by which to quantitatively measure any future pollution of the stream, biweekly turbidity samples were taken over a two year period, 1957 through 1958. Sixteen possible sampling stations were set up and ten were used over the two year period. Figure 2 is a map of Belt Creek showing the location of these stations.

An analysis of variance was applied to the two year's turbidity data and no significant difference (5 percent level) was found to exist between stations or between dates within a station. These results will provide a comparison in the event of future pollution.

Eight stations have been set up for biweekly sampling procedures over an annual basis commencing January 1, 1960. Chlorophyll extracts from periphyton growth samples are being used to establish a standard of stream primary production. It is thought the effect of the mine-mill waste on periphyton growth will be that of decreasing the light penetration and scouring, both drastically reducing production. Total dissolved solids and turbidity are also being sampled to study their relationship to periphyton growth. Figure 3 illustrates the mean total dissolved solids, periphyton production and turbidity measurements from January through April, 1960.

Figure 1. Age-length Relationship Comparing Trout Growth Rates from Kipp and Duck Lake, Glacier County.

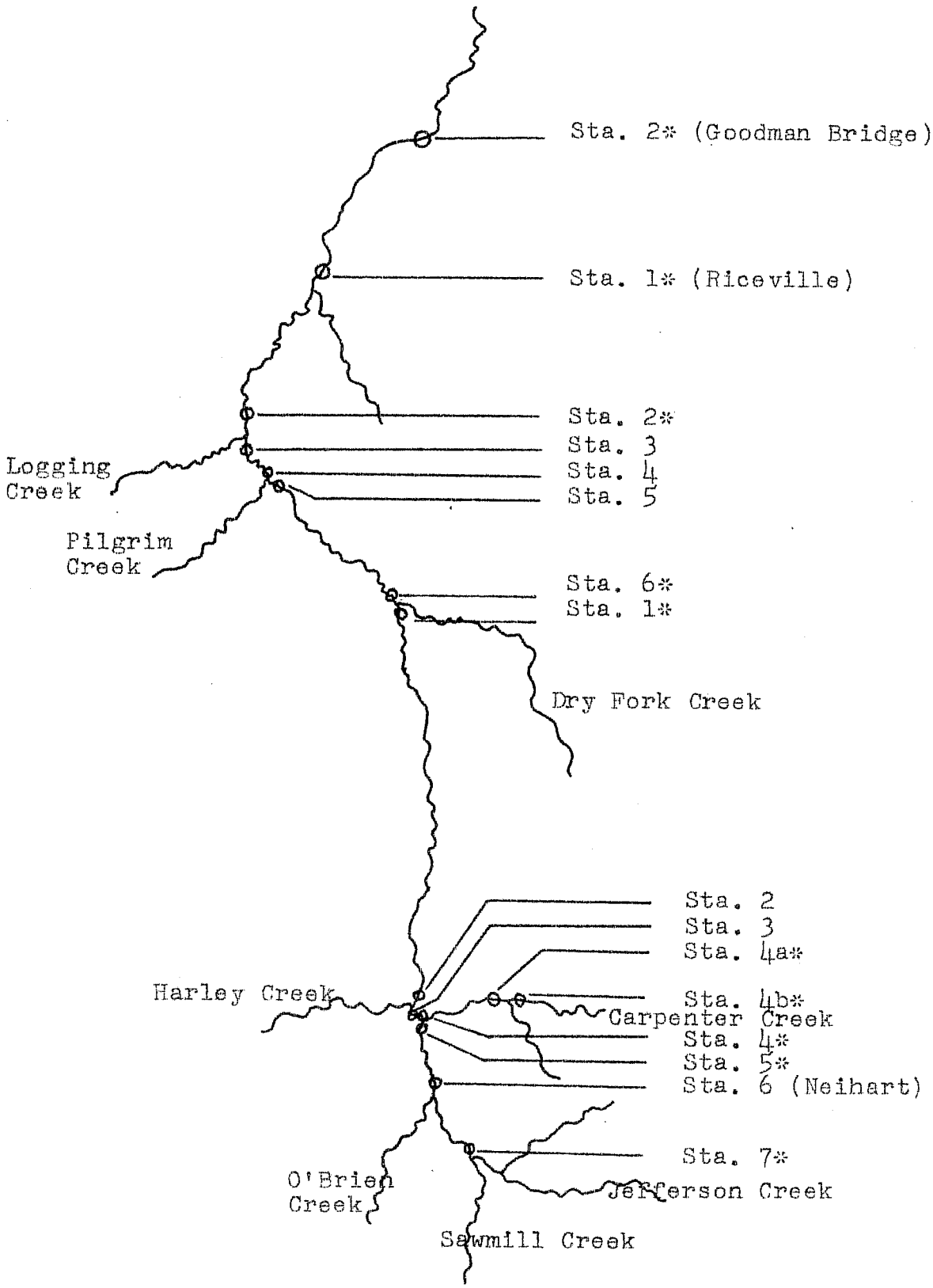


Productivity Index

A quantitative measurement of stream fertility or production is needed in Montana's stream rating system. The problem is being approached from three angles: fish growth, total dissolved solids (T.D.S.) and periphyton production. An attempt to correlate total dissolved solids with fish growth throughout the state is being carried out by the Fish and Game Laboratory at Montana State College. To obtain more support for T.D.S. as an index to fertility throughout the state, since T.D.S. samples are more easily obtained, an attempt to correlate T.D.S. with periphyton production is being carried out in the Central Montana District.

A limited number of periphyton and total dissolved solids samples were collected on some of the more important waters in the district during the summer of 1959. There seems to be a positive relationship between periphyton production and total dissolved solids in the waters sampled, however, the number of samples were insufficient for a correlation analysis. Two to three samples will be taken on every stream of major importance in the district during the coming summer. Figure 4 illustrates the relation between T.D.S. (mg/l.) and periphyton production (phyto-pigment)

Figure 2.
BELT CREEK SAMPLING STATIONS
CASCADE COUNTY, MONTANA



Stations Unused

Stations Used *

Figure 3. Mean Total Dissolved Solids, Periphyton Production and Turbidity Measurements for Eight Stations Sampled in Belt Creek from January Through April, 1960.

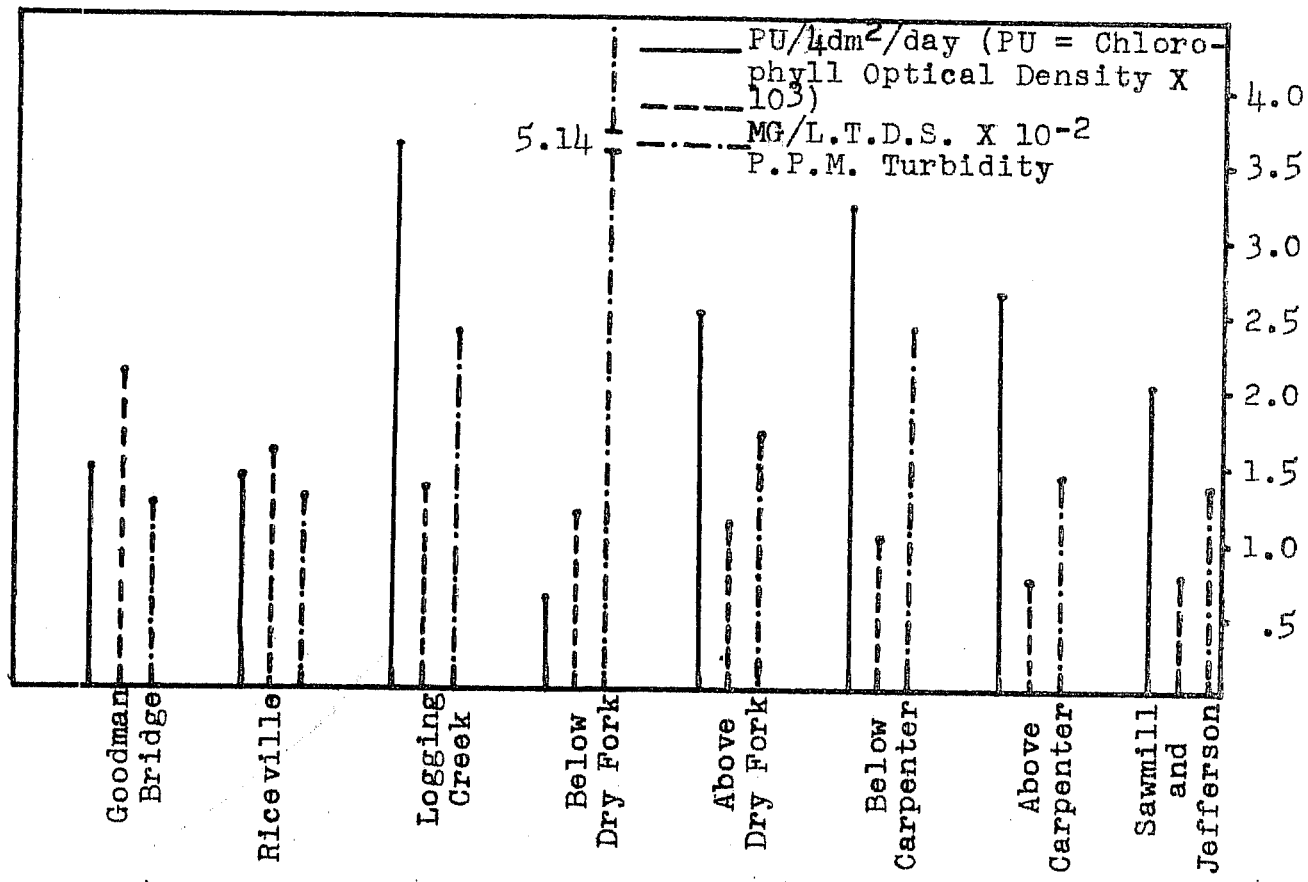
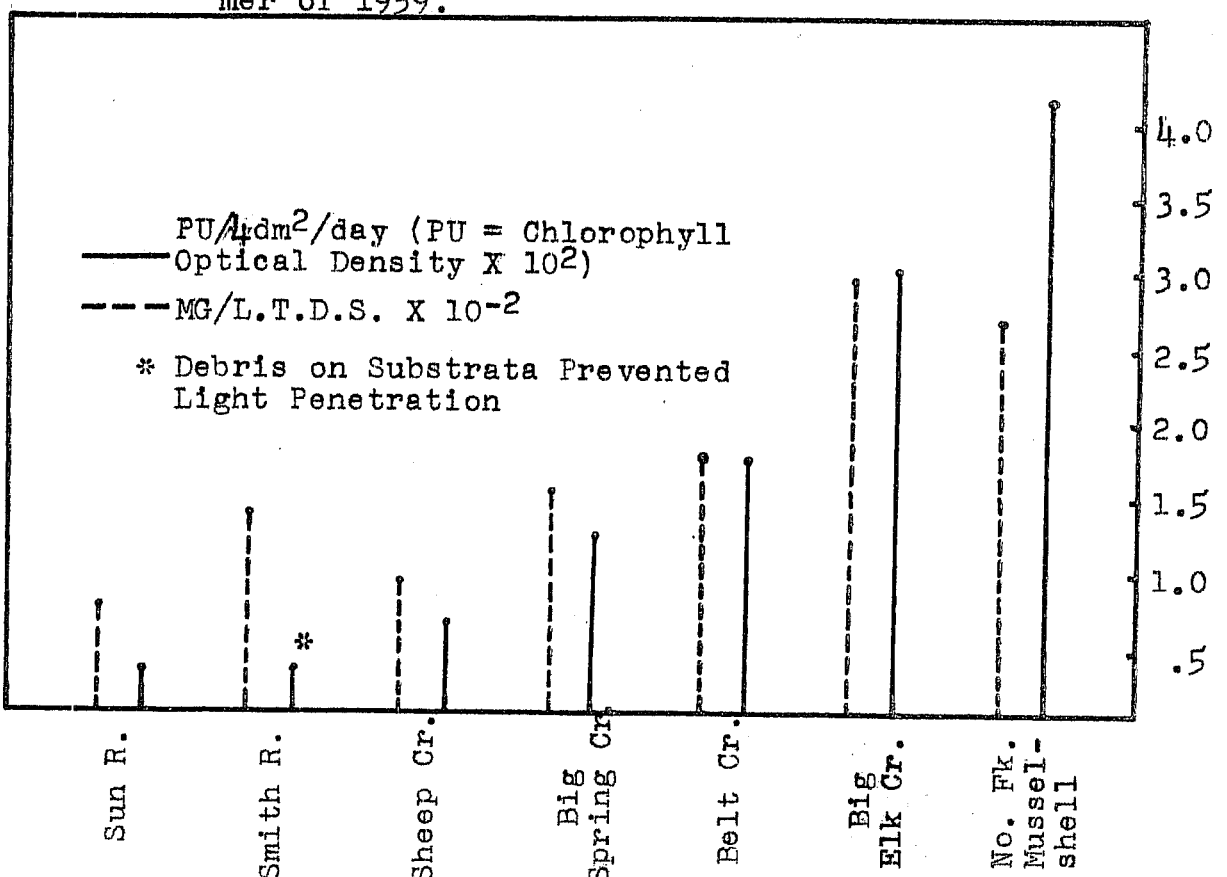


Figure 4. Relation Between Total Dissolved Solids and Periphyton Growth in Seven Streams Sampled During the Summer of 1959.



units/4 dm^2/day) for the samples taken during the summer of 1959.

Winter Fishing Success

Fishermen were checked on two impoundments to obtain age and growth information and an indication of winter fishing success. Nilan Reservoir, in Lewis and Clark County, is one of the heaviest fished waters in the district, both in winter and summer. It has never been rehabilitated and maintains an excellent fishery, however, the sucker population is rapidly becoming a problem. Fishermen were checked on a Wednesday and Sunday in January. The catch per hour agreed quite closely with the local game warden's creel census report for January. The fish checked consisted of age groups I and II. Age group I comprised 76 percent of the catch which was the 1959 spring plant. Table 3 is a summary of the January work on Nilan.

Table 3. Nilan Reservoir Winter Fishermen Creel Checks, January, 1960.

Collector	Time	No. Fish-men	No. Fish	Fish/ hr.	Total Hrs.	Mean Lth.	Mean Wt.
Biologist	Jan. Wed.	12	8	.23	39.5	13.7	.93
Biologist	Jan. Sun.	59	31	.16	194.5	14.7	1.17
Warden	All of Jan.	91	57	.18	326.0	Est. 15.0	

Holliday Lake, in Meagher County, has been open only to winter fishing in the past. One month has been the extent of the season, however, it will be two months next year. A much longer season would be desirable due to the decline in growth rate, condition and catch per hour of the trout. The reservoir is used for irrigation and during some years has a considerable water fluctuation. The fish population consists of cutthroat, rainbow and eastern brook trout. Brook trout have comprised an average of 68 percent of the catch during the periods sampled in 1954, 56, 58 and 60. Creel checks were made during January of each year indicated. There seems to be no trend in increase or decrease of this composition of catch by brook trout. The catch per hour for the periods sampled has decreased from 1.27 in 1956 to .80 in 1960 (the two largest samples). Table 4 shows the catch per hour and species contribution to the catch for the four years sampled. The cutthroat population has declined considerably due to hybridization with rainbow.

Table 4. Catch and Species Contribution to the Catch for the Various Years Samples in Holliday Lake.

	Percent Contribution Eb	Percent Contribution Rb and/or Ct	Total Fish	Catch/hr.
1954	62	38	29	-
1956	73	27	212	1.27
1958	67	33	150	.60
1960	71	29	386	.80

The decrease in growth in the brook trout is expressed by the following length-weight (Figure 5) and age-length (Figure 6) relationships. The data from 1954 are not considered too strongly, in the length-weight relationship, since the sample consisted of large fish. The more gradual slope for 1960 indicates the decline in condition of the brook trout. The average length at each annulus has also decreased considerably since 1954 (Figure 6).

Recommendations:

In order to formulate future fishery management procedure, compilation of a complete file of information regarding all Montana waters should be continued.

The water quality sampling should be carried out through 1960 on Belt Creek to establish a standard in the event of future mine-mill pollution.

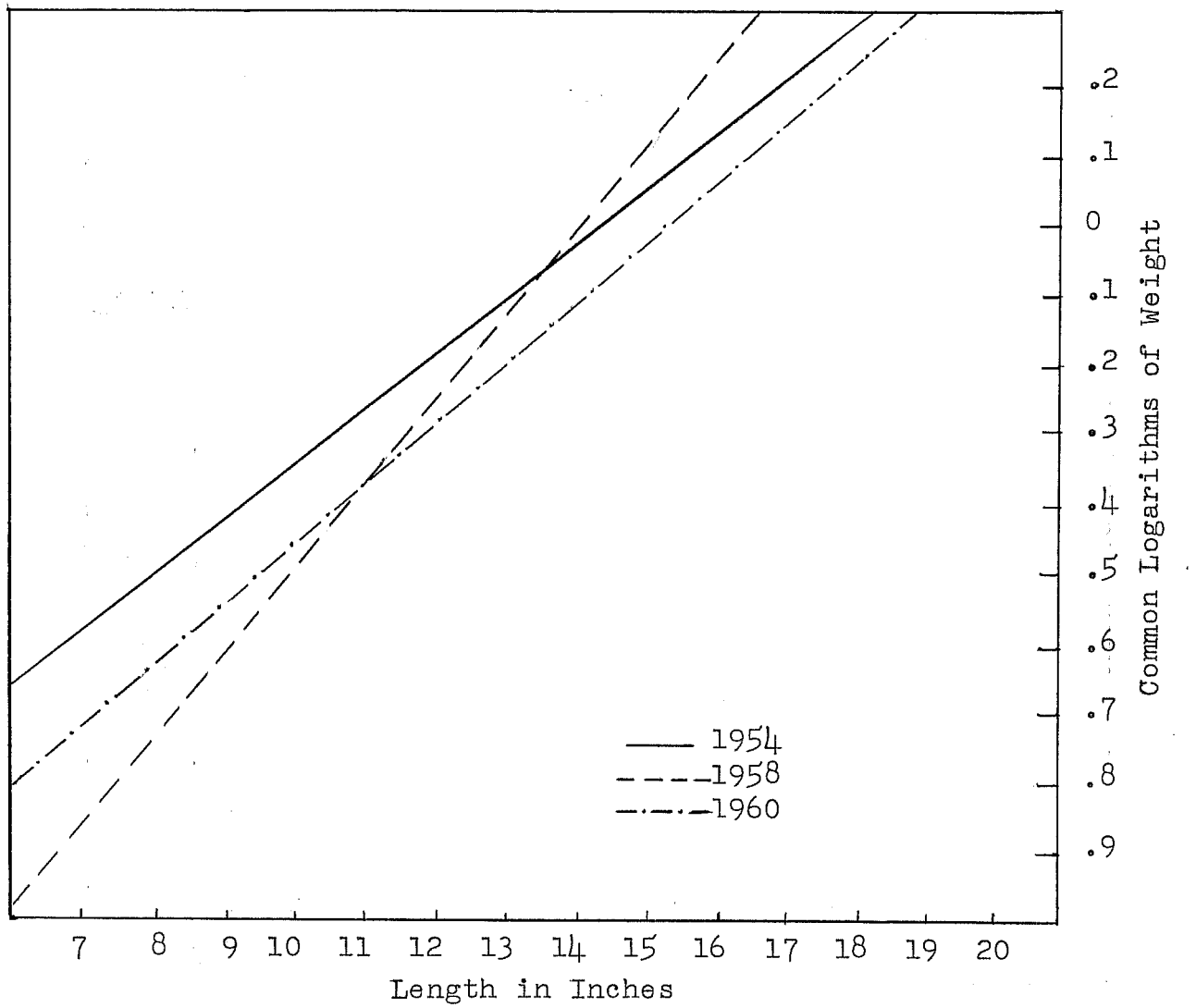
Summary:

1. Two mountain lakes were surveyed and recommended for planting. Hidden Lake in Teton County was planted with native cutthroat trout. It is thought that the inlet is adequate for natural reproduction. If so, this lake could prove to be a strong hold for the native.

2. Two large reservoirs and one natural lake were sounded and mapped for purposes of future rehabilitation. Rehabilitation projects were approved for Bean Lake and Lebo Reservoir, however, failure to attain permanent easements terminated work on the projects. It is recommended that everything possible be done to gain access to these important bodies of water.

3. Several small reservoirs were mapped and investigated for fish populations present. Finley Reservoir is recommended for rehabilitation, since it is an important recreation spot for neighboring communities and is now overpopulated with rough fish. The quality of fishing should be further investigated on Stafford Reservoir, since it is questionable whether we should manage a body of water for trout if warm water game fish are present. Lower Kolar Reservoir was rehabilitated and should have a follow up investigation under F-5-R-10.

Figure 5. Length-weight Relationship of Eastern Brook Trout from Holliday Lake, Meagher County

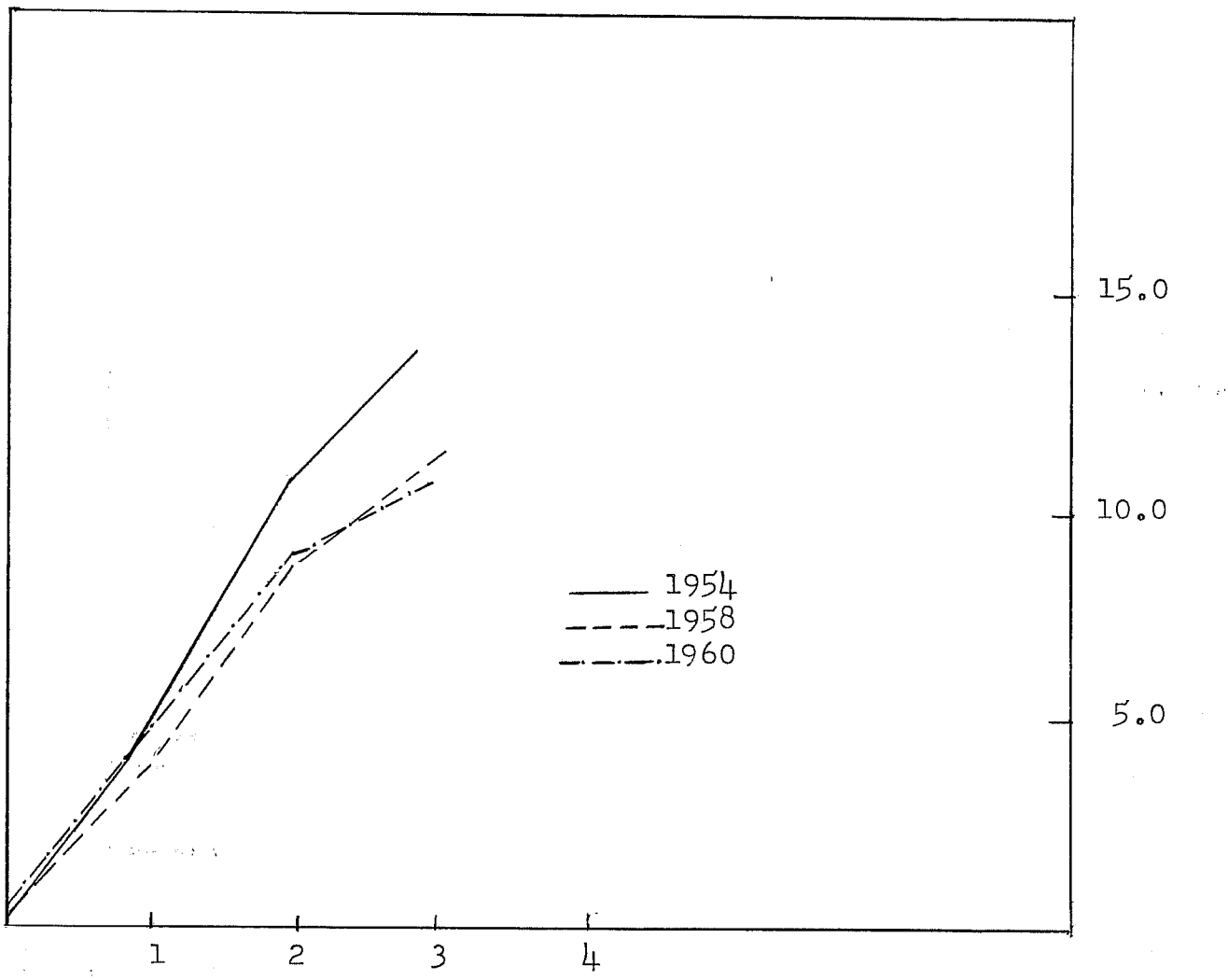


4. Some of the previously rehabilitated waters in the area were investigated. Excellent fish growth was noted in most waters. Close attention should be paid to the fish growth in these waters so the duration of good fishing in rehabilitated waters can be more accurately predicted.

5. A considerable amount of water quality data has been collected from Belt Creek to establish a standard with which to compare the effect of future mine-mill pollution. This creek is one of the closest and most popular recreation spots to the city of Great Falls, therefore, every effort should be made to prevent contamination with mine-mill waste.

6. In order to establish an index to water fertility to be used throughout the state, a limited amount of periphyton and TDS samples were collected in various waters in the district. It is recommended that a more complete sampling procedure be carried out

Figure 6. Age-length Relationship Comparing Eastern Brook Trout Growth Rates, in Holliday Lake, from Samples Taken in 1954, 1958 and 1960



in this district to correlate periphyton production with total dissolved solids in order to further validate an index to fertility.

7. The winter fishing success was investigated on two impoundments in the district. There are indications that winter fishing has little effect on a trout population. The decrease in growth and condition of the eastern brook in Holliday Lake indicate over population, therefore, a longer season and greater harvest would be desirable.

Data and Reports:

The original data and reports are filed in the Fisheries office of the District Headquarters in Great Falls.

References Cited

Grzenda, Alfred R. and Brehmer, Morris L. 1960. A Quantitative Method for the Collection and Measurement of Stream Periphyton. Limnology and Oceanography. Vol. 5 No. 2. April, 1960.

Prepared by: Eugene B. Welch

Date: April 25, 1960

Approved by: George D. Holton
Assistant Coordinator

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-5-R-9 Name Central Montana Fishery Study

Job No. II Title Investigation of the Effectiveness of the Marias River Fishery Restoration

Period Covered May 1, 1959 to April 30, 1960

Abstract:

Fish populations were sampled in Tiber Reservoir and upstream tributaries by use of gill nets, an electric shocker and dynamite. Trout taken from Cut Bank Creek averaged 12.9 inches in length and .76 pounds in weight and were in better condition than trout taken from Tiber Reservoir and the Marias River below Tiber Dam. Trout were found in the Dry Fork which was not planted following rehabilitation. Creel checks showed a decrease in fishing success on Tiber Reservoir during 1959.

Objectives:

Rehabilitation of the Marias River Drainage above Tiber Dam was accomplished during 1954 and 1955. The objective of this rehabilitation work was the removal of carp and goldeye, the decimation of other undesirable species and the re-establishment of trout. The objective of this study was to determine the completeness of the non-game fish removal, the extent of fish population recovery and the status of the trout fishery in Tiber Reservoir and the Marias River drainage.

Techniques Used:

Creel census data were taken from fishermen logs and warden reports.

Samples of fish were taken from lakes and impounded waters by use of experimental gill nets. Stream fish samples were taken with a 110 to 220-volt A.C. electric shocker and dynamite.

Findings:

Creel census checks on Tiber Reservoir have revealed a decrease in fishing success from 1.07 and 1.05 fish per fisherman hour in 1957 and 1958 to .86 in 1959. Table 1 shows the sample size from which these data were taken.

Table 1. Tiber Reservoir Creel Census Recorded from Fishermen Logs and Warden Reports

Year	Sp	No. Fish	% of Total	Ave. Length	No. Fishermen	Hours	Catch/hr.
1957	Rb	3,453	99.4	11.1	1114	3278	1.05
1958	Rb	3,053	100.0	12.2	804	2853	1.07
1959	Rb	1,056	99.8	11.4	324	1225	.86

The trout taken from Tiber Reservoir and below the dam were in poor condition and showed a slow rate of growth (Table 2) when compared to those taken from other rehabilitated prairie reservoirs in the district (see Completion Report F-5-R-9 Job I). A few stomachs were examined and found to contain zooplankton and debris from the bottom of the reservoir.

Table 2. Average Calculated Lengths (Using Direct Proportion Computations) at the First and Second Annuli of 50 Rainbow Trout and 67 Common Suckers Taken from Tiber Reservoir September 9, 1958

Species	Annulus 1		Annulus 2	
	No.	Mean Length	No.	Mean Length
Rb	58	8.7	23	11.5
CSu	67	3.0	32	9.7

The Marias River immediately above Tiber Reservoir and the Dry Fork, which enters the Marias approximately eight miles above the reservoir, were sampled in the spring of 1960. Trout from the Dry Fork and the Marias immediately above the reservoir were in poor condition and silvery in appearance, resembling the reservoir fish. The origin of the fish in the Dry Fork is difficult to determine since the Tiber plant was not marked, however, since the Dry Fork was not planted following rehabilitation the presence of these fish suggests fish movement upstream from the reservoir.

A section of Cut Bank Creek below the water works dam at the town of Cut Bank was sampled on April 14, 1960. The efficiency of the shocker was impeded by high water, therefore an accurate estimate of the population was not possible. Rainbow trout, whitefish, ling and suckers were collected with ling being the most numerous species. The trout (14 in sample) averaged 12.9 inches and .76 pounds and were

in better condition than the trout from Tiber Reservoir.

The fish population was sampled in Kipp Lake and the results are included in the Job I report (F-5-R-9).

Recommendations:

It is recommended a more complete investigation be made of the existing fish populations in the tributary streams of the Marias River drainage above Tiber Dam, and that additional studies be made:

1. To evaluate the fish food and fish growth in the reservoir and in the river below the dam.

2. To determine the effect of the dam on the river below insofar as it affects physical, chemical and basic food chain properties.

Data and Reports:

The original data and reports are in the fisheries office of the District Headquarters in Great Falls, Montana.

Prepared by: Eugene B. Welch

Approved by: George D. Holton

Date: October 7, 1960

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

Job Completion Report
Development Project

State of Montana — Name Central Montana Fishery Study

Project No. F-24-D-22 — Title Statewide Lake and Stream Rehabilitation-Willow Creek Reservoir

Period Covered: September 1, 1959 - April 30, 1960

ABSTRACT:

A project to eradicate rough fish from Willow Creek Reservoir and its incoming waters was started September 14, 1959 and completed October 23, 1959. Pro-Noxfish and Fish-Tox were applied by airplane and boat to incoming waters and to pot-holes which remained following drainage of the reservoir.

A maximum of 90 trout were collected from the 33,000 acre-foot reservoir on which growth data were recorded. The suckers, which formed the bulk of the rough fish, were extremely slow to react in some instances. Toxicant was distributed in the body of water (49° F) above the dam on October 1 and seven to eight hours had elapsed before suckers began to appear. Additional toxicant was added the following day due to the slow reaction. No additional suckers appeared. It is recommended that 240,000 two-to three-inch rainbow trout will be planted in Willow Creek Reservoir during the spring of 1960.

OBJECTIVES:

To eradicate undesirable populations of suckers from Willow Creek Reservoir and as completely as possible from its connecting waters and replace with a population of rainbow trout.

TECHNIQUES USED:

Complete drainage of the reservoir resulted in approximately ten pot-holes left standing. They ranged in size from one to sixty acres and one to ten feet in depth. A large boat was used to apply Pro-Noxfish to the large pot-hole (60 acres, 10 feet maximum depth). The toxicant-water solution was pumped into the water through two hoses on either side of the boat's bow and distributed by the boat's wake and mixing action of the motor.

Toxicant was applied to the six acre area of water above the dam by means of a hand pump and a 12-foot boat. After observing an extremely slow fish-kill three sacks of Fish-Tox were added by towing them behind the boat with a rope.

The remainder of the pot-holes were sprayed by air since the ooze prevented work with a boat.

Approximately four miles of the West and South Forks of Willow Creek were killed out with Fish-Tox. The entire Willow Creek Supply Canal and pot-holes along the canal were killed out from Diversion Dam on the Sun River to Willow Creek Reservoir. Pro-Noxfish was used in the larger pot-holes and Fish-Tox in the canal proper.

FINDINGS:

On September 21, Pro-Noxfish was applied to the largest (approximately 60 acres, Maximum depth 10 feet) and most accessible pot-hole by boat. Trout began to appear within one hour and suckers shortly thereafter. Nine rainbows and one Yellowstone cutthroat were recorded. Dead and dying suckers were extremely numerous along the shore.

Pro-Noxfish was applied to the six-acre body of water above the dam on October 1. The water temperature was 49° F., and was thought to be the main reason for the slow reaction of the fish to the toxicant. Approximately three hours had elapsed before trout were completely killed and seven to eight hours before suckers began to appear. Fish-Tox was added the following day due to the apparent light kill of suckers, however, there were no further signs of distressed fish. It was thought most of the fish in this water had previously gone out the outlet.

The stream below the dam was killed out on September 28, because it was feared suckers might get back into the reservoir when water began to overflow again. Suckers were so numerous, there appeared to be a large mortality due to suffocation.

The remainder of the pot-holes in the reservoir basin were sprayed by airplane. Seven hours of flying time were required to distribute 165 gallons of Pro-Noxfish mixed with 235 gallons of water. John Nordhagen of the Choteau Flying Service was very cooperative in this project. Only small fish were observed after the first covering of toxicant. Another application was made and numerous large fish appeared. It was virtually impossible to operate a boat in the pot-holes due to the ooze, however, a somewhat exaggerated estimate was made of the total volume contained in the pot-holes and 165 gallons of toxicant was a more than ample concentration for a complete kill.

Anderson Lake was poisoned on September 11. It is a lake of approximately 65 acres with a maximum depth of 11 feet. It was believed this lake would drain into Willow Creek with high water. Common suckers were the only species observed and were present in large numbers. The local game warden counted 52 dead fish per foot of lake shore. It is possible this lake can be made available for the public in the near future.

Frenchie Lake on the Willow Creek Supply Canal was poisoned October 2. The lake is approximately 35 acres with a maximum depth of 10 feet. There was local opinion that this lake was a good trout lake and that large trout were present. Four trout were killed and the largest was fifteen inches in length. Small suckers and minnows were numerous.

Several days were required to finish work on the remainder of the canal and connecting pot-holes. The entire length of the canal was covered with a back pump on September 23 and 29, and several small connecting pot-holes were killed. On October 5, six bags of Fish-Tox were added to the canal and a complete kill was expected down stream to the reservoir. Water had just arrived there from Diversion Dam to commence filling Willow Creek Reservoir. The following day fish were observed down to the inlet to the reservoir. Two bags of toxicant were added to the stream one-half mile up from the inlet and followed down. No additional kill was observed.

The West and South Forks of Willow Creek were killed approximately four miles up from the inlet to the reservoir on October 23. No suckers were observed. Brook trout, long nose dace and creek chubs were numerous.

RECOMMENDATIONS:

It is recommended that 240,000 two-to three-inch rainbow trout be planted in Willow Creek Reservoir when sufficient food is available in the spring of 1960. This plant is approximately 170 fish per surface acre. Willow Creek Reservoir has an apparent low fertility and fair accessibility.

Prepared by Eugene B. Welch

Date November 6, 1959

Approved by George D. Holton
Assistant Coordinator

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

Helena, Montana

Job Completion Report
Development Project

State of Montana

Name Central Montana Fishery Study

Project No. F-24-D-24

Title Statewide Lake and Stream Rehabilitation
Lower Kolar's Reservoir

Period Covered: September 1, 1959 to April 30, 1960.

Abstract:

On October 14, 1959 Lower Kolar's Reservoir was treated with thirty gallons of Pro-Noxfish to eradicate the existing fish population. Due to the low water temperature it was necessary to make an additional application of Fish-Tox on two following dates to insure a complete kill. A gill net was left in the reservoir from December 11 to 17, during which time no fish were caught. Efforts will be made to establish a fishable population by planting rainbow trout fingerlings.

Objectives:

To remove or decimate as completely as possible the existing fish population in Lower Kolar's Reservoir in Judith Basin County, Montana. Fingerling rainbow trout will be planted in the spring of 1960 in an effort to establish a fishable population of trout.

Techniques Used:

On October 14, 1959 Lower Kolar's Reservoir was treated with thirty gallons of Pro-Noxfish, a rotenone emulsive.

The emulsion was distributed from a thirty gallon drum by means of a hand pump and a hose. The emulsion was pumped over the end of the boat and mixed by action of the boat's wake and motor.

On October 16 and November 3, eight bags of Fish-Tox were added to the reservoir and on October 27 four bags were added to Arrow Creek and the canal above the reservoir. The toxicant was put into solution by dragging the bags through the water.

Findings:

An extremely slow kill was observed following the application of Pro-Noxfish, probably due to the low water temperature (48°F). Trout began appearing three to four hours following application and small suckers and minnows shortly thereafter. Large suckers failed to show following the application of Pro-Noxfish.

On October 16, five bags of fish-Tox were added in an attempt to eradicate the larger suckers which had not previously shown up to any extent.

On October 27 Fish-Tox was added to the canal and Arrow Creek above the reservoir. Gill nets were set in the reservoir at that time and removed November 2. Three suckers were caught in the nets and presumed to have entered from the canal. Additional Fish-Tox (3 bags) was then added to the reservoir and canal on November 3.

One gill net was set December 11 and lifted December 17. No fish were caught during this period.

Suckers (Catostomus sp.) were the predominant species killed. Rainbow trout were the only game fish killed, sixteen in number. Several species of small forage fish were observed.

Fingerling rainbow trout will be planted in the reservoir during the spring of 1960 in an effort to establish a fishable population of trout.

Recommendations:

None

Data and Reports:

The original data and reports are in the fisheries office of the Fish and Game Department District Headquarters in Great Falls.

Prepared by: Eugene B. Welch

Approved by: George D. Holton
Assistant Coordinator

Date December 21, 1959