MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION

JOB COMPLETION REPORT
INVESTIGATIONS PROJECT

State of Montana Name North Central Montana Fishery Study

Project No. F-5-R-18 Title Inventory of Waters of Project Area

Job No. I

Period Covered July 1, 1968 to June 30, 1969

ABSTRACT

Final plans for the Big Spring Creek Watershed Project were accepted in March, 1969. Work is scheduled to begin in the spring of 1970 if federal funds are made available. Big Spring Creek, Lost and Middle Forks of the Judith River, Smith River and several small streams were electrofished. Cutthroat trout were predominant in headwater tributaries of both Lost and Middle Forks, and rainbow-cutthroat trout hybrids or rainbow trout populations were the most abundant in the main tributaries. Information is given on other work done on Big Spring Creek.

Numerous reservoirs in Central Montana were sampled with gill nets. Average lengths and weights, species composition and condition of the catch were recorded. Several reservoirs were checked (at owner's request) and added to the planting program, and several were taken off the planting schedule. Commercial fishermen sampled several reservoirs for marketable size black bullheads, white suckers and carp.

RECOMMENDATIONS

Streams

Fish population information, collected during the past two summers, and bottom fauna data are needed prior to and after construction of five dams on tributaries of Big Spring Creek. Turbidity measurements need to be continued to see what effect the dams will have on the amount of sediment reaching Big Spring Creek via tributaries, especially East Fork. Fish population information is needed in the area of housing development on upper Big Spring Creek. Pollution sources should be continually checked and an effort made to eliminate the problems. Areas of excessive erosion need to be located and the problems corrected.

An attempt should be made to isolate a population of cutthroat trout in Lost Fork of the Judith River. This would require construction of a barrier on the Lost Fork, impassable to upstream movement of fish. In addition, West Fork, South Fork and Lost Fork would need to be rehabilitated and restocked with cutthroat trout native to the area.

A complete survey is needed on the Judith River in the Utica-Hobson area in Judith Basin County. Permanent sections should be marked and electrofished to determine species composition and abundance of trout. Habitat should be classified and areas located where improvement is needed. Bottom fauna sample stations should be set up to determine densities of insects and get an idea of the stream's productivity. Two thermographs need to be installed near Utica and below Hobson to determine if temperature is a limiting factor for trout in the lower river area. Areas of intermittent water flows on the Judith River and the South Fork of the Judith River need to be documented.

Sections of Warm Spring Creek in Fergus County should be electrofished to determine species composition and trout numbers. Factors limiting trout reproduction need to be determined and a suitable species of fish introduced to establish a self-sustained fishery. This might be an excellent stream for a graduate student study.

Small stream sampling should be continued to determine trout populations and species composition. The use of catchable trout in many of these small streams needs evaluation.

The Smith River, especially the canyon area of the river, is becoming more and more important to fishermen. More float trips are taken through the canyon every summer and this is expected to increase. Trout population estimates should be made in the canyon area of the river. The number of fishermen using the canyon should be determined.

Reservoirs

Gill net sampling and creel census should be continued to check condition of fish, success of fishermen, and extent of rough fish populations. An attempt should be made to establish a black crappie and burbot fishery in Petrolia Reservoir in Petroleum County. Burbot and black crappie could provide additional winter fishing in the Lewistown area.

Commercial fishermen should continue to fish Yellow Water and War Horse reservoirs for bullheads and suckers in hopes of keeping these species in check. Fishing by commercial fishermen can, at times, improve a fishery by harvesting rough fish which otherwise receive little or no fishing pressure. Caution should be taken to prevent over-harvesting the breeding stock of certain species (e.g. bullheads) in which numbers need only to be reduced.

Larger sized fingerling rainbow should be planted in Martinsdale Reservoir to enhance growth and survival. Creel checks should be continued on Ackley, War Horse, Yellow Water and Stafford reservoirs.

Evaluation of our planting program for both Hauser and Holter reservoirs is needed. Size of fish and the time of planting need to be investigated to insure the best use of these fish.

Catfish and sauger have been planted in Tiber Reservoir and in the Marias River above Tiber Reservoir. To date neither species have been taken in any of our sampling, or, have we had any reports of either species being taken by fishermen. We have had trouble obtaining sauger in any numbers for planting and have had no success hatching the eggs.

Since sauger are difficult to obtain, it is recommended that walleye be planted. There are several large gravel bars that should provide spawning areas. The population of perch and minnows in the reservoir should provide adequate forage.

Northern pike might do well in the reservoir but water level manipulation by the Bureau of Reclamation would probably prohibit successful spawning. The possibility of northern pike moving out of the reservoir and into trout streams above the reservoir would also present a problem.

Farm Ponds

Reservoirs that have not been gill-netted within the past two years, should be surveyed to determine species, growth and abundance of fish. Creel checks should be continued on the more important reservoirs.

OBJECTIVES

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

TECHNIQUES USED

Fish were collected using a 300-volt DC shocker, 125 foot experimental gill nets and 1 3/8 inch mesh hoop nets. Fish were measured to the nearest tenth of an inch total length and weighed to a hundredth of a pound.

FINDINGS

Streams

Big Spring Creek. - The signing and acceptance of the final work plan of the Big Spring Creek Watershed Project was accomplished in March, 1969. With congressional approval and authorization of federal funds, construction could begin in spring, 1970. The objectives of this project are: to provide land treatment measures that will reduce runoff, erosion and sediment deposition to the lowest practical minimum; to alleviate flood damages to properties now affected; and to provide water-based recreational opportunities at a close proximity to Lewistown. Five dams on tributaries of Big Spring Creek are involved in the project, including a recreational reservoir on the East Fork of Big Spring Creek (119 surface acres), smaller recreational dams on Castle and Hanson Creeks (18 and 13 surface acres), sediment dams on Casino and Pike Creeks (25 and 13 acres), and some work on the Mill Ditch (Figure 1). The entire project is estimated to cost $2,431,120.00.

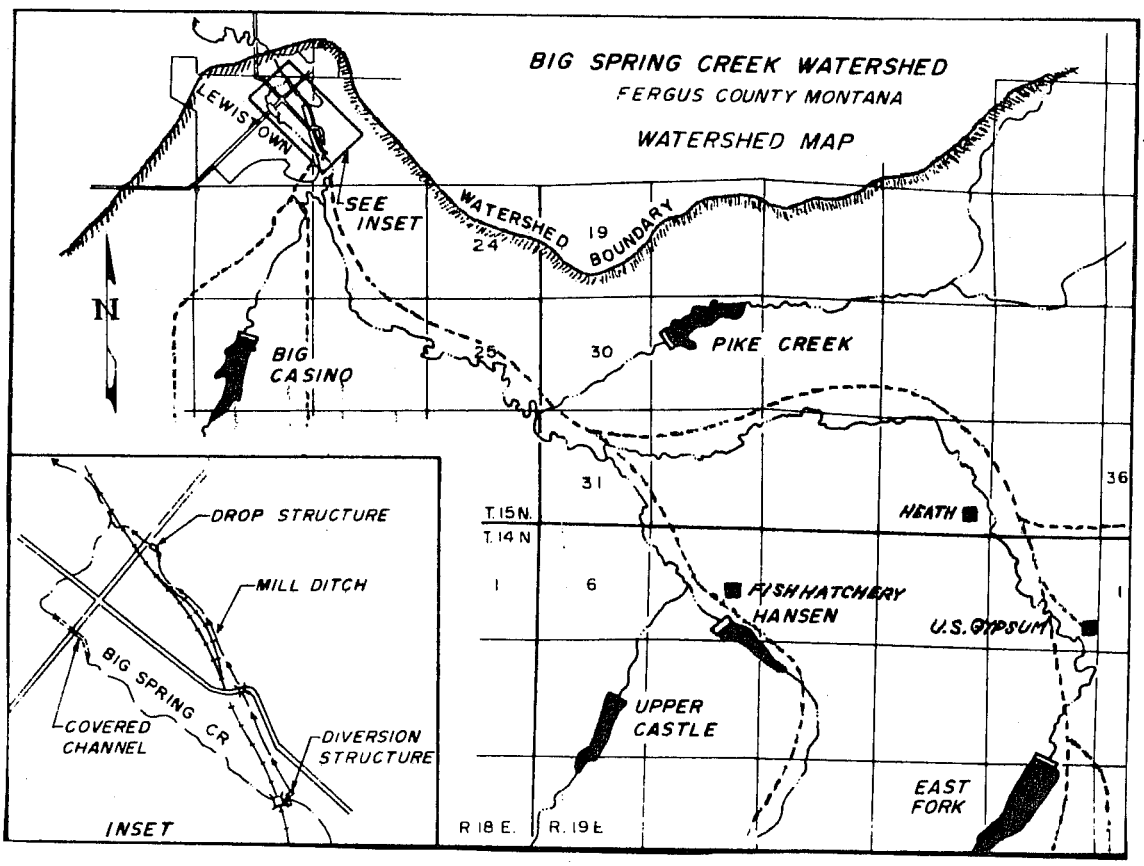


FIGURE 1. The Big Spring Creek Watershed area drains approximately 150 square miles. Five major drainages join with Big Spring Creek to flow through Lewistown.

The project will give the Fish and Game Department an excellent opportunity to evaluate the effects of such an undertaking on a stream. Fish populations, erosion, fisherman success, turbidities, bottom fauna and other aspects can be compared prior to and after completion of the project.

A study of fish populations of Big Spring Creek was concluded in 1969. A creel census study on upper Big Spring Creek was concluded in 1970. Both studies were done by the Montana Cooperative Fishery Unit, headquartered at Montana State University, and reports have been prepared by this agency.

Studies such as these provide information needed for optimum management of Big Spring Creek and also provide information on stream conditions prior to construction of impoundments on the tributaries.

In February, 1961, a naturally meandering section (4,200 feet) of Big Spring Creek below Lewistown was bulldozed into a 2,200 foot straight chute (Figure 2). Increased water velocity created by the channel alteration began under-cutting the banks in the meandering channel upstream from the change (Figure 3). Prior to the change, the stream was "bank full", with little erosion occurring. Afterwards, the level dropped four feet below the bank top, and within a year, 15 feet of bank in one area washed away (Figure 3 and Section B of Figure 4). Now there is a continual process of erosion in this area.

Channel width measurements were made from 1938, 1953, 1962 and 1967 aerial photos. A transect was placed in the same location and measured in 1968 and 1969 and compared to previous years. Loss of stream bank in one area (Section B, Figure 4) was in excess of 105 feet in the eight year span. Approximately 100 feet of stream bank has been lost in the narrow peninsula area (Section A) shown in Figure 4. Little erosion has occurred in an area rip-rapped by the State Highway Department in the area of the bend.

Since Big Spring Creek flows through the city of Lewistown, it is an easy mark for pollution from various sources. Complaints of oil and/or gas and frequent observations of oil on the surface of the stream have been common. With the cooperation of the City Sanitarian; service stations, garages and other possible sources were investigated for the pollutants. Sumps and oil traps were checked for proper equipment. Of 42 locations checked, 10 were classified as possible sources of pollution of Big Spring Creek. Of the 10 checked at a later date, four were still in violation.

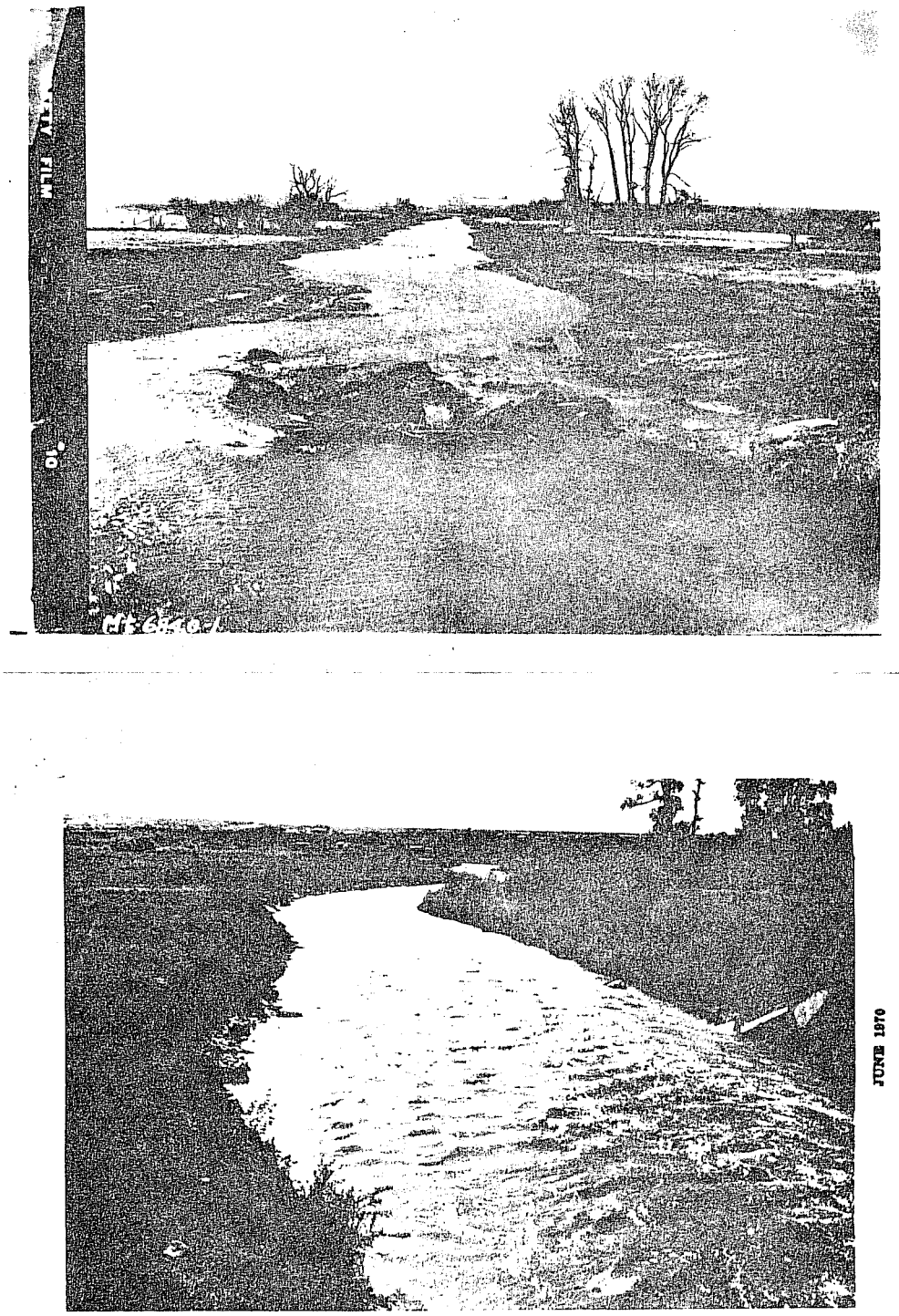
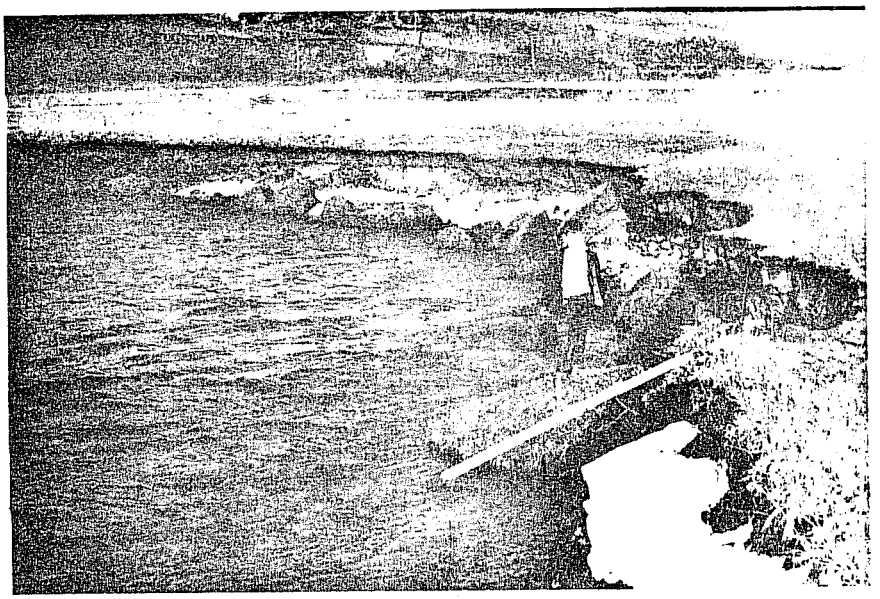


FIGURE 2. Portion of Big Spring Creek straightened in 1961. Lower photo shows same area in 1970. Note the stream's natural meandering tendency.



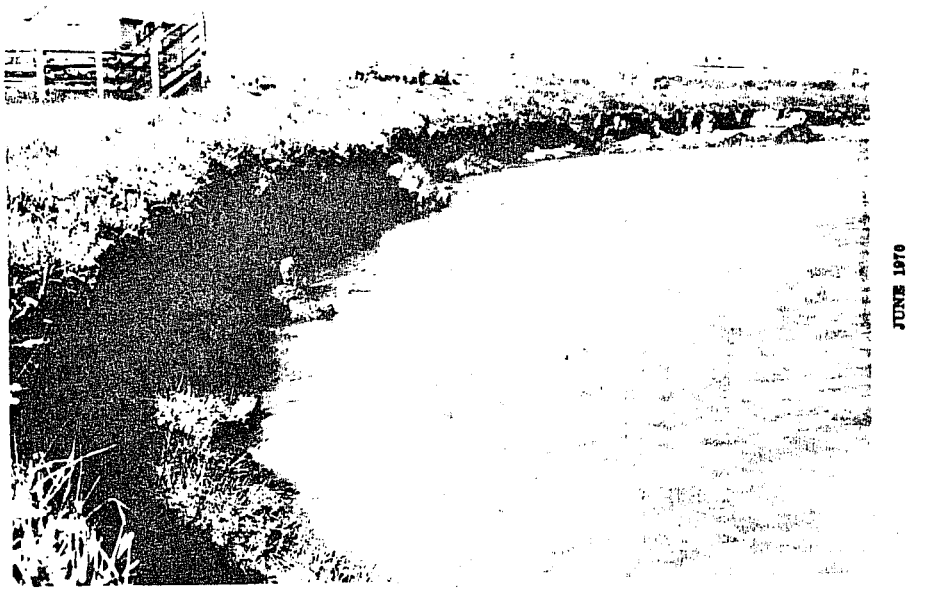
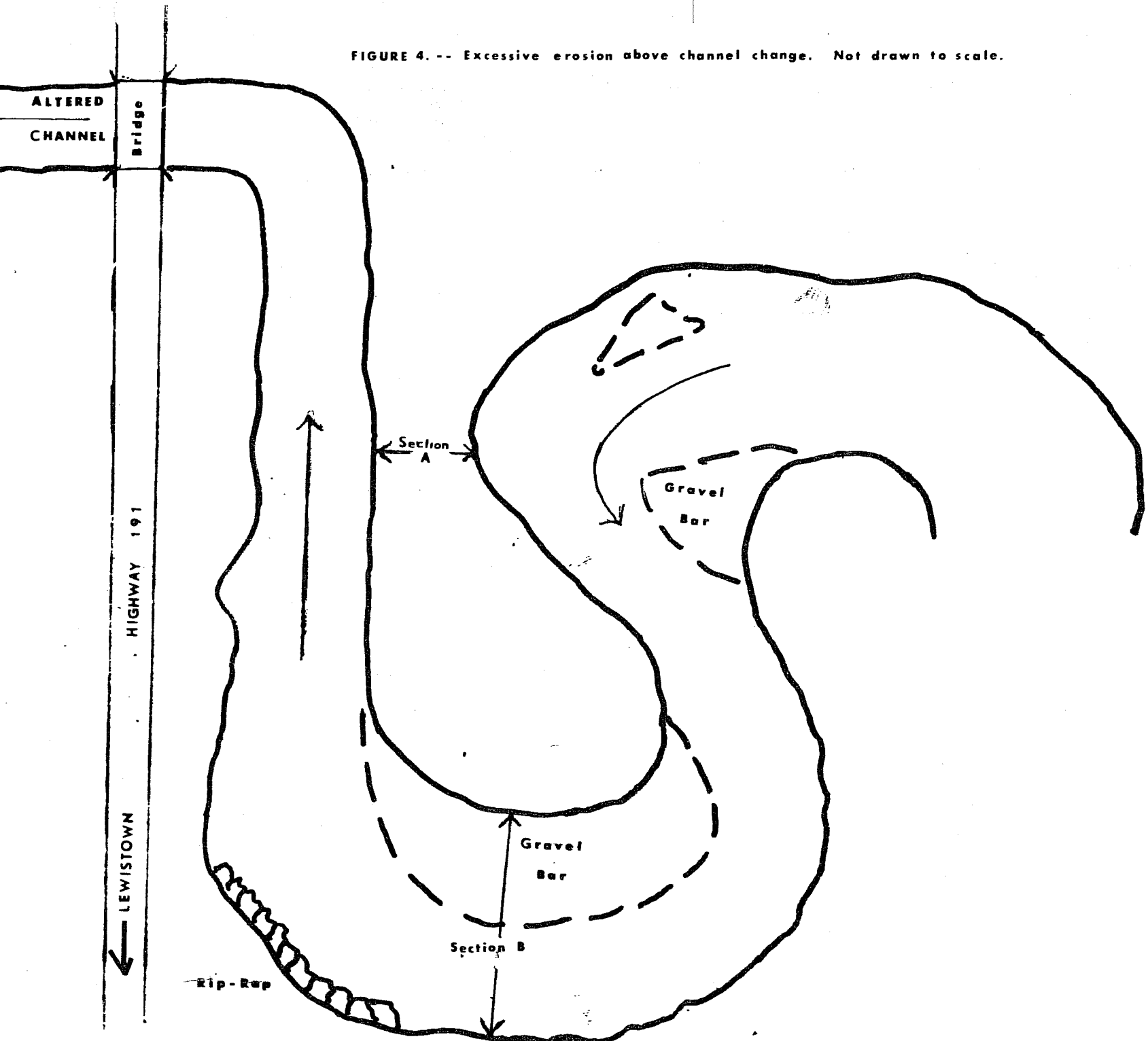


FIGURE 3. Eroding bank above the channel alterations. The stream channel was normally full prior to alteration. After alteration, the stream level dropped four feet and severe bank erosion commenced.

FIGURE 4. -- Excessive erosion above channel change. Not drawn to scale.



Three thermographs and one maximum-minimum (Max-Min) thermometer were placed in Big Spring Creek from April through October, 1968. Locations were above Lewistown at Hanover, and just above the mouth of Spring Creek. Temperature extremes above the city of Lewistown were from 45° to 68° F. Average max-min temperatures for the summer (June-September) were 61° and 53° F. Extreme temperatures recorded for the stream near its mouth were 40° to 70° F. Other extremes, average max-min temperatures, and max-min thermometer observations are given in Table 1. Spot measurements of water temperature were also copied from U.S.G.S. records from 1949-1957, (Aagaard, 1969).

TABLE 1. Temperatures recorded in four different locations on Big Spring Creek in 1968

	Average summer temperatures °F. (June - Sept.)		Temperature extremes	
	Max.	Min.	High	Low
Above Lewistown	61	53	68	45
Hanover	60	54	69	41
Mouth of Big Spring Creek	57	51*	70	40
Below hatchery**	58	49	60	44

* Max-Min temperatures were not available from June 21 to July 27, 1968.

** Max-Min thermometer was used during June, August and September.

Warm Spring Creek. - One thermograph was installed five miles downstream from the origin of Warm Springs. Temperature extremes were from 40° - 78° F during the period from May 11 to December 31, 1968. A max-min thermometer was placed one-fourth mile below the Spring. Temperature extremes were less near the Springs than five miles below (Table 2). All temperature measurements were forwarded to the U.S.G.S. for eventual publication.

TABLE 2. Temperatures recorded for Warm Springs Creek

	Average summer temperatures °F (June - Sept.)		Temperature extremes	
	Max.	Min.	High	Low
Gremaux - 1968 (5-Mi. below Springs)	70	62	78	41
Gremaux - 1969*	--	--	72	38
Warm Springs**	71	64	78	58

* Thermograph was pulled in June, 1969. Extreme temperatures are from January 1 to June 12, 1969.

** Maximum-minimum thermometer was used during July, August and September, 1968.

Judith River. - Middle and Lost Forks (and tributaries) of the Judith River were electrofished in August, 1968 to determine species composition, population sizes and extent of rainbow distribution in relation to cutthroat trout (Figure 5). Rainbow were found to be present in all areas electrofished. Areas with highest concentration of cutthroat were found in Harrison Creek (Middle Fork), West and South Forks of Lost Fork. Cutthroat were slightly larger than rainbow.

In a 1,940-foot section of the Middle Fork below the mouth of Lost Fork (yielding 100 fish the first run and 108 in the recovery run), the population was estimated as: 3.0 to 5.9 inches, 187; 6.0 to 6.9 inches, 123; 7.0 to 8.9 inches, 54; 9.0 inches and above, 21. Ninety-seven percent were rainbow trout, two percent brook trout and one percent cutthroat-rainbow hybrids.

Two sections (330 and 350-foot) of the Middle Fork above the mouth of Lost Fork were electrofished. Only rainbow trout were taken (Table 3).

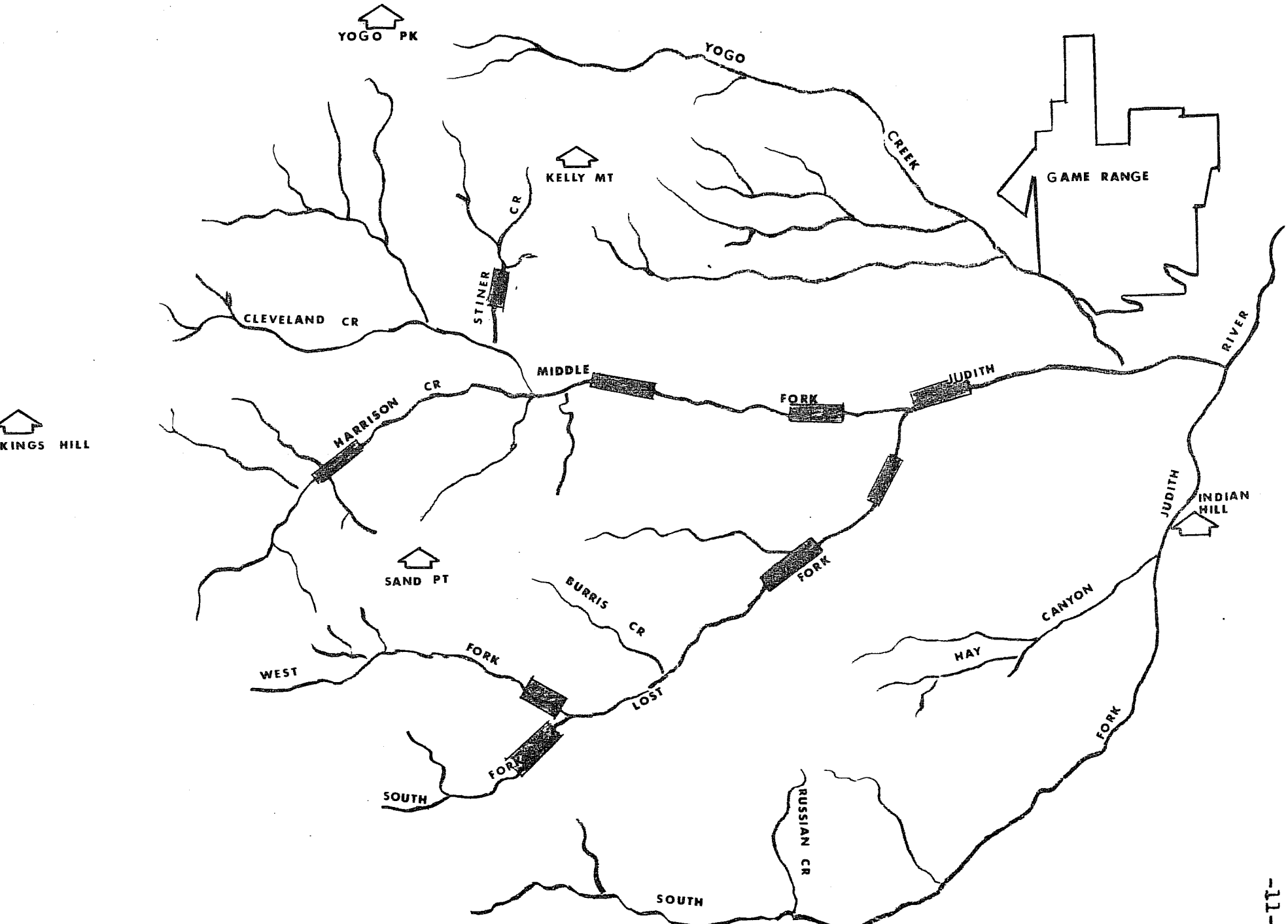
Harrison Creek, a major tributary of Middle Fork was electrofished near the mouth of King Creek. Cutthroat trout were the predominant fish, making up 45 percent of 31 trout taken. Rainbow trout made up 32 percent and the remaining 23 percent was rainbow-cutthroat hybrids.

TABLE 3. Middle Fork and Lost Fork electrofishing results

Location	Length of stream electrofished (ft.)	Number of trout	Ave. length (inches)	Ave. weight (lbs.)
Middle Fork				
Below junction of Middle & Lost Forks	1,940	97	6.4	0.13
One mile above junction	330	39	6.3	0.15
Korrell Lodge	350	66	7.3	0.18
Harrison Creek (mouth of King Creek)	--*	31	5.6	0.09
Lost Fork				
Mouth of Sand Point Creek	440	44	6.7	0.13
Two miles above junction	300	18	5.3	0.07
West Fork	--*	12	6.5	0.12
South Fork	None**	37	--	--

* Only short sections electrofished.
** Caught by hook and line.

FIGURE 5.-- Areas where fish were collected.



Two sections of Lost Fork (300 and 440 foot) were electrofished. A total of 62 rainbow trout were caught.

Twelve trout were taken in a small section of the West Fork of Lost Fork. Cutthroat trout, rainbow and cutthroat-rainbow trout hybrids were caught. Fish taken by rod and reel in the South Fork of Lost Fork consisted mainly of cutthroat. Rainbow trout were also present. See Table 3.

Four square-foot bottom fauna samples were collected from both the Lost Fork and Middle Forks of the Judith River, a short distance above their confluence. More insects were found in the Middle Fork (Table 4). Sculpins (Cottus sp.) were noted to be more abundant in the Middle Fork. Although erosion and silt are a serious problem in both streams, it is noticeably worse in Lost Fork. Considerable silt accumulation is due to vehicle traffic that cross both streams numerous times. However, the majority of silt load is probably caused by erosion of over-grazed slopes along the stream.

TABLE 4. Square-foot bottom samples (four) collected from two tributaries of the Judith River

	Total number		Average number/sq. ft.	
Insect order	Middle Fork	Lost Fork	Middle Fork	Lost Fork
Diptera	184	52	46.0	13.0
Tricoptera	58	20	14.5	5.0
Plecoptera	32	31	8.0	7.8
Ephemeroptera	35	29	8.8	7.2
Hemiptera	68	None	17.0	--
Coleoptera	3	8	0.8	2.0
Nematoda	None	3	--	0.8
Oligochaeta	None	1	--	0.2

The Forest Service is contemplating timber clear-cutting and road building into this area. The streams are small and easily fished and will support good fishing for a few sportsmen. If roads were built into the area, the stream could not support the increased pressure and it would be folly to try to maintain it as a cutthroat trout fishery unless a change in the creel limit was made. If logging is done on the steep slopes along these tributaries it is likely that even more problems from silt and erosion will occur. A transect was placed in two areas (fall, 1968) along Lost Fork to measure amount of bank loss.

Smith River. - Three areas of the Smith River were electrofished from a boat during 1968. Our objective was to determine species composition, determine the feasibility of electrofishing in the canyon area of the river and locate permanent shocking sections.

Mountain whitefish were the most numerous species found in any of the three areas. Good numbers of all size fish were taken. Rainbow, brown trout and an occasional brook trout were found throughout the canyon. Of the trout species present rainbow made up 91 percent and brown 9 percent at the head of the canyon. In the middle of the canyon just below the mouth of Tenderfoot Creek, rainbow made up 66 percent of the sample and brown trout 34 percent. On the Fraunhofer Ranch near the end of the canyon, brown trout made up 58 percent of the sample and rainbow 42 percent. Other species present in the canyon area included longnose and white sucker, burbot, mottled sculpin and longnose dace.

Other Streams. - A number of small streams were electrofished in the Central Montana area. Poor trout populations were found in streams originating in the Snowy Mountains. Those sampled were Ross Fork, Little Rock, Flatwillow, North Fork of Flatwillow, Beaver and Cottonwood creeks. Information on these streams has been recorded on stream survey cards.

Running Wolf Creek, originating in the Little Belt Mountains near Stanford has a good population of brook trout. A total of 182 brook trout five inches or greater was taken in 970 feet of stream on the first run. The recapture run gave a sample of 150 trout, of which 83 were marked. The population estimate for the section was 392 brook trout (Table 5).

TABLE 5. Age structures of brook trout from Running Wolf Creek

	Age groups			
	0+	I+	II+	III+
Brook trout	3.0-7.3	7.4-9.4	9.5-11-4	11.5-13.4

Creel checks indicate that the stream receives considerable fishing pressure at times. On opening day of fishing season (1969), 127 brood trout caught by fishermen averaged 8.4 inches in length.

Reservoirs

Ackley Lake, a 247-acre irrigation reservoir located in Judith Basin County, was rehabilitated in September, 1966, to eradicate populations of carp and suckers. Fishing has been

good since the fall of 1967. The lake was sampled in September, 1968 and again in May, 1969, with three overnight gill net sets. Rainbow trout averaged the same length and nearly the same weight during both gill-netting periods (Table 6). Kokanee increased considerably in length and weight in the seven month period. This is the heaviest fished lake in the Lewistown area.

TABLE 6. Number, average length and weight of fish caught in three gill nets from Ackley Lake

	Total number	Average length (in.)	Average weight (lbs.)
1968			
Rainbow	60	13.2	0.85
Kokanee	48	9.2	0.32
White sucker	78	--	--
Longnose sucker	61	--	--
1969			
Rainbow	89	13.2	0.82
Kokanee	45	11.5	0.53
White sucker	172	--	--
Longnose sucker	78	--	--

Martinsdale Reservoir is a 1,000-acre irrigation impoundment in Meagher County. Four gill nets set overnight in late June, 1968 caught one 14.5-inch rainbow, 6 brown trout averaging 18.3 inches in length and 2.48 pounds, 187 white and 35 longnose suckers. No rainbow from the 1967 fingerling plant were caught.

Petrolia Reservoir is a 515-acre State Water Board Reservoir in Petroleum County. Fluctuations are not as severe as in most irrigation reservoirs. Four gill nets were set overnight in mid-September, 1968. Twenty-three walleye pike caught averaged 16.6 inches in length and 1.79 pounds. In addition, 151 carp, 45 white suckers, 6 black bullheads and 3 goldeye were taken. In late April, 1969, eight overnight gill net sets were made. All walleye pike (31) were ripe males and averaged 17.0 inches in length and 1.84 pounds. The largest male was 24.7 inches in length and weighed 5.67 pounds. One goldeye was caught and weighed 2.21 pounds and measured 17.7 inches in length. A total of 149 carp, 60 white suckers and 4 black bullheads were also netted.

Petrolia, Yellow Water and War Horse reservoirs were experimentally fished by commercial fishermen from Lewistown with 1 3/8 inch square mesh hoop nets for marketable sized black bullheads,

carp and white suckers. Carp and white suckers were numerous in Petrolia but of insufficient size to market commercially. Black bullheads were large in War Horse, however, the sucker population is so dense that unless they find a use for them, the reservoir would not be feasible to fish. War Horse also has a good fishable population of largemouth bass and a few carp have been caught.

Yellow Water Reservoir was fished in April and May, 1968 with hoop nets. Many black bullheads, a few white suckers, and at times, numerous rainbow trout were caught. It was thought that the black bullheads were too small to sell and the lake was not fished again until fall. Bullheads caught at this time averaged 4½ dressed bullheads per pound (7 dressed per pound in spring) and were of marketable size. To this date, May, 1969, approximately 12,000 pounds of dressed bullheads have been harvested from Yellow Water Reservoir. Commercial fishermen are continuing to fish the reservoir. Rainbow trout taken in the 1 3/8 inch mesh hoop nets averaged 15.6 inches in length and weighed 1.38 pounds. The trout were returned to the reservoir.

During mid-June of 1968 a series of gill nets were set overnight in Tiber Reservoir. The objective was to determine if there was a major change in the species composition of the reservoir since the last gill net series in 1960 and 1961.

The change in predominance from white suckers in 1961 to yellow perch in 1968 was the most significant change found (Table 7). The decrease in the trout population was expected since trout planting was discontinued in 1963. Other fish taken in the net series in 1968 included carp, burbot, shovelnose sturgon and brown trout.

TABLE 7. Gill net catch from Tiber Reservoir and number of fish by species given as a percentage of the total catch

Year	Total catch	Yellow perch	White sucker	Longnose sucker	Rainbow trout	Other fish
1960	1,054	0	67.0	4.0	29.0	0
1961	331	0	83.0	2.0	15.0	0
1968	1,930	59.0	36.3	2.7	1.0	1.0

Seine hauls were made in the Willow Creek Arm and the main reservoir near Turner Park. Young yellow perch and emerald shiners were taken in good numbers in the Willow Creek Arm but poor catches were made in the main reservoir. No carp were taken in either area with seines.

Hauser Reservoir is a 3,800 surface acre impoundment, and the middle reservoir in a series of three reservoirs on the Missouri River in Lewis and Clark County. Canyon Ferry, the largest and first in the series was built by the Bureau of Reclamation. Hauser and Holter (the last in the series) were both built by the Montana Power Company and are used primarily for power production. Management information has been collected on Canyon Ferry but very little data has been collected on either Hauser or Holter Reservoir.

Gill nets were fished in Hauser during 1968 in an attempt to determine what species were in the reservoir. Eighteen gill nets were fished overnight during mid-June. Twelve of the sets were floated and six were bottom sets.

The gill nets caught 1,241 fish, of which 90 percent were white and longnose suckers. White suckers were the predominant species. Carp, yellow perch and mountain whitefish made up 5 percent of the catch, with trout and kokanee making up the other 5 percent.

Of the 60 game fish taken, 31 were brown trout, 25 were rainbow trout and 4 were kokanee. The brown trout averaged 18.2 inches and 2.54 pounds, the rainbow averaged 15.1 inches and 1.43 pounds and the kokanee averaged 14.2 inches and 1.17 pounds.

The kokanee were aged at two years and are presumedly from a plant of fry made in Canyon Ferry Reservoir in the spring of 1966. This plant has provided some fishing in Hauser, Holter and in the river immediately below both reservoirs.

Growth of the rainbow was considered good. Two and a half year old fish ranged from 12.5 inches to 17.2 inches, three and a half year old fish from 16.5 inches to 18.5 inches. Only one four year old rainbow was taken.

Ponds

Forty-six small reservoirs were gill-netted during the year to determine fish species present, growth rates and abundance. Several new reservoirs were added to the planting program and others were taken off. Fish losses due to winterkill were common the past winter (1968-69). Although most small reservoirs are stocked with rainbow trout (which grow well) brook trout have done well and provided considerable fishing, especially in the Denton area. A map showing location of ponds present was given to the Lewistown Rod and Gun Club to facilitate use of stocked waters.

LITERATURE CITED

Aagaard, Fern C. 1969. Temperature of surface waters in Montana. Montana Fish and Game Department. 613 p. multilith.

Prepared by Richard Baldes

Approved by George D. Holton

Date June 22, 1970

Waters referred to:

16-0200
16-0300
16-0310
16-0800
16-0900
16-1445
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