

MONTANA DEPARTMENT OF FISH AND GAME

FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana

Project No.: F-5-R-27

Title: Northcentral Montana Fisheries Study

Job No.: I-a

Title: Inventory and Survey of Waters in
the Western Half of Region Four

Period Covered: July 1, 1977 through June 30, 1978

ABSTRACT

Inventory surveys were conducted on a total of 29 waters. Northern pike and walleye populations were investigated in Tiber and Pishkun Reservoirs and Lake Frances in relation to age and growth, harvest, movement and reproduction. Tagging studies continued on northern pike and walleye in Tiber Reservoir. Fluctuations in the burbot population throughout the years in Tiber Reservoir is discussed. An experimental plant of rainbow trout was made in Pishkun Reservoir in the face of a somewhat decreased pike population. Survival of hatchery rainbow trout appears most successful when planted at later stocking dates and warmer water temperatures as evidenced at Nilan and Willow Creek Reservoirs and Bean Lake. Kokanee salmon growth and harvest was determined for Bynum and Pishkun Reservoirs. The fishery of three existing farm ponds and two small lakes was investigated and one new farm pond was added to the management program. Data was collected regarding the two-fish limit in the North and South Forks of the Sun River and in the Smith River. A gradual increase in length is noted since the regulation was imposed in 1975. Preliminary information was gathered on stream stability and fish habitat of the Teton River in relation to debris removal projects versus areas where debris was left. Presence of the Upper Missouri River Cutthroat Trout was documented in several streams in the Badger Creek and South Fork Two Medicine River drainages which are proposed for oil and gas exploration. Smallmouth bass were introduced in the Marias River below Tiber Dam and channel catfish were planted in the Marias River above Tiber Reservoir and in the Teton River near Dutton.

OBJECTIVES AND DEGREE OF ATTAINMENT

To inventory and survey the waters of value for fisheries management in the western half of the northcentral region of Montana. The following goals will be accomplished under this job:

1. To determine harvest and population trend information for northern pike, walleye and burbot in Tiber Reservoir, and for northern pike and walleye

in Lake Frances and Pishkun Reservoir. This work was done and is included in this report.

2. To determine survival of hatchery rainbow trout in relation to stocking dates in Nilan and Willow Creek Reservoirs and Bean Lake. This information is included in this report.
3. To determine growth and harvest of kokanee salmon in Bynum and Pishkun Reservoirs. This data is included in the report.
4. To evaluate the fishery potential of new farm ponds and evaluate stocking levels and growth of fish in five existing farm ponds and small lakes presently under management programs. Data is presented for one new pond and five waters under existing programs.
5. To evaluate the effects of a two-fish limit on trout populations in the North and South Forks of the Sun River and in the Smith River. This work is included in this report.
6. To evaluate flow data for recommending minimum flow requirements for aquatic life in the Smith River. This was not done because several errors were found in the field data.
7. To evaluate stability of stream habitat on the Teton River in reaches where debris was mechanically removed and in reaches where debris was not removed. Preliminary information was gathered and appears in this report.
8. To investigate the feasibility of rehabilitating the fishery of Swazee Lake and Eureka Reservoir. Data is presented concerning these projects.

PROCEDURES

Fish were sampled with 3 x 4 foot and 4 x 6 foot frame net traps ($\frac{1}{4}$, $\frac{1}{2}$ and 1-inch mesh), 6 x 125 foot experimental gill nets ($\frac{3}{4}$ to 2-inch square mesh), 8 x 300 foot gill nets ($1\frac{1}{4}$ to $1\frac{3}{4}$ inch square mesh), 24 x 100 foot gill nets ($\frac{3}{4}$ to 2-inch square mesh), a 300 volt DC electrofish shocker, and by hook and line. Measurements of fish include total lengths to the nearest tenth of an inch and weights to the nearest hundredth of a pound. Scale and otolith samples were collected for age and growth studies. Northern pike and walleye were tagged with T-tags and dart tags and were additionally marked by removal of the right pectoral fin to help determine tag loss. Harvest determinations were made through voluntary angler tag returns and limited creel census. Portions of the rainbow trout plants for Willow Creek and Nilan Reservoirs and Bean Lake were marked with a fluorescent pigment prior to planting. Gill net samples of trout were examined for markings with the aid of a black light. Stream habitat and channel stability measurements of the Teton River were made on the ground with the aid of photographs and benchmarks were established. White sucker populations in Swazee Lake and Nilan and Eureka Reservoirs were rehabilitated by boat application with rotenone.

ACCOMPLISHMENTS

Lakes and Reservoirs

Gill net summaries for the lakes inventoried are presented in Table 1.
Individual discussion of various waters follows.

Table 1. Summary of gill netting in lakes and reservoirs, 1977.

Area (Date Sampled)	*Surface Acres	No. of Nets	Species	**No. of Fish	Length Range (Average)	Weight Range (Average)
Bynum Res. (Dec. 1)	3,600	2	KOK Wf WSu	10 1 27	13.8-15.8(14.9)	0.82-1.22(1.02)
Nilan Res. (July 12)	150	5	Rb Rb Rb WSu	11 32 2 826	8.3-10.1(9.4) 13.4-16.4(15.2) 21.0-21.5(21.3)	0.20-0.46(0.39) 0.98-2.05(1.43) 3.55-5.21(4.38)
Pishkun Res. (June 28)	1,400	4	KOK Rb	3 13 10 1	6.6-7.6(7.0) 12.5-15.0(13.3) 15.9-21.1(18.5) (17.9)	0.08-0.14(0.11) 0.68-1.22(0.88) 1.66-3.72(2.51) (2.07)
Tiber Res. (Sept. 22-23)	11,400	12	NP WE YP WSu LnSu Carp	19 5 6 224 28 50 6 5	19.6-24.0(22.1) 25.0-29.5(26.6) 8.0-11.3(9.4) 15.0-20.7(18.2) 6.0-9.9 (6.8)	1.52-3.15(2.38) 3.53-5.75(4.26) 0.13-0.44(0.26) 1.22-3.40(2.11) 0.09-0.59(0.16)
Willow Cr. Res. (Sept. 29-30)	1,300	8	Rb WSu LnSu	17 25 1 214 1	10.3-12.9(11.5) 14.8-19.4(16.8)	0.42-0.86(0.61) 1.29-3.28(1.90) est. 7#

* Approximate surface acres at time of survey.

** Species abbreviations: KOK -kokanee; Wf - mountain whitefish; WSu - white sucker; Rb - rainbow trout; NP - northern pike; WE - walleye; YP - yellow perch; LnSu - longnose sucker.

No water ran into Bynum Reservoir during the fall of 1977 during the kokanee spawning season.

Gill nets were fished under the ice in December (Table 1) to attempt to locate spawning salmon. A few salmon were taken in the nets and concentrations were later found near shoreline areas adjacent to the outlet. Fishermen snagged salmon through the ice until the first part of January. Length measurements and otoliths were collected from a representative sample of these fish and data is presented in Table 2.

Table 2. Age class and length range of mature kokanee from Bynum Reservoir, December, 1977

	Age Class	No. of Fish	Length Range (Average)
Male	II	12	12.8-15.8 (13.8)
	III	16	14.9-16.0 (15.4)
Female	II	1	(13.8)
	III	21	13.2-15.7 (14.6)

Bynum Reservoir - Since kokanee were first introduced in 1971, the fishery has mainly centered around harvesting mature fish by snagging in the inlet stream in the fall. Very few salmon are caught at other times of the year. Competition with trout is also evident (Hill, 1975). Because of little use and competition with trout, kokanee plants will be discontinued in the reservoir beginning in 1978.

Nilan Reservoir - Five gill nets were fished in this reservoir in July to monitor the buildup of suckers. A total of 45 rainbow trout and 826 white suckers were taken (Table 1).

Although trout growth remained good, the lake was rehabilitated October 4, 1977, to take advantage of the low lake levels. It was felt that trout growth would soon decrease with the large sucker population. A total of 275 gallons of rotenone was used to treat approximately 1,100 acre feet of the main lake. Another 45 gallons treated potholes and two ponds above the main lake.

As part of an ongoing study to determine survival of hatchery rainbow trout in relation to stocking dates, part of the 1977 plant for Nilan Reservoir was marked. One half (37,800) of the total number planted was unmarked and was planted March 16, 1977. The other half (37,920) was marked with a fluorescent pigment and was planted April 26, 1977. Both plants consisted of five-inch fingerlings. A difference of 20°F. in surface water temperatures existed between the two planting dates; 35°F. on March 16 and 55°F. on April 26. A total of 359 rainbow trout were checked for fluorescent markings with a black light during the rehabilitation project. A total of 317 (88.3%) fish were marked. This data again suggests that trout planted after water temperatures have warmed have better survival. Data supporting this has been reported for Eureka Reservoir and Bean Lake (Hill and Wipperman, 1977).

Fingerling rainbow trout will be planted in the spring of 1978 and half will be stocked early after ice-out and half will be stocked approximately one month later. The late plant will be marked with fluorescent pigment to help determine survival rates between the two planting dates.

Bean Lake - Efforts to determine survival of hatchery stocked rainbow trout in respect to stocking dates continued in Bean Lake. Half of 75,600 five-inch rainbow trout was planted on March 23, 1977 and the other half was planted on April 28, 1977. The latter plant was marked with fluorescent pigment.

On October 18, 1977, two gill nets caught 48 of the trout planted in the spring of 1977 and 37 (77%) trout were marked. The nets also caught 28 trout planted in 1975 and 1976 and 7(25%) of these were marked. Only 13.3% of 1975-1976 plants had been marked by clipping the adipose fin. Clipped fish were planted later in the spring.

Two gill nets were fished in April, 1977 and caught 49 trout that were planted in 1976. Of these, 11 (22.4%) were marked. These findings strongly indicate better survival of fingerling trout when they are planted later in the spring. Review of past planting and survey data reveals greater survival of trout when surface waters were about 50° F. or more at the time the lake was planted. We propose to evaluate stocking dates another year before submitting final conclusions and management recommendations from this study.

Eureka Reservoir - Due to poor growth of rainbow trout and increasing numbers of suckers, this reservoir was chemically rehabilitated on October 10, 1977. The reservoir was at minimum levels which enabled treatment at lowest cost. Approximately 85 gallons of rotenone was applied to the reservoir by boat and another three gallons was sprayed along the inlet ditch. The reservoir reached its lowest level just prior to the rehabilitation project and due to this late date, water temperatures were undesirably low (in the low 40's). Suckers were observed dying for up to four days following application of the rotenone. Fingerling rainbow trout will be stocked into Eureka Reservoir in the spring of 1978. Half of the total number will be planted early and half approximately one month later. The latter will be marked to determine survival ratio. See discussion for Bean Lake and Nilan Reservoir.

Lake Frances - Three trap nets were fished from April 18-22 to monitor trends in the northern pike and walleye populations. The survey was terminated earlier than planned due to nets being tampered with and fish being removed. A total of 45 northern pike and one walleye were taken during the survey, along with one yellow perch, one rainbow trout and 35 white suckers. During 1977, no tags were returned from anglers catching northern pike.

A total of 1.6 million walleye fry were planted during May, 1977. A total of 4,235,000 walleye have been stocked into Lake Frances since 1969. However, over three million of these had questionable survival due to early planting dates or poor condition on arrival.

Pishkun Reservoir - This reservoir was stocked with rainbow trout until 1963 when it became evident that northern pike existed in large enough proportions to cause serious predation on trout. Northern pike were presumably illegally introduced into the system in the late 1950's. Some wild rainbow are present in the reservoir as they enter via the Supply Canal from the Sun River and are large enough to escape predation.

For several years, many of the local sportsmen have requested eradication of the pike and restocking with rainbow trout. It is economically unfeasible to rehabilitate the reservoir and a complete kill would be difficult, if not impossible, due to the 50 foot depth of dead storage. Kokanee salmon were introduced in 1970 in hopes of satisfying the trout enthusiasts. It is felt that most of the time kokanee would occupy the deeper water away from shore and escape predation of pike.

The pike population increased from 1970 through 1973 and then decreased or was unstable from 1975 through 1977. Spring trapping identifies the ups and downs in the pike population as shown by the numbers of fish taken per trap day (Table 3). The increase in average length also indicates fewer individuals in the population. The decrease may possibly be attributed to a number of factors: high harvest rates for the years 1970-1972 (Hill, 1975); predation on pike by pike and other stress related mortalities caused by extremely low lake levels in 1973; and fish escapement from the reservoir during the low water year of 1973.

Table 3. Increase and decrease of the northern pike population in Pishkun Reservoir 1970-77, by trap netting (Age III and older fish).

Year	Date Sampled	Water Elevation	No. of Trap Days	Fish/trap Day	Average Length
1977	4-16 to 4-21		22	1.6	24.0
1976	4-19 to 4-22	65.7-68.1	15	4.6	23.0
1975	5-12 to 5-16	69.9-70.6	10	2.2	23.5
1974	No data				
1973	4-23 to 4-24	66.5-67.2	5	11.0	
1972	4-17 to 4-29	62.0-68.8	72	8.1	22.0
1971	4-15 to 4-28	60.1-66.5	78	6.8	20.5
1970	4-21 to 5-05	60.6-66.9	70	5.8	21.0

Because of the noted decrease in the pike population, an experimental plant of rainbow trout was made in Pishkun Reservoir during 1977. A total of 2,764 nine-inch fish were planted July 27 and another 11,222 three to five-inch fish were planted August 3. All of these fish were marked with fluorescent pigment for later identification to determine survival, growth and to separate them from wild rainbow. Another experimental plant of marked rainbow will be made in 1978. The trout plant will be small in number to achieve maximum growth and also to minimize competition with kokanee.

In addition to the spring trapping to determine the relative abundance of northern pike mentioned in Table 3, information on kokanee was obtained at various times. Four gill nets were fished June 28 and caught 26 kokanee (Table 1). Scale analysis indicates the following age groups and corresponding

length ranges: Age group I 6.6 - 7.6 inches, age group II 12.5 - 15.5 inches; age group III 15.9 - 20.9 inches; and age group IV 19.3 - 21.1 inches.

Length and weight measurements and otoliths were obtained from spawning salmon in October, November and December. Mature fish ranged from 10.8 inches and 0.43 pounds to 22.9 inches and 3.68 pounds (Table 4).

Table 4. Age class and size of mature kokanee from Pishkun Reservoir, October-December, 1977. (Otolith examination.)

Age Class		No. Fish	Length Range (Average)	Weight Range (Average)
Male	II+	34	10.8 - 17.8(15.2)	0.43 - 1.88 (1.14)
	III+	3	14.3 - 20.8(17.5)	0.84 - 2.85 (1.78)
	IV+	2	22.3 - 22.9(22.6)	3.40 - 3.68 (3.14)
Female	II+	13	12.8 - 15.5(14.1)	0.72 - 1.10 (0.91)
	III+	10	17.3 - 20.0(18.3)	1.37 - 2.64 (1.82)
	IV+	2	17.5 - 20.7(19.1)	1.40 - 2.88 (2.14)

Both male and female salmon were represented by age groups II+, III+ and IV+. The majority of the males sampled were in age group II+ while females were fairly evenly divided in age groups II+ and III+.

Anglers utilize the kokanee fishery in Pishkun much more than at Bynum Reservoir. At Pishkun they have learned to harvest salmon throughout the summer and to snag spawners in the fall and into early winter. Attempts were made in February and March of 1978 to locate kokanee concentrations through the ice so that fishermen could catch them and in so doing would be utilizing this available resource throughout the year. Fishermen caught several kokanee around the middle to end of March although no large concentration was found. Scale and otolith samples from some of these indicate two age groups were caught: age group I with fish ranging from 9.8 - 9.9 inches; and age group II with fish from 10.8 - 13.9 inches. These fish will be two and three years old, respectively, in the spring of 1978.

There is a slight possibility that natural reproduction of kokanee is occurring in Pishkun Reservoir. The annual plant for 1978 will be deleted and gill nets will be employed to determine whether or not this particular age group exists. Future management recommendations for kokanee will be based on these findings.

A total of 525,000 walleye fry were introduced into this reservoir in early April, 1974. To date, none have been caught by fishermen or taken in nets. It is believed that the fry experienced heavy mortality because of the very early planting date.

Trap nets will be fished in the spring of 1978 to determine the status of the northern pike population. A creel census will be conducted two days

a week during the summer to determine rainbow trout survival planted in 1977 and 1978. From these results, a decision will be made whether it is biologically sound to make additional plants of rainbow trout into the existing pike population.

Tiber Reservoir - Trap nets were fished to monitor trends in the northern pike, walleye and burbot populations. Five trap nets fished in the Willow Creek Arm from April 5 - 15, caught a total of 522 pike, 497 walleye and 77 burbot along with 126 yellow perch, three rainbow trout, 249 white and longnose sucker and four carp. Five trap nets were also fished in the main reservoir above the Bootlegger Crossing. From April 22 - 26, these nets captured 120 pike, 625 walleye, 12 burbot, 12 yellow perch, 19 rainbow trout, 54 white and longnose sucker, 35 carp and three mountain whitefish.

A total of 595 pike were tagged with T-tags in April; 484 in the Willow Creek Arm and in the upper reservoir. In the Willow Creek Arm, 233 males averaged 20.8 inches (range 17.2 - 36.4) and 251 females averaged 21.4 inches (range 18.1 - 38.5). The average size of pike captured in the upper reservoir was larger with 44 males at 22.7 inches (range 19.3 - 32.8) and 67 females at 25.3 inches (range 19.2 - 38.5). To assist in determining tag loss, the right pectoral fin was clipped from all tagged fish. Fishermen have voluntarily returned 56 tags from pike tagged in 1977 for an overall return of 9.4 percent. The return from the upper reservoir is 9.9 percent compared to 8.9 percent for the Willow Creek Arm. An additional 15 tags were returned from fish tagged in 1976 which brings the accumulative return to 15.0 percent.

A total of 472 walleye (356 males, 116 females) were tagged in 1977, all in the Willow Creek Arm. Males averaged 17.4 inches (range 13.3 - 21.7) and 1.83 pounds (range 1.11 - 3.33) while females averaged 18.9 inches (range 17.2 - 21.8) and 2.59 pounds (range 1.78 - 3.87). Tag return percentage for walleye are much lower than for pike. A total of 18 tags were returned by fishermen and another 8 tags were removed from the population during gill net surveys for a total return of 5.5 percent for 1977 tagged fish. Accumulative return for walleye tagged in 1976 now totals only 4.0 percent with two tags returned during 1977. It is expected that tag loss is quite high on walleye and will be determined in future surveys from fin clipped fish.

During trapping operations in April, a total of 40 northern pike and one walleye tagged in 1976 were recaptured. Measurements on these fish indicate an average annual growth increment of 3.7 inches (range 0.9 - 6.4) for male pike and 5.2 inches (range 0.8 - 7.7) for females. One walleye, a male, grew 2.2 inches since being tagged, 1976.

Considerable movement occurs during the spawning season. Nine walleye and five northern pike were taken in the upper reservoir approximately two weeks after being tagged in the Willow Creek Arm, a distance of about 15 miles.

Scale samples were analyzed from northern pike and walleye captured during the spring survey and the results appear in Table 5. Pike scales

were examined and it was determined that the last year of successful reproduction was 1975. Analysis of walleye scales reveal age groups III through VI which represents the years of introductions, 1971-1974.

Table 5. Scale analysis of northern pike and walleye from Tiber Reservoir, April 1977.

Species	Age Class	No. of Fish	Length Range
Northern pike	II	20	17.2 - 23.2
Walleye	III	2	13.2 - 13.6
	IV	38	14.8 - 20.0
	V	10	17.4 - 21.2
	VI	1	21.7

The burbot population has gradually decreased since 1973 to a low in 1976. Table 6 shows the total numbers of burbot taken during spring trapping operations for the past five years. Fishermen reported similar decreases in the catch of burbot but an upward trend is indicated.

Table 6. Fluctuations in the burbot population, Tiber Reservoir, 1973-1977, as determined by spring trap netting.

Year	Trapping Dates	Trap Days	Burbot Caught	Fish/trap Day
1973	4-9 to 4-12	20	271	13.6
1974	4-4 to 4-9	25	282	11.3
1975	5-1 to 5-9	48	368	7.7
1976	4-1 to 4-10	45	5	.1
1977	4-5 to 4-15	50	77	1.5

Twelve gill nets were fished in Tiber Reservoir in September and caught 344 fish (Table 1). Walleye dominated the catch, accounting for nearly 67 percent of all fish taken. Table 7 shows the change in relative abundance of each species as determined by fall gill net surveys from 1960 to 1977. The yellow perch and sucker populations began to decrease about the time northern pike and walleye populations were increasing. This is to be expected, as yellow perch and small suckers are favorite prey of pike and walleye. Pike were first documented in Tiber Reservoir in 1973 and walleye were introduced in 1971.

Table 7. Change in relative abundance of species composition, Tiber Reservoir 1960 to 1977. (Gill nets)

Year	Fish/Net	Total Catch	No. of Nets	Percent of Total Catch					
				YP	Sucker*	Rb	NP	WE	Others**
1960	-	1,054	-	.0	71.0	29.0	.0	.0	.0
1961	-	331	-	.0	85.0	15.0	.0	.0	.0
1968	53.7	1,934	36	59.0	39.0	1.0	.0	.0	1.0
1971	38.0	380	10	78.2	16.3	2.4	.0	.0	3.2
1972	35.0	70	2	65.7	32.9	.0	.0	.0	1.4
1973	26.2	367	14	17.7	64.9	4.6	.5	9.8	2.5
1974	14.6	262	18	11.5	42.4	2.3	1.9	40.5	1.5
1975	31.6	284	9	17.6	31.4	4.9	22.9	20.4	2.8
1976	19.3	308	16	9.7	19.8	.3	17.2	52.3	0.6
1977	28.7	344	12	8.1	16.2	.3	7.0	66.9	1.5

* Sucker = white and longnose

** Others = carp, whitefish, burbot

Reproduction of northern pike was very good in 1975 but was very limited in 1976 and 1977. In the fall of 1977, terrestrial vegetation exists along the shoreline and would serve as excellent pike spawning habitat if flooded at the appropriate time in the spring. The Bureau of Reclamation has agreed to flood this vegetation during the 1978 pike spawning season and should produce a strong year class. It appears a strong year class is needed every three to four years to maintain an adequate pike sport fishery.

Natural reproduction of walleye was first documented in the fall survey of 1977. Scale analysis indicates walleye ranging from 8.0 - 11.3 inches are age group I fish and were produced in 1976. Natural reproduction occurred in 1975 also as evidenced by one walleye, 15.6 inches, and aged as two years old. Future surveys will determine the extent of natural reproduction of walleye. Additional scale analysis gave the following age distribution: age group III - (three fish) 15.0 - 16.5 inches; and age group IV - (nine fish) 16.3 - 19.8 inches.

Willow Creek Reservoir - Five floating and three sinking gill nets were fished overnight on September 29 and 30 to determine survival of hatchery trout in relation to stocking dates. A total of 43 rainbow trout and 215 suckers were taken (Table 1).

On April 6, 1977, a total of 63,211 unmarked four inch rainbow were stocked when the surface water temperature was 48°F. The remainder of the plant, 62,481 four inch fish were marked with fluorescent pigment and planted April 28 when surface water temperature was 56°F. Only 17 rainbow from these plants were collected in the gill net surveys and ten of these were marked. Although sample size is small, the data indicates slightly better survival for the April 28 plant. Survival rates of the two stocking dates are more nearly equal than either Bean Lake or Nilan Reservoir and

may be attributed to warmer water temperatures when planted.

The 1978 plant for Willow Creek Reservoir will not be marked because of the difficulty in obtaining a large enough sample. However, results of the experiments at Bean Lake, Eureka Reservoir and Nilan Reservoir, will be applied to the management program for Willow Creek Reservoir.

Small Lakes and Farm Ponds

Zell Pond in Toole County experienced winterkill as verified by low oxygen readings taken in February of 1977. Largemouth bass were introduced into this pond in 1976. Future management will be planned when water levels return to normal.

Hook and line attempts to sample adult largemouth bass and crappie introduced into Ferris Pond (Teton County) in 1976 were negative. Future attempts will employ nets to determine whether these species have successfully reproduced.

A fish kill sometime during early August was reported for Fitzpatrick Lake. An investigation was not made because the report was received several days after. However, the kill was only partial, as creel checks later in the fall proved fishing success to be good. A possible explanation for the fish kill is similar to that reported for this lake in 1971 (Phinney and Hill, 1973). Hot, calm, dry weather was responsible for the kill in 1971 in which a thermocline developed and oxygen levels were depleted below the thermocline.

The cutthroat trout population of Kiyo Lake was sampled by hook and line on August 19, 1977. This is a mountain lake south of Glacier Park. Yellowstone cutthroat measuring 12-14 inches were sampled.

Swazee Lake, on the Sun River Game Range near Augusta, was chemically rehabilitated May 3, 1977, to remove large numbers of white suckers. Approximately nine gallons of rotenone was used to treat the lake and the inlet. The lake was restocked June 20, 1977 with 1,505 seven inch rainbow trout.

Several ponds in Toole County were surveyed on the Furnell Ranch property recently purchased by the U. S. Fish and Wildlife Service. One pond was found suitable and recommended for a fishery. This pond was approximately 6.5 acres and had a maximum depth of 16 feet on the date of survey, July 19, 1977.

Streams

North and South Forks of Sun River - Hook and line surveys were conducted on the forks of the Sun River above Gibson Reservoir. This is the third year that information was collected pertaining to the two fish limit on rainbow and cutthroat trout imposed in 1975. Preliminary results (for rainbow only) indicate that the numbers of fish larger than ten inches has progressively increased for each one inch increment in length (Table 8). From this table it is apparent that the South Fork has attained a greater percentage of large

fish from 1975 to 1977 than has the North Fork. Stream flow in both forks was much lower during 1977 than during previous surveys.

Table 8. Length frequency changes for rainbow trout in the North and South Forks of the Sun River, 1975-1977. (Expressed as percent of total trout sampled.)

<u>North Fork</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
10" and up	70.6	74.0	80.5
11" and up	54.4	59.4	65.9
12" and up	29.4	41.7	51.3
13" and up	17.6	22.9	34.2
No. of Fish in sample	68	96	41
Average Length (all fish)	10.9	11.3	11.5
<u>South Fork</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
10" and up	71.2	80.0	91.4
11" and up	56.0	63.3	84.3
12" and up	40.8	50.5	78.6
13" and up	30.6	24.8	51.4
No. of Fish in sample	59	102	70
Average Length (all fish)	11.4	11.8	12.7

Scale samples were collected and analyzed for rainbow trout only. This analysis as well as length range for all species collected is presented in Table 9.

Table 9. Length and age class distribution of fish in the North and South Forks of the Sun River, August 8-10, 1977.

<u>Stream</u>	<u>Species*</u>	<u>No. Fish</u>	<u>Length Range (Average)</u>	<u>Age Class</u>	<u>No. Fish</u>	<u>Length Range</u>
North Fork	CT	7	8.6-12.3 (10.1)			
	Eb	7	5.5-11.6 (8.0)			
	RbxCT	4	9.3-12.3 (10.5)			
	Rb	41	4.4-15.5 (11.5)	I	4	4.4- 7.5
				II	7	8.6-12.0
				III	19	10.0-14.4
				IV	11	11.5-15.5

Table 9. (continued)

Stream	Species*	No. Fish	Length Range (Average)	Age Class	No. Fish	Length Range
South Fork	CT	9	7.9-12.1 (10.6)			
	Eb	5	10.5-13.8 (11.8)			
	Rb	70	7.0-17.3 (12.7)	I	3	7.0-7.8
				II	11	8.3-12.6
				III	34	10.2-14.6
				IV	19	12.7-16.2
				V	3	16.2-17.3

* Species abbreviations: CT - cutthroat; Eb - brook trout; RbxCT - rainbow-cutthroat hybrid; Rb - rainbow trout

Smith River - Trout population estimates were conducted in the Smith River in an effort to evaluate the effects of a restricted creel limit. A special limit of two rainbow trout became effective in May, 1975 in the river from its mouth to the mouth of Sheep Creek, a distance of about 80 river miles. Estimates were made in three river sections; the Fraunhofer and Zieg Sections within the restricted creel limit area and the Loney Section where normal creel limits apply. Results of electrofishing trout population estimates are presented in Tables 10, 11 and 12.

Table 10. Trout population estimates from Loney Section on the Smith River, September, 1977.

Species	Age	Length Range (inches)	Number	Weight (pound)
Rainbow Trout	I	5.9-10.5	432	99.28
	II	8.6-12.7	204	99.56
	III & older	11.8-16.0	132	113.24
			768([±] 96)	312.08 ([±] 35)
Brown Trout	I	6.1-11.2	111	31.62
	II	11.1-14.6	56	43.12
	III & older	12.8-20.5	174	288.35
			341 ([±] 54)	363.10 ([±] 78)
Brook Trout	I-III	7.9-13.2	63 ([±] 20)	27.00 ([±] 9)
Grand Total			1,172	702.18
Standing Crop per 1,000 feet			139	83.24
Standing Crop per acre			137	82.03

Table 11. Trout population estimates from Zieg Section on the Smith River, September, 1977.

Species	Age	Length Range (inches)	Number	Weight (pounds)
Rainbow Trout	I	5.2-8.8	1,189	199.64
	II	8.9-11.2	713	273.10
	III & older	9.6-15.2	439	271.27
			2,341 (\pm 333)	744.01
Brown Trout	I	6.0-9.5	42	10.84
	II	12.2-15.6	11	13.03
	III & older	12.2-19.6	48	96.81
			101 (\pm 42)	120.68 (\pm 50)
Grand Total			2,442	864.69
Standing Crop per 1,000 feet			227	80.44
Standing Crop per acre			117	41.31

Table 12. Trout population estimates from Fraunhofer Section on the Smith River, September, 1977.

Species	Age	Length Range (inches)	Number	Weight (pounds)
Rainbow Trout	I	6.7-10.3	584	142.95
	II	10.4-13.2	68	39.60
	III & older	11.4-16.0	69	65.64
			721 (\pm 114)	248.19 (\pm 34)
Brown Trout	I	8.5-12.1	131	55.71
	II	12.6-15.1	82	88.47
	III & older	14.3-20.0	58	107.75
			271 (\pm 71)	251.93 (\pm 83)
Grand Total			992	500.12
Standing Crop per 1,000 feet			83	41.68

Table 13. Estimated number and average length (inches) by age group of rainbow trout from three sections of the Smith River, 1969 to 1977.

<u>Year</u>		<u>1969</u>		<u>1975</u>		<u>1976</u>		<u>1977</u>	
Loney Section		No.	Av. Length	No.	Av. Length	No.	Av. Length	No.	Av. Length
Age I		273	7.9	162	7.4	261	7.5	432	8.4
II		65	11.0	115	9.9	194	10.2	204	10.9
III & older		<u>79</u>	12.8	<u>122</u>	13.0	<u>205</u>	12.4	<u>132</u>	13.3
Total		417		399		660		768	
<u>Zieg Section</u>									
Age I		292	7.5	314	6.5	815	6.8	1,189	7.6
II		280	9.4	550	9.1	703	9.5	713	10.2
III & older		<u>216</u>	11.8	<u>501</u>	12.0	<u>536</u>	11.4	<u>439</u>	11.9
Total		788		1,365		2,054		2,341	
<u>Fraunhofer Section</u>									
Age I		943	7.7	-	-	288	8.4	584	8.6
II		77	10.2	-	-	18	11.3	68	11.6
III & older		<u>75</u>	13.0	-	-	<u>142</u>	13.1	<u>69</u>	13.7
Total		1,095		-		448		721	

Trout populations were estimated in the Smith River since 1975 when the special two rainbow trout limit became effective. Estimates were also conducted in 1969. The number of rainbow trout and average length of each age group is presented in Table 13 for the four years of record.

Two conclusions can be drawn from the data. The number of yearling and two year old trout have steadily increased in the Loney and Zieg Sections and the average size of age III & older trout have remained about the same in all sections. The increase in number of age I and II trout may be due to greater flow in the upper river in recent years. One factor that may influence the size of age III & older trout is selective harvest. Anglers may be inclined to keep only larger fish under the two fish kill limit. Efforts will be continued to evaluate this regulation.

Teton River - Following the June flood of 1975, debris (trees) was left scattered throughout the flood plain of the Teton River in large piles or as single trees. Some were deeply embedded in the gravel and others were left loose on top of the ground. Various groups became concerned that future high waters would create exaggerated problems if the debris was not removed.

Teton County was the first to act and removed debris from the Teton River floodplain from Choteau to approximately five miles upstream. The Forest Service then got into the act and removed debris on their land. The SCS then removed debris from the Forest boundary downstream to where the County stopped. However, one landowner did not allow the SCS to remove debris from his stretch of the river. This area was chosen to determine whether it is beneficial for river stability and fish populations to leave debris in a floodplain or have it removed.

Preliminary surveys and measurements of stream habitat and channel stability were made on the Teton River following the 1975 flood. Photographs were taken of key locations to monitor any changes that may occur where debris was removed or left. Aerial photos were obtained from a SCS flight made after the 1975 flood and from a Montana Highway Department flight made in September of 1977. These will be used to document changes and another photo flight will be made if future high waters create new channels or causes erosion due to debris that has been removed or left.

Approximately six miles of river are included in the study area with the upper boundary being the Bynum Diversion (Table 14). Debris was removed from the upper three areas which consist of 17,603 feet. The channel is wide and the distance between pools averages approximately 156 feet. Debris was left in the lower two areas (14,215 feet) and the channel is much narrower. Pools average 90 feet apart.

Table 14. Teton River study sections relating to debris removed or left intact. (Measurements made July 26-28, 1977.)

Area	Length (ft.)	No. of Pools	Feet between Pools	Description
A. Bynum Diversion to Peebles Bridge	9868	44	224.3	Lower end of left abutment of Diversion to
B. Peebles Bridge to Crary Diversion	1325	8	165.6	Lower end of middle pier of bridge to
C. Shocking Section I	6410	61	105.1	50' below Crary headgate to
D. Shocking Section II	5140	60	85.7	Crawford-Crary fence to
E. Crary's Entrance to Crawford Diversion	9075	98	92.6	Crary Ford crossing to Crest of right abutment on Crawford Diversion

Basic fisheries inventory data was also gathered on the Teton River. Electro-fishing was conducted on June 15, 1977, in areas C and D (refer to

Table 14). Brook trout predominated in both sections with slightly more and larger fish present in the "debris intact" area. Other species taken include brown trout, mountain whitefish, mottled sculpins and longnose dace. Future surveys will follow trends in the fish populations.

Other Streams - Although not specifically covered in the objectives, several streams in the Rocky Mountain Front area were surveyed to obtain species composition and relative abundance. Streams in the Badger Creek and South Fork Two Medicine drainages were electro-fished or sampled by hook and line (Table 15). These streams are important because this area is predicted to be one of the first to be explored for oil and gas development, particularly gas. All of these streams contain the Upper Missouri River cutthroat trout. The Forest Service has been informed of the distribution of the cutthroat and of the precautions necessary to preserve this species and its habitat.

Table 15. Species composition of some streams in the Badger Creek and South Fork Two Medicine River drainages.

Stream (Location)	Date	Species*	No.	Length Range
<u>So. Fk. Two Medicine</u>				
Below Benson Cr. (T29N, R13W, Sec. 12)	8-17-77	CT Wf	14 1	3.3 - 12.4 12.4
Below Woods Cr. (T29N, R12W, Sec. 7)	8-17-77	CT	16	3.3 - 15.0
Below Sidney Cr. (T29N, R12W, Sec. 17)	8-18-77	CT Sculpins	6	3.6 - 7.9
Woods Creek (T29N, R12W, Sec. 7)	8-18-77	CT Sculpins	23	2.8 - 7.5
Townsend Creek (T29N, R13W, Sec. 2)	8-17-77	CT		No measurements
Benson Creek (T29N, R13W, Sec. 12)	8-17-77	CT Sculpins		No measurements
Lost Shirt Creek (T29N, R12W, Sec. 18)	8-18-77	CT Sculpins		No measurements
Sidney Creek (T29N, R12W, Sec. 17)	8-18-77	CT Sculpins	14	5.6 - 9.3
Whiterock Creek (T29N, R12W, Sec. 16)	8-02-77	CT Sculpins	1	5.1

Table 15. (continued)

Stream (Location)	Date	Species*	No.	Length Range
<u>So. Fk. Badger Creek</u>				
Above large falls (T28N, R12W, Sec. 1)	8-03-77	Eb	3	9.0 - 9.3
Below large falls (T29N, R12W, Sec. 36)	8-03-77	Eb	2	8.0 - 9.5
		CT	13	7.8 - 15.0
<u>No. Fk. Badger Creek</u>				
Below Kip Creek (T28N, R12W, Sec. 5)	8-02-77	CT	14	3.9 - 13.6
Above Lee Creek (T29N, R12W, Sec. 27)	8-02-77	CT	8	2.8 - 13.5
Gorge Area (T29N, R12W, Sec. 34)	8-02-77	CT	19	8.0 - 14.6
Lee Creek (T29N, R12W, Sec. 27)	8-02-77	CT	13	2.8 - 8.7
Creek next to Badger Cr. (T29N, R12W, Sec. 23)	8-02-77	CT	3	5.0 - 9.1

* Species abbreviations: CT - upper Missouri River cutthroat trout; Eb - brook trout; Wf - mountain whitefish.

Introduction - The following fish introductions were made: A total of 5,000 two-inch smallmouth bass were planted in the Marias River below Tiber Dam. Channel catfish (75,000 two-inch fish) were planted in the Marias River above Tiber Reservoir to attempt to re-establish this native species that was removed during the Tiber rehabilitation. Another 25,000 two-inch catfish were put in the Teton River near Dutton to try and re-establish this fish that was decimated in the fish kill of 1974.

Code numbers of waters referred to in this report are:

14-0065	Badger Cabin Creek
14-0180	Benson Creek
14-2880	Lee Creek
14-3200	Lost Shirt Creek
14-3240	Marias River Section 1
14-3280	Marias River Section 2
14-3760	North Fork Badger Creek
14-5080	Sidney Creek
14-5350	South Fork Badger Creek
14-5680	South Fork Two Medicine River
14-6000	Teton River Section 1
14-6040	Teton River Section 2
14-6160	Townsend Creek
14-6600	Whiterock Creek
14-6760	Woods Creek
14-7080	Bynum Reservoir
14-7320	Eureka Reservoir
14-9180	Ferris Pond
14-7370	Fitzpatrick Lake
14-7440	Lake Frances
14-7450	Furnell Pond
14-8000	Kiyo Lake
14-9240	Tiber Reservoir
14-	Zell Pond
20-4400	North Fork Sun River
20-5600	South Fork Sun River
20-7900	Nilan Reservoir
20-7950	Pishkun Reservoir
20-8500	Willow Creek Reservoir
17-6832	Smith River
17-8720	Bean Lake

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Prepared by: William J. Hill and Alfred H. Wipperman

Date: June 30, 1978

MONTANA DEPARTMENT OF FISH AND GAME
FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana

Project No.: F-5-R-27

Title: Central Montana Fisheries Study

Job No.: I-b

Title: Inventory of Waters in the
Eastern half of Region Four

Period Covered: July 1, 1977 to June 30, 1978

ABSTRACT

Netting surveys were conducted on the 7 large reservoirs located in the study area and on 14 small ponds. In addition 10 BLM and 6 private ponds were inspected. Largemouth bass were planted into 5 reservoirs. Invertebrate bottom samples were collected from the established stations along Big Spring Creek and its major tributary. Trout population estimates were made for two sections of Big Spring Creek. Rainbow trout numbers were up 56% in section B and 244% in section D and brown trout numbers were up 26% in section B and 163% in section D when compared to 1976 estimates. Streambank stabilization projects were monitored and documented along Big Spring Creek. Limited sampling was done on the Missouri River. Erosion transects were measured and fish populations sampled along the Lost Fork of the Judith River and several tributaries.

OBJECTIVES AND DEGREE OF ATTAINMENT

The objectives of this job were:

1. To evaluate present management of fisheries in Ackley, Bair, Martinsdale, North Fork Smith River, Petrolia, War Horse, and Yellow Water Reservoirs. This work was done and the findings are included.
2. To evaluate the fishery potential of new farm ponds and evaluate stocking levels and growth of fish in ten existing farm ponds and small lakes presently under management programs. This work was done and the findings are included.
3. To obtain trend information and evaluate the management of trout populations in Big Spring Creek. This work was done for two sections of Big Spring Creek and the findings are included.

4. To evaluate habitat changes in Big Spring Creek in respect to changes in watershed management practices. This was done and the findings are included.
5. To obtain fish population data and evaluate habitat conditions on five tributary streams in the upper Judith River drainage. This was done along the Lost Fork of the Judith River and two of its tributaries. A more detailed analysis of findings will be included later following additional investigations.

PROCEDURES

Fish were sampled with sinking and floating nylon gill nets 125 x 6 foot (with graduated mesh sizes from 3/4 to 2 inch); 4 x 6 foot frame trap nets (1/2 and 1 inch mesh); 3 x 4 foot frame trap nets (1/4 inch mesh); a 300 volt D.C. electrofish shocker; a 0-500 variable voltage D.C. electrofish shocker; and by hook and line. Fish captured were measured to the nearest tenth of an inch (total length) and weighed to the nearest hundredth of a pound. Scales were collected for growth analysis. Occasional creel census and fishermen interviews were employed to check harvest, fishing pressure, and success of trout stocking in the more important reservoirs and streams. Invertebrate bottom samples were collected with a Surber Sampler. Population estimates for Big Spring Creek were made using the mark and recapture method described by Vincent (1971 and 1974). Erosion and habitat changes were measured from established transects and photo points.

ACCOMPLISHMENTS

Large Reservoirs

All seven of the larger Department of Natural Resources reservoirs located within the study area were sampled during 1977 and 1978. Sampling results are given in Table #1. Reduced run-off resulting from severe drouth conditions in some areas coupled with moderate to heavy irrigation withdrawals greatly depleted water levels in several of the reservoirs. A short narrative summary of findings in each of the reservoirs follows.

Ackley Lake - Netting surveys and fishermen interviews indicate fishing success remained relatively good during 1977 and 1978. Sucker populations appear to have stabilized. No rainbow trout from the 1978 plant were netted which may indicate poor survival or possibly the new fish had not yet distributed into deeper water where the nets were set. For 1978, the rainbow trout plant was cut in half and 100,000 kokanee are scheduled to be planted. Past experience in Ackley Lake (Poore 1973) indicated that kokanee survived much better than rainbow trout with high sucker populations. Although no brown trout were netted, unconfirmed reports were received of two or three brown trout in the five pound class being taken by fishermen.

Table 1. Summary of netting data from large lakes and reservoirs, 1977-78.

Location (Date Sampled)	Surface Acres	No. and Type of Net	Species*	No. of Fish	Length Range-Inches (Average)	Weight Range-Pounds (Average)
Ackley Lake May 10-11, 1978	247	2-Gill	Rb	22	11.2 - 17.0 (13.9)	0.58 - 1.65 (1.09)
			Eb	1	11.3	0.53
			WF	6	8.3 - 13.2 (9.9)	0.16 - 0.72 (0.34)
			FSU	38	-	-
			CSU	110	-	-
Bair Reservoir July 12, 1977	272	3-Gill	1977 Plants	16	-	-
			Rb	40	9.7 - 13.8 (11.6)	0.30 - 0.95 (0.57)
			Rb	15	6.6 - 10.0 (8.3)	0.10 - 0.35 (0.23)
			Eb	187	-	-
			CSU	6	1977 Plants	-
Martinsdale Reservoir July 13-14, 1977	985	3-Gill	Rb	28	11.7 - 16.2 (14.6)	0.60 - 1.56 (1.17)
			Rb	2	15.3 - 17.1 (16.2)	1.35 - 1.90 (1.62)
			LL	320	-	-
			CSU	23	-	-
			FSU	18	8.9 - 28.6 (13.9)	0.19 - 11.30 (1.85)
Petrolia Reservoir October 12-17, 1977	515	4-Traps	WE	5	7.8 - 8.3 (8.1)	0.18 - 0.24 (0.22)
			YP	1	16.5	1.32
			LING	44	-	-
			Carp	71	-	-
			CSU	13	11.6 - 28.7 (20.1)	0.52 - 12.50 (4.59)
April 6-10, 1978		4-Traps	WE	3	7.4 - 8.0 (7.6)	0.20 - 0.26 (0.22)
			YP	1	21.1	1.90
			Ling	3	6.1 - 8.1 (7.3)	0.12 - 0.30 (0.21)
			Bullhead	318	-	-
			Carp	11	-	-
Smith River Reservoir July 12-13, 1977	327	2-Gill	CSU	4	7.4 - 15.0 (9.6)	0.17 - 0.98 (0.41)
			Rb	3	8.9 - 11.2 (9.7)	0.24 - 0.54 (0.36)
			Eb	3	10.0 - 11.7 (10.8)	0.36 - 0.60 (0.50)
			WF	2	8.5 - 9.4 (8.9)	0.17 - 0.18 (0.18)
			Ling	181	-	-
			CSU	47	-	-
			FSU		-	-

Table 1. Continued.

Location (Date Sampled)	Surface Acres	No. and Type of Net	Species*	No. of Fish	Length Range-Inches (Average)	Weight Range-Pounds (Average)
War Horse Reservoir October 17-20, 1977	1000	4-Trap	NP Bullheads CSU	7 Adults 6 100's	- - -	- - -
April 4-6, 1978		4-Trap	Carp Bullheads CSU	100's 10 12	- - -	- - -
Yellow Water Reservoir July 7-8, 1977	600	2-Gill	Carp Rb Rb Bullhead CSU	15 37 23 6 96	- 1977 Plants 12.6 -20.7 (15.4) 9.0 -10.7 (9.6) -	- - 0.89 - 3.52 (1.51) 0.48 - 0.74 (0.57) -
April 24-25, 1978		2-Gill	Bullhead CSU	2 119	- -	- -

* Species abbreviations: Rb - rainbow trout; LL - brown trout; WF - mountain whitefish; NP - northern pike;
 CSU - white sucker; FSU - longnose sucker; Eb - brook trout; WE - walleye;
 YP - yellow perch; Ling - burbot.

Bair Reservoir - Netting surveys indicate sucker populations have stabilized somewhat. In spite of the relatively small average size of trout from the reservoir it remains a popular location for fishermen. Although we annually stock 25,000 rainbow trout in the lake, brook trout which enter the lake from the inlet stream made up 21% of the trout in our netting survey and in 1976 they made up 19%.

Martinsdale Reservoir - Netting surveys indicate suckers outnumber trout about 10 to 1. This is an increase over data collected in 1975 and 1976 when the ratio of suckers to trout was about 2 to 1. Trout continue to show relatively good growth and survival and fishing success has been good. Although the reservoir is a very popular fishing location access is a problem. The main road to the lake crosses the inlet canal over an old wooden bridge which needs to be replaced. Fishing at the reservoir is limited to those who walk in. Normally a large portion of the fishing is from boats.

Petrolia Reservoir - Netting surveys conducted in the fall of 1977 and the spring of 1978 indicate the walleye population is stable. The age structure of the population indicates natural reproduction is maintaining the species but the nearly equal ratio of young fish to old fish is not characteristic of a healthy population. Survival of young fish is apparently low. Several yellow perch from the 1975 introduction were taken in the traps. Perch netted in the spring of 1978 were ripe males. Two burbot from the 1973 introduction were also taken. These are the first burbot taken in the reservoir since 1974.

Smith River Reservoir - Netting surveys indicate growth and survival of planted trout continues to be low. Although 35,000 rainbow trout are stocked annually brook trout which enter the lake from two inlet streams made up 43% of the trout in the surveys. Suckers outnumber trout 30 to 1 in the surveys. The abundance of rough fish should provide good forage for burbot introduced into the reservoir in 1975. Several small burbot were taken in gill nets indicating the presence of adequate spawning conditions within the lake.

War Horse Reservoir - Low water levels coupled with extended heavy snow cover resulted in a major winter kill in the reservoir. After ice-out in the spring of 1978, carp and suckers were piled in windrows around the reservoir. Trap nets set in the spring of 1978 took only a handful of rough fish and no northern pike or bass.

Yellow Water Reservoir - Growth and survival of trout planted in the reservoir remained very good until the severe winter of 1977-78. Low water coupled with extended deep snow cover caused a heavy die-off of trout in the lake. Two gill nets set in the lake failed to capture any trout. Fishermen interviews confirmed the absence of trout. More recent information indicates that some large trout are still being taken from the lake.

Farm Ponds

Fourteen small ponds were netted during the report period and the

results are given in Table 2. Also included are netting results from several private ponds sampled at the landowners requests to determine the extent of winter fish kills. Low water levels coupled with deep snow cover of long duration resulted in oxygen depletion which killed fish in many of the local trout ponds. Conditions were severe enough to cause fish kills in several bass reservoirs. Melting of the deep snow pack and heavy spring rains provided enough run-off to fill nearly all the reservoirs within the study area including several where water levels have been declining for four or five years.

Ten BLM reservoirs and six private ponds were checked to determine whether they could support fish. As a result of these investigations, several ponds will be planted with fish.

Large mouth bass were planted in five reservoirs.

Streams

Big Spring Creek - Although no major flooding occurred along Big Spring Creek during 1977 and 1978, bank full flows were recorded for nearly a month. These abnormally high flows continued to cause considerable erosion and destruction of habitat along several areas of the stream. Erosion was excessive throughout much of the Tresch-County Farm properties inspite of an extensive 216 stream bank stabilization project completed in 1977. Erosion was common at both ends of riprap sections and even along densely vegetated stream banks. Apparently a very unstable stream gradient, meander pattern, velocity relationship still exists throughout much of the stream course.

Additional 216 emergency watershed protection funds are scheduled to be spent on three grade stabilization structures in 1978. These structures are designed to slow down the stream and thus reduce the erosive potential. Considerable time was spent monitoring and documenting the various stabilization projects and their ultimate affect upon the stream ecosystem.

Invertebrate bottom samples were collected from the nine established stations along Big Spring Creek and the results are given in Table 3. The total number of invertebrates collected from all stations was more than three times the total collected in 1975 and 1976 which was 2228 and 2193 respectively. The 1977 figure of 6886 even exceeds the number of organisms sampled during the years 1972 through 1974 which varied from 5300 to 6200. The unusually low number of organisms sampled at the station below the sewer outfall is the result of extensive channel distrubance from a 216 stream stabilization project.

Trout population estimates were made in two sections of Big Spring Creek in the fall of 1977. The results of these population estimates along with corresponding estimates from 1974 and 1976 are given in Table 4. Data for all three estimates was treated with the fish population statistics computer program.

Table 2. Results of sampling small ponds and reservoirs, 1977-78.

Pond (Year)	Number of Gill Nets	Species*	No. of Fish	Length Range-Inches (Average)	Weight Range-Pounds (Average)
Bell Reservoir (1977)	1	Rb CSU	7 121	11.4 - 13.9 (12.5)	0.42 - 0.97 (0.70)
Box Elder Reservoir (1978)	1	Rb	7	15.4 - 18.3 (17.1)	1.60 - 2.43 (2.03)
Breaks Reservoir (1977)	1	YP	55	-	-
Breaks Reservoir (1978)	1	YP	4	-	-
Buffalo Wallow Upper (1978)	1	0	0	-	-
Buffalo Wallow Lower (1978)	1	0	0	-	-
Carters Upper (1977)	1	Rb	48	7.0 - 10.2 (8.8)	0.14 - 0.59 (0.36)
Carters Lower (1977)	1	0	0	-	-
Carters Upper (1978)	2	0	0	-	-
Crooked Creek Reservoir (1978)	1	LMB	2	10.1 - 10.6 (10.3)	0.75 - 0.79 (0.77)
Dry Blood Reservoir (1978)	1	0	0	-	-
Hanson Creek Reservoir (1977)	1	Eb Rb	7 128	11.4 - 14.9 (13.2) 1977 Plants	0.56 - 1.56 (1.05)
Norman (Private (1977)	2	Rb	18	12.8 - 14.9 (13.8)	0.72 - 1.46 (1.03)
		Rb	7	17.8 - 21.0 (19.6)	2.79 - 4.75 (3.83)
	1	Rb	40	1977 Plants	-
		Rb	4	14.8 - 18.1 (16.7)	1.46 - 2.88 (1.97)
Volf Reservoir (1977)	1	Rb	14	7.0 - 13.1 (9.7)	0.12 - 0.78 (0.37)

* Species abbreviations: Rb - rainbow trout; Eb - brook trout; CSU - white sucker; YP - yellow perch;
LMB - largemouth bass

Table 3. Numbers and families of organisms collected in two one-square foot bottom samples from nine stations on Big Spring Creek and East Fork on July 27, 1977.

Organism	Hatchery	East Fork	Burleigh's	Montana Power	St. Leo's School	Above Sewer	Below Sewer	Trestle	Spring Creek Colony
Trichoptera									
Limnephilidae								7	
Bracycentridae	640	2	365	1285	200	202	3	29	10
Leptoceridae	155	1	25	324	91	165	9	39	
Rhyacophilidae	213		67	85	91	61	3	34	50
Hydropsychidae				1				463	132
Hydroptilidae		31		1		39		9	1
Psychomyiidae						1		1	
Gastropoda									
Planorbidae	1			1					
Physidae	5	1			1	5	1	8	
Diptera									
Tipulidae	12	8	26	123	20	107	2	96	11
Tendipedidae	12	11	2	5	2	21	10	147	86
Rhagionidae		9		1		3		8	11
Empididae	1	7	1	1		1	1		
Simuliidae						1			
Tricladida									
Planariidae	3				1	21	1		1
Ephemeroptera									
Baetidae	54	70	16	68	13	60	29	299	411
Heptageniidae	3	1	6	7	3				48
Plecoptera									
Perlodidae	3	1	1	14	2				4
Perlidae				2					
Nemouridae	2								
Annelida									
Oligochaeta					2				
Pelecypoda									
Sphaeriidae	1	1				1		3	
Coleoptera									
Elmidae	1	2	1		18	12		27	5
Hydracarina		9	1	20		12			
Odonata						12			
Gomphidae		2							
Station Totals -	1106	156	511	1938	454	712	59	1180	770
Org. No./Sq. Ft.	553	78	256	969	227	356	30	590	385
No. of Families	16	15	11	15	12	16	9	14	12
(Total 6886)									

Table 4. Summary of trout population estimates in two sections of Big Spring Creek over three years

Section	Year	Rainbow Trout		Brown Trout	
		No.	Weight (lbs.)	No.	Weight (lbs.)
B	1974	1165	524	100	148
	1976	450	263	65	89
	1977	702	297	82	110
	1978	563	224	60	93
D	1974	1268	568	243	195
	1976	567	376	149	128
	1977	1569	674	359	285
	1978	1550	526	381	215
	77	909	441	386	211

Section	Age Group	Rainbow Trout			Age Group	Brown Trout		
		1974	1976	1977		1974	1976	1977
B	I	537	1/	357	I-II	40	1/	14
	II	570	290	190	III&older	56	65	68
	III	48	125	140				
	IV&older	10	9	14				
D	I	639	182	1016	I	80	38	169
	II	551	124	323	II	104	33	73
	III	69	170	139	III	38	65	53
	IV&older	6	91	91	IV&older	21	13	64

1/ Sample size inadequate for estimate.

Rainbow trout estimates were up 56% in section B and 178% in section D when compared to estimates from 1976. Brown trout estimates were up 26% in section B and 141% in section D. Total weight for both species in both sections also increased but not as dramatically as total numbers indicating an increase in small fish. This becomes even clearer if we look at the age structure of fish populations from both sections. The major increase for both sections was in age group I. Rainbow trout in age group I increased from numbers too few to estimate to 357 in section B and from 182 to 1016 in section D between 1976 and 1977 estimates. In some instances a decrease in estimates for age groups II, III, IV and older fish took place from 1976 to 1977.

Spawning conditions during 1976 were good with stream flows moderate to low during the spawning and incubation period. Another factor favorably influencing fish populations was the relatively high aquatic invertebrate numbers discussed earlier. These two factors resulted in good recruitment into the trout population for 1977. Surprisingly the extensive 216 stream-bank stabilization project which was completed during 1977 throughout portions of section D did not have a noticeable adverse affect upon trout populations.

Lost Fork - Erosion transects were measured along the Lost Fork of the Judith River and photos were taken at established photo points. The amount of bank erosion in cubic yards measured in 1978 was only 11% at one site and 37% at the other site when compared to measurements made in 1977. Cattle were grazed in the pasture where the two transects are located during August and September of 1977. The pasture is scheduled to be deferred from livestock grazing during 1978. A new transect was established in addition to the two established in 1968.

Rainbow and cutthroat trout populations were sampled with hook and line in the Lost Fork and several of its tributaries and additional sampling is planned for 1978 and 1979. Habitat conditions and watershed problems were documented with photos along most of the Lost Fork to its confluence with the Middle Fork.

Missouri River - Limited sampling was done in the Missouri River immediately upstream from Fort Peck Reservoir. Spring flooding which washed out boat launching areas and silted in river bottoms hampered sampling. High spring flows coupled with the unusual timing of fish movements made sampling difficult. Game fish collected were tagged with individually numbered tags and the data was transferred to the Middle Missouri River Planning Project (Berg 1975).

Literature Cited

- Berg, Rod. 1975. Middle Missouri River Planning Project, Montana Department of Fish and Game. Job Progress Report, Federal Aid in Fish and Wildlife Restoration Acts. Montana Project No. FW-3-R-4 Job 1-a.
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- Vincent, Richard. 1971. River Electrofishing and Fish Population Estimates. Progressive Fish-Culturist, Vol. 33, No. 3 pp. 163-169.
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Code numbers of waters referred to in this report are:

16-0300 Big Spring Creek Sec. 01
16-0310 Big Spring Creek Sec. 02
16-2140 Lost Fork Judith River
16-2520 Missouri River Sec. 06
16-4300 Ackley Lake
16-4620 Carters Pond Upper
16-4620 Carters Pond Lower
16-4950 East Fork Spring Creek Reservoir
16-5095 Crooked Creek Dam
16-5535 Hanson Creek Reservoir
16-7286 Norman Pond
16-8703 Volf Reservoir
17-9616 Smith River Reservoir
18-7165 Bell Pond
18-7220 Box Elder Creek Reservoir
18-7340 Buffalo Wallow Reservoir Upper
18-7341 Buffalo Wallow Reservoir Lower
18-7565 Dry Blood Reservoir
18-7750 Bair Reservoir
18-8380 Martinsdale Reservoir
18-8720 Petrolia Reservoir
18-9440 War Horse Reservoir
18-9500 Yellow Water Reservoir