MONTANA DEPARTMENT OF FISH AND GAME
FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana

Project No.: F-5-R-25 Title: Central Montana Fisheries Study

Job No.: I-a Title: Inventory and Survey of Waters in The Western Half of Region Four

Period Covered: July 1, 1975 to June 30, 1976

ABSTRACT

Inventory surveys were conducted on a total of 32 waters during the report period. Population trends, age and growth, and reproduction information was gathered in reservoirs containing burbot, northern pike and walleye. Burbot were tagged in Tiber Reservoir. Survival of stocked rainbow trout was good in all lakes studied with the exception of Bynum Reservoir. Fishing pressure estimates are presented for Holter Reservoir. Rainbow trout stocked in Eureka Reservoir and Bean Lake were divided into two plants about three weeks apart. Approximately ten percent of the plant for each water was fin clipped. Netting observations indicate the later plants to have better survival. Kokanee populations in Bynum and Pishkun Reservoirs were studied with fish as large as 3.5 pounds taken during the spawning run at Pishkun Reservoir. Rainbow trout population dynamics are presented from an experimental pond. Several farm ponds were inspected and recommendations made for management. An evaluation of a catchable rainbow trout plant was conducted on the Marias River below Tiber Dam. Preliminary data was collected on fish in the forks of the Sun River in relation to the new two-fish limit. Trout population estimates were collected in two sections of the Smith River. Survey electrofishing was conducted on Beaver Creek, a tributary of the Missouri River.

OBJECTIVES AND DEGREE OF ATTAINMENT

The long term objectives of this job are to inventory and survey waters of value or potential value for fisheries management in the western half of the North Central Region of Montana. Specific objectives in 1975-76 were:

1. To collect inventory data to evaluate walleye introductions, northern pike and walleye reproduction, survival and growth of rainbow trout and kokanee salmon, and to obtain trend information on burbot populations in the following reservoirs: Tiber, Frances, Pishkun, Willow Creek, Eureka, Bynum, Nilan and Bean Lake. Fishermen use was to be estimated on lower Holter Reservoir. This work was done and data are included in this report.

2. To inventory and survey new ranch ponds and ponds presently on the management program for water levels, fish growth and survival. This work was done and data are included in this report.

3. The following streams were to be studied to evaluate fishery management plans, habitat conditions and biological communities: Beaver Creek, Teton River, Muddy Creek, North and South Forks of the Sun River and the Smith River. Data are included for the streams above with the exception of the Teton River and Muddy Creek. Sampling of these waters was discouraged due to turbidity and high flows.

4. Minimum flow requirements for maintenance of aquatic life were to be investigated on the Smith River and Belt Creek. Field data was collected and computorized, however evaluation of the data for recommending minimum flows have not been made. These recommendations will appear after guidelines for interim streamflow criteria for aquatic life are developed.

PROCEDURES

Fish were sampled by a 50 foot seine (¼-inch square mesh), 6 by 125 foot experimental gill nets (3/4 to 2-inch square mesh), 8 by 300 foot gill nets (1½ to 1 3/4-inch square mesh), 3 by 4 foot and 4 by 6 foot frame net traps (¼, ½ and 1-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. Growth rates of fish were back calculated from scale readings assuming a straight line relationship with the intercept at zero.

ACCOMPLISHMENTS

Lakes and Reservoirs

Gill net summaries for the lakes inventoried are presented in Table 1.

Table 1. Gill net summary of lakes and reservoirs, 1975.

Area (Date Sampled)	Surface Acres	No. of Nets	Species*	No. of Fish	Length Range (Average)	Weight Range (Average)
Bynum Res. (July 17, Sept. 19)	4,120	4	Rb	14	11.9-14.5(13.2)	0.61-1.04(0.78)
			KOK	4	8.7- 9.5(9.2)	0.24-0.32(0.28)
			KOK	2	11.1-12.1(11.6)	0.47-0.69(0.58)
			KOK	4	14.0-15.5(14.5)	0.94-1.33(1.06)
			Wf	3	12.9-13.6(13.4)	0.87-1.11(1.02)
			WSu	42	7.7-16.3(13.8)	0.14-1.90(1.09)

Table 1. continued.

Area (Date Sampled)	Surface Acres	No. of Nets	Species*	No. of Fish	Length Range (Average)	Weight Range (Average)
Eureka Res. (Sept. 17)	408	2	Rb	22	8.6-10.6(9.6)	0.22-0.49(0.34)
			Rb	2	18.1-18.3(18.2)	2.12-2.35(2.24)
			WSu	17	7.0-15.0(11.5)	0.15-1.60(0.85)
			LnSu	10	12.4-16.2(15.6)	0.66-1.77(1.58)
Eyraud Lake (Aug. 27)	170	2	NP	1	(10.0)	(0.21)
			NP	6	13.6-17.0(15.4)	0.50-1.14(0.90)
			NP	2	21.0-22.3(21.7)	2.22-2.66(2.44)
			YP	25	5.2- 8.2(6.2)	0.06-0.31(0.13)
			YP	13	10.6-13.2(12.4)	0.80-1.46(1.17)
			WSu	1	(16.8)	(2.50)
Fitzpatrick Lake (July 3)	75	2	Rb	36	5.6- 8.2(6.8)	0.08-0.28(0.15)
			Rb	2	15.1-16.0(15.6)	1.75-2.02(1.89)
Lake Frances (Sept. 23)	5,500	3	YP	1	(4.9)	(0.06)
			NP	1	(9.5)	(0.19)
			NP	9	20.3-22.7(21.3)	2.01-2.94(2.43)
Nilan Res. (Aug. 19)	500	1	Rb	29	8.2-10.2(9.3)	0.21-0.41(0.31)
			Rb	4	15.4-18.0(16.3)	1.30-2.31(1.69)
			WSu	13	7.2-13.2(8.0)	0.22-1.37(0.35)
Pishkun Res. (Aug. 6)	1,550	6	KOK	2	10.5-11.4(11.0)	0.41-0.61(0.51)
			KOK	2	14.3-18.3(16.3)	1.14-2.30(1.72)
			Rb	2	18.1-22.7(20.4)	2.17-3.47(2.82)
			NP	1	(35.5)	(13+)
			YP	2	5.0- 5.5(5.3)	0.05-0.08(0.07)
			WSu	18	6.6-19.7(16.9)	0.13-3.80(2.32)
Tiber Res. (Oct. 7)	13,000	9	WE	56	14.2-17.9(15.7)	0.96-2.25(1.52)
			WE	2	19.0-19.5(19.3)	2.80-3.49(3.15)
			NP	41	11.3-15.3(13.3)	0.33-0.93(0.61)
			NP	23	20.6-23.7(21.8)	2.27-3.53(2.87)
			NP	1	(32.0)	(10+)
			Rb	14	16.1-20.3(18.6)	1.60-3.10(2.48)
			Ling	5	16.5-25.5(20.1)	1.20-5.20(2.47)
			YP	50		
			WSu	88		
			LnSu	1		
			Carp	3		
Willow Crk. Res. (Aug. 19)	1,530	2	Rb	24	8.1- 9.7(9.0)	0.21-0.35(0.27)
			Rb	3	13.3-14.6(14.1)	0.81-1.02(0.92)
			WSu	86	6.3-16.6(11.9)	0.14-1.95(0.87)

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

Survival of Rainbow Trout Plants - In the past few years, survival of planted rainbow trout has been poor in some of the lakes in the area (Hill, 1975). Several of the lakes were surveyed to determine growth and survival of the 1975 plant (Table 1). Adequate numbers of planted trout were recaptured in all lakes except Bynum Reservoir. None of the 1975 plant were taken in gill nets in this reservoir on two sampling dates and only one was collected in trap nets. Poor growth and survival of rainbow trout in Bynum Reservoir may be attributed to competition with kokanee as reported in previous studies (Hill, 1975).

It is felt that survival of rainbow trout plants are related to stocking dates, with better survival expected at later dates. To obtain information on this subject, approximately 10 percent (10,000) of the rainbow trout plant for Eureka Reservoir were marked with an adipose fin clip. The plant was divided in half, 50,000 planted on April 5 and 50,000 on April 28, with the marked fish being stocked on the latter date. Gill nets and trap nets were fished on five occasions throughout the summer and nets were placed in as near to the same locality as possible for comparison purposes. A total of 152 planted fish were collected and 25 percent were marked. These results indicate the latter stocking date experience better survival.

Bynum Reservoir -In addition to data already presented for this reservoir, information was gathered on kokanee. A total of 10 kokanee were taken in gill nets (Table 1) and scale analysis indicates the following growth patterns for ages I, II and III: 4.4; 9.4 and 11.8 inches, respectively. Additional data was collected on mature kokanee during the snagging season. Sixty males averaged 15.0 inches (range 12.6-16.8) and 1.13 pounds (range 0.58-1.50) while 42 females averaged 15.1 inches (range 13.0-16.5) and 1.09 pounds (0.64-1.31). Otolith analysis indicates mature kokanee represented by age classes II+ and III+ (Table 2).

Table 2. Age class and length range of mature kokanee from Bynum Reservoir, November 1975.

	Age Class	Number	Length Range (Average)
Male	II+	18	13.3-16.0 (14.6)
	III+	5	12.8-16.7 (15.6)
Female	II+	6	13.7-15.9 (14.7)
	III+	8	14.4-16.5 (15.7)

Eyraud Lake - Sampling efforts were directed at determining growth and year class strength of yellow perch and northern pike. Gill net summaries are presented in Table 1. Trap nets were fished during May and scale samples were collected from yellow perch and northern pike. Average growth in inches for each year of life for yellow perch is as follows: I-2.8; II-5.4; III-7.5; IV-9.3; V-10.8; VI-11.7 and VII-12.9. Northern pike growth is presented in Table 3 and serves as a comparison with northern pike from other lakes.

Table 3. Comparison of northern pike growth from four lakes, 1975.

Area	No. of Fish	Avg. total length at each year of life					
		I	II	III	IV	V	VI
Eyraud Lake	29	8.3	13.7	17.7	20.0	21.3	
Lake Frances	104	7.6	13.3	17.7	20.3	21.8	23.6
Pishkun Res.	18	7.2	14.4	19.8	22.9	26.0	28.6
Tiber Res.	28	13.5	24.0	28.7	30.8		

Lake Frances - Three trap nets were fished overnight on May 14, 1975 and collected 544 northern pike, 1 walleye, 1 yellow perch and 190 white sucker.

Measurements indicated 176 female northern pike averaged 21.7 inches total length (range 17.1-28.3) while 368 males averaged 20.6 inches range (16.9-23.8). A total of 104 scale samples (55 females, 49 males) from northern pike were analyzed. Female growth is slightly better than males but overall growth is lower than surrounding lakes (Table 3).

Water levels were low in 1973 and 1974 and northern pike reproduction has been limited. However, Lake Frances filled to capacity during spring runoff in 1975. During trapping in May, 49 percent of the female northern pike were ripe (eggs flowed freely) and reproductive potential was high due to the newly flooded areas.

The limit on northern pike will be increased from three to five fish in Region Four beginning with the 1976 fishing season. One reason for the increase is the poor growth rates which are attributed to a lack of forage fishes (mainly yellow perch) and also the high density of the northern pike population. Growth rates are expected to improve with the increased water levels if there is a corresponding increase in forage fish numbers. Growth rates may increase also due to the small number of age class 0 northern pike produced in 1973 and 1974, leaving more forage available for the older age classes.

Gill net surveys conducted in September are summarized in Table 1. Reproduction of yellow perch and northern pike was visually observed by boating through vegetated areas. Both species were observed in most areas checked. Seining and trap netting produced negative results.

Fishermen returned nine tags during 1975 from northern pike tagged in previous years. Accumulative tag returns for fish tagged in 1971, 1972 and 1973 are 21.4, 11.9 and 11.0 percent, respectively.

Pishkun Reservoir - A total of 10 trap net days during May captured 22 northern pike, 4 rainbow trout and 105 white sucker. Scales were analyzed from 18 northern pike and are compared with other area lakes (Table 3).

Gill net surveys of August are summarized in Table 1. During November and December, kokanee concentrated near the inlet to Pishkun and were available to snag fishermen. Kokanee measured during this run are the largest sampled since this species was introduced into the lake. Ages, lengths and weights of mature kokanee are presented in Table 4. Otolith determinations reveal all females analyzed were III+ while most males were III+ and some were II+. Under normal operations, no water flows into Pishkun when the kokanee are congregated. A request to maintain a minimum flow in the inlet during the spawning season will be made to the Greenfields Irrigation District. Flowing water should attract more fish for a longer period of time.

Table 4. Age composition (from otoliths), lengths and weights of mature kokanee, Pishkun Reservoir, 1975.

	Age Class	Number	Length Range (Avg)	Weight Range (Avg)
Male	II+	5	15.4-16.4 (15.9)	1.24-1.72 (1.52)
	III+	24	18.4-21.4 (19.8)	2.21-3.54 (2.86)
Female	III+	24	17.0-19.2 (18.1)	1.79-2.60 (2.17)

Tiber Reservoir - To obtain trend information on burbot, northern pike, walleye and other species in Tiber Reservoir, surveys were conducted as follows: 34 trap net days in April; 9 gill net days and 8 trap net days in October; and 139 set line days in January, 1976.

A total of 368 burbot were collected in April with 240 of these being transferred to North Fork Smith River near White Sulphur. The remaining 128 were tagged to learn more about this species which was recently named a game fish. These fish averaged 22.6 inches total length (range 14.7-31.6). To date, one burbot tag has been returned from a fish that moved approximately eight miles from the tagging site. In January, 1976, a total of 139 set lines were fished at 9 locations in the reservoir to obtain additional burbot for tagging purposes. No burbot were caught and may be directly related to the tremendous availability of forage fishes to be discussed later. The burbot population in the reservoir may also be on a downward trend.

Walleye fry were introduced into Tiber Reservoir annually from 1971 through 1974. Natural reproduction may have occured in 1975. A total of 266 walleye were collected in trap nets in April. Males averaged 15.0 inches (range 12.1-17.1) and females averaged 14.8 inches (range 11.9-19.1). Scale analysis of 52 walleye reveal average growth in inches for each year of life as follows: I-6.4; II-12.3; III-15.4 and IV-17.4. Additional walleye were collected in the fall netting (Table 1). Future surveys will determine whether or not natural reproduction is occurring.

A total of 62 northern pike were taken during spring surveys and scale analysis reveals very good growth as compared to surrounding waters (Table 3). This exceptional growth is attributed to the availability of forage fish. Large numbers of small yellow perch, carp, suckers and emerald shiner were taken in small mesh trap nets in October. Gill netting in October indicated substantial reproduction of northern pike. Scale analysis of 25 northern pike ranging in length from 11.3-15.3 inches were all aged as young-of-the-year fish and again point to very good growth.

To increase angling interest and fishing success for walleye and northern pike, live bait will be legal in Tiber Reservoir beginning with the 1976 fishing season.

Holter Reservoir - This reservoir is located on the Missouri River about 60 miles south of Great Falls, Montana. It receives the heaviest fishing pressure of any lentic environment in the Region. A car counter was employed to help estimate the number of fishermen utilizing the north access to the reservoir. There are two other access areas to the lake, however the north access receives the heaviest use since public facilities are well developed in this area. Pressure estimates from May through November, 1975 are presented in Table 5.

Table 5. Visitor use to north access on Holter Reservoir, May 1 to November 25, 1975.

Month	Fishermen	Others
May	6201	6790
June	4439	4857
July	6884	7539
August	4486	4913
September	2583	2829
October	2057	2257
November	1700	1867
Totals	28350	31052

Since fishing at all hours is allowed during open fishing seasons, the Department has received several complaints regarding all night fishing on Holter Reservoir. The primary complaint received was that night fishermen were catching all the fish and taking over limits.

Close surveillance of the area by enforcement personnel did not reveal unusual numbers of anglers taking overlimits of fish. Night fishing with the aid of artifical light, however, did prove to be effective for catching fish.

In conjunction with evaluating fishermen per vehicle for car counter data, anglers were asked their opinion regarding night fishing. From a total of 517 anglers interviewed throughout the summer, 43% answered they were in favor of night fishing, 31% were against and 26% had no opinion. This information was the basis for leaving the all hour regulation in effect. Holter Reservoir was apparently the only body of water in the State where night fishing was of concern to a number of anglers. Very few complaints have been received recently on this issue which would indicate that the regulation is acceptable.

Bean Lake - Poor survival of rainbow trout stocked in Bean Lake in 1974 prompted a study to evaluate survival of trout in respect to stocking dates. Approximately 75,000 rainbow trout were stocked in the spring of 1975, with 38% of these planted immediately after ice out and the remainder or second plant made about three weeks later. A total of 10,000 trout were marked by clipping the adipose fin in the second plant (13.3% of the 75,000 planted).

The trout population was checked with gill nets in fall 1975 and again in spring 1976. A chi-square comparison of the ratio of marked to unmarked fish caught in nets, with the marked:unmarked ratio when planted, revealed a higher than expected proportion of marked fish in the spring gillnetting (Table 6). It appears that both lots of fish experience good survival since large numbers of trout were collected in the gill nets. Further study needs to be done to evaluate spring stocking before definite conclusions can be made.

Table 6. Results of evaluation of survival of two lots of rainbow trout stocked in Bean Lake, 1975.

Stocking date	Number	Size	% Marked
May 15	28,980	5"	None
June 2 & 3	46,250	4"	13.3 of total
Total	75,230		

Netting date	Number of Nets	Catch/ net	%Marked fish in sample
Sept. 22, 1975	3	64	16.7*
April 15, 1976	2	72	20.8**

* Proportion of marked fish not significantly different from expected.
** Proportion of marked fish significantly different from expected at 95% confidence level.

Bowman Pond - A large number of rainbow trout are stocked in the Regions lakes and reservoirs each year. These waters provide excellent fishing opportunity but fail to offer any trophy sized fish from planted stocks. Nearly all rainbow trout observed in netting and creel census work were stocked within the last two year program period. The following theories may explain the lack of older trout in the populations:

1. Selective breeding of our brood trout may have genetically altered the fishes ability to live long in the wild;
2. Anglers remove nearly all the surviving fish after they have been exposed to two years of angling pressure;
3. Population densities control the number of older fish in a body of water.

Fingerling rainbow trout were stocked in a small farm pond to determine year to year natural mortality and longevity. A total of 491 4-inch trout were planted in the pond on June 2, 1972. The pond is 0.6 surface acres with a maximumdepth of 20 feet. The littoral zone represented a very small area of the pond. No fishing was permitted in the pond, although some poaching may have occurred.

The trout population was estimated in the spring each year by trap netting fish for marking and about a week later a recapture sample was collected with gill nets. The results from 1973 to 1976 are presented in Table 7.

Table 7. Population dynamics of one lot of hatchery reared rainbow trout stocked in a small Montana pond.

Year	Age of fish	Number theoretically available	Population estimate	Mortality (percent) Each year	Total	Length range of Fish (inches)	Average weight (Pounds)
1973	I	491	362(±130)	26.3	26.3	6.7-11.6	0.36
1974	II	316[1]	218(± 82)	31.0	55.6	10.9-16.1	0.83
1975	III	172[1]	75(± 22)	56.4	84.7	12.3-16.1	1.25
1976	IV	53[1]	7[2]	86.8	98.6	16.5-19.4	2.73

1/ Adjusted from previous years estimate to allow for mortality caused by gill netting.

2/ Number of dead fish found after rotenone treatment

Results from this experiment revealed nearly 56% natural mortality of trout two years after introduction into the pond. Mortality jumped to nearly 85% after three years. This increase in mortality may have been caused from fish flushing over the spillway during high runoff in the spring of 1975. Erosion scars on the spillway revealed the water was over one foot in depth, but the period of time this flow occurred is not known. Some water also flowed over the spillway in the spring of 1976. The fact that trout were found in the pond after four years tends to discount the longevity theory.

If the results of this study can be applied to other lakes and reservoirs in Region 4, over half of the fish planted in these waters die from natural causes within two years. Angling pressure and success data for popular stocked waters indicate angler harvest is high enough to account for most of the remaining fish.

Low population density results in larger and older fish. Between the third and fourth year, the trout in Bowman Pond gained an average of about 1.5 pounds, which is over double the weight gained in the first three years. Therefore, if we are expected to provide a trophy fishery, stocking densities will have to be drastically reduced. Most anglers are satisfied with the quality of fishing now provided by our management programs. Those anglers desiring to catch trophy fish do so in those few waters where large fish are naturally found.

Small Lakes and Farm Ponds

A total of 15 farm ponds were surveyed to determine depth and water quality in relation to management as fish ponds. Eight public and two private ponds were too shallow for management. Five others were filled from spring runoff and were recommended for stocking with rainbow trout. These include Myrvold, Stephens #1, Stephens #2, Loch (all previously managed) and Chester Ponds (a new pond).

Two mountain lakes, Hidden and Renshaw, were sampled by hook and line. Both lakes contain yellowstone cutthroat trout.

Streams

Data collected by electrofishing and hook and line surveys is presented in Table 8. In addition, information is presented on the Marias, Sun and Smith Rivers.

Table 8. Streams surveyed by electrofishing and hook and line, 1975.

Stream and Location	Date	Species*	No.	Length Range (Avg)	Weight Range (Avg)
Deep Creek	9-16-75	Eb	4	8.3-12.7 (10.7)	0.22-1.00 (0.62)
T23N-R8W-Sec26		Eb	1	(16.9)	(2.25)
		Rb	2	6.0- 8.1 (7.1)	0.09-0.19 (0.14)
		Ct	1	(11.7)	(0.65)
Elk Creek	7-8-75	Ct	2	11.8-15.3 (13.6)	0.54-0.99 (0.77)
T18N-R7W-Sec6		Rb	4	4.6-10.9 (6.0)	0.03-0.39 (0.13)
		Eb	21	3.5- 7.8 (5.5)	0.02-0.15 (0.07)
Ford Creek	7-8-75	Eb	5	3.8- 8.1 (5.6)	0.02-0.23 (0.09)
T19N-R9W-Sec15					
No.Fk.Sun River	8-11-75	Eb	2	7.1- 9.3 (8.2)	
Mouth-Cabin Ck.	to	Ct	7	7.4-12.9 (11.0)	
	8-13-75	RbXCt	5	9.7-12.1 (10.9)	
		Rb	68	5.7-16.9 (10.9)	
So.Fk.Sun River		Eb	14	5.8-10.5 (7.7)	
Mouth-Pretty Prairie		Ct	1	(12.7)	
	8-11-75	RbXCt	8	6.6-17.7 (11.5)	
to	8-13-75	Rb	59	6.0-17.3 (11.4)	

* Species abbreviations: Eb-brook trout; Rb-rainbow trout; Ct-cutthroat trout; RbXCt-rainbow-cutthroat hybrid.

Marias River - A periodic creel census was conducted on the Marias River below Tiber Dam to evaluate the catchable-sized rainbow trout plant. Approximately 3,000 catchables have been planted annually in recent years. A total of 203 fishermen caught 2 catchable trout in 440 hours along with 10 wild trout. Because of low numbers of catchables returned to the creel and the existence of a wild trout fishery, it is recommended the Marias River plant be discontinued.

An interesting sidelight to the catchable evaluation was that a walleye fishery developed below Tiber Dam during the summer of 1975. The walleye presumably came through the outlet works of Tiber Dam and represent fish stocked in the reservoir. Two age classes of walleye were caught, one about 11-13 inches in length and another 15-16 inches in length. A total of 269 walleye were caught during the creel census period. Other game species caught include sauger, northern pike and channel catfish. Non-game fish caught in order of abundance include goldeye, freshwater drum, smallmouth buffalo, carp and yellow perch. Table 9 is a breakdown of game fish caught, hours fished and number of fishermen.

Table 9. Marias River creel census below Tiber Dam, 1975.

No. of Fishermen	Hours Fished	HRb	Rb	We	Sauger	NP	Catfish
203	440	2	10	269	11	2	1

Game Fish/man: 1.45
Game Fish/hr.: 0.67

Species abbreviations: HRb-Hatchery rainbow trout; Rb-wild rainbow trout; WE-walleye; NP-northern pike.

Sun River - Beginning with the 1975 fishing season, a two-fish trout limit was imposed on the forks of the Sun River above Gibson Reservoir, to attempt to increase the size of the fish. The area lies within the Bob Marshall Wilderness Area and is accessible by foot or horseback only. Because of the wilderness designation, fish sampling was done by hook and line. Two two-man crews sampled fish in the North and South Forks of the Sun River from August 11-13, 1975 (Table 8).

Sampled fish were examined for general body condition, total lengths measured and scales samples secured. Similar surveys will be conducted in the future to determine changes, if any, brought about by the new regulation. Species collected include brook trout, cutthroat trout, rainbow-cutthroat hybrids and rainbow trout. Since rainbow trout were taken in highest numbers, scale analysis is presented for this species only (Table 10). Growth is somewhat better in the South Fork than the North Fork.

Table 10. Calculated growth (in inches) of rainbow trout from the forks of the Sun River, August, 1975.

	Age Group	No. of Fish	Average total length at each year of life I	II	III	IV	V
North Fork Sun River	I	6	4.4				
	II	11	3.7	7.0			
	III	30	3.8	7.2	9.7		
	IV	15	3.2	5.9	9.5	12.0	
	V	2	2.9	6.4	9.3	12.1	13.6
Averages		64	3.6	6.8	9.6	12.0	13.6
South Fork Sun River	I	5	4.4				
	II	9	4.0	7.6			
	III	12	3.9	7.1	9.8		
	IV	12	3.9	6.9	10.3	12.9	
Averages		38	4.0	7.1	10.1	12.9	

Table 11. Trout population estimates from Zieg Section on the Smith River, September 1975.

Species	Age	Length Range (in)	Number	Weight (lbs)
Rainbow Trout	I	5.3 - 7.7	314	31.6
	II	7.2 - 12.4	550	144.8
	III	9.7 - 13.3	365	180.5
	IV (and older)	11.2 - 15.4	136	99.9
			1365 (±190)	456.8 (±81)
Brown Trout	I	5.9 - 8.0	ONLY 4 CAPTURED 1/	
	II	9.5 - 14.6	36	26.9
	III	14.7 - 16.6	54	74.7
	IV (and older)	16.1 - 23.0	24	49.4
			114 (±29)	151.0 (±43)
Grand Total (Table 11)			1479	607.8
Standing crop per 1,000 feet			138	56.6
Standing crop per acre			71	29.1

1/ Not included in estimates.

Smith River - Trout population estimates were conducted on two sections of river and survey shocking was conducted on another section. This work was done primarily to obtain population data in conjunction with evaluating the effects of a two fish limit on rainbow and/or cutthroat trout. This special limit became effective at the beginning of the 1975-76 fishing season on the Smith River from its mouth to the mouth of Sheep Creek. Population data from two river sections is presented in Tables 11 and 12. The Zieg Section lies within the area where the reduced limit is in effect and the Straugh Section is upstream in the portion of river where the normal limit of 10 trout or 10 pounds and one trout is in effect.

Population data compared with that collected in 1969 (Wipperman, 1973) reveals nearly a 60% increase in trout numbers in the Zieg Section. This increase was largely due to an increase in numbers of two year old and older rainbow trout. Growth rates were similar between the two sampling periods, however, the condition factor (C) is poor for larger rainbow trout. For example, C for all 13-inch rainbow trout captured in 1969 was 34.8, while in 1975 the C was only 30.0.

The standing population in the Straugh Section decreased nearly 11% when compared with the 1969 data. This decline was almost entirely due to fewer numbers of brook trout. This section also showed an increase of 2 year old and older rainbow trout and brown trout although there were fewer yearlings in the estimate than in 1969.

Survey shocking was conducted in the Fraunhoffer Section, a considerable distance downstream from the Zieg Section. Time did not allow a population estimate in this section of river. The overall numbers of rainbow trout captured did not reveal individual specimens any larger than those collected in 1970 (Wipperman, 1973). The C for 13 and 14 inch rainbow trout was about 35, or similar to the C noted in 1970.

Table 12. Trout population estimates from Straugh (Loney) Section on the Smith River, September 1975.

Species	Age	Length Range (in)	Number	Weight (lbs)
Rainbow Trout	I	5.8 - 9.8	162	26.4
	II	7.0 - 11.4	115	40.8
	III	10.3 - 13.6	45	26.7
	IV (and older)	11.8 - 16.8	77	66.1
			399 (±60)	160.0 (±19)
Brown Trout	I	6.2 - 9.1	59	12.3
	II	9.6 - 13.9	100	63.7
	III	12.4 - 16.6	94	127.0
	IV (and older)	15.7 - 22.6	61	131.4
			314 (±36)	334.4 (±47)
Brook Trout	I - III	6.5 - 11.9	32 (±15)	11.0 (±5)
Grand Total			745	505.4
Standing Crop per 1000 feet			88	59.9
Standing Crop per acre			87	59.0

It is premature to determine if the reduced limit is enhancing the rainbow trout population. One variable that may make this determination difficult is that catchable-sized rainbow trout plants were discontinued in the river in 1974. The elimination of the catchable program in other Montana streams has been documented as beneficial to wild trout populations.

The poor condition factor of rainbow trout in the Smith River may be due to a poor food supply or competition for food with other species. A tremendous mountain whitefish population exists in the Smith River. More work should be done to determine what the forage base is in this river.

Flow Reservation-Smith River drainage.

The Montana Water Use Act of 1973 provides that fish, wildlife and recreation are a beneficial use of water. It also provides that water can be reserved in streams and lakes for fish and wildlife and procedures are established for accomplishing this. In order to submit applications for reservation of water, information to justify our requests should be substantiated with field data revealing what flows are necessary to maintain healthy sport and game fish populations.

Water surface profile and flow measurements were made on the Smith River and several tributary streams during the summer of 1975. These measurements were made by following guidelines prepared by Spence (1975) in conjunction with the Bureau of Reclamation. A total of 3 sections were measured on the Smith River, 2 Sections on Sheep Creek and 1 Section each on Birch, Moose, Rock and Tenderfoot Creeks. The data was processed by computor analysis, however, the results have not been evaluated for recommending minimum flows for fish. We feel more refinement is needed in the technique before specific flow recommendations can be made. When available, these recommendations will appear in a later report.

Beaver Creek - This stream drains an area of about 75 square miles of which nearly all is National Forest land. It flows into the Missouri River about two miles below Hauser Dam in Lewis and Clark County. In 1974, the Forest Service purchased a private ranch along the lower six miles of the stream.

Historically, Beaver Creek has suffered severe habitat destruction from human activities. Channel encroachment for roads, pipeline crossings, rechanneling and dewatering are all noted on the stream. A department survey in 1973 revealed 24% of the streams 13.9 mile length had been altered for reasons mentioned above. The lower two miles of Beaver Creek have gone dry seasonally from irrigation use the past several years prior to purchase by the Forest Service.

Fish populations were surveyed in five stream sections in late September, 1975. This data is presented in Table 13. Other than trout, mottled sculpin was the only other fish species collected.

Table 13. Results of electrofishing survey on Beaver Creek, September 1975.

Section and Location	Section Length (feet)	Species of Fish	Number	Length Range (inches)
1 T12N,R2W,S20B	385	Rainbow Trout	84(15)*	1.7 - 12.4
		Brown Trout	11(8)	3.1 - 12.2
2 T12N,R2W,S21C	382	Rainbow Trout	17(0)	2.0 - 5.8
		Brown Trout	15(14)	4.7 - 11.2
3 T12N,R2W,S11C	350	Rainbow Trout	13(3)	4.1 - 11.8
		Brown Trout	21(19)	5.5 - 15.0
		Brook Trout	2(0)	4.9 - 5.3
4 T12N,R5W,S32D	344	Rainbow Trout**	35(8)	3.1 - 10.7
		Cutthroat Trout	7(5)	4.9 - 8.0
		Brown Trout	1(1)	14.7
		Brook Trout	2(1)	5.7 - 6.1
5 T13N,R1W,S23C	305	Rainbow Trout	3(0)	3.8 - 5.9
		Cutthroat Trout	13(1)	2.8 - 7.2
		Rainbow Trout X Cutthroat Trout	21(2)	3.6 - 9.0
		Brook Trout	11(6)	2.8 - 11.0

* Number of fish in sample greater than 6 inches in length.

** Includes four Rainbow-Cutthroat trout hybrids.

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Wipperman, A.H. 1973. Smith River Drainage Inventory and Planning Investigation. Section I. Fisheries Inventory and Plan. Montana Department of Fish and Game. FW-1-R-3, Job I-a.

Prepared By: William J. Hill and Al Wipperman

Date: June 30, 1976

Code numbers of waters referred to in this report are:

14-1320	Deep Creek
14-3240	Marias River
14-6840	Eyraud Lake
14-7080	Bynum Reservoir
14-7140	Chester Pond
14-7320	Eureka Reservoir
14-7370	Fitzpatrick Lake
14-7440	Lake Frances
14-8060	Loch Pond
14-8250	Myrvold Pond
14-8440	Hidden Lake
14-9080	Stephens #1
14-9081	Stephens #2
14-9240	Tiber Reservoir
17-0496	Beaver Creek
17-0720	Birch Creek
17-5056	Moose Creek
17-6224	Rock Creek
17-6544	Sheep Creek
17-6832	Smith River
17-7536	Tenderfoot Creek
17-8720	Bean Lake
17-8771	Bowman Pond
17-9136	Holter Reservoir
20-2000	Elk Creek
20-2150	Ford Creek
20-4400	No. Fk. Sun River
20-5600	So. Fk. Sun River
20-7900	Nilan Reservoir
20-7950	Pishkun Reservoir
20-8000	Renshaw Lake
20-8500	Willow Creek Reservoir

MONTANA DEPARTMENT OF FISH AND GAME
FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana

Project No.: F-5-R-25 Title: Central Montana Fisheries Study

Job No.: I-b Title: Inventory and Survey of Waters in the Eastern Half of Region Four

Period Covered: July 1, 1975 to June 30, 1976

ABSTRACT

Netting surveys were conducted on 24 ponds and reservoirs throughout the Central Montana study area. Black crappies, yellow perch and largemouth bass were collected and transplanted into four reservoirs. Flood damage from a hundred year flood on Big Spring Creek was documented. Bottom samples were collected from established stations along Big Spring Creek and East Fork Spring Creek. The East Fork Spring Creek above the dam was chemically treated to remove undesirable fish. A summary of trout population estimates for two sections of Big Spring Creek electrofished in 1974 is included. Limited netting surveys were conducted on the Missouri River above Fort Peck Reservoir. Electrofishing inventory data was collected on five streams within the study area. A summary of electrofishing data collected over a three year period on the North Fork of Flatwillow Creek is included. Twice as many trout were found above and below an area sprayed to kill willows as were found within the sprayed area.

OBJECTIVES AND DEGREE OF ATTAINMENT

The objectives of this job were:

1. To inventory and survey ponds and reservoirs with a fisheries potential in the eastern half of North Central Montana. This was done for a number of ponds and the findings are included.

2. To inventory and resurvey six of the seven large reservoirs in the study area. All seven of the large reservoirs were resurveyed since Yellow Water Reservoir filled with water and was stocked with trout. Findings from these surveys are included. Fishermen use figures were collected for Ackley Lake as planned.

3. To conduct fish species and distribution inventories and to evaluate various sampling gear in portions of the Missouri River. A limited amount of this work was done and the findings are included.

4. To survey and evaluate fishery management plans, habitat conditions and biological communities in various streams. This work was done for several streams and the findings are included.

5. To determine minimum flow requirements for maintenance of aquatic life in Big Spring Creek. This work was not done on Big Spring Creek but instead was done on the Smith River and several of its tributaries.

PROCEDURES

Fish were sampled with floating and sinking nylon gill nets, 125x6-foot (with graduated mesh sizes from 3/4 to 2-inch); 4x6-foot frame net traps ($\frac{1}{2}$ and 1-inch mesh); 3x4-foot frame net traps $\frac{1}{4}$-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 and weighed to the nearest hundredth of a pound. Scales were collected for age and growth analysis. Bottom samples in streams were collected with a Surber sampler. Population estimates for Big Spring Creek were made using the mark and recapture method described by Vincent (1971). Electrofishing on other streams consisted of making one pass through each section without the use of blocking nets. With the exception of Warm Spring Creek, these other streams were all small, having flows less than 5 cfs. Reservoir rehabilitation was done with rotenone base fish toxicant.

ACCOMPLISHMENTS

Large Reservoirs

All seven of the larger Department of Natural Resources reservoirs in the Central Montana study area were surveyed in 1975 and 1976, and the results are given in Table 1. Following several years of drought, spring rains and heavy snowpack resulted in adequate runoff to fill all the large reservoirs. A brief summary of the findings in these reservoirs follows:

Ackley Lake - Since rehabilitation of Ackley Lake in 1973, the fishing has been very good. The lake has been excellent fishing year around. To estimate summer fishing pressure, a car counter installed from May 15, 1975 to November 23, 1975 tallied 5,617 vehicles. Interview data revealed an average of 1.8 anglers per

Table 1. Summary of netting surveys conducted in large lakes and reservoirs.

Location (Date Sampled)	Surface Acres	No. of Nets	** Species	No. of Fish	Length Range (Average)	Weight Range (Average)
Ackley Lake (June 9-10, 1975)	247	2	Rb	41	10.6-13.3(12.3)	0.46-0.92(0.67)
			Rb	15	1975 Plants	
			WF	1	8.9	0.24
			FSu	8	--	--
			CSu	2	--	--
Creel Census (Feb. 13, 1976)			Rb	20	10.3-15.3(12.4)	0.41-1.26(0.76)
(May 10,11, 1976)		2	Rb	55	11.2-14.9(12.8)	0.53-1.35(0.80)
			WF	4	8.1-10.9(8.9)	0.15-0.64(0.28)
			FSu	8	--	--
			CSu	1	--	--
Bair Reservoir (Aug. 19, 1975)	272	2	Rb	5	8.8- 9.8(9.3)	0.26-0.36(0.30)
			Eb	1	10.7	0.40
			CSu	148	--	--
Martinsdale Res. (Aug. 20-21, 1975)	985	3	Rb	55	7.2-16.6(10.8)	0.16-1.67(0.62)
			LL	4	8.7-16.8(14.4)	0.28-2.02(1.33)
			CSu	150	--	--
			FSu	13	--	--
Petrolia Reservoir (May 16-19, 1975)	515	4*	Walleye	28	9.8-26.2(14.1)	0.26-6.05(1.12)
			BH	8	7.2- 9.3(8.4)	0.23-0.49(0.35)
			Carp	320	--	--
			CSu	16	--	--
(Nov. 4-8, 1975)		4*	Walleye	11	9.1-14.6(10.1)	0.20-0.98(0.34)
			Carp	1	--	--
			CSu	39	--	--
(March 29-31, 1976)		4*	Walleye	8	9.7-23.9(15.5)	0.23-4.04(1.54)
			Carp	17	--	--
			CSu	6	--	--
Smith River Res. (Aug. 19, 1975)	327	2	Rb	3	8.6-14.3(10.5)	0.20-1.03(0.49)
			WF	2	8.6-10.8(9.7)	0.24-0.47(0.35)

Table 1. Continued.

Location (Date Sampled)	Surface Acres	No. of Nets	** Species	No. of Fish	Length Range (Average)	Weight Range (Average)
War Horse Res. (May 13-16, 1975)	1000	4*	BH	9	6.3-12.8(9.9)	0.13-0.96(0.52)
			NP	54	All Adults	
			LMB	3	8.6-9.5 (9.1)	0.30-0.44(0.36)
			Carp	1462	--	--
			CSu	338	--	--
(Sept. 16-17, 1975)		3*	LMB	1	11.0	0.70
			Carp	23	--	--
			CSu	21	--	--
(March 31-Apr. 2, 1976)		4*	NP	3	Adults	
			Carp	43	--	--
			CSu	36	--	--
			CSu, Carp, Minnow Sp.	3000	1.0- 3.0	--
Yellow Water Res. (Oct. 15-16, 1975)	600	2	Rb	55	9.8-13.8(12.1)	0.40-1.18(0.83)
			CSu	12	--	--

* Trap Nets

** Species Abbreviations: Rb-rainbow trout; FSu-longnose sucker; CSu-white sucker; NP-northern pike; BH-black bullhead; LMB-largemouth bass; Eb-brook trout; WF-mountain whitefish; LL-brown trout.

vehicle. Pressure estimates revealed 10,111 anglers for the period. In addition, the lake supported a substantial number of winter fishermen. Netting in the lake the past two years showed that trout outnumber rough fish over 5 to 1 and this ratio has not changed for two years. It appears that the high trout population may be inhibiting rough fish.

Bair Reservoir - Netting in Bair Reservoir indicates that rough fish populations have again built up to undesirable levels. Suckers outnumbered trout 25 to 1. The introduction of a large predator species such as burbot would be desirable to utilize rough fish and establish a natural sport fishery.

Martinsdale Reservoir - Following rehabilitation of the reservoir in 1973, growth and survival of trout in the lake has improved. In spite of a relatively high rough fish population, the trout are doing well and fishing has been good for the past two years. An added bonus to the creel are occasional brown trout which gain access to the reservoir via the inlet canal. Several brown trout over ten pounds were caught during 1975 and 1976.

Petrolia Reservoir - Trap netting in Petrolia during 1975 and 1976 failed to capture any burbot from an introduction made in 1973. No burbot have been netted in the reservoir since the spring of 1974 when 65 adults were trap netted and released. The walleye population appears to have stabilized at a relatively low level. Yellow perch were introduced into the lake during 1975 because it appeared the lack of forage fish was a limiting factor to walleye and burbot.

Smith River Reservoir - Netting indicates rainbow trout have not done particularly well in Smith River Reservoir since it was rehabed in 1974. Burbot were introduced into the reservoir in 1975 to help control rough fish and to establish a burbot fishery.

War Horse Reservoir - War Horse filled with water during the spring of 1975 following several years of progressively declining water levels. With the improved water levels fish production should improve considerably. Netting during 1975 and 1976 failed to take any northern pike other than adults from the original introduction made in 1973. No evidence has been found to indicate northern pike have spawned successfully. Largemouth bass and black bullhead populations are low but should increase rapidly if water levels remain favorable.

Yellow Water Reservoir - Yellow Water filled up during the spring of 1975 following several years of extreme drought during which the lake level had continued to decline. Sampling in 1974 indicated that survival of planted trout had dropped to zero. Netting in 1975 confirms that growth and survival of rainbow trout

stocked after the reservoir filled has been very good. Fishing was only fair during the winter months but improved after ice out this spring. The lake will continue to be stocked with trout as long as water levels remain adequate.

Plans for the remainder of 1976 include netting and occasional creel checks in Smith River, Bair, Martinsdale and Yellow Water Reservoirs to check growth and survival of stocked rainbow trout and abundance of undesirable fish. Additional sampling is also planned on War Horse and Petrolia to monitor the success of introductions.

Farm Ponds

Fourteen farm ponds stocked by the Department of Fish and Game were netted. The results are given in Table 2. Also included are the findings from creel checks on two ponds.

Nineteen BLM reservoirs and nine private ponds were checked to determine if they could support fish. Based on findings from these investigations several ponds were added to our planting program. In addition, largemouth bass were introduced into two ponds, black crappies into one and yellow perch into one pond.

Ponds and reservoirs stocked by the state should be netted every two to three years as a check on present management. Occasional creel checks on the more important ponds provide information about fishing pressure, fishing success and harvest useful for management purposes.

Streams

Big Spring Creek - Heavy rains combined with melting snow caused flooding of major proportions in central Montana. Local SCS officials estimated the flood was near 100-year intensity. Peak flows estimated at 2200 cfs in Big Spring Creek caused tremendous amounts of bank erosion along the stream. More bank erosion occurred during 1975 than in the previous 20 years combined. Particularly hard hit was the Satran property located immediately upstream from the area channelized in 1961. One SCS engineer estimated between 15,000 - 20,000 cubic yards of material were removed from this one area alone. Major deposition problems occurred downstream where the channel was completely filled with gravel and fine sediments. This caused the stream to flow over its banks across productive bottomlands. Nearly $600,000.00 worth of 216 emergency watershed protection funds are scheduled

Table 2. Results of sampling done in small ponds and reservoirs.

Pond (Year)	No. of Nets	Species[1]	No. Fish	Length Range (Average)	Weight Range (Average)
Bell (1975)	1	Eb	1	16.1	1.96
		CSu	151	--	--
Bell (1976)	1	CSu	81	--	--
Berg (1975)	1	Eb	7	10.3-13.2(11.6)	0.46-0.93(0.69)
		Rb	14	8.6-14.2(11.9)	0.25-1.09(0.74)
Box Elder (1975)	1	Rb	15	10.0-17.0(11.8)	0.51-2.17(0.85)
Buffalo Wallow (1976)	1	Ct	11	18.1-21.0(19.7)	2.92-4.02(3.52)
		Rb	6	14.0-15.8(15.3)	1.27-2.12(1.75)
C-1 (1975)	1	Rb	15	11.4-14.4(12.9)	0.69-1.38(1.06)
Upper Carter (1975)	2	Rb	35	12.7-18.7(15.5)	0.88-4.00(1.94)
		Rb	50	1975 Plants	--
East Fork (1975)	2	Eb	3	8.7-14.3(10.7)	0.30-1.35(0.65)
		CSu,FSu	73	--	--
East Fork (1976)	2	CSu,FSu	12	--	--
Hassler (1976)	2	--	0	--	--
Kovacich (1975)	1	--	0	--	--
Lipke (1975)	2	Rb	4	11.1-17.0(14.4)	0.63-2.26(1.34)
Norman (1975)	1	Rb	12	12.9-20.9(16.5)	0.90-3.16(1.74)
		Rb	4	1975 Plants	--
Peterson (1975)	1	Rb	1	7.9	0.22
Rindal (1975)	Creel Check	Rb	28	11.5-16.6(13.4)	0.69-1.99(1.10)
Snapp (1975)	1	Rb	1	6.7	0.11
Volf (1975)	Creel Check	Rb	14	8.4-13.6(11.2)	0.20-1.00(0.55)

[1] Rb-rainbow trout; FSu-longnose sucker; CSu-white sucker; Eb-brook trout; Ct-cutthroat trout

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 3, 1975.

Organism	Hatchery	East Fork	Burleigh's	Montana Power	St. Leo School	Above Sewer	Below Sewer	Trestle	Colony
Tricoptera									
Brachycentridae	18	1	114	74	153	114	14	6	
Leptoceridae	22		670	299	113	99	57		1
Rhyacophilidae	32		21						
Helicopsychidae	1								
Hydropsychidae	1		1			4	1	20	
Limnephilidae			1						
Gastropoda									
Planorbidae	2	3	42	4		1	1		
Physidae	2		27	1	1		1		
Spaeriidae		1	3		1	2	1		
Diptera									
Tipulidae	1		4					2	3
Tabanidae	1								
Tendipedidae	10		3		1	3	1		
Rhagionidae		5	1				1	1	
Empididae					2				
Tricladida									
Planariidae	1								
Coleoptera									
Elmidae	1		1				1		
Haliplidae			2						
Ephemeroptera									
Baetidae	37	38	26		14	26	18	28	9
Heptageniidae	3				1	2		8	5
Plecoptera									
Perlidae	1		1						
Perlodidae		1			3	6	1	5	1
Annelida									
Oligochaeta			1			18			
Station Totals	133	49	918	378	289	275	97	70	19
Avg. No./Sq. Ft.	66	24	459	189	144	137	48	35	9
No. of Families	15	6	16	4	9	10	11	7	5

to be spent along Big Spring Creek to repair flood damage. Plans call for construction of several drop structures, channel dredging, riprapping, bank shaping, diking and re-vegetating. Considerable time was spent during 1975 documenting and monitoring flooding and flood damage along Big Spring Creek and its major tributaries. Much of this work was related to damage which occurred as the result of a major channel alteration made in 1961.

Invertebrate bottom samples were collected from the nine established stations along Big Spring Creek and East Fork Spring Creek. The results are given in Table 3. When comparing the samples taken in 1975 to those taken in previous years, the most striking point was the low numbers of organisms in the 1975 samples. This was probably due to bottom scouring caused by the 1975 flood. It appeared that flooding was particularly destructive to case-building caddis flies.

The Big Spring Creek Watershed Project progressed on schedule during 1975. Hanson Creek and East Fork Spring Creek dams have been completed and Casino Creek Dam is nearly finished. Bids were recently accepted for the dam on Pike Creek. During November 1975, prior to the final filling of East Fork Spring Creek Dam, several miles of tributaries and the exposed pre-poundment stream channel were treated with rotenone base fish toxicant to remove undesirable fish. Netting in the reservoir during 1976 confirms that a total rough fish kill was not achieved but they were greatly reduced. Both East Fork Spring Creek Dam and Hanson Creek Dam are now on the fish planting program.

1974 Population Estimates

As mentioned in Job Progress Report F-5-R-24, a more detailed analysis of trout population estimates for two sections of Big Spring Creek would be given in this report.

Trout population estimates were made on two sections of Big Spring Creek in the fall of 1974. Marcoux (1968) referred to these two sections as section B and D. Section B is located upstream from Lewistown below the mouth of East Fork Spring Creek and section D is located downstream from town near the outfall of the primary sewage treatment plant. The primary purpose of this work was to monitor wild trout populations following the discontinuation of stocking catchable-sized rainbow trout after 1973 and also to determine affects of a year-around fishing season.

Throughout this report trout populations estimated for 1974 are compared to trout populations estimated in 1968. A comparison is made using total numbers and total weight of rainbow and brown trout within each section and a comparison is made using number estimates broken down by age classes. This data is given in Table 4. The 1968 population estimates were calculated by hand, while the 1974 data was treated through a fish population statistics computer program.

Table 4. Summary of trout population estimates in two sections of Big Spring Creek, 1968 and 1974.

Trout Species	Year	Total number per section: Section B	Section D
Rainbow	1968	784	1,059
Rainbow	1974	1,165	1,268
Brown	1968	182	426
Brown	1974	100	243
	Total weight per section (pounds)		
Rainbow	1968	383	432
Rainbow	1974	524	568
Brown	1968	175	234
Brown	1974	148	195

Age Group	Total number per section: 1968	1974
	Section B - Rainbow trout	
I	225	536
II	338	570
III	209	48
IV & older	12	10
	Brown Trout	
I & II	45	40
III & older	138	56
	Section D - Rainbow trout	
I	333	639
II	503	551
III	184	69
IV & older	39	6
	Brown Trout	
I	100	80
II	208	103
III	83	38
IV & older	35	21

A comparison of the data from the two years shows the total number of rainbow trout increased in both sections, approximately 49% in section B and only slightly in section D. A significant increase is shown in the number of rainbow trout in age groups I and II and a decrease in age groups III and IV for both sections. In 1974 we found more rainbow trout in Spring Creek, but the average age and size had declined when compared to 1968 data.

Brown trout numbers decreased approximately 50% in both sections. This decrease is reflected in all age groups of brown trout. Even though total numbers decreased by about 50% in each section, total weight of brown trout per section only decreased by about 15%, indicating an increase in the average weight of individual brown trout.

If we look at the combined estimated total number and weight of trout in the stream we find an increase in both sections over 1968. It appears that a decrease in brown trout numbers has been compensated for by an increase in rainbow trout numbers. If we speculate about the possible effect to the wild trout population of opening the stream to year around fishing and removing the catchable plant, it appears that neither action has had an adverse effect. We plan to make population estimates on the same two sections again in 1976.

Missouri River - Because of a growing interest in Montana's water for industrial and agricultural development, the prospect of additional dams being constructed on the Missouri River system appears more likely. Relatively little is known about the fishery resources in the last free-flowing stretch of the river. As part of an attempt to gather some baseline fisheries information, limited sampling was done during 1975 and 1976. The results are given in Table 5. This work was directed toward evaluating various sampling techniques, determining species composition and distribution and gathering life history information. Sampling during 1975 was only attempted in the spring because of unusually high water throughout most of the summer months. In addition to netting, assistance was given Region Six on a paddlefish creel census and tagging study on the river. Data collected was transferred to Region Six.

It appears that the free-flowing river and Fort Peck Reservoir are both important links in the life history of certain species of fish. Backwater areas along the river appear to be important for spawning to bigmouth and smallmouth buffalo, northern pike, blue suckers and carp. Plans for 1976 include limited additional sampling during the summer and fall.

Table 5. Results of netting done in the Missouri River.

Date (Year)	No. of Nets	Species**	No. of Fish	Length Range (Average)	Weight Range (Average)
April 22-23 24-25 (1975)	4*	Sa	26	9.5-20.5(13.6)	0.26-2.53(0.80)
		Ling	28	15.4-27.7(22.4)	0.71-5.90(2.78)
		NP	3	31.1-41.0(36.0)	4.73-18.10(11.50)
		BMB	17	26.9-33.0(30.0)	11.50-23.00(16.70)
		SMB	8	20.9-25.8(22.9)	4.20-10.10(6.28)
		Carp Su	12	--	--
		GE	74	--	--
		CSu	3	--	--
		Carp	20	--	--
		B CR	1	--	--
		YP	1	--	--
June 6&7 (1975)	3*	Sa	4	10.4-14.9(12.3)	0.30-0.80(0.52)
		Carp	13	--	--
		CSu	2	--	--
		GE	22	--	--
		BH	2	--	--
April 7-8 (1976)	4*	Sa	37	7.3-18.7(12.4)	0.10-2.12(0.66)
		Ling	1	22.2-22.9(22.6)	1.64-2.68(2.16)
		NP	8	22.9-38.0(31.6)	2.90-14.00(7.98)
		YP	3	6.1- 6.3(6.2)	0.10-0.19(0.14)
		B CR	2	5.2- 9.6(7.4)	0.09-0.50(0.30)
		Carp Su	19	--	--
		Carp	19	--	--
		GE	32	--	--
		S Cat	1	--	--
		BMB	2	--	--
		CSu	4	--	--
April 13-14 (1976)	3*	Sa	26	7.1-19.7(12.6)	0.09-2.50(0.65)
		NP	8	15.9-39.0(26.6)	0.93-12.05(4.88)
		YP	2	5.7- 8.0(6.8)	0.10-0.20(0.15)
		B CR	2	9.0- 9.9(9.5)	0.36-0.55(0.45)
		SMB	4	--	--
		Drum	19	--	--
		Carp	4	--	--
		Red Su	5	--	--
		Carp Su	10	--	--
		CSu	2	--	--
		GE	6	--	--
May 12-13 & 14 (1976)	2*	Sa	22	11.6-20.2(17.8)	0.37-2.20(0.99)
		NP	10	23.5-37.1(28.7)	3.04-13.10(5.92)

Table 5. Continued.

Date (Year)	No. of Nets	Species**	No. of Fish	Length Range (Average)	Weight Range (Average)
		B CR	4	5.4-11.5(9.23)	0.11-1.02(0.60)
		B Su	4	27.6-29.3(28.4)	5.75-6.50(6.13)
		SMB	171	--	--
		BMB	46	--	--
		GE	69	--	--
		Carp	20	--	--
		Red Su	4	--	--
		C Cat	1	--	--
		Carp Su	2	--	--
		Drum	15	--	--

* Trap Nets

** Species Abbreviations: Sa-sauger; NP-northern pike; BMB-bigmouth buffalo; SMB-smallmouth buffalo; Carp Su-river carpsucker; GE-goldeye; B CR-black crappie; YP-yellow perch; BH-black bullhead; S Cat-stonecat; Red Su-Redhorse sucker; B Su-blue sucker; C Cat-channel catfish.

North Fork of Flatwillow Creek - Fish populations along the North Fork of Flatwillow Creek around an area sprayed with 2-4-D to kill willows were sampled again during 1975. This study was initiated in 1973 (Poore 1973, 1974) to check fish populations in an area with greatly reduced cover to areas above and below where cover was essentially natural. The results from the three years of sampling are summarized in Table 6. Because of considerable variation between sections and between species for different sampling years, the most reliable figures for comparison are probably the combined total number of trout sampled in each section for the three years. Using these figures for the 3 years combined, about twice as many trout were found in the sections above and below as were found in the section in the sprayed area.

Probably of even more importance than fish numbers was the accelerated erosion that occurred where the willows were destroyed. Measurements from stakes placed at several locations showed that up to 10 feet of erosion occurred during high water in 1975. It appears that any potential for gaining grazing land through willow removal along streams is far outweighed by the potential for loss of productive bottomland soils through accelerated erosion.

Table 6. Summary of electrofishing results from three sections on the North Fork of Flatwillow Creek during 1973, 1974 and 1975.

(1975) Species	Section #1 1,000' Above Sprayed Total	Under 6"	Section #2 1,000' Sprayed Total	Under 6"	Section #3 400' Below Sprayed Total	Under 6"
Rainbow trout	16	0	7	2	4	0
Brook trout	28	5	17	2	49	4
Brown trout	3	2	1	1	2	1
Total trout	47		25		55	
(1974)						
Rainbow trout	12	3	16	5	7	0
brook trout	16	2	9	1	45	3
Brown trout	0	0	1	0	2	2
Total trout	28		26		54	
(1973)	(800')		(800')		(400')	
Rainbow trout	42	35	8	2	2	0
Brook trout	23	3	17	2	27	4
Brown trout	0	0	0	0	1	0
	73		26		29	
Total for 3 years						
Rainbow trout	70	38	31	9	13	0
Brook trout	67	10	43	5	121	11
Brown trout	3	2	2	1	5	3
Total trout	140		76		139	

Other Streams - Electrofishing data collected on other streams is summarized in Table 7. Electrofishing inventory data was collected from Deer Creek, a small tributary to Armells Creek. This small stream was reported to have a population of brook trout but none were collected.

Table 7. Summary of electrofishing data collected on streams during 1975.

Name of Stream	Length of Section	Date	Species	No. of Fish	Length Range (Average)
Deer Creek T18N, R19E, S22	400'	7/24/75	CSu, DA, Minnow sp.	Many	--
East Fk. Spring Creek T14N, R19E, S34	2000'	8/27/75	Rb	15	10.7-14.8(13.1)
			Eb	24	8.1-15.1(11.7)
			CSu, JSu, FSu	282	--
T15N, R19E, S34	3500'	8/28/75	Rb	34	7.5-18.7(11.9)
			Eb	1	10.7
			LL	1	20.5
			Ct	1	12.1
			CSu, JSu, FSu	238	--
Little Rock Creek T15N, R17E, S29	600'	7/22/75	Eb	4	9.1-11.5(10.1)
			Cot, DA, CSu	Many	--
Warm Spring Creek T17N, R17E, S16	6000'	8/30/75	Rb	40	5.3-15.2(8.9)
			SMB	1	10.7
			Sa	2	16.5-17.5(17.0)

* Species Abbreviations: CSu-white sucker; DA-longnose dace; Rb-rainbow trout; Eb-brook trout; JSu-mountain sucker; FSu-longnose sucker; LL-brown trout; Ct-cutthroat trout; Cot-sculpin; SMB-smallmouth bass; Sa-sauger.

Two sections below the new dam on the East Fork of Big Spring Creek were electrofished. This work was done to gather baseline fisheries information prior to stocking of East Fork Dam. A movement of hatchery fish from the dam down into the stream is anticipated once stocking begins.

Four short sections along Little Rock Creek were electrofished to check on the success of an introduction of brook trout made in

1973. One brook trout was taken in each location and all the fish were in good body condition. It appeared that the introduction was a success.

A mile long section of Warm Spring Creek was electrofished to check on the status of an introduction of smallmouth bass made in 1973. Only one smallmouth bass was taken from the section. It was felt that sampling efficiency was low due to inadequate gear for this type of stream. A number of unconfirmed reports have been received of fishermen catching bass from the stream.

Plans for 1976 include collecting survey and inventory data from tributaries of the upper Musselshell and Judith River drainages in order to evaluate aquatic communities and habitat conditions.

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Prepared By Al Wipperman

Date September 22, 1976

Code numbers of waters referred to in this report are:

16-0300	Big Spring Creek Sec. 01
16-0310	Big Spring Creek Sec. 02
16-1445	East Fork Spring Creek
16-2520	Missouri River Sec. 06
16-3040	Rock Creek
16-3920	Warm Spring Creek
16-4300	Ackley Lake
16-4620	Carter's Pond
16-4950	East Fork Spring Creek Reservoir
16-5535	Hanson Creek Reservoir
16-5720	Hassler Pond
16-6580	Lipke Pond
16-7286	Norman Pond
16-8340	Snapp Pond
16-8390	C-1 Pond
16-8703	Volf Pond
17-9616	Smith River Reservoir
18-4560	North Fork Flatwillow Creek
18-7165	Bell Pond
18-7180	Berg Pond
18-7340	Buffalo Wallow Reservoir
18-7720	Box Elder Reservoir
18-7750	Bair Reservoir
18-8110	Kovacich Pond
18-8380	Martinsdale Reservoir
18-8720	Petrolia Reservoir
18-8745	Peterson Pond
18-8840	Rindal Pond
18-9440	War Horse Reservoir
18-9500	Yellow Water Reservoir

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