MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

State: Montana

Project No.: F-36-R-1 Title: D-J Fisheries Restoration

Job No.: 1-a Title: Upper Missouri River System Fishery Improvement Project

Period Covered: July 1, 1985 through June 30, 1986

ABSTRACT

A long range fisheries research plan was developed for the Canyon Ferry - Hauser - Holter Reservoir complex. In association with this research plan, a program to mass mark all fish planted in the reservoir complex was adopted. Approximately 1,255,000 hatchery rainbow trout were spray marked with fluorescent pigment during the Spring, 1986. These fish also received a tetracycline dye mark. Approximately 200,000 additional rainbow trout were marked with an adipose fin clip.

Thirteen gill nets were set in Canyon Ferry Reservoir, 9 gill nets were set in Hauser Reservoir and 6 gill nets were set in Holter Reservoir during the Spring, 1986.

Creel censuses were conducted on 3 sections of the Missouri River during the Fall, 1985; from Toston to Toston Dam, in the Canyon Ferry delta, and in the Canyon Ferry tailrace. A winter creel census was conducted on Canyon Ferry Reservoir.

OBJECTIVES

1. To develop a long range fisheries research plan for the study area.

2. To evaluate impacts of existing reservoir operations on the sport fisheries.

3. To evaluate existing strains of rainbow trout planted in the reservoir system and to assess the potential for improvement of the fishery with introductions of new species and/or strains of fish.

4. To determine abundance, seasonal movement and distribution of reservoir fish.

5. To evaluate the escapement of rainbow trout from the reservoirs and document the conditions under which it occurs.

6. To determine angler catch statistics through a creel census and recreational user preference.

DEGREE OF ATTAINMENT

Progress was made on all objectives. This report details the research plan developed for the study area. Results from other study elements are also presented. However, these findings should be considered preliminary since intensive field work was initiated just prior to the report period deadline. Detailed results for each objective will be presented in future progress reports.

DESCRIPTION OF STUDY AREA AND METHODS

A description of the study area has been presented by Berg and Lere (1983) and Heaton (1959).

Fish were sampled with floating 6 x 125 foot experimental gill nets (3/4 to 2 inch mesh). Captured game fish were classified by species, measured to the nearest tenth of an inch in total length and weighed to the nearest hundredth of a pound. Samples of scales were taken for analyses of age and growth. Vertebrate were removed from all captured rainbow trout for examination of tetracyline dye marks. Stomach contents from all captured game fish, except mountain whitefish, were taken for analyses of food habits.

All of the approximately 955,000 rainbow trout (855,000 Arlee strain and 80,000 Desmet strain) planted in Canyon Ferry Reservoir and all of the approximately 300,000 rainbow trout (Arlee strain) planted in Holter Reservoir during 1986 were spray marked with fluorescent pigment. Techniques used in spray marking followed those described by Phinney and Mathews (1973) and Pribble (1976). In addition, all of the approximately 200,000 rainbow trout (Arlee strain) planted in Hauser Reservoir during 1986 were marked with an adipose fin clip.

Creel censuses were conducted on three sections of the Missouri River from late September through late November, 1985. The three areas included the section of river located between Toston Dam and Toston, the Canyon Ferry delta located near Townsend and the tailwater of Canyon Ferry Reservoir. The censuses were adapted from procedures presented by Neuhold and Lu (1957). Surveys were conducted on all weekend days, all holidays and two randomly selected weekdays. Starting times for angler counts were selected randomly without replacement within 2-week stata.

An additional partial creel survey was conducted on Canyon Ferry Reservoir from December 19 through March 12, 1986 to assess harvest by ice fisherman. This roving survey was conducted 2 days a week and included one weekend day and one week day. A roving creel survey, begun April 19, is currently ongoing on the Canyon Ferry - Hauser - Holter Reservoir complex. This survey is being conducted on all weekend days, all holidays and 2 randomly selected weekdays.

RESULTS

Long Term Study Plan

The following outline presents the elements of the long term study plan:

Objective I. Evaluate the impacts of existing reservoir operations on the sport fisheries.

A. Review historical operations of each reservoir. Where available, historical information on spill, water level fluctuations and retention will be summarized.

B. Determine rainbow trout escapement through the reservoir complex and correlate with operations. A mass marking program has been developed for all planted hatchery fish and will be used to identify strain of fish and reservoir where planted.

C. Evaluate effects of water level fluctuations in Canyon Ferry Reservoir on yellow perch reproduction. Spawning areas will be identified by searching for perch eggs with scrape type dredge nets during April and May. Horizontal gill nets will be placed in littoral zones during the spring to sample for adult spawners.

D. Evaluate effects of water level fluctuations on the invertebrate food supply of sport fish. Crustacean zooplankton are being sampled at 3 permanent stations establish on both Canyon Ferry Reservoir and Hauser Reservoir and at 2 permanent stations established on Holter Reservoir. Samples are being collected biweekly by making 45 foot vertical tows with a conical plankton net.

Objective II. Evaluate existing strains of rainbow trout planted in the reservoir complex.

A. Evaluate size of planted fish, number planted and timing of plants in relation to reservoir operations and availability of food (zooplankton).

B. Evaluate growth, catchability, food habits and survival of the different strains of rainbow trout planted in the reservoir complex. The different strains will be identified by mass marking with a combination of fluorescent pigment, fin clips, and tetracycline dye. Planted fish are being collected by creel census, gill nets, traps and electrofishing.

C. Evaluate extent of natural reproduction. Traps and electrofishing will be used to evaluate tributary recruitment of game fish into the reservoir complex. Mass marking will allow planted fish and wild fish to be separately identified when sampling in the reservoir complex.

Objective III. Determine abundance, seasonal movement and distribution of reservoir fish. Floating and sinking horizontal gill nets are being used to determine areal distribution of fish during the spring and fall. Distribution of fish by depth is being determined by setting vertical gill net monthly at permanent sampling stations and by hydroaccoustical sampling along gill net sets and along established transects. Seasonal movements will be determined by trapping and electrofishing tributaries and by electrofishing sections of the Missouri River. Selected samples of trout will be tagged with individually numbered Floy tags. Tag recoveries will be used to further evaluate movements of reservoir fish.

Objective IV. Determine angler effort, success and preference through a creel census. Creel censuses are being conducted annually on 3 sections of the Missouri River during the fall. These include the reach of river located between Toston and Toston Dam, the Canyon Ferry delta located near Townsend, and the tailwater of Canyon Ferry Reservoir. Also, a summer creel census is being conducted annually on the section of Missouri River located between Holter Dam and Craig. Partial creel surveys are being conducted annually on Canyon Ferry, Hauser and Holter Reservoirs during the summer and on Canyon Ferry Reservoir during the winter.

Fish Abundance and Distribution

A summary of horizontal gill net catches in Canyon Ferry, Hauser and Holter Reservoirs during the Spring, 1986 is presented in Table 1. Indices of abundance derived from gill net data are comparable only when sampling is done during similar times of the year since passive gear such as gill nets are highly dependent on the activity of fish for capture and, in turn, activity of fish is highly dependent on water temperature. Spring sampling in Canyon Ferry Reservoir was begun almost 2 months earlier than sampling in Holter Reservoir because time was needed to acquire appropriate equipment to begin this study. Since these sampling times were not similar, the catch data from gill netting should not be used to compare abundance of salmonids among the three reservoirs.

Rainbow trout dominated the catch of game fish in all three reservoirs during the Spring, 1986. Captured rainbow trout averaged 13.8, 13.6 and 15.1 inches in total length in Canyon Ferry, Hauser and Holter Reservoirs, respectively.

Table 1. Summary of horizontal gill net catches in Canyon Ferry, Hauser, and Holter Reservoirs during the Spring, 1986.

Reservoir	Reservoir Location	Date	Number of Nets	Number Captured: Rainbow Trout	Number Captured: Brown Trout	Number Captured: Kokanee	Total Number Per Net
Canyon Ferry	Upper	4-17-86	5	91	0	-	18.2
	Mid	4-28-86	5	149	22	-	34.2
	Lower	5-2-86	3	33	1	-	11.3
	TOTAL		13	273	23	-	22.8
Hauser	Upper	5-30-86	3	10	0	11	7.0
	Mid	6-3-86	3	13	0	1	4.7
	Lower	6-4-86	3	107	1	1	36.3
	TOTAL		9	130	1	13	16.0
Holter	Mid	6-6-86	3	20	0	1	7.0
	Lower	6-10-86	3	21	0	0	7.0
	TOTAL		6	41	0	1	7.0

Kokanee, captured in both Hauser and Holter Reservoirs, averaged 15.1 inches in total length. Walleye were captured only in Holter Reservoir. A total of eight walleye were collected. These fish averaged 17.9 inches in total length (Range 11.7 to 29.2 inches).

Since 1983, 10% of all rainbow trout (Arlee and Desmet strains) planted in Canyon Ferry Reservoir have been marked with a fin clip. Table 2 presents a summary of fin clipped rainbow trout captured in Canyon Ferry Reservoir during the Spring, 1986. Although the average stocking rate was similar for both strains over the past three years, fewer marked Desmet were captured in gill nets than marked Arlee. Apparently, the fall plants of Desmet have been less successful than the spring/summer plants of Arlee in Canyon Ferry Reservoir.

Table 2. The number and mean total length of fin clipped rainbow trout captured in Canyon Ferry Reservoir during the Spring, 1986.

Strain	Year Planted	Fin Clip	Number Captured	Mean Length (Inches)
Arlee	1983	Left Pelvic	1	18.0
	1984	Right Pelvic	2	17.0
	1985	Left Pelvic	13	13.2
Desmet	1983-1985	Adipose	8	13.6

Since 1984, all the McConaughy strain of rainbow trout planted in the section of Missouri River located immediately upstream from Holter Reservoir have been marked with a fin clip. Four of these marked fish, all planted in 1984, were captured in Holter Reservoir during the Spring, 1986. These captured fish averaged 15.5 inches in total length (Range 14.1 to 16.2 inches).

Angler Effort and Success

Preliminary results from creel censuses conducted on three sections of the Missouri River during the Fall, 1985 are presented in Table 3. In the Toston Dam area, anglers expended an estimated 3900 hours fishing and harvested an estimated 760 brown trout and 400 rainbow trout. Fishing pressure in the Canyon Ferry delta was estimated to total only 120 hours and fewer than 50 rainbow trout were harvested. In the Canyon Ferry tailwater, fishing pressure totaled 4000 hours and an estimated 2300 kokanee and 2100 rainbow trout were harvested.

Table 3. Summary of creel survey results collected by angler contacts on three sections of the Missouri River during the Fall, 1985

Area	Species	Number Caught Per Hour	Average Length (Inches)
Toston	Brown Trout	0.31	17.7
	Rainbow Trout	0.14	17.5
Canyon Ferry Delta	Rainbow Trout	0.11	-
Canyon Ferry Tailwater	Kokanee	0.63	19.3
	Rainbow Trout	0.69	12.3

A summary of creel survey results collected from ice fisherman on Canyon Ferry Reservoir during the winter, 1985-86 is presented in Table 4. Catch rates for rainbow trout during 1985-86 were similar to those obtained during 1983. In

contrast, catch rates for perch were almost 4.5 times greater during 1985-86 than during 1983.

Table 4. Creel survey results collected by angler contacts on Canyon Ferry Reservoir during the Winter, 1985-86 with comparable results collected during 1983.

	Catch per hour during 1985-86		Catch per hour during 1983[1]	
Month	Rainbow Trout	Yellow Perch	Rainbow Trout	Yellow Perch
December	0.12	3.9	0.20	1.9
January	0.10	2.9	0.13	0.9
February	0.14	3.5	0.14	1.1
March	0.07	7.7	0.10	0.06
Total	0.12	3.65	0.13	0.79

[1]From MDFWP Files

RECOMMENDATIONS

1. Work toward accomplishing all goals set forth in the long term study plan.

2. Continue mass marking all fish planted in the reservoir complex utilizing the marking scheme developed for 1986.

3. Evaluate kokanee life history and spawning characteristics in Hauser Reservoir to determine reasons for an apparent expansion of the population since accidental introductions occurred in 1978.

4. Evaluate walleye spawning characteristics in Holter Reservoir to determine causes of apparent low reproductive success.

Literature Cited

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Prepared by: Mark Lere

Date: August 15, 1986

Waters referred to:

Canyon Ferry Reservoir		17-8832
Hauser Reservoir		17-9056
Holter Reservoir		17-9136
Missouri River	Sec. 10A	17-4913
	Sec. 10B	17-4914
	Sec. 11	17-4928

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MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

JOB PROGRESS REPORT

State of: Montana
Project No.: FW-2-R-15 Title: Middle Missouri River Basin - Instream Flow Studies

Job No.: 1-B Title: Planning Inventory, Fisheries

Period Covered: July 1, 1985 through June 30, 1986

ABSTRACT

Fourteen WETP cross sections at five riffle sites were established in the upper Marias River. Measurements at high flows were taken at these locations. Sauger and shovelnose sturgeon spawning migrations were monitored in the lower Marias River during 1985 and 1986. Sauger catch rates averaged 14.4 fish per hour during spring 1986 and were only 50% of that reported for past years. The sturgeon catch rates during the spawning season were 18.8 and 1.5 fish per hour for 1985 and 1986, respectively, indicating that very few sturgeon migrated up the lower Marias during 1986. An inventory survey was conducted on the upper Marias River. Sportfish were found to be low in numbers with walleye being the most common sportfish.

OBJECTIVES

The overall objectives include completion of the lower Missouri River basin planning and inventory report and begin to assess instream flow requirements for fisheries in the middle Missouri River basin from Great Falls to Fort Peck Dam.

Specific objectives include the following:

1) To complete planning and inventory study report. This report is in the final editing stages and will appear under separate cover.

2) To establish and begin measuring WETP survey sites which will be used for determining instream flow requirements for fish in important streams. Fourteen cross-sections at five riffle sites were established in the upper Marias River. Measurements at high flows were taken at these locations.

3) To begin monitoring spawning migrations within the study area. This objective was initiated with the investigations in the upper and lower Marias River. Data is presented.

4) To begin surveying fish populations in streams within the study area. This objective was initiated with the investigations in the upper and lower Marias River. Data is presented.

5) Compile and assemble existing data concerning instream flow assessments for fisheries in the study area. Several streams were prioritized and assigned for study. Existing fisheries information was gathered using the department's data base files.

PROCEDURES

Instream Flow Studies

The wetted perimeter (WETP) hydraulic simulation computer program was employed to evaluate the instream flow necessary for maintenance of important fish habitat areas in streams. This program was described in detail by Nelson (1984). Using standard surveying techniques, water surface elevations at three discharges (high, medium and low) were measured with a level and rod. Channel profiles will be measured at low flow.

Electrofishing Apparatus

The electrofishing system used was adapted from the system described by Novotny and Priegal (1976). The electrofishing apparatus was mounted on a 14-foot aluminum McKenzie style driftboat powered by a 10 Hp outboard motor.

Power was supplied by a 3,500-watt AC generator. The alternating current was delivered to a Coffelt Model VVP-10 rectifying unit which changes the alternating current to pulsed on continuous direct current. The positive electrode consisted of two circular hoops with twelve 16-inch stainless steel droppers fastened on each hoops. These electrodes were supported by fiberglass booms and were positioned about six feet in front of the boat. The negative electrodes were five foot lengths of

flexible steel conduit; four suspended off each side of the boat. The unit was typically operated at 2-7 amps, 100-215 volts, 50% pulse width and a pulse frequency of 100 pulses per second.

Fish Sample Processing

Fish captured by electrofishing were measured to the nearest 0.1 inch and weighed to the nearest 0.01 pound. A catch per unit effort (CPUE) statistic was reported for relative comparisons. A CPUE is the number of fish caught per electrofishing hour.

INTRODUCTION

The Montana Water Use Act of 1973 provides that stream flow can be reserved for fish and wildlife resources. The reservation process involves submitting an application for documented instream flow needs to the Department of Natural Resources. This application is the minimum instream flow necessary to maintain a stream's fish and wildlife resources at acceptable levels. The applications and documentation for all streams with important fishery resources in the Missouri River Basin must be submitted by July 1, 1989. This study is involved with collecting pertinent fisheries field information which describes the value of a streams resource and quantifying and recommending instream flows which would maintain these resources.

DESCRIPTION OF STUDY AREA

The study area includes seven tributary streams in the middle Missouri River basin. The streams vary in size from average flows about 30 cfs for Shonkin Creek to 947 cfs for the Marias River (USGS 1982). These seven tributaries are labeled in Figure 1. Table 1 lists the tributary streams to the seven mainstem tributaries which will also be evaluated for possible inclusion in the instream flow study.

The Sun and Marias rivers are 106 and 170 miles in length, respectively, and drain a major portion of the East Front of the Continental Divide and the Lewis Range of Glacier National Park in northern Montana. Both drainages have a large run-off in spring and early summer and low base flows in summer. Substantial irrigation withdrawls further act to reduce the already poor base flows.

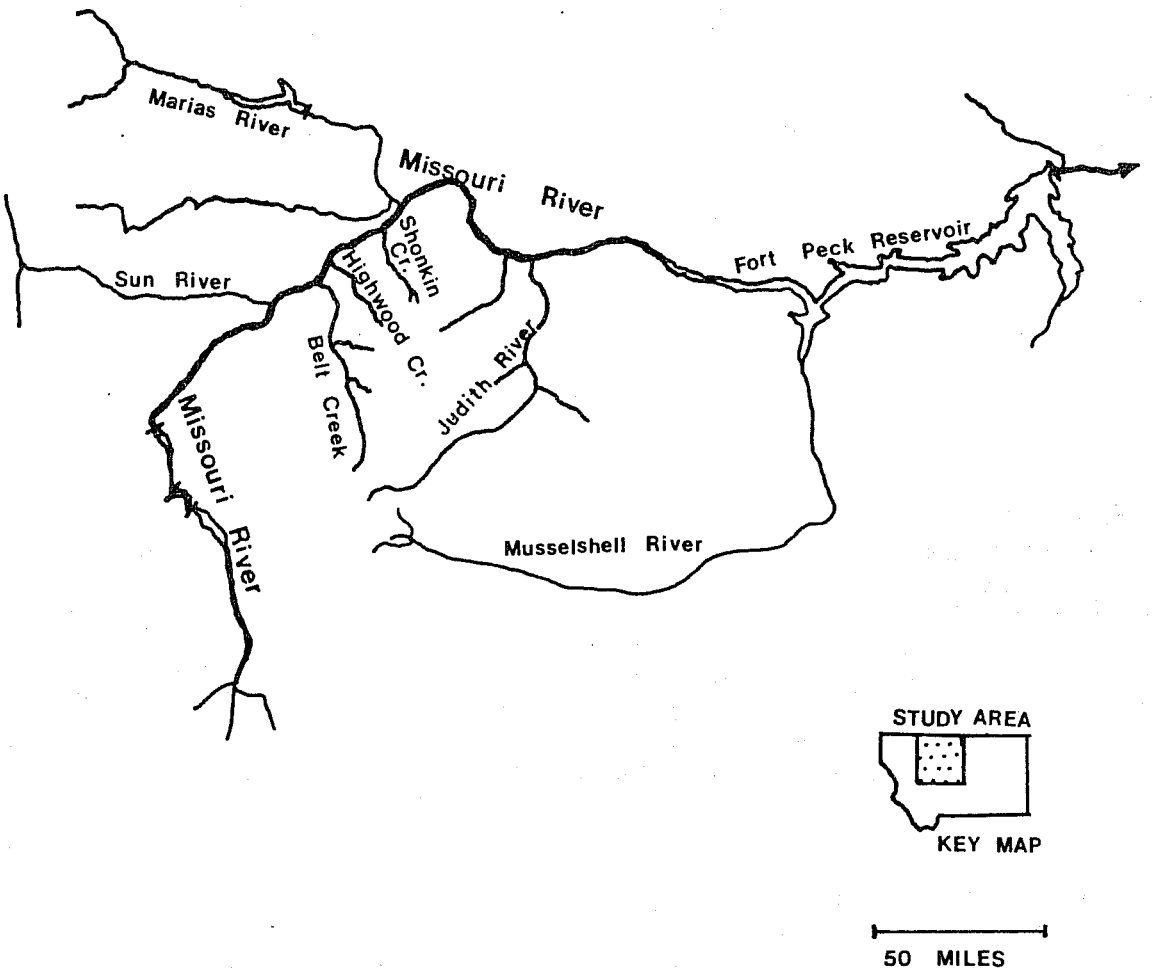

Figure 1. Map of the Study Area

Table 1. List of Streams which will be considered for minimum instream flow studies.

Sun River
Gibson Dam - Great Falls

Marias River
Two Medicine/Cutbank Confluence - Missouri River

Belt Creek
Headwaters to - Missouri River
Tillinghast Creek
Pilgrim Creek
Logging Creek
Big Otter Creek

Highwood Creek
Headwaters to - Missouri River

Shonkin Creek
Headwaters to - Missouri River

Judith River
Headwaters to - Missouri River
South Fork
Middle Fork
Lost Fork
Yogo Creek
East Fork of Big Spring Creek
Running Wolf Creek

Musselshell River (Tributaries Only)
South Fork
Alabaugh Creek
Bonanza Creek
Cottonwood Creek
North Fork
Checkerboard Creek
Flagstaff Creek
Spring Creek

Belt, Highwood and Shonkin creeks are 83, 29 and 40 miles in length, respective, and drain interior mountain ranges. They generally maintain adequate flows throughout the summer. The Judith River is 130 miles in length and drains interior mountain ranges. The upper half of this drainage usually becomes dewatered during the summer. The lower portion maintains a good base flow because of the contributions from Big Spring and Warm Spring creeks. Both streams have base flows of about 125 cfs. Only the upper portion of the 364 mile Musselshell River will be investigated for this study. The upper reach and large tributary streams which drain portions of the Little Belts, Castle and Crazy mountains, generally maintain fair flows during the summer.

FINDINGS

Lower Marias River

Fish Populations
Spawning Migrations

The sauger and shovelnose sturgeon are two important sport fish which are known to spawn in the lower Marias River (Berg 1981). The lower Marias also has a resident population of sauger. The shovelnose sturgeon population, unlike the sauger, resides exclusively in the Missouri and at least a portion of the mature sturgeon population ascend the lower Marias to spawn. The objective of this investigation was to collect more information on the relationships between streamflow and abundances of migrating fish.

Sauger. The sauger spawning run appeared to be poor compared to past years. Table 2 lists the dates, sizes and catch rates for this year's spawning season (20 April - 25 May). The comparison below indicates that the 1986 spawning run was lower than most years:

Year	CPUE
1986	14.4
1985	18.3
1976-79	27.3 (Berg 1981)

Table 2. Size statistics and catch rates for sauger sampled by electrofishing in the lower Marias River, 1986.

Date	Number	Average Length	Average Weight	CPUE
21 Apr	17	14.8	1.06	10.6
30 Apr	32	13.6	0.73	18.3
10 Jun	5	14.2	0.83	2.9
20 Jun	7	13.7	0.70	4.0
30 Jun	15	13.4	0.79	8.3

It was possible that sauger numbers could have increased during the month of May when no sampling was conducted. However, if this had occurred we would have expected to find larger numbers of sauger in the river in June when sampling was resumed. Flows in the river between 500-600 cfs were considered suitable for attracting a spawning run out of the mainstem Missouri and therefore were probably not a factor limiting the migratory run this year.

Shovelnose Sturgeon: The spawning migration of sturgeon usually occurs in the Marias River from late-May through mid-July (Berg 1981). During 1985 sturgeon were first observed in the Marias 13 June but were not observed on the previous sampling date of 30 May. Good numbers of shovelnose were counted in the six mile section through the last sampling date, 30 July (Figure 2). The observed timing of the 1985 sturgeon spawning run occurred

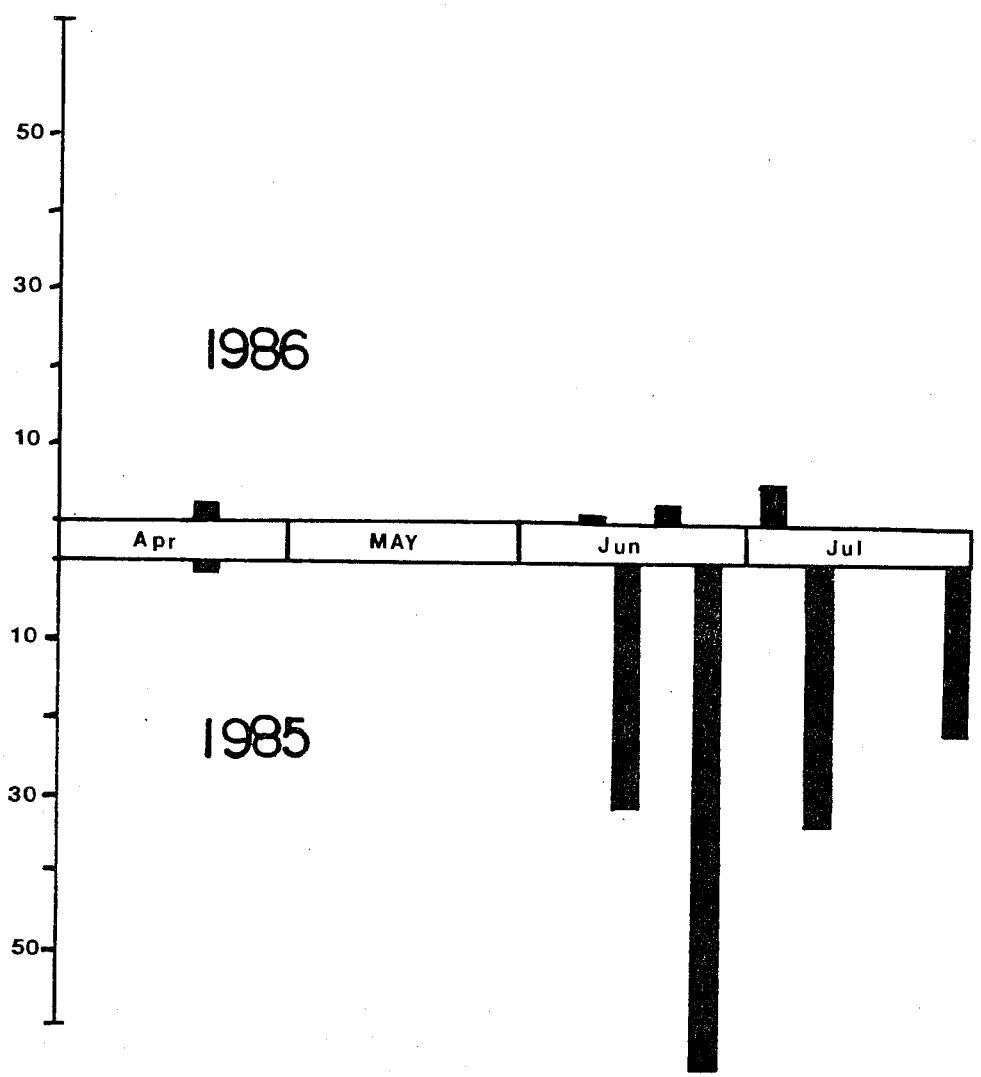

Figure 2. Histogram of the total number of Shovelnose Sturgeon counted in the six-mile study section while electrofishing in the lower Marias River, 1985-86.

considerably later than normal. A likely explanation for this departure could be related to the extremely low May and early - June flows of about 350 cfs. By 10 June lower Marias flows were 600 cfs and were more likely to attract sturgeon from the mainstem Missouri River.

During 1986 in the period, 21 April - 30 June, there did not appear to be much of a sturgeon run developing. Counts were considerably lower than in 1985 (Figure 2). Comparisons of shovelnose catch rates in the six mile study section is given below:

Year	CPUE
1986	1.5
1985	18.8
1976-79	20.0 (Berg 1981)

River flows for this period ranged form 600-950 cfs. The factor limiting this year's sturgeon run has not been determined.

It is possible that the sturgeon run is late. Berg (1981) observed a late run during 1978. Concentrations of sturgeon were found in the Marias from 9 June through the last sampling date, 4 August.

Upper Marias River

Fish Populations

Composition

The upper Marias River fishery was rehabilitated in 1955 in conjunction with the closure of Tiber Dam. Most native warmwater species were removed from the area. The sport fish presently found in this reach are mountain whitefish, rainbow trout, burbot, channel catfish and walleye.

Table 3 presents a list of these sportfish and nonsport fish along with sizes and relative catch rates. Very few sportfish were sampled in the Sullivan Section. The most common fish collected was the longnose sucker, a species described by Brown (1971) as having a wide distribution in Montana. The Naismith Section, located about 24 miles downstream, appeared to have a greater variety of fish. All four sport fish known to occur in the upper Marias were sampled here. Walleye were found to be the third most abundant fish with a catch rate of 1.9 fish per hour. Both spawners and juveniles were sampled, indicating that walleye probably spend a considerable portion of their life cycle in the river. Sexually mature male and female walleye were sampled in the river and it was apparent that some spawning occurs in the river as far upstream from Tiber Reservoir as these study sections. Like the Sullivan section, longnose suckers were found to be the most abundant fish sampled in the Naismith. Flathead chubs were the second most common species sampled at 3.6 fish per hour.

Table 3. Size statistics and catch rates for fish sampled by electro-fishing in the upper Marias River, April 24-June 30, 1986.

Species	Number	Average Length	Range	Average Weight	Range	CPUE
Sullivan Sec. (2.0 hrs)		(0 - 6 river miles below beginning Marias)				
Mountain Whitefish	5	10.9	(9.8-12.2)	0.45	(0.33-0.62)	2.5
Flathead Chub	5	6.5	(5.3- 9.3)	0.14	(0.04-0.33)	2.5
White Sucker	3	15.6	(14.5-16.3)	1.52	(1.32-1.70)	1.5
Longnose Sucker	22	12.6	(5.4-18.4)	0.96	(0.12-2.38)	11.0
Burbot	2	15.6	(15.3-15.9)	0.69	(0.68-0.70)	1.0
Naismith Sec. (10.5 hrs)		(29.8-53.6 river miles below beginning of Marias)				
Mountain Whitefish	2	12.4	(10.8-14.1)	0.70	(0.40-0.99)	0.2
Rainbow Trout	4	18.3	(16.3-20.0)	2.08	(1.54-2.75)	0.4
Carp	20	- no measurements -				1.9
Flathead Chub	38	6.5	(4.8- 8.2)	0.14	(0.04-0.31)	3.6
Emerald Shiner	3	- no measurements -				0.3
Mountain Sucker	4	6.1	(5.4- 7.0)	0.13	(0.07-0.20)	0.4
White Sucker	20	14.2	(9.3-19.1)	1.36	(0.04-3.37)	1.9
Longnose Sucker	96	14.5	(8.3-17.2)	1.02	(0.26-1.89)	9.1
Burbot	5	8.1	(6.0-15.5)	0.18	(0.04-1.10)	0.5
Walleye	20	15.9	(8.0-20.0)	1.39	(0.18-2.53)	1.9
Sculpin	1	- no measurements -				

Hill (1986) monitored the water temperatures at these two sections during the summer of 1985. His data describes the upper Marias as a warmwater stream with average mid-July through August temperatures of 64.7 and 67.6 F for Sullivan and Naismith stations, respectively. Maximum temperatures for this period were 80 and 81 F, respectively.

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Prepared By: William M. Gardner
Date: August, 1986

CODE NUMBERS OF WATERS REFERRED TO IN THIS REPORT ARE:

14-3240	Marias River Sec. 1
14-3280	Marias River Sec. 2
16-1800	Judith River Sec. 1
16-1820	Judith River Sec. 2
16-3520	S. Fk. Judith River
16-2140	Lost Fk. Judith River
16-2360	Middle Fk. Judith River
16-4260	Yogo Creek
16-1340	E. Fk. of Big Spring Creek
16-3160	Running Wolf Creek
17-0544	Belt Creek
17-7680	Tillinghast Creek
17-5888	Pilgrim Creek
17-4304	Logging Creek
17-0608	Big Otter Creek
17-3456	Highwood Creek
17-6656	Shonkin Creek
18-5670	So. Fk. Musselshell River
18-0060	Alabaugh Creek
18-0540	Bonanza Creek
18-1380	Cottonwood Creek
18-4620	No. Fk. Musselshell River
18-1080	Checkerboard Creek
18-2580	Flagstaff Creek
18-5820	Spring Creek

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana

Project No.: F-5-R-35 Title: Northcentral Montana Fisheries Study

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

Period Covered: July 1, 1985 through June 30, 1986

Report Period: July 1, 1986 through June 30, 1986

ABSTRACT

Information was obtained from 8 large reservoirs, 13 farm ponds and 2 rivers. Drought conditions decimated fish populations on the majority of the farm ponds and 5 of the large reservoirs. Precipitation in the fall of 1985 and spring of 1986 filled nearly all storage impoundments except War Horse and Yellow Water Reservoirs. Electrofishing to obtain trout population estimates was conducted on two sections of the Smith River and one section on the Missouri River. Preliminary population data for the Craig Section on the Missouri River is presented for 1983 and 1984.

OBJECTIVES AND DEGREE OF ATTAINMENT

The objectives of this job were:

1. To monitor growth, survival, catchability and longevity for two strains of rainbow trout planted into Ackley Lake and East Fork Spring Creek Reservoir. No work was done on this objective since Ackley Lake was drained to dead storage by fall and three-inch Eagle Lake rainbow were just stocked in East Fork Spring Creek Reservoir on July 1, 1985.

2. To monitor growth, survival and longevity for two species of trout planted into Buffalo Wallow and Drag Reservoirs. No work was done on this objective.

3. To survey new farm ponds to determine suitability for addition to our management program. Only one pond was added to the management program.

4. To obtain information for management of several species of trout, burbot and walleye in 5 reservoirs, 15 farm ponds, 4 mountain lakes and 3 streams. Information was obtained on 8 reservoirs, 5 farm ponds and 1 river and is presented in this report.

5. To monitor habitat changes and rainbow and brown trout populations in Big Spring Creek for management recommendations. No work was done on this objective.

6. To evaluate effects of reduced creel limits on rainbow and brown trout populations in the Smith River for management recommendations. Field work was accomplished but data has not been analysed. Preliminary data appears in this report, however.

7. To continue monitoring potential impacts of proposed small hydro-power projects on aquatic ecosystems on Warm Spring Creek and Big Spring Creek. No activity occurred on the projects during this report period and no data was obtained.

8. To evaluate survival and growth of northern pike introduced into Petrolia and War Horse Reservoirs and of largemouth bass and yellow perch introduced into eight farm ponds. No data was gathered for Petrolia and War Horse Reservoirs since they were drained to dead storage. Information on 8 ponds is presented in this report.

PROCEDURES

Evaluation of trout strains were initiated by fin clipping and tetracycline marking prior to stocking for later identification. Trout were marked in the spring of 1986 for fish stocked in Smith River Reservoir, Bair Reservoir and Ackley Lake. Fish were sampled with sinking nylon experimental gill nets and hook-and-line. Trout in the Smith River and Missouri River were sampled by employing multiple run mark-and-recapture

electrofishing techniques described by Vincent (1971 and 1974) for estimating fish populations. Fish captured were measured to the nearest tenth of an inch and weighed to the nearest hundredth of a pound. Scales were collected from river fish for age and growth analysis.

FINDINGS AND RECOMMENDATIONS

Large Reservoirs

For the second consecutive year, extreme drought did not allow most of the irrigation storage reservoirs to fill. Bair Reservoir only filled to half capacity and because of rapid drawdown was not stocked at all in 1985. Martinsdale Reservoir was drained to about a 30-acre pool with a maximum depth of about 6 feet by August. We recommended removal of fish limits so anglers could utilize remaining trout before anticipated winter-kill. Ackley Lake was only filled to two-thirds capacity before it was again drained to dead storage. Only half the recommended number of trout were stocked prior to drawdown. No storage was gained in Yellow Water Reservoir and it was not stocked in 1985.

Walleye and northern pike fry were stocked in Petrolia Reservoir in early spring of 1985 but it was drained to dead storage by late summer. No additional storage was obtained in War Horse Reservoir and by late summer, windrows of dead carp were observed along the shoreline of the lake.

Good precipitation during the fall of 1985 and spring of 1986 filled nearly all reservoirs and normal fish stocking was accomplished in Bair, Martinsdale, Smith River and Petrolia Reservoirs and Ackley Lake. Yellow Water Reservoir failed to fill in 1986 and no trout were stocked. Northern pike fry were stocked in War Horse Reservoir in anticipation of a good water year, however, it failed to fill and late summer fish kills are again likely.

The trout stocked in Ackley Lake in 1985 survived low water winter conditions and provided some fair fishing when the reservoir was filling in the spring of 1986. These trout were about 12 inches in length and weighed about two-thirds of a pound.

About 12,500 DeSmet strain of rainbow trout received an adipose fin clip and were stocked in Smith River Reservoir in May, 1986. This reservoir has two perennial tributary streams which appear to provide good spawning potential. Unless the reservoir is drained dry at some future date, we anticipate developing a brood supply of DeSmet rainbows in this water.

Pool

2020 / 100 ml

River

820 / 100 ml

Eagle Lake strain of rainbow trout were stocked in Bair Reservoir and Ackley Lake in 1986. The trout were marked with tetracycline for later identification. Both reservoirs have become heavily infested with white suckers. We plan to evaluate success of this piscivourous trout in the presence of this forage base.

Newlan Creek Reservoir, located about 10 miles north of White Sulphur Springs, did not suffer drawdown because irrigation facilities have not been fully developed. Supplemental water is diverted into this reservoir from Sheep Creek, which helps to maintain water levels. Beginning in 1983, management of Newlan Creek Reservoir was converted to Yellowstone cutthroat trout and they have established in the lake in spite of heavy fishing pressure. The creel limit was reduced to 5 fish in 1985 when pressure estimates revealed nearly 19,000 angler days were expended on this reservoir in 1984.

Three sinking gill nets were fished in Newlan Creek Reservoir in October, 1985, and results are presented in Table 1. A good sample of cutthroat trout were collected. Some small rainbow trout in the catch reveal some natural reproduction supplements the gamefish population. Longnose suckers continue to expand in this fairly new reservoir.

Farm Ponds and Small Reservoirs

Drought conditions nearly decimated most of the farm ponds in Judith Basin, Fergus and Petroleum Counties. Many of the ponds no longer contained fish. Information on 13 of these ponds are presented in Table 1.

Good precipitation and runoff in the spring of 1986 filled farm ponds to capacity. A total of 32 ponds and small reservoirs were stocked with rainbow trout. A new pond on BLM land, Cotton Dam was added to the management program. Six other ponds were reserved for introductions of largemouth bass fingerlings if available from the Miles City Hatchery.

High interest by Lewistown area sportsmen for maintaining fish populations prompted development of a fishery plan for waters in Fergus, Judith Basin and Petroleum counties. The plan was presented at a public meeting which was attended by about 25 sportsmen. Briefly, the plan contained the stocking program for area waters, strategies for monitoring and maintenance, and personnel designated for conducting the work.

Table 1. Netting Summary and Observations on Several Reservoirs and Ponds

Water (Date Sampled)	Surface Area	No. of Nets	Species Caught	No. of Fish	Length Range Average
Newlan Creek Res. (Oct 3)	280	3	CT	49(1984)	8.1-11.5(9.9)
				17(1983)	12.2-16.6(14.1)
			Rb	15	8.7-17.3(13.1)
			LnSu	75	7.0-17.3
Kolar Pond #1 (Oct 4)	11	1	Rb	5	8.0-17.5
			WSu	82	7.9-12.5
Kolar Pond #2 (Oct 4)	8	1	WSu	54	7.2-14.9
Box Elder Res. (Nov 6)	Nearly Dry.		No fish		
Catfish Res. (Oct 24)	Very low.		No fish taken		
C-1 Pond (Sept 4)	Nearly dry.		No fish		
Dry Blood Res. (Oct 14)	Very low.		No fish taken		
Hopalong Res. (Nov 6)	Good water level.		Observed fish but none taken.		
Manuel Res. (Aug 6)	Very low.		No fish		
Payola Res. (Nov 6)	Water level low.		Captured yellow perch and bass.		
S. F.Dry Blood Res. (Nov 6)	Very low.		No fish		
Styers (Ed) Pond (Nov 6)	Nearly dry.		No fish		
Wolf Coulee (upper) (Oct 24)	Low.		No fish taken or observed.		
Wolf Coulee (lower) (Oct 24)	Low.		No fish taken or observed.		

1/ Species Abbreviations: CT - cutthroat trout; Rb - rainbow trout; LnSu longnose sucker; WSu - white sucker.

2/ Year fish were stocked.

Rivers

Trout populations were sampled by mark-and-recapture electrofishing on two sections of the Smith River. Population data is being gathered to evaluate a special "slot-limit" regulation designed to enhance production of larger trout. The limit, placed into effect in May, 1985, is three trout under 13 inches in length and one over 22 inches in length from the mouth of Rock Creek downstream to the Eden Bridge, a reach of 52 river miles. Information collected in 1984 from these two river sections is presented in Job Progress Report, F-5-R-34, Job I-a (Hill and Wipperman, 1985). Information collected in the fall of 1985 has not been analysed for final publishing, however, data will appear in the next report. Trout population data will continue to be gathered for the next two years to evaluate the effectiveness of the special regulations.

A partial creel census was conducted on the Smith River from May 14 to July 10 to evaluate success of anglers who fish while floating the river. This program was a cooperative venture with the Parks Division who collected the data at our request. A total of 501 anglers were interviewed. They caught a total of 10,206 fish of which only 638 were kept. This averaged about 20 fish per angler trip (angler trips varied from two to four days).

Various species of fish comprised the following portion of the catch:

Species	Number Caught	Number Kept
Rainbow trout	4,678	383
Mountain Whitefish	2,734	75
Brown Trout	2,715	148
Brook Trout	48	20
Cutthroat Trout	24	10
Suckers	7	2

The low number of suckers caught probably does not reflect their abundance in the population. It is more likely the result of the regulation that only artifical lures and flies may be used for trout fishing. It is recommended that creel census be continued during the float season for management evaluation. The census should be expanded to include hours fished, reach of river involved and number of fish released over 13 inches in length.

Fall, 1985 and spring, 1986 electrofishing was conducted on the Craig and Holter Sections on the Missouri River. This data has not been analyzed but will be presented in later reports. This work is being conducted to establish base data on trout

populations to evaluate present management practices plus data needed for habitat evaluation pertaining to flow releases from upstream power generating facilities.

Trout populations were also estimated in the Craig Section in the fall of 1983 and 1984. Electrofishing runs were made during extremely different flows between the two years. In 1983, September flows were about 4,200 cfs while in 1984, flows averaged about 10,000 cfs. Although good numbers of fish were caught during high flows in 1984, the population estimates are believed to be overestimated. Comparison of the two years estimates are presented in Table 2.

Further work needs to be done to develop electrofishing technique on this large river before confidence can be gained from the data. The Missouri River from Holter Dam downstream to the town of Cascade is one of the heaviest fished reaches in the state. We plan to expand effort on the Missouri to keep abreast of increasing angler use on this important water.

Table 2. Trout population estimates from the Craig Section of the Missouri River (Section length, 5.6 miles).

Year		1983		1984	
Species	Length Group(in.)	Number	Weight	Number	Weight
Rainbow Trout	5.0- 9.9	5,966	1,713	10,414	3,188
	10.0-11.9	2,554	1,379	3,392	1,759
	12.0-13.9	2,536	2,432	5,110	4,459
	14.0-15.9	4,758	6,462	6,403	8,028
	16.0-17.9	1,721	2,969	3,410	5,468
	18.0 & over	67	145	200	428
	Totals	17,602	15,100	28,929	23,260
	80% Confidence Limits	1,816	1,660	3,563	3,379
Brown Trout	8.0- 9.9	58	20	130	45
	10.0-11.9	290	159	743	377
	12.0-13.9	251	227	353	284
	14.0-15.9	360	496	345	450
	16.0-17.9	280	578	200	382
	18.0 & over	372	1,344	231	824
	Totals	1,621	2,824	2,002	2,362
	80% Confidence Limits	223	528	335	384
	Grand Total	19,223	17,924	30,931	25,622
	Biomass Per Mile	3,432	3,200	5,523	4,575

LITERATURE CITED

Hill, William J. and A.H. Wipperman 1985. Inventory and Survey of Waters in the Western Half of Region Four. Montana Department of Fish, Wildlife and Parks. Job Progress Report. F-5-R-34, Job No. I-a.

Vincent, Richard. 1971. River Electrofishing and Fish Population Estimates. Progressive Fish Culturist, Volume 33, No. 3, pp. 163-169.

_____. 1974. Addendum to River Electrofishing and Fish Population Estimates. Progressive Fish Culturist. Volume 36, No. 3, pp. 182.

Prepared by: Al Wipperman

Date: July 31, 1986

WATERS REFERRED TO IN THIS REPORT

16-4300	Ackley Lake
16-4590	C-1 Pond
16-6340	Kolar Pond #1
16-6360	Kolar Pond #2
16-8986	Wolf Coulee (lower)
16-	Wolf Coulee (upper)
16-	Styers (Ed) Pond
17-4896	Missouri River (Sec 9)
17-6832	Smith River (Sec 2)
17-9330	Newlan Creek Res.
17-9616	Smith River Res.
18-7220	Box Elder Res.
18-7395	Catfish Res.
18-7498	Cotton Dam
18-7565	Dry Blood Res.
18-7750	Bair Res.
18-7920	Hopalong Res.
18-8340	Manuel Res.
18-8380	Martinsdale Res.
18-8720	Petrolia Res.
18-9150	South Fork Dry Blood Res.
18-9440	War Horse Res.
18-9500	Yellow Water Res.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

State: Montana Title: Northcentral Montana Fisheries Study
Project No.: F-5-R-35 Title: Inventory and Survey of Waters in the Western Half of Region Four
Job No.: I-a

Period Covered: July 1, 1985 through June 30, 1986

Report Period: April 1, 1985 through March 31, 1986

ABSTRACT

A total of 20 waters were surveyed during the report period. These include 9 large lakes and reservoirs, 5 small lakes and farm ponds and 6 streams. Rainbow trout strains evaluated in the Region include Arlee in several waters including Nilan Reservoir, Eagle Lake in Eureka Reservoir, Arlee-Eagle Lake cross in Willow Creek Reservoir, DeSmet in Bean Lake and McConoughy in Holter Lake. Walleye, yellow perch and spottail shiner were introduced into Bynum Reservoir. Walleye and northern pike were tagged in Lake Frances and Lake Elwell. Voluntary angler returns have accumulated to 25.9 percent for walleye in Lake Elwell and 31.5 percent for northern pike in Pishkun Reservoir. Forage fish surveys indicate an adequate supply in Lake Elwell and Pishkun Reservoir, but a sparse population in Lake Frances. Lake trout appear to be increasing in Lake Elwell while kokanee salmon in Pishkun Reservoir are at low numbers. Grayling were planted in Tunnel Lake to provide an opportunity for fishermen to catch a species of special concern. Fish from Lee Creek and the North Fork of Badger Creek were determined to be genetically pure westslope cutthroat. Grayling survival was documented in Rock Creek. Rainbow trout from the forks of the Sun River show an increase in average length when compared to previous surveys. Maximum water temperatures of 81°F. were recorded in the Marias River above Lake Elwell.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To determine growth rates, angler success and survival of rainbow trout stocked in Eureka, Nilan, Willow Creek and Holter Reservoirs and Bean Lake to prescribe management recommendations. This work was done and the data is included in the report.

2. To evaluate present management of rainbow trout, black and white crappie, largemouth bass and yellow perch in six small lakes and farm ponds and to investigate the fishery potential of new waters. Five waters were sampled and the results are presented in the report.

3. To obtain trend information on populations, food habits, age, growth and angler harvest of northern pike, walleye, burbot and lake trout in Lake Elwell and Lake Frances for management recommendations. This information was collected and is included in the report.

4. To monitor population trends of northern pike, forage fish and salmonids in Pishkun Reservoir in order to prescribe management recommendations. This data appears in the report.

5. To inventory fish populations in five streams to update management files. Information was collected on six streams and appears in the report.

PROCEDURES

Fish were sampled with 125 x 6 foot experimental gill nets with 25 foot sections of 3/4, 1, 1 1/4, 1 1/2 and 2-inch square mesh; 300 x 8 foot gill nets with 100 foot sections of 2 1/2, 3 and 3 1/2 - inch square mesh; 3 x 4 foot frame net traps (1/4-inch mesh) and 4 x 6 foot frame net traps (1/2 and 1-inch mesh); a 50 x 4 foot seine (1/4 mesh); a 300-volt D.C. electrofish shocker; and by hook and line. Measurements taken on fish include total lengths to the nearest tenth of an inch and weights to the nearest hundredth of a pound. Scale samples were collected for age and growth studies. Northern pike and walleye were marked with T-tags and Cinch-up tags, respectively. Angler success and harvest determinations were made through voluntary angler tag returns, occasional creel census and interviews with fishermen. Stomach samples of rainbow trout, northern pike and walleye were collected for later analysis. River temperatures were recorded on 30-day Taylor thermographs and reservoir temperature profiles were determined with an electronic depth thermometer. Cutthroat trout were genetically evaluated by electrophoresis.

FINDINGS

Gill net summaries for the waters inventoried are presented in Table 1. Discussion of individual waters follows.

Table 1. Gill net summaries of lakes and reservoirs, 1985.

Lake Date Sampled	Surface Acres [1]	No of Nets [2]	Species [3]	No of Fish [4]	Length Range (Avg)	Weight Range (Avg)
Bean Lake (Oct 1)	200	2S	Rb-A	67(1985)	8.9 - 12.0 (10.7)	0.28 - 0.70 (0.51)
			Rb-A	1(1983)	(15.0)	(1.51)
			Rb-D	11(1984)	12.6 - 14-2 (13.4)	0.70 - 1.11 (0.89)
			Rb-D	3(1982)	15.6 - 15.9 (15.7)	1.50 - 1.61 (1.54)
Eureka Res. (Oct 16)	200	2F&1S	Rb-E	2(1985)	8.4 - 9.3 (8.8)	0.21 - 0.30 (0.26)
			Rb-E	1(1984)	15.5 (15.5)	(1.51)
			Rb-A	1	(18.5)	(2.40)
			LL	10	7.5 - 17.7 (13.4)	0.16 - 1.81 (0.97)
			LL	1	(23.1)	(4.45)
			WSu	50		
			LNSu	5		
Lake Elwell (Oct 11,12)	15,500	15S	WE	24	9.0 - 15.7 (12.7)	
				8	16.1 - 19.3 (17.8)	1.52 - 2.75 (2.05)
			NP	6	9.1 - 11.8 (10.9)	0.21 - 0.35 (0.29)
				5	14.8 - 18.9 (16.9)	0.74 - 1.51 (1.06)
				16	20.6 - 26.7 (23.1)	1.55 - 5.54 (3.03)
			YP	9	7.5 - 10.1 (7.8)	0.20 - 0.47 (0.23)
			Rb	3	15.4 - 19.6 (16.8)	1.51 - 2.84 (1.97)
			LT	5	23.0 - 30.0 (26.3)	3.82 - 8.00 (5.89)
			Ling	1	(22.4)	(2.61)
			WSu	14	7.0 - 18.9 (16.2)	0.15 - 2.88 (2.08)
			LnSu	2	15.4 - 17.4 (16.4)	1.65 - 2.00 (1.83)

Lake Elwell (Oct. 18)		2-300's	LT	5	24.0 - 31.5	(27.7)	4.50 -10.00 (6.65)
			WE	3	18.3 - 19.4	(18.8)	2.26 - 2.95 (2.54)
			Carp	5	23.2 - 27.7	(24.7)	@6# - 15# (@8.80)
			WSu	2	18.5 - 20.6	(19.6)	2.75 - 3.80 (3.28)
Lake Frances (Oct. 22)	3,000	4S	WE	6	8.6 - 13.9	(12.5)	0.19 - 0.82 (0.65)
			YP	3	8.8 - 9.7	(9.4)	0.30 - 0.60 (0.48)
			Ling	1			(@ 5#)
			WSu	1		(16.4)	(1.90)
Holter Res. (Oct. 30)	4,800	1-300'F	Rb-A	161(1985)	10.0 - 12.2	(11.1)	0.41 - 0.85 (0.60)
		&3-125'F	Rb-A	34(1984)	12.7 - 19.0	(15.6)	0.90 - 2.51 (1.56)
			LL	2	21.4 - 22.0	(21.7)	3.69 - 3.88 (3.88)
			Kok	8	12.1 - 21.3	(14.5)	0.75 - 3.46 (1.39)
			WE	2	22.6 - 23.7	(23.2)	5.25 - 5.50 (5.38)
Nilan Res. (Oct. 23)	200	2F	Rb-A	52	9.8 - 11.9	(10.8)	0.39 - 0.71 (0.53)
			Rb-A	19	12.6 - 15.0	(13.9)	0.81 - 1.29 (1.01)
			WSu	4	7.2 - 10.3	(9.1)	0.12 - 0.40 (0.29)
Pishkun Res. (July 23)	1,100	3S	Kok	4	9.0 - 9.5	(9.3)	0.25 - 0.32 (0.29)
			Kok	1		(15.2)	(1.71)
			NP	7	16.8 - 20.7	(18.7)	1.10 - 2.24 (1.58)
			YP	82	5.9 - 11.4	(7.4)	0.10 - 0.52 (0.21)
			WSu	1		(13.2)	(1.06)
Willow Cr. Res. (Oct. 16)	1,000	1F	AXE	5	7.9 - 9.3	(8.6)	0.12 - 0.26 (0.22)
		1-300'F	AXE	7	12.2 - 13.2	(12.7)	0.59 - 0.74 (0.66)
(Jan. 27, 86)		H-L	AXE	3	8.7 - 10.0	(9.3)	0.26 - 0.40 (0.33)
			AXE	12	12.3 - 13.6	(12.8)	0.64 - 0.80 (0.70)
			Rb-A	2	14.4 - 14.8	(14.6)	1.00 - 1.21 (1.11)
			Rb-A	1		(17.6)	(2.20)

1/ Approximate surface acres at time of survey.
2/ Type of nets: F=floating; S=sinking; H-L= hook-and-line.
3/ Species abbreviations = Rb-rainbow trout (A = Arlee; E = Eagle Lake; D - Lake De Smet; AXE - Arlee - Eagle Lake cross); LL - brown trout; Ct - Cutthroat trout; WE - walleye; NP - northern pike; YP - yellow perch; LT - lake trout; WSu - white sucker; Ln Su - longnose sucker; Kok - kokanee.
4/ Year planted.

Bynum Reservoir

This reservoir was converted from trout to a warm/coolwater fishery during 1985. Walleye, yellow perch and spottail shiner were introduced. Water levels reached dead storage during July. Survival of the introduced species is unknown. All three species will be stocked again in 1986. Beach seining will be conducted to determine survival of the introductions and subsequent expansion through reproduction.

Rainbow Strain Evaluation

Presently there are five strains of rainbow trout being evaluated in Region 4. These include Arlee, DeSmet, Eagle Lake, Arlee-Eagle Lake cross and McConaughy. The Arlee rainbow has been used for many years with varying degrees of success. Growth is generally good but longevity is short. The Arlee strain continues to provide an excellent fishery in Nilan Reservoir.

The other strains have been tried for two years and results are inconclusive at this time. The Eagle Lake rainbow planted in Eureka Reservoir appears to have had poor survival. The Arlee-Eagle Lake cross in Willow Creek Reservoir has good survival but growth is less than the Arlee. Future surveys will determine longevity. Netting summaries of these reservoirs and strains are found in Table 1.

Bean Lake. Gill netting in Bean Lake in the fall of 1985 revealed a good population of current year Arlee strain rainbow trout that were stocked on May 14. No Arlee strain planted in 1984 were taken indicating poor survival of fish. However, a fair number of Lake DeSmet strain rainbow trout planted in 1984 were represented in the catch (Table 1). Some DeSmet rainbows planted in 1982 were also caught. This information suggests the DeSmet strain exhibits superior longevity when compared to Arlee strain but does not grow as well in Bean Lake as the Arlee strain. Longevity and growth of the DeSmet strain will continue to be monitored; however, we will not recommend further stocking of this strain in the lake.

The food base in Bean Lake is primarily invertebrates (Hemiptera, Diptera and Amphipoda). Many acres of shallow water area contain dense aquatic weed beds, providing excellent habitat for invertebrates. It appears neither Arlee or DeSmet rainbow strains will grow to trophy size on the forage present in the lake. It is recommended that Arlee-Eagle Lake cross rainbow trout be stocked in the lake and evaluated.

Holter Lake. A total of 50,000 Lake McConaughy rainbow trout were stocked in the Missouri River below Hauser Dam each year in the fall of 1984 and 1985. These fish were supplemental with 300,000 Arlee rainbow. Life history studies reveal McConaughy rainbows migrate downstream when attaining smolting length of about 6 to 7 inches. Creel census during the fall of 1985 revealed many of these fish were still inhabiting the river below Hauser Dam. The fish were about 12 to 13 inches in length.

Gill netting was conducted in Holter Lake on October 30, 1985 and many current year Arlee strain rainbow trout were collected (Table 1). No McConaughy rainbows were taken. A good sample of 1984 stocked Arlee rainbow were taken, indicating few fish were lost through Holter Dam during runoff. In addition, 8 kokanee salmon were collected, the most ever taken in fall sampling. Kokanee appear to be increasing the past few years and are now frequently caught in the river segment above Holter Lake in the fall.

Increased sampling effort will be conducted in 1986 to determine survival and distribution of game fish in the lake. All planted fish will be marked to identify various strains and movement patterns during run-off periods.

Lake Elwell and Lake Frances

A total of 71 trap net days at Lake Elwell and 11 trap net-days at Lake Frances were expended during the spring of 1985. Species composition and number of fish collected are presented in Table 2. Compared to past years, catches of walleye and northern pike are somewhat higher while yellow perch numbers are much higher.

Northern pike and walleye taken during spring trapping operations were tagged for harvest determinations. Table 3 exhibits the numbers tagged during 1984 and 1985 along with the voluntary return by fishermen. One-year returns for walleye range from 11.2-18.9 percent and accumulating to 25.9 percent. Northern pike range from 8.8-21.2 percent for one-year returns.

Only mature fish were tagged, which included walleye 13 inches or larger and northern pike over 15 inches. Figure 1 shows a length frequency for these species taken in trapping operations in the spring of 1985. Walleye 16 inches or larger accounted for 65 percent of the population in Lake Frances and 68 percent in Lake Elwell. In Lake Frances, 90 percent of the northern pike were over 20 inches while 58 percent in Lake Elwell were over 20 inches.

Forage fish surveys were conducted several times throughout the summer. Few spottail shiner or young-of-the-year yellow perch were sampled in Lake Frances whereas large numbers of both species were taken in Lake Elwell. Forage numbers should improve in Lake Frances with improved spawning conditions as water levels rise. Northern pike and walleye in the same reservoir have the potential to drastically reduce a yellow perch population. However, it is felt that if the spottail shiner expands to its fullest, some of the predation will be taken off the yellow perch and result in adequate forage.

The gill net summaries for both waters are found in Table 1. Special effort was made to sample lake trout in Lake Elwell. A total of 10 lake trout were collected in three nets near a gravel point in the Bootlegger Trail area. Stomach contents of northern pike and walleye collected in Lake Elwell in the fall gill net sample were analyzed and 33 and 50 percent, respectively, contained no food items. The remaining stomachs contained yellow perch, walleye, fish remains and crayfish.

Scale sample analysis of northern pike and walleye indicate below average growth for Lake Frances and near average for Lake Elwell. Poor growth in Lake Frances is attributed to a paucity of forage. Growth should improve in both waters as forage conditions improve. Future surveys will continue to monitor trends in the fishery of these waters.

Pishkun Reservoir

Gill nets were fished to monitor kokanee salmon, northern pike and yellow perch numbers (Table 1). Few salmon were taken which reflects the small numbers planted from 1981-83. Few, if any salmon were caught during the fall snag fishery. The 1986 plant will be increased to 200,000 in an attempt to improve the salmon fishery.

Yellow perch numbers are fairly large which should provide adequate forage for northern pike. Both the numbers of pike and perch appear to be on the increase. Voluntary tag returns for northern pike tagged in 1984 have now accumulated to 31.5 percent (Table 3). A Preliminary Environmental Review (Hill, 1986) was prepared to introduce spottail shiner into Pishkun Reservoir. It is anticipated that the spottail will provide adequate forage to maintain northern pike populations if yellow perch populations decline.

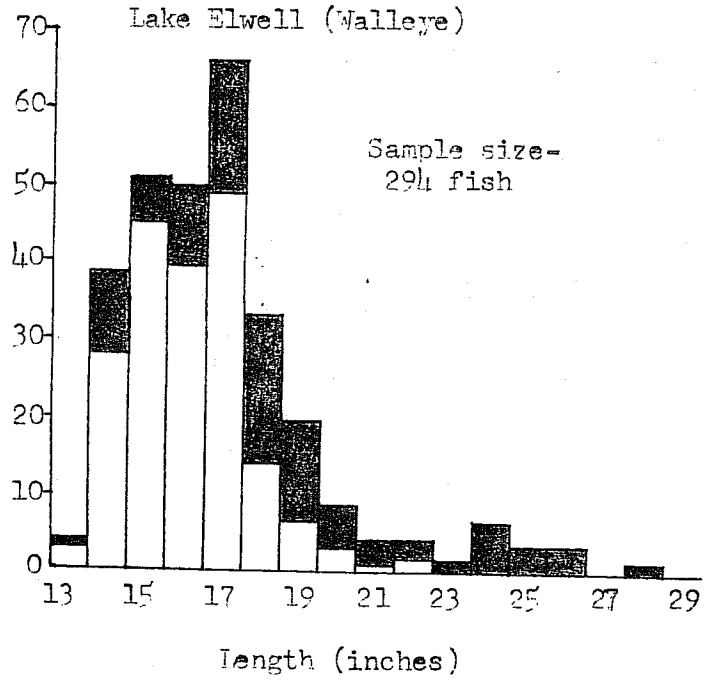
Table 2. Trapping results, Lake Elwell and Frances, 1985.

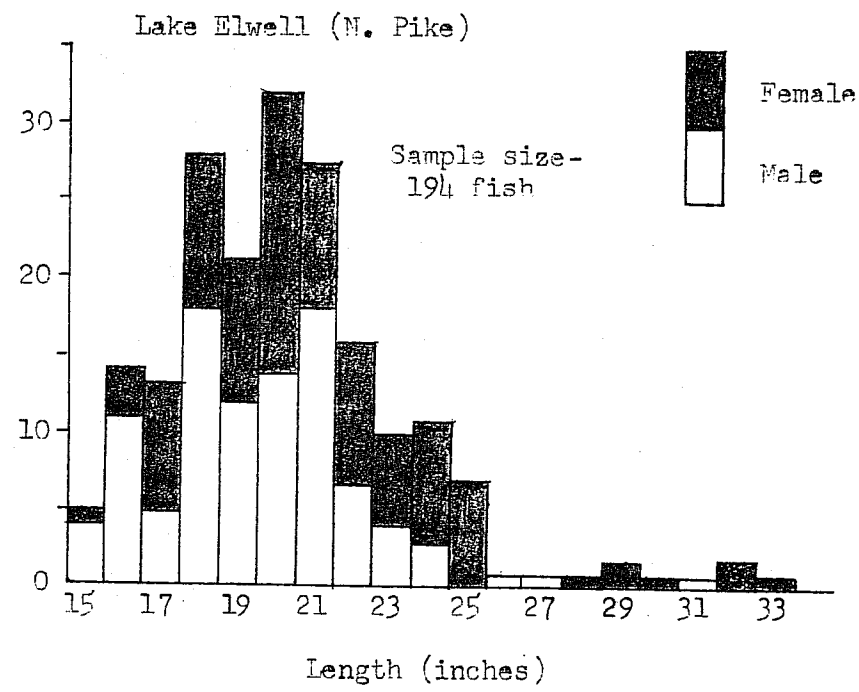
Area	No Trap Days	Species Composition NP	WE	Ling	YP	Rb	Sucker	Carp	Crappie
Lake Elwell									
WCA	52	133	251	6	773	2	238	3	23
Devon	9	29	13	1	3	1	8	3	0
B. Trail	10	39	30	1	11	0	10	0	0
Lake Frances	11	137	125	13	48	0	16	0	0

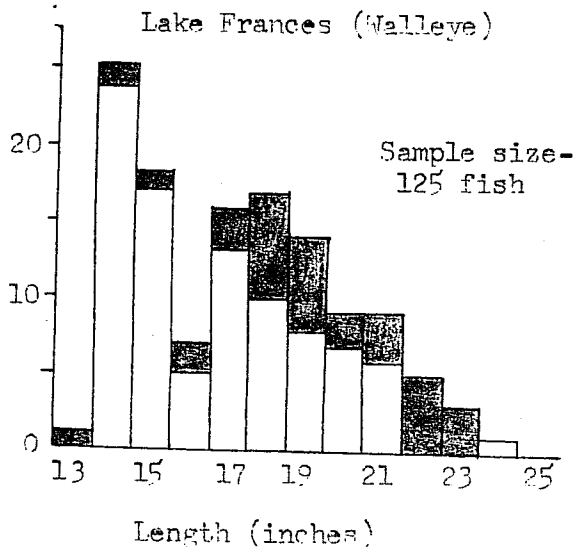
Table 3. Tagging and harvest results, 1984-85. (Lakes Elwell & Frances, Pishkun Reservoir).

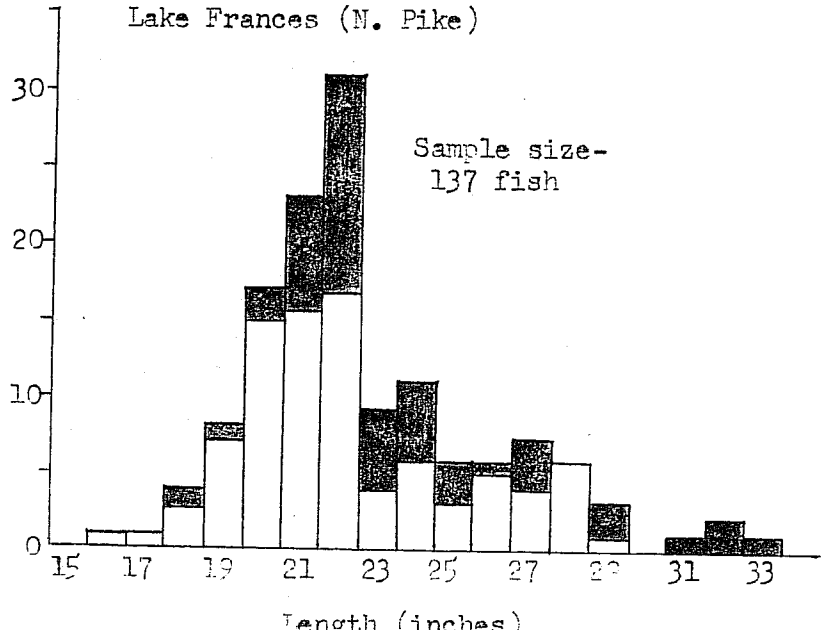
Area	Species	Year Tagged	Number Tagged	No Returns (%) 1984	1985	Accumulative No. Returns (%
Lake Elwell	Walleye	1984	185	35(18.9)	13(7.0)	48 (25.9)
		1985	294		33(11.2)	33 (11.2)
	N. Pike	1984	177	21(11.9)	2(1.1)	23 (13.0)
		1985	194		17(8.8)	17 (8.8)
Lake Frances	Walleye	1985	125		18(14.4)	18 (14.4)
	N. Pike	1984	30	4(13.3)	2(6.7)	6 (20.0)
		1985	137		29(21.2)	29 (21.2)
Pishkun Res.	N. Pike	1984	200	60(30.0)	3(1.5)	63 (31.5)

Figure 1. Length frequency of walleye and northern pike - Lakes Elwell & Frances, 1985, (Spring).









Small Lakes and Farm Ponds

Attempts have been made to develop a warm/coolwater fishery composed of yellow perch, crappie and largemouth bass in Priest Butte Lake. Limited success with perch and crappie has occurred but no reproduction has been documented. To further the problem, perch and suckers died in August from unknown causes. Netting surveys will be conducted in the spring of 1986 to determine the extent of the fish kill.

A total of 184 artic grayling were transferred from the Sunny Slope Canal near Fairfield to Tunnel Lake. Most of the grayling ranged from 5-6 inches. with some at 8-10 inches. Additional grayling will be transferred to Tunnel Lake in future years.

The Department acquired a fishing access on the Missouri River South of Cascade in 1984 which contained a 20 acre gravel pit pond, which we named Goose Pond. Two gill nets yielded 61 yellow perch. Age analyses indicated very slow growth; 7.0 inch perch were 4 years old. Most of the pond is less than 5 feet in depth with the deepest water at 14 feet. Netting data is presented in Table 4.

Streams

Cutthroat trout from streams along the Rocky Mountain Front were collected in 1984 for analysis of genetic purity (Hill and Wipperman, 1985). Specimens from the South Fork Two Medicine River and Woods Creek tested 97 percent pure westslope cutthroat. Additional cutthroat were collected in 1985 from Lee Creek and the North Fork of Badger Creek. Tests at the University of Montana found these fish to be genetically pure populations of westslope cutthroat trout.

Hook-and-line surveys were conducted on Rock Creek on August 20. Surveys were directed at determining survival of grayling introduced in 1983 (Hill and Wipperman, 1984). One grayling was hooked but none were landed. Future surveys are planned.

Trout were sampled in the forks of the Sun River to monitor trends in the average size. A total of 73 rainbow from the North Fork averaged 11.6 inches (range 7.0-15.2). Rainbow in the South Fork averaged 12.2 inches with a range of 7.5-16.8 inches (61 fish). The trend is that trout are increasing in average length in both forks. Table 5 shows the cyclic pattern of average length. This pattern could be attributed to changes in age composition of the fish sampled.

Table 4. Netting summaries of small lakes and farm ponds, 1985.

Water (Date Sampled)	Type of Nets	Species*	No. of Fish	Length Range	Weight Ran
Canal Lake (Oct. 24)	1 - exp gill		None		
Little Pishkun Pond (Nov. 1)	1 - exp gill	NP	3	20.4-21.5	2.34-2.78
		YP	1	5.5	0.10
		WSu	2	8.2-17.3	0.22-2.10
	1 - 1/4" trap	YP	500	@ 2-7"	
Priest Butte Lake (June 13)	1 - 1" trap	Cr	3	11.3-12.3	0.95-1.33
		WSu	65		
	2 - 1/2" trap	Cr	3	2.9-3.4	
		YP	8	@ 4-8"	
		WSu	10		
		Minnow	500		
Tunnel Lake (Oct.24)	1 - exp gill	Rb	17	8.9-10.0	0.30-0.41
		Gr	16	9.7-11.2	0.31-0.46
			2	12.0-12.9	0.61-0.70
Goose Pond (June 6)	2 - exp gill	YP	61	5.4- 9.8	0.06-0.34

*Species abbreviations: NP-northern pike; YP-yellow perch; WSu-white sucker; Cr-black crappie; Minnow-fathead & brassy; Rb-rainbow trout; Gr-artic grayling.

Table 5. Trends in the average length of rainbow trout sampled in the forks of the Sun River, 1975-85.

	1975	1976	1977	1978	1979	1981	1983	1985
N. Fk. Sun R.	10.9	11.3	11.5	12.2	10.7	11.0	11.3	11.6
S. Fk. Sun R.	11.4	11.8	12.7	11.8	11.6	12.0	11.8	12.2

Water temperatures were monitored at two locations in the Marias River above Lake Elwell form June 11 to September 15. Thermographs were placed approximately 30 miles apart, 15 miles above and below the Interstate bridge south of Shelby. The data is presented in Table 5. Low flows are experienced at times in this river, allowing temperatures to reach into the high 70's ^{o}F. Warm/coolwater species such as sauger and smallmouth bass may be introduced in an attempt to establish a fishery. Sauger were native to the system prior to the Marias River rehabilitation project in 1955.

Table 6. Water temperatures of the Marias River above Lake Elwell, 1985.

	Layne Ranch (Upper Station)			F-Bridge (Lower Station)			
	June	July	August	June	July	August	Sept
Temp. range F.	59-71	66-80	57-69	61-72	68-81	59-77	48-6
Avg. Temp F.	65.2	73.6	63.8	66.9	75.8	67.2	55.7
Days Above 75 F.	0	12	0	0	20	4	0
Days Monitored	11-30	1-31	1-17	20-30	1-31	1-31	1-15

DISCUSSION AND RECOMMENDATIONS

Five strains of rainbow trout are currently being tested in the Region. The Arlee rainbow continued to provide an excellent fishery in Nilan Reservoir with good survival and growth. Catchability was high but longevity was short. Other strains being tested include Arlee-Eagle Lake Cross in Willow Creek Reservoir, Eagle Lake in Eureka Reservoir, DeSmet in Bean Lake and McConaughy in Holter Lake. Data was insufficient to draw conclusions from these introductions. Three to five more years are needed to determine their potential.

Considerable effort has been directed at waters with existing or the potential for warm/coolwater fisheries. Bynum Reservoir received introductions of walleye, yellow perch and spottail shiner. Initial survival was questionable due to the extremely low water experienced during 1985. These species will be stocked again for the next several years. Fishing pressure continued to increase on northern pike and walleye populations in Lake Frances and Lake Elwell. Maximum one-year harvest rates from voluntary angler returns varied from 18.9 percent for Lake Frances walleye to 30.0 percent for Pishkun Reservoir northern pike.

Stream surveys were conducted to update management files. Additional cutthroat trout from streams along the Rocky Mountain front were tested by electrophoresis, and were determined to be genetically pure westslope cutthroat strain. Preliminary surveys indicated some survival of the grayling introduced into Rock Creek. Future surveys are needed to determine survival and if a self-sustaining population is developing. Average length of rainbow trout in the forks of the Sun River was increased slightly. This parameter should be monitored in future surveys to detect any change in trends. Past surveys indicate that the population goes through a cycle where average length increases, declines, and then increases again.

LITERATURE CITED

Hill, William J. and Alfred H. Wipperman. 1984. Inventory and Survey of Waters in the Western Half of Region Four. Montana Department of Fish, Wildlife and Parks. Job Progress Report. F-5-R-33, Job No. I-a.

Hill, William J. and Alfred H. Wipperman. 1985. Inventory and Survey of Waters in the Western Half of Region Four. Montana Department of Fish, Wildlife and Parks. Job Progress Report. F-5-R-34, Job No. I-a.

Hill, William J. 1986. Preliminary Environmental Review. Spottail Shiner Introduction into Pishkun Reservoir. Montana Department of Fish, Wildlife and Parks.

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

Date: July 10, 1986

CODE NUMBERS OF WATERS REFERRED TO IN THE REPORT ARE:

14-2880	Lee Creek
14-3280	Marias River Sec 02
14-3760	No. Fk. Badger Creek
14-7080	Bynum Reservoir
14-7320	Eureka Reservoir
14-7440	Lake Frances
14-8540	Priest Butte Lake
14-9240	Lake Elwell (Tiber Reservoir)
17-4896	Missouri River Sec 09
17-8720	Bean Lake
17-	Goose Pond
17-9136	Holter Lake
20-4400	No. Fk. Sun River
20-5100	Rock Creek
20-6500	So. Fk. Sun River
20-7005	Canal Lake
20-7730	Little Pishkun Pond
20-7900	Nilan Reservoir
20-7950	Pishkun Reservoir
20-8400	Tunnel Lake
20-8500	Willow Creek Reservoir