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.

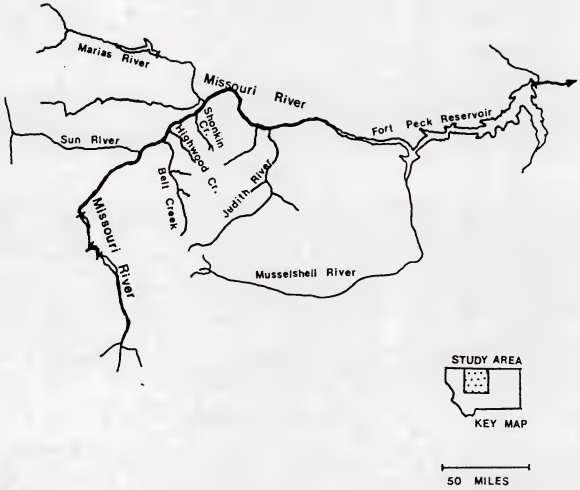

Figure 1. Map of the Study Area

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

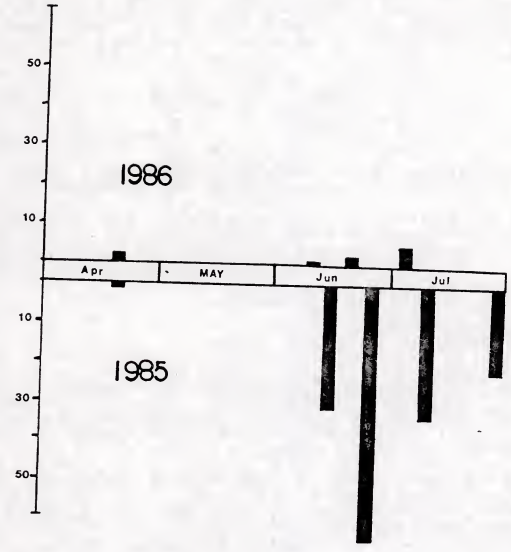

Figure 2. Histogram of the total number of Shovelnose Sturgeon counted in the six-mile study section while electrofishing in the lower Marias River, 1985-86.

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.

LITERATURE CITED

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Nelson, F.A. 1980. Guidelines for using the wetted perimeter (WETP) computer program of the Montana Department of Fish, Wildlife and Parks. 23 pp.

USGS. 1982. Water resources data for Montana. U.S. Dept. of Interior.

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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