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

State: Montana Title: Northcentral Montana Fisheries Study

Project No.: F-46-R3 Title: Missouri River Pallid Sturgeon

Job No.: IIId Inventory

Title: Planning Inventory, Fisheries

Period Covered: July 1, 1989 through June 30, 1990

ABSTRACT

A study to evaluate the status of the pallid sturgeon in the middle Missouri River was initiated. The historical record of the pallid in the study area was investigated and out of 50 resident interviews and Department of Fish Wildlife and Parks (MDFWP) records a total of 35 pallid observations were documented. No pallid sturgeon were observed while sampling with gill nets and set lines during the fallof 1989. The Tiber Dam tailwaters trout fishery was evaluated for population improvements since 1985 when the Bureau of Reclamation began meeting recommended instream flows. The trout population appeared to have declined this past year compared to previous years. Very few yearling trout were sampled along with low numbers of larger trout.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. **To determine current status (abundance and distribution) of pallid sturgeon in Missouri River upstream of Fort Peck Dam.** Sampling for pallid sturgeon was initiated and carried out throughout the study area.

2. **To enhance trout populations and trout fishing opportunity in Marais River immediately downstream from Tiber Dam.** Trout populations in the Marias were monitored and wild rainbow trout eggs from the Madison River were collected for a later stocking of fingerlings in the Marias.

3. **To secure adequate instream flows in 20 - 30 streams in the mid-Missouri drainage.** Several irrigation projects from conservation districts were evaluated and comments forwarded to MDFWP water resource supervisor.

4. To maintain streambanks and beds in a stable and near-natural condition in Chouteau and Liberty counties (state funded). Two stream projects, both carried out by the Department of Highways, were evaluated and recommendations were given to MDFWP stream habitat bureau.

PROCEDURES

Interviews for determining the historical occurrence of pallid sturgeon in the study area were usually conducted in the home of the interviewee. When this could not be accommodated a telephone interview would be arranged. The list of people interviewed included individuals who may have knowledge about pallid sturgeon. This list was expanded to include people recommended by several of the interviewees. A typical interview consisted of an explanation of the project, description of the 2 species of sturgeon along with photographs for comparative purposes and recording of the information that interviewees had to offer concerning knowledge of sturgeon in the study area. Sightings of pallid sturgeon were assigned to three categories. Class I sightings were confirmed sightings of a pallid sturgeon. Records of these sightings were well docuemented with photos, newsclippings or had identification confirmed by a MDFWP employee. Class II sightings were most likely sightings of a pallid. Records of these sightings were based on ability to distinguish between the two species of sturgeon found in the study area, reported measurements of the sturgeon and ability to cross-reference sighting with another person. Class III sightings were possible sightings of a pallid. Records of these sightings could not be confirmed with any of the above methods and the interviewee was not familar with the identification of the two sturgeon species. Class III sightings were not included in the total number of docuemented pallid sturgeon sightings because of the possibility for an incorrect identification. Transcripts from each interview were summarized and placed on file.

Stationary gill nets, setlines and electroshocking were used to capture sturgeon. The sinking gillnets were 100-150 long, 6 feet high, with 3 inch bar mesh. Nets were anchored to a steel fence post and then positioned oblique or parallel to the current. Catch per unit effort for gill net sampling was expressed as number of fish caught for an overnight set. Setlines were 20-30 feet long with four 12 inch staging lines. Hooks from size 2/0 to 4 were tied on each staging line and baited with cut goldeye meat. The lines were usually set from the shore in deep pool areas and anchored to the shore with a stake. Catch per unit effort for setline fishing was expressed as number of fish caught for an overnight set.

The electroshocking system used was adapted from the system described by Novotny and Priegal (1976). The electroshocking apparatus was a boom-type and mounted on a 14-foot aluminum McKenzie style driftboat powered by a 10 hp outboard motor. Power was supplied by a 3500-watt AC generator. The alternating current

was delivered to a Coffelt Model VVP-10 rectifying unit which changes the alternating current to pulsed or continuous direct current. The positive electrode consisted of two circular hoops with twelve 16-inch stainless steel droppers fastened on each hoop. These electrodes were supported by fiberglass booms and were positioned about six feet in front of the boat. The hull of the boat served as the negative. The unit was typically operated at 2-7 amps, 100-215 volts and continuous direct current. A Coffelt Model BP-6 gas powered backpack shocker was used for young-of-the-year (YOY) trout sampling.

All sturgeon were measured to the nearest 0.1 inch and weighed to the nearest 0.1 pound. A numbered plastic cinch tag was attached to the keel of the dorsal fin for identification purposes. Morphometric measurements recorded from sturgeon were: total, fork and standard lengths, head length, barbel lengths, mouth width, caudal peduncle length, distance between inner barbel and mouth; and distance between outer barbel and snout tip. These measurements will then be used for a Character Index, as modified by Carlson and Pflieger (1981), to test for hybridization. This index gives a single expression of how each sturgeon used in the analysis compares with every other sturgeon in the composite of the characters studied. It can be used to objectively rank the sturgeon with the most shovelnose-like characteristics at one extreme of the ranking and the most pallid-like characteristics at the other extreme.

FINDINGS

Introduction

Pallid sturgeon are found in the Wild and Scenic portions of the Missouri River in Montana. They exist in low numbers throughout their geographic range (Pflieger 1975) as is probably the case in this section of the Missouri River. Recently the U.S. Fish and Wildlife Service proposed the pallid for federal listing as "endangered" under the Endangered Species Act 1976. Reasons for listing are habitat modification and apparent lack of reproduction. Reports of pallid sturgeon sightings have also declined dramatically in the last 20 years (U.S. Fish and Wildlife Service, 1989). The pallid sturgeon has been listed as a class A "species of special concern" in Montana since 1973 (Holton, 1980).

In an effort to determine the past and present status of the pallid sturgeon in this 200 mile reach of river, the MDFWP is conducting a fisheries study directed at learning more about this species. Results from the study will be used to develop a status report. This report will aid in devising management and recovery plans designed to maintain and enhance the pallid population in the river.

Description of Study Area

The study area for the pallid sturgeon study consists of a 175 mile reach of the mainstem middle Missouri River in northcentral Montana from Fort Benton to the headwaters of Fort Peck Reservoir near Lewistown (Fig. 1). There are two major tributaries entering the Missouri in this reach; the Marias River from the north and Judith River from the south. The present flow regimen of the Missouri river in the study area is not entirely natural because of regulation and storage at several upriver dams. The study area was divided into 8 study sections and the mileage for each is given in Table 1.

Table 1. Locations of study sections on the middle Missouri River.

SECTION	RIVER MILE upper	lower	LOCATION
Fort Benton	0	18	T24N R8E Sec26 to T25N R10E Sec28
Loma	18	33	T25N R10E Sec28 to T26N R11E Sec28
Coal Banks	33	51	T26N R11E Sec28 to T26N R13E Sec31
White Rocks	51	76	T26N R13E Sec31 to T23N R15E Sec31
Judith Landg.	76	100	T23N R15E Sec31 to T23N R18E Sec33
Stafford F.	100	122	T23N R18E Sec33 to T23N R21E Sec3
Cow Island	122	142	T23N R21E Sec3 to T22N R23E Sec17
Robinson Bg.	142	175	T22N R23E Sec17 to T21N R27E Sec10

The study area for the Tiber Dam tailwater study is a 21 mile reach of the Marias River extending from the dam near Chester to the Circle Bridge at Highway 223. Tiber Dam, a water storage reservoir, completely controls the flows in the river downstream.

Pallid Sturgeon Historical Abundance Survey

An attempt was made to determine the historical abundance and distribution of pallid sturgeon in the study area. Fifty individuals were interviewed, including local newspaper editors, MDFWP personnel, long-time residents, fisherman, river ferry operators, farmers, commercial fisherman, U.S. Fish and Wildlife Service and U.S. Soil and Conservation Service personnel, and local bait and tackle owners. These people resided in 13 communities throughout the study area. Their ages ranged from 18 to 92 years old.

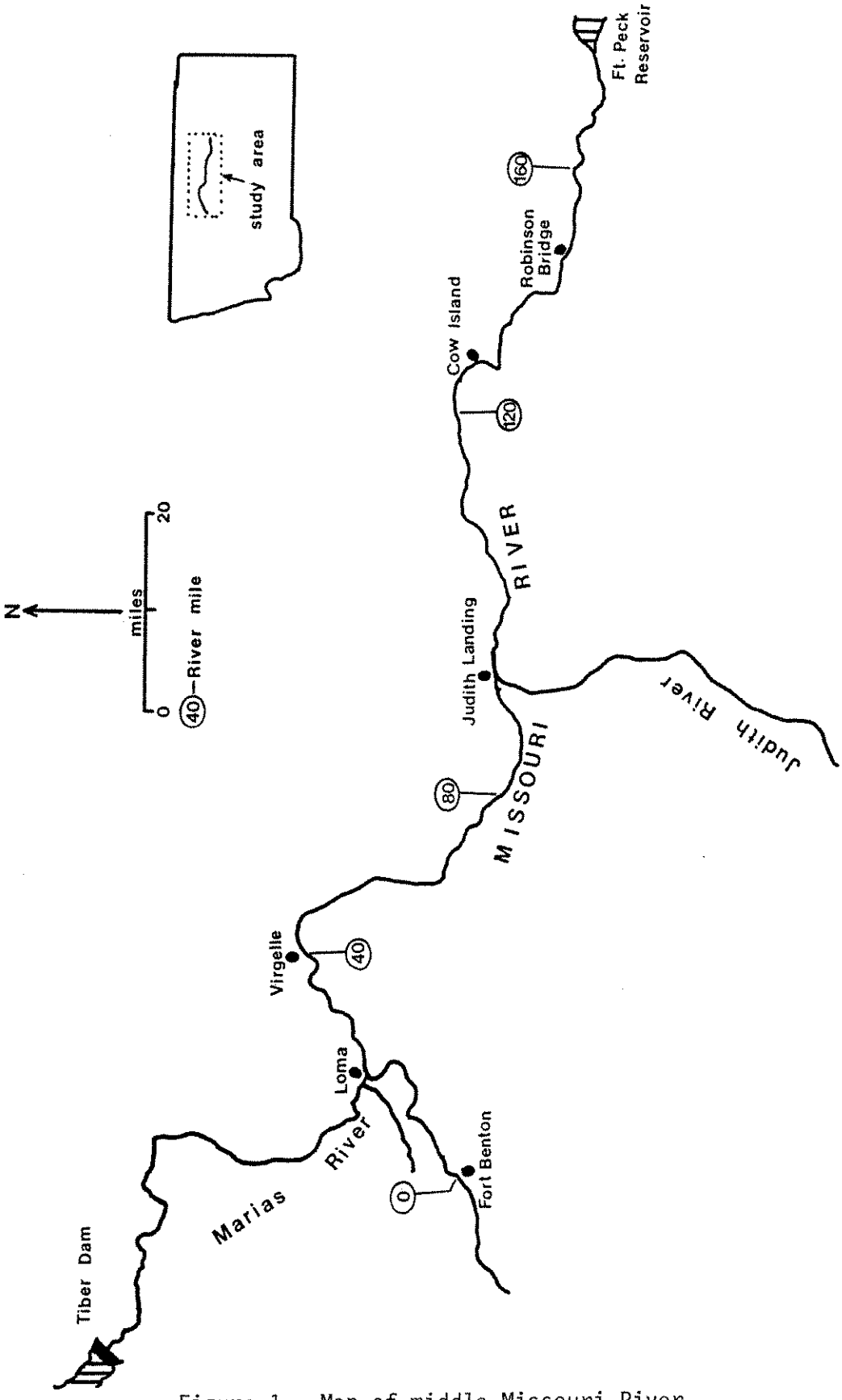


Figure 1. Map of middle Missouri River drainage and study area.

Other pallid sightings in the study area summarized by Keenlyne (1989) are included so that the sightings list is complete as possible.

There have been 35 documented pallid sturgeon sightings for the middle Missouri River (Table 2). The earliest sighting occurred at Fort Benton in 1876, while the most recent was recorded in 1987 near the Robinson Bridge. Thirty-two percent of the 50 people interviewed reported a class I or II sighting. An additional 15 respondents indicated they observed a pallid (class III observation) but could not provide sufficient documentation to be included in the total. Of the 35 class I and class II pallid sturgeon sightings 15 were caught by or in the presence of the interviewee; 9 were documented sightings of pallids not actually observed by interviewee; and the remaining 11 sightings were from fisheries biologists observed during the course of their surveys.

The pallids with recorded weights ranged from 17 to 62 pounds and averaged 36 pounds (Table 1). Five of the respondents reported catching small white colored sturgeon (less than 12 pounds) although these observations were not documented. Reported methods of capture for pallid sturgeon were varied. For 22 pallids with known method of capture, 8 were caught on setlines, 7 caught snagging while attempting for paddlefish, 4 in gillnets and 3 observed while conducting electrofishing surveys. Brown (1971) stated that pallid sturgeon are not known to take a baited hook, but are more likely to be snagged by paddlefish anglers.

Observations of pallid sturgeon span the period that European man settled in this reach of the Missouri (Figure 2). The frequency of pallid sturgeon sightings appear to have always been low. In the three decades from 1960 to present the rate of pallid sturgeon sightings have averaged 0.7 fish per year. The 1970's had the most observations totalling to 9 in this ten year period. The MDFWP was conducting an intensive fisheries study During the 1970's in this section of the Missouri and accounted for three of the nine pallid observations. During the 1980's only five pallid sturgeon observations were recorded. This may be indicative of a decline in their numbers but it may also be related to a change in the fishing regulations beginning in 1980 restricting the sturgeon taken to a maximum weight of 16 pounds. This regulation in effect precludes the taking of pallid sturgeon.
Keenlyne (1989) reports a general decline in pallid sturgeon observations over the past years. For the entire Missouri River numbers of observations have been steadily declining from a high of 500 observations for the 1960's to only 56 observations for the 1980's.

To a large extent, the locations where the greater number of pallid sturgeon were observed are places that receive the most general fishing use and have good public access. River mile segment (RM) 160 was the section where the greatest number of pallid sturgeon observations were recorded (Figure 3).

Table 2. Documented pallid sturgeon observations in the middle Missouri River, MT. (1876 - 1990).

Year	River Mile	Location	Person	Evidence	Fish Wt.
1876	0	Ft. Benton	Brown/Cope	biologist	47
1887	0	Ft. Benton	J. Overholser	newspaper	55
1893	0	Ft. Benton	J. Overholser	newspaper	46
1894	0	Ft. Benton	J. Overholser	newspaper	24
1919	0	Ft. Benton	W. Morger	recall	20
1924	24	Loma	H. LeFurgey	photo	66
1931	0	Ft. Benton	J. Hankins	cross ref.	-
1938	149	Robnsn Bdg.	Dr. Shavers	recall	45
1941	24	Loma	H. LeFurgey	recall	38
1946	23	Loma	L. May	recall	25
1948	149	Robnsn Bdg.	F. Emery	photo	-
1949	270	Ft. Peck Rs	Brown/Newman	biologist	36
1949	275	Ft. Peck Rs	Bailey/Cross	biologist	-
1953	88	PN Ferry	A. Rice	newspaper	-
1958	23	Loma	C. Blodgett	photo	-
1960	270	Ft. Peck Rs	C. Brown	biologist	40
1962	160	Robnsn Bdg.	C. Schoenbergr	recall	-
1964	25	Loma	E. Olson	photo	62
1964	25	Loma	E. Olson	photo	20
1964	39	Virgelle	R. Needham	biologist	60
1968	275	Ft. Peck Rs	R. Needham	biologist	20
1970	160	Robnsn Bdg.	M. Poore	biologist	40
1974	160	Robnsn Bdg.	D. Rush	warden	-
1975	160	Robnsn Bdg.	M. Poore	biologist	35
1977	160	Robnsn Bdg.	R. Needham	biologist	47
1977	127	Cow Island	R. Berg	biologist	-
1977	122	Bullwhacker	R. Berg	biologist	-
1978	37	Virgelle	R. Berg	biologist	32
1979	275	Ft. Peck Rs	J. Liebelt	biologist	35
1979	149	Robnsn Bdg.	J. McCollum	ranger	17
1980	160	Robnsn Bdg.	L. Schweitzer	recall	-
1980	160	Robnsn Bdg.	L. Schweitzer	recall	-
1986	160	Robnsn Bdg.	L. Roberts	photo	25
1986	263	Ft. Peck Rs	R. Needham	biologist	33
1987	160	Robnsn Bdg.	D. Rush	warden	27

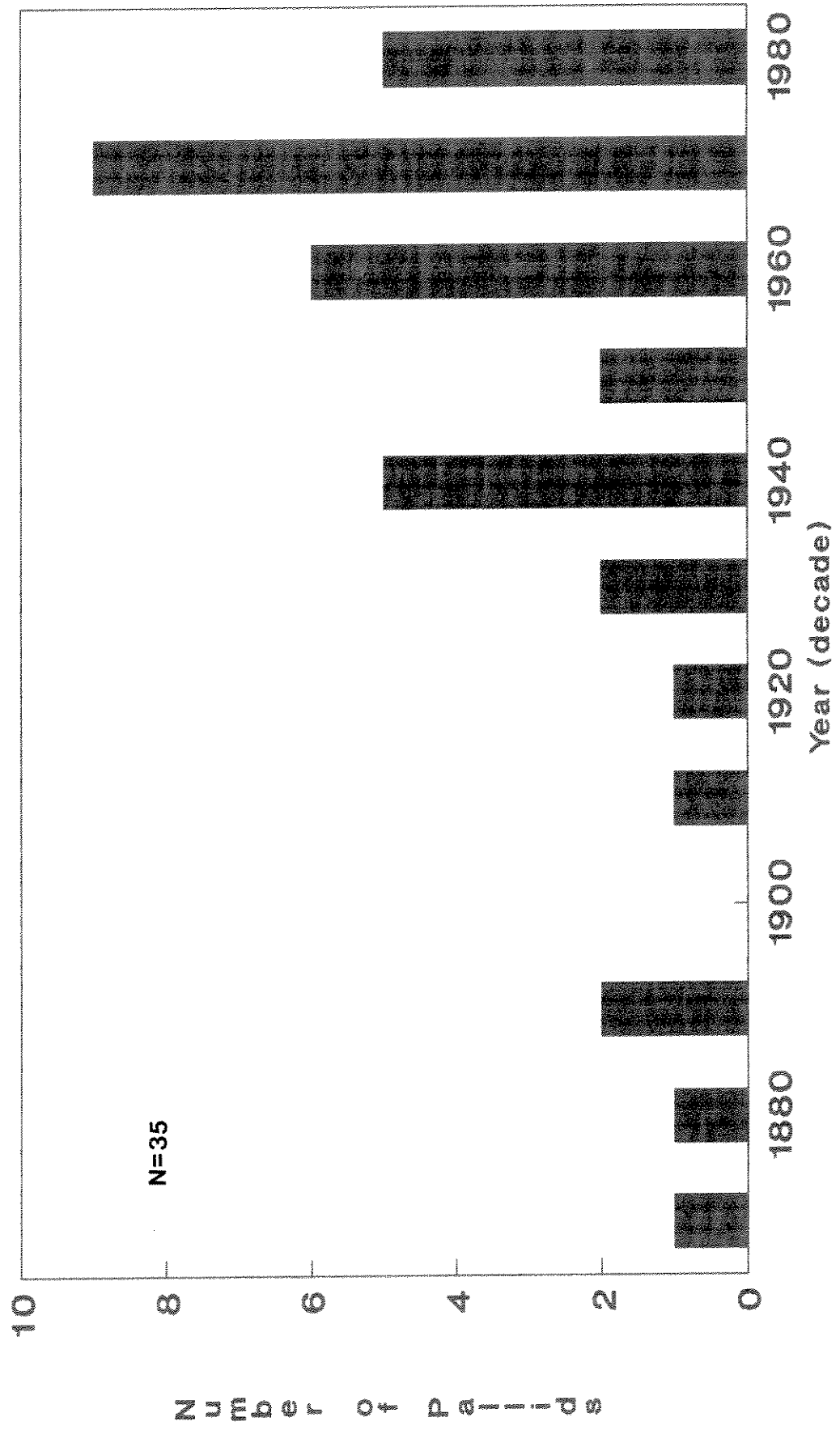
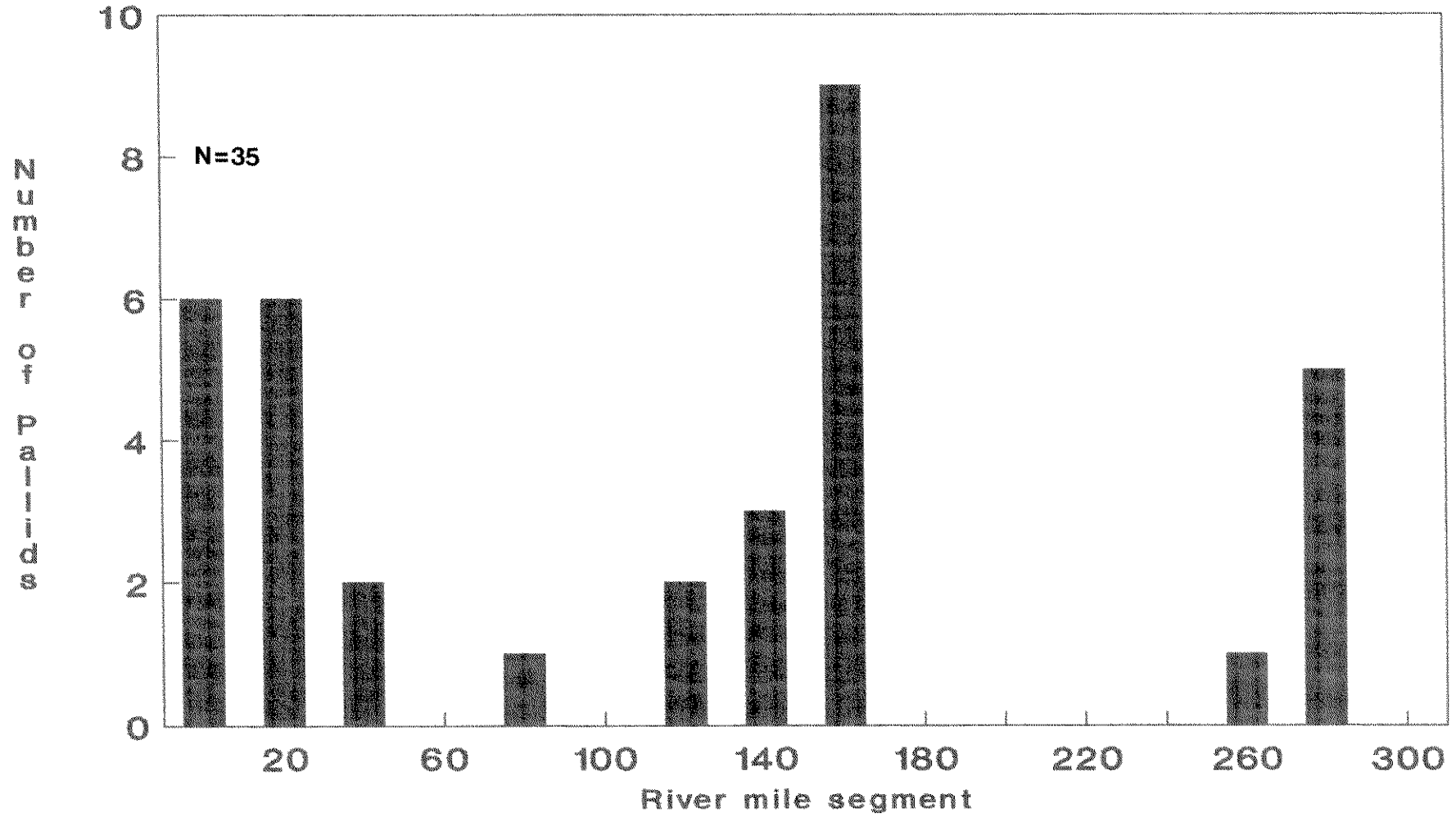


Figure 2. Pallid sturgeon sightings by decade, middle Missouri River.

Figure 3. Pallid sturgeon sightings by river mile segment in the Missouri River, 1876 -1990.



This section is located immediately up river from the upper end of Fort Peck Reservoir. A popular paddlefish snagging area is located here and a number of pallid sturgeon were caught incidentally the while snagging for paddlefish. Pallid sturgeon were also recorded in higher numbers in the vicinity of RM 0 and RM 20 segments. The Marias River enters the Missouri at RM 21 and may have played an important role attracting pallids to this area of the river. Finally, five observations of pallid sturgeon were reported in the area around RM 280. This location in Fort Peck Reservoir at the lower end. Extensive fisheries studies and commercial fishing operations have been occurring in this area over the past 30 years and most of the pallid sturgeon sightings have been associated with these activities.

Most of the pallid sturgeon sightings (14 of 15) since 1964 have occurred in the lower 50 miles of the study area or in the reservoir. The reason for this is unclear, but, it could be related to the improved fishing access at this lower reach associated with the addition of the Robinson Bridge in 1959. The decline in pallid sightings in the upper reach may correspond to changes in the flow regime of the Marias River attributed to the impounding of this major tributary with Tiber Dam in 1955. There is some evidence which indicates that Tiber Dam may have eliminated a paddlefish spawning run in the Marias River due to changes in flow and/or temperature regimes. Paddlefish were believed to migrate up the Marias River before the construction of Tiber but fisheries surveys and fisherman reports have not documented their presence in the last 10 years. Pallid sturgeon use of the Marias may have been similarly affected. The Marias River is very isolated and only a few people could be located to discuss possible historic pallid sturgeon sightings. No pallid sightings were reported by the three people interviewed. These people lived on the river between 1920 and 1980.

Present Status of the Pallid Sturgeon Population

The pallid sturgeon is a difficult fish to study because of its life habits and sparce abundance. Carlson and Pflieger (1981) studied pallid sturgeon populations in Missouri and caught only 11 pallids out of 4062 sturgeon sampled in two field seasons. Berg (1981) conducted a 5-year fisheries planning and inventory study in the middle Missouri River, Montana and only captured one pallid and observed two others. Primary sampling methods he used were electroshocking, gill netting and frame traps. Use of electroshocking for sampling pallid sturgeon is presently being discouraged because this method may cause back injuries to the fish. Gill netting and setline fishing are probably the most effective means of capturing sturgeon. However, after one field season both proved to be of limited use and effectiveness in this study area.

A total of 69 shovelnose sturgeon were sampled using electroshocking, gill netting and setline fishing techniques during the field season, July 6 - December 1, 1989. No pallid sturgeon were sampled during this period. Electroshocking was used for only 5 days in areas frequented by shovelnose sturgeon to increase the sample size of shovelnose and monitor their spawning run up the Marias River. All 69 shovelnose sturgeon were tagged with plastic cinch tags, and morphometric data were recorded for 32 shovelnose. These fish averaged 33.4 inches total length (range 27.3 - 39.2 inches) and 5.5 pounds in weight (range 2.5 - 10.5 pounds). Analysis of morphometric characteristics will be used to determine hybridization and be reported next year.

Gill netting in the study area during the fall was hindered by large amounts of drifting filamentous algae that clogged the nets and decreased their effectiveness. Results from the gill net surveys are reported in Table 3. The low catch rates probably are not indicative of the shovelnose population in the study area.

Table 3. Gill netting results for sturgeon sampled in the middle Missouri River, September - November, 1989.

Study Section	Total No. of Sets	Avg. No. of Sets/Day	No. Sturgeon Caught	Avg. No. Sturgeon/Set
Loma	7	3.5	4	0.6
Coal Banks	5	2.5	1	0.2
White Rocks	6	3.0	12	2.0
Judith Lndg.	3	3.0	0	0
Cow Island	13	3.2	3	0.2
Total	34	3.1	20	0.6

Setline fishing also proved to be ineffective for sampling sturgeon. No sturgeon were caught using this method despite a considerable amount of effort (Table 4). Drifting filamentous algae hindered the effectiveness of this method by covering the baited lines making it impossible for fish to get at the hooks. Another problem that affected our efficiency was the light weight line and hooks that were used. There were several instances where the staging lines broke because of the light-weight line that was used.

Table 4. Setline fishing results for sturgeon sampled in the middle Missouri River, August - December, 1989.

Study Section	Total No. of Setlines	Avg. No. Setlines/Day
Loma	36	5.1
Coal Banks	8	4.0
White Rocks	1	1.0
Total	45	4.4

Marias River - Tiber Dam Tailwater

A coldwater fishery exists in a 21 mile reach of river below Tiber Dam. This condition is maintained by coldwater releases from Tiber Dam. Prior to 1985 the coldwater fishery existed far below its potential because of inadequate instream flows and periodic surface warmwater releases from the dam (Gardner and Berg 1983). Flows in the Marias below Tiber have been 500 cfs or greater for the periods June 1985 through August 1988 and May 1989 to present. Since 1985 summertime water releases from Tiber have been from the bottomof the reservoir, thereby maintaining the coldwater conditions.

The trout fishery has improved substantially since 1985, most likely in response to the better flow and temperature conditions. Field studies in 1987 showed marked improvements in trout numbers, sizes and reproductive success. Results from the 1988 survey indicated that the trout populations had stabilized and not continued to improve as anticipated. Field studies during 1989 were not productive and it was difficult to determine whether it was because of equipment malfunctions or low trout population levels.

A number of mountain whitefish, brown and rainbow trout were sampled and a summary of the size statistics are given in Table 5. Survey data indicated that populations of all three species were dominated by large older fish. Small fish or yearlings were noticeably absent. A possible explanation for the apparent lack of small trout could be related to the poor flow conditions experienced the previous winter. During the fall and winter of 1988-89 river flows below Tiber were reduced below the minium instream flow of 500 cfs to 300 cfs because of drought conditions.

Low winter flows in the Marias River may have resulted in a substantial reduction of rearing habitat for juvenile trout.

Table 5. Comparison of size statistics for mountain whitefish and trout sampled in the Marias River, Tiber section, 1987-89.

	Year	Number	Avg. Length (inches)	Avg. Weight (pounds)	Mode (inch)	Median (inch)
Mountain whitefish						
	1988	104	12.3	0.78	9	12.6
	1989	99	13.1	0.91	15	13.2
Brown trout						
	1987	102	15.7	2.00	8	17.0
	1988	111	14.0	1.24	13	13.9
	1989	27	17.0	1.89	16	16.3
Rainbow trout						
	1987	108	12.2	0.87	7	12.3
	1988	124	11.5	0.63	10	11.5
	1989	5	13.8	1.00	15	15.1

Young-of-the-year (YOY) brown and rainbow trout surveys at established study sites confirmed that numbers of YOY trout sampled in 1989 declined from previous years (Table 6).

In response to the declining rainbow trout population a plan was developed to stock the Marias with wild fingerling rainbows from the Madison River. This action was taken to: 1.) increase numbers of rainbow trout to anglers, 2.) possibly enhance natural reproduction by introducing rainbow from a population known to reproduce effectively by spawning in a mainstem river, and 3.) determine whether or not survival of juvenile fish during the first year is a critical limiting factor. We intended to collect 15,000 -20,000 eggs from the wild source during the spring, incubate them in the state hatchery and stock them in the Marias during September when they reach 3 inches in length. All the fingerlings would be adipose clipped for identification in future years. About 400 rainbows averaging about 15 inches were examined on the Madison River near Ennis for spawning condition in spring 1990. From this total only 10 females could be spawned yielding approximately 7000 eggs to be incubated in the hatchery. Incubation of these wild trout eggs was highly successful, producing 5300 fish at the fingerling stage. Half of the fingerlings will be stocked this fall after flows from Tiber are reduced for the season.

The remaining portion will be stocked in spring when river temperatures warm up. Stocking the rainbow fingerlings at different sizes and seasons will make it possible to evaluate which strategy for stocking is best suited for the Marias River.

Table 6. Numbers and sizes of young-of-the-year trout sampled in the Marias River during late August, 1987-89.

Year	Species	Number Sampled	Average Length	Section Length
Park (Right) (River mile 1.0)				
1987	Brown trout	52	2.7	100 yds.
	Rainbow trout	13	1.9	100 yds.
1988	Brown trout	32	3.0	150 yds.
	Rainbow trout	19	2.4	150 yds.
1989	Brown trout	34	2.8	150 yds.
	Rainbow trout	15	2.0	150 yds.
Park (Left)				
1987	Brown trout	26	2.9	50 yds.
	Rainbow trout	13	1.9	50 yds.
1988	Brown trout	36	3.0	75 yds.
	Rainbow trout	39	2.2	75 yds.
1989	Brown trout	4	3.1	100 yds.
	Rainbow trout	3	2.2	100 yds.
Pugsley Bridge Side Channel (River mile 5.3)				
1987	Brown trout	7	3.0	200 yds.
	Rainbow trout	16	1.9	200 yds.
1988	Brown trout	27	3.3	200 yds.
	Rainbow trout	32	2.5	200 yds.
1989	Brown trout	1	-	200 yds.
	Rainbow trout	0	-	200 yds.

RECOMMENDATIONS

1. Continue with the pallid sturgeon study. Sampling techniques should be improved on and other sampling methods explored. Radio telemetry monitoring of individual pallids should be attempted. This would give us repeat sightings for the same fish and provide better information about habitat use and movements and possibly direct us to other pallid sturgeon.

2. Monitor trout population trends in the Tiber Dam tailwater section by conducting biennial standing crop estimates. Trout cover, especially for young-of-the-year and yearling fish should be improved in the Marias. Continue with the wild rainbow trout stocking program for three years and complete evaluation for future management plans. Problems with trout reproduction and recruitment should be investigated more thoroughly, possibly through a special project funded by the Bureau of Reclamation.

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Code numbers of waters referred to in this report are:

16-2520	Missouri River	Section 06
16-2522	Missouri River	Section 06B
17-4864	Missouri River	Section 07
14-3240	Marias River	Section 01