

**LOWER MISSOURI RIVER AND YELLOWSTONE RIVER
PALLID STURGEON STUDY**

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ABSTRACT

A total of 10 pallid sturgeon ranging in weight from 12.7 to 26.3 kg were captured by drift netting and SCUBA in the Missouri River during 1996. The fish averaged 19.4 kg and ranged in weight from 12.7 kg to 26.3 kg. Mean fork length was 1446.6 mm and ranged from 1319 mm to 1552 mm. Seven were recaptures from previous years and three were "new" fish. None of the three "new" fish were suspected pallid x shovelnose hybrids based on character index measurements. Habitat measurements were taken at all pallid sturgeon capture sites. Shovelnose sturgeon were the most abundant species captured by drift netting in the Missouri and Yellowstone Rivers with a total of 422 caught. An additional 358 were caught with stationary gill and trammel nets primarily in section 1. Only four were netted in the Milk River. The combined mean fork length was 598.9 mm and ranged from 185 to 904 mm and the mean weight was 950.2 gms and ranged from 20.6 to 3900.0 gms. A total of 51 shovelnose sturgeon recaptures from previous years tagging were recovered. Twenty-nine of 31 originally tagged in the Fort Peck tailwater/dredge cut complex were again recovered in this area and the majority of recaptures were recovered within 8.0 km of the original capture site. Surface and bottom larval fish sampling in the Milk, Missouri and Yellowstone rivers collected three larval sturgeon in the Yellowstone River but none in the Milk or Missouri rivers. Eleven and two larval paddlefish were collected in the Missouri and Yellowstone rivers, respectively, and none were found in Milk river samples. Beach seining captured a total of 25 species of fish in the Milk, Missouri and Yellowstone rivers. The Milk River had the greatest diversity of species with 19, including blue sucker. This was the only section where blue sucker were captured. Flathead chubs were the most abundant species captured and comprised 31.7 percent of the total number of fish seined in all sections. The most fish captured were in section 1 with a total of 516 fish; approximately 61 percent were longnose and white sucker. A trawl was used to sample deep, main channel habitat in the Missouri and Yellowstone rivers. Seven species of fish were collected with sicklefin chub and sturgeon chub the most common.

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INTRODUCTION

This report summarizes 1996 field research of the lower Missouri River and Yellowstone River Pallid Sturgeon Project. Funding was provided by the Western Area Power Administration. Project objectives were to: 1) Investigate the relationships between pallid sturgeon and associated fish species relative to river reach, discharges, habitat type, season and physical characteristics of the lower Missouri and Yellowstone rivers; 2) Measure physical habitat characteristics at regular sampling and all pallid sturgeon capture locations; 3) Collect and monitor larval drift of sturgeon and other species in both rivers; 4) Measure morphological characteristics on all pallid sturgeon to determine if pallid x shovelnose hybrids are present; 5) Collect macro invertebrates in both rivers; 6) Sample for juvenile sturgeon and species of special concern, i.e. blue sucker, sturgeon chub, sicklefin chub, western/plains silvery minnow; 6) Sample and monitor fish species in the lower Milk River.

STUDY AREA

The study area is comprised of approximately 355 km of the Missouri River from Fort Peck Dam to the headwaters of Lake Sakakawea, North Dakota, the lower 114 km of the Yellowstone River from the mouth to Intake Dam, and the lower 9 km of the Milk River (Figure 1). The Missouri River was divided into seven study sections, the Yellowstone River into two sections, and the Milk River was treated as one section (Table 1). Only six sections of the Missouri River could be sampled due to high reservoir conditions of Lake Sakakawea which inundated most of section 7. A detailed description of the Missouri and Yellowstone rivers study area is provided by Tews (1994), and additional information on the physical characteristics of the Missouri River is found in Gardner and Stewart's report (1987). The lower Milk River is characterized as a low gradient (0.12 m per km in the lower 23 km) turbid stream, with historic flows ranging from 0 cfs to about 45,000 cfs. Rocky riffles followed by pools are common with heavy sedimentation in the pool areas. The river is primarily used for irrigation but still manages to support a wide array of fish species commonly associated with the Missouri River.

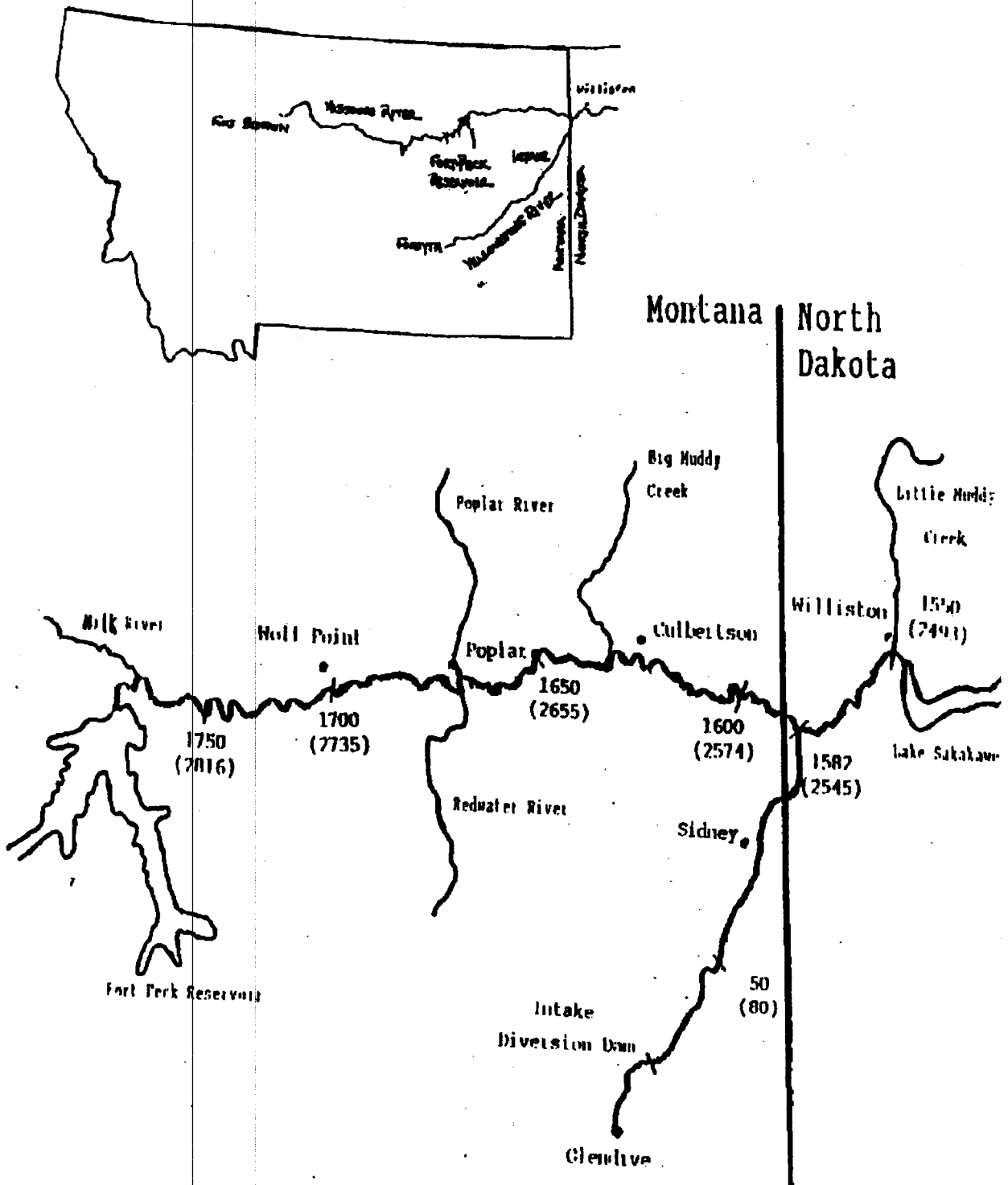


Figure 1. Map of Lower Missouri and Yellowstone river pallid sturgeon study area with river miles (kilometers).

Table 1. Section numbers and location by river mile and physical features.

Section	Location
0	Lower 15 miles of Milk River
1	Fort Peck Dam to the mouth of Milk River River Mile 1770 to 1761
2	Mouth of Milk River to Wolf Point River Mile 1760 to 1708
3	Wolf Point to mouth of Redwater River River Mile 1707 to 1683
4	Mouth of Redwater River to mouth of Big Muddy River Mile 1682 to 1630
5	Mouth of Big Muddy to mouth of Yellowstone River River Mile 1629 to 1582
6	Mouth of Yellowstone River to highway 85 bridge River Mile 1581 to 1553
7	Highway 85 bridge to Lake Sakakawea River Mile 1552 to 1530
8	Yellowstone River from Intake to highway 23 bridge River Mile 71 to 30
9	Highway 23 bridge to mouth of Yellowstone River River Mile 29 to 0

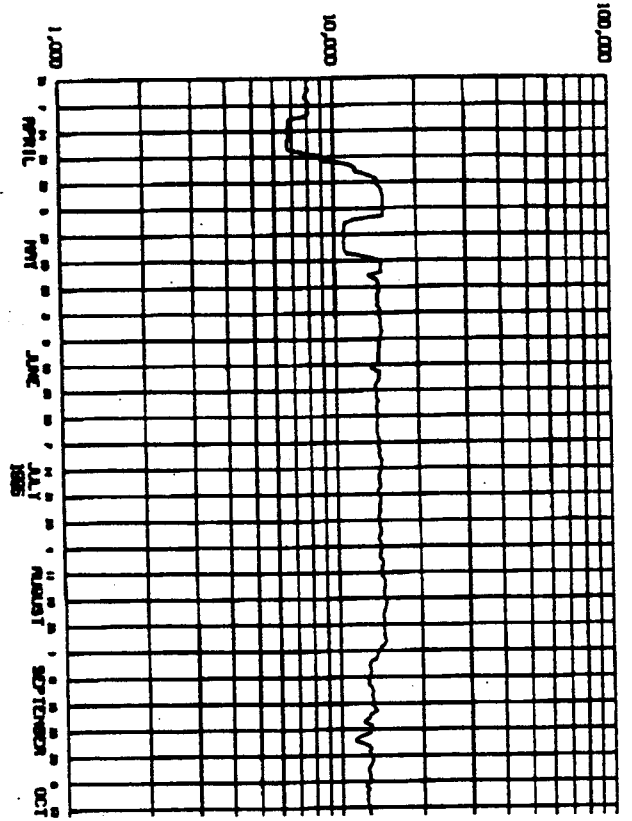
Discharges from Fort Peck Dam ranged from 6,700 cfs to 15,200 cfs and averaged 13,073 cfs between April and October, 1996. In addition, the Fort Peck spillway discharged varying flows between May and August 1 ranging from 700 cfs to 4,000 cfs periodically during May and continually from June through July. Flows averaged about 1,000 cfs during this period.

Discharges in the Missouri River at Culbertson ranged from 12,100 cfs to 18,137 cfs and averaged about 15,700 cfs for the same time period. The Milk River at Nashua (36.5 km from Missouri River confluence) ranged from 44 cfs in July to 7,320 in April and averaged 996 cfs from April through October. The Yellowstone River at Sidney ranged from 4,820 cfs in August to 65,300 cfs in June and averaged 19,113 cfs. Monthly minimums, maximums and averages for these sites are shown in Table 2. Hydrographs for the Missouri River at Fort Peck Dam and Culbertson, the Milk River at Nashua, and the Yellowstone River at Sidney for 1966 are shown in Figure 2.

Table 2. Mean discharges and range of maximum and minimum flows for the Missouri River at Fort Peck and Culbertson, the Yellowstone River at Sidney and Milk River at Nashua from April through October, 1966. Maximums and minimums for the time period are shown in parentheses.

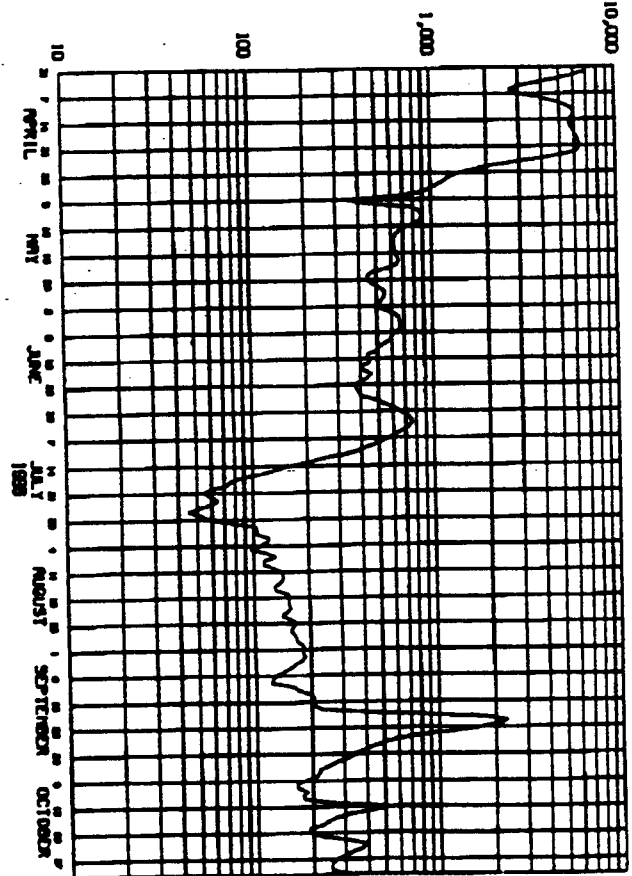
	Mean Discharges(cfs)	Average Maximums(cfs)	Average Minimums(cfs)
Missouri River Fort Peck	13,073	14,629 (15,200 May)	12,171 (6,700 April)
Missouri River Culbertson	15,735	19,471 (29,200 April)	14,071 (12,100 Sept.)
Yellowstone River Sidney	19,113	27,733 (65,300 June)	12,610 (4,820 Aug., Sept.)
Milk River Nashua	996	1,869 (7,320 April)	317 (44 July)

DISCHARGE, IN CUBIC FEET PER SECOND



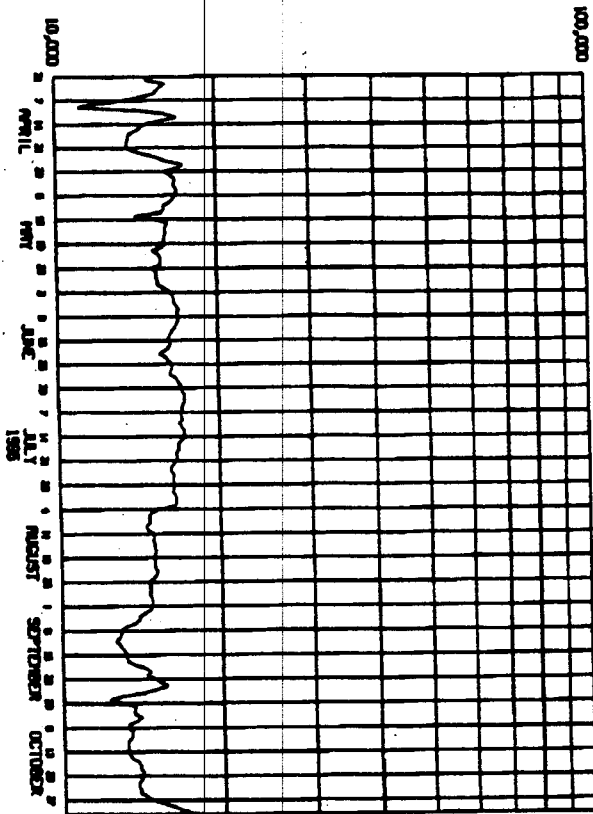
A — 06132000 MISSOURI RIVER BELOW FORT PECK DAM,
MEAN DAILY DISCHARGE (CFS)

DISCHARGE, IN CUBIC FEET PER SECOND



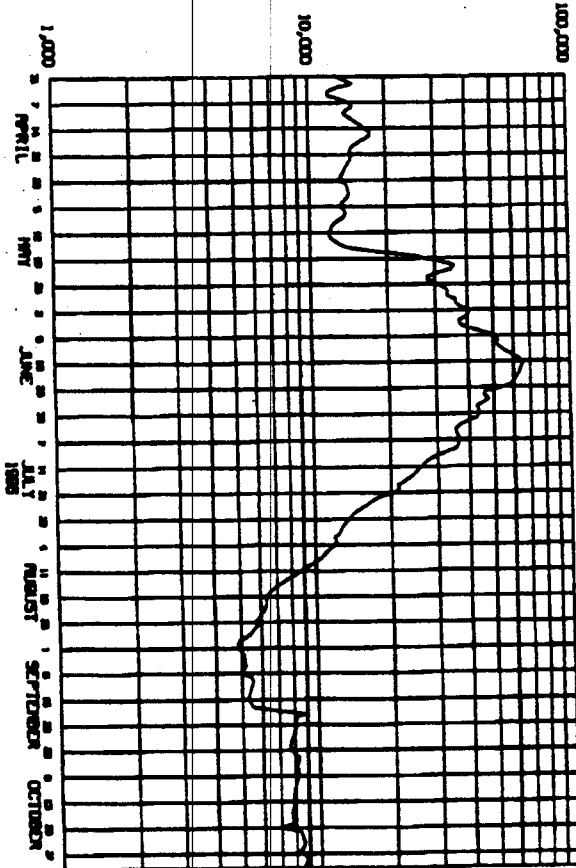
C — 06174500 MILK RIVER AT NASHUA MT
MEAN DAILY DISCHARGE (CFS)

DISCHARGE, IN CUBIC FEET PER SECOND



B — 06185500 MISSOURI RIVER NEAR CULBERTSON, MT.
MEAN DAILY DISCHARGE (CFS)

DISCHARGE, IN CUBIC FEET PER SECOND



D — 06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT.
MEAN DAILY DISCHARGE (CFS)

Figure 2. 1996 Hydrographs of the Missouri River at: A. Fort Peck Tailwaters; B. Culbertson; C. Milk River at Nashua; D. Yellowstone River at Sidney.

METHODS

Drift Netting

A variety of sinking multifilament gill and trammel nets and monofilament gill nets were used during the field season (Table 3). Nets were drifted for about 10 minutes and covered approximately 300 meters. Methods for drifting were similar to those used in 1994 and 1995 (Liebelt, 1996). All fish captured were weighed and measured in grams and millimeters. Depth and water temperatures were recorded at all drift net sites and in addition, conductivity, turbidity, secchi disc, channel width, current velocity and substrate composition were taken at selected sites and all pallid sturgeon capture sites. Catch rate was tabulated as catch per unit of effort (CPUE) per hour.

Table 3. Summary of net types used in 1996 field season.

Net type	Mesh type	Net length	Net depth	Number of panels	Bar mesh size	Lead core line weight
Trammel	Multifilament	22.9m	1.8m	1	2.5 cm inner 20.3 cm outer	13.6 kg
Trammel	Multifilament	45.7m	1.8m	1	2.5 cm inner 20.3 cm outer	13.6 kg
Trammel	Multifilament	22.9m	1.8m	1	5.1 cm inner 25.4 cm outer	13.6kg
Trammel	Multifilament	45.7m	1.8m	1	5.1 cm inner 25.4 cm outer	13.6 kg
Gill	Multifilament	36.6m	2.4m	4	5.1-7.6-10.2- 12.7 cm	22.7 kg
Gill	Multifilament	38.1m	1.8m	5	1.9-2.5-3.2-3.8- 5.1 cm	13.6 kg
Gill	Multifilament	24.3m	1.8m	4	2.5-5.1-2.5-5.1cm	13.6 kg
Gill	Monofilament	30.5m	1.8m	4	1.9-2.5-3.8-5.1- 7.6 cm	13.6 kg
Gill	Monofilament	36.6m	2.4m	4	5.1-7.6-10.2-12.7cm	22.7 kg

Attempts to drift net in the Milk River were abandoned due to the generally low flows and heavy siltation in pool areas. Stationary gill and trammel net sets were quite effective for sampling the various species present.

The majority of shovelnose sturgeon captured in section 1 were from overnight stationary gill and trammel net sets in the tailwater area and dredge cuts. Drift netting was tried in the tailwater area to capture pallid sturgeon but the generally high releases, water depth (6.1 to over 12.2 m) and heavy filamentous algae growth, hampered the efforts. No pallid sturgeon were caught by drift netting in this area but three were captured by SCUBA.

Measurements and Tagging of Sturgeon

Morphological measurements were taken on all pallid sturgeon captured during 1996 (Table 4). The percent of standard length was calculated from the measurements in order to develop a character index which is used to evaluate the possible presence of pallid x shovelnose hybrids. Methodology is based on work done by Tews and Clancy (1993), Gardner (1995), and Krentz (1996).

Biosonic 125 kilohertz (kHz) passive integrated transponder (PIT) tags were implanted on both sides of the dorsal fin on "new" pallid sturgeon and only the right side of recaptures. Numbered yellow spaghetti tags were attached through the dorsal fin of shovelnose sturgeon not previously captured and weighing at least 0.2 kilograms. A numbered dangler tag was also attached to the anterior margin of the dorsal fin of some shovelnose sturgeon netted during the fall, including recaptures, in section 1 to check for possible loss or sloughing of spaghetti tags in the future.

Table 4. Morphological measurements of pallid sturgeon captured in 1996.

Date	RM	Net Type	Head Length mm	Total Length mm	Fork Length mm	Standard Length mm	Interrostral Length mm	Mouth to			WT (KG)	Pit Tag # 1	Pit Tag # 2	Recap	CI ¹
								Inner Barbel mm	Outer Barbel mm	Inner Barbel mm					
02/18/96	1770	SCUBA	485	1642	1552	1480	208	62	160	51	23.1	7F7B081169	220D0A6037	Y	538.9
03/19/96	1770	SCUBA		1594	1522	1454					23.1	7F7E055428	1F545E002F	Y	
03/20/96	1770	SCUBA		1453	1319	1244					13.6	7F7F065841	220E7E3A38	Y	
05/13/96	1577	Mono2 ²	462		1503		210	62	123	51	26.3	2204657963	220F01755C	N	490.3
08/28/96	1578	Tm1 ³	455	1568	1452	1379	213	59	130	35	16.3	7F7D24754C	220E465E74	Y	554.2
08/28/96	1578	Tm1 ³	408	1406	1320	1230	192	67	125	47	12.7	220C7D0429	2204523542	N	490.2
08/28/96	1578	Tm2 ⁴	432	1522	1398	1323	207	58	108	41	16.8	220D4E6A57	1F4A13592B	Y	507.2
08/28/96	1574	Tm1 ³	446	1549	1432	1370	216	51	122	46	18.1	7F7F066A40	2204583665	Y	534.7
09/19/96	1578	Tm2 ⁴			1453									Y	
09/25/96*	1578	Tm2 ⁴	460		1545		195	72	175	50	24.9	1F4B246E04		N	517.9

¹ CI-Character Index Value.

² 37-meter monofilament gill net with 5,8,10,13-cm mesh panels.

³ 46-meter trammel net, 3-cm inner mesh and 15-cm outer mesh.

⁴ 46-meter trammel net, 5-cm inner mesh and 25-cm outer mesh.

*. Transported to Garrison National Fish Hatchery.

Larval Fish Sampling

Sampling for larval sturgeon and other species was done in the Milk River, spillway channel, sections 1-6 of the Missouri River and section 9 of the Yellowstone River from May through the first week of August. Samples were collected from the surface and the bottom at sampling locations for comparison purposes. Methods and equipment were similar to those reported previously (Liebelt, 1996).

Beach Seining

Beach seining was done at selected sites in the Milk, Missouri, and Yellowstone rivers along main channel borders, island edges and side channels. A 15.4 m x 1.2 m with 3 mm Delta mesh and a "many ends" bottom line was used. Length of hauls depended on shoreline configuration and depth but most hauls were approximately 45 meters. All fish captured were identified except for very small young-of-the-year (YOY) species, counted and released. All or a subsample of species of special concern, i.e. flathead chub, *Hybognathus* (Western silvery/plains minnow), sicklefin chub, and sturgeon chub were weighed and measured.

Trawl Sampling

A modified benthic trawl as described by Grisak (1994), was used to sample deep, main channel habitat. Trawls were usually of two to four minutes duration and average estimated distance was about 224 meters. Sampling sites were determined based on current velocity and depth as well as being relatively snag-free. Samples were emptied into a bucket with water and fish and invertebrates sorted with the aid of sieves (U.S. Standard Sieve Series). Fish were identified, weighed and measured and released at the capture site.

RESULTS AND DISCUSSION

Pallid Sturgeon

A total of 10 pallid sturgeon were captured during 1996 (Appendix 1). Seven were caught by drift netting in section 6 of the Missouri River and three were caught by SCUBA in the tailwater area of Fort Peck Dam. Seven of the fish were recaptures and three were "new" fish (Table 5).

Table 5. Pallid sturgeon recaptures from the Missouri River captured during 1996.

Date Captured	PIT Tag	RM	FL mm	WT kg	Recapture Date	RM	FL mm	WT kg
03/21/89*	L-7F7F065841 R-220E7E3A38	1770	1321	13.2	03/20/96	1770	1319	13.6
02/10/90*	L-7F7F055428 R-1F545ED027	1770	1493	20.0	03/19/96	1770	1522	23.1
03/20/93*	L-7F7FB081169 R-220D0A6037	1770	1524	17.5	02/18/96	1770	1552	23.1
09/24/94	L-7F7F066A40 R-2204583665	1577	1409	16.8	08/28/96	1575	1432	18.1
09/24/94	L-7F7D24754C R-220E465E74	1564	1425	17.5	08/28/96	1578	1452	16.3
04/27/95	L-1F4A312640 Not Tagged	9	1490	22.2	09/19/96	1578	1453	NA
10/11/95	L-1F4A13592B R-220D4E6A57	1577	1410	16.6	08/28/96	1578	1398	16.9

*Transported to the Garrison National Fish Hatchery

The three sturgeon captured by SCUBA in the tailwater area during February and March, 1996, were all recaptures, originally captured in the tailwater area by SCUBA during the same months. All three fish had radio transmitters externally attached when first captured and one captured

February 16, 1990, also had a sonic transmitter attached (Clancy, 1990, 1991, Tews 1993). There was no obvious evidence of previous radio/sonic transmitter attachment when we recaptured these fish. The pallid sturgeon recaptured February 18, 1996, had gained 5.6 kg since the initial capture on March 20, 1993 and appeared to be a female. Capture depths ranged from 10.9 meters to 11.3 meters and water temperatures averaged 2.5 degrees C (Appendix 2). The remaining four recaptures were caught by drift netting in the Missouri River below the confluence of the Yellowstone River, three at approximately RM 1578 and one at RM 1575. The three "new" pallid sturgeon were also captured by drift netting, one each in May, August, and September. Two were caught at RM 1578 and one at RM 1577, also below the confluence (Table 6). The largest fish, 26.3 kg, was captured in May and appeared to be a female and was transported to the Garrison National Fish Hatchery (GNFH), North Dakota by USFWS personnel. There it was examined and determined to be an immature female in the early stages of egg development. This fish was returned and released at the Highway 85 Bridge (RM 1552), North Dakota. Another fish captured in September weighed 24.9 kg and field examination showed black ova present indicating a probable Stage IV or V female. This fish was also transported to the GNFH but later moved to the Gavins Point hatchery in South Dakota where spawning will be attempted during spring, 1997.

Table 6. New pallid sturgeon captured by drift netting in the Missouri River during 1996.

Capture Date	PIT Tag	RM	FL mm	WT kg	CI value
05/13/96	L-2204657963 R-220F01755C	1577	1503	26.3	490.3
08/28/96	L-220C7D0429 R-2204523542	1578	1320	12.7	490.2
09/25/96*	L-1F4B246E04 R-Not Tagged	1578	1545	24.9	517.9

*-Transported to Garrison National Fish Hatchery

Six morphological measurements were taken on the three new pallid sturgeon to develop a

character index (CI) value to detect the possible presence of pallid x shovelnose hybrids. The morphometrics used for the index are fork length, head length, mouth to inner barbel, interrostral distance, and inner and outer barbel lengths. The measurements are converted to percent of fork length so differences in sizes of individual fish are standardized. The CI values were 490.2, 490.3, and 517.9, indicating these fish are "pure" pallid sturgeon. Krentz (1996), found CI values ranging from 358 to 636 with a mean of 509 for pallid sturgeon based on 167 fish. Shovelnose sturgeon CI values ranged from 154 to 293 with a mean of 230, based on 95 fish. The pallid sturgeon were all captured in the Missouri River in North Dakota and Montana; the shovelnose sturgeon data were from fish in the Missouri River below Lake Sakakawea in North Dakota and above the lake in Montana.

Shovelnose Sturgeon

A total of 796 shovelnose sturgeon were captured by drift and stationary gill and trammel netting in all sections sampled in the lower Missouri and Yellowstone rivers and an additional four shovelnose sturgeon were netted in the Milk River (Table 7). The majority, 488, were netted in section 1, and 222 were captured in section 6.

Table 7. Length and weight of shovelnose sturgeon captured by drift and stationary gill nets by section in the Milk, Missouri and Yellowstone rivers during 1996.

Section	N	Fork length (mm)		Weight (g)	
		Mean	Range	Mean	Range
1	488	623.0	436-851	1006.9	300.0-2973.7
2	No Sturgeon Sampled				
3	1	616.0	616	858.1	858.1
4	1	495.0	495	390.0	390.0
5	3	591.3	552-635	892.1	771.1-1043.3
6	222	602.0	185-888	1079.4	20.6-3900.0
7	No Sturgeon Sampled				
8	54	660.0	300-856	1443.7	100.0-3400.0
9	24	599.0	214-904	1104.9	30.5-3650.0
Milk	4	606.0	550-677	874.0	612.9-1180.4
Average	796	598.9	185-904	950.2	20.6-3900.0

The combined mean fork length was 598.9 mm and ranged from 185-904 mm. Shovelnose sturgeon in the 500-700 mm range comprised 94.9 percent of those captured in section 1 and 83.2 percent of those caught in sections 2-6. Shovelnose sturgeon in this range from the Yellowstone River made up 72.7 percent of those captured. Overall, those in the 600-650 mm size group accounted for 33.2 percent of the combined total sturgeon captured. No shovelnose sturgeon less than 399 mm were caught in section 1 while two were captured in the Yellowstone River and 13 in sections 2-6.

The combined mean weight was 950.2 grams and ranged from 20.6 to 3900.0 grams. Shovelnose sturgeon weighing from 600 to 1200 grams comprised 65.8 percent of the total fish captured. Fish weighing 1100 grams made up 64.3 percent of the total fish captured in section 1 and ranged from 300.2 to 2973.7 grams. Those caught in sections 8 and 9 of the Yellowstone River had the greatest mean weight of 1443.7 and 1104.9 grams, respectively. Ranges were 100.0 to 3400.0 grams in section 8 and 30.5 to 3650.0 grams in section 9. The greatest weight range occurred in section 6 where sturgeon weighed from 20.6 to 3900.0 grams.

Shovelnose Sturgeon Recaptures

A total of 51 shovelnose sturgeon recaptures were recovered during 1996 (Table 8). Thirty-one (60.8 %) were recaptured in the Fort Peck tailwater/dredge cut area (RM 1770) and of these, at least 29 had been originally tagged in this area. One fish captured by SCUBA on July 31, 1991 (Clancy, 1992), was surgically implanted with a radio in the abdominal cavity. This fish was again captured by SCUBA on February 18, 1996, in the tailwaters with a protruding antenna visible. Some inflammation was noted around the exit area; the fish appeared to be healthy but quite thin. A shovelnose sturgeon first tagged April 4, 1993, in the Yellowstone River at RM 1.5, was recaptured June 24, 1996 in the Missouri River at RM 1765. This is a distance of about 297 km and was the greatest distance traveled of all sturgeon recaptured in 1996. The majority of recaptures were recaptured within 8.0 km of the original capture site and is similar to findings during 1994 and 1995 (Liebelt, 1996).

Table 8. 1996 Shovelnose sturgeon recaptures from the Missouri and Yellowstone rivers.

Tag No.	Capture Date	RM	FL mm	Wt grams	Recapture Date	RM	FL mm	Wt grams
681	07/31/91	DC	N/A	1135	02/18/96	DC	645	N/A
5206	04/22/93	Y-1.5	734	N/A	06/24/96	M-1765	735	1406
7321 ¹	04/22/93	Y-.3	609	N/A	10/16/96	M-1578	624	1100
5433	10/13/93	Y-51	742	2041	08/15/96	Y-52	745	2300
5457	10/21/93	M-1766	607	726	06/19/96	DC	598	863
5498	07/05/94	DC	569	726	10/07/96	DC	580	700
5525	07/14/94	Y-2	599	839	09/20/96	Y-2	604	925
5568	07/28/94	M-1577	551	567	09/18/96	M-1578	558	550
5656	08/24/94	M-1568	526	590	08/28/96	M-1564	531	650
5714	09/15/94	DC	680	998	09/03/96	DC	680	950
6010	06/20/95	DC	666	1157	05/02/96	DC	660	1043
6063	06/20/95	DC	739	1769	03/20/96	DC	734	1792
6218	08/29/95	DC	625	1022	06/18/96	DC	628	953
6222	08/29/95	DC	666	1203	06/18/96	DC	605	953
6254	08/30/95	DC	625	1043	03/20/96	DC	622	953
6254	08/30/95	DC	625	1043	05/29/96	DC	622	953
6264	08/30/95	DC	592	840	06/18/96	DC	596	772
6265	08/30/95	DC	615	953	03/20/96	DC	615	816
6274	09/07/95	DC	663	1157	03/20/96	DC	658	1043
6276	09/07/95	DC	556	635	07/29/96	DC	560	676
6232	09/08/95	DC	605	866	04/29/96	DC	602	816
6282	09/08/95	DC	549	590	10/07/96	DC	546	600
6295	09/08/95	DC	645	975	05/01/96	DC	645	930
6313	09/13/95	DC	688	1202	04/10/96	DC	683	1202
6317	09/13/95	M-1760	439	295	05/01/96	DC	526	544
6320	09/13/95	M-1578	549	780	07/26/96	M-1585	553	816
6332	09/14/95	M-1577	587	962	08/29/96	M-1578	604	1150
6335	09/14/95	M-1577	798	2427	10/17/96	M-1578	798	2750
6382	09/26/95	M-1578	792	2336	10/16/96	M-1578	797	2600
6491	10/04/95	DC	660	1021	04/30/96	DC	643	975
6490	10/04/95	DC	572	590	05/01/96	DC	569	544
6480	10/04/95	DC	605	907	05/28/96	DC	610	862
6501	10/05/95	DC	630	1043	03/20/96	DC	617	1043
6501	10/05/95	DC	630	1043	04/30/96	DC	622	1043
6561	10/12/95	Y-1	577	635	09/25/96	M-1578	586	900
6573	03/19/96	DC	622	862	05/02/96	DC	N/A	N/A
6586	03/20/96	DC	602	817	05/02/96	DC	N/A	N/A
6646	05/01/96	DC	533	590	10/22/96	DC	539	650
6648	05/01/96	DC	531	567	10/09/96	DC	532	600
6690	05/15/96	M-1577	550	680	07/24/96	M-1577	563	862
6905	05/28/96	DC	706	1406	06/03/96	DC	N/A	N/A
6906	05/28/96	DC	559	726	06/03/96	DC	N/A	N/A
6907	05/28/96	DC	650	1134	05/29/96	DC	650	1134
6907	05/28/96	DC	650	1134	06/03/96	DC	N/A	N/A
6912	05/28/96	DC	673	1180	06/18/96	DC	684	1090
6741	05/28/96	DC	589	862	06/03/96	DC	N/A	N/A
6079	06/12/96	M-1585	635	1043	07/13/96	M-1585	632	975
7019	08/27/96	M-1574	516	550	08/28/96	M-1564	515	550
7210	08/28/96	M-1578	645	1200	09/19/96	M-1568	638	1200
7038	08/29/96	M-1578	569	700	09/09/96	M-1578	569	725
7060	09/18/96	M-1578	574	700	09/19/96	M-1578	579	725
7060	09/18/96	M-1578	574	700	09/25/96	M-1578	574	700
7265 ²	09/20/96	M-1579	580	850	09/25/96	M-1578	582	850
7097	09/25/96	M-1578	586	700	10/16/96	M-1578	589	650
7148	10/09/96	DC	727	2336	10/22/96	DC	728	1900
6626 ³	N/A	N/A	N/A	N/A	05/01/96	DC	693	N/A
7094 ⁴	N/A	N/A	N/A	N/A	09/24/96	M-1579	547	775

RM - Rivernile

FL - Fork Length

WT - Weight

Y - Yellowstone River

M - Missouri River

DC - Fort Peck Dredge Cuts and Tailwaters

1 - Tag 5213 removed and replaced with tag 7321

2 - Tag 5346 removed and replaced with tag 7265

3 - Original tag number not visible and replaced with 6626

4 - Original tag number not visible and replaced with 7094

Stationary and Drift Netting

Twenty-two species of fish were caught using stationary gill and trammel net sets in the Missouri and Milk rivers and 18 species were captured drift netting in the Missouri and Yellowstone rivers (Tables 9 and 10).

Table 9. Catch rates by section for species captured with stationary gill and trammel nets in the Milk and Missouri rivers during 1996 (CPUE fish/hour).

Sections	Milk River		Missouri River				Totals	
	0		1		2-6			
Hours	278.9		683.6		24.1		986.6	
Nets	17		51		9		77	

Species	#	CPUE	#	CPUE	#	CPUE	#	CPUE
Shovelnose Sturgeon	4	0.01	352	0.52	2	0.08	358	0.36
Paddlefish	0	0	1	<0.01	0	0	1	<0.01
Goldeye	371	1.33	151	0.22	13	0.54	535	0.54
Lake whitefish	5	0.02	4	0.01	0	0	9	<0.01
Cisco	3	0.01	190	0.28	0	0	193	0.20
Rainbow smelt	0	0	44	0.01	0	0	4	<0.01
Northern pike	14	0.05	39	0.06	1	0.04	54	0.05
Carp	7	0.03	8	0.01	1	0.04	16	0.02
Flathead chub	0	0	0	0	1	0.04	1	<0.01
River carpsucker	70	0.25	36	0.05	37	1.54	143	0.14
Blue sucker	40	0.14	4	0.01	0	0	44	0.04
Smallmouth buffalo	5	0.02	7	0.01	1	0.04	13	0.01
Bigmouth buffalo	0	0	1	<0.01	0	0	1	<0.01
Shorthead redhorse	47	0.17	14	0.02	1	0.04	62	0.06
Longnose sucker	4	0.01	4	0.01	0	0	8	<0.01
White sucker	4	0.01	61	0.09	0	0	65	0.07
Channel catfish	212	0.76	114	0.17	8	0.33	334	0.34
Burbot	0	0	3	<0.01	0	0	3	<0.01
Yellow perch	1	<0.01	0	0	0	0	1	<0.01
Sauger	109	0.39	34	0.05	3	0.12	146	0.15
Walleye	33	0.12	55	0.08	1	0.04	89	0.09
Freshwater drum	1	<0.01	0	0	2	0.08	3	<0.01
Totals	930	3.33	1082	1.58	71	2.95	2083	2.11

Table 10. Catch rates by section for species captured with drift nets in the Missouri and Yellowstone rivers during 1996 (CPUE fish\hour).

Sections	Missouri River				Yellowstone River		Totals	
	1-5	6			8,9			
Hours	9.2	23.1			4		36.3	
Drifts	218	151			32		401	

Species	#	CPUE	#	CPUE	#	CPUE	#	CPUE
Pallid Sturgeon	0	0	7	0.3	0	0	7	0.19
Shovelnose Sturgeon	118	12.83	224	9.69	80	20	422	11.62
Paddlefish	0	0	5	0.22	0	0	5	0.14
Goldeye	18	1.96	28	1.21	2	0.50	48	1.32
Rainbow trout	1	0.11	0	0	0	0	1	0.03
Carp	0	0	15	0.65	3	0.75	18	0.50
Flathead chub	0	0	3	0.13	0	0	3	0.08
River carpsucker	6	0.65	49	2.12	3	0.75	58	1.60
Blue sucker	7	0.76	6	0.26	6	1.50	19	0.52
Smallmouth buffalo	1	0.11	20	0.87	2	0.50	23	0.63
Bigmouth buffalo	0	0	9	0.39	2	0.50	11	0.30
Shorthead redhorse	1	0.11	0	0	1	0.25	2	0.06
Longnose sucker	8	0.87	0	0	1	0.25	9	0.25
White sucker	3	0.33	0	0	0	0	3	0.08
Channel catfish	0	0	38	1.65	23	5.75	61	1.68
Burbot	0	0	1	0.04	0	0	1	0.03
Sauger	1	0.11	10	0.43	2	0.50	13	0.36
Freshwater drum	0	0	5	0.22	1	0.25	6	0.17
Totals	164	19.83	420	18.18	126	31.50	710	19.60

Stationary nets were fished a total of 986.6 hours with an overall CPUE of 2.11. Goldeye were the most abundant species captured with a total of 533 fish and had the highest CPUE of 0.54 for all species caught. Females comprised 56.3% of the total catch and 67.5% of those netted in section 1. The greatest number, 371, were netted in the Milk River with a CPUE of 1.33.

Shovelnose sturgeon were the next most abundant species captured with a total of 358 fish and a CPUE of 0.36. Ninety-eight percent were netted in section 1; however, almost 70 percent of the total stationary netting effort was done in this section. It is somewhat surprising only four shovelnose sturgeon were caught in the Milk River since this a relatively warm, turbid stream and would seem to provide ideal habitat for this species in comparison to the cold, clear water of the Missouri River.

Three hundred thirty-four channel catfish were netted of which 212 were caught in the Milk River, 114 in section 6, and eight in sections 2-5 in the Missouri River. The CPUE was 0.76, 0.17, and 0.33, respectively.

Other species captured included 183 cisco with 98.4 percent caught in section 1; 146 sauger and 143 river carpsucker with 75 and 49 percent netted in the Milk River, respectively; 89 walleye with 62 and 37 percent caught in section 1 and the Milk River, respectively. Approximately 91 percent of 44 blue sucker and 76 percent of 62 shorthead redhorse sucker were netted in the Milk River, and about 94 percent of 65 white sucker were captured in section 1.

A total of 369 drift nets, representing 32.3 hours were made in sections 1-6 in the Missouri River and 32 drifts, representing four hours were made in sections 8 and 9 of the Yellowstone River. Shovelnose sturgeon were the most abundant species captured with 118, 224, and 80 caught in sections 1-5, section 6, and section 9, respectively. The CPUE's were 12.88, 9.69, and 20.00, respectively. Channel catfish were netted only in sections 6 (38 fish) and 9 (23 fish). Forty-nine of 58 river carpsucker and 20 of 23 smallmouth buffalo were caught in section 6. Also, all seven pallid sturgeon and all five paddlefish were captured in this section. A total of 19 blue sucker were caught, seven in section 1-5, six in section 6, and seven in section 9. Goldeye were most abundant in section 6 with 28 netted; 18 were caught in sections 1-5 and two in section 9.

A list of all fish species captured during 1996 in the Missouri, Milk, and Yellowstone rivers is shown in Table 11.

Table 11. List of fish species caught in the Milk, Missouri and Yellowstone Rivers during 1996.

Pallid sturgeon (*Scaphirhynchus albus*)
Shovelnose sturgeon (*S. platyrhynchus*)
Paddlefish (*Polyodon spathula*)
Goldeye (*Hiodon alosoides*)
Lake whitefish (*Coregonus clupeaformis*)
Cisco (*C. artedii*)
Chinook salmon (*Oncorhynchus tshawytscha*)
Rainbow trout (*O. mykiss*)
Rainbow smelt (*Osmerus mordax*)
Northern pike (*Esox lucius*)
Carp (*Cyprinus carpio*)
Flathead chub (*Platygobio gracilis*)
Sicklefin chub (*Macrohybopsis meeki*)
Sturgeon chub (*M. gelida*)
Emerald shiner (*Notropis atherinoides*)
Spottail shiner (*N. Hudsonius*)
Plains minnow (*Hybognathus placitus*)
Silvery minnow (*H. argyritis*)
River carpsucker (*Carpionodes carpio*)
Blue sucker (*Cycleptus elongatus*)
Smallmouth buffalo (*Ictiobus bubalus*)
Bigmouth buffalo (*I. cyprinellus*)
Shorthead redhorse sucker (*Moxostoma macrolepidotum*)
Longnose sucker (*Catostomus catostomus*)
White sucker (*C. commersoni*)
Channel catfish (*Ictalurus punctatus*)
Burbot (*Lota lota*)
White crappie (*Pomoxis annularis*)
Yellow perch (*Perca flavescens*)
Sauger (*Stizostedion canadense*)
Walleye (*Stizostedion vitreum*)
Freshwater drum (*Aplodinotus grunniens*)

Larval Fish Sampling

Larval fish sampling was done in the Missouri, Milk, and Yellowstone rivers and in Fort Peck Spillway channel from May through July, 1996. A total of 109 surface and 102 bottom samples were collected with paired one-half meter nets and 39 additional bottom samples were collected with a single D-net. No sturgeon larvae were captured in the Missouri or Milk rivers but three were collected in the Yellowstone River. Seven paddlefish larvae were captured in section 5, four in section 6, and two in section 9. None were found in the Milk River samples. Three sturgeon/paddlefish (S/P) eggs were found in section 6 below the confluence and none were collected in the Missouri River above the confluence. Ten S/P eggs were collected in the Yellowstone River samples. With the exception of one paddlefish larva, all S/P larvae and eggs were collected in bottom samples (Table 12).

A total of 269 other larval fish were collected from the Missouri and Yellowstone rivers including 137 sucker species, 55 walleye/sauger (W/S), 44 minnow species, eight catfish, four goldeye, and 21 unknown due to damage of specimens (Table 13).

Fifty-four of the W/S larvae were collected in the Missouri River above the Yellowstone River confluence, primarily in section 5. Thirty-eight were captured from bottom samples during the 6/12-6/21 sampling period; eight were collected from surface samples. Only one W/S larva was found in samples from below the confluence and none in the Yellowstone River samples. In addition, 528 eggs were collected in the Missouri and Yellowstone river samples of which about 46 percent were from the Yellowstone River.

Sixty-four catostomid, 14 cyprinid, and 10 unknown larvae were collected in spillway samples (Table 14). In addition, 3,749 eggs were also found of which 63.7% were collected between June 12 and July 2. Thirteen catostomid and one cyprinid larvae and 49 eggs were identified in Milk River samples. Eleven of the catostomid larvae were captured during the 5/30-6/6 sampling period.

Table 12. Comparison of surface and bottom larval fish sampling for Scaphirhynchus and Polyodon species in the Missouri River above and below the Yellowstone River confluence and the Yellowstone River during 1996.
S=Surface B=Bottom

River Location	Section #'s	Net Position	Sample Period	Number of Scaphirhynchus	Number of Polyodon	Scaphirhynchus/ Polyodon Eggs
Missouri Above Confluence	1-5	S	5/30-6/6	0	0	0
		B	5/30-6/6	0	0	0
		S	6/12-6/21	0	0	0
		B	6/12-6/21	0	1	0
		S	6/25-7/2	0	0	0
		B	6/25-7/2	0	0	0
		S	7/9-7/12	0	1	0
		B	7/9-7/12	0	1	0
		S	7/19-7/26	0	0	0
		B	7/19-7/26	0	4	0
		S	7/29-8/7	0	0	0
		B	7/29-8/7	0	0	0
Totals				0	7	0
Missouri Below Confluence	6	S	5/30-6/6	0	0	0
		B	5/30-6/6	0	0	0
		S	6/12-6/21	No Samples Taken		
		B	6/12-6/21	No Samples Taken		
		S	6/25-7/2	0	0	0
		B	6/25-7/2	0	1	1
		S	7/9-7/12	0	0	0
		B	7/9-7/12	0	1	2
		S	7/19-7/26	0	0	0
		B	7/19-7/26	0	2	0
		S	7/29-8/7	No Samples Taken		
		B	7/29-8/7	No Samples Taken		
Totals				0	4	3
Yellowstone	9	S	5/30-6/6	0	0	0
		B	5/30-6/6	0	0	0
		S	6/12-6/21	No Samples Taken		
		B	6/12-6/21	No Samples Taken		
		S	6/25-7/2	0	0	0
		B	6/25-7/2	0	1	6
		S	7/9-7/12	0	0	0
		B	7/9-7/12	2	1	4
		S	7/19-7/26	0	0	0
		B	7/19-7/26	1	0	0
		S	7/29-8/7	No Samples Taken		
		B	7/29-8/7	No Samples Taken		
Totals				3	2	10
Totals				3	13	13

Table 13. Comparison of surface and bottom larval fish sampling for associated fish species in the Missouri River above and below the Yellowstone River confluence and the Yellowstone River during 1996.
S=Surface B=bottom

River Location	Section #'s	Net Position	Sample Period	Numbers of						
				Catostomid	Cyprinid	Hiodon	Ictalurid	Stizostedion	Unknown	Eggs
Missouri Above Confluence	1-5	S	5/30-6/6	0	6	0	0	0	0	3
		B	5/30-6/6	0	1	0	0	0	0	5
		S	6/12-6/21	21	11	0	0	5	9	1
		B	6/12-6/21	20	1	0	0	38	1	10
		S	6/25-7/2	21	7	0	0	2	0	2
		B	6/25-7/2	8	2	0	0	7	0	30
		S	7/9-7/12	5	2	0	0	0	0	8
		B	7/9-7/12	4	4	0	0	0	0	13
		S	7/19-7/26	9	0	0	0	0	0	5
		B	7/19-7/26	5	2	0	0	1	0	13
		S	7/29-8/7	11	1	0	0	1	0	3
		B	7/29-8/7	3	0	0	0	0	0	47
Totals				107	37	0	0	54	10	132
Missouri Below Confluence	6	S	5/30-6/6	0	0	0	0	0	0	0
		B	5/30-6/6	0	0	0	0	1	0	1
		S	6/12-6/21			No Samples Taken				
		B	6/12-6/21			No Samples Taken				
		S	6/25-7/2	0	0	0	0	0	0	17
		B	6/25-7/2	0	0	0	0	0	0	36
		S	7/9-7/12	1	0	2	0	0	0	45
		B	7/9-7/12	4	2	1	0	0	2	14
		S	7/19-7/26	2	0	0	0	0	0	12
		B	7/19-7/26	1	1	0	3	0	0	29
		S	7/29-8/7			No Samples Taken				
		B	7/29-8/7			No Samples Taken				
Totals				8	3	3	3	1	2	154
Yellowstone	9	S	5/30-6/6	1	0	0	0	0	0	0
		B	5/30-6/6	0	0	0	0	0	0	1
		S	6/12-6/21			No Samples Taken				
		B	6/12-6/21			No Samples Taken				
		S	6/25-7/2	5	0	0	0	0	5	36
		B	6/25-7/2	7	0	0	0	0	2	52
		S	7/9-7/12	3	4	0	1	0	1	15
		B	7/9-7/12	3	0	1	0	0	0	23
		S	7/19-7/26	1	0	0	0	0	0	23
		B	7/19-7/26	2	0	0	4	0	1	92
		S	7/29-8/7			No Samples Taken				
		B	7/29-8/7			No Samples Taken				
Totals				22	4	1	5	0	9	242
Totals				137	44	4	8	55	21	528

Table 14. Comparison of surface and bottom larval fish sampling in the Fort Peck Spillway channel and the lower Milk River during 1996.
S=Surface B=bottom

River Location	Section #	Net Position	Sample Period	Numbers of						
				Catostomid	Cyprinid	Hiodon	Ictalurid	Stizostedion	Unknown	Eggs
Spillway	1	S	5/7			No Samples Taken¹				
		B	5/7			No Samples Taken¹				
		S	5/30-6/6			No Samples Taken¹				
		B	5/30-6/6			No Samples Taken¹				
		S	6/12-6/21	20	7	0	0	0	9	357
		B	6/12-6/21	19	0	0	0	0	1	481
		S	6/25-7/2	15	3	0	0	0	0	1253
		B	6/25-7/2	2	2	0	0	0	0	1135
		S	7/9-7/12	1	0	0	0	0	0	178
		B	7/9-7/12	1	2	0	0	0	0	224
		S	7/19-7/26	1	0	0	0	0	0	22
		B	7/19-7/26	1	0	0	0	0	0	31
		S	7/29-8/7	2	0	0	0	0	0	35
		B	7/29-8/7	2	0	0	0	0	0	33
Totals				64	14	0	0	0	10	3749
Milk River	0	S	5/7	0	0	0	0	0	0	0
		B	5/7	0	0	0	0	0	0	0
		S	5/30-6/6	11	0	0	0	0	0	0
		B	5/30-6/6	0	0	0	0	0	0	0
		S	6/12-6/21	2	1	0	0	0	0	49
		B	6/12-6/21	0	0	0	0	0	0	0
		S	6/25-7/2			No Samples Taken*				
		B	6/25-7/2			No Samples Taken*				
		S	7/9-7/12			No Samples Taken*				
		B	7/9-7/12			No Samples Taken*				
		S	7/19-7/26			No Samples Taken*				
		B	7/19-7/26			No Samples Taken*				
		S	7/29-8/7			No Samples Taken*				
		B	7/29-8/7			No Samples Taken*				
Totals				13	1	0	0	0	0	49
Overall Totals				77	15	0	0	0	10	3798

¹ Spillway not operational until 5/29/96

* No samples taken due to lack of flow

Trawling

A total of 16 trawls were made in sections 1-5 of the Missouri River and two in section 9 of the Yellowstone river during July and August. Eighteen sicklefin chub, 11 sturgeon chub, and one each of shovelnose sturgeon, flathead chub, longnose sucker, channel catfish, and burbot were collected. Eleven and seven of the sicklefin chub were sampled in sections 5 and 9, respectively. Two sturgeon chub were sampled in section 3, six in section 5, and three in section 9. The shovelnose sturgeon and channel catfish were also collected in section 9 and the burbot and longnose sucker were found in section 5 and 1, respectively. The results are shown in Table 15.

Beach Seining

A total of 49 seine hauls captured 1,689 fish, representing 25 species in the Milk, Missouri, and Yellowstone rivers (Table 16). Nineteen species were caught in the Milk River (Section 0) and had the greatest diversity of species found in all sections seined. Emerald shiner, goldeye, channel catfish and shorthead redhorse sucker were the most common species seined. Two blue sucker were also captured and were the only ones caught in all sections sampled.

The most fish captured were in section 1 with a total of 516; about 61 percent were longnose and white sucker. Goldeye were also quite abundant and accounted for almost 20 percent of the total fish seined in this section.

Flathead chub were the most numerous species caught with a total of 536 and comprised 31.7 percent of the total number of fish captured in all sections. The CPUE of 10.94 per haul was also the highest. The greatest numbers were caught in sections 6, 2, and 9 and made up 43, 32, and 20 percent, respectively, of the flathead chub captured. *Hybognathus* species (western silvery and plains minnows) were most common in section 2 with 58 captured and sections 6 and 9 where 25 were seined in each section.

Table 15. Fish species captured by trawling in the Missouri and Yellowstone rivers during 1996 (CPUE fish/minute).

	Missouri				Yellowstone				Totals
Section	1	2	3	4	5	9			
Minutes	6	6	12	5	8.8	8		45.8	
Trawls	2	2	3	1	8	2		18	
Species	#	CPUE	#	CPUE	#	CPUE	#	CPUE	
Shovelnose sturgeon							1	0.13	
Flathead chub					1	0.11			
Sicklefin chub					11	1.25	7	0.88	
Sturgeon chub			2	0.17	6	0.68	3	0.38	
Longnose sucker	1	0.17							
Channel catfish							1	0.13	
Burbot					1	0.11			
Total	1	0.17	2	0.17	19	2.16	12	1.50	
							34	0.74	

Table 16. Species and number of fish captured by seining in the Milk, Missouri and Yellowstone Rivers during 1996. (CPUE fish/haul).

Section	0	1	2	3	5	6	9	Totals
Number of hauls	10	23	2	3	1	6	4	49
	#	CPUE	#	CPUE	#	CPUE	#	CPUE
Goldeye	53	5.30	101	4.39	10	1.66	1	0.25
Rainbow trout	6	0.26						0.12
Northern pike	1	0.10	7	0.30	7	3.50		0.33
Carp	2	0.20	1	0.04			5	1.25
Flathead chub	7	0.70			174	87.0	15	5.00
Sturgeon chub					1	0.16		0.02
Emerald shiner	91	9.10	43	1.87	1	0.50		135
Spottail shiner	2	0.20	1	0.04	2	1.00		2.76
<i>Hybognathus spp.</i> ¹	2	0.20			58	29.00	25	5
River carpsucker	3	0.30	15	0.65	1	0.50		0.10
Blue sucker	2	0.20						110
<i>Actinopterus spp.</i> ²	11	1.10	1	0.04	34	17.00	1	2.25
Shorthead redhorse	32	3.20						30
<i>Catostomus spp.</i> ³	7	0.70	336	14.61	14	7.0	1	0.61
Channel catfish	44	4.40						2
White crappie			1	0.04				0.04
Yellow perch								47
<i>Sizostedius spp.</i> ⁴	8	0.80			5	2.50		0.96
Freshwater drum	3	0.30						32
Unknown fry			4	0.17				0.65
Totals	268	26.80	516	22.43	296	148.00	17	5.70
							0	0.33
							218	54.50
							16	4.00
							85	1.74
							1689	34.47

¹-*Hybognathus spp.*-Western silvery minnow and Plains minnow

²-*Actinopterus spp.*- Smallmouth buffalo and Bigmouth buffalo

³-*Catostomus spp.*- White sucker and Longnose sucker

⁴-*Sizostedius spp.*-Walleye and Sauger

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Appendix 1. Morphological measurements of pallid sturgeon captured in 1996.

Date	RM	Net Type	Head Length mm	Total Length mm	Fork Length mm	Standard Length mm	Interrostral Length mm	Mouth to		WT (KG)	Pit Tag # 1	Pit Tag # 2	Recap	CI ¹	
								Inner Barbel mm	Outer Barbel mm						
02/18/96	1770	SCUBA	485	1642	1552	1480	208	62	160	51	23.1	7F7B081169	220D0A6037	Y	538.9
03/19/96	1770	SCUBA		1594	1522	1454					23.1	7F7F055428	1F545E002F	Y	
03/20/96	1770	SCUBA		1453	1319	1244					13.6	7F7F065841	220E7E3A38	Y	490.3
05/13/96	1577	Mono2 ²	462		1503		210	62	123	51	26.3	2204657963	220F01755C	N	490.3
08/28/96	1578	Tm1 ³	455	1568	1452	1379	213	59	130	35	16.3	7F7D24754C	220E465E74	Y	554.2
08/28/96	1578	Tm1 ³	408	1406	1320	1230	192	67	125	47	12.7	220C7D0429	2204523542	N	490.2
08/28/96	1578	Tm2 ⁴	432	1522	1398	1323	207	58	108	41	16.8	220D4E6A57	1F4A13592B	Y	507.2
08/28/96	1574	Tm1 ³	446	1549	1432	1370	216	51	122	46	18.1	7F7F066A40	2204583665	Y	534.7
09/19/96	1578	Tm2 ⁴			1453									Y	
09/25/96*	1578	Tm2 ⁴	460		1545		195	72	175	50	24.9	1F4B246E04		N	517.9

1. CI-Character Index Value.
2. 37-meter monofilament gill net with 5,8,10,13-cm mesh panels.
3. 46-meter trammel net, 3-cm inner mesh and 15-cm outer mesh.
4. 46-meter trammel net, 5-cm inner mesh and 25-cm outer mesh.
*. Transported to Garrison National Fish Hatchery.

Appendix 2. Habitat measurements of pallid sturgeon capture sites for 1996.

Date	Section	Depth(m)		Temp C°	Turbidity NTU	Secchi cm	Conductivity umhos	Velocity m/s
		Min	Max					
02/18/96	1		10.7	2.2				
03/19/96	1		10.7	2.7		>76.2		
03/20/96	1		11.3	2.7				
05/13/96	6	1.8	6.1	10.0	186.0	12.0	500.0	1.00
08/28/96	6	1.2	4.3	18.3	64.6		612.0	1.00
08/28/96	6	3.1	3.8	18.3	64.6		610.0	0.70
08/28/96	6	3.1	3.8	18.3	64.6		610.0	0.70
08/28/96	6	2.4	6.1	19.6	46.3		604.0	0.40
09/19/96	6	1.2	3.7	13.3			578.0	
09/25/96	6	2.7	6.1	12.2				
Average		2.2	4.8	15.7	85.2		586.0	0.76

Appendix 2. Habitat measurements of pallid sturgeon capture sites for 1996.

Date	Section	Depth(m)		Temp C°	Turbidity NTU	Secchi cm	Conductivity umhos	Velocity m/s
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08/28/96	6	1.2	4.3	18.3	64.6		612.0	1.00
08/28/96	6	3.1	3.8	18.3	64.6		610.0	0.70
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08/28/96	6	2.4	6.1	19.6	46.3		604.0	0.40
09/19/96	6	1.2	3.7	13.3			578.0	
09/25/96	6	2.7	6.1	12.2				
Average		2.2	4.8	15.7	85.2		586.0	0.76