

LOWER YELLOWSTONE RIVER PALLID STURGEON STUDY II

and

MISSOURI RIVER PALLID STURGEON CREEL SURVEY

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## ABSTRACT

From May 18 to August 19, 1992, gill and trammel nets were drifted on the Yellowstone River between Cartersville Diversion Dam and Intake Diversion Dam, the Tongue River [up to the Tongue and Yellowstone (T&Y) Diversion Dam], and the Powder River to locate any pallid sturgeon possibly in the area. No pallid sturgeon were located upstream of Intake during the study but fifteen other fish species were collected, with shovelnose sturgeon being most abundant. Below Intake, sturgeon were also collected from anglers and paddlefish snaggers from May 15 to July 30, 1992. Most shovelnose sturgeon collected below Intake were tagged with orange cinch up tags and released. One pallid sturgeon was snagged on June 26, 1992. Small (less than 454 grams) shovelnose sturgeon were common downstream of Intake and rare upstream of Intake. Shovelnose sturgeon seem able to move over or around Intake Diversion Dam to upstream points. No pallid sturgeon were found in the Intake canal in October, immediately after the seasonal ditch shutdown. Missouri River anglers in the Fred Robinson Bridge area caught and released at least two pallid sturgeon.

## PART I - YELLOWSTONE RIVER STUDY

### INTRODUCTION AND OBJECTIVES

Recent work with the pallid sturgeon (Scaphirhynchus albus) on the Yellowstone River was prompted by the Tongue River Dam Rehabilitation Project. In 1991, the Bureau of Reclamation provided a grant (No. 1-FG-60-01840) to the Montana Department of Fish, Wildlife and Parks to conduct a pallid sturgeon survey in the Yellowstone basin between Intake Diversion Dam near Glendive and Cartersville Diversion Dam near Forsyth (Watson and Stewart 1991). This grant allowed exploration for the pallid sturgeon in the lower Tongue and Powder rivers and the Yellowstone River. The pallid was listed as an endangered species in 1990 (Federal Register 1990). If pallids are still present, the opportunity exists for water to be released from the Tongue River Dam to facilitate spawning. During the 1991 survey, one pallid sturgeon was captured above Intake. This stimulated additional efforts in 1992.

The primary objective in 1992 was to further determine the occurrence of pallid sturgeon in the Yellowstone River upstream of Intake, including the two main tributaries, the Tongue and Powder rivers (Figure 1). Secondly, as much information as possible would be collected from captured pallids and each would be identified with a numbered tag.

We collected information about sturgeon below Intake by observing angler-caught and incidentally snagged sturgeon. All sturgeon collected were identified as to species, tagged, and then released. Movement of tagged sturgeon was used to determine if Intake Diversion Dam blocks upstream movements of sturgeon.

Fish were also sampled in the Intake canal in October, after water flow to the canal was shut off, to find out if pallid sturgeon entered the system.

### STUDY AREA DESCRIPTION

The study area is located in the Yellowstone River drainage in southeastern Montana. Work was done between the Cartersville Diversion Dam at Forsyth downstream to the area immediately below Intake Diversion Dam (Figure 1). This is 268 km (166 miles) of river. Also included in the study area was the upper portion of the Intake canal and two major tributaries, the Tongue and Powder rivers. The Tongue River was sampled from the mouth upstream to the Tongue and Yellowstone (T&Y) Diversion Dam at river kilometer 32.8 (20 miles). The Powder River was sampled from the mouth upstream to a natural rock structure at river km 13.5 (8.4 miles) which restricted boat travel.

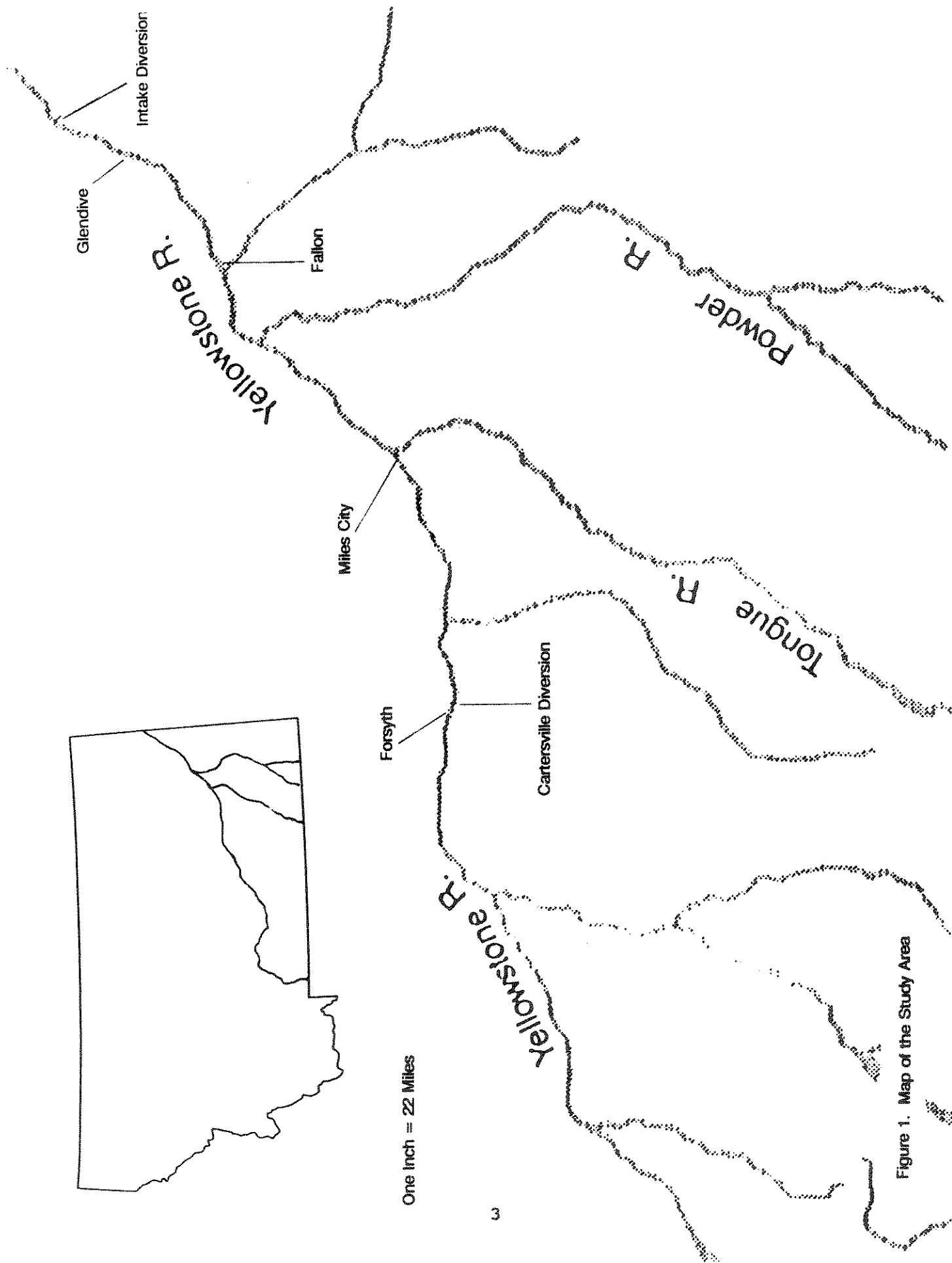


Figure 1. Map of the Study Area

The study area was divided into seven sections (five in the Yellowstone and one each in the Powder and Tongue). Physical characteristics of these sections are shown in Table 1. Streamflows for 1992 and long term mean flows are shown in Table 2.

## METHODS

Two types of sinking drift nets were used: Trammel nets 150 feet long by 6 feet deep with 2 inch inner mesh and 12 inch outer mesh, and gill nets 50 or 100 feet long by 6 feet deep with 3 inch mesh. Usage of either net depended upon the width, current speed, and the amount of debris within the river.

Nets were set from the bow of a boat while the driver was backing perpendicular to the river current. The nets were kept as wide and perpendicular to the current as possible for no longer than 45 minutes per drift. Drifting time was recorded from the time the net was placed into the water until retrieval began. This time was recorded as net sampling effort, in hours, by river section and time period. The distance in miles covered for each drift was recorded with the aid of the River Mile Index of the Yellowstone River (DNRC 1976). Tables 3 and 4 summarize this information.

We recorded fork length and weight for sturgeon while total length and weight were recorded for all other fish species. Shovelnose sturgeon were also fin clipped on various fins for identification of recaptures. Any tags present from past research were recorded. Efforts to collect hybridization measurements were not attempted as other research has shown no evidence of hybrids in surrounding areas (Clancy 1991).

Below Intake, sturgeon incidentally snagged by paddlefish anglers and those that anglers did not want were placed into steel tanks that were periodically checked. Fork length and weight were recorded and an orange cinch up tag (numbered from 7-00001 to 7-00323) was placed just below the dorsal fin before releasing the fish. Most sturgeon weighing less than approximately 250 grams were not tagged. Length and weight were also obtained from some sturgeon retained by anglers.

The Intake canal was sampled with a back-pack electrofishing unit and a 50 foot 1/4" mesh bag seine.

## RESULTS

No pallid sturgeon were collected upstream from Intake. However, on June 26, 1992, a pallid sturgeon 1381 millimeters long was snagged by a paddlefish angler just below Intake (weight was



not taken). An orange cinch up tag bearing number 7-00324 was secured near the dorsal fin on the pallid. It was then released back to the river. No other pallid sturgeon were captured in 1992.

Upstream of Intake, a total of 2088 fish were captured, of which 1082 were shovelnose sturgeon. The remaining 1006 fish were a combination of 14 different fish species. Shovelnose sturgeon comprised 52% of the total fish collected while 29% were river carpsuckers. Together, they accounted for 81% of all fish caught. Below Intake, 467 shovelnose sturgeon were weighed and measured, 316 received a tag and 151 were either retained by anglers or were too small to tag.

Shovelnose sturgeon seemed to occupy all habitat types available but were most abundant in habitats characterized by fast to moderate current with a relatively flat gravel bottom. These areas were most prevalent around large inside bends of the river, in wide river stretches, and areas surrounding small gravel islands.

Numbers of shovelnose sturgeon collected above Intake were recorded by river section and time period (Tables 5 and 6). Numbers of shovelnose sturgeon collected per unit time increased from late May to early June but the highest number per unit of effort occurred around late July - early August. Yellowstone River sections three and four yielded the highest number of sturgeon per unit effort.

The maximum, minimum and mean length and weights for sturgeon upstream of Intake are recorded in Table 7. Sturgeon tended to be larger in upstream areas. Minimum sturgeon size was largest in the Tongue and Power rivers. These rivers are known spawning areas not used by smaller, immature sturgeon. Below Intake, maximum, minimum and mean values for lengths and weights were calculated for tagged and untagged specimens (Table 12). Numbers and percentages of fish under 908 kg (2 pounds) and 454 kg (1 pound) were calculated above and below Intake (Table 13). These figures tend to indicate that sturgeon are larger upstream of Intake and that small shovelnose sturgeon are much more abundant downstream of Intake.

Numbers of non-sturgeon fish species collected by time period and river section are shown in Tables 8 and 9. Maximum, minimum and mean lengths and weights for each group are shown in Table 10. More fish were collected in late May - early June. River carpsuckers were the most abundant of the 14 non-sturgeon species collected.

Table 11 summarizes shovelnose sturgeon recapture data for 1992. Sturgeon in the Yellowstone River and tributaries have been tagged since the early 1970's. Of 31 tagged and recaptured shovelnose sturgeon, we were unable to locate the original tagging date for six fish. These six fish were omitted from Table 11. The remaining 25 were tagged between 1974-1992 in various locations. Three sturgeon of particular interest were tagged below Intake and recaptured upstream. Two were tagged in the late 70's

but one was tagged on June 7, 1992, and recaptured above Intake on July 29, 1992, a time period with a maximum water flow of 38,700 cfs, a below-average peak annual flow. These three fish, especially the one tagged in 1992, indicate some ability of sturgeon to travel upstream over Intake Diversion Dam. Of the 1082 sturgeon captured upstream of Intake in 1992, we fin-clipped approximately 900. Only three of these fish were subsequently recaptured in 1992, indicating the 900 fish were a small portion of the total number of sturgeon in the study area.

No pallid sturgeon were found in October 1992 in the Intake canal. Approximately 10,000 feet of the canal between Intake and the town of Crane were sampled a few days after seasonal shutdown of the canal. A total of 509 fish of 14 species was collected. All species were common Yellowstone River fish species. Results are shown in Table 14.

## DISCUSSION

The biggest influence on numbers of fish collected at each location was water flow. Yellowstone River flows during the study period in 1992 were below average (Table 2). Tongue and Powder River flows in 1992 were below average in May and June and above average in July and August. This influenced fish movements into the Tongue and Powder rivers. During last year's study (Watson and Stewart 1991), when above average flows occurred, highest efficiency in catching shovelnose sturgeon was in the Tongue River. This year's sampling efficiency was much lower for the Tongue River in May and June due to insufficient flow to attract sturgeon to the Tongue. Highest netting efficiency in 1992 occurred in the Yellowstone River during late July - early August when drifting debris that clogs nets was low.

An important question is whether the pallid sturgeon caught upstream of Intake in 1991 was a resident or migrant. High stream flows in 1991 may have facilitated sturgeon passage over or around Intake Diversion Dam. Much lower Yellowstone River flows in 1992 may have prevented pallid sturgeon migration upstream of Intake. However, the passage of the shovelnose sturgeon tagged and recaptured in 1992 over Intake suggests that pallid sturgeon could also migrate over Intake while water flows are below average.

Migration over Intake may require a sturgeon to be a certain minimum size. The three shovelnose tagged below Intake and recaptured above were larger than the mean length and weight for Intake sturgeon (Tables 11 and 12). This may also be reflected in the lower percentage of small sturgeon (less than 980 kg) found above Intake and the high percentage found below (Table 13). Although sampling methods upstream and downstream of Intake were different in 1992, sampling with electrofishing gear in past years suggests that the difference in sturgeon size upstream and downstream of Intake is real.

Tagged shovelnose sturgeon recaptured in 1992 had been at large as long as 18 years. Based on size, these were adult fish when tagged, suggesting some may exceed age 30.

Individual movement of tagged sturgeon varied from a few miles up to 110 miles. Distances of 20 to 40 miles were common and longer distances can be expected when considering the number of years these fish have been at large since tagging (Table 11).

Blue suckers may become a future concern nationwide as a threatened or endangered species but they appeared frequently in net collections in the study area (Tables 8 and 9). Higher numbers were collected in the lower Yellowstone River sections. Efficiency increased towards the end of the study period at lower river flows.

### RECOMMENDATIONS

1. Continue to sample for pallid sturgeon in the study area with primary emphasis on river sections four and five after high flows to see if any sturgeon migrate above Intake.
2. Sample the Yellowstone River later into the year to take advantage of higher netting efficiency associated with lower flows. Continue to sample the Tongue and Powder rivers during high spring flows.
3. Continue to tag shovelnose sturgeon to gain further information about fish movements.
4. Have three or four ready-to-use nets in the boat at all times to increase drifting time. If any amount of debris collects, or twists develop in the net, it can take up to one and a half hours to clean and straighten a net on shore. It is much easier and faster to clean nets on lawn or cement surfaces at the end of the day.

## PART II - MISSOURI RIVER PALLID STURGEON CREEL SURVEY.

The Missouri River upstream of Fort Peck Reservoir is one of the few remaining reaches of the Missouri where the pallid sturgeon is known to exist. The Montana Department of Fish, Wildlife and Parks (MDFWP) has been conducting a pallid sturgeon study here since 1989 and has captured 21 different pallids during this four year period. In addition to these pallid captures, several other unconfirmed pallid sturgeon sightings have been reported each year by fishermen in the Fred Robinson Bridge area.

The U.S. Bureau of Reclamation (USBR) has two large storage reservoirs that significantly alter the flow and sediment transport regimes of the Missouri River in the study area. Canyon Ferry Reservoir, located 150 miles upstream of the study area, has maximum storage of 2,043,000 acre-feet. Tiber Reservoir, located 80 miles upstream on the Marias River (a large tributary of the Missouri River), is the other USBR reservoir. Maximum storage of Tiber is approximately 1,190,000 acre-feet. The operation of these two projects could affect the pallid sturgeon population in the study area.

The USBR was interested in assisting with the pallid sturgeon study and it was agreed that a pallid sturgeon creel survey at the Fred Robinson Bridge would be beneficial for acquiring more information about this endangered species.

The purposes of the survey were to 1) locate any pallids caught by fishermen before they were released and tag and attach radio transmitters so that general movement and habitat utilization information could be collected; 2) distribute information pamphlets to paddlefish snaggers and bait fishermen and answer questions concerning identification and reporting of pallid sturgeon sightings; and 3) increase the amount of department activity in the area to ensure that anglers release all captured pallid sturgeon.

Fishermen were surveyed in a 22-mile reach of the Missouri River near the Fred Robinson Bridge (river mile 149-171). The eight established access sites in this reach were checked at least twice a day. All fishermen were interviewed concerning their fishing activity. Information about the pallid sturgeon along with an information pamphlet about the pallid was given to each fisherman.

A total of 495 paddlefish snaggers and 89 bait fishermen were interviewed during the period April 23 through June 14, 1992 (Table 15). Only two confirmed pallid sturgeon were caught and released by fishermen during this period; both pallids were caught by bait fishermen. These two pallids were not observed by MDFWP personnel. They were confirmed as pallids based on approximate size reported by the anglers. There were four additional reports of small pallids less than 10 pounds caught and released; however, these sightings could not be confirmed because pertinent information was lacking. A total of 88 shovelnose sturgeon were harvested by bait

fishermen during the study period. Most of these shovelnose were caught during the period May 20 - June 1.

#### LITERATURE CITED

Clancy, P. 1991. Fort Peck Pallid Sturgeon study. Montana Dept. of Fish, Wildlife and Parks. 13 pp.

DNRC, 1976. River Mile Index of the Yellowstone River. Water Resources Division. 61 p.

Federal Register, 1990. Volume 55, No. 173, pp. 36641-36647.

Watson, J.H. and P.A. Stewart, 1991. Lower Yellowstone River Pallid Sturgeon Study. Mont. Dept. of Fish, Wildlife and Parks. 24 pp.

Table 1. General description of river sections in the study area.

<u>River Section</u>	<u>Section Length (Kilometers)</u>	<u>Characteristics</u>
Tongue River T & Y Diversion to mouth	32.8	Shallow, slow and meandering with few riffles. Many cut and undercut soil banks. Downstream ends of inside banks usually slow and of a uniform shallow depth. Mostly sand and small gravel substrate.
Powder River - River Kilometer 13.5 to mouth	13.5	Shallow and braided with slow to moderate current. Numerous rocks and shelf rock ledges. Mostly sand and small gravel substrate.
Yellowstone River #1 Cartersville Diversion to Tongue River	84.3	Showed a variety of features including deep pools, riffles and some braided sections around islands. The current is mostly moderate with some fast areas where the river narrows. Substrate contains mostly medium sized gravel and rock.
Yellowstone River #2 Tongue River to Powder River	57.1	Characterized by moderate to fast current with numerous rapids. Mostly a single channel with few islands. Some deep pools occur between the fast water areas. Medium to large gravel and rock make up the majority of the substrate. Many large bedrock shelves are scattered throughout the section.
Yellowstone River #3 Powder River to Fallon Bridge	36.4	Deeper and slower for the most part with a few sets of rapids on the upper end. Many deep outside bends occur on the north side of the river. Inside corners can be very slow and shallow. Medium gravel, rock and large rocks comprise the bulk of the substrate.

Table 1. Continued

River Section	Section Length (Kilometer)	Characteristics
Yellowstone River #4 Fallon Bridge to Glendive	54.7	Many large islands located in the middle and lower portions making for numerous shallow channels. Long, straight and fairly deep stretches occur between islands. Substrate contains mostly medium sized gravel with some rocky areas.
Yellowstone River #5 Glendive to Intake Diversion Dam	35.1	Slow and deep for the most part with several large islands. Mostly larger and deeper channels. Some areas are relatively fast with deep water where channels converge. Current slows dramatically as it nears the diversion. Substrate is mainly gravel of medium to large size.

Table 2. 1992 and long term (for period of record) monthly mean stream flows (cfs) for key stream gauges in the study area.<sup>a</sup>

	Tongue River Near Miles City (1938-41; 1946-91)	Powder River near Locate (1938-1991)	Yellowstone River at Miles City (1922-23; 1928-91)
<u>May</u>			
1992	149	166	16310
Mean	725	1150	17200
<u>June</u>			
1992	238	651	21650
Mean	1331	1680	35200
<u>July</u>			
1992	955	923	17930
Mean	462	572	20500
<u>August</u> <sup>b</sup>			
1992	536	404	7561
Mean	175	210	8200

<sup>a</sup> Data from USGS. 1992 data are provisional and subject to revision.

<sup>b</sup> Figures through August 19.



Table 3. Trammel net and gill net sampling effort by time period.

Date	2" Trammel Net			3" Gill Net		
	Hours	Miles	# Drifts	Hours	Miles	# Drifts
5/18 - 5/31	11.0	27.3	30			
6/1 - 6/15	12.1	29.8	31			
6/16 - 6/30	4.5	13.0	14	6.9	12.1	15
7/1 - 7/15	4.1	18.2	15	5.4	15.5	14
7/16 - 7/31	6.9	20.4	21			
8/1 - 8/15	6.5	17.3	22			
8/15 - 8/19	3.9	9.0	12			
	49.0	135.0	145	12.3	27.6	29

Table 4. Trammel net and gill net sampling effort by river section.

River Section	2" Trammel Net			3" Gill Net		
	Hours	Miles	# Drifts	Hours	Miles	# Drifts
Tongue	1.5	1.8	3	5.9	15.4	14
Powder	1.0	2.4	3	3.7	6.7	9
Yellowstone						
1	7.6	22.0	28	2.0	5.0	5
2	9.4	26.1	25			
3	18.3	48.2	50			
4	7.0	17.9	22	0.7	0.5	1
5	4.2	16.6	14			
Total	49.0	135.0	145	12.3	27.6	29

Table 5. Number of shovelnose sturgeon caught in drift nets by time period and river section (hours of netting effort in parentheses).

Time Period	Yellowstone					Period Total
	Tongue	Powder	1	2	3	
5/18 - 5/31	0(0.4)	0(0.2)	4(2.3)	15(4.9)	92(3.2)	111(11)
6/1 - 6/15	0(0.8)			7(1.6)	256(9.6)	263(12)
6/16 - 6/30	0(0.8)	27(4.4)	0(1.8)	5(0.8)	40(3.0)	72(11.5)
7/1 - 7/15	101(5.1)		19(0.8)		30(1.2)	198(9.4)
7/16 - 7/31			15(1.1)	9(1.4)	34(1.2)	176(7.0)
8/1 - 8/15			72(2.7)	16(0.9)	151(4.0)	172(6.5)
8/16 - 8/19			19(0.7)	17(0.5)	65(1.3)	90(3.9)
Total	101(7.1)	27(4.6)	129(9.4)	69(10.1)	432(18.2)	1082(61.3)

Table 6. Number of shovelnose sturgeon caught per hour of netting effort by time period and river section.

Time Period	Yellowstone					Period Total
	Tongue	Powder	1	2	3	
5/18 - 5/31	0	0	1.7	3.1	28.8	10.1
6/1 - 6/15	0			4.4	26.7	22.0
6/16 - 6/30	0	6.1	0	6.3	13.3	6.3
7/1 - 7/15	19.8		23.8		28.3	21.1
7/16 - 7/31			13.6	6.4	37.8	25.1
8/1 - 8/15			26.7	17.8	11.7	26.5
8/16 - 8/19			27.1	34.0	50.0	23.1
Mean	14.2	5.9	13.7	6.8	23.7	17.7

Table 7. Maximum, minimum and mean fork length and weight of shovelnose sturgeon by river section.

	Tonque	Powder	Yellowstone					All Fish Combined
			1	2	3	4	5	
			Fork Length (mm)					
Max	994	900	1062	955	996	938	905	1062
Min	665	636	512	532	358	386	501	358
Mean	794	762	828	752	767	753	739	771
			Weight (kg)					
Max	5.90	4.04	8.17	6.80	7.71	4.54	5.90	8.17
Min	1.31	1.00	0.59	0.51	0.15	0.45	0.45	0.15
Mean	2.35	2.03	2.38	1.92	2.18	2.12	1.99	2.17
Sample Size	101	27	129	68	434	251	73	1082

Table 8. Fish species and number caught by time period (excluding sturgeon).

Species	5/18-5/31	6/1-6/15	6/16-6/30	7/1-7/15	7/16-7/31	8/1-8/15	8/16-8/19	Total
Bigmouth buffalo	1			1			1	3
Blue sucker	4	7	2	5	3	13	41	75
Burbot	1							1
Carp	5	16	9	7	10	21	13	81
Channel catfish	6	21	16	3	9	8	1	64
Goldeye	21	9	50	3	3	3	7	93
Longnose sucker	1		1	1		9	1	13
River carpsucker	219	277	69	12	18	3	4	602
Sauger					1		1	2
Shorthead redhorse	6	6	3	2		18	11	46
Smallmouth buffalo	1	2		3	3	5	2	16
Stonecat		1	2	1				4
White sucker	1					3		4
Walleye	1					1		2
Total	267	339	152	35	47	84	82	1006

Table 9. Fish species and number caught by river section (excluding sturgeon).

Species	Tongue	Powder	Yellowstone					Total
			1	2	3	4	5	
Bigmouth buffalo	1				1		1	3
Blue sucker	1		13		14	9	38	75
Burbot			1					1
Carp	2		12	9	29	13	16	81
Channel catfish	3		19	2	29	6	5	64
Goldeye			58	21	13	1		93
Longnose sucker			10	2	1			13
River carpsucker	59	2	20	208	304	5	4	602
Sauger				1			1	2
Shorthhead redhorse	2		13	8	4	7	12	46
Smallmouth buffalo			6	4	2	3	1	16
Stonecat			2	1			1	4
White sucker			1	1		1		4
Walleye			1	1			1	2
Total	68	2	156	258	397	45	80	1006

Table 10. Maximum, minimum and mean total length and weight for a subsample of all fish species collected (excluding sturgeon).

Species	Total Length (mm)			Weight (kg)			Sample Size
	Max.	Min.	Mean	Max.	Min.	Mean	
Bigmouth buffalo	760	716	743	9.07	9.07	9.07	3
Blue sucker	809	370	702	4.22	1.69	2.86	75
Burbot	453	453	453	0.42	0.42	0.42	1
Carp	711	354	501	6.35	0.48	1.65	79
Channel catfish	1024	205	462	11.79	0.02	1.35	63
Goldeye	350	220	296	0.37	0.06	0.21	55
Longnose sucker	489	396	447	1.50	0.63	0.98	13
River carpsucker	612	270	413	3.41	0.25	0.96	232
Sauger	497	395	446	1.21	0.59	0.90	2
Shorthead redhorse	516	348	420	1.66	0.45	0.80	46
Smallmouth buffalo	741	477	632	7.71	1.58	3.96	16
Stonecat	200	147	169	0.09	0.01	0.06	4
White sucker	434	372	400	0.93	0.58	0.71	4
Walleye	698	655	672	4.09	2.57	3.33	2
Total							595

Table 11. Tagged shovelnose sturgeon that were recaptured in 1992.

Original Tagging Data							Recapture Data			
Color	Tag Number	Date	Ln.(mm) <sup>1</sup>	Wt.(kg)	Location <sup>2</sup>	River <sup>2</sup> Miles <sup>2</sup>	Date	Ln. (mm)	Wt.(kg)	Location <sup>3</sup>
Yellow	7-01774	5-4-78	740	0.96	YR	149.5-71.1 <sup>4</sup>	6-1-92	770	1.95	148.5 YR
	7-01221	5-5-77	736	0.56	YR	149.5-71.1 <sup>4</sup>	6-8-92	793	2.45	129.5 YR
	7-01304	6-3-80	791	1.24	PR	-	6-15-92	755	1.73	143.0 YR
	7-01496	6-17-80	790	1.04	TR	1.5	7-6-92	810	2.60	7.0 YR
	7-01824	6-19-80	632	0.95	TR	1.5	7-7-92	810	2.65	0.5 YR
	7-01369	6-9-80	864	1.08	TR	1.5	7-7-92	796	1.98	0.5 YR
	7-01434	6-13-80	797	1.33	TR	1.5	7-23-92	839	3.06	123.8 YR
	7-02994	8-18-77	812	1.81	YR	160.0	7-28-92	670	1.15	95.5 YR
	7-00516	4-28-77	855	3.50	TR	1.5	8-13-92	880	3.17	237.0 YR
	7-01839	6-30-80	782	0.74	TR	1.5	8-13-92	733	1.86	236.0 YR
	7-01494	6-17-80	860	1.34	TR	1.5	8-13-92	906	3.33	236.0 YR
	7-01442	6-30-80	779	0.88	TR	1.5	8-13-92	805	2.45	236.0 YR
	7-01851	5-17-82	840	3.70	TR	1.5	8-19-92	853	2.75	191.6 YR
Blue	7-00269	11-3-77	856	2.72	YR	237.0	6-9-92	830	2.77	143.0 YR
	7-00983	5-17-79	685	0.95	YR	71.1	6-15-92	774	2.05	143.0 YR
	7-00093	10-29-77	543	0.41	YR	71.1	6-15-92	807	2.34	143.0 YR
	7-00314	11-9-77	820	2.40	YR	237.0	7-1-92	885	3.77	231.5 YR
	7-00189	11-1-77	848	2.11	YR	237.0	7-1-92	810	2.22	231.5 YR
	7-101905	9-4-79	745	1.85	YR	237.0	7-7-92	781	1.95	0.5 YR
	7-00843	10-31-78	817	2.08	YR	237.0	7-13-92	780	2.13	127.5 YR
	7-00731	8-31-78	877	2.66	YR	237.0	8-13-92	826	2.70	236.0 YR
Red	7-02212	6-3-75	711	1.72	TR	3.0	5-28-92	740	1.85	147.5 YR
	7-01223	5-1-74	914	3.06	TR	3.0	8-13-92	872	3.61	237.0 YR
	7-01498	7-3-74	813	2.04	TR		8-13-92	810	2.82	237.0 YR
Orange	7-00246	6-7-92	740	1.80	YR	71.1	7-29-92	732	1.99	93.4 YR
Abbreviations: YR - Yellowstone River TR - Tongue River PR - Powder River										

Abbreviations: YR - Yellowstone River  
TR - Tongue River  
PR - Powder River

<sup>1</sup>Unknown whether lengths are total or fork length except for Tag #7-00246 which is fork length.

<sup>2</sup>Stream and river mile where originally tagged.

<sup>3</sup>Stream and river mile where recaptured.

<sup>4</sup>Between Powder River and Intake. Exact site unknown.

Table 12. Maximum, minimum and mean length and weight for shovelnose sturgeon above and below Intake.

	Below Intake		
	Fish Tagged	Fish Not Tagged	Combined
<u>Length (mm)</u>			
Maximum	989	940	989
			1062
Minimum	405	268	268
			358
Mean	672	591	650
			771
<u>Weight (kg)</u>			
Maximum	5.22	4.65	5.22
			8.17
Minimum	0.14	0.03	0.03
			0.15
Mean	1.34	1.20 (128) <sup>1</sup>	1.31 (444)
			2.17
<u>Number of Fish</u>			
	316	151	467
			1082

<sup>1</sup>Numbers in parentheses are numbers of fish weighed.

Table 13. Percentages of shovelnose sturgeon weighing less than 908 kg and 454 kg above and below Intake.

	Below Intake (467 Fish)		Above Intake (1082 Fish)	
	Number	Percent	Number	Percent
Less than 908 kg	150	32.12	74	6.83
Less than 454 kg	68	14.56	6	0.55



Table 14. Results of back-pack electrofishing and seining in the Intake canal, October 1992.

Species	Number Caught	Length Range (mm)
<u>Section 1 - at Intake - 4000 Ft.</u>		
White sucker	9	259 - 358
Burbot	1	200
Longnose sucker	4	261 - 335
Rainbow trout	3	413 - 430
Blue sucker	1	783
Sauger	8	268 - 475
Channel catfish	4	152 - 244
Shorthead redhorse	1	350
Goldeye	3	95 - 314
Flathead chub	170	76 - 176
Longnose and white suckers, adult	30	-
Carp, adult	50	-
<u>Section 2 - 2 miles downstream of Intake - 300 Ft.</u>		
Longnose dace	2	-
<u>Section 3 - 4 miles downstream of Intake - 2000 Ft.</u>		
Sauger	1	230
Carp, adult	1	-
<u>Section 4 - 6 miles downstream of Intake - 1000 Ft.</u>		
Sauger	1	252
Shorthead redhorse	2	308 - 329
Longnose dace	1	-
Carp, adult	3	-

Table 14. (Continued) Results of back-pack electrofishing and seining in the Intake canal, October 1992.

Species	Number Caught	Length Range (mm)
<u>Section 5 - 1 mile downstream of Burns Creek - 1000 Ft.</u>		
Carp, adult	42	-
Shorthead redhorse, adult	5	-
White sucker, adult	1	-
<u>Section 6 - 3 miles downstream of Burns Creek - 150 Ft.</u>		
Emerald shiner	3	1
Flathead chub	1	1
<u>Section 7 - Near Beef Slough - 500 Ft.</u>		
Carp, adult	53	-
White sucker, adult	3	-
Shorthead redhorse, adult	5	-
Longnose sucker, adult	4	-
Flathead chub, adult	27	-
<u>Section 8 - Near Highway Bridge at Savage - 1000 Ft.</u>		
Walleye	1	349
Flathead chub	72	160 - 247
Shorthead redhorse	1	220
<u>Section 9 - 4 miles south of Crane - 1000 Ft.</u>		
No fish observed		

Table 15. Fishermen survey and sturgeon creel information for the Missouri River in the Fred Robinson Bridge area, April 23 - June 14, 1992.

Survey Period	Number of Anglers Interviewed		No. Pallids Caught and Released	No. of Sturgeon Harvested
	Paddlefish Snaggers	Bait Fishermen		
4/23 - 4/27	56	10	1	0
4-30 - 5/4	72	8	0	0
5/7 - 5/10	84	10	0	8
5/13 - 5/17	86	31	0	16
5/20 - 5/25	175	10	0	31
5/28 - 6/1	16	15	1	26
6/5 - 6/7	4	2	0	7
6/12 - 6/14	2	3	0	0