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

STATE: Montana PROJECT TITLE: Statewide Fisheries Investigations

PROJECT NO.: F-46-R-4 STUDY TITLE: Survey and Inventory of Warmwater Streams

STUDY NO.: III JOB TITLE: Yellowstone River Paddlefish Spawning Study

JOB NO.: E

Period Covered: July 1, 1990 through June 30, 1991

ABSTRACT

A study to determine the locations of paddlefish spawning sites and evaluate spawning success in the lower Yellowstone River was continued. Larval fish sampling with plankton nets collected a total of 13 paddlefish larvae. Twelve of the larvae were collected during the June 20 and 26 sampling periods. A total of 203 paddlefish/scaphirhynchus eggs were also sampled. Eighty-six percent of the eggs were collected at the Intake site with most of these present in June 20 samples.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. Monitor the Yellowstone River paddlefish run in the lower Yellowstone River. Based on the results of the 1990 annual report it was recommended that this objective be deleted. This work was reported under Job III-C.

2. Locate paddlefish spawning areas. Efforts towards this objective were made and results are reported.

3. Evaluate paddlefish spawning success. Efforts towards this objective were accomplished and results are reported.

4. Determine effect of commercial roe harvest, if any, on paddlefish population. This is discussed under the heading "Results and Discussion". (State funded)

5. Report amount of roe harvested commercially. This is reported under the heading "Results and Discussions". (State funded)

PROCEDURES

Larval fish sampling was used to evaluate paddlefish spawning success and locate spawning sites. Larval samples were obtained using boat mounted, plankton net samples. Conical, 20-inch diameter, 6 feet long Nitex nets (750 micron mesh) were used in tandem so that duplicate samples could be taken simultaneously. The nets had a 3-rope harness that was fastened to and suspended off a weighted line attached to each end of a cross-boom mounted on the bow of a boat. Surface and bottom samples were collected while drifting slightly downstream. Most of the sampling occurred in strong current areas of the river, at a depth of about 6 feet, and therefore power was provided by the outboard motor to decrease the downstream drift rate. When the boat and nets were held stationary in the river current the force of the currents would cause the nets to surface preventing collections at the river bottom. The nets were positioned in the river usually for a duration of 6-10 minutes.

The volume of water filtered was determined using General Oceanic flow meters (Model 2030) mounted on the front ring and positioned at one third of the net diameter.

INTRODUCTION

Every year during the late spring paddlefish from Garrison Reservoir migrate up the Yellowstone River to spawn. The Yellowstone contains one of the five known natural paddlefish spawning areas within their geographical range (U.S. Fish and Wildlife Service, 1990). Although paddlefish eggs and larva have been collected in the river (Penkal 1981), exact spawning sites and habitat preferences have not been determined.

In 1989 the Montana Legislature passed House Bill 289 which allows for the commercial sale of paddlefish eggs from paddlefish harvested only in the Yellowstone River at the Intake fishing access site. The bill also emphasized protection of the paddlefish population from overharvest. One of the methods of protection was to collect more information on spawning success and locate spawning sites so that effects of potential increased harvest of female paddlefish could be better evaluated.

DESCRIPTION OF STUDY AREA

The study areas consists of a 185 mile reach of the lower Yellowstone River in southeastern Montana, from Miles City to Fort Buford, ND. The Tongue and Powder Rivers are the only two major tributaries entering the Yellowstone in the reach. The Yellowstone is one of the few remaining free-flowing rivers. The river is

fairly large with a mean annual flow of 13,170 cfs near its confluence with the Missouri River (USGS 1976). The headwaters of Garrison Reservoir begin about 5 mile downriver of the confluence.

Intake Diversion Dam is the only major diversion in the study area. This diversion is constructed of scattered boulders and spans the width of the river. The drop is approximately 4 feet in 100 feet and is characterized by very turbulent water (Graham and Penkal, 1978). The diversion acts as a partial barrier for upstream travel to most fish species.

Five sampling stations were established on the Yellowstone in the study area (Figure 1 and Table 1). The distances between station ranged between 21 and 37 miles.

RESULTS AND DISCUSSION

Paddlefish Spawning Success and Spawning Locations

Larval fish were sampled at five study sites on the Yellowstone River. Samples were collected from late May through mid July, 1990, to determine timing and location of paddlefish hatching and emergence.

A total of 252 larvae were collected in 164 samples representing 7 taxonomic families (Table 2). Average larval densities ranged form a low of 0.76 to a high of 4.25 larvae/100 m^3 at stations 4 and 5, respectively. Larval densities were generally the greatest during the late June sampling period.

A total of 13 paddlefish larvae were sampled during 1990, all of which were collected at Station 5, the confluence area of the Yellowstone (Table 3). A total of 203 paddlefish or sturgeon eggs were collected at Station 1, 3 and 5 with 86% taken at Station 3, Intake area. Thousands of adult paddlefish stage near Station 3 and it is believed that these eggs were most likely paddlefish. Presently there is no method to distinguish between paddlefish and sturgeon (Scaphirhynchus) eggs. Paddlefish and sturgeon both inhabit the Yellowstone River in the study area.

The 1990 spawning season probably peaked between June 20-26. During this period paddlefish larvae and egg collections were highest.

Methodology for efficient sampling of paddlefish larvae and eggs is still not developed, therefore a variety of net positions were tested. Table 4 shows that the bottom positioned net collected far greater numbers of both larvae and eggs compared to the surface samples. These findings are similar to that reported for this study during 1989 (Gardner 1990).

Commercial Roe Harvest

Beginning with the 1990 paddlefish season, a commercial operation to collect paddlefish roe for caviar was begun at Intake by the Glendive Chamber of Commerce and Agriculture. This activity was authorized by the 1989 Montana legislature.

The Chamber collected roe from 974 female paddlefish. These fish had a total ovary weieght of 9,723 pounds. This produced 3,608 pounds of #1 grade caviar which sold for $30 per pound and produced a gross income of $108,240. Also 765 pounds of #3 caviar was produced. This was sold for $382.

This commercial operation seemed to have no effect on the paddlefish population or on the paddlefish harvest at Intake. The 1990 harvest by anglers of paddlefish at Intake was relatively low and fishing pressure was moderate. No additional harvest or fishing effort resulted from the commercial operation. Effects of the roe harvest in future years will be monitored.

RECOMMENDATIONS

1. Larval fish sampling should continue as a means for evaluating spawning success and discovering spawning sites.

2. Sampling methodology for larval paddlefish should be further developed to improve efficiency. A more intense effort at fewer sites would allow for testing a variety of net orientations and sites.

LITERATURE CITED

Gardner, W.M. 1990. Yellowstone River Paddlefish Spawning Study. Mont. Dept. Fish, Wildlife & Parks. Job. Prog. Rept., Project No. F-46-R-3. Job No. IIIE. 5 pp.

Graham, P.J. and R.F. Penkal. 1978. Aquatic environmental analysis in the lower Yellowstone River. Mont. Dept. Fish, Wildlife and Parks, Helena. 102 pp.

Penkal, R.F. 1981. Life history and flow requirements of paddlefish, shovelnose sturgeon, channel catfish and other fish in the lower Yellowstone River system. Mont. Dept. Fish. Wildlife and Parks. Helena. 53 pp.

U.S. Fish and Wildlife Service. 1990. Endangered and Threatened Wildlife and Plants; finding on petition to list the paddlefish. Federal Register. Vol. 55, No. 80.

U.S.G.S. 1976. Water Resources Data - Montana, Volume 1.

Prepared by: William M. Gardner

Date Prepared: August, 1991

Water Referred to:

Yellowstone River Section 1	21-1350-02
Yellowstone River Section 2	21-1400-02

Table 1. Locations and legal descriptions for larval fish sampling stations in the Yellowstone River, 1990.

Station Number	Locality	Legal Description
1	Fallon	T13N R52E Sec 27
2	Glendive	T16N R55E Sec 26
3	Intake	T18N R56E Sec 36
4	7-Sisters	T21N R58E Sec 13
5	Confluence	T15N R103W Sec 35

Table 2. Summary statistics for larval fish collections sampled in the Yellowstone River, 1990.

Station	Total Number of samples	Avg # # of larvae sampled	larvae/ $100m^3$ filtered	Range (larval/ $100m^3$)	Date of greatest larval density	Total # of families represented
1	28	47	2.69	0 -16.87	6/25/90	5
2	24	26	1.67	0 - 7.90	6/25/90	3
3	27	25	1.20	0- 3.89	7/12/90	3
4	27	16	.76	0 - 5.38	6/26/90	2
5	58	138	4.25	0 -37.60	6/28/90	7
Totals	164	252	-	-		-

Table 3. Average number per sample of paddlefish larvae and eggs [1/] (in parentheses) collected in the Yellowstone River, 1990.

Station	SAMPLING PERIOD							Total
	May 30	June 6	June 14	June 20	June 26	July 5	July 12	
1				(1.5)		(0.2)		(7)
2								
3		(5.5)		(37)	(1)	(2)		(175)
4								
5	(0.2)		0.2(0.2)	0.4(0.2)	0.3(0.7)	(0.2)		13 (21)

[1/] Paddlefish and sturgeon eggs cannot be distinguished from each other, therefore both fish groups could be represented in the total.

Table 4. Comparison of paddlefish larvae and egg [1/] collections for nets sampled at the surface and bottom in the Yellowstone River, 1990.

Net location	Number of larvae	Number of eggs	Total number of samples
Station 3			
Surface	0	3	13
Bottom	0	172	14
Station 5			
Surface	4	3	28
Bottom	9	18	30

[1/] Paddlefish and sturgeon eggs cannot be distinguished from each other, therefore both fish groups could be represented in the total.

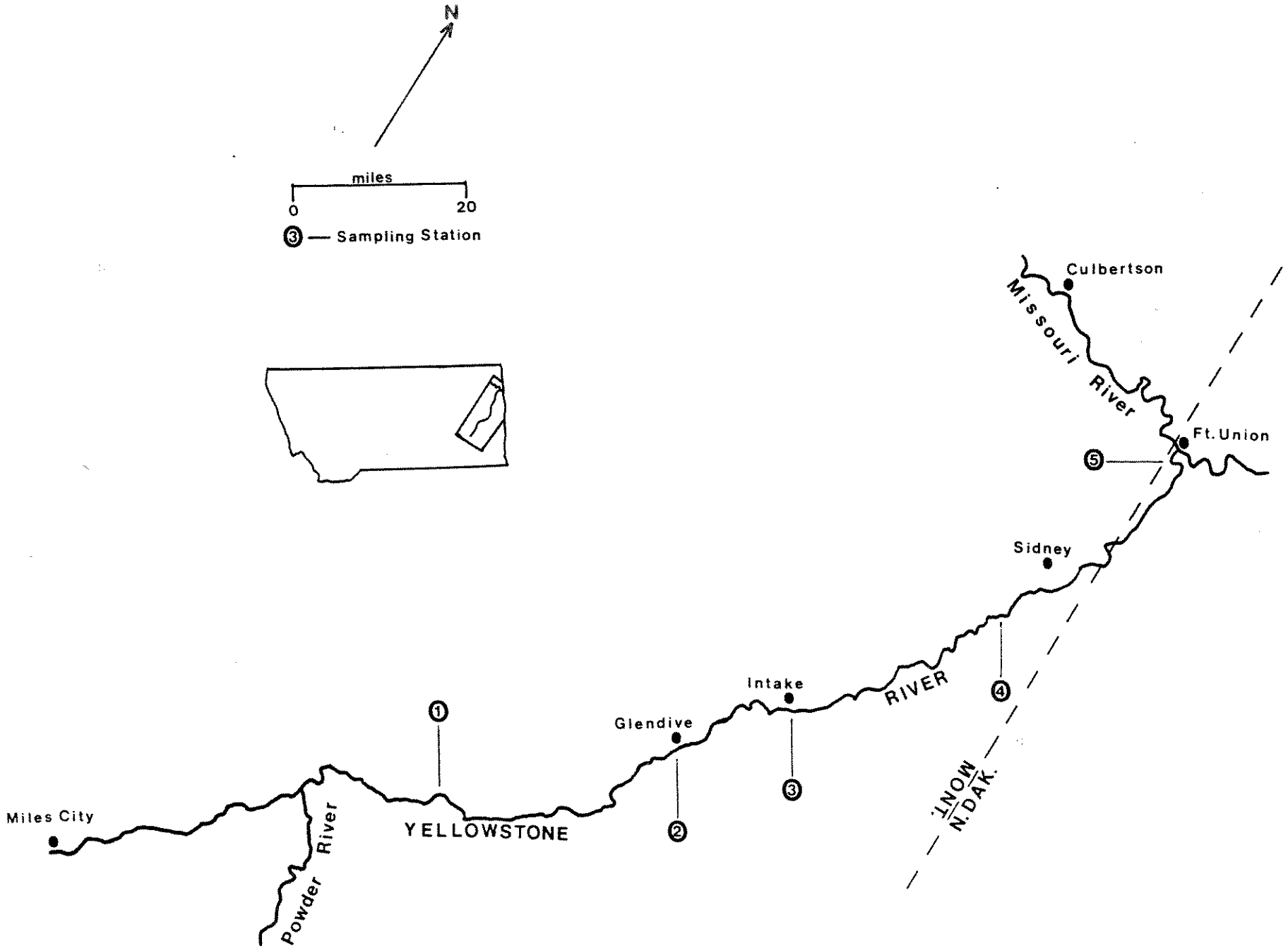

Figure 1. Map of the lower Yellowstone River.