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

STATE: Montana
PROJECT TITLE: Statewide Fisheries Investigations

PROJECT NO.: F-46-R-3
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, 1989 through June 30, 1990

ABSTRACT

A study to determine the locations of paddlefish spawning sites and evaluate spawning success in the lower Yellowstone River was initiated. Electroshocking survey counts conducted during the spawning migration period found that paddlefish were somewhat randomly distributed with very few concentration areas. Larval fish sampling with plankton nets collected a total of 13 paddlefish larvae. Nine of the larvae were collected during the last two sampling periods, June 20 and 29.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. Monitor the Yellowstone River paddlefish run in the lower Yellowstone River. This objective was accomplished and results are reported.

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. Commercial roe harvest commenced May 15, 1990 and ended July 10, 1990. Statistics and evaluation will be reported in the 1990-91 report.

5. Report amount of roe harvested commercially. Commercial harvest commenced May 15, 1990 and ended July 10, 1990. Statistics will be reported in 1990-91 report.

PROCEDURES

The paddlefish spawning run was monitored by conducting electroshocking surveys throughout the lower Yellowstone River. The presence or absence of paddlefish were determined by electroshocking with a boom electroshocking unit mounted on a 16 foot aluminum river sled. The electrode system was adapted from

that described by Novotny and Priegal (1976). Power was supplied by a 3,500-watt AC generator. The alternating current was delivered to a Coffelt Model VVP-10 rectifying unit which changes the alternative 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. No effort was made to capture paddlefish, thereby, limiting the exposure time to the electrical field.

Larval fish sampling was used to evaluate paddlefish spawning success and locate spawning sites. Larval samples were obtained using boat mounted, plankton net samples. The 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 and lead that was attached to each end of a cross-boom mounted on the bow of a boat. While anchored in the river channel duplicate samples were collected at the water surface and near the bottom. The nets were positioned in the river for a duration of 20 minutes.

FINDINGS

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 begins about 5 miles 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.

Paddlefish Migration and Concentration

In an attempt to locate paddlefish spawning sites electroshocking survey counts were made throughout the study area during the spawning season. This effort resulted in only one paddlefish observed above Intake Diversion while 20 fish were observed below the diversion (Table 1).

Table 1. Number of paddlefish observed while electroshocking above and below Intake Diversion on the Yellowstone River during June, 1989.

Location	No. of Survey Runs	Av. Length (Miles)	Total No. Of Paddlefish Observed
Above Intake Diversion	3	17	1
Below Intake Diversion	1	20	20

Most of the paddlefish observed below Intake were evenly distributed throughout the 20 mile section and there were no evident concentrations in any one particular area. This paddlefish distribution pattern observed below Intake was similar to that reported by Stewart (1988) for the previous 2 years.

Paddlefish Spawning Success and Spawning Locations

Larval fish sampling was used to determine paddlefish spawning success. The orientation and other characteristics of larval paddlefish drift in rivers is unclear and therefore a study on this phase was warranted before evaluation of spawning success and locations could be addressed.

Larval fish were sampled only at one station located 2 miles upriver from the confluence with the Missouri River. Six sets of samples were collected at 2-9 day intervals commencing June 3 and ending June 29. A total of 49 fish larvae and 374 fish eggs were collected of which 13 and 4 were paddlefish larvae and eggs, respectively (Table 2).

Table 2. Total Number of Fish Larvae and Eggs Collected in Larval Fish Tows Taken in the Yellowstone River near Fort Buford, North Dakota, 1989.

	Date					
Species	6/3	6/7	6/9	6/15	6/20	6/29
Paddlefish (larvae)	0	2	2	0	4	5
Paddlefish (eggs)	0	2	1	1	0	0
Goldeye (larvae)	0	3	15	1	12	1
Goldeye (eggs)	0	328	4	0	24	14
Sucker (larvae)	0	0	0	2	1	1
No. Samples Taken	4	4	4	4	3	4

A comparison of surface versus bottom larval tows revealed that 11 of the 13 (85%) paddlefish larvae were collected in the bottom nets (Table 3).

Table 3. Comparison of Paddlefish larvae collections for nets sampled at the Surface and Bottom in the Yellowstone River near Fort Buford, ND, 1989.

Net Location	No. of Larvae	Total No. of Samples
Surface	2	12
Bottom	11	11

The most paddlefish larvae collected in one net was 3, once on June 20 and again on June 29. The most paddlefish larvae collected on one day for all samples combined was 5, and this occurred on June 29.

It is possible that paddlefish may have spawned throughout the month of June. Spawning most likely commenced on May 30 at the latest. This is based on an incubation period of 7 days (Purkett 1961 and Yeager and Wallus 1982) and an estimated age of about 2 days for the collected paddlefish larvae. Based on the previously mentioned explanation it is most likely that spawning continued at least through June 20. The completion of the paddlefish spawning period cannot be determined because larval sampling ended on June 29 and paddlefish larvae were still present in the samples.

RECOMMENDATIONS

1. Discontinue the paddlefish electroshocking survey counts as a means of locating spawning sites. For three years this method failed to provide new and more useful information. It is possible that paddlefish continually move through the 70+

miles of the lower Yellowstone and never remain in one location to stage during the spawning period. Efforts should continue with locating paddlefish spawning sites. The collection of spawned eggs would confirm the location of a spawning area. Attempts should be made to sample paddlefish eggs.

2. Larval fish sampling should continue as a means for evaluating spawning success. An index station should be established so that yearly trends in numbers of drifting paddlefish larvae could be monitored and later correlated with spawning success. Larvae should be sampled at several more sites to investigate the presence of spawning in other areas.

LITERATURE CITED

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Novotny, D. W. and G. R. Priegal. 1974. Electrofishing boats -- improved designs and operational guidelines to increase the effectiveness of boom shockers. Wisc. Dept. Nat. Res. Tech. Bull. No. 73. Madison. 48 pp.

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Date Prepared: August, 1990

Water Referred to:

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