

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-2

Study No.: 682

Title: Pond rearing of juvenile lake sturgeon

Period Covered: October 1, 2000 to September 30, 2001

Study Objective: To determine the relationship between initial size, rearing density, and growth rate and survival of age-0 lake sturgeon in rearing ponds, and to measure size-dependent vulnerability to piscivores such as walleye.

Summary: This year we concluded the pond experiment started last summer, monitored growth of surviving age-0 lake sturgeon from that experiment, and began analysis of the data from crayfish trapping. We were not able to start the new pond experiment planned for this summer; this experiment would have evaluated the effect of adult largemouth bass on lake sturgeon survival in ponds that contain crayfish. As reported last year, six ponds were stocked in August 2000 with age-0 lake sturgeon (mean weight: 2.1 g; approximately 80 mm total length). To evaluate the effect of crayfish density on lake sturgeon survival, crayfish were trapped daily in two ponds but not trapped in two other ponds. Each of these four ponds received 100 age-0 lake sturgeon. To evaluate the effect of lake sturgeon density on growth and survival, two additional ponds were each stocked with 200 fish, and crayfish were trapped daily. As of November 27, 2000, 16,528 crayfish had been trapped and removed from the four low-crayfish ponds. Lake sturgeon survival was poor in all six ponds. Four ponds were drained in late November 2000, and only six lake sturgeon were recovered from the 600 that had been stocked in these four ponds (1% survival). The other two ponds, one with crayfish trapping and one without, were drained in June 2001 and no lake sturgeon were recovered. The six survivors captured in November had an average weight of 73.4 ± 14.3 g and an average length of 243 ± 21 mm TL, and included two fish with caudal fin damage. Three of these were recaptured in June and July 2001. After almost one year of growth in Saline ponds, these three age-1 lake sturgeon had reached 295, 370, and 387 mm in length. Survivors grow well in these ponds.

Job 1. Title: Stock ponds.

Findings: We were not able to start a pond experiment in summer 2001. The age-0 lake sturgeon which were to be used in the pond experiment were instead stocked as part of the 3,500 fish which went into the Ontonagon River in Michigan's Upper Peninsula.

The experiment that was planned to start in 2001 was intended to test whether the presence of adult largemouth bass would improve survival of age-0 lake sturgeon in ponds containing crayfish. Results of previous experiments as well as direct observations in the lab and in ponds indicate that adult crayfish can reduce survival of age-0 lake sturgeon. Adult largemouth bass reduce the number of crayfish through predation. Presence of largemouth bass is also likely to have an indirect effect on lake sturgeon survival by altering the behavior of crayfish. In ponds with predators, crayfish are expected to be less active and spend more time in burrows, further reducing the encounter rate between crayfish and lake sturgeon. Based on laboratory

experiments conducted in summer 2000, we would not expect largemouth bass to ingest many lake sturgeon.

We intend to begin the following experiment in summer 2002. Each of four ponds will receive equal numbers of age-0 lake sturgeon (approximately 100, depending upon availability). Two of the ponds will contain 50 adult largemouth bass and a few juvenile bluegill introduced as forage. The other two ponds will be controls, with no other fish. Because of concern about other fish species entering lake sturgeon ponds from the water supply reservoir, a net will be positioned to strain inflow water, as was done last year. We will drain the ponds in early winter or spring and compare sturgeon survival in ponds with versus without largemouth bass. We expect much higher survival in ponds containing largemouth bass.

Job 2. Title: Monitor growth of lake sturgeon.

Findings: As reported last year, six ponds were stocked on August 2, 2000, with age-0 lake sturgeon (mean weight: 2.1 g; approximately 80 mm total length). Four of these ponds were drained on November 29 and 30, 2000, and six survivors were recovered from the 600 stocked into these four ponds (1.0% survival). These six survivors had an average weight of 73.4 ± 14.3 g, and an average length of 243 ± 21 mm TL, including two fish with caudal fin damage. Three of these fish were stocked into Pond 6 and three were stocked into Pond 7. Pond 6 was drained again on June 14, 2001, and one lake sturgeon was recovered (295 mm TL). Pond 7 was next drained on July 3, 2001, and two lake sturgeon were recovered (370 mm and 387 mm TL). Significant growth had occurred between November and July. After almost one year of growth in Saline ponds, these three age-1 lake sturgeon had reached 295, 370, and 387 mm in length.

Job 3. Title: Drain ponds.

Findings: Following the experimental design, crayfish were trapped from four ponds; two ponds were controls (no crayfish trapping). Because of various constraints only four ponds were drained in late fall 2000. Six surviving lake sturgeon were recovered (1% survival). The other two ponds were drained in June 2001; no survivors were recovered. Trapping crayfish did not appear to improve survival of the lake sturgeon (Table 1).

The poor survival may have been caused by reduced food availability at stocking (August 2, 2000). The ponds had been drained on July 20 and 21, 2000, which was 12-13 days prior to stocking. Many crayfish left the ponds through the drain pipe at draining, others crawled up the bank and walked to another pond. Prior to refilling, the ponds were held dry for several days during a hot spell in order to eliminate crayfish. Those crayfish that stayed in the ponds either died in the hot sun or were eaten by raccoons or birds, whose tracks were visible in the drying mud. This period of drying may have also severely reduced the biomass of benthos available as food to the newly stocked lake sturgeon. However, we did observe many exuviae of midge pupae on the surface of the water on August 9, one week after fish stocking, suggesting that a large hatch of midges had occurred.

The six survivors from November 2000 were restocked into Pond 6 and Pond 7, three fish into each; crayfish trapping ceased. One of three fish was recaptured when Pond 6 was drained June 14, 2001. Two of three fish were recaptured when Pond 7 was drained July 3, 2001. The growth of these fish is described under Job 2.

Job 4. Title: Evaluate vulnerability to predators.

Findings: Because no age-0 lake sturgeon were available from Wolf Lake Hatchery, no laboratory experiments could be conducted this year on vulnerability to predators. We plan to conduct such experiments next year if sufficient fish are available.

The 2000 experiment was intended to test the effect of trapping and removing crayfish on survival of age-0 lake sturgeon. We hypothesized that crayfish were predators of young lake sturgeon and that trapping would reduce crayfish densities enough to improve sturgeon survival. As explained under Job 3, the ponds were drained 12-13 days before stocking and held dry for several days to eliminate crayfish. We began trapping crayfish on August 9, seven days after stocking. It became clear that crayfish could easily move between ponds, because we were able to trap large numbers of adult crayfish even during the first weeks of trapping. From August 9 to November 27, a total of 16,528 crayfish were removed from the four treatment ponds (Table 2).

Job 5. Title: Write progress report.

Findings: This progress report has been prepared.

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Date: September 30, 2001

Table 1.—Results of pond experiment to evaluate the effect of trapping crayfish on survival of age-0 lake sturgeon. Fish were stocked on August 2, 2000, at a mean weight of 2.1 g and approximately 80 mm total length.

Pond	Treatment	Number stocked	Number recovered	Draining date	Length (mm TL)	Weight (g)
Pond 16	Control	100	0	11/30/00		
Pond 10	Control	100	0	6/8/01		
Pond 7	Trap crayfish	100	5	11/29/00	239±21	69.1±10.8
Pond 8	Trap crayfish	100	0	6/14/01		
Pond 6	Trap crayfish	200	0	11/29/00		
Pond 9	Trap crayfish	200	1	11/30/00	263	95.0

Table 2.—Number of crayfish removed per pond during the experiment to evaluate the effect of trapping crayfish on survival of age-0 lake sturgeon. Trapping began on August 9 and ended on November 27, 2000.

Month	Pond 6	Pond 7	Pond 8	Pond 9	Total
August	1,428	993	1,058	648	4,127
September	1,881	2,106	2,030	1,535	7,552
October	596	1,238	1,046	1,113	3,993
November	76	377	221	182	856
Total	3,981	4,714	4,355	3,478	16,528