

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-4

Study No.: 682

Title: Pond rearing of juvenile lake sturgeon

Period Covered: October 1, 2002 to September 30, 2003

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: According to the study as amended in 2000-01, Jobs 1, 2, 3, 4, and 5 were active this year. This year we completed a pond experiment begun in summer 2002. The goal of this pond experiment was to evaluate the effect of adult largemouth bass on lake sturgeon survival in ponds that contain crayfish. In July 2002, four ponds were each stocked with 100 age-0 lake sturgeon (mean weight: 2.0 g; mean total length: 81 mm). Two ponds had been stocked earlier with 50 adult largemouth bass. Our hypothesis was that direct and indirect effects of largemouth bass on crayfish would improve survival of age-0 lake sturgeon. We drained these four ponds in the spring of 2003 to measure sturgeon survival. Only one lake sturgeon survived (0.25% survival). Recovered in a pond with largemouth bass, the sole survivor appeared to be in excellent condition (275 mm TL, 97.3 g). The presence of largemouth bass did not cause a substantially higher survival of juvenile lake sturgeon. Our hypothesis for this experiment is rejected. This finding is making us reconsider the possibility that a period of low food availability or high temperature is limiting survival of lake sturgeon in the Saline ponds.

Findings: Jobs 1 through 5 were scheduled for 2002-03, and progress is reported below.

Job 1. Title: Stock ponds.—We started the current pond experiment in the last reporting period, on July 23, 2002, using age-0 lake sturgeon reared at Wolf Lake Hatchery. These age-0 lake sturgeon came from eggs and milt obtained from lake sturgeon captured in Michigan's Upper Peninsula. The eggs hatched at Wolf Lake Hatchery on June 5, 2002.

The experiment tested whether 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, indicated that adult crayfish can be predators of age-0 lake sturgeon, reducing their survival. Adult largemouth bass directly 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 such as adult largemouth bass, crayfish were expected to be less active and spend more time in burrows or move to another pond, further reducing the encounter rate between crayfish and lake sturgeon. Based on laboratory experiments conducted in summer 2000, and confirmed in the experiments from summer 2002, we did not expect largemouth bass to ingest many (if any) lake sturgeon.

Each of four ponds had received 100 age-0 lake sturgeon (mean weight: 2.0 g; mean total length: 81 mm). Two ponds (Pond 6 and Pond 9) were previously stocked with 50 adult largemouth bass. The other two ponds (Pond 5 and Pond 7) were controls, with no other fish. Because of concern about other fish species entering lake sturgeon ponds from the water supply reservoir, a net was positioned to strain inflow water, as was done in previous years.

No additional ponds were stocked in 2003 for this study.

Job 2. Title: Monitor growth of lake sturgeon.—On one occasion during this experiment, one of us snorkeled around one pond (Pond 5) to look for lake sturgeon. None were observed. This pond had clear water, but aquatic macrophytes were abundant, so fish may have hidden in the plants. The other three ponds were sufficiently turbid that observation was considered impractical.

The single lake sturgeon recovered in April 2003 appeared to be in excellent condition and had good growth (97.3 g, 275 mm TL) from the initial size at stocking (mean weight: 2.0 g; mean total length: 81 mm). This is similar to the growth observed in a previous experiment, where lake sturgeon were stocked in July 1999 at a mean weight of 0.48 g and mean total length \pm 1 SD of 51.3 \pm 5.7 mm; three individuals were recaptured in April 2000 with mean weight \pm SD of 59 \pm 16 g and mean total length \pm 1 SD of 219 \pm 24 mm.

Job 3. Title: Drain ponds.—We drained the four ponds in April 2003 and compared lake sturgeon survival in ponds with versus without largemouth bass. Of the 100 lake sturgeon stocked into each of four ponds, only one juvenile lake sturgeon survived (0.25%); it was recovered in a pond containing largemouth bass. The presence of largemouth bass did not cause a substantially higher survival of juvenile lake sturgeon. Our hypothesis for this experiment is rejected. This finding is making us reconsider the possibility that a period of low food availability or high temperature is limiting survival of lake sturgeon in the Saline ponds (Wehrly 1995).

Of the 50 adult largemouth bass stocked into each of two ponds in May 2002, we recovered 46 (92%) in Pond 6 and 41 (82%) in Pond 9 in April 2003. Reproduction had occurred in 2002 in each of these ponds. We recovered 20.5 pounds of age-1 largemouth bass in Pond 6 and 11 pounds of age-1 largemouth bass in Pond 9.

The adult largemouth bass appeared to be effective in reducing the number of crayfish. The total weight of crayfish recovered at draining was 100.0 lbs (Pond 5) and 19.8 lbs (Pond 7) in the two ponds without largemouth bass versus 2.2 lbs (Pond 6) and 4.7 lbs (Pond 9) in the two ponds with largemouth bass.

Job 4. Title: Evaluate vulnerability to predators.—We did not conduct additional lab studies this reporting period. However, plans have been made to conduct experiments in late spring 2004 to further evaluate vulnerability to predators by using very small lake sturgeon. We plan to use juvenile lake sturgeon from a study that is being conducted on Black River, the major tributary to Black Lake, Cheboygan County. One of the investigators of that study has offered to supply some very small lake sturgeon that are being captured as they move downstream of a major spawning location in the Black River. The purpose of the planned lab studies would be to see if very small lake sturgeon are taken by fish predators or rejected because of mechanical defenses such as sharp scutes.

Job 5. Title: Write progress report.—This progress report has been prepared.

Literature Cited:

Wehrly, K. E. 1995. The effect of temperature on the growth of juvenile lake sturgeon, *Acipenser fulvescens*. Michigan Department of Natural Resources, Fisheries Research Report 2004, Ann Arbor.

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