

## Pond Rearing of Juvenile Lake Sturgeon

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**Abstract.**—Pond rearing of age-0 lake sturgeon could provide an alternative to intensive rearing of juveniles in a hatchery setting. We conducted a series of six pond and raceway experiments and nine laboratory experiments to evaluate factors related to pond rearing. We measured survival and growth of age-0 lake sturgeon stocked at different densities into 0.25-ha earthen ponds and outdoor raceways. In the first pond experiment we observed 100% mortality of the age-0 lake sturgeon. Subsequent experiments were conducted to determine the causes of mortality and improve survival. During summer months, pond water temperatures exceeded 25°C on many days. In several experiments lasting 2-4 months, pond survival of the juvenile lake sturgeon never exceeded 5%. High water temperatures were probably the main cause for the poor survival of juvenile lake sturgeon in these ponds. In one raceway experiment we found 81% mortality during the first 14 d, but water temperatures were only above 20°C for a few hours. We conclude that high water temperature was not the cause of mortality in the raceways. To evaluate the role of predation as a source of mortality observed in our outdoor experiments, we conducted several lab experiments with crayfish and largemouth bass, two main predators in our system. Our observations in both pond and lab experiments confirm that crayfish will attack and can consume juvenile lake sturgeon. Predation by crayfish *Orconectes virilis* was probably the major cause of mortality in the raceways. Crayfish predation may have also contributed to the high mortality of juvenile lake sturgeon in our experimental ponds. Attempts to reduce crayfish predation in ponds by trapping crayfish did not improve lake sturgeon survival. Stocking 50 adult largemouth bass per pond to control crayfish also did not improve sturgeon survival. Several laboratory experiments clearly demonstrated that largemouth bass do not voluntarily consume juvenile lake sturgeon. If a juvenile lake sturgeon is ingested, it is rapidly expelled, with no obvious harm to the lake sturgeon. The natural pattern of dark spots on the head, body, and fins can be used as natural marks to identify individual juvenile lake sturgeon using photographic images, at least during the first year of life. We successfully used this method to monitor the growth of several individuals for up to one year. Rearing of juvenile lake sturgeon in earthen ponds or outdoor raceways can result in good growth during the first year, exceeding the typical growth rates for wild juveniles. We measured specific growth rates during summer to fall of 3.0 and 4.8 % body weight/d. The small numbers of survivors often reached 300 mm after 12 months of growth. Rearing age-0 lake sturgeon is not feasible in ponds with high summer temperatures or with abundant crayfish. If survival can be improved by avoiding exposures to high water temperatures and predators, then pond rearing may provide a low-cost method to rear juvenile lake sturgeon.