

GREAT LAKES FISHERY COMMISSION

Project Completion Report¹

Duration of river residence of newly-hatched lake sturgeon: Implications for sea lamprey control

by:

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**Duration of river residence of newly-hatched lake sturgeon:
Implications for sea lamprey control**

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Abstract:

The drift of larval lake sturgeon in the Sturgeon River, Baraga and Houghton Counties Michigan, was monitored nightly from 5 June to 17 July 1997. Sampling for drifting larvae was conducted at two locations, 26 and 61 river km downstream of the adult lake sturgeon spawning site. At the station 26 river km below the spawning site, 104 larvae were collected in 60 hours of sampling, while only 5 larvae were collected in 252 hours of sampling at the station 61 river km below the spawning site. Lake sturgeon larvae appear to drift out of the upper reaches of the river system during June and July but may settle in the lower river. In 6.5 hours of visual stream surveys conducted in July and August and covering 10.1 km of river, only two juveniles, 200 mm and 28.8 cm, were observed. Visual surveys conducted by members of the USFWS in July and August 1997 resulted in about 30 additional sitings of small juveniles (55 to 170 mm) in the mid to lower river. Lake sturgeon eggs, larvae, juveniles or adults are present in the river from late April until September. Sea lamprey chemical treatment must be adjusted and carefully monitored to provide a safe outcome for lake sturgeon in the Sturgeon River or an alternate method must be found for rivers supporting lake sturgeon populations. Data from this research, funded by the Great Lakes Fishery Commission, will be combined with data collected in the summer of 1997 by the Michigan Department of Natural Resources and with data collected in 1992, 1993 and 1996 as a technical paper and submitted for publication in early 1998.

Introduction:

Lake sturgeon juveniles were found to be sensitive to the sea lamprey treatment chemical TFM, (draft - Johnson and Weisser 1993). This sensitivity was determined for hatchery-reared,

175 mm lake sturgeon used in a flow-through toxicity test in 1989. Testing for sensitivity on smaller, newly-hatched larvae (20-35 mm TL) found drifting in the river has not been done. Drift of larval lake sturgeon was documented to occur in June and July in 1992, 1993, and 1996 to 46 river km below the adult spawning site (Auer unpublished). This research was conducted to determine if lake sturgeon larvae drift entirely out of the 67 km river and if there is some time during the year when sea lamprey chemical treatments can be conducted with the least endangerment to lake sturgeon. To insure survival, recruitment and recovery of lake sturgeon in the Sturgeon River and other Great Lake tributaries where remnant populations persist, all life stages of the lake sturgeon must be safeguarded.

Methods:

A Ryan recording thermometer was set at the spawning site on 22 April 1997 to monitor water temperature and 8 visual surveys were made to document adult spawning and record water temperature. Two to four drift nets, and occasionally a larval fish seine and an adult fish seine, were set at dusk at two stations on the Sturgeon River. Nets were set for three hours and monitored hourly. The first station, located at the Froberg Road bridge, was 26 river km below the known lake sturgeon spawning site and the other station, at Chassell Road bridge, was 61 river km below the site. D-ring frame drift nets were borrowed from the Marquette USFWS office and set from the bridge structure. These nets were 76 cm across the base, 54 cm high and held a knotless nylon bag 317.5 cm long of 1600 um mesh netting with a detachable cod end. The larval seine had a bag of 500 um mesh, measured 102 by 102 cm and 190 cm long with a detachable cod end. This seine possessed two 127 cm long wings of 1000 um mesh. The adult fish seine of 0.64 cm mesh measured 22.9 m across, 183 cm deep with a 183 by 183 cm bag. Sampling was conducted from June 5 to 12 at the first station, 26 river km below the spawning site, and from June 13 to July 21 at the lower station, 61 river km from the spawning site. Larval lake sturgeon were measured and returned immediately to the river, below the net sets.

Visual and SCUBA surveys were conducted on 5 occasions at 16, 26, 36, and 61 river km

below the spawning site from July 11 to August 9, 1997. Two to four individuals walked abreast upstream visually observing lake sturgeon juveniles. When possible young were captured and measured for total and fork lengths and released.

Results:

Larval drift nets were set at 26 river km below the adult spawning site from June 5 to June 12, then sampling was moved to 61 river km below the spawning site from June 13 to July 21. The Michigan Department of Natural Resources continued monitoring the upper most site until June 21 and also sampled another site 46 river km below the spawning site from 11 June to 24 June. Data collected by the Michigan Department of Natural Resources are not presented here.

In 1997 adult lake sturgeon probably spawned at least twice near the Prickett dam spawning site, 67 river km above the river mouth. The fish probably spawned first on May 10 when the river water first rose above 10 C. Water temperatures dropped sharply the next day after a heavy snow and did not rise again above 10 C until May 26.

Tables 1 and 2 summarize sampling effort at the Sturgeon River stations in 1997. At the station 26 river km below the adult spawning site, 60 net hours of sampling resulted in the capture of 104 larval lake sturgeon between 17 and 28 mm TL. The majority of these larvae were captured over the sandy substrate on the west side of the river in water 100 to 130 cm (Figure 1). At the second station, 61 river km below the spawning site, 252 net hours of sampling resulted in the capture of only 5 larvae, 20 to 33 mm TL. These young were captured on the west side of the river over a sandy substrate in water 100 to 200 cm. Although data from the Michigan Department of Natural Resources are not included in this report, Figure 3 shows the number of larvae captured at each of the three stations in 1997. The dark shaded bars are total larvae collected at 26 river km, the medium shaded bars are total larvae collected at the 46 river km station and the few light shaded patches are the 5 larvae collected at the lowest, 61 river km station.

A total of 6.5 hours were spent in visual survey work, covering a total of 10.1 km of river. These surveys were conducted on 5 days between 11 July and 9 August at sites 16 (two times), 26, 35, and 61 river km below the spawning site. Only two lake sturgeon juveniles were observed and both were found in a section of the river above the 16 river km location. The first fish was approximately 200 mm TL and observed in water about 25 cm on small pea gravel and was not captured. The second fish was collected in the same area during another survey using two SCUBA divers. It was found in a 183 cm hole, captured and measured 28.8 cm TL.

Discussion:

In 1997, 104 larval lake sturgeon were collected while drifting past a point 26 river km below the adult spawning site from June 5 to June 12. The Michigan DNR collected almost 200 more larvae at this same location before drift was completed at this point in the river by mid-June. In 1992, 1993, and 1996 similar peaks of drifting lake sturgeon larvae were observed at this location.

The Michigan DNR collected nearly 150 larvae at a station 46 river km below the spawning site by late June 1997. Some lake sturgeon larvae had been collected at the 46 river km station in 1992 and 1993 but this station was not sampled in 1996.

Nets, set to capture drifting lake sturgeon larvae at the lowest station, 61 river km, resulted in the capture of only 5 larval lake sturgeon from June 13 to July 17, 1997. This sampling period occurred during and after the collection of over 450 lake sturgeon larvae made between June 5 and June 24 at the 26 and 46 river km stations on the Sturgeon River.

Research on drift of larval lake sturgeon in the Sturgeon River, Michigan conducted in 1997 clearly shows these young reach 46 river km by late June. Few larvae were collected beyond this point in the river. Some possible causes for the limited success in capturing lake sturgeon larvae in the lower river include:

Slowing of the river flow - this was visually observed, but no instruments were used to measure water flows in the river during drift sampling. At the stations 26 and 46 river km below the spawning site the nets inflated immediately upon placement in the river. Nets deployed at the 61 river km station often had to be manually straightened out, as water flows were not strong enough to completely inflate the netting.

Tributary entrance - at about 50 river km below the spawning location the outflow from the Otter Lake, Otter River system enters the Sturgeon River. This system may carry fishes which prey upon lake sturgeon larvae, or sediments or nutrients which affect the larvae (either positively or negatively).

Net Avoidance - the slower water flow in the lower river may allow lake sturgeon larvae, approximately 30 mm TL at 61 river km downstream, to avoid capture by the various nets employed.

From data collected in this study and those of the USFWS in 1997 it would appear lake sturgeon larvae and young-of-the-year, utilize the lower Sturgeon River as a nursery area and do not drift entirely out of the river system. Water quality, substrate quality and changes in river flow need to be examined at points between 46 and 61 river km below the spawning site. Until a method is developed to determine where these young reside beyond the 46 river km station, care must be taken in treating this system with the chemical lampricide currently in use.

References:

Johnson, D.A. and J. W. Weisser. 1993. DRAFT - Tolerance of sea lamprey larvae (*Petromyzon marinus*) and lake sturgeon (*Acipenser fulvescens*) to the lampricide 3-Trifluoromethyl-4-nitrophenol (TFM) in flow-through toxicity tests on the Sturgeon River, Baraga County, Michigan. U.S. Fish and Wildlife Service, 1924 Industrial Parkway, Marquette, MI 49855.

List of Figures:

Figure 1. Cross section of the Sturgeon River at the Froberg Road bridge, 26 river km below the adult lake sturgeon spawning site. West side to the left.

Figure 2. Cross section of the Sturgeon River at the Chassell Road bridge, 61 river km below the adult lake sturgeon spawning site. West side to the left.

Figure 3. Total number of lake sturgeon larvae collected in 1997 at each of three stations. The dark shaded bars are larvae collected at 26 rkm, the medium shaded bars are larvae collected at 46 rkm and the 5 light shaded squares are the larvae collected at 61 rkm below the adult lake sturgeon spawning site.

Table 1. Date, number of nets set, total net hours and number of lake sturgeon larvae collected from June 5 through June 12, 1997 at the station 26 river km below the spawning site on the Sturgeon River, Michigan.

Date	Day of year	Nets set	Total net hours	Number of lake sturgeon larvae
June 5	156	2	6	0
June 6	157	2	6	1
June 7	158	2	6	0
June 8	159	2	6	2
June 9	160	3	9	28
June 10	161	2	12	31
June 11	162	2	6	28
June 12	163	3	9	14

Table 2. Date, number of nets set, total net hours and number of lake sturgeon larvae collected from June 13 through July 17, 1997 at the station 61 river km below the spawning site on the Sturgeon River, Michigan. (ls = larval seine, as = adult seine).

Date	Day of year	Nets set	Total net hours	Number of lake sturgeon larvae
June 13	164	3	9	1
June 14	165	3	9	0
June 15	166	3	9	0
June 16	167	3	9	0
June 17	168	4	12	2
June 18	169	3	9	0
June 19	170	3	9	1
June 20	171	3	9	0
June 21	172	4	12	1
June 22	173	4	12	0
June 23	174	4	12	0
June 24	175	3	9	0
June 25	176	3	9	0
June 26	177	3	9	0
June 27	178	3	9	0
June 28	179	3	9	0
June 29	180	3	9	0
June 30	181	3 + ls	9	0
July 2	183	3 + ls + as	9	0
July 6	187	3 + ls + as	9	0
July 7	188	3 + ls	9	0
July 8	189	3 + ls	9	0
July 9	190	3 + ls	9	0

July 10	191	3 + ls	9	0
July 14	195	3 + ls	9	0
July 16	197	3 + ls	9	0
July 17	198	3 + ls	9	0





