

## STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-5

Study No.: 230491

Title: Evaluation of lake sturgeon *Acipenser fulvescens* populations in the St. Clair River and Lake St. Clair

Period Covered: October 1, 2003 to September 30, 2004

**Study Objective:** The objectives of this study are (1) to determine spawning period, areal distribution of spawning activity, and spawning habitat for lake sturgeon in the St. Clair River, (2) to determine early (juvenile) life history of lake sturgeon in the St. Clair River and Lake St. Clair, and identify habitat requirements of lake sturgeon, (3) to document lake sturgeon population parameters for Lake St. Clair and the St. Clair River, including estimated abundance, exploitation rate, age composition, growth rate, age structure, and sex composition of the spawning stock..

**Summary:** Data entry and analysis for all 2003 field collections has been completed. A research report summarizing the results of this study from 1996 through 2002 was prepared in 2003 and revised during 2004. Work continued on Jobs 1, 2, 3, and 4 in 2004 under the most recent amendment to the study. Vessel repair scheduling during spring 2003 prevented setline sampling in the St. Clair River, but trawling was conducted on schedule during June, July and August. Field sampling was conducted on schedule in 2004.

**Findings:** Jobs 1 through 4 were scheduled for 2003-04, and progress is reported below.

**Job 1. Title: Collect biological data, and tag juvenile and adult sturgeon with monel tags in the St. Clair River and Lake St. Clair.**—A complete summary of the biological data collected between 1996 and 2002 was provided in the research report manuscript prepared in September 2003. Four sturgeon were incidentally caught in survey trap nets in Anchor Bay during May, 2004. The trap netting is conducted under Study 488. A total of 105 lake sturgeon were caught with 85 setlines fished in the St. Clair River from June 1 to 17, 2004. Sturgeon were also caught with trawls in Lake St. Clair during June, July, and August 2004. A summary of the biological statistics for lake sturgeon sampled from the St. Clair River and Lake St. Clair from 1996 to 2003 is presented in Table 1. The age was estimated for a total of 1,136 lake sturgeon based on pectoral fin ray sections (Table 2). A total of 55 year-classes were represented. The strongest year-classes were 1993, 1989, 1985, 1979, and 1977. The weakest year-classes appeared to include 1992, 1981, and 1971. Data entry for field collections during 2004 is underway.

**Job 2. Title: Characterize adult spawning habitat and juvenile habitat based on catch distribution and using underwater video, sidescan sonar, doppler flow meter, temperature and oxygen profiles.**—Efforts to identify habitat requirements of juvenile lake sturgeon have been impeded by our inability to consistently collect young lake sturgeon. Less than 1% of the sturgeon captured through 2003 were younger than age 3 (smaller than about 500 mm total length). A total of 68 fish (about 5%) measuring 762 mm in total length or smaller (approximately age 6 or younger) were caught through 1993. Roughly 40% of those were caught in the St. Clair River with setlines, while 60% came from Lake St. Clair sampling with trap nets and trawls. During the summer of 2004, we participated in a cooperative mid-summer juvenile lake sturgeon survey in the St. Clair River. This survey effort included MDNR, USFWS, and USGS personnel. Small-mesh gill nets proved

ineffective, often becoming badly fouled with drifting aquatic plants. However, setlines captured numerous lake sturgeon under 762mm in total length. The physical characteristics of those locations that consistently produced juvenile lake sturgeon will be documented during fall 2004 and summer 2005. We plan to continue snorkel surveys in other areas of the delta and along the delta channels during summer 2004.

Potentially, age 0 lake sturgeon in the St. Clair system may inhabit deep channel areas of the St. Clair delta. However, sampling in these areas is extremely difficult. Additional catch data from setline and trawl collections over the next few years may also help identify juvenile habitat based on the geographical distribution of juveniles in the catch.

No additional progress was made in identifying additional spawning sites in 2004. However, egg mats will be deployed during the spawning period in 2005 at two sites reported by local residents to include coal cinder substrates.

**Job 3. Title: Collect and analyze tag recovery data.**—A total of 62 tag recoveries had been recorded through 2003, representing approximately 5% of the total number of 1,230 fish tagged and released over this time period (Table 3). Recapture numbers in 2003 were much lower than for the previous three years. We suspect this is largely a function of a lack of setline sampling in the St. Clair River in 2003. Setlines have been the single largest source of tag recoveries during this study (Table 4), followed by commercial fishing. Overall, the tag recovery data have documented that St. Clair system lake sturgeon move into Lake Huron and Lake Erie (Table 5). Furthermore, it suggests that sturgeon spawning in the Michigan waters of the St. Clair River experience considerable fishing exploitation in the Ontario waters of southern Lake Huron. These factors should be recognized in future sturgeon management strategies.

Lake sturgeon movements are unrestricted by human or natural barriers in the St. Clair system. This potential for free immigration and emmigration makes it difficult to estimate abundance based on mark-recapture techniques. Other factors such as fishing mortality, tag loss, and individual fish behavior also make it difficult to use the mark-recapture techniques for estimating abundance and survival rates. We will continue to explore the use of more appropriate mark-recapture programs/models as they become available in the future.

**Job 4. Title: Analyze data and prepare annual performance report, final report, and other reports.**—A summary of all Mt. Clemens sturgeon assessment activities was prepared for inclusion in the annual Interbasin Sturgeon Working Group Report, compiled by the US Fish and Wildlife Service Alpena Fisheries Resource Office, and distributed at the Great Lakes Fisheries Commission lake meetings. The results of some portions of the work conducted under this study were reported in Thomas and Haas (2004), Nichols et al (2003), and Thomas and Haas (in press).

**Job 5. Title: Publish final report covering sampling through October 2002.**—The following research report summarizes the results of all work conducted under this study from 1996 to 2002:

Thomas, M. V., and R. C. Haas. In press. Spawning habitat, abundance, age structure, and spatial distribution of lake sturgeon *Acipenser fulvescens* in the St. Clair system. Michigan Department of Natural Resources, Fisheries Research Report, Ann Arbor.

**References:**

Nichols, S. J., G. Kennedy, E. Crawford, J. Allen, J. French III, G. Black, M. Blouin, J. Hickey, S. Chernyák, R. Haas, and M. Thomas. 2003. Assessment of lake sturgeon (*Acipenser fulvescens*) spawning efforts in the lower St. Clair River, Michigan. *Journal of Great Lakes Research* 29:383-391.

Thomas, M. V., and R. C. Haas. 2004. Status of the Lake St. Clair fish community and sport fishery, 1996-2001. Michigan Department of Natural Resources, Fisheries Research Report, Ann Arbor.

Thomas, M. V., and R. C. Haas. 2002. Abundance, age structure, and spatial distribution of lake sturgeon, *Acipenser fulvescens*, in the St. Clair system. *Journal of Applied Ichthyology* 18:495-501.

Thomas, M. V. and R. C. Haas. 1999. Capture of lake sturgeon with setlines in the St. Clair River, Michigan. *North American Journal of Fisheries Management* 19:610-612.

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Table 1.—Mean length, weight, girth, and age for sturgeon collected from the St. Clair River and Lake St. Clair, from 1996 to 2003.

	St. Clair River (Setline)	Lake St. Clair (Trawl)
Total number caught	489	752
Mean length	1,235 mm	1,204 mm
Length range	546 mm – 1,887 mm	244 mm – 1,849 mm
Mean weight	14.6 kg	13.2 kg
Weight range	0.8 kg – 53.6 kg	0.2 kg – 44.0 kg
Mean age	20.0	18.9
Age range	3-74	1-59

Table 2.—Combined age distribution for 1,136 lake sturgeon sampled for age from the St. Clair River and Lake St. Clair in 1997 -2003 with four gear types (trap net, setline, trawl, and gill net).

Year class	Year							Total catch
	1997	1998	1999	2000	2001	2002	2003	
2000	0	0	0	0	0	2	0	2
1999	0	0	0	0	1	0	0	1
1998	0	0	1	0	0	1	0	2
1997	0	0	1	0	3	1	0	5
1996	1	1	2	0	2	8	0	14
1995	0	1	3	0	0	2	0	6
1994	2	3	7	3	10	6	2	33
1993	7	13	13	12	6	7	1	59
1992	5	3	1	4	2	1	0	16
1991	11	6	6	9	5	2	1	40
1990	10	6	4	3	3	3	1	30
1989	7	12	4	8	7	8	6	52
1988	10	6	7	7	8	7	1	46
1987	5	7	1	6	8	1	0	28
1986	7	4	4	11	6	5	0	37
1985	12	7	10	7	13	3	0	52
1984	5	8	5	9	6	2	1	36
1983	7	3	3	11	8	2	0	34
1982	3	11	5	13	8	3	1	44
1981	1	7	3	8	3	2	0	24
1980	5	10	3	6	5	6	0	35
1979	6	8	7	12	7	6	5	51
1978	8	10	7	6	7	6	4	48
1977	7	14	7	6	9	8	1	52
1976	5	10	7	10	6	5	0	43
1975	10	7	7	8	5	3	2	42
1974	4	12	6	9	5	4	0	40
1973	6	7	6	9	5	3	1	37
1972	2	7	5	2	4	4	0	24
1971	3	2	3	1	4	2	0	15
1970	1	7	10	3	2	2	2	27
1969	1	10	1	6	1	4	0	23
1968	5	5	4	4	3	1	2	24
1967	3	10	1	8	3	0	1	26
1966	5	3	3	2	2	1	0	16
1965	2	4	4	2	3	0	0	15
1964	2	3	1	6	0	1	0	13
1963	1	5	1	1	2	0	0	10
1962	0	0	0	0	2	0	0	2
1961	1	0	2	1	2	1	0	7

Table 2.–Continued.

Year class	Year							Total catch
	1997	1998	1999	2000	2001	2002	2003	
1960	0	1	0	1	1	0	0	3
1959	0	0	0	2	0	0	0	2
1958	0	0	0	2	0	0	1	3
1957	0	1	1	0	0	1	0	3
1956	0	1	0	0	0	0	0	1
1955	1	1	0	2	0	0	0	4
1954	0	1	0	0	0	0	0	1
1953	0	0	1	0	0	0	0	1
1951	0	0	0	1	0	0	0	1
1950	0	0	0	0	0	1	0	1
1946	0	0	0	1	0	0	0	1
1945	0	1	0	0	0	0	0	1
1941	0	0	0	1	0	0	0	1
1937	0	0	1	0	0	0	0	1
1926	0	0	0	1	0	0	0	1

Table 3.–Tag recovery matrix for lake sturgeon tagged with monel tags and released in Lake St. Clair and the St. Clair River.

Year of tag recovery	Tag year								Grand total
	1996	1997	1998	1999	2000	2001	2002	2003	
1996	1								1
1997		3							3
1998		5	3						8
1999		2	5	0					7
2000			3	4	3				10
2001			2	5	5	2			14
2002			1	4	4	4	2		15
2003			1	1				2	4
Total recoveries	1	10	15	14	12	6	2	2	62
Total tagged	81	182	242	169	222	176	124	34	1230
% Recovered	1%	5%	6%	8%	5%	3%	2%	6%	5%

Table 4.—Number of lake sturgeon tagged and released by gear type, and mode of recapture for tag recoveries from 1996 to 2003, including seven fish with multiple recoveries.

Capture gear	Number tagged	Mode of recapture							Total
		Setline	Trap net	Trawl	Gill net	Sport fishing	Commercial fishing	Found dead	
Setline	460	23	0	2	1	10	10	1	47
Trap net	21	0	1	1	0	0	0	0	2
Trawl	740	0	0	3	0	1	7	1	12
Gill net	9	0	0	1	0	0	0	0	1
Total	1230	23	1	7	1	11	17	2	62

Table 5.—Original tag location and subsequent recapture locations for tag recovery reports from 1996 to 2003, including seven fish with multiple recoveries.

Tag location	Recapture location				
	Lake Erie	Lake St. Clair	St. Clair River	Lake Huron	All waters
Lake St. Clair	0	7	1	7	15
St. Clair River	1	4	32	10	47
Total	1	11	33	17	62