STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-81-R-6

Study No.: 230491 **Title:** Evaluation of lake sturgeon *Acipenser fulvescens* populations in the St. Clair River and Lake St. Clair

Period Covered: October 1, 2004 to September 30, 2005

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 published in 2004. Work continued on Jobs 1, 2, 3, and 4 in 2004 and 2005 under the most recent amendment to the study. Field sampling was conducted on schedule in 2004 and 2005.

Findings: Jobs 1 through 4 were scheduled for 2004-05, 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.–One sturgeon was incidentally caught in a survey trap net in Anchor Bay during May, 2005. The trap netting is conducted under Study 488. A total of 168 lake sturgeon were caught with 88 setlines fished in the North Channel of the St. Clair River from May 31 to June 16, 2005. An additional 4 sturgeon were caught with 16 setlines in the Middle Channel of the St. Clair River during July 2005. Trawling in Lake St. Clair during July and August 2005 resulted in the capture of 46 lake sturgeon. Finally, experimental trammel netting in the North Channel during August 2005 captured 1 lake sturgeon. Data entry and processing for fish caught during 2005 is underway, but incomplete at the time of the preparation of this report.

A summary of the biological statistics for lake sturgeon sampled from the St. Clair River and Lake St. Clair from 1996 to 2004 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 57 year-classes were represented. The strongest year-classes were 1993, 1989, 1985, 1979, and 1977. The weakest year-classes appeared to include 1995, 1992, 1987, 1981, and 1971. Data entry for field collections during 2005 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 2004 were younger than age 3 (smaller than about 500 mm total length). A total of 31 fish (about 5%) measuring 640 mm in total length or smaller (approximately age 5 or younger) were caught through 2004. Roughly 35% of those were caught in the St. Clair River with setlines, while 65% 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 were documented during fall 2004 and summer 2005. We investigated the feasibility of trammel nets for sampling these small juvenile lake sturgeon in the St. Clair River during summer and fall of 2005.

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 2005.

Job 3. Title: Collect and analyze tag recovery data.–A total of 81 tag recoveries had been recorded through 2004, representing approximately 6% of the total number of 1,411 fish tagged and released over this time period (Table 3). Recapture numbers in 2004 were higher than for any previous year. Setlines have been the single largest source of tag recoveries during this study (Table 4), followed by commercial fishing and sport 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 Lake St. Clair Fisheries Research Station 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. Additionally, some of the data collected during this study were presented in the annual status report prepared each winter by the Lake St. Clair Fisheries Research Station for the Great Lakes Fisheries Commission's Lake Erie Committee Annual Meeting (Thomas and Haas, 2005). This report is included as an attachment to the Study Performance Report for F-81-R-6, Study 230460.

References:

Thomas, M.V., and R. C. Haas. 2005. Status of the fisheries in Michigan waters of Lake Erie and Lake St. Clair. Report to the Lake Erie Committee of the Great Lakes Fisheries Commission. Michigan Department of Natural Resources, Mt. Clemens.

Prepared by: Michael V. Thomas and Robert C. Haas
Date: September 30, 2005

Table 1−Mean length, weight, girth, and age for sturgeon collected from the St. Clair River and Lake St. Clair, from 1996 to 2004.

	St. Clair River (Setline)	Lake St. Clair (Trawl)
Total number caught	647	787
Mean length (mm)	1,214	1,208
Length range (mm)	546–1,887	244–1,849
Mean weight (kg)	13.8	13.4
Weight range (kg)	0.8–53.6	0.2–44.0
Mean age (years)	18.8	19.0
Age range (years)	3-74	1-59

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Table 2.–Combined age distribution for 1,320 lake sturgeon sampled for age from the St. Clair River and Lake St. Clair in 1997 to 2004 with four gear types (trap net, setline, trawl, and gill net).

Year class	Sample year								Total catch
	1997	1998	1999	2000	2001	2002	2003	2004	
2002	0	0	0	0	0	1	0	0	1
2001	0	0	0	0	0	0	0	2	2
2000	0	0	0	1	0	2	0	11	14
1999	0	0	0	0	1	0	0	6	7
1998	0	0	1	0	0	1	0	8	10
1997	0	0	1	0	3	1	0	6	11
1996	1	1	2	0	2	8	0	7	21
1995	0	1	3	0	0	2	0	2	8
1994	2	3	7	3	10	6	2	7	40
1993	7	13	13	12	6	7	1	13	72
1992	5	3	1	4	2	1	0	6	22
1991	11	7	6	9	5	2	1	7	48
1990	10	6	4	3	3	3	1	7	37
1989	7	12	4	8	7	8	6	5	57
1988	10	6	7	7	8	7	1	9	55
1987	5	7	1	6	8	1	0	5	33
1986	7	4	4	11	6	5	0	8	45
1985	12	7	10	7	13	3	0	6	58
1984	5	8	5	9	6	2	1	8	44
1983	8	3	3	11	8	2	0	7	42
1982	3	11	5	13	8	3	1	6	50
1981	1	7	3	8	3	2	0	4	28
1980	5	10	3	6	5	3	0	5	37
1979	6	8	7	13	7	6	5	5	57
1978	8	10	7	6	7	5	4	8	55
1977	7	14	7	6	9	8	1	5	57
1976	5	10	7	10	6	6	0	2	46
1975	10	7	7	8	5	4	2	4	47
1974	4	12	6	9	5	4	0	0	40
1973	6	7	6	9	5	4	1	3	41
1972	2	7	5	2	4	2	0	2	24
1971	3	2	3	1	5	2	0	0	16
1970	1	7	10	3	2	2	2	2	29
1969	1	10	1	6	1	4	0	0	23
1968	5	5	4	4	3	1	2	2	26
1967	3	10	1	8	3	0	1	1	27

Table 2.–Continued.

Year class	Sample year								Total catch
	1997	1998	1999	2000	2001	2002	2003	2004	
1966	5	3	3	2	2	1	0	1	17
1965	2	4	4	2	3	0	0	0	15
1964	2	3	1	6	0	1	0	1	14
1963	1	5	1	1	2	0	0	0	10
1962	0	0	0	0	2	0	0	0	2
1961	1	0	2	1	2	1	0	0	7
1960	0	1	0	1	1	0	0	0	3
1959	0	0	0	2	0	0	0	0	2
1958	0	0	0	2	0	0	1	0	3
1957	0	1	1	0	0	1	0	0	3
1956	0	1	0	0	0	0	0	0	1
1955	1	1	0	2	0	0	0	0	4
1954	0	1	0	0	0	0	0	0	1
1953	0	0	1	0	0	0	0	0	1
1951	0	0	0	1	0	0	0	0	1
1950	0	0	0	0	0	1	0	0	1
1946	0	0	0	1	0	0	0	0	1
1945	0	1	0	0	0	0	0	0	1
1941	0	0	0	1	0	0	0	0	1
1937	0	0	1	0	0	0	0	0	1
1926	0	0	0	1	0	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.

Tag year	Total tagged	Year of tag recovery									Total recoveries	Percent recovered
		1996	1997	1998	1999	2000	2001	2002	2003	2004		
1996	81	1	-	-	-	-	-	-	-	-	1	1
1997	182		3	5	2	-	-	-	-	-	10	5
1998	242			3	5	3	2	1	1	1	16	7
1999	169				0	4	5	4	1	3	17	10
2000	222					3	5	4	-	4	16	7
2001	176						2	4	-	5	11	6
2002	124							2	-	5	7	6
2003	34								2	-	2	6
2004	181									1	1	1
Total	1,411	1	3	8	7	10	14	15	4	19	81	6

Table 4.−Number of lake sturgeon tagged and released by gear type, and mode of recapture for tag recoveries from 1996 to 2004, including seven fish with multiple recoveries.

		Mode of recapture							
Tagging gear	Number tagged	Setline	Trap net	Trawl	Gill net	Sport fishing	Commercial fishing	Found dead	Total
Setline	602	35	0	3	1	13	10	1	62
Trap net	25	0	1	1	0	0	0	0	2
Trawl	775	0	0	3	0	1	10	2	16
Gill net	9	0	0	1	0	0	0	0	1
Total	1,411	35	1	7	1	14	20	3	81

Table 5.−Number of tagged sturgeon recovered by water body and subsequent recapture locations for tag recovery reports from 1996 to 2004, including seven fish with multiple recoveries, with percentage recovered in parentheses.

	Number	Number and percent recovered by location									
Tag location	tagged	Lake Erie		Lake St. Clair		St. Clair River		Lake Huron		All waters	
Lake St. Clair	809	0	(0.0)	7	(0.8)	2	(0.2)	10	(1.2)	19	(2.3)
St. Clair River	602	1	(0.2)	4	(0.7)	47	(7.8)	10	(1.7)	62	(10.3)
Total	1,411	1	(0.1)	11	(0.8)	49	(3.5)	20	(1.4)	81	(5.7)