STUDY PERFORMANCE REPORT

State: Michigan   **Project No.:** ___F-81-R-8___

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

Period Covered: October 1, 2006 to September 30, 2007

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 field collections in 2006 was completed. Work continued on Jobs 1, 2, 3, and 4 in 2006 and 2007 under the most recent amendment to the study. Field sampling was conducted on schedule in 2006 and 2007.

Findings: Jobs 1 through 4 were scheduled for 2006-07, and progress is reported below.

Job 1. Title: <u>Collect biological data, and tag juvenile and adult sturgeon.</u>–A total of 151 lake sturgeon were caught with 88 setline lifts in the North Channel of the St. Clair River from May 30 to June 15, 2006. Trawling effort in Lake St. Clair during July, and August 2007 was reduced and only a few lake sturgeon were captured. Data entry and processing for fish caught during 2007 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 2006 is presented in Table 1. Age was estimated for a total of 1,821 lake sturgeon based on pectoral fin ray sections (Table 2). Data entry for field collections made during 2007 is underway.

Job 2. Title: <u>Characterize adult spawning habitat and juvenile habitat.</u>–Efforts to identify habitat requirements of juvenile lake sturgeon were impeded by our inability to consistently collect young lake sturgeon. Only five fish less than two years old were collected during the study and all five were caught in Lake St. Clair, including two age-0 fish caught in a small-mesh gill net set in October 2005 near Strawberry Island. Benson et al. (2005) found that age-0 lake sturgeon remained in their natal rivers through the first summer and then out migrated in the fall to shallow, sandy areas near Green Bay, Lake Michigan near their natal rivers. We suspect that age-0 lake sturgeon in the St. Clair system inhabit deep channel areas of the St. Clair delta through the first summer of life and then move out into the shallow, sandy areas of the St. Clair delta in the fall. Such a movement pattern would explain the limited success we have had searching for age 0 lake sturgeon over the course of this study. The deep portions of the St. Clair River delta channels are difficult to sample with survey gear other than setlines, and age-0 sturgeon may be almost invulnerable to setline sampling because their mouths are small relative to hook size. We will continue to explore sampling locations and methods that could provide better assessment results for age 0 and age 1 lake sturgeon in the St. Clair River and Lake St. Clair.

No additional progress was made in identifying additional spawning sites in 2007.

Job 3. Title: <u>Collect and analyze tag recovery data.</u>–A total of 139 tag recoveries had been recorded through 2006, representing approximately 8% of 1,830 fish tagged and released over this time period (Table 3). Recapture numbers in 2006 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. The tag recovery data have documented that St. Clair system lake sturgeon move into Lake Huron and Lake Erie.

Lake sturgeon in the St. Clair system can move back and forth between the Upper Great Lakes and Lake Erie. This potential for free immigration and emigration makes it undesirable to estimate abundance based on closed population mark-recapture techniques. Additionally, other factors such as fishing mortality, tag loss, and individual fish behavior make it challenging to use mark-recapture techniques for estimating abundance and survival rates. In 2006, we explored the use of open population estimation techniques. For example, we used a Cormack-Jolly-Seber model based on individual fish capture histories to estimate population abundance and survival for lake sturgeon tagged in the St. Clair system. We will continue to explore the use of the most appropriate mark-recapture programs and models as they become available in the future.

Job 4. Title: <u>Analyze data and prepare annual performance report, final report, and other reports.</u>–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 following 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, M. V., and R. C. Haas. 2007. Status of the fisheries in Michigan waters of Lake Erie and Lake St. Clair 2006. Report to the Lake Erie Committee of the Great Lakes Fisheries Commission. Michigan Department of Natural Resources, Mt. Clemens.

This report is included as an attachment to the Study Performance Report for F-81-R-8, Study 230460.

References:

Benson, A. C., T. M. Sutton, R. F. Elloitt, and T. G. Meronek. 2005. Seasonal movement patterns and habitat preferences of Age-0 lake sturgeon in the lower Peshtigo River, Wisconsin. Transactions of the American Fisheries Society 1334:1400–1409.

Prepared by: <u>Michael V. Thomas</u>
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Table 1−Mean length, weight, and age for sturgeon collected from the St. Clair River and Lake St. Clair, from 1996 to 2006.

	St. Clair River (Setline)	Lake St. Clair (Trawl)
Total number caught	963	923
Mean length (mm)	1,161	1,228
Length range (mm)	508–1,887	244–1,849
Mean weight (kg)	12.2	13.7
Weight range (kg)	0.5–53.6	0.2–44.0
Mean age (years)	17.0	19.9
Age range (years)	3–74	1–59

Table 2.–Combined age distribution for 1,320 unique lake sturgeon sampled for age from the St. Clair River and Lake St. Clair from 1997 to 2006 with four gear types (trap net, setline, trawl, and gill net). Ages of recaptured fish not included.

Year class	Survey year										Total catch
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
2005	0	0	0	0	0	0	0	0	2	0	2
2004	0	0	0	0	0	0	0	0	1	0	1
2003	0	0	0	0	0	0	0	0	2	5	7
2002	0	0	0	0	0	1	0	0	3	8	12
2001	0	0	0	0	0	0	0	2	11	16	29
2000	0	0	0	0	0	2	0	11	26	15	54
1999	0	0	0	0	1	0	0	6	15	11	33
1998	0	0	1	0	0	1	0	8	3	9	22
1997	0	0	1	0	3	1	0	6	3	3	17
1996	1	1	2	0	2	8	0	7	14	7	42
1995	0	1	3	0	0	2	0	2	5	3	16
1994	2	3	7	3	10	6	2	7	4	11	55
1993	7	13	13	12	6	7	1	13	15	10	97
1992	5	3	1	4	2	1	0	6	5	3	30
1991	11	6	6	9	5	2	1	6	4	4	54
1990	10	6	4	3	3	3	1	7	3	6	46
1989	7	12	4	8	7	8	5	5	4	4	64
1988	10	6	7	7	8	7	1	9	6	6	67
1987	5	7	1	6	8	1	0	5	4	5	42
1986	7	4	4	11	6	5	0	8	8	7	60
1985	12	7	10	7	13	3	0	6	6	2	66
1984	5	8	5	9	6	2	1	8	9	4	57
1983	7	3	3	11	8	2	0	7	9	8	58
1982	3	11	5	13	8	3	1	6	10	5	65
1981	1	7	3	8	3	2	0	4	6	3	37
1980	5	10	3	6	5	3	0	5	5	3	45
1979	6	8	7	12	7	6	5	5	4	5	65
1978	8	10	7	6	7	5	4	8	2	6	63
1977	7	14	7	6	9	8	1	5	3	1	61
1976	5	10	7	10	6	6	0	2	3	2	51
1975	10	7	7	8	5	4	2	4	0	3	50
1974	4	12	6	9	5	4	0	0	0	4	44
1973	6	7	6	9	5	4	1	3	5	4	50
1972	2	7	5	2	4	2	0	2	2	2	28
1971	3	2	3	1	4	2	0	0	3	4	22
1970	1	7	10	3	2	2	2	2	1	1	31
1969	1	10	1	6	1	4	0	0	2	3	28
1968	5	5	4	4	3	1	2	2	3	5	34
1967	3	10	1	7	3	0	1	1	2	0	28
1966	5	3	3	2	2	1	0	1	1	0	18
1965	2	4	4	2	3	0	0	0	1	0	16
1964	2	3	1	6	0	0	0	1	1	1	15
1963	1	5	1	1	2	0	0	0	1	2	13

Table 2.–Continued.

Year class	Survey year										Total catch
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
1962	0	0	0	0	1	0	0	0	0	1	2
1961	1	0	2	1	2	1	0	0	1	0	8
1960	0	1	0	1	1	0	0	0	0	0	3
1959	0	0	0	2	0	0	0	0	1	0	3
1958	0	0	0	2	0	0	1	0	0	0	3
1957	0	1	1	0	0	1	0	0	0	0	3
1956	0	1	0	0	0	0	0	0	0	0	1
1955	1	1	0	2	0	0	0	0	0	0	4
1954	0	1	0	0	0	0	0	0	1	0	2
1953	0	0	1	0	0	0	0	0	0	0	1
1952	0	0	0	0	0	0	0	0	1	0	1
1951	0	0	0	1	0	0	0	0	0	0	1
1950	0	0	0	0	0	1	0	0	0	0	1
1949	0	0	0	0	0	0	0	0	0	0	0
1948	0	0	0	0	0	0	0	0	0	0	0
1947	0	0	0	0	0	0	0	0	0	0	0
1946	0	0	0	1	0	0	0	0	0	0	1
1945	0	1	0	0	0	0	0	0	0	0	1
1944	0	0	0	0	0	0	0	0	0	0	0
1943	0	0	0	0	0	0	0	0	0	0	0
1942	0	0	0	0	0	0	0	0	0	0	0
1941	0	0	0	1	0	0	0	0	0	0	1
1940	0	0	0	0	0	0	0	0	0	0	0
1939	0	0	0	0	0	0	0	0	0	0	0
1938	0	0	0	0	0	0	0	0	0	0	0
1937	0	0	1	0	0	0	0	0	0	0	1
1936	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	0	0	0	0	0	0	0
1934	0	0	0	0	0	0	0	0	0	0	0
1933	0	0	0	0	0	0	0	0	0	0	0
1932	0	0	0	0	0	0	0	0	0	0	0
1931	0	0	0	0	0	0	0	0	0	0	0
1930	0	0	0	0	0	0	0	0	0	0	0
1929	0	0	0	0	0	0	0	0	0	0	0
1928	0	0	0	0	0	0	0	0	0	0	0
1927	0	0	0	0	0	0	0	0	0	0	0
1926	0	0	0	1	0	0	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. Includes initial capture and recapture by all gear types.

Tag year	Total tagged	Year of tag recovery											Recovered	
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total	Percent
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	–	1	18	11
2000	222	–	–	–	–	3	5	4	–	4	2	5	23	10
2001	176	–	–	–	–	–	2	4	–	5	2	1	14	8
2002	124	–	–	–	–	–	–	2	–	5	1	2	10	8
2003	34	–	–	–	–	–	–	–	2	–	–	–	2	6
2004	181	–	–	–	–	–	–	–	–	1	13	5	19	10
2005	216	–	–	–	–	–	–	–	–	–	5	19	24	11
2006	203	–	–	–	–	–	–	–	–	–	–	2	2	1
Total	1,830	1	3	8	7	10	14	15	4	19	23	35	139	8

Table 4.−Number of lake sturgeon tagged and released by gear type, and mode of recapture for tag recoveries from 1996 to 2006, including seven fish with multiple recoveries.

Tagging gear	Number tagged	Setline	Trap net	Trawl	Gill net	Sport fishing	Commercial fishing	Found dead	Total
				Mode of recapture					
Setline	872	71	0	3	1	27	10	1	113
Trap net	30	0	1	1	0	0	0	0	2
Trawl	904	0	0	6	0	3	10	2	21
Sport fishing	6	0	0	0	0	1	0	1	2
Gill net	13	0	0	1	0	0	0	0	1
Trammel net	5	0	0	0	0	0	0	0	0
Total	1,830	71	1	11	1	31	20	4	139