

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-3

Study No.: 491

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

Period Covered: October 1, 2001 to September 30, 2002

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 2001 field collections has been completed. A total of 185 lake sturgeon were collected from the St. Clair River and Lake St. Clair in 2001. Sturgeon were collected with baited setlines, bottom trawls, and gill nets. Pectoral fin ray sections were used to age 973 fish captured between 1997 and 2001. Ages ranged from 1 to 74 years and included 53 year classes. Mean length at age suggested that these sturgeon grew faster as juveniles, compared with lake sturgeon in Michigan's inland waters. A total of 177 sturgeon were tagged with serial-numbered monel cattle ear tags and released in 2001. An additional 66 sturgeon have been tagged and released through September 1, 2002. The total number of sturgeon tagged and released in the St. Clair system, since 1996, now exceeds 1100 fish. Tag recoveries are increasing, with a total of 39 recoveries through 2001. Field collections in 2002, including setline and trawl sampling, have been conducted as scheduled. Data entry and analysis for 2002 sampling is underway.

Findings: Jobs 1, 2, 3, and 4 were scheduled for 2001-02, 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.—Sturgeon were collected with three gear types in 2001. A total of 52 sturgeon, including three recaptures, was caught in 56 overnight sets using setlines in the North Channel of the St. Clair River, between May 29 and June 7. Total length of sturgeon caught on setlines ranged from 683 mm to 1,669 mm. Ages ranged from 5 to 39 years. All fish were tagged with monel cattle ear tags and PIT tags and released. The PIT tag is inserted under a dorsal scute and will allow us to evaluate tag loss of the monel tags.

A total of 122 lake sturgeon, including three recaptures, was captured with 10 m headrope bottom trawls from June through October on Lake St. Clair. Total lengths of sturgeon captured ranged from 483 mm to 1,712 mm. Ages ranged from 2 to 41 years. All fish were tagged with monel cattle ear tags and PIT tags and released.

We caught a total of 11 lake sturgeon in three gill net lifts made on August 20 and 21, 2001. Each gill net set was fished for a two hour duration. Two of the sets were 450 foot nets of 10 inch stretch mesh. The remaining set was a 300 ft net of 8 in stretch mesh. One of the lake sturgeon captured was a recapture. The fish had originally been caught on a setline in the St. Clair River in spring 2000. Total lengths of sturgeon captured with gill nets ranged from 1,120 mm to 1,527 mm. Ages

ranged from 14 to 36 years. All fish were tagged with monel cattle ear tags and PIT tags and released.

In 2002, we caught a total of 66 sturgeon, including 8 recaptures, with setlines in 71 overnight sets. An additional 66 sturgeon, including 2 recaptures, were captured with trawls on Lake St. Clair through August 15. Passive integrated transponder (PIT) tags were applied to all sturgeon captured and released in 2002. Processing of fin rays for age analysis for sturgeon captured in 2002 is underway.

Overall, the age distribution of lake sturgeon captured from 1997 through 2001 appeared well balanced, with a total of 53 year classes represented by the 973 lake sturgeon sampled for age (Table 2). This sample reveals consistently good recruitment from 1973 to 1993. It may not be coincidental that this period of recruitment followed the federal Clean Water Act of 1972. The strongest year-classes were produced in 1993 and 1985. The 1995 to 1999 year classes were poorly represented in the sample. This could be due to gear selectivity, juvenile distribution, or poor recruitment in recent years. Since lake sturgeon are known to be capable of exceeding 50 years in age (Scott and Crossman 1973), year-classes prior to 1965 appeared under-represented in the catch. This could be an indication that recruitment prior to 1965 was poor, but has improved dramatically since that time. Alternatively, those year-classes may have experienced high exploitation rates in the past, particularly during the 1970's and early 1980's (prior to the closure in 1983 of sturgeon season during the spawning period in May and June). It is also possible that the natural longevity of lake sturgeon in the St. Clair system is shorter than that observed for lake sturgeon in some other waters.

Growth of lake sturgeon in the St. Clair ecosystem was good, with some fish attaining a total length of 1 m as early as age 8. A mean length of 1,270 mm is attained by age 19 (Table 3). In contrast, lake sturgeon in Michigan's inland waters grow slower, particularly from age 1 to age 15, and attain a mean length of 1270 mm at age 22 (Baker 1980). Based on age and growth data collected during this study, the MDNR implemented new regulations for sturgeon sport fishing on Lake St. Clair and the St. Clair River in 1999. The regulations included a "slot" size limit, with a minimum length limit of 1,067 mm (42 inches) and a maximum length limit of 1,270 mm (50 inches), a season bag limit of 1 fish, an open season from July 16 to September 30, and mandatory registration of harvested sturgeon at designated check stations. This "slot" limit will allow a limited harvest to continue, while protecting sexually mature female fish and potentially allowing older fish to increase in abundance.

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 continued to be impeded by our inability to consistently collect young lake sturgeon. Less than 1% of the sturgeon captured through 2001 were younger than age 3 (smaller than about 500 mm total length). Efforts to capture Age 0 lake sturgeon in littoral areas with a 4.8 m headrope trawl have been unsuccessful. Use of smaller scale setlines in the St. Clair River in spring 2002 failed to capture any age 1 or 0 lake sturgeon. 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. Alternative methods of collecting juveniles will be further explored in 2002. Small fyke nets or small minnow trap devices are possible sampling options yet to be investigated. Additional catch data from 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. Setline surveys in 2001 and 2002 did not produce catches of ripe males or females at any new locations. The use of

hydroacoustics gear to help identify potential spawning substrates will be investigated in 2002 and 2003.

Job 3. Title: Collect and analyze tag recovery data.—Tag recovery data is slowly accumulating. Through 2001, a total of 39 lake sturgeon tagged and released during this study had been recaptured. Fourteen were recovered during the setline surveys in the North Channel, while six were recovered while survey trawling. Eight recoveries were reported by sport anglers in the St. Clair River. Nine recoveries have been reported from the Ontario commercial trap-net fishery in southern Lake Huron, approximately 70 kilometers from the tag site. One recovery was reported by a sport angler from Lake Erie near Huron, Ohio. All other recaptures have occurred within 10 km of the tag sites. These recovery data confirm that St. Clair system lake sturgeon move into Lake Huron and Lake Erie. 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 on these waters.

Lake sturgeon movements are unrestricted by human or natural barriers in the St. Clair system. This potential for free immigration and emigration makes it difficult to estimate abundance based on mark-recapture techniques. However, as recovery data continues to accumulate, we will explore the use of Program MARK software for estimating abundance and survival rates. (White and Burnham 1999).

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. This annual performance report was also prepared. A paper summarizing the results of this study from 1996 to 2000 was prepared and presented orally at the 4th International Sturgeon Symposium in Oshkosh, Wisconsin, in July 2001. A revised manuscript of the paper has been accepted for publication in the Journal of Applied Ichthyology.

Literature Cited:

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- 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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Prepared by: Michael V. Thomas and Robert C. Haas

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Table 1.—Mean length and weight for lake sturgeon collected from St. Clair River and Lake St. Clair in 2001.

	Set-line	Trawl	Gill net
Total number caught	52	122	11
Mean length	1,216 mm	1,249 mm	1,335 mm
Length range	683 mm – 1,669 mm	483 mm – 1,712 mm	1,120mm – 1,527 mm
Mean weight	12.7 kg	14.1 kg	16.9 kg
Weight range	2.0 kg – 32.0 kg	0.5 kg – 36.0 kg	8.3 kg – 31.2 kg

Table 2.--Age distribution for 973 lake sturgeon sampled for age from the St. Clair River and Lake St. Clair in 1997 -2001 with four gear types (TN=trap net, SL=setline, TR=trawl, GN=gill net).

Year Class	1997			1998			1999		2000		2001			Total Catch
	TN	SL	TR	TN	SL	TR	SL	TR	SL	TR	SL	TR	GN	
1999	0	0	0	0	0	0	0	0	0	0	0	1	0	1
1998	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1997	0	0	0	0	0	0	0	1	0	0	0	3	0	4
1996	0	0	1	0	0	1	2	0	0	0	1	1	0	6
1995	0	0	0	1	0	0	0	3	0	0	0	0	0	4
1994	1	0	1	0	2	1	6	1	2	1	3	7	0	25
1993	0	1	6	1	8	4	8	5	2	10	3	3	0	51
1992	0	1	4	0	2	1	1	0	2	2	1	1	0	15
1991	1	4	6	0	3	3	4	2	3	6	2	3	0	37
1990	0	6	4	0	2	4	2	2	1	2	1	2	0	26
1989	0	2	5	0	5	7	0	4	0	8	1	6	0	38
1988	0	5	5	0	3	3	3	4	0	7	2	6	0	38
1987	0	2	3	0	1	6	0	1	4	2	3	4	1	27
1986	0	0	7	0	1	3	2	2	3	8	3	3	0	32
1985	2	4	6	0	2	5	7	3	1	6	3	9	1	49
1984	1	0	4	0	4	4	4	1	1	8	2	2	2	33
1983	0	3	4	0	0	3	1	2	1	10	2	5	1	32
1982	1	1	1	0	2	9	2	3	2	11	3	5	0	40
1981	0	1	0	0	1	6	2	1	4	4	2	1	0	22
1980	2	2	1	0	2	8	2	1	2	4	0	5	0	29
1979	2	3	1	0	3	5	3	4	5	7	2	5	0	40
1978	0	5	3	0	5	5	6	1	3	3	0	6	1	38
1977	0	4	3	0	3	11	3	4	6	0	3	4	2	43
1976	0	5	0	0	6	4	3	4	3	7	3	3	0	38
1975	0	3	7	0	1	6	6	1	3	5	0	5	0	37
1974	0	2	2	0	3	9	5	1	5	4	2	3	0	36
1973	0	4	2	0	5	2	4	2	4	5	1	4	0	33
1972	0	1	1	0	3	4	4	1	0	2	1	2	1	20
1971	0	2	1	0	0	2	2	1	0	1	1	3	0	13
1970	0	0	1	0	2	5	6	4	1	2	0	2	0	23
1969	0	1	0	0	3	7	1	0	1	5	0	1	0	19
1968	0	3	2	0	2	3	2	2	2	2	2	1	0	21
1967	0	2	1	0	1	9	1	0	4	4	1	2	0	25
1966	0	2	3	0	3	0	3	0	1	1	0	2	0	15
1965	0	1	1	0	2	2	4	0	1	1	0	2	1	15
1964	0	0	2	0	0	3	1	0	3	3	0	0	0	12
1963	0	0	1	0	2	3	1	0	1	0	0	2	0	10

Table 2.–Continued.

Year Class	1997			1998			1999		2000		2001			Total Catch
	TN	SL	TR	TN	SL	TR	SL	TR	SL	TR	SL	TR	GN	
1962	0	0	0	0	0	0	0	0	0	0	1	1	0	2
1961	0	1	0	0	0	0	1	1	0	1	0	2	0	6
1960	0	0	0	0	0	1	0	0	1	0	0	1	0	3
1959	0	0	0	0	0	0	0	0	1	1	0	0	0	2
1958	0	0	0	0	0	0	0	0	1	1	0	0	0	2
1957	0	0	0	0	1	0	0	1	0	0	0	0	0	2
1956	0	0	0	0	1	0	0	0	0	0	0	0	0	1
1955	0	1	0	0	1	0	0	0	1	1	0	0	0	4
1954	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1953	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1951	0	0	0	0	0	0	0	0	0	1	0	0	0	1
1946	0	0	0	0	0	0	0	0	0	1	0	0	0	1
1945	0	0	0	0	1	0	0	0	0	0	0	0	0	1
1941	0	0	0	0	0	0	0	0	0	1	0	0	0	1
1937	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1926	0	0	0	0	0	0	0	0	1	0	0	0	0	1

Table 3.—Mean length at age and standard error (SE) for all lake sturgeon sampled for age from the St. Clair River (SCR) and Lake St. Clair (LSC) for 1997-2001, compared to mean length at age from Michigan's inland lakes (Baker 1980).

Age	SCR & LSC		Michigan Inland
	Mean length (mm)	SE	Mean length (mm)
1	298	53.5	152
2	462	17.5	279
3	559	45.6	318
4	663	14.8	409
5	736	14.6	513
6	818	11.8	561
7	891	10.6	627
8	922	17.2	699
9	951	11.7	770
10	961	13.7	810
11	1033	14.8	884
12	1070	15.0	940
13	1098	15.4	1008
14	1129	13.3	1054
15	1197	21.9	1133
16	1192	17.5	—
17	1249	15.0	1171
18	1251	15.9	1171
19	1272	14.2	1173
20	1296	16.4	1242
21	1335	13.6	1245
22	1323	37.2	1278
23	1362	17.8	1288
24	1364	15.5	1293
25	1432	19.4	1341
26	1377	17.8	1344
27	1433	25.0	1392
28	1423	20.4	1389
29	1456	19.6	1463
30	1473	22.9	1384
31	1494	19.0	1466
32	1437	27.2	1453
33	1474	26.5	1440
34	1440	34.5	1511
35	1522	27.5	1496
36	1510	37.0	1529
37	1765	—	1557
38	1495	26.5	1542
39	1528	31.2	1638
40	1597	78.0	1651
41	1566	14.0	1590
42	1568	54.6	—
43	1529	—	—