2001 Activities of the Central Great Lakes Binational Lake Sturgeon Group

Editors:

Tracy D. Hill and Jerry R. McClain
US Fish and Wildlife Service
Alpena Fishery Resources Office
Federal Building Room 204
145 Water St.
Alpena, MI 49707
(989) 356-5102, (989) 356-4651 Fax
tracy_hill@fws.gov

CONTRIBUTORS

Nathan Caswell (St. Clair Waterway)
US Fish and Wildlife Service
Carterville Fishery Resources Office
9053 Route 148, Suite A
Marion, IL 62959
(618) 997-6869, (618) 997-9185 Fax
Email: nate_caswell@fws.gov

Roger Greil (St. Marys River)
Lake Superior State University
Aquatic Research Lab
625 Easterday Ave.
Sault Ste. Marie, MI 49783
(906) 635-1949, (906) 635-0214 Fax
Email: rgreil@gw.lssu.edu

Adam Kowalski (Lake Huron)
US Fish and Wildlife Service
Alpena Fishery Resources Office
Federal Building Room 204
145 Water St.
Alpena, MI 49707
(989) 356-5102, (989) 356-4651 Fax
Email: adam_kowalski@fws.gov

Bruce Manny (St. Clair Waterway)
US Geological Survey
Great Lakes Science Center
1451 Green Road
Ann Arbor, MI 48105
(734) 214-7255, (734) 994-8780 Fax
Email: bruce_manny@usgs.gov

Lloyd C Mohr (Lake Huron)
Ontario Ministry of Natural Resources
Lake Huron Management Unit
1450 Seventh Avenue East
Owen Sound, ONT N4k 2Z1
(519) 371-5669, (519) 371-5844 Fax
Email: lloyd.mohr@mnr.gov.on.ca

Rich Quintal (St. Clair Waterway)
US Geological Survey
Great Lakes Science Center
1451 Green Road
Ann Arbor, MI 48105
(734) 214-9319, (734) 994-8780 Fax
Email: richard_quintal@usgs.gov

Presented at: Great Lakes Fishery Commission
Upper Lakes Committee Meetings, Milwaukee, WI, March 17-20, 2003
Lake Erie Committee Meeting, Port Huron, MI, March 24-25, 2003
Lake Ontario Committee Meeting, Niagara Falls, ONT, March 27-28, 2003

Trent Sutton (St. Marys)
Purdue University
Forestry and Natural Resources
195 Marsteller St.
West Lafayette, IN 47907-1159
(765) 496-6266, (765) 496-2422 Fax
Email: tsutton@fnr.purdue.edu

Michael V. Thomas (St. Clair Waterway)
Michigan Dept. of Natural Resources
Mt. Clemens Fisheries Research Station
33135 South River Road
Mt. Clemens, MI 48045
(586) 465-4771, (586) 465-7504 Fax
e-mail: thomasmv@michigan.gov

Chris Vandergoot (Lake Erie)
Ohio Department of Natural Resources
Sandusky Fisheries Research Station
305 East Shoreline Drive
Sandusky, OH 44870
(419) 625-8062, (419) 625-6272 Fax
Email: christopher.vandergoot@dnr.state.oh.us

Jerry Weise (Lake Huron)
Fisheries and Oceans Canada
Sea Lamprey Control Center
1 Canal Drive
Sault Ste. Marie, ON P6A 6W4
(705) 941-3006, (705) 941-3025 Fax
Email: weisej@dfo-mpo.gc.ca

John Weisser (Lake Huron)
US Fish & Wildlife Service
Marquette Biological Station
1924 Industrial Parkway
Marquette, MI 49855-1699
(906) 226-1213, (906) 226-3632 Fax
email: john_weisser@fws.gov

Emily C. Zollweg (Lake Erie)
US Fish and Wildlife Service
Lower Great Lakes Fishery Resources Office
405 N. French Road, Suite 120A
Amherst, NY 14228
(716) 691-5456, (716) 691-6154 Fax
Email: emily_zollweg@fws.gov

CONTENTS

PREFACE

In 1995, resource personnel from federal, state, and provincial agencies agreed to a collaborative effort to better define the population status of lake sturgeon in Lakes Huron and Erie and their connecting waterways. These efforts resulted in the creation of the Central Great Lakes Bi-National Lake Sturgeon Group (CGLBLSG). The U.S. Fish & Wildlife Service Alpena FRO has agreed to compile an annual report summarizing activities of agencies and organizations participating in the CGLBLSG. Following is a summary of 2001 activities. This report details information on 1,138 lake sturgeon encountered during the 2001 field season. A total of 60 lake sturgeon that were handled during 2001 were tagged in previous years. The total number of lake sturgeon tagged in the central Great Lakes is approaching 5,500 fish. Information from the St. Marys River is included in this report for the first time. Previous years' reports for this group can be found on the Alpena FRO home page (midwest.fws.gov/alpena/index.htm) under "Reports".

The increased level of cooperation within this group has led to several notable results. First, with increased participation by commercial fishers, both Canadian and US, information recorded from lake sturgeon by-catch and harvest has been used to describe the life history and relative health and sustainability of lake sturgeon stocks throughout the central Great Lakes basin. Investigations are now underway to identify and quantify current spawning use at historic spawning sites, areas identified through new research, and creation of new spawning areas. Using emerging technologies we are investigating habitat use and identifying critical habitat that will be essential for the recovery and sustainability of this species. Emerging technologies have also allowed for the development of a non-lethal contaminant sampling procedure for lake sturgeon. Intensive research efforts in the St. Clair system have resulted in a limited sport fishery and a population estimate for that stock. Cooperation between US Sea Lamprey Control agents the MIDNR and Ontario Ministry of Natural Resources resulted in treatment of 9 streams in Michigan and Canada containing both sea lamprey and lake sturgeon, with no lake sturgeon mortality in 2001.

In the years ahead, investigations are planned to identify juvenile lake sturgeon habitat and assess status of this life stage, genetic data will be used to identify spawning stocks and level of mixing throughout the central Great Lakes, a tributary inventory is planned to locate more spawning sites and populations, and contaminants investigations will continue.

ST. MARYS

Lake Superior State University
Aquatic Research Lab

Contact: Trent Sutton
E-mail: tsutton@fnr.purdue.edu

Assessment of Lake Sturgeon in U.S. Waters of the St. Marys River 2000

The St. Marys River, an 112-km strait connecting Lakes Superior and Huron, has been identified as historically supporting an abundant, self-sustaining population of lake sturgeon (Holey et al. 2000). However, the current population status of lake sturgeon in this system remains unknown. Since 1998, recreational anglers targeting walleye in the river during summer months have reported catching lake sturgeon that have ranged in size from 60 to 152 cm in length from the rapids to Lake George. During June 2000, a congregation of ten to twelve lake sturgeon that were possibly exhibiting spawning behaviors were reported in the shallow rapids of Munuscong Channel that connect Lake George to the main channel of the St. Marys River (G. Padgham, Michigan Department of Natural Resources, personnel communication). According to Auer (1999), self-sustaining lake sturgeon populations require access to deep, cool waters for refugia from environmental disturbance and to fulfill wintering and feeding needs; similar connecting channels within the Great Lakes basin known to provide such habitats include the St. Clair, Detroit, and Niagara Rivers (T. Hill, U.S. Fish and Wildlife Service, personal communication). In addition, upper reaches of large rivers with swift currents and gravel-cobble substrates provide critical spawning habitats for mature adults (Lyons and Kempinger 1992; Carlson 1995; Auer 1996a, 1996b), while nutient-rich areas with less coarse substrates and slower flow regimes provide important nursery and feeding areas for all life stages (Auer 1996a, 1999). The St. Marys River meets all life stage requirements by providing deep, coldwater refugias, potential spawning habitats, and nursery-feeding areas. Because this system would appear to provide critical habitats for all life stages of this species, as well as serving as an important migratory corridor in the upper Great Lakes, an assessment survey was initiated by personnel from the Lake Superior State University Aquatic Research Laboratory for lake sturgeon in the St. Marys River during the summer and fall 2000.

Sampling for lake sturgeon in U.S. waters of the St. Marys River was conducted from 15 August through 25 September 2000. Four set lines, each 100-m long and containing 25 snews with 7/0 hooks baited with frozen squid (see Thomas and Haas 1999 for complete set-line design) were deployed parallel to the shoreline of the river at depths ranging from six to twelve meters. Netting locations from 15-29 August were located in the north channel from the mouth of the Garden River to Lake George and from 01-25 September along the south shore of western Sugar Island. For the duration of these two study periods, set lines were checked and rebaited at two-day intervals.

All captured lake sturgeon were measured for total length, fork length, and body girth to the nearest 1 mm and weighed to the nearest 0.5 kg. The leading ray of the left pectoral fin was removed from each captured fish for aging purposes using a fin ray saw, and a small sample of tissue from this fin was preserved for subsequent genetic analysis by Michigan State University. Prior to release, all fish received an individually-coded passive integrated transponder (PIT) tag below the first dorsal scute, and one or two serially numbered t-bar anchor tags below the dorsal fin on the upper left side of the dorsum. In addition, the exact capture location in the St. Marys River of each captured fish was marked using a hand-held global positioning system.

During the August 2000 sampling period, two lake sturgeon were captured in the north channel of the St. Marys River near Lake George. The first fish was captured on 25 August, and the biological data for that fish are as follows: total length = 130 cm, fork length = 120 cm, body girth = 61 cm, and weight = 17 kg. For this fish, the implanted PIT tag number was 420A6E6416 and the attached t-bar anchor tag number was MDNR 04326. The second fish was captured on 30 August, and that individual had the following biological information: total length = 113 cm, fork length = 106 cm, girth = 45 cm, and weight = 8.5 kg. The PIT tag and floy tag numbers were 420B3B2709 and MDNR 04327/04328 (two t-bar anchor tags), respectively. For the September 2000 sampling period, no lake sturgeon were captured in the vicinity of Sugar Island.

Based on the success of capturing lake sturgeon in the St. Marys River given the limited sampling duration, effort, and gear deployment, sampling efforts will be expanded during 2001 to include the spring and early summer periods. In addition, a field crew will be hired to specifically run the assessment effort, thereby allowing for the deployment of more set lines over a greater expanse of the river. Given the expanded nature of the study for the 2001 sampling period, we fully expect to collect more lake sturgeon and develop a greater understanding of this species in the St. Marys River ecosystem.

Lake Superior State University
Aquatic Research Lab

Contact: Roger Greil and Richard Back
E-mail: rgreil@gw.lssu.edu
rback@gw.lssu.edu

Assessment of Lake Sturgeon in U.S. Waters of the St. Marys River 2001

As a sole outlet of Lake Superior and the largest tributary to Lake Huron, the St. Marys River is an important ecological corridor and provides a variety of habits for fish and wildlife (Bray, 1996). Historically, the St. Marys Rapids was one of the most productive habitats for fish in the continent (CHRS 2002), and in turn Lake Sturgeon *(Acipenser fulvescens)* were abundant. The current size of the sturgeon population in the St. Marys River system is unknown. There is evidence from anglers of a sturgeon population residing within the river system as fish have been observed and caught during both open water and ice- fishing seasons. Fish are caught throughout the lower river to Munuscong Bay, and have ranged in size from 46 to 127 cm. There have also been reports of groups of sturgeon showing spawning traits in two different locations in the river (personal communication with anglers). These fish were seen in water depths of six to fifteen feet, in early to mid June (12 to 15 degrees Celsius), and where the river narrows up and swift current is. Sturgeon spawn in depths of two to fifteen feet and in areas of swift water or rapids, and optimum spawning temperature appears to be between 13 to 18 degrees Celsius (Scott, Freshwater Fishes of Canada). These sites are just below Lake George, where the river narrows, with a lot of rock substrate. With this information, and little known about lake sturgeon in the St Marys River, personnel at Lake Superior State University Aquatic Research Laboratory (ARL) became interested in doing a assessment survey for sturgeon within the river system. Preliminary study was conducted in 2000 (unpublished report submitted to USFWS Alpena by T. Sutton 2000) which captured and tagged two sturgeon. A more complete survey was conducted during 2001, results of which are summarized here.

Study Site

The US waters of the St Marys River are under two different MDNR watershed management units. The Lake Superior Management Unit, subsequently called “upper river”, is a 22.5 km long reach that encompasses the region from Whitefish Bay to the head of the rapids or compensating gates at Sault Ste. Marie. The Lake Huron Management Unit, subsequently called the “lower river”, is a 90 km long reach which starts at the head of the rapids or just after the compensating gates and flows down to the mouth of the St. Marys River at the Detour passage into Lake Huron (personal communication Steve Scott, MDNR Fisheries, Newberry MI). All assessment survey work was done on the U.S. side of the St. Marys River. The upper river was sampled from Sherman Park to within 500m of the compensating gates. The lower river was

sampled from the foot of the rapids through the north channel to Little Lake George, and through the main shipping channel the Little Rapids cut at Island # 4 (Figure 1).

Methods

The 2001 sturgeon assessment took place from 23 May through 28 October. All Survey work was done with six to ten baited setlines 100 m in length. Each setline was configured with 25 snews, each with a 7/0 hook, following the design of Thomas and Haas (1999). The first snew was set 7.6 m from the end of the line with snews every 3.05 m there after. Each set line had an anchor and float on each end. Hooks were baited with a variety of different baits depending on previous success and availability. Baits used included pickled squid, night crawlers, chicken liver, smelt, shrimp, and strips of herring or whitefish. The set-lines were deployed in depths greater than 4.6-m running with the river channel, and near the St. Marys shipping channel or other, natural drop-offs. The set-lines were checked every other day and rebaited if needed. Lines which were catching fish were left in place. Any lines that did not catch a sturgeon for seven days were moved to a new locale. Duration and location of all sets is given in Table 1 and Figure 1.

Table 1. Set line locations and duration for the 2001 LSSU Sturgeon Assessment in the St. Marys River (MI). For each set the starting and ending date is given along with the location, the number of lines set, number of times checked and sturgeon caught.

Starting	Ending	Days in water	Location (and info)	Lines set	Days checked	Sturgeon
5/23/2001	5/30/2001	7	Upper river	6	4	0
5/31/2001	6/6/2001	7	Upper river	6	3	0
6/7/2001	6/8/2001	1	Upper River Pulled	6	1	0
6/11/2001	6/15/2001	5	Set in lower River	6	3	0
6/15/2001	6/21/2001	6	Pulled 6-21	6	4	burbot, wt. Sucker
6/25/2001	6/30/2001	5	Reset lines in lower river on 6-25	6	2	0
7/1/2001	7/2/2001	1	pulled on 7-2	6	1	0
7/9/2001	7/16/2001	7	Reset lines in lower river on 7-9	8	3	5
7/17/2001	7/24/2001	7	Lower river	8	3	5
7/25/2001	8/1/2001	10	set 2 new set-lines on 7-30	8 & 10	5	9
8/2/2001	8/9/2001	7	Lower river	10	6	11
8/10/2001	8/17/2001	7	Lower river	10	4	2
8/18/2001	8/25/2001	7	1 set missing on 8-18	9	4	3
8/26/2001	8/29/2001	3	all lines pulled on 8-29	9	3	5
9/26/2001	9/30/2001	4	Set 5 lines in lower river on 9-26	5	2	2
10/5/2001	10/12/2001	7	Set 1 more line on 10-5	6	4	3
10/13/2001	10/20/2001	7	Lower river	6	3	0
10/21/2001	10/28/2001	7	Lower river; pulled all lines on 10-28	6	3	0

All sturgeon caught were measured for fork length, total length, and body girth to the nearest mm, and weighed to the nearest 0.5 kg. The tip of the left pectoral fin was taken, dried in a scale envelope and sent down to Dr. K. Scribner, Michigan State University for DNA analysis. A first fin ray on the outer edge of the left pectoral was cut close to the body and 10 mm up a cross section was taken out with a hack saw. These samples were

sent to Dr. Edward Baker MDNR Fisheries Division, Marquette Michigan for aging. The fish were then examined for any type of scarring, which, if present, was recorded. Just prior to release, each sturgeon was tagged with two types of tags: a Floy T-Bar anchor and a Passive Integrated Transponder (PIT). The Floy tags were yellow in color with a numbering scheme beginning at 00001 and placed just behind the dorsal fin. PIT tags also had a unique numbers, although not sequential, and were placed just under and behind the third dorsal scute. Functioning of PIT tags was checked with a Mini-Portable Reader (125-kHz, Biomark, Boise ID) prior to release to insure proper placement and retention.

Results and Discussion

During the 2001 LSSU Sturgeon Assessment, a total of 45 sturgeon were caught including 2 recaptures; one from 2000 and one from the current study (Table 1). No sturgeon were caught in the upper river, or in the main channel down to the Little Rapids cut. All sturgeon were caught in the North Channel past Brassar Point and into Little Lake George (Figure 2). All sturgeon were caught after July 11, 2001 in water with sandy shorelines. Data for each sturgeon caught, including tag numbers, scarring and bait used is provided in Table 2. Because of the sampling strategy, the lower river was sampled later than the upper river, and increasing catch there could be due, in part at least, to seasonal migration patterns and or temperature changes in the river.

The sturgeon collected in the present survey averaged 128 cm in total length, 15.9 kg in weight and 22 years in age (Table 3). Most fish caught (60%) were estimated to be between 11 and 25 years old (Figure 3). The absence of fish less than 92 cm was most likely due to gear selection. Gear selection may have also precluded the capture of fish larger than 159 cm, and in fact several instances of tangled lines and straightened hooks indicate large fish possibly escaping. Even with this limited age distribution, the relationship between length and age was evident (Figure 4) and indicates a growth rate of approximately 2 cm per year after the age of 10 years.

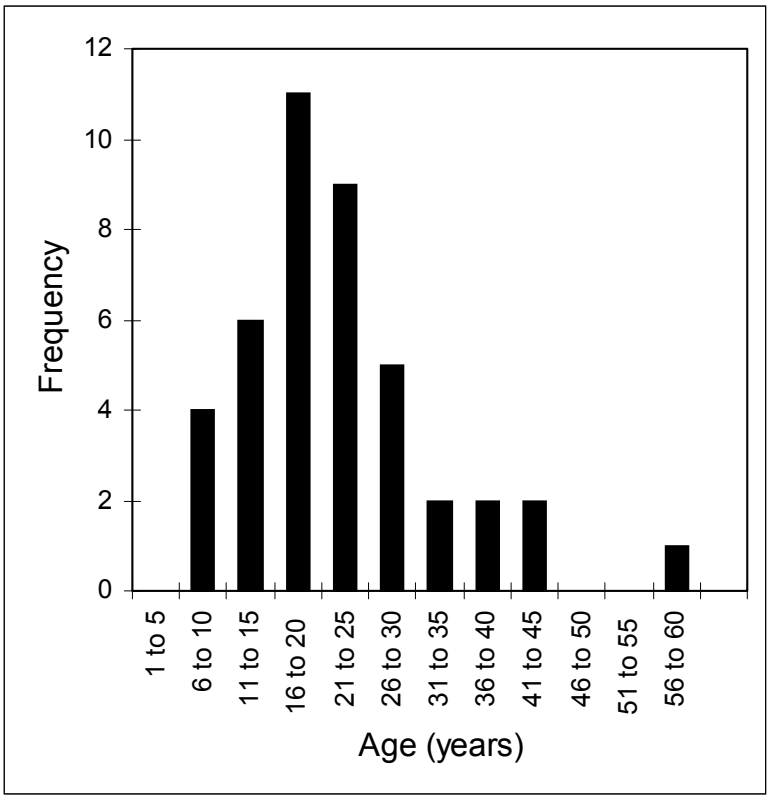

Figure 3. Age distribution of sturgeon caught during the 2001 LSSU Lake Sturgeon Assessment in the St. Marys River (MI).

Table 2. Sturgeon collected during the 2001 LSSU Lake Sturgeon Assessment in the St. Marys River (MI). For each individual fish collected, tag numbers, lengths and weight are given as well evidence of sea lamprey scarring and the bait that fish was caught on.

FISH #	DATE	SET LINE #	PIT TAG #	FLOY TAG #	FL (cm)	TL (cm)	GIRTH (cm)	WGT (kg)	LAMPREY SCARS	BAIT
1	7/11/2001	22	422E1C317A	00001	N/A	122	45	12	N/A	N/A
2	7/13/2001	24	423A631E7A	00002	N/A	132	50	14.5	N/A	SQUID
3	7/16/2001	26	423A491A47	00003	124.5	133	54	16	N/A	SQUID
4	7/16/2001	26	4235384B28	00004	131.5	139	55	20	N/A	N/A
5	7/16/2001	24	423B441B4F	00005	109.5	117	50	12	N/A	N/A
6	7/18/2001	25	423B252316	00006	137	145.5	58	25	N/A	SQUID
7	7/18/2001	20	4202743750	00008	144	152	69.5	29	N/A	SQUID
8	7/23/2001	26	423B680602	00009	111	119.5	44	10	NONE	HERRING
9	7/23/2001	26	4230D398B	00010	139.5	145	53.5	20	NONE	HERRING
10	7/23/2001	23	423B1E360E	00011	114	121.5	39.5	9.5	NONE	N/A
11	7/25/2001	26	4235193464	00012	138.5	137.5	59	23	N/A	HERRING
12	7/25/2001	23	422E13500B	00013	92.5	100	35.5	6.5	N/A	HERRING
13	7/27/2001	24	422E13531C	00014	84	92.5	38	8	N/A	N/A
14	7/30/2001	20	4234596652	00015	116	129.5	45	11.5	NONE	HERRING
15	7/30/2001	20	42343A4543	00016	135	146.5	50.5	18	NONE	HERRING
16	7/30/2001	20	423B714460	00017	114.5	125	54	16.5	OLD SCAR	HERRING
17	7/30/2001	19	4235365736	00018	128	146.5	60.5	21.5	1 SCAR	HERRING
18	7/31/2001	25	423B53131A	00019	92	99.5	37	6.5	NONE	WHITEFISH
19	8/1/2001	24	423A726763	00020	136.5	146.5	55.5	18	NONE	SQUID
20	8/2/2001	23	4235146202	00021	111.5	122	47	12	NONE	WHITEFISH
21	8/2/2001	19	423A62036F	00022	91.5	101	39	7.5	NONE	WHITEFISH
22	8/3/2001	28	423B570651	00023	105.25	113	45	11.5	NONE	SHRIMP
23	8/3/2001	28	4334502165	00024	150	159	73	26	2 SCARS	WHITEFISH
24	8/3/2001	28	42380C4E54	00025	120	125	53	20	>5 SCARS	WHITEFISH
25	8/6/2001	27	423B4D7104	00026	87	98	39	7	NONE	WHITEFISH
26	8/6/2001	26	423B58410D	00027	117	126.5	55	17	NONE	WHITEFISH
27	8/6/2001	20	422E0A7B76	00029	130	142	55.25	21	1 SCAR	WHITEFISH
28	8/7/2001	27	422E077B39	00030	137	150	55.5	25.5	1 SCAR	WHITEFISH
29	8/7/2001	23	422E115555	00031	123	137	53.5	16.5	NONE	WHITEFISH
30	8/8/2001	20	423B657C3B	00032	122.5	131	53	17	NONE	WHITEFISH
31	8/10/2001	28	423B617552	00033	133	141	52	24	NONE	WHITEFISH
32	8/13/2001	27	422E0C704C	00034	123	133	54	17.5	1 SCAR	SQUID
33	8/18/2001	22	422E0A7330	00035	143	153	63	26	NONE	WHITEFISH
34	8/20/2001	26	423A710067	00036	144	155	53	20.5	NONE	WHITEFISH
35	8/22/2001	19	423800022A	00037	129.5	136.5	58.5	20	1 SCAR	SQUID
36	8/28/2001	22	41794C6533	00038	92.5	99	39.5	7	None	WHITEFISH
37	8/29/2001	26	422D7A533A	00039	120.5	127	50.5	16	None	CRAWLERS
38	8/29/2001	24	423A7C5338	00040	95.5	105.5	41	10	None	WHITEFISH
39	8/29/2001	24	422E140916	00041	116	127.5	51.5	17	None	WHITEFISH
40	8/29/2001	24	4237700F0A	00042	131	140	56	21	1 Scar	WHITEFISH
41	10/3/2001		42344B154A	00043	95	106	40	10	None	SUCKER
42	10/3/2001		423A504710	00044	98	109	37	8	None	SUCKER
43	10/10/2001		4235332942	00045	107	116	42.5	10	none	

Table 3. Descriptive statistics for sturgeon caught during the LSSU Lake Sturgeon Assessment in the St. Marys River (MI).

	Mean	Standard Deviation	Median	Minimum	Maximum	Number
Total Length (cm)	128.0	17.8	129.5	92.5	159	43
Weight (kg)	15.9	6.3	16.5	6.5	29	43
Age (y)	22	10.5	20	9	59	42*

*One fish was excluded from age analysis due to damaged fin sample.

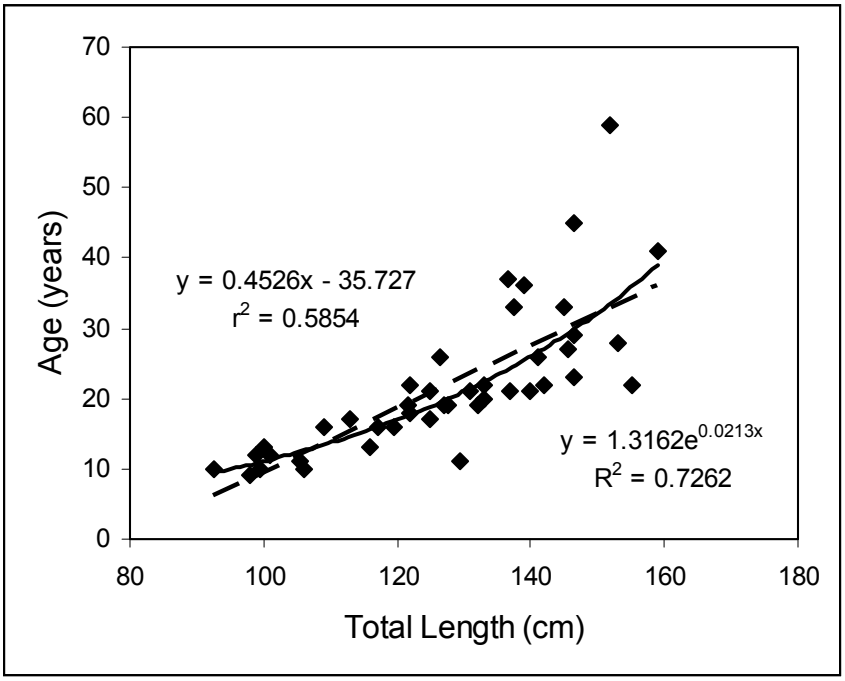

Figure 4. Length at age of sturgeon caught during the 2001 LSSU Lake Sturgeon Assessment in the St. Marys River (MI). Both linear (dashed) and exponential (solid) lines were fit to the data.

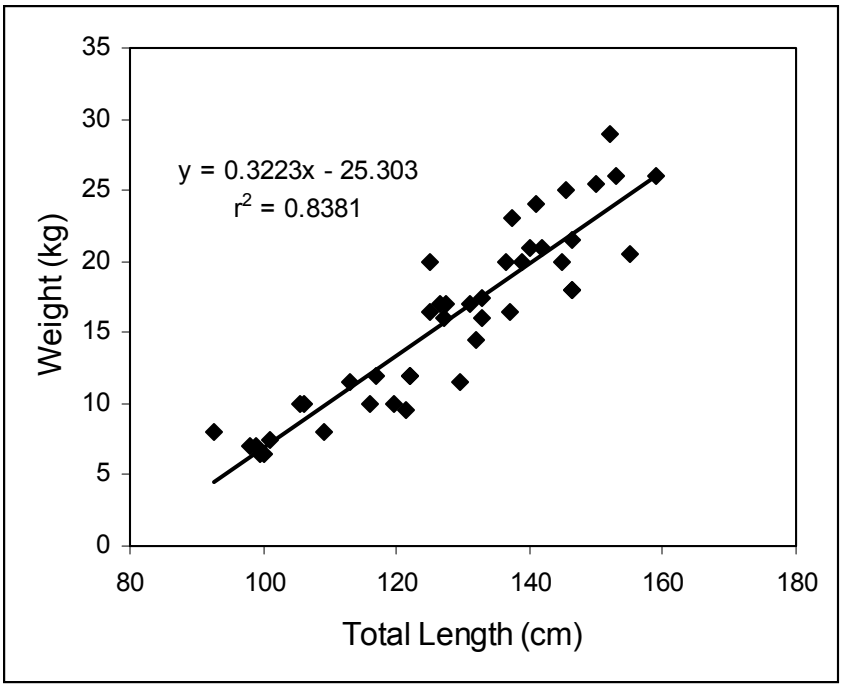

Figure 5. Weight / length relationship of sturgeon caught during the 2001 LSSU Lake Sturgeon Assessment in the St. Marys River (MI).

Conclusions

It appears from this survey that a healthy population of lake sturgeon exists in the St. Marys River, although sampling was biased against fish less than 9 years old. Further sampling is required to better sample the entire population. All areas that sturgeon were not caught had rocky shore lines. It could be that the sturgeon have a tough time finding feed in the rock substrate, if the rocky shore line is an indicator of what is on the bottom of the river. Poor results early in the assessment could have been due to sturgeon migrating to a spawning sites, during which time feeding ceases for the whole of the spawning period (Scott, Freshwater Fishes of Canada).

Literature Cited:

Bray, K. E. 1996. *Habitat models as tools for evaluating historic change in the St. Marys River*. Canadian Journal of Fisheries and Aquatic sciences 53 (Suppl. 1):88-98

Edsall, T. A. And John E. Gannon. 1993. *A Profile of St. Marys River*. MICHU-SG-93-700
Michigan Sea Grant College Program. Ann Arbor, Michigan.

The Canadian Heritage Rivers System (CHRS). www.chrs.ca (accessed 4Mar2003).

Scott, W. B. and E. J. Crossman. 1973. *Freshwater Fishes of Canada*. Fisheries Research Board of Canada. Bulletin 184, Ottawa.

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.

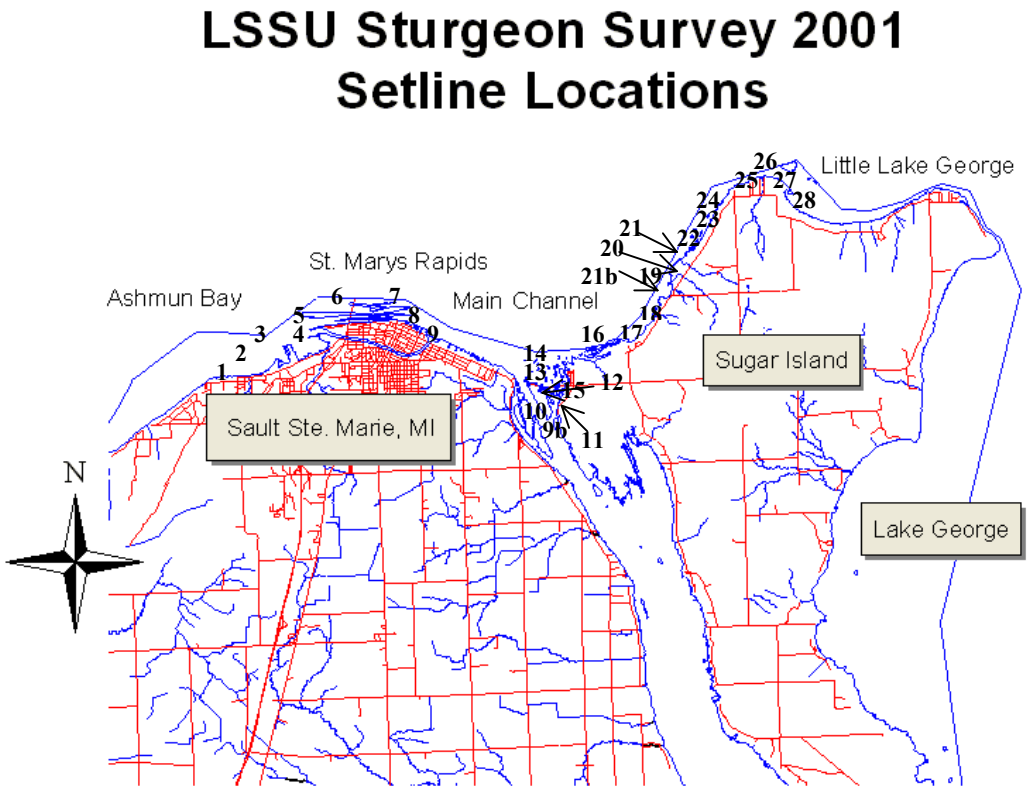

Figure 1. Approximate locations of setlines deployed during the 2001 LSSU Lake Sturgeon Assessment in the St. Marys River (MI).

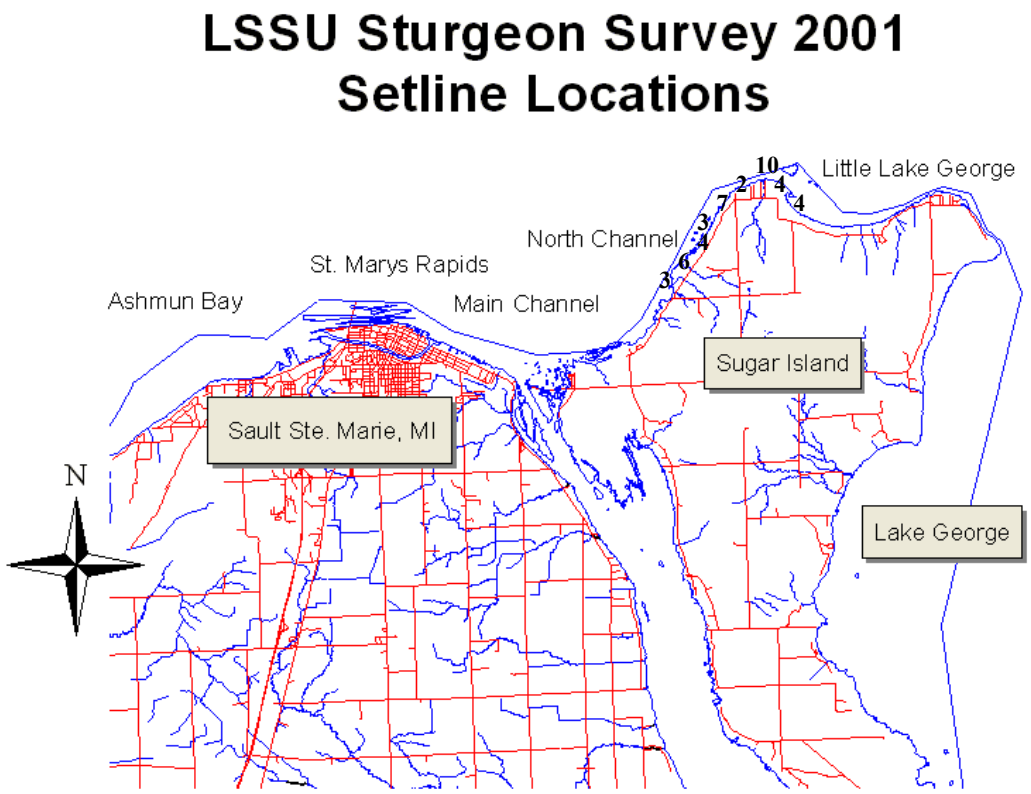

Figure 2. Approximate locations and number of sturgeon caught during the 2001 LSSU Lake Sturgeon Assessment in the St. Marys River (MI).

LAKE HURON

Ontario Ministry of Natural Resources
Lake Huron Management Unit

Contact: Lloyd C Mohr
E-mail: lloyd.mohr@mnr.gov.on.ca

Lake Huron (Georgian Bay and the North Channel) Sturgeon Assessment Update

The assessment of lake sturgeon (*Ascipenser fulvescens*) stocks in Ontario waters of Lake Huron (including Georgian Bay and the North Channel) has been on going since 1995 (Mohr 2000). The purpose of this report is to summarize the data collected by the Upper Great Lakes Management Unit – Lake Huron Office (UGLMU) in 2001. As in previous years, commercial fishermen on Lake Huron captured most of the lake sturgeon sampled. One fish was collected from an angler. Commercial fishermen in Lake Huron (Figure 1) incidentally captured sturgeon in either gill nets or trap nets. The fish are held until such time as there is a large enough sample to be processed by UGLMU staff or sturgeon are sampled by staff while on-board commercial vessels.

The data collected from this project will be used to assess the health of the lake sturgeon population in Lake Huron. Further studies in sturgeon movement and migration, as well as, the general biology of Lake Sturgeon found in Lake Huron/Georgian Bay and the North Channel will be used to enhance our understanding of this unique fish and provide recommendations for management actions.

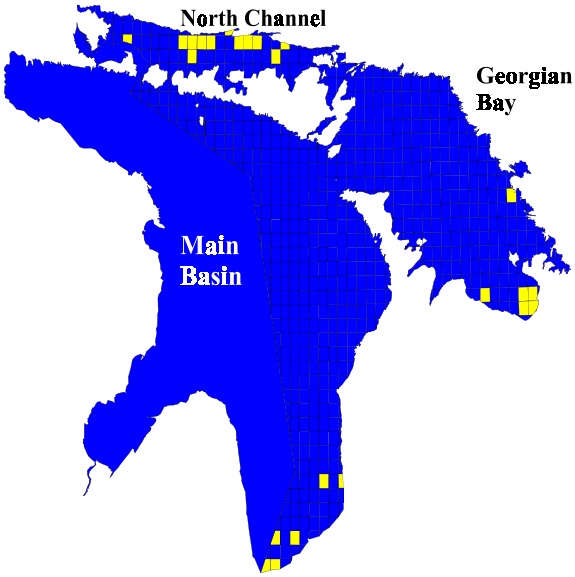

Figure 1. Lake Huron with sturgeon capture sites (indicated by grey grid) for 2001.

Results

Lake Sturgeon samples were collected between April 6 through November 16, 2001. There were 697 sturgeon sampled in 2001. The majority (n = 480) came from the main basin, while 137 and 80 sturgeon came from the North Channel and Georgian Bay, respectively (Figure 1). The largest fish sampled was 1894 mm in total length (Figure 2), with a 960 mm girth, and weighing 40.37 kg (89 lbs.). Conversely, the smallest sturgeon sampled in 2001 was 272 mm in length with a girth of 100 mm and only weighing a mere 100 grams. The average length of sturgeon captured in 2001 was 1040 mm in length and 395 mm in girth. Of the 697 sturgeon caught and sampled in 2001, 204 were harvested, 491 released alive and 2 whose fate remain unknown. Tags were applied to 446 sturgeon using either a yellow vinyl floy tag or a silver cattle tag located

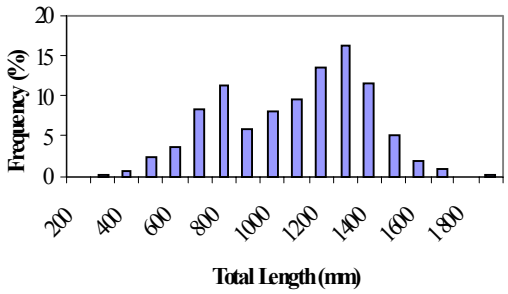

Figure 2. Total length distribution of Lake Sturgeon captured in Lake Huron in 2001.

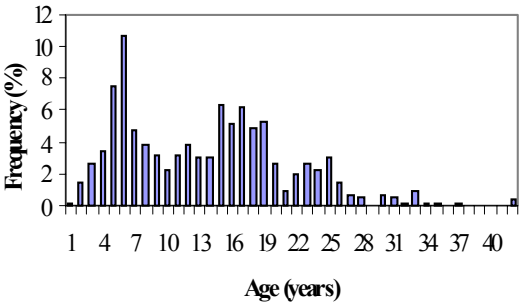

Figure 3. Age composition of lake sturgeon caught in Lake Huron in 2001.

posteriorly on the dorsal fin (Figure 4). Also, 29 fish were recaptured and subsequently released, while 7 recaps were harvested.

The ages of sturgeon, determined by sectioning pectoral fin rays, included 36 age groups with the most representation in age 6 (Figure 3). The average age of lake sturgeon captured in 2001 was found to be 13.5 years.

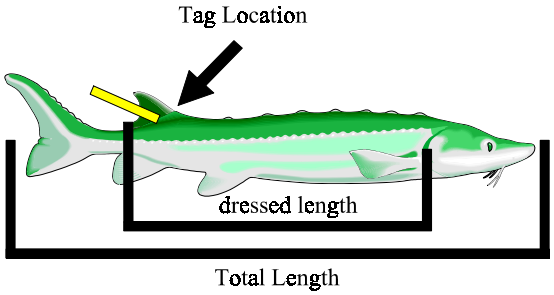

Figure 4. Pictorial representation of a sturgeon where tags (yellow, vinyl tube tags OR silver, aluminum cattle tags) are applied.

The youngest fish sampled, which also happened to be the smallest sturgeon handled, was a one-year-old caught in the North Channel. The oldest sturgeons (n=2) captured were 42 years old from southern Lake Huron. Since some of the sturgeon collected by commercial fishers are of legal harvestable size (≥ 63 cm dressed length – see figure 4), fish are examined internally to determined sex, maturity and to estimate fecundity. In 2001 a total of 116 sturgeon were sexed, 86 were deemed males and 30 were females.

The openwater monitoring and assessment of lake sturgeon in Lake Huron will continue in 2002. In addition to the continued Lake Huron sturgeon stock assessment, the UGLMU will initiate a research project increasing emphasis on the Lake Huron sturgeon spawning stocks within the watershed.

Acknowledgements

This important and valuable data could not have been collected without the continued support of the commercial fishing industry on Lake Huron, First Nations around the lake, international partners such as the U.S. Fish and Wildlife Service, and the numerous volunteers and staff who continue to participate in data collection.

It is also imperative that commercial fishers and recreational anglers report information regarding tagged sturgeon caught in Lake Huron/Georgian Bay and the North Channel to Lloyd Mohr. Be sure to include length, tag description and number (Figure 4), fin clips, fate (harvested or released) date and location where the fish was caught. This information is valuable as it is continually used to monitor and assess lake sturgeon habitat requirements, population dynamics (size, mortality and growth rates), and the general health of the species.

U.S. Fish and Wildlife Service
Alpena Fishery Resources Office

Contact: Adam Kowalski
E-mail: adam_kowalski@ fws.gov

Summary: A total of 69 lake sturgeon was captured by Lake Huron commercial fishers in 2001. This represents the largest number of sturgeon collected in a single year since the program began in 1995. Sturgeon were collected in trap nets, tagged and released alive. Pectoral fin ray sections were collected and used to age fish. Ages ranged from 4 to 26 years. Total number of fish tagged since this study started in 1995 is 254. Tag recaptures continue to increase every year. Twelve sturgeon captured in 2001 had previously been tagged. This represents 5% of the total lake sturgeon tagged to date.

The U.S. Fish and Wildlife Service-Alpena Fishery Resources Office (FRO) began investigating the Lake Huron lake sturgeon population in 1995. The purpose for the study was to gather critical information on Lake Huron lake sturgeon necessary for determination of federal listing and the development of recovery plans. Previous year's reports for this project can be found on the Alpena FRO web page (midwest.fws.gov/Alpena/index.htm) under station reports.

Most of the lake sturgeon collected for this study came from Saginaw Bay, Lake Huron. Saginaw Bay is one of the largest bays in the Great Lakes. It is a shallow, well-mixed extension of the western shoreline of Lake Huron. Total area of the bay is 2,771 km^2, and total water volume is 24.5 km^3. Bottom substrates in Saginaw Bay range from silt to mostly cobble and rock.

Since 1995, 302 lake sturgeon have been captured from Michigan waters and had biological data collected. Of the total, 254 have been tagged. This would not have been possible without the assistance of commercial fishers (Table 1). During the 2001 fishing season sturgeon were most frequently caught during the months of May and October (Figure 1).

Table 1. Number of lake sturgeon caught by participating commercial fishers in Lake Huron trap net fishery since 1995. Dash indicates the fisher was not participating in the program.

Fisher	Year Enrolled	1995	1996	1997	1998	1999	2000	2001	Total
Barbeaux Fishery	1996	-	1	7	0	0	0	7	8
Bay Port Fish Company	1995	13	7	10	8	12	3	2	53
Beardsley Fish Company	1997	-	-	0	0	0	0	1	0
Cedarville Fish Company	1997	-	-	1	7	9	4	7	21
Gauthier-Spaulding Fishery	1995	2	0	2	2	4	1	0	11
Kuhl Fishery	1999	-	-	-	-	1	0	2	1
Lentz Fishery	1995	3	8	8	9	10	6	7	44
M&W Fish Company[1]	1995	1	3	4	4	2	14	17	28
Serafin Fishery	1996	-	10	17	3	4	8	20	42
Beers Fishery	1995	2	0	1	0	0	0	2	3
Whytes Fishery	1995	2	7	3	4	3	3	2	22
Total		23	36	53	37	45	39	69	302[2]

[1]Formerly Sam's Fishery

[2]Not all lake sturgeon caught were measured or tagged.

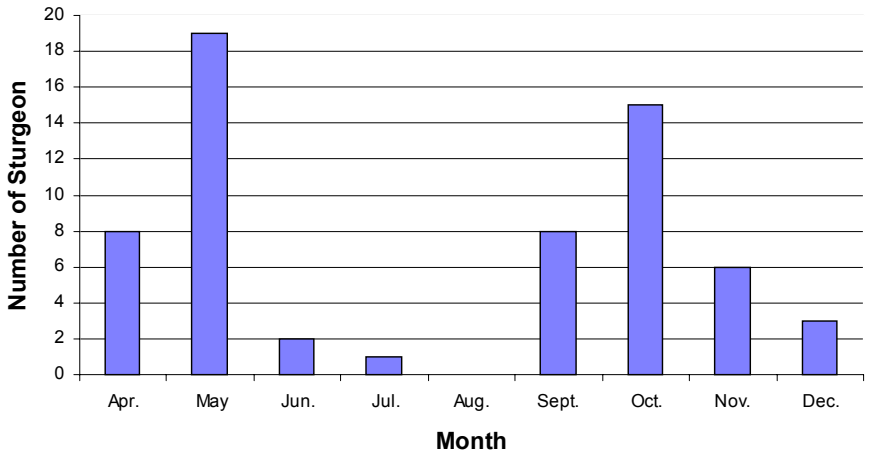

Figure 1. Number of sturgeon caught by month in Saginaw Bay by commercial fishers during the 2001 fishing season.

The mean fork length of lake sturgeon collected in 2001 was 106 cm and ranged from 48 cm to183 cm. The mean total length was 114 cm and ranged from 53 cm to 191 cm. The mean girth was 45 cm and ranged from 15 cm to 83 cm. Comparison of these values with

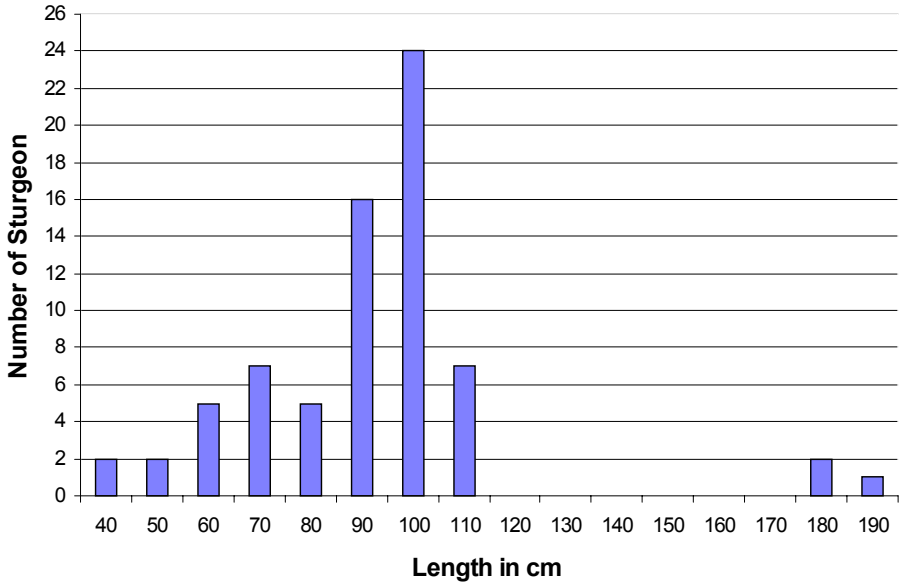

Figure 2. Number of sturgeon caught by commercial fishers, by length, for 2001.

previous years data shows the sturgeon collected in 2001 are consistent in size with previous years fish. Figure 2 illustrates the length frequency for sturgeon captured in 2001. Sturgeon within the 100 cm range were the size most frequently caught. Sturgeon with a length of 90-110 cm are usually sexually immature for both sexes averaging around 11 yrs old. Examining the age structure of sturgeon in Saginaw Bay reveals that fish 11-20 yrs old are most frequently caught.

There were 12 sturgeon recaptured in 2001. Figure 3 illustrates the number of recaptured sturgeon from 1996 to 2001.

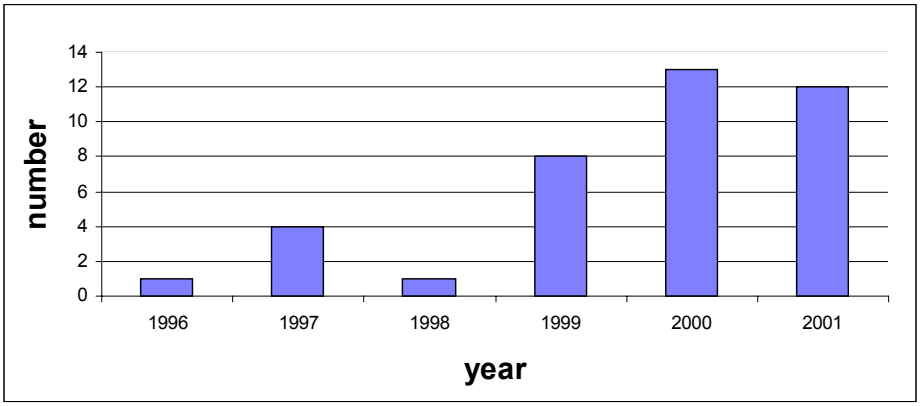

Figure 3. Number of sturgeon recaptured by commercial fishers from 1996 through 2001.

Saginaw Bay seems to be an area occupied by juvenile to sub-adult lake sturgeon. This result may be biased by the gear used to collect the lake sturgeon. The trap nets may not be big enough for a large sturgeon (the target species are lake whitefish and yellow perch). Another reason may be that larger sturgeon are occupying areas of the Bay that are not being fished. Because limited numbers of adult lake sturgeon have been caught in the Bay and restoration of the species is dependent on spawning adults, future agency assessment should focus on determining whether or not adult sturgeon occupy the Bay.

U.S. Fish and Wildlife Service
Marquette Biological Station

Contact: John Wisser
E-mail: john_weisser@ fws.gov

Fisheries and Oceans Canada
Sea Lamprey Control Center

Contact: Jerry Weise
E-mail: weisej@dfo-mpo.gc.ca

Integrated Management of Sea Lampreys Related to Lake Sturgeons in the Great Lakes

Since the 1950s, the U.S. Fish and Wildlife Service (FWS) and Department of Fisheries and Oceans (DFO) of Canada have been contracted by the Great Lakes Fishery Commission (GLFC) to conduct operational activities of the Integrated Sea Lamprey Management Program (Program) in streams throughout the Great Lakes basin. The Program continues to work with fisheries management agencies to achieve consensus on sea lamprey control, complement jurisdictional fisheries management plans, apply the ecosystem approach, use adaptive management strategies, and minimize the risk to nontarget organisms. The Program has reduced populations of sea lampreys by 90% in the basin and is a key fishery management activity that contributes to the success of the Great Lakes fishery, an estimated benefit of about $4 billion/year to the region.

The Program uses several techniques to attack sea lampreys during different stages of its life cycle with the support and approval of regulatory and fisheries management agencies. Currently, the primary method used to control sea lampreys is the application of lampricides (treatments): Lampricid® Sea Lamprey Larvicide [active ingredient 3-trifluoromethyl-4-nitrophenol (TFM)], the combination of TFM and Bayluscide 70% WP [active ingredient 2',5-dichloro-4'-nitrosalicylanilide (niclosamide)], and niclosamide released from Bayluscide 3.2% Granular Sea Lamprey Larvicide to kill sea lamprey larvae in streams with little or no impact on other fishes. Other methods of sea lamprey control include barriers to block the upstream migration of spawning lampreys, traps to capture and remove spawning lampreys, and the sterile-male-release-technique to reduce the success of spawning lampreys.

The lake sturgeon is among the nontarget fishes most sensitive to TFM. Young-of-the-year sturgeons approximately 15 to 100 mm total length are most vulnerable to

lampricides, usually during May 15 to July 15. Since 1989, the Program has established partnerships with agencies in the basin to identify lake sturgeon spawning streams and conducted toxicity tests using TFM and the combination of TFM and niclosamide to determine the LC 99.9 for larval sea lampreys and no mortality on lake sturgeons. Additional studies found that lake sturgeons will avoid niclosamide released from the granular formulation of Bayluscide and will not be harmed. State, provincial, and tribal agencies determine lake sturgeon streams where present production occurs. In streams where sea lampreys and lake sturgeons co-exist, consultations are conducted with jurisdictional agencies to achieve consensus on specialized treatment protocols to control sea lampreys and minimize the risk to lake sturgeons.

Lampricide treatments and lake sturgeon assessments in the USA

During 2001, treatments were conducted in the following nine state designated lake sturgeon streams in Michigan and Wisconsin. Treatments in Michigan included the Sturgeon and Ontonagon rivers (Lake Superior) and Manistique, Whitefish, Cedar, and White rivers (Lake Michigan). Treatments in Wisconsin included the Bad River (Lake Superior) and Peshtigo and Oconto rivers (Lake Michigan). Assessments by dip net during and immediately after the treatments found no dead lake sturgeons. The assessments in Michigan were completed to fulfill requirements specified in the 2001 certification of approval issued for lampricide treatments by the Michigan Department of Environmental Quality.

During 2002, lampricide treatments are scheduled in the following four State of Michigan designated lake sturgeon streams: the Tahquamenon River (Lake Superior), Manistique and Muskegon rivers (Lake Michigan), and Rifle River (Lake Huron). Assessments of the effect of each treatment on lake sturgeons will occur during and immediately after each treatment.

Lampricide treatments and lake sturgeon assessments in Canada

During 2001, lampricide applications were made to three streams that have had a history of lake sturgeon production; the Garden and Thessalon rivers in Lake Huron, and Bronte Creek in Lake Ontario. The Thessalon River was treated from the dam at Rydal Bank. The last observation of lake sturgeon from Bronte Creek was in 1962 and from the lower Thessalon River in 1994. Surveys in the early summer of 2001 found larval lake sturgeon in the Garden River but none in the Thessalon River. A young-of-the-year sturgeon (80 mm) was found in the Garden River the day prior to the lampricide applications, verifying their presence in the river at the time of treatment. Growth of the lake sturgeon was 60 mm and 2.0 g in about 30 days. Random sampling of ~20% of the Garden River habitat below the known spawning site (Murphy's Rapids) failed to find any evidence of lake sturgeon mortality following the lampricide application. Diligent searching of stream habitat with dip nets during lampricide applications to all three streams also failed to find any evidence of lake sturgeon mortality.
During routine sea lamprey trapping at the Koshkawong River on St. Joseph Island an adult lake sturgeon was observed (May 17, 2001) below the low-head barrier. The

sturgeon was about 122 cm long and it had four sea lamprey marks on it. The river is a relatively small tributary to the St. Marys River and has had no previous record of lake sturgeon from it.

During 2002, six streams with historical records of lake sturgeon were scheduled for lampricide applications. In Lake Superior the Kaministiquia and Goulais rivers, in Lake Huron the Thessalon River above Rock Lake, the Spanish and Nottawasaga rivers, and in Lake Ontario, the Black River were scheduled. During the lampricide applications, staff will search stream habitat for non-target mortality, especially lake sturgeon. Larval lake sturgeon fyke nets will be fished in the Nottawasaga, Thessalon (above Rock Lake), and Goulais rivers to determine the extent of larval lake sturgeon reproduction and random stream sites will be searched for lake sturgeon mortality in the upper Thessalon and Goulais rivers. Electrofishing surveys will be conducted in all the rivers to classify the fish communities in each river and to search for immature lake sturgeon.

Links to the sea lamprey management program and lake sturgeon:

Lake Sturgeon and Sea Lamprey Control in the USA
http://midwest.fws.gov/Marquette/etc/sturgeon.html

Sea Lamprey Control in Canada
http://www.dfo-mpo.gc.ca/regions/CENTRAL/science/Sea-mer/Sea-mer_e.htm

Strategic Vision of the Great Lakes Fishery Commission for the First Decade of the New Millennium (pages 6 to 9)
http://www.glfc.org/pubs/SpecialPubs/StrategicVision2001.pdf

Joint Strategic Plan for Management of Great Lakes Fisheries (1997 Revision)
http://www.glfc.org/fishmgmt/sglfmp97.htm

ST. CLAIR WATERWAY

Michigan Department of Natural Resources
Mt. Clemens Fisheries Research Station

Contact: Mike Thomas
E-mail: thomasmv@michigan.gov

Summary: *Data entry and analysis for all 2001 field collections has been completed. A total of 185 lake sturgeon was 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 60 sturgeon have been tagged and released through July 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.*

The Mt. Clemens Fisheries Research Station began an investigation into the distribution and abundance of lake sturgeon in the St. Clair River and Lake St. Clair in 1996. Since 1997, the study has been funded through the Federal Aid for Sport Fish Restoration program. The objectives of this study are (1) to determine spawning period, spatial distribution of spawning activity, and characterize 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, age composition, growth rate, and age/sex composition of the spawning stock.

Capture of juvenile and adult lake sturgeon to collect biological data and mark with monel tags –

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 foot net of 8 inch stretch mesh. The first two-hour set captured seven lake sturgeon, including one recapture. That 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. Unfortunately, one of the fish caught in the gill net was dead when we lifted the net, and a second fish was nearly dead. All live fish were tagged with monel cattle ear tags and PIT tags and released. Due to an apparent net mortality problem, we have no plans to conduct any further gill net sampling for lake sturgeon on Lake St. Clair.

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 (Figure 1). 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

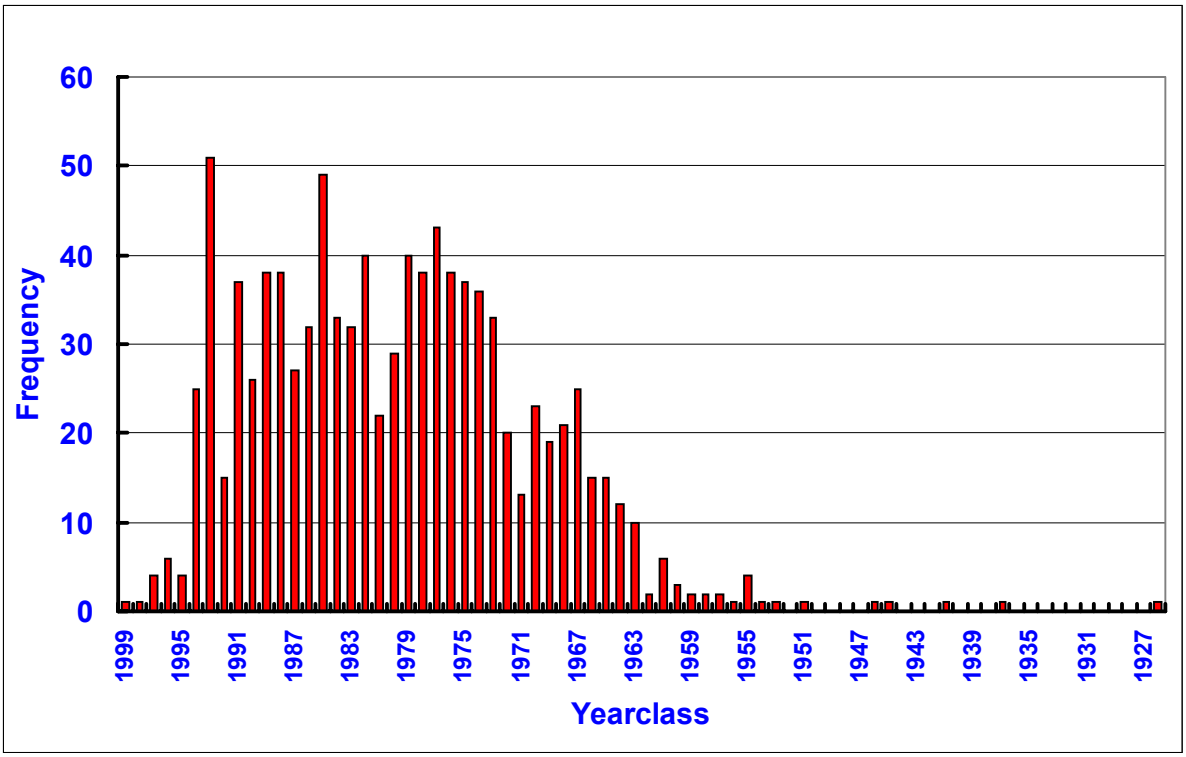

Figure 1. Year class frequency for lake sturgeon captured in the St. Clair River and Lake St. Clair from 1997 to 2001 (n=978). Ages based on pectoral fin ray section interpretation.

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, 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 to 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. In contrast, lake sturgeon in Michigan's inland waters grow slower, particularly from age 1 to age 15, and attain a mean length of 1,270 mm at age 22. 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 allows a limited harvest to continue, while protecting sexually mature female fish and potentially allowing older fish to increase in abundance. In 2001, three lake sturgeon were registered at the check stations.

Diet samples were collected from 10 lake sturgeon collected with trawls in late August 2001, using a non-lethal stomach flushing technique. The volume of gut contents collected from several of the fish was substantial and required considerable lab processing time. Common food items in the stomachs were gastropods, amphipods, chironomids, ephemerids, and dreissenids.

Characterization of adult spawning habitat and juvenile habitat, based on catch distribution, 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 Age 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. 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 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.

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. One recapture was caught in an experimental large-mesh gill net in Lake St. Clair. 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.

US Geological Survey
Great Lakes Science Center

Contact: Bruce Manny
E-mail: bruce_manny@usgs.gov

Sturgeon Spawning Habitat in the Lake Huron-Lake Erie Waterway

Condition of historic reputed lake sturgeon spawning sites.
Eighteen sites in Goodyear et al. (1982) or reported by local residents (two active/known and six reputed in the St. Clair River and one known and nine reputed in the Detroit River) were documented with side scan sonar and underwater TV, using a Global Positioning System. Suitability of bottom substrates at each site for protection of developing sturgeon eggs and sac-fry was gauged by subjective estimation of interstitial void space present among layers of rock on rock. Estimated area of suitable spawning substrates in the St. Clair River (1279 ha or 2814 acres) exceeded that in the Detroit River (645 ha or 1419 acres). Only 2 of 9 historic, reputed spawning sites in the Detroit River possess much void space for egg incubation, due to siltation, but a majority of such sites in the St. Clair River possess enough (> 30 cm) interstitial void space. Hence, potential for sturgeon reproduction in the corridor is much greater in the St. Clair River than in the Detroit River.

Substrates at three active known spawning sites.
Substrates at the three active, known spawning sites in this waterway consisted of beds of either metamorphic, rounded, cobble (10-40 cm in diameter) and coarse gravel (2-8 cm in dia.) of glacial origin or coal cinders (0.5-12 cm in dia.) of human origin, >0.25 ha in area and >0.3 m in thickness. Water velocity at the bottom at these sites (0.36-0.98 m/s) was in the range in which lake sturgeon were reported to deposit eggs in two small Canadian rivers. Results of this research were published in J. Appl. Icthyol. 18 (2002):1-5.

Construction of new spawning habitat in the upper Detroit River.
Because suitable spawning habitat is limited in this river, funding has been sought from the Great Lakes Fishery Trust and MDEQ's Coastal Restoration Grant program to enhance a healthy, self-sustaining population of lake sturgeon in the river by constructing clean spawning habitat near the head of the river in an area of high current velocity, using beds of three preferred spawning substrates of lake sturgeon: screened, limestone "shot rock", 6-24 in dia.; a mixture of 4-6 in, igneous cobble and 1-3 in gravel; and 1-3 inch coal cinders. The project includes bed construction, a fisheries monitoring element, and a public education program.

US Geological Survey
Great Lakes Science Center

Contact: Richard Quintal
E-mail: richard_quintal@usgs.gov

A Non-Lethal Procedure for the Determination of Organic Contaminant Concentrations in Lake Sturgeon

Lake sturgeon are listed as threatened and are protected in the Michigan waters of the Great Lakes under the Michigan Endangered Species Act of 1994. Harvest is banned or severely restricted throughout its range in the basin.

Protection under the Michigan Endangered Species Act has made it impossible to incorporate sturgeon into routine contaminant monitoring programs that typically require the sacrifice of the fish but which produce data critical to a better understanding of a species' overall health. Because of this protection, there is very little data published enumerating the contaminant levels in sturgeon**.**

From several perspectives, knowledge of contaminant levels in lake sturgeon is vital. From an ecosystem perspective, this long-lived species will act as a sink for many contaminants since it's armor and size afford it protection from predation. Tracing the movement of target chemicals into sturgeon is therefore important. Most species of sturgeon are today prized for their meat and roe. Lake sturgeon are no exception and there is a considerable demand for these food products. Although the species is afforded protection in the United States waters of the Great Lakes, Canada allows a quota each year to meet the public demand. It is therefore necessary to obtain baseline data and establish monitoring programs to assess the risk to humans. Lastly, contaminant data is needed to assess the general health of the species, to help predict its potential for recovery, and will be used in the management decision-making process for lake sturgeon populations.

To this end, a non-lethal method has been developed to sample lake sturgeon tissue. This method, once deployed, will provide invaluable contaminant data without harming the species' population or violating the Endangered Species Act.

The procedure involves the use of a 0.5" (12.7 mm) i.d. steel tube, sharpened at one end, to take a core sample through the fish. The core sample is taken at the midpoint of the dorsal fin on the left side. A small incision makes it easier to start the sampling tube into the dorsal surface. After this, the tube is driven straight down through the tail and ventral skin. No primary closure is required. Wounds should heal without serious complication within approximately eight weeks.

The method is suitable for most organochlorine contaminant analysis and has applicability to other species of sturgeon. Because the method employs a standardized location for sampling, it may not be applicable to non-acipenserid species. Its use should yield 4-6 grams of tissue, sufficient for most modern instrumentation to quantify contaminant levels.

Contaminant data presented here were derived from fish provided by the US Fish and Wildlife Service and from field tests conducted in June of 2002. Specific tissues included muscle, gonad, liver, and blood. The analytes included 80 PCB congeners including the most toxic planar congeners, 21 pesticides, and Toxaphene.

A total of 15 fish were sampled for various tissues during this study. Results from the tests on the lakes Michigan and St. Clair lab fish and the Lake Huron test fish yielded the following results:

Lake Michigan: Chemical analyses demonstrated that significant amounts of chlorinated hydrocarbons were accumulated in the blood and liver of the sturgeon collected near Manistee in 1999. In spite of the fact that the age, gender, and length of collected fishes were different, their PCB concentrations in the liver were similar, differing no more than 10% from 850 ng/g to 950 ng/g. The margin in blood samples was somewhat greater, varying by 20% from 800 ng/g to 980 ng/g. Nevertheless, these concentrations are much lower than lake trout sampled at approximately the same time and location where whole fish and liver had values of about 1,800 ng/g and 7,500 ng/g respectively.

It is important to mention that in contrast with PCB accumulation by other fish species in Lake Michigan, the distribution of congeners in lake sturgeon is relatively more even. The highest abundance was found in congeners #153 and #163, corresponding to lake trout from Lake Michigan, but the next highest congeners were #118, #84, #66, and #71 which do not contribute significantly to lake trout or smelt contaminant loads. There are insignificant amounts of the toxic planar congeners. Congener #126 did not exceed 0.5 ng/g in sturgeon whereas it tends to be 10 ng/g in lake trout from the same location.

In the pesticide category, there is great variability in the liver concentrations of DDE, Toxaphene, Mirex, and Total Chlordanes, depending on age and gender however, the concentrations did not vary greatly in the blood samples. The octa and nona-chlorinated Toxaphene homologues showed a greater relative abundance in lake trout as compared to lake trout, which typically have more of the hepta-chlorinated homologues.
Emerging issue contaminants, especially Polybrominated Diphenyl Ether (PBDE) #47 and #99 showed very small concentrations in Manistee sturgeon at 1 ng/g and 0.2 ng/g respectively as compared to lake trout. In contrast to lake trout, where concentrations of the various categories is very consistent, PBDE concentrations in sturgeon exceed the concentrations of some of the more global contaminants, specifically Chlordanes, HCHs, Hexachlorobenzene, and most industrial organochlorines.

Lake St. Clair: A different picture of contaminants was observed in Lake St. Clair samples. PCB concentrations were much lower in these fish as compared to Lake Michigan fish. The concentrations for liver, testes, and muscle were 400-600 ng/g, ~650 ng/g, and ~425 ng/g respectively. Even the very fatty muscle tissue had only 3,700 ng/g. Unlike Lake Michigan sturgeon, these fish looked very much like most other biota from that area with respect to the congener patterns. Congeners #153, #163, #180, and #187 were the most abundant. We found only traces of Toxaphene in this fish and moderate concentrations of most other pesticides including DDE, trans-Chlordane, and Oxychlordane.

Lake Huron: A relationship was seen in the Lake Huron fish. The test subjects were smaller on average than the eight sacrificed fish. As expected, the contaminant loads were lower in muscle tissue, especially with regard to total PCB. An exponential relationship is noted ($R2 = 0.597$) between total length and Total PCB within this group of twelve fish (Fig. 6). Because the four test subjects could not be sampled for gonad and liver tissue, resulting in a more narrow range of lengths, these relationships were much weaker. As expected, when the four test fish are removed from the muscle analysis, the relationship becomes linear and shows practically no goodness-of-fit ($R2 = 0.0276$). The three lab fish were similar in size to the sacrificed fish, were from a different site, and had been frozen prior to sampling, and therefore lend no further insight.

Central Michigan University
College of Science and Technology

Contacts: Nathan Caswell
Email: nate_caswell@fws.gov

Summary - *Using baited set lines, we captured adult lake sturgeon in several locations in the Detroit River from March - September 2001. A total of 35 sturgeon was captured with one recapture, bringing the 2000-2001 total to 74 individual lake sturgeon. Biological data was collected, and cross-sections of pectoral fin ray samples were used to evaluate age structure and growth of the population. Sonic transmitters were implanted in 10 additional adult fish in 2001 for a total of 20 deployed transmitters. Lake sturgeon from 2000 and 2001 were monitored throughout the field season to evaluate habitat use and to identify potential spawning sites within the river. Growth of Detroit River lake sturgeon appears to be similar to other populations. Sturgeon appear to use only a relatively small portion of the Detroit River. We were able to locate one spawning site for sturgeon in the Detroit River in 2001.*

Central Michigan University, in conjunction with the USFWS Alpena FRO, began investigating the biology, spawning habitat, and movements of adult Detroit River Lake Sturgeon in 2000. The main objectives of this study were to (1) obtain baseline biological data including growth rates and age structure of the Detroit River stock, (2) evaluate movement patterns of adult lake sturgeon within the Detroit River, and (3) determine if lake sturgeon spawning is taking place in the Detroit River.

Capture of Detroit River Lake Sturgeon to collect biological data and mark with floy and pit tags – Beginning on 11 March 2001, baited setlines were set in selected areas of the Detroit River. Setlines were set for two nights. Setlining continued until 22 September 2001. We ended the year with a total of 189 sets, which yielded 387 setline-days. Combined with the 2000 totals (217 sets, 354 setline-days), we had 406 sets and 741 setline-days for the project. Thirty-five (35) lake sturgeon were captured in 2001 with one recapture, bringing our two-year total to 74 individual lake sturgeon. Our overall CPUE was 0.10 sturgeon/setline-day. Sturgeon were primarily captured east and south of Fighting Island on the Canadian Side of the Detroit River (Figure 1). Lake sturgeon were marked externally with floy tags inserted at the base of the dorsal fin, and internally with a PIT tag inserted underneath the fourth dorsal scute.

Total lengths ranged from 68.5 – 186 cm (mean = 129 cm) (Figure 2). Weights ranged from 1.5 – 55 kg (mean = 16.2 kg). The length-weight relationship for sturgeon in the Detroit River is $W = 4E\text{-}07(L)^{3.551}$ (Figure 3). Pectoral fin ray cross-sections were used to age fish, and a total of 69 lake sturgeon from the Detroit River were aged in 2000-2001. Ages ranged from 4 to 38 years with 30 year-classes represented (Figure 4). Findings were similar to those of Thomas and Haas (2000) with the strongest year-classes

occurring after 1973. Growth of lake sturgeon in the Detroit River is good (Figure 5), and appears to be similar to growth reported for other populations in the St. Clair system (Thomas and Hass 2000) and Lake Winnebago (Folz and Meyers 1985).

Implantation of ultrasonic transmitters and movements of adult lake sturgeon in the Detroit River – Ultrasonic transmitters were implanted in ten (10) adult lake sturgeon between 20 April and 19 June 2001. Total lengths for these fish ranged from 106 to 186 cm. Starting on 29 March 2001, the entire river was traveled by boat at least twice each week (weather permitting) to monitor individual movements of transmittered sturgeon. We checked for the presence of transmittered fish at 1.6-km intervals during each tracking day. The date, GPS coordinates, depth, and a general description of the location were recorded each time a fish was relocated.

Individual sturgeon were relocated 0 – 67 times from 5 April 2000 to 22 September 2001. In total, 404 locations were recorded for transmittered lake sturgeon in the Detroit River in 2000-2001. Of these, 88% occurred in a section of the river that we refer to as their "home area" which extends along the Canadian portion of the river from the north end of Fighting Island south to the north end of the Amherstburg Channel (Figure 1). It appears that when sturgeon are in the Detroit River, they hold within this area. It also appears that when sturgeon leave the home area (with the exception of spawning movements), they leave the river entirely. Adult lake sturgeon are apparently using only a small portion of the available habitat in the Detroit River.

Lake sturgeon in the Detroit River displayed complex movement patterns. Transmittered lake sturgeon left the Detroit River throughout the summer and fall of 2000. By late October, nine of the ten transmittered fish had left the river. In 2001, sturgeon reentered the river in early spring, and moved in and out of the river, apparently at random, through the 2001 field season. There did not appear to be a specific event based on photoperiod or temperature that triggered the movement of sturgeon out of the river. Transmittered lake sturgeon from the Detroit River were located in both Lake St. Clair (MDNR) and Lake Erie. The Detroit River simply may be used by some sturgeon as a corridor between the St. Clair system and Lake Erie.

Lake sturgeon spawning in the Detroit River – We were able to locate one definite and two potential lake sturgeon spawning sites in the Detroit River (Figure 1). The first two fish captured in 2001 were ripe males. One of these males, along with two fish from 2000 made multiple runs from the home area upstream to Zug Island in early May 2001. Egg mats were supplied by USGS GLSC and deployed near the upstream end of Zug Island approximately 10 m from the seawall. Water temperature at this time was approximately 8^{o}C. The mats were retrieved after three days, and contained six lake sturgeon eggs (verified by USGS GLSC). Based on timing and the movements of some transmittered fish, we were able to identify two other potential spawning sites. One is located just above the head of the Amherstburg Channel, and the other is located near the northwest corner of Fighting Island.

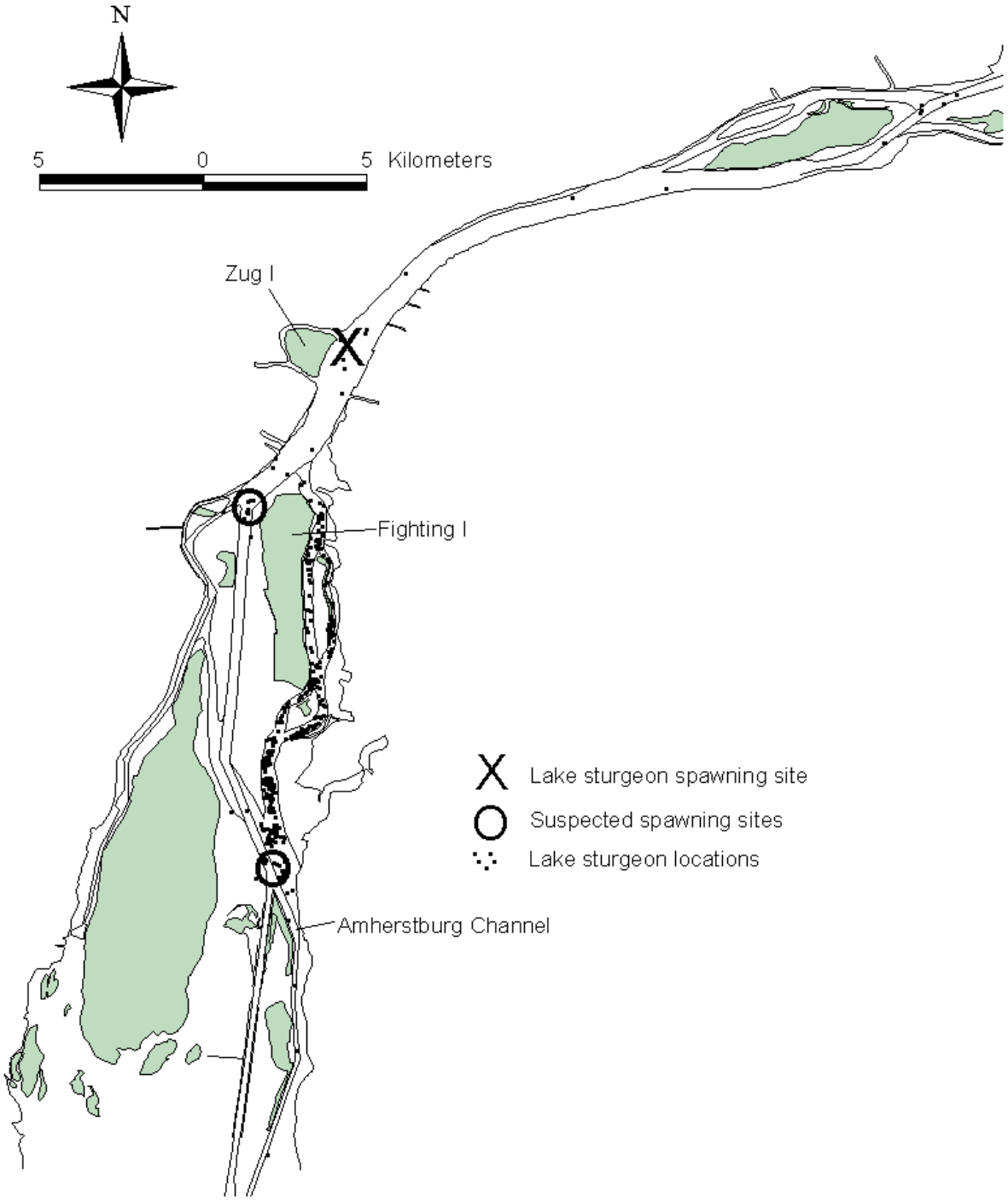

Figure 1. Map of the Detroit River showing lake sturgeon locations for 2000-2001and confirmed and suspected spawning sites.

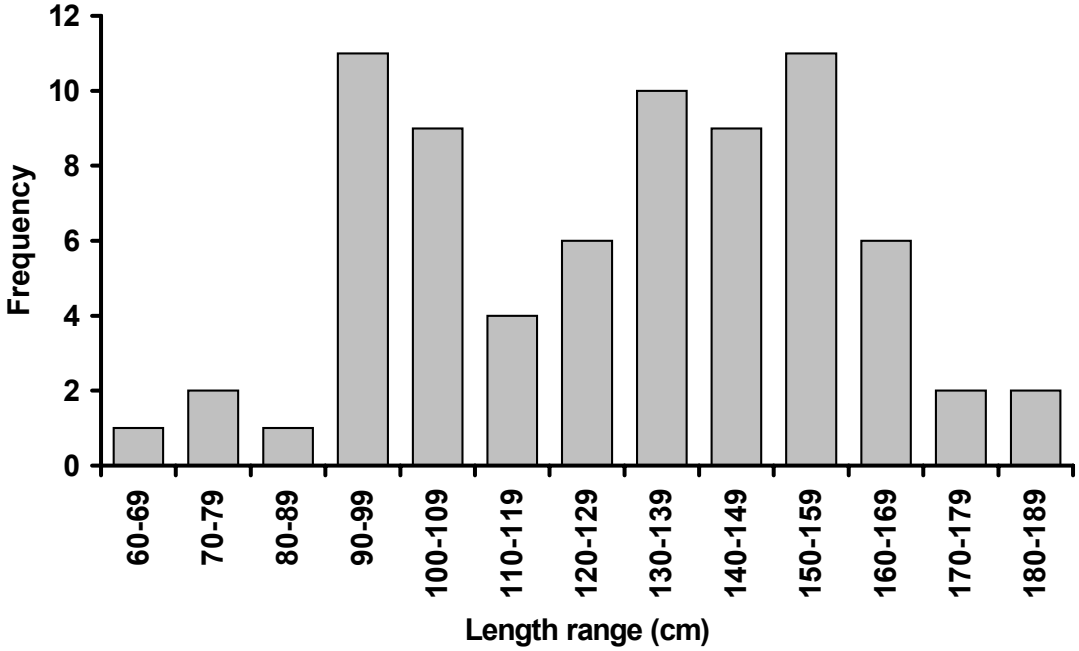

Figure 2. Length frequency distribution for lake sturgeon captured in the Detroit River in 2000-2001 (mean=129 cm).

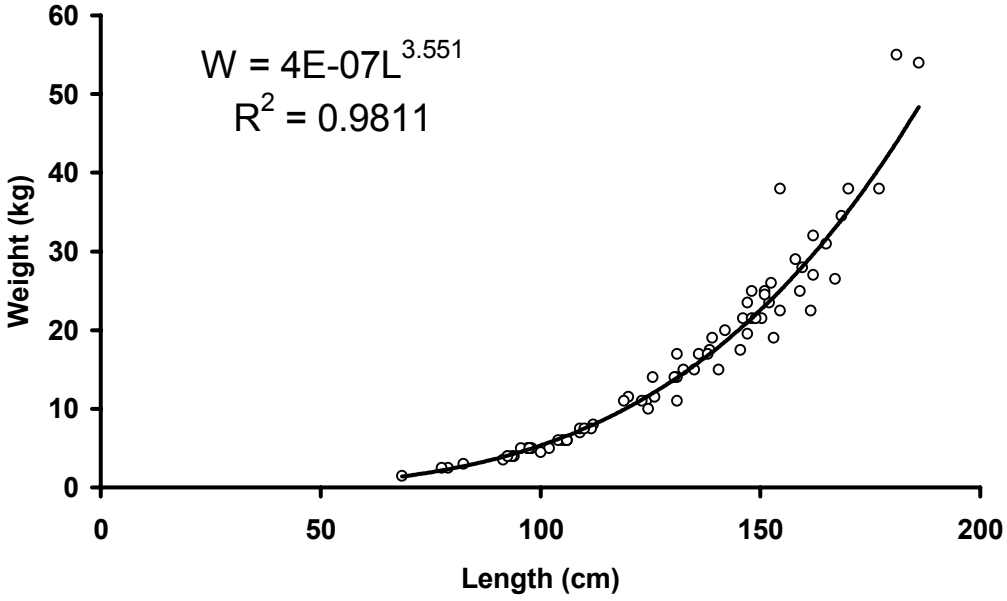

Figure 3. Weight-length relationship for lake sturgeon (n=74) captured in the Detroit River in 2000-2001.

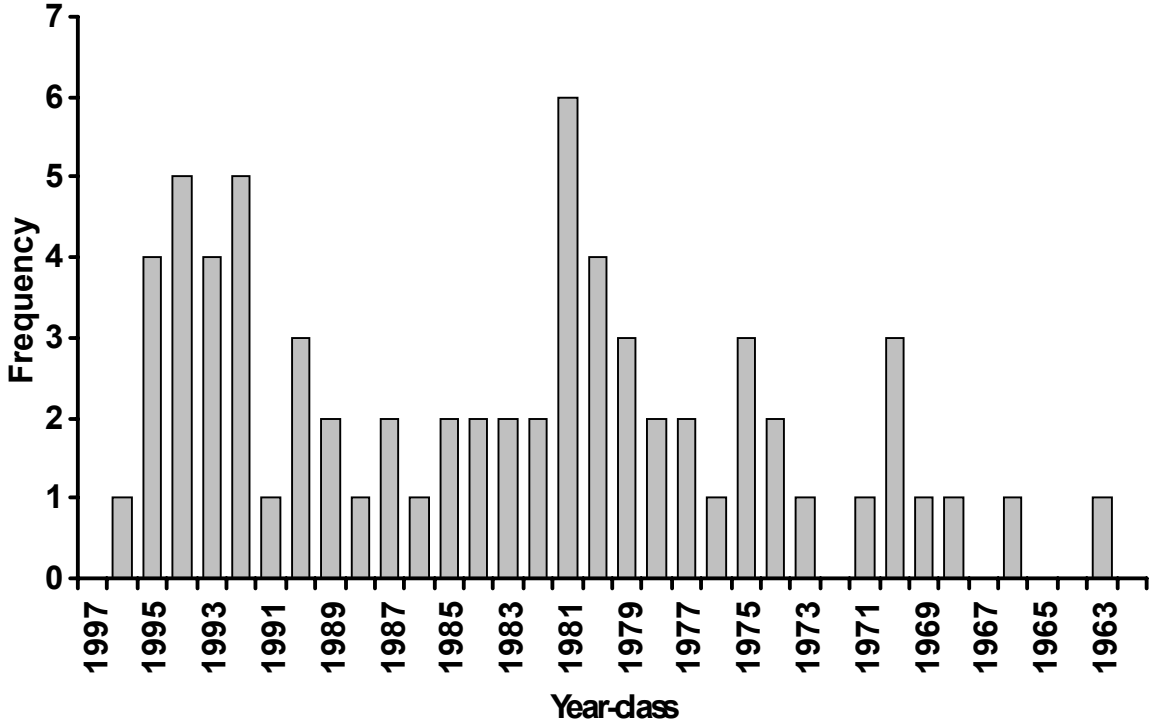

Figure 4. Year-class frequency distribution for lake sturgeon (n=69) captured in the Detroit River 2000-2001.

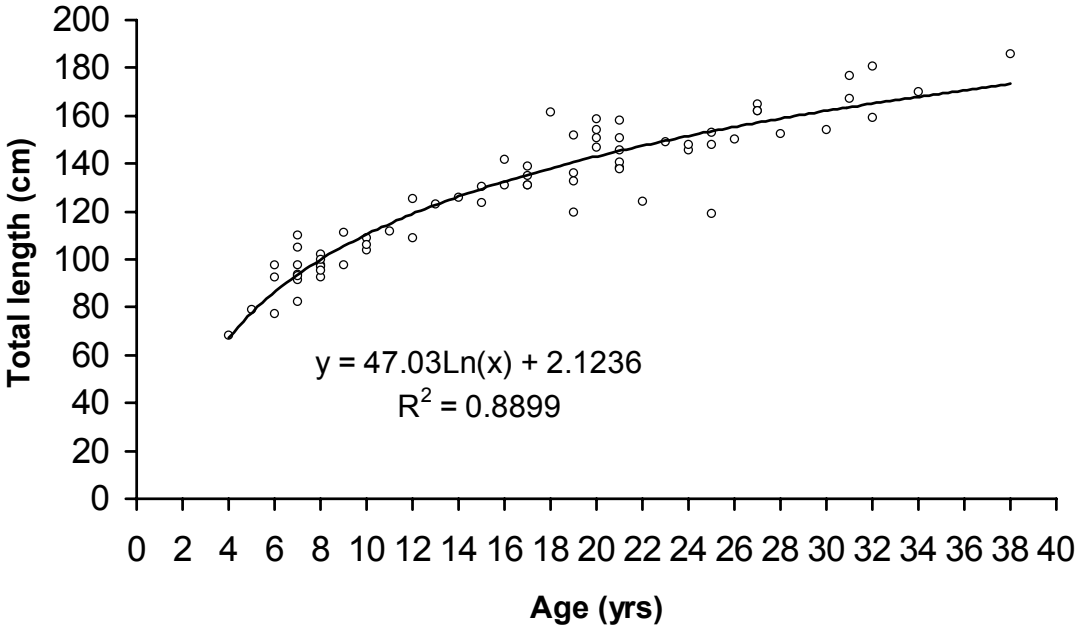

Figure 5. Length-at-age for lake sturgeon (n=69) captured in the Detroit River in 2000-2001.

LAKE ERIE

Ohio Division of Wildlife
Sandusky Fisheries Research Station

Contact: Chris Vandergoot
E-mail:
christopher.vandergoot@dnr.state.oh.us

There were 19 reported lake sturgeon sightings in 2001 within Ohio waters. Commercial fisherman reported only 6 of these sightings. Anglers reported catching and releasing 13 sturgeon, the same as in 2000. Anglers reported 4 adult-sized sturgeon while ice fishing in the island area. Total lengths from Ohio-caught lake sturgeon ranged from 178 mm (7 inches) to 1625 mm (64 inches) and averaged 1168 mm (46 inches). The one 64-inch sturgeon was reported caught and released in the Cuyahoga River. The majority of the Ohio sightings were from Catawba to Cedar Point in the lake's western basin, which is similar to previous years.

Lakewide, sightings were also reported from Michigan (2), and New York (23) waters as well. Most of the New York sightings were fish that probably died from botulism E and had washed up on the beach. The New York reports were from carcasses of large adults, 610 mm (24 inches) to 2032 mm (80 inches) in total length, encountered in late summer and fall. Ohio will continue to monitor sturgeon sightings during 2002.

U.S. Fish and Wildlife Service
Lower Great Lakes Fishery Resources Office

Contact: Emily Zollweg
E-mail: emily_zollweg@ fws.gov

Western Lake Erie Juvenile Lake Sturgeon Assessment

In 1995, an Ontario commercial fisher reported significant catches of small juvenile lake sturgeon as by-catch in his nets in northwestern Lake Erie. Simultaneously, sport anglers in Ohio waters of Lake Erie began reporting substantial numbers of juvenile sturgeon as by-catch in the yellow perch, *Perca flavescens,* fishery. In an effort to collect biological and genetic information on these small fish, the Alpena Fishery Resources Office (ALPFRO), Alpena, MI, and the Lower Great Lakes Fishery Resources Office (LGLFRO), Amherst, NY established a program with the Ontario commercial fisher (Mr. Gerry Penner), whereby he collected lengths and weights from all by-caught lake sturgeon, as well as fin rays for age and fin tissue for genetic analysis, and tagged with Monel cattle ear tags. In 2001, as a result of funds received from the National Fish and Wildlife Foundation, the U. S. Fish and Wildlife Service (Alpena and Lower Great Lakes offices), were able to work with Mr. Penner to once again collect information on lake sturgeon in the western basin of Lake Erie.

When a lake sturgeon was captured, it was measured for length, girth, and weight and tagged. Sturgeon data collection occurred from 16 April to 8 June 2001.

Monofilament gill nets in 6.3 cm to 11.4 cm mesh sizes were set on the bottom or suspended 10 feet below the surface. Nets were pulled within three days of set. In 2001, water depths varied from 7.0 to 11.3 meters.

All captured lake sturgeon were tagged with both Floy T and PIT Tags. The FLOY tags were placed in the anterior musculature under the last dorsal scute directly in-front of the dorsal fin. PIT tags were placed directly underneath the 4th dorsal scute. All fish captured alive were released alive. Three lake sturgeon were found dead in the nets, but were determined to have died before entering the nets.

Results

Approximately 165 lake sturgeon have been captured during the course of this study. Twenty-five were caught in 2001. In 2001, total length ranged from 320 to 970 mm

(Table 1). Length frequency of fish caught in 2001 was similar to length frequency of fish caught in 1996-1998 (Figure 1).

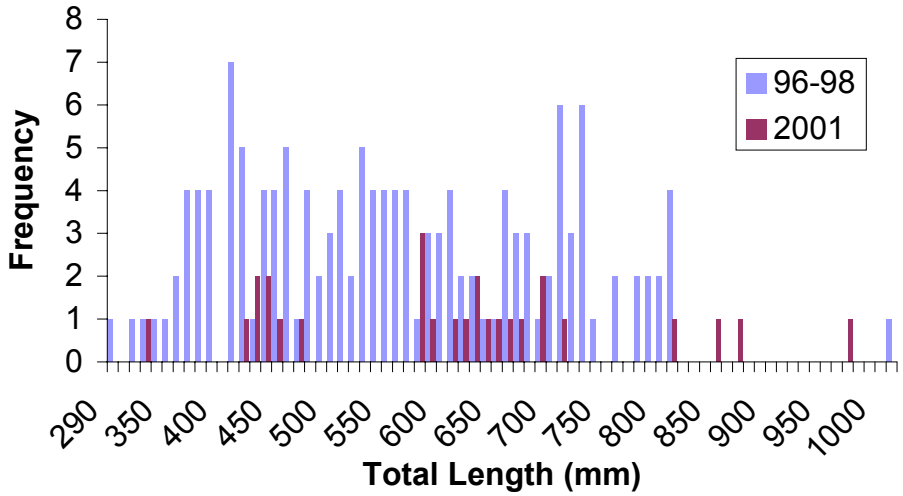

Figure 1. Length frequency of western Lake Erie lake sturgeon 1996 to 1998 compared to 2001.

Table 1. Biostatistics on lake sturgeon caught and tagged in 2001.

	Girth (mm)	Total Length (mm)	Weight (kg)
Mean	237	611	1.53
Minimum	115	320	0.06
Maximum	390	970	5.00

Length and other biostatistics indicate that this is a population of juvenile and sub-adult fish. In 1996-1998, 26 lake sturgeon less than 420 mm were captured, in the spring of 2001 only one lake sturgeon less than 420 mm was captured. The smallest juvenile fish are no longer represented in our sampling efforts. These lake sturgeon would have been spawned in the last 1-5 years. We need to determine spawning periodicity and factors affecting survival of the smallest juvenile lake sturgeon including climatic and other environmental events. The adults in this stock may reside elsewhere or may be too large for the gear.

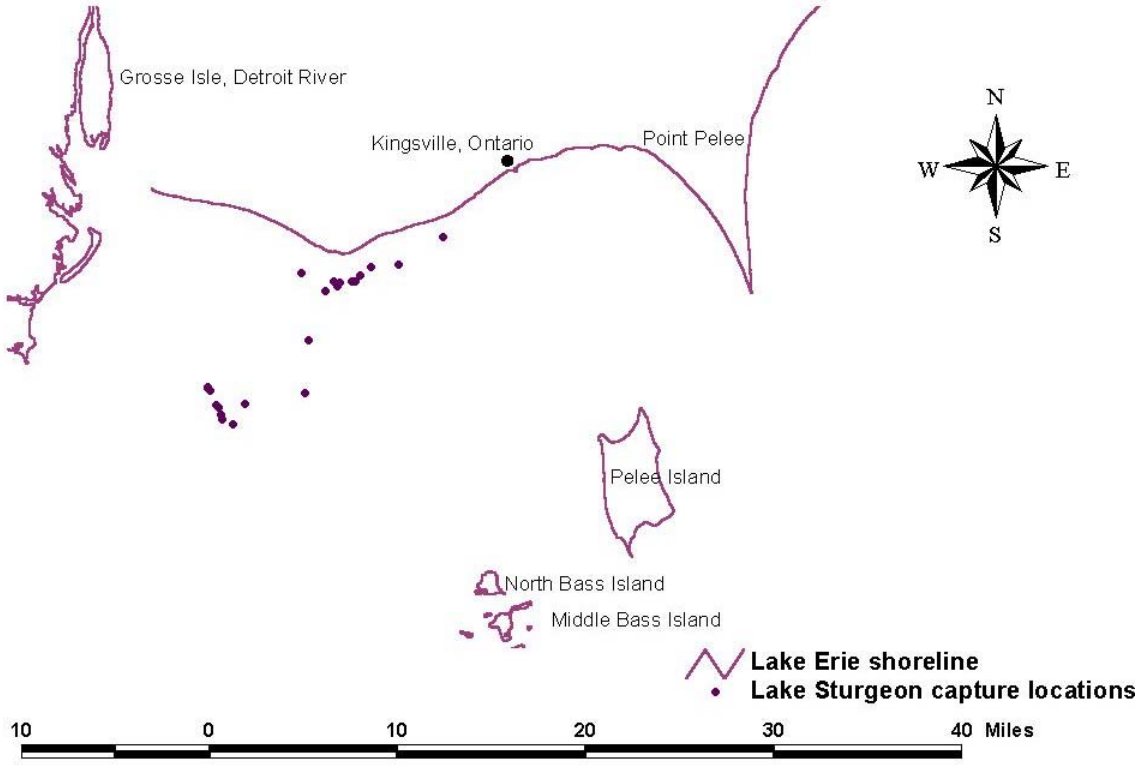

Figure 2. Locations of lake sturgeon caught and tagged in spring 2001.

As more fish are tagged and as these fish are recaptured in future years, we will be able to determine where the western Lake Erie lake sturgeon are spawning and whether or not they migrate out of the area (Figure 2). This information will be invaluable in protecting this stock and others throughout the Great Lakes.

NIAGARA RIVER

U.S. Fish and Wildlife Service
Lower Great Lakes Fishery Resources Office

Contact: Emily Zollweg
E-mail: emily_zollweg@ fws.gov

In 2001, the LGLFRO continued the lake sturgeon sampling in the lower Niagara River and ultrasonic telemetry initiated in 1998. This lake sturgeon project was in cooperation with the State University of New York - College at Brockport for 1998-2000. Complete analysis of this study is available in a thesis publication (Hughes 2002). The overall goal of our study is to identify key spawning and feeding habitats in the river in order to better manage, protect, and enhance the lake sturgeon population in the lower Niagara River. The research objectives of our study are to: (1) assess the population of lake sturgeon in the lower Niagara River by collecting and analyzing age, growth, and abundance data, (2) compare the movements of adult and juvenile lake sturgeon in the lower Niagara River, and (3) identify potential spawning, feeding, and nursery habitats in the lower Niagara River and compare utilization of these habitats between adult and juvenile lake sturgeon.

During 2001, we collected a total of 26 lake sturgeon (1 recaptured fish) using baited setlines. Setlines were constructed according to the methods of Thomas and Haas (1999) and fished periodically from May through September.

In 2000, overall CPUE was 0.28 fish per night, with gill nets (0.36 fish/night) performing slightly better than setlines (0.22 fish/night). Total CPUE for 2000 was remarkably similar to that of 1999 (0.27 fish/night). In 2001, gill nets were discontinued. CPUE for setlines was 0.29 fish/night overall (Table 1). Overall data includes highly productive setline sets near the mouth of the lower Niagara River in Lake Ontario (CPUE 0.57 fish/night for Lake Ontario sets vs. 0.21 fish/night for lower Niagara River).

Fork length, total length, weight, and girth were recorded for all lake sturgeon. Pectoral fin ray and tissue samples were collected for age estimation and genetic analysis. Measurements are summarized in Table 2. Age of lake sturgeon captured in 2001 ranged from 5 to 15 years old, with most fish (n = 21) less than 10 years old (Figure 1, Table 2). Consistent with 1998-2000, our setlines targeted lake sturgeon over 700 mm with an average total length of 1013 mm (Figure 2, Table 2).

In 2002, the lower Niagara River was sampled for lake sturgeon from April 29-July 25. Forty lake sturgeon were captured in the lower river and in Lake Ontario near the mouth. No recaptures were recorded in 2002. Size and age composition of the catch were similar to previous years. Year class analysis indicates that 1993-1996 were relatively good recruitment years (Figure 3). It will be important to notice whether these fish remain in the area and return to attempt to spawn in the next few years.

Table 1. Summary of CPUE of lake sturgeon caught on setlines in the lower Niagara River and Lake Ontario 2001.

Month	Location	Total nights	Total hours	Number caught	CPUE (fish/night)	CPUE (fish/hr)
May	Niagara River	40	930	9	0.23	0.010
	Lake Ontario	3	66	0	0	0
June	Niagara River	16	373	1	0.06	0.003
	Lake Ontario	0	0	0	0	0
July	Niagara River	6	142	2	0.33	0.014
	Lake Ontario	3	73	1	0.33	0.014
August	Niagara River	4	88	2	0.50	0.023
	Lake Ontario	9	216	10	1.11	0.046
September	Niagara River	2	47	0	0	0
	Lake Ontario	6	144	1	0.17	0.007
2001 Total	Niagara River	68	1580	14	0.21	0.009
	Lake Ontario	21	499	12	0.57	0.024
	Total	89	2079	26	0.29	0.013

The growth of these fish appear to be higher than populations from the Lake Huron Basin (Hill and McClain 1999). Specifically, lake sturgeon from the Niagara River tend to be longer and heavier than lake sturgeon of the same age from Lake Huron waters (Hill and McClain 1999). However, subadult and adult fish are rare in the Niagara River catch overall, and were absent in the 2002 catch.

Table 2. Summary of biological data collected from lake sturgeon, for which all measurements were taken, captured on setlines in the lower Niagara River and Lake Ontario during 2001.

	Mean	Range	N
Total Length (mm)	1013	695-1369	26
Fork Length (mm)	907	630-1220	26
Girth (mm)	389	110-605	26
Weight (kg)	6.6	1.2-18.6	26
Age (years)	9	5-15	22

During 2001, we continued to monitor movements of ultrasonic tagged fish from 1999 and 2000. Ultrasonic tags were applied to fish externally through the base of the dorsal fin. Plastic coded wire harnesses and fitted PVC plates were used to attach the ultrasonic tags according to the methods used by researchers on the St. Lawrence River, New York (J. Hayes personal comm.). Several fish were located in the lower Niagara River in February, April, and May 2001. In May, the fish dispersed as in previous years.

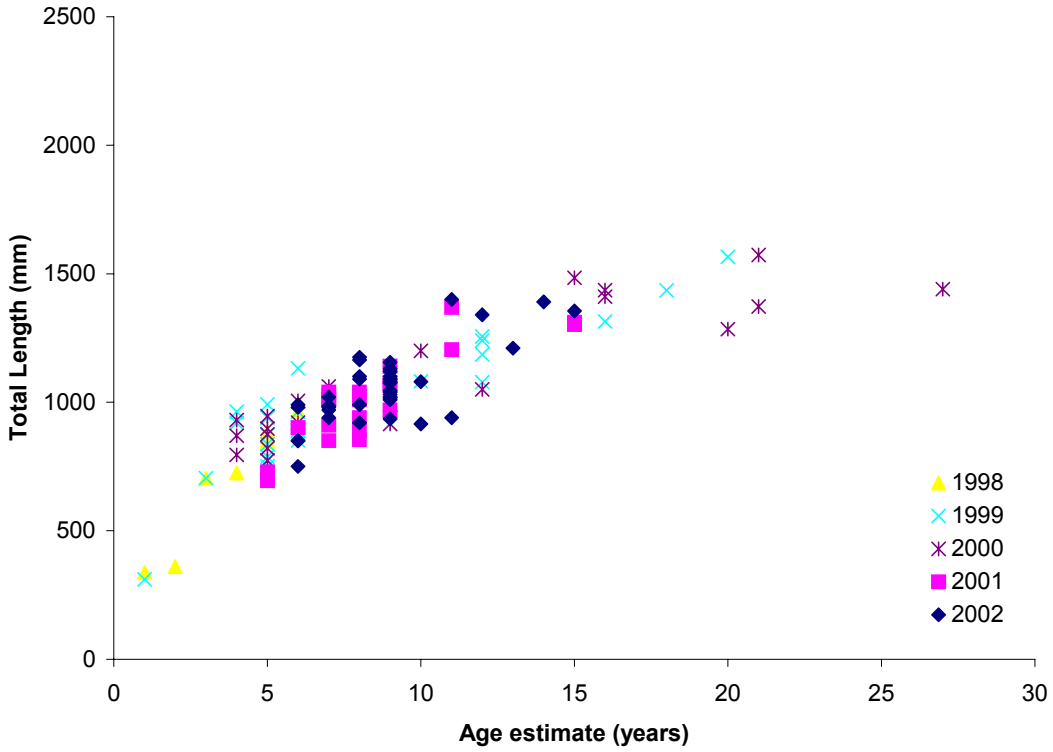

Figure 1. Age vs. total length comparison for lake sturgeon caught in the lower Niagara River, 1998-2002.

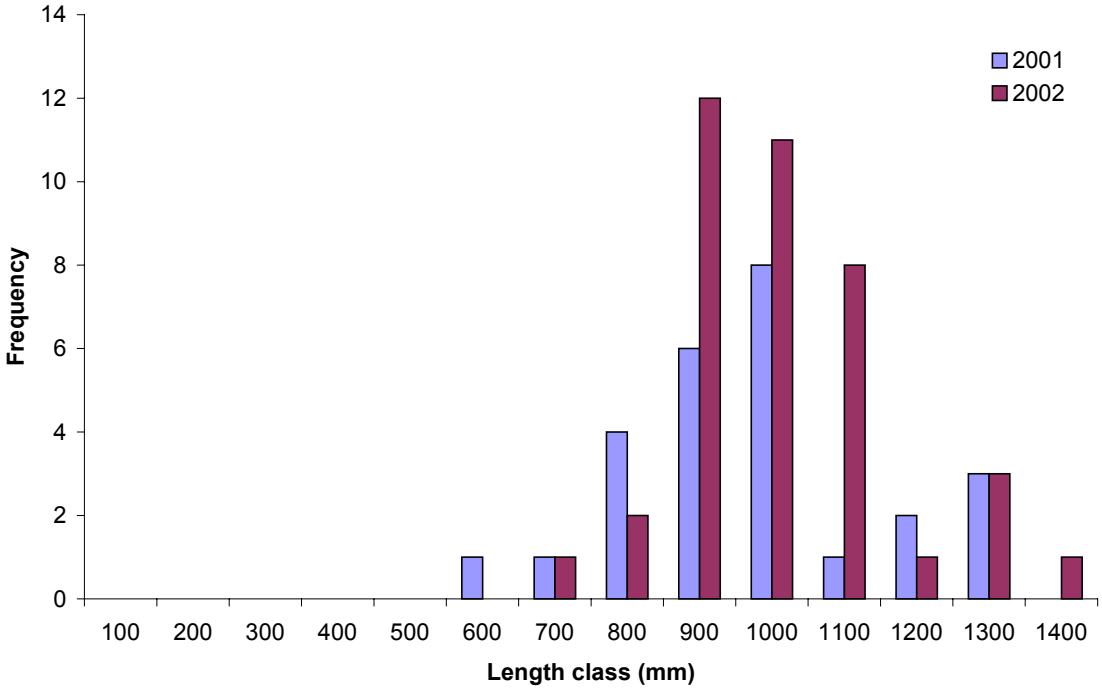

Figure 2. Length distribution of lake sturgeon caught in the lower Niagara River, 2001-2002.

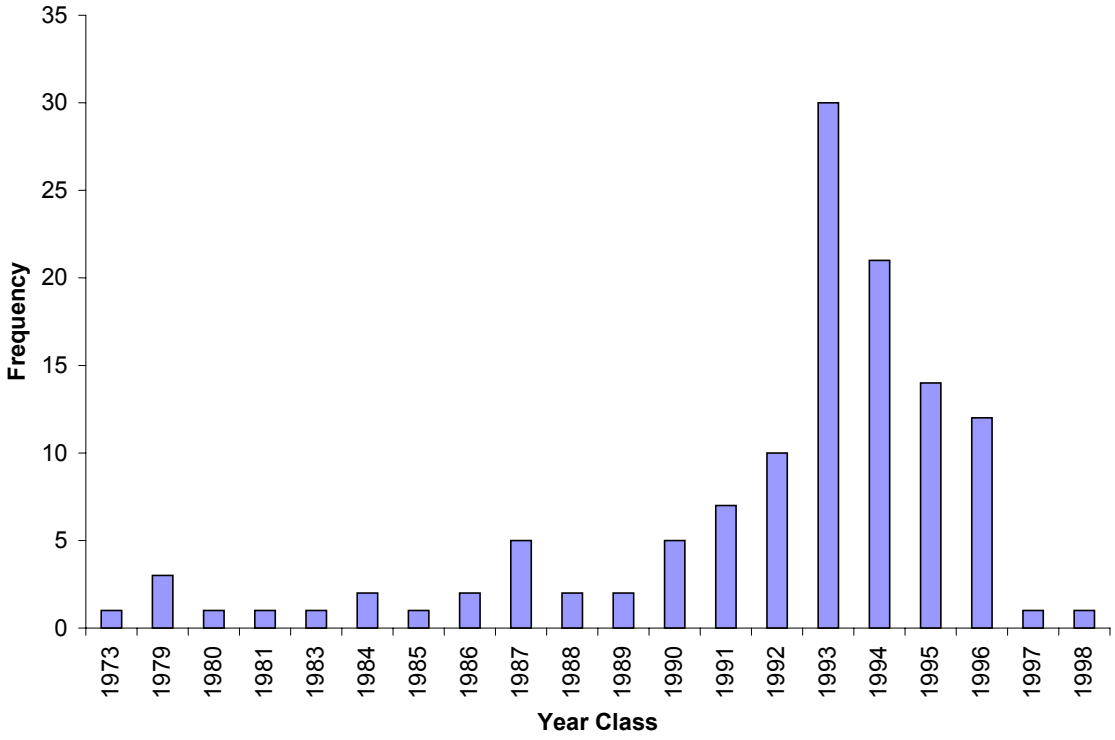

Figure 3. Year class frequency of lake sturgeon caught in the Niagara River 1998-2002.

Genesee River

In a cooperative effort with New York State Department of Environmental Conservation (NYSDEC) Region 8, Avon and Endangered Species, and U.S. Geological Survey, Tunison Laboratory of Aquatic Science, we are determining the habitat suitability for, and the present utilization of lake sturgeon in the Genesee River below Rochester. Our office deployed 10-inch stretch gillnets in the river to catch adult lake sturgeon potentially migrating during the suspected spawning period. In addition, during the summer months (July and August), experimental gillnets were fished to capture young lake sturgeon in 1999-2000. No lake sturgeon were caught after 30 gillnet nights of effort in 1999-2001. According to the HSI for lake sturgeon (Threader et. al. 1998), suitable spawning habitat (0.5-2.5 m depth, 50-240 cm/s velocity, 10-18^{o} C, and boulder/cobble substrate) was found below the lower falls. Sub-optimum juvenile habitat was found in the downstream areas of the river. The Rochester Embayment is listed as an Area of Concern, therefore the effects of chemical contamination on the suitability for lake sturgeon cannot be ignored. However, no water chemical analysis was done in 1999.

We originally identified that lake sturgeon would be stocked in the Genesee River in Fall 2001 and 2002. Due to 100% mortality of the available lake sturgeon fry, we were not able to stock in 2001. Eggs were successfully collected and fertilized, by the New York State Department of Environmental Conservation (NYSDEC), from one female from the St. Lawrence River. Eggs were transported to NYSDEC's Oneida Lake hatchery (approx. 60,000), USFWS' Pittsford National Fish Hatchery (approx. 10,000), USGS Great Lakes Science Center (unknown amount), and Kentucky State University (approx. 10,000). All eggs hatched, but after one day post-hatch, all fry had died at all facilities. The cause of the mortality has not been determined; however, it is expected the female did not have viable eggs; possibly due to contaminant loads.

We will continue attempting to acquire eggs from both the Niagara and St. Lawrence Rivers and obtain more than one individual female, and rear the fry at multiple hatcheries. Even if these precautions are taken in the future, there still is no guarantee of successfully producing juveniles. The only contingency plan we have for the unlikely event of total failure again is to annually delay the project until juveniles are successfully reared.

LAKE STURGEON SIGHTING PROGRAM and PUBLIC EDUCATION

Anecdotal information of lake sturgeon sightings has been reported by recreationalists and commercial fishermen since 1994. In 1998, we significantly increased our public outreach efforts. Lake sturgeon 'Sighting Alert' cards were distributed to marinas, bait shops and boat launches; posters were displayed in dive shops; LGLFRO web pages were created; and a 'Sighting Alert' notice was posted in the NY State Fishing Regulations Guide. In each sighting report, participants recorded general information regarding the sturgeon sighting (date, time, location, number and size of fish) as well as habitat variables (depth, water temperature, substrate composition, and vegetative abundance). As a result of our increased

educational effort, 86 reports of 120 lake sturgeon (in 7 waterbodies) were filed by our office in 1998. In 1999, 77 reports of 119 lake sturgeon (in 16 waterbodies) were recorded. The increase in the number of waterbodies where lake sturgeon were sighted in 1999 is likely due to NYSDEC stocking efforts and increased public awareness. All new waterbodies reported in 1999 have received stocked lake sturgeon either directly into or in adjacent waters over the past three years. In 2001, sighting reports declined to 30 reports, the majority of which were Lake Erie shoreline mortalities. In 2002, sighting reports declined further to 6 reports. Two reports were from Lake Erie, one each from the upper and lower Niagara River, and two from the Oswegatchie River.