

# 2015 Lake Erie Lake Sturgeon Working Group Report



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**Project Title:** Life history of Lake Sturgeon in eastern Lake Erie

**Location:** Buffalo Harbor and upper Niagara River

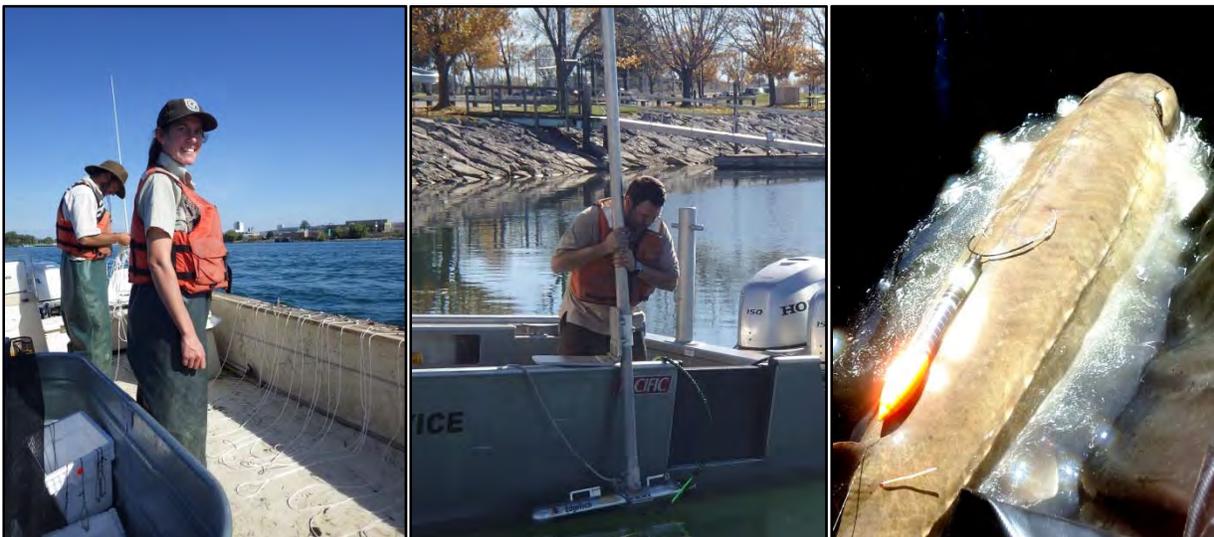
**Project Description:** The U.S. Fish and Wildlife Service Northeast Fishery Center and Lower Great Lakes Fish and Wildlife Conservation Office, in partnership with the U.S. Army Corp of Engineers, the Great Lakes Center at SUNY Buffalo State and the New York Department of Environmental Conservation are collecting life history and population demographics for the lake sturgeon population in and about Buffalo Harbor. Researchers equipped 9 fish with archival satellite transmitters and surgically implanted acoustic transmitters into 19 fish to analyze coarse- and fine-scale temporo-spatial movement, behavior and habitat use within Buffalo Harbor. To connect sturgeon space-use choices with available substrate, a categorical habitat map is being constructed from sidescan and multibeam sonar imagery. Raw imagery was collected in 2015 and the categorical map will be completed in 2016. Additionally, biometric, age, blood and genetic data for each individual will be used to describe population demographics and health. Setline catch efforts will begin in the spring of 2016 using a random stratified sampling design to determine presence/absence of adult and sub-adult lake sturgeon in various habitat types throughout the river during the spawning season. These results will guide future work to determine appropriate survey sampling design and inform demographic parameter estimation in future stock assessments for eastern Lake Erie lake sturgeon.



**Project Duration:** Annually

**Contact Information:**

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**Project Title:** Demographics of Lake Sturgeon in Buffalo Harbor and the upper Niagara River

**Location:** Buffalo Harbor and upper Niagara River

**Project Description:** Informed population assessment for lake sturgeon in and about the Buffalo Harbor and upper Niagara River is data deficient. The U.S. Fish and Wildlife Service Northeast Fishery Center in partnership with the New York Department of Environmental Conservation are collecting information on age, growth, sex, health and spawning contribution of adult and sub-adult lake sturgeon caught in annual surveys conducted in the harbor and upper river. Researchers will use a number of methods to collect and analyze morphometric data. First, fish will be equipped with a PIT and anchor floy tag. A section of the leading spine will be removed from the left pectoral fin upon capture, and individual age will be estimated by assessing the number of discrete annuli observed in cross-section. An endoscope is inserted intraperitoneally upon capture to assess the sex and stage of the gonads. Observations of fish at capture/recapture relative to spawning activity and sex and stage of gonad maturity will be used to determine spawning contribution, periodicity and a population maturity schedule. Centrifuged blood draws taken for descriptions of pathogenicity in eastern Lake Erie lake sturgeon. These analytical products will provide baseline information for: 1) future age-structured and/or age-aggregate population dynamics models that require substantive time series of catch numbers, age, growth, maturity and reproductive contribution, 2) assessments of population productivity and 3) information about potential pathogens that could limit long-term population recovery. This study contributes to an understanding of basic stock status parameters and health of a depleted population whose individuals demonstrate a suite of life history traits that make them particularly vulnerable to environmental stressors (e.g., slow-growth, late maturity, long-lived).



**Project Duration:** Annually

**Contact Information:** John Sweka, USFWS, Northeast Fishery Center

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**Project Title:** Genetic analysis of Lake Sturgeon in eastern Lake Erie and Niagara River

**Location:** Eastern Lake Erie and upper Niagara River

**Project Description:** Defining genetic population structure and genetic relationships to other populations is critical to manage lake sturgeon. The upper Niagara River lake sturgeon population has not previously been analyzed, and its relationship to the downriver population, which is separated by Niagara Falls, is unknown. Previous genetic analysis of lake sturgeon from the Great Lakes included a limited number of samples from the lower Niagara River to characterize that population and to understand its relationship to other lake sturgeon populations throughout the region (Welsh et al. 2008). Inclusion of the additional lower river samples would improve upon the previous analysis, and provide additional information as other biological information is available to link individual samples to year class. For example, with the inclusion of age data, estimates such as of the number of breeders per cohort, estimates of genetic relationships within cohorts, as well as overall estimates of genetic diversity of lake sturgeon from both locations will provide insight into the genetic status of the populations.



Genetic analysis of the lake sturgeon sampled in the Niagara River and eastern Lake Erie will improve the understanding of the genetic relationship between lake sturgeon from both the upper and lower Niagara River, as well as in comparison to other populations throughout the Great Lakes.

**Project Duration:** Annual

**Contact Information:** Meredith Bartron – USFWS, Northeast Fishery Center

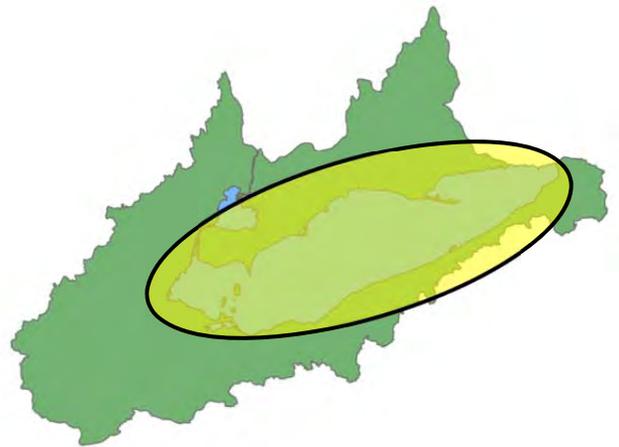
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Welsh, A. T. Hill, H. Quinlan, C. Robinson, and B. May. 2008. Genetic assessment of Lake Sturgeon population structure in the Laurentian Great Lakes. North American Journal of Fisheries Management 28:2, 572-591, DOI: [10.1577/M06-184.1](https://doi.org/10.1577/M06-184.1)

**Project Title:** Historic presence and absence of Lake Sturgeon throughout Lake Erie

**Location:** Lake Erie

**Project Description:** Lake Erie historically supported the largest commercial fishery of lake sturgeon in the Great Lakes. However, since their precipitous lake-wide decline, few sources have examined the spatial-temporal distribution of lake sturgeon. At present, two remnant groups of sturgeon are being studied: one in the Detroit River and the other in the upper Niagara River. In order to gain a better understanding of these existing groups of sturgeon as they relate to historical populations and identify other historically important areas that supported lake sturgeon, the U.S. Fish and Wildlife Service Northeast Fishery Center has begun synthesizing historic fisheries-dependent and -independent data pertaining to lake sturgeon throughout Lake Erie. The resulting chronology of presence and absence data will be analyzed to: 1) determine the probability of extirpation throughout various tributaries and areas of the lake and 2) identify areas where additional research and recovery efforts may be needed. An interactive map that can be utilized by researchers and the public will be produced as a result of this chronology and will be made available on the Great Lakes lake sturgeon website. This chronology will contribute to an understanding of historic densities and distribution of lake sturgeon stocks and inform future stock assessments.



**Project Duration:** Annually

**Contact Information:** John Sweka, USFWS, Northeast Fishery Center

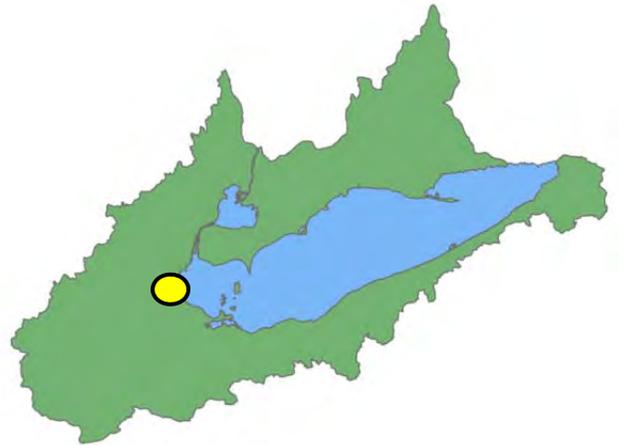
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**Project Title:** Supporting Lake Sturgeon (*Acipenser fulvescens*) Restoration in the Maumee River with Habitat Suitability Modeling

**Location:** Maumee River

**Project Description:** Lake sturgeon are a candidate for reintroduction in the Maumee River where they were historically abundant but are presently absent from the system. In order to determine if current habitat quantity and quality are sufficient to support reintroduction, we are constructing a spatially explicit habitat suitability index model for spawning adult and age-0 lake sturgeon for the lower Maumee River. Habitat variables including substrate composition, water depth, water quality characteristics, velocity, habitat size, and connectivity are used to inform the model. A combination of survey methods including side-scan sonar, visual observation, and benthic grabs are used to assess substrate composition while water depth is measured simultaneously with side-scan data. Data loggers and a multi-parameter sonde measure a suite of water quality characteristics and water velocity is calculated for points throughout the system using discharge, water depth, and bankfull width.

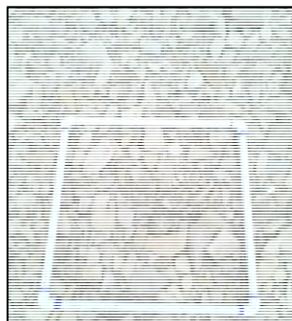


Each habitat variable is assigned a suitability index number ranging from 0 – 1 and interpolated as a spatially explicit layer in ArcGIS. The habitat layers are combined using geometric mean calculations to provide an overall assessment of habitat suitability and connectivity delineated as good (0.8 – 1), moderate (0.3 – 0.8), or poor (0 – 0.3). Preliminary analysis using substrate validation data and water depth suggests 27% and 58% of the Maumee River is classified as good for spawning adults and age-0 lake sturgeon, respectively. The model is currently being processed with the remaining habitat variables and with substrate classification delineated from side-scan sonar in place of the validation data. The model will be completed and a Restoration Plan for lake sturgeon reintroduction in the Maumee River developed by summer 2016.

**Project Duration:** August 2014 – August 2016

**Contact Information:** Jessica Sherman, University of Toledo, Department of Environmental Sciences PhD Candidate

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**Project Title:** Population Demographics of Lake Sturgeon in the St. Clair River and Lake St. Clair

**Location:** St. Clair River and Lake St. Clair

**Project Description:** The Michigan Department of Natural Resources' Lake St. Clair Fisheries Research Station (LSCFRS) has been conducting lake sturgeon assessment surveys since 1996. Setlines with large and small hooks baited with round gobies are used in the St. Clair River to catch juvenile, subadult, and adult lake sturgeon. A custom trawl, designed to ride over vegetation, is used to capture lake sturgeon in the open waters of Lake St. Clair during the summer. Most lake sturgeon captured in Lake St. Clair are sub-adult or adult size fish. All sturgeon captured are scanned for PIT tags and untagged fish are PIT tagged prior to release. The data obtained during these assessments have been used to obtain growth, genetics, distribution, spawning site, and population demographic information. Thru 2015, LSCFRS crews have tagged 2,955 lake sturgeon in Lake St. Clair and the lower St. Clair River. Using mark-recapture data, the estimated population size of adult and subadult lake sturgeon in the lower St. Clair River and Lake St. Clair is near 16,000 individuals. Minnow traps attached to the survey setlines provide value-added data on endangered northern madtom presence and distribution in the lower St. Clair River. Since 2011, 86 lake sturgeon captured in the lower St. Clair River have received transmitters as part of a project funded by the Great Lakes Fishery Trust to monitor movement throughout the St. Clair-Detroit River System (see *Geographic organization and population structure of lake sturgeon in the Lake Huron-to-Lake Erie corridor as inferred from long-term, population-scale movement patterns* study in this report).



**Project Duration:** Annually

**Contact Information:** Michael Thomas, Michigan DNR, Lake St. Clair Fisheries Research Station

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**Project Title:** Investigating the Lake Sturgeon Recreational Fishery of the lower St. Clair River

**Location:** St. Clair River

**Project Description:** The North Channel of the St. Clair River supports a unique recreational fishery for lake sturgeon. In 2014 and 2015, staff from the Michigan Department of Natural Resources' Lake St. Clair Fisheries Research Station (LSCFRS) personally participated in this fishery, while off the clock, using all private equipment. The objectives of this project are: 1. To have fun, 2. To better understand the human dimensions of



sturgeon fishing, and 3. To gather firsthand observations of the effect of recreational angling on lake sturgeon caught with conventional fishing equipment. This project grew into a collaborative effort with voluntary participation by staff from the U.S. Fish and Wildlife Service Alpena Fish and Wildlife Conservation Office – Waterford Substation and Michigan State University students. The project has also included on-water interactions with the United States Coast Guard. Tackle used includes 10 foot mooching rods with level wind trolling reels spooled with 60 or 80 pound braided line. The technique is still-fishing with a slip-sinker rig that includes weights from 3 to 8 oz. depending on location. Perhaps the most important gear item is a double jingle-bell strike indicator attached to each rod. To date, 16 trips have resulted in the boating of 16 lake sturgeon. Fish have ranged in size from 25 inches to 66.5 inches. Earthworms have been reliable bait, but dead round gobies have also been productive. By-catch has included channel catfish, freshwater drum, silver redhorse, shorthead redhorse, rock bass, smallmouth bass, white perch, walleye, stonecat, northern madtom, and a mudpuppy. During the late portion of the 2015 catch-and-release season, a new protocol of moving to a different location every 30 minutes, unless a sturgeon is caught, seemed to improve the catch rate. Further work to evaluate this protocol is planned for summer and fall of 2016.

**Project Duration:** Undetermined

**Contact Information:** Michael Thomas, Michigan DNR, Lake St. Clair Fisheries Research Station

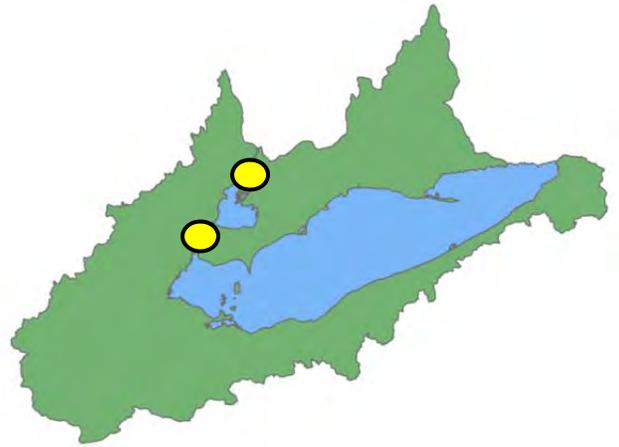
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**Project Title:** Monitoring Lake Sturgeon Spawning and Egg Deposition in the St. Clair and Detroit Rivers

**Location:** St. Clair River, Detroit River

**Project Description:** The USGS Great Lakes Science Center has monitored lake sturgeon spawning in the Detroit and St. Clair rivers since 2003 and 2010, respectively. Multiple habitat types were sampled in each river including main channels, channel fringes, shallow island margins, rivermouths, and open lake areas using egg mats. In addition, spawning reefs were constructed in the Detroit River at Belle Isle (2004), Fighting Island (2008 and expanded in 2013), Fort Wayne (test reef, 2015), and Grassy Island (2015); and in the St. Clair River at Middle Channel (2012), Harts Light (2014), and Pointe aux Chenes (2014). Assessment of lake sturgeon egg deposition occurred at the reefs sites, and at control sites upstream and downstream, during both pre- and post-construction years. Over the years, lake sturgeon eggs have been collected in the St. Clair River near or on Harts Light Reef, Pointe aux Chenes Reef, Middle Channel Reef, and Maslinka's Reef, and at the Fighting Island Reef in the Detroit River. Egg deposition monitoring throughout the system will continue in 2016.



**Project Duration:** 2003-present

**Contact Information:** Greg Kennedy and Ed Roseman, USGS, Great Lakes Science Center

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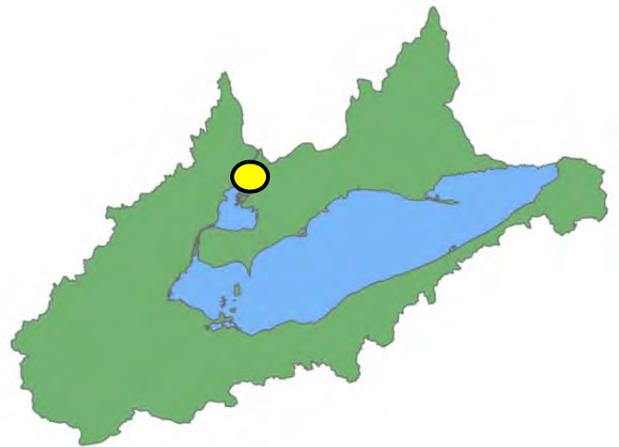
Left: Lake sturgeon eggs deposited on Middle Channel Reef (2012).

Right: Lake sturgeon eggs collected on egg mats on Fighting Island Reef (2012).

**Project Title:** Lake Sturgeon Use of Newly Constructed Artificial Reefs in the St. Clair River

**Location:** St. Clair River

**Project Description:** The USGS Great Lakes Science Center monitored lake sturgeon use of two newly-constructed artificial spawning reefs in the St. Clair River at Harts Light and Point aux Chenes in 2015. Egg deposition upstream, downstream, and on the reefs was assessed using egg mats, while larval drift was sampled using benthic D-frame and depth-stratified conical nets upstream and downstream of the reefs. Lake sturgeon eggs were not detected at either reef during pre-construction monitoring, but were detected on both reefs post-construction. Larvae were collected from early-June to mid-July upstream and downstream of both reefs in the D-frame nets and at all depths with the depth-stratified conical nets. Yolk-sac and post-yolk sac larvae were collected but collection of larvae >22 mm was rare. Significantly more lake sturgeon larvae were collected downstream of Harts Light reef than upstream; no significant difference was found at the Pointe aux Chenes reef. Egg and larval drift monitoring at these two newly constructed reef sites will continue in 2016.



**Project Duration:** 2015-2016

**Contact Information:** Ed Roseman, USGS, Great Lakes Science Center

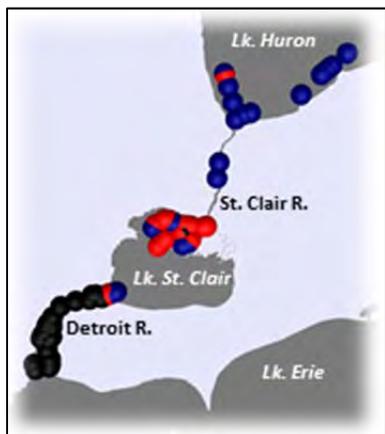
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**Location(s):** Detroit-St. Clair River System; Lake Huron; Lake Erie

**Project Title:** Geographic organization and population structure of lake sturgeon in the Lake Huron-to-Lake Erie corridor as inferred from long-term, population-scale movement patterns.

**Project Description:** This study uses acoustic telemetry to describe the spatial structure of lake sturgeon populations that spawn in the St. Clair and Detroit rivers in order to provide managers with information on habitat use by different sturgeon populations as well as on population-scale movements and dispersal patterns at ecologically-relevant temporal scales. Since 2011, a total of 268 adult lake sturgeon have been captured in the Detroit and St. Clair rivers, implanted with high-power acoustic tags with a battery life of 10 years, and then released near the capture site. Strategically-located acoustic receivers in the Detroit-St. Clair river system, Lake Huron, and Lake Erie (map to the right), are allowing scientists to track sturgeon movements between feeding, overwintering, and spawning grounds over thousands of square miles. Study results will be used to test the hypothesis that a number of separate sturgeon populations occur in the Lake Huron-to-Lake Erie corridor rather than one large population.



Results to date have shown that lake sturgeon habitat use varies by release location. Lake sturgeon released into the Detroit River (black circles, left) tended to remain in the Detroit River or move up into Lake St. Clair, whereas lake sturgeon released into the lower St. Clair River (red circles) either remained in the St. Clair River or moved down into Lake St. Clair. Lake sturgeon released into the upper St. Clair river (blue circles) spread out to occupy Lake Huron, the St. Clair River, and Lake St. Clair. Significant mixing of release groups occurs in Lake St. Clair, whereas Lake Erie is rarely used by lake sturgeon, even those released into the Detroit River. The extent and timing of movements by different release groups suggest the potential for complex metapopulation dynamics, which could impact conservation

strategies. Year-round tracking of lake sturgeon movements also has confirmed the existence of migratory and river-resident life histories. The high incidence of river residency in Detroit-St. Clair river lake sturgeon was a surprise.

**Project Duration:** 2012-2022

**Contact Information:** Darryl Hondorp, USGS, Great Lakes Science Center

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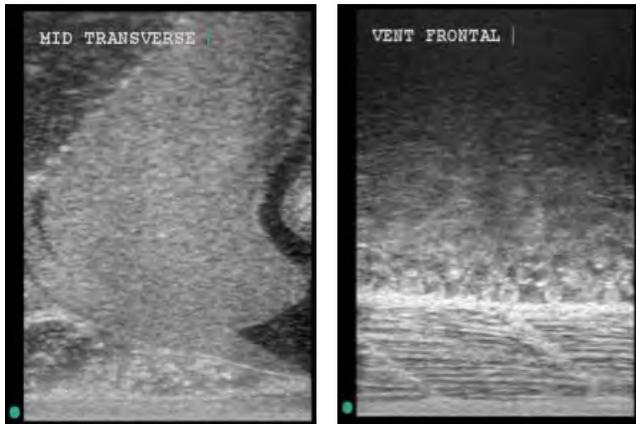
**Location:** St. Clair-Detroit River System

**Project Title:** Using Ultrasound to Determine the Sex and Maturity of Lake Sturgeon in the Field

**Project Description:** Sex determination of fish species in the field is difficult to assess when sexual dimorphism and gametes are not apparent. For threatened and endangered fish species, unobtrusive techniques are needed when determining sex to minimize stress and the potential for mortality. The current study evaluated the use of a portable ultrasound unit to determine sex of lake sturgeon in the field. The sex and maturity of 41 female and 107 male lake sturgeon was determined by visually inspecting gametes through a small incision. Six images (ventral transverse, middle transverse, anterior transverse, ventral frontal, middle frontal, and anterior frontal) were collected from each fish using a SonoSite MicroMaxx ultrasound unit. The average time spent collecting images was 3 minutes, and ranged between 2-5 minutes once comfortable with operating procedures. Images were analyzed and sex and maturity was assigned and compared with the 148 sturgeon of known sex and maturity. Analysis indicates F4 (black egg), F5 (black egg-spawning) female, and M2 (fully developed) male gametes can be accurately identified during the spring spawning season. This work shows the utility of using an ultrasound unit in the field to determine sex of female and male lake sturgeon in later reproductive stages around the spawning season.



*Chiotti, J.A., J. Boase, D. Hondorp, and A. Briggs. 2016. Assigning Sex and Maturity to Adult Lake Sturgeon using Ultrasonography and Common Morphological Measurements. NAJM 36:21-29.*



Sex & Maturity	Number Field Verified	Number Correctly Assigned	
		Reader 1	Reader 2
Male - Fully Developed	107	95 (89%)	103 (96%)
Female - Yellow Egg	9	6 (67%)	3 (33%)
Female - Black Egg	32	32 (100%)	32 (100%)
<b>OVERALL</b>	<b>148</b>	<b>133 (90%)</b>	<b>138 (93%)</b>
<b>MALES</b>	<b>75 (70%)</b>	<b>95 (89%)</b>	<b>103 (96%)</b>
<b>FEMALES</b>	<b>2 (5%)</b>	<b>39 (95%)</b>	<b>36 (88%)</b>

**Project Duration:** 2012 – Spring 2015

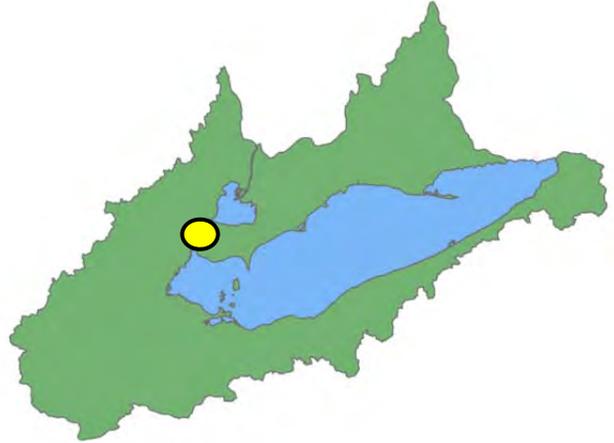
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**Location:** Detroit River

**Project Title:** Lake Sturgeon Population Demographics in the Detroit River

**Project Description:** The U.S. Fish and Wildlife Service (Service) has been conducting setline assessments in the Detroit River annually since 2002 to obtain information on adult and subadult lake sturgeon. This data is used to obtain growth information, genetics, distribution, potential spawning sites, and population demographic information. To date, the Service has tagged 374 lake sturgeon in the Detroit River. Using mark-recapture data, the estimated population size of adult and subadult lake sturgeon in the Detroit River is near 4,000 individuals. In the spring of 2015, 72 lake sturgeon were captured during setline assessments. Since 2012, 76 lake sturgeon captured in the Detroit River have received transmitters as part of a larger project funded by the Great Lakes Fishery Trust to monitor movement throughout the St. Clair-Detroit River System (see “Geographic organization and population structure of lake sturgeon in the Lake Huron-to-Lake Erie corridor as inferred from long-term, population-scale movement patterns” brief in this report).



**Project Duration:** 2002 - Annually

**Contact Information:** James Boase, USFWS, Alpena FWCO (Waterford Substation)

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**Location:** St. Clair-Detroit River System

**Project Title:** Juvenile Lake Sturgeon Assessments in the St. Clair-Detroit River System

**Project Description:** The U.S. Fish and Wildlife Service (Service) has been conducting juvenile lake sturgeon assessments in the St. Clair-Detroit River System (SCDRS) since 2010 to evaluate habitat restoration efforts and gain better understanding of juvenile distribution and abundance in the system. Juvenile lake sturgeon have been targeted using otter trawls (4.9 and 6.1 m head rope; 3 mm and 32 mm cod end, respectively) and monofilament gill nets (small mesh nets - 25, 38 and 51 mm mesh, 91 m in length; basin wide nets - 114, 203, and 254 mm mesh, 305 m in length). Additionally in 2015, the Service set experimental multifilament gill nets (mesh ranging from 76 to 152 mm, 107 m in length) in western Lake Erie to target juvenile lake sturgeon and in the Detroit and St. Clair Rivers at locations where juvenile lake sturgeon have been captured historically.



In 2015, effort was focused in western Lake Erie near the Detroit River mouth. Small mesh nets (see description above) were set at 24 locations in western Lake Erie on three different occasions (72 total sets) to determine the factors influencing presence and detection (water quality, substrate, flow, water temperature). Nets were set biweekly between September 1<sup>st</sup> – October 22<sup>nd</sup>. Only one juvenile lake sturgeon was captured, 430 mm on September 8<sup>th</sup>. Multifilament experimental gill nets (see description above) were also set at these 24 locations to compare lake sturgeon catches between the two gears. Experimental nets were only set the week of October 5<sup>th</sup>. Five juvenile lake sturgeon (574 – 890 mm TL) were captured in these 24 sets. While the two gears are targeting different sizes of sturgeon, in the future, more effort will be allocated to the multifilament nets in order to monitor trends in juvenile lake sturgeon abundance over time near the Detroit River mouth.



**Project Duration:** 2010 - Annually

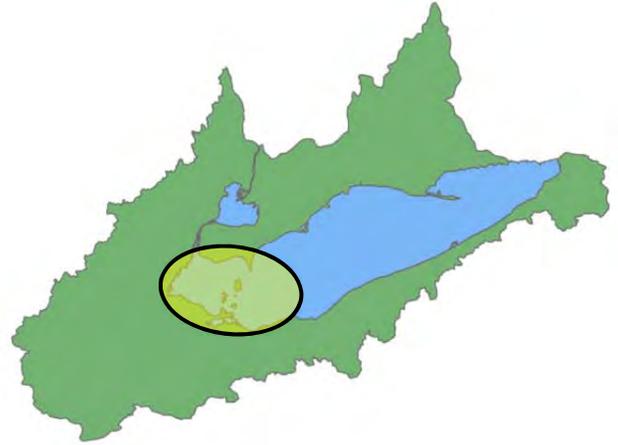
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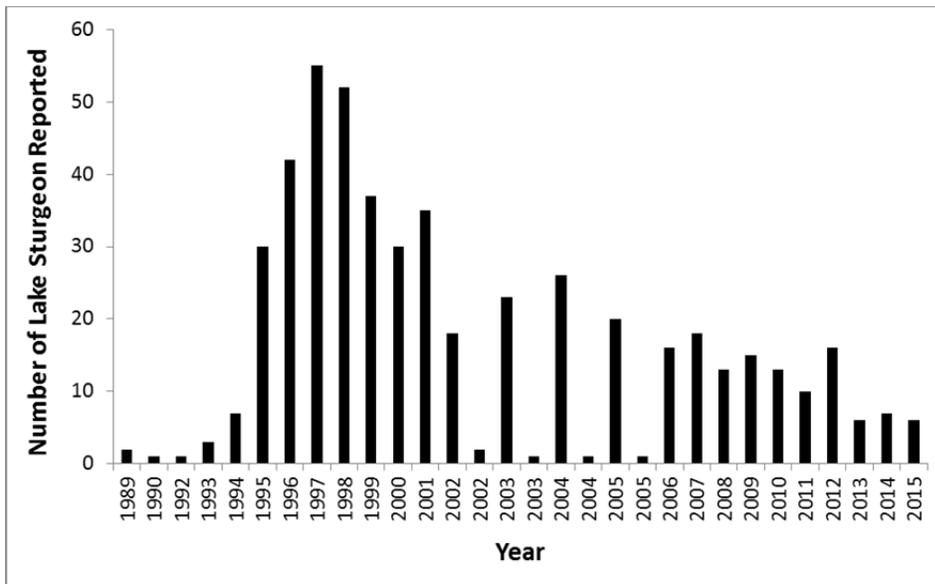
**Location:** Western basin Lake Erie

**Project Title:** Monitoring Lake Sturgeon in Ohio waters of Lake Erie

**Project Description:** In an effort to gain a better understanding of lake sturgeon presence and abundance in western Lake Erie, the Ohio DNR and USFWS Alpena FWCO are working with commercial fisherman in Ohio waters of Lake Erie to collect lake sturgeon information. A total of 507 lake sturgeon have been documented in the Lake Erie commercial catch since 1989. Using commercial catch



data, lake sturgeon presence and distribution will be identified. A group of fisherman have also received PIT tag readers to scan lake sturgeon for the presence of tags. This information will also be useful to determine the contribution of lake sturgeon resulting from restoration programs taking place in the future.



**Project Duration:** Annually

**Contact Information:**

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**Project Title:** Lake Sturgeon Monitoring in Buffalo Harbor

**Location:** Buffalo Harbor (Lake Erie)

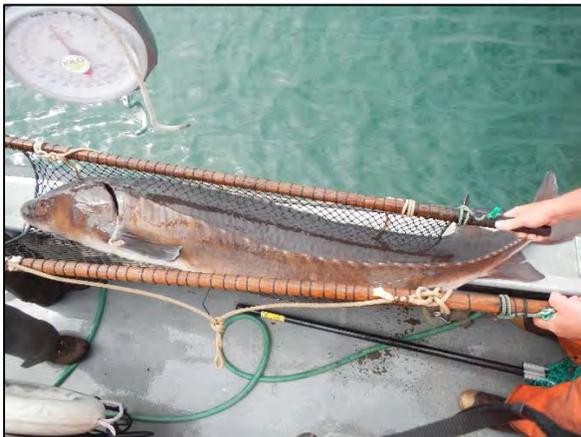
**Project Description:** The New York State Department of Environmental Conservation has been conducting lake sturgeon gill net and set line assessments in Buffalo Harbor since 2012. Buffalo Harbor is located at the head of the Niagara River and is a historic spawning location for lake sturgeon. In 2012, we received reports of anglers catching lake sturgeon in Buffalo Harbor and initiated a study to investigate the lake sturgeon population in the harbor. Set lines were fished in 2012 and 2013 but catches on this gear were limited. Two – hour daytime gill net sets proved to be the most effective method for collecting lake sturgeon in Buffalo Harbor. Since 2012 we have caught 131 lake sturgeon. All fish are were measured for total length, fork length, girth, weight and tagged using external FLOY tags and internal PIT tags. In 2014 and 2015 we partnered with the U. S. Fish and Wildlife Service Northeast Fishery Center to tag some fish with satellite tags and acoustic telemetry transmitters.



**Project Duration:** Annually

**Contact Information:** Christopher Legard, New York State Department of Environmental Conservation, Region 9, Buffalo, NY

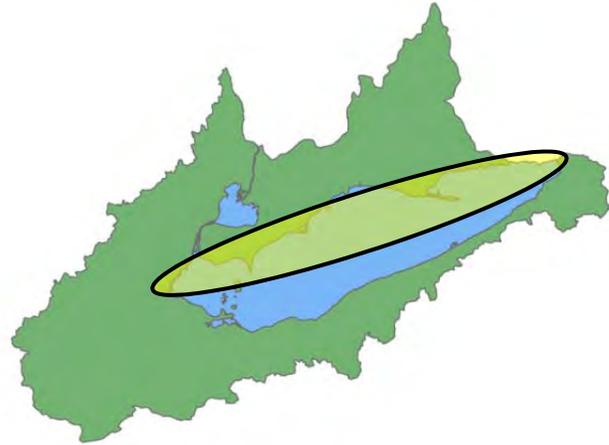
Phone: 716-851-7010, [christopher.legard@dec.ny.gov](mailto:christopher.legard@dec.ny.gov)



**Project Title:** Monitoring Lake Sturgeon in the Ontario Waters of Lake Erie

**Location:** Lake Erie

**Project Description:** The Ontario Ministry of Natural Resources and Forestry (OMNRF) Lake Erie Management Unit (LEMU) does not conduct annual targeted survey for lake sturgeon on Lake Erie. Instead, LEMU relies on indirect sources of information in order to track lake sturgeon presence and absence over time across the Ontario waters of Lake Erie. These sources of information include; Ontario's Partnership Index Fishing Gill Netting Program, our Inter-agency Trawl Program and reported commercial catch and release of lake sturgeon.



The Ontario's Partnership Index Fishing Gill Netting Program is a cooperative fisheries assessment program with the Ontario Commercial Fisheries Association (OCFA). This program monitors the abundance, age structure, size, and species composition throughout Lake Erie. In 2015, 133 sites lake-wide were fished from August to November and catching two lake sturgeon. Over the course of the last 26 years, this program averages approximately 2 lake sturgeon per year for a total catch of 51 lake sturgeon. The majority (48 lake Sturgeon) have been caught in the west basin of Lake Erie; particularly around Pelee Island and the mouth of the Detroit River.

The west basin interagency trawling index is conducted by Ontario and Ohio and is used to assess the year class strength of species based on catches of young-of-the-year, yearlings and older fish. Approximately 36 stations are trawled over a two week period starting around mid-August. Records indicate that 6 out of the 28 year time series lake sturgeon (juveniles and adults) have been caught

As a condition of their commercial fishing license, an Ontario commercial fisher is required to submit daily catch reports (DCR's) prior to landing any fish. DCR's are used to record the amount of fish caught, effort, gear, time and location, as well as any discards and released fish. Since 2011, LEMU has made an effort to monitor DCR's for reported catch and release of lake sturgeon. Less than 1% of all DCR's submitted on Lake Erie on an annual basis record the presence of a lake sturgeon caught and released. Over the past five years, a total of 650 DCR's report incidentally caught and released lake sturgeon; of which 310 DCR's reported caught and released sturgeon in 2015. The small number of reported lake sturgeon by commercial DCR's occur in the west basin, in the spring (April/May) and fall (November/December), as part of the large mesh fishery targeting walleye/white bass.

**Project Duration:** Annually

**Contact Information:** Rich Drouin, OMNRF, Lake Erie Management Unit (London office)

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**Project Title:** Changes in Lake Sturgeon Isotopic Signatures in the Huron-Erie Corridor

**Location:** Lake Huron, Lake St. Clair and the Detroit River

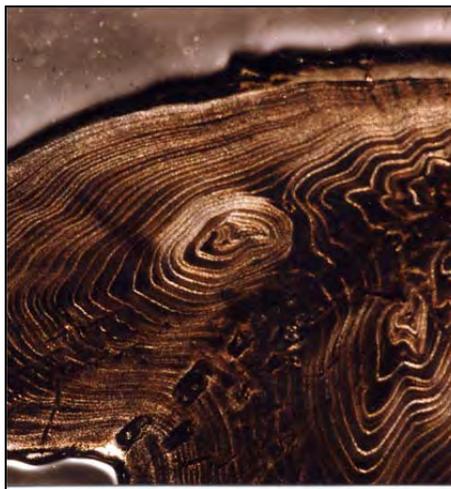
**Project Description:** Understanding how invasive species alter the food web structure of lake sturgeon through isotopic signatures can assist in rehabilitation efforts. The research questions to address are (1) Is there an ontogenetic shift in lake sturgeon trophic position? and (2) How have/are invasive species affecting the trophic position of juvenile and adult lake sturgeon? In order to answer these questions, we have obtained a time series of pectoral fin spine samples collected from U.S. Fish and Wildlife Service and Ontario Ministry of Natural Resources and Forestry consecutively from 1991 to 2015. The samples have been and will be cross-sectioned and drilled using a vertical mill at three specific time points on the spine. These points represent three stages in that individual's life history (juvenile, immature adult and mature adult) in order to study the ontogenetic diet composition through stable isotope analyses ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ). Pilot data thus far indicates a trend that lake sturgeon from the Detroit River have shifted to feed more littoral in nature (i.e. near-shore) and at a lower trophic position over time.



**Project Duration:** 2015/2016

**Contact Information:**

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**Location:** Southern Lake Huron

**Project Title:** Characterization of the Migratory Phenotype in Lake Sturgeon

**Project Description:** The goal of this collaboration was to better understand the genomic basis for migratory phenotypes in lake sturgeon (*Acipenser fulvescens*) of the Great Lakes. Most lake sturgeon reside in the lakes, only entering the rivers to spawn. However, the coexistence of both river resident and out-migrating lake sturgeon in the St. Clair-Detroit River System (SCDRS) indicates the possibility of a molecular mechanism for differences in migration tendencies. An integrative approach employing morphometrics, genetic and epigenetic techniques was used to characterize the migratory phenotypes of the partially



migrant population of lake sturgeon in the SCDRS. The objectives of the study were to: 1) determine whether the lake sturgeon of the St. Clair system differ morphometrically due to variation in migratory phenotypes, 2) determine if individuals with different migratory phenotypes are reproductively isolated, and 3) determine if migratory and river resident individuals are differentially methylated, indicating epigenetic differences between the two phenotypes. Based on telemetry data, fish were grouped according to migratory phenotype and then analyzed for differences in morphometrics, genetics, and epigenetics. The PCA, performed on 18 morphological features, did not support the hypothesis that there are morphological differences between lake sturgeon (n=71; 44 residents, 27 migrants). To identify a genetic component to the variation in migratory phenotypes, a subset of those samples (n=48; 25 residents, 23 migrants) was analyzed at 11 microsatellite loci. Bayesian analysis revealed that there is one population, indicating gene flow between the migratory phenotypes. The  $F_{ST}$  value calculated to determine genetic differentiation between migratory phenotypes was 0.0005 ( $p=0.3$ ) which is interpreted as no genetic differentiation between the two groups. DNA extractions from blood samples were analyzed using the methylation sensitive amplified fragment length polymorphism (MS-AFLP) protocol to test for epigenetic differences. The AMOVA performed on all restriction sites (81) showed that the migratory phenotypes are differentially methylated ( $p<0.05$ ). The AMOVA performed on individual restriction sites showed that 11 were differentially methylated. While there is no evidence for a genetic component to the migratory phenotypes of lake sturgeon in the SCDRS, DNA methylation may play a role in the observed plasticity of movement patterns.

**Project Duration:** Spring 2012 – Fall 2015

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