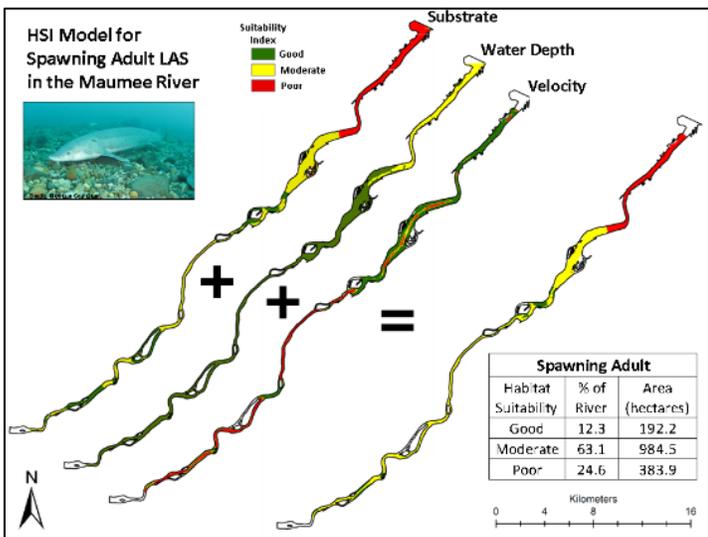
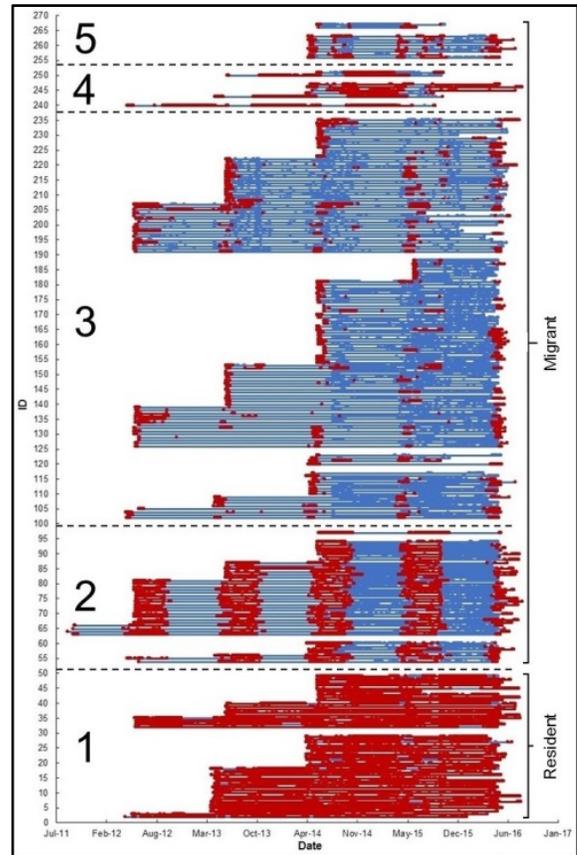


2016 Lake Erie Lake Sturgeon Working Group Report



Electronic copies of the report can be found at:
<http://www.fws.gov/midwest/sturgeon/resources.htm>

Prepared By:

| | |
|------------------------|---|
| Doug Aloisi | <i>U.S. Fish and Wildlife Service – Genoa National Fish Hatchery</i> |
| Meredith Bartron | <i>U.S. Fish and Wildlife Service – Northeast Fishery Center</i> |
| Kent Bekker | <i>Toledo Zoo</i> |
| Zy Biesinger | <i>U.S. Fish and Wildlife Service – Lower Great Lakes FWCO</i> |
| James Boase | <i>U.S. Fish and Wildlife Service – Alpena FWCO, Waterford Substation</i> |
| Justin Chiotti | <i>U.S. Fish and Wildlife Service – Alpena FWCO, Waterford Substation</i> |
| Chris Davis | <i>Ontario Ministry of Natural Resources and Forestry</i> |
| Lori Davis | <i>U.S. Fish and Wildlife Service – Northeast Fishery Center</i> |
| Richard Drouin | <i>Ontario Ministry of Natural Resources and Forestry</i> |
| Tanya Fendler | <i>University of Windsor – Great Lakes Institute for Environmental Research</i> |
| Aaron Fisk | <i>University of Windsor – Great Lakes Institute for Environmental Research</i> |
| Jim Francis | <i>Michigan Department of Natural Resources – Fish Division</i> |
| Dimitry Gorsky | <i>U.S. Fish and Wildlife Service – Lower Great Lakes FWCO</i> |
| Jan-Michael Hessenauer | <i>Michigan Department of Natural Resources – Fish Division</i> |
| Travis Hartman | <i>Ohio Department of Natural Resources – Sandusky Research Station</i> |
| Darryl Hondorp | <i>U.S. Geological Survey – Great Lakes Science Center</i> |
| Greg Kennedy | <i>U.S. Geological Survey – Great Lakes Science Center</i> |
| Christopher Legard | <i>New York State Department of Environmental Conservation</i> |
| Christine Mayer | <i>University of Toledo – Department of Environmental Sciences</i> |
| Rachel Neuenhoff | <i>U.S. Fish and Wildlife Service – Northeast Fishery Center</i> |
| Trevor Pitcher | <i>University of Windsor – Great Lakes Institute for Environmental Research</i> |
| Edward Roseman | <i>U.S. Geological Survey – Great Lakes Science Center</i> |
| Brian Schmidt | <i>U.S. Fish and Wildlife Service – Alpena FWCO, Waterford Substation</i> |
| Jessica Sherman | <i>University of Toledo – Department of Environmental Sciences</i> |
| John Sweka | <i>U.S. Fish and Wildlife Service – Northeast Fishery Center</i> |
| Christopher Vandergoot | <i>U.S. Geological Survey – Great Lakes Science Center</i> |
| Jonah Withers | <i>U.S. Fish and Wildlife Service – Northeast Fishery Center</i> |
| Eric Weimer | <i>Ohio Department of Natural Resources – Sandusky Research Station</i> |

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; however, due to gear malfunctions trawling in 2016 was extremely limited. 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. In 2016 we captured a total of 174 Lake Sturgeon during our annual St. Clair River Setline Survey. Of these, 54 were recaptures from previous year's surveys. Fish sizes ranged from 21 to 71 inches in total length. In addition to targeting sturgeon we attach a minnow trap to each end of the setline to sample the endangered Northern Madtom. Due to adjustments to our bait from previous years we caught a record 297 Madtoms in 2016. We are hopeful that such catches can be sustained and provide additional demographic information in the future. Finally, we had a couple of special guests participate in our annual setline survey: Michigan Governor Rick Snyder and former Congresswoman and current Macomb County Public Works Commissioner Candice Miller. This provided an opportune time to explain the importance of our annual sturgeon assessment to the conservation and management of this charismatic species.



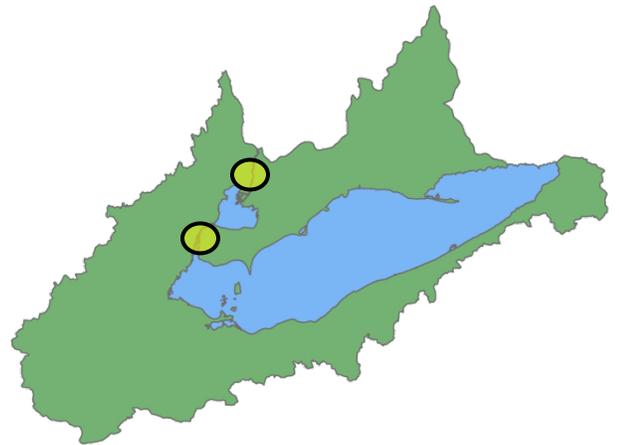
Project Duration: Annually

Contact Information: Jan-Michael Hessenauer, Michigan DNR, Lake St. Clair Fisheries Research Station, Phone: 586-465-4771 ext. 35, hessenauerj1@michigan.gov

Project Title: Lake Sturgeon Use of Newly Constructed Artificial Reefs in the St. Clair River (Preliminary Draft Results)

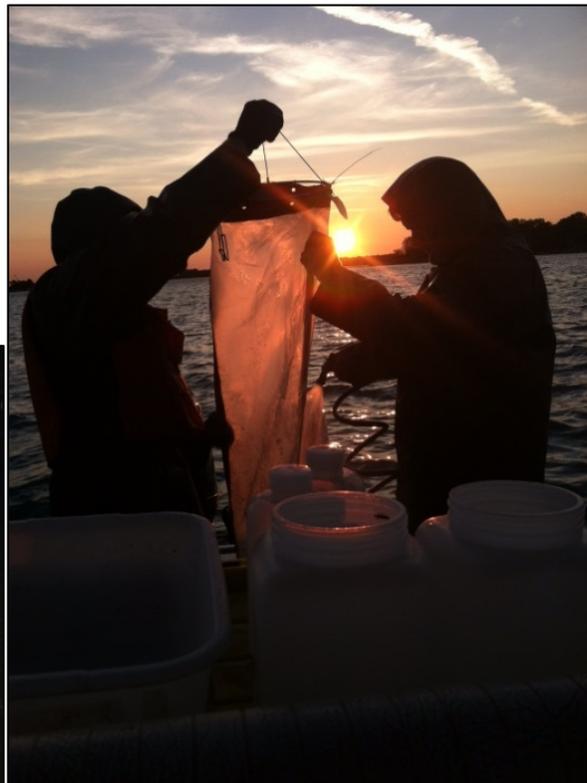
Location: St. Clair River and Detroit River

Project Description: The USGS Great Lakes Science Center monitored lake sturgeon use of three newly-constructed artificial spawning reefs in 2016; two in the St. Clair River at Harts Light and Point Aux Chenes and one in the Detroit River at Grassy Island. 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 (Detroit River only) upstream and downstream of the reefs. At all reefs, lake sturgeon eggs were not detected during pre-construction monitoring, but were detected on the reefs post- construction. Larvae were sampled from late-May to early-June in the Detroit River and early-June to early-July in the St. Clair River. Yolk-sac and post-yolk sac larvae were collected upstream and downstream at each reef, and at control locations, but collection of larvae >22 mm was rare. Egg and larval drift monitoring at the Grassy Island constructed reef sites and at sites near the newly constructed spawning reefs near Belle Isle (completed December 2016) will continue in 2017.



Project Duration: 2015 - 2016 (St. Clair River), 2015 - 2018 (Detroit River)

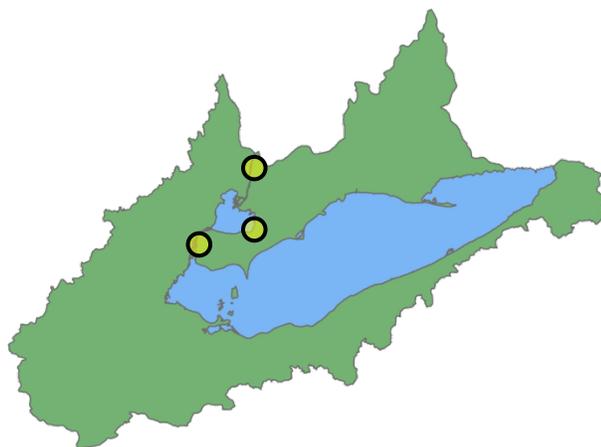
Contact Information: Ed Roseman, USGS, Great Lakes Science Center,
Phone: 734-214-7237, eroseman@usgs.gov



Project Title: The Isotopic Niches of Lake Sturgeon Movement Groups Pre- and Post- Dreissenid Mussel and Round Goby Invasions

Location: Lake Huron to Lake Erie Corridor (HEC)

Project Description: We aim to understanding the connection between movement ecology and foraging ecology of lake sturgeon in the HEC. The main questions we want to answer are (1) how did the isotopic niche at which lake sturgeon feed change after the introduction of benthic invasive species; and (2) how does isotopic niche vary between lake sturgeon that show broad scale migratory behaviors and those that are resident within river systems? Archived pectoral fin spines of lake sturgeon were obtained from United States Fish and Wildlife Services (USFWS) and Ontario Ministry of Natural Resources and Forestry (OMNRF) collected from 1991 to 2014. By conducting stable isotope analyses on their pectoral fin spines, changes within individual lake sturgeon over different life history stages will be examined and the temporal diet patterns of lake sturgeon from before the dreissenid mussels (*Dreissena spp.*) and round goby (*Neogobius melanostomus*) invasions to present. Acoustic telemetry was used to establish the movement patterns of lake sturgeon, identifying individuals that made large scale movement (i.e., migration) and those that did not (i.e., resident). Foraging and habitat use are tightly linked aspects of ecology that should be considered together and both of which will inform the conservation and restoration efforts of the threatened lake sturgeon.

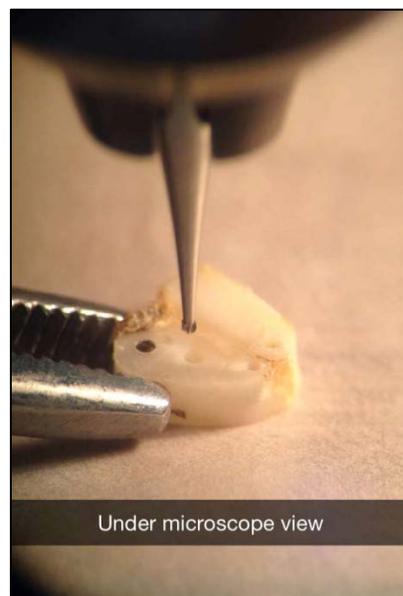


Project Duration: 2016 - 2018

Contact Information:

Tanya Fendler, University of Windsor, Phone: 519-253-3000 ext. 4243, fendler@uwindsor.ca

Trevor Pitcher, University of Windsor, Phone: 519-253-3000 ext. 2710, tpitcher@uwindsor.ca

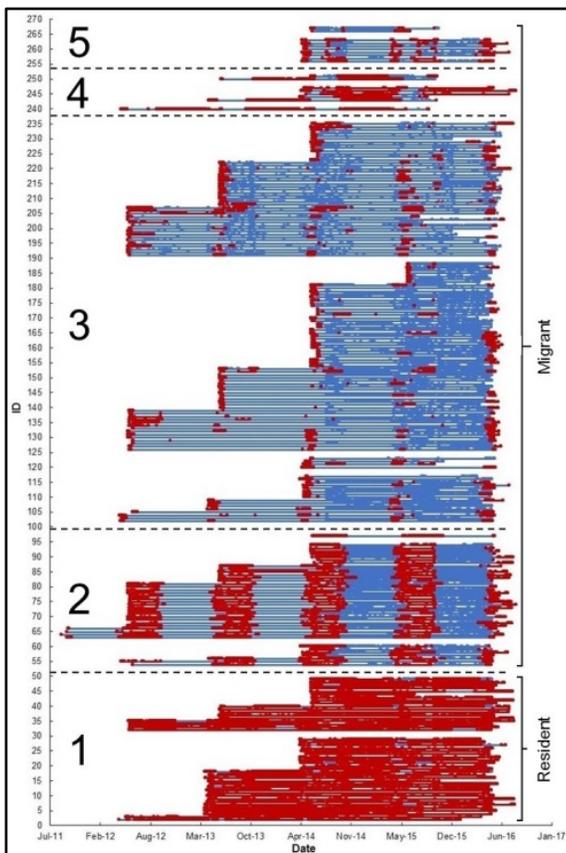
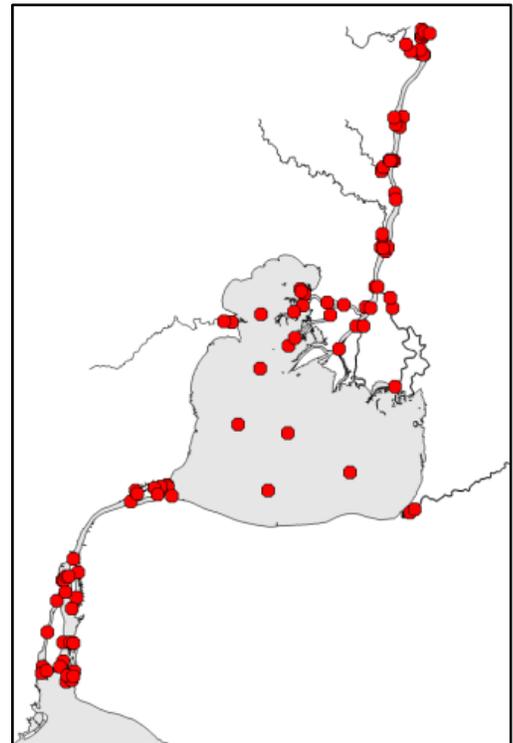
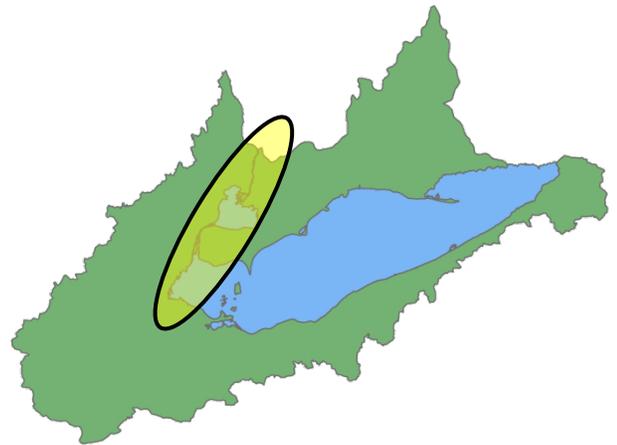


Project Title: Geographic organization and population structure of lake sturgeon in the Lake Huron-to-Lake Erie corridor

Location: Detroit-St. Clair River System; Lake Huron; Lake Erie

Project Description This study is using acoustic telemetry to describe the spatial structure and habitat use of lake sturgeon populations that spawn in the St. Clair and Detroit rivers. Since 2011, a total of 282 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 (see map to the right), as well as in lakes Huron and Erie, are allowing scientists to track sturgeon movements over thousands of square miles. Study results have been 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.

Preliminary results: The most significant finding of the study so far has been the discovery of significant within-population



variability in lake sturgeon migratory behavior (graphic below). Analysis of the movements of 178 individuals over several years identified as many as five distinct migratory

strategies or behaviors based on the phenology and duration of river (red) and lake (blue) use. Specific strategies included year-round river residency and multiple lake-migrant behaviors that involved movements between lakes and rivers. Individual movements were repeatable, which suggested that lake sturgeon do not switch behaviors. Differential use of specific rivers or lakes by acoustic-tagged lake sturgeon further grouped individuals into “contingents.” Contingent structure and dynamics suggested that lake sturgeon in the Detroit and St. Clair rivers function as semi-independent units that require separate management consideration. Limited exchange of spawners between rivers likely prevents the Detroit and St.

Clair lake sturgeon populations from becoming genetically distinct. Additional insights provided by the study included 1) the importance of Lake St. Clair as overwintering habitat for lake sturgeon, 2) the potential for complex metapopulation dynamics among lake sturgeon populations in lakes Huron and Erie, and 3) the potential for navigational engineering practices such as channelization to increase lake sturgeon vulnerability to ship strikes. Study results suggest that priorities for future lake sturgeon rehabilitation efforts in the Great Lakes include the protection and restoration of fluvial lakes (e.g., Lake St. Clair), the conservation of genetic *and* phenotypic diversity (e.g., year-round river residency), and consideration of how lake sturgeon interact with their habitat in human-dominated landscapes.

Project Duration: 2012-2022

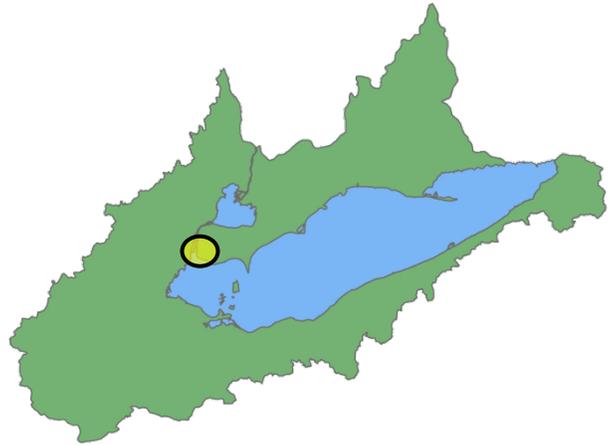
Contact Information: Darryl Hondorp, USGS, Great Lakes Science Center

Phone: 734-214-7241, dhondorp@usgs.gov

Project Title: Lake Sturgeon Population Demographics in the Detroit River

Location: 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 450 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 6,360 (95% CI = 3,106 - 13,599) individuals. In the spring of 2016, 78 lake sturgeon were captured during setline assessments. Between 2012 - 2014, 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).



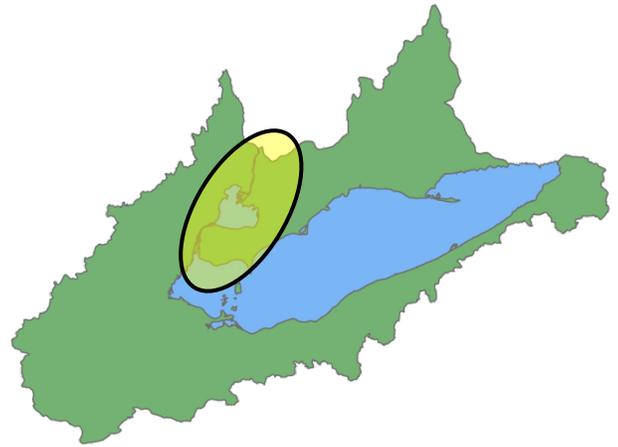
Project Duration: 2002 - Annually

Contact Information: Justin Chiotti, USFWS, Alpena FWCO (Waterford Substation)
Phone: 248-891-0087, justin_chiotti@fws.gov

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

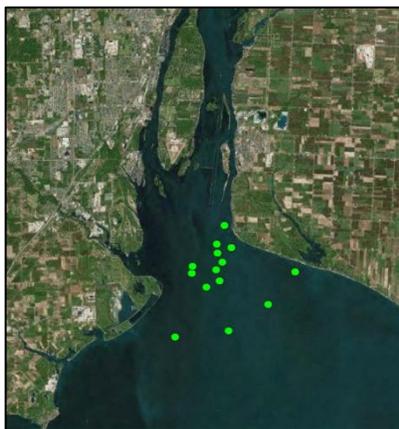
Location: St. Clair-Detroit River System

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 gill nets of varying mesh sizes.



In 2016, 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. Forty-two (941 hours of effort) experimental multifilament gill nets were set between September 13th and October 27th, when water temperatures were between 10.5°C and 22.5°C. Four juvenile lake sturgeon (619-754 mm) were captured. All four fish were captured on September 13th when water temperatures were approximately 22°C. Three individuals were captured in 127 mm mesh, and one individual was captured in 101.6 mm mesh.

The Service plans to further refine juvenile lake sturgeon assessments in the summer and fall of 2017. Juvenile lake sturgeon will be targeted in western Lake Erie and Maumee Bay August – October using experimental multifilament gill nets. In addition, habitat attributes will be assessed through the collection of various water chemistry and physical habitat parameters including substrate, flow, water temperatures, dissolved oxygen etc.



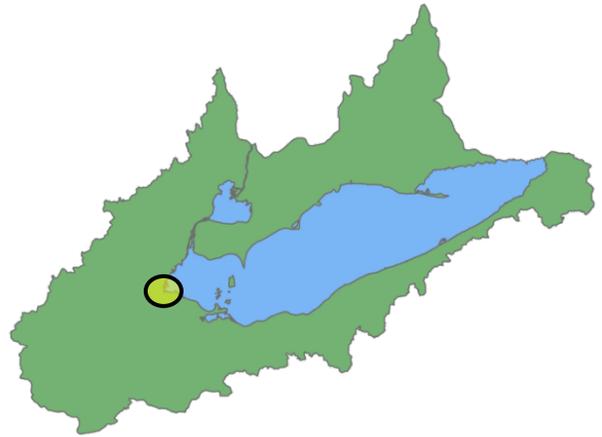
Project Duration: 2010 - Annually

Contact Information: Justin Chiotti, USFWS, Alpena FWCO (Waterford Substation)
Phone: 248-891-0087, justin_chiotti@fws.gov

Project Title: Maumee River Lake Sturgeon Rearing Facility

Location: Maumee River

Project Description: Lake sturgeon recruitment in the Lake Erie basin is currently supported by two connecting channels, the St. Clair – Detroit River System and Niagara River. Historically, there were 16 other spawning populations in Lake Erie. In an effort to delist this endangered species in the State of Ohio and throughout the Lake Erie basin, efforts are underway to rehabilitate lake sturgeon populations in suitable river systems. The Maumee River, located in western Lake Erie, historically supported large runs of lake sturgeon, but currently are considered functionally extirpated from this system. A habitat suitability model for spawning adult and age-0 lake sturgeon indicates sufficient habitat is present in the Maumee River (Jessica Sherman Collier, University of Toledo). Therefore, the river is a strong candidate for a lake sturgeon reintroduction. A lake sturgeon restoration plan has been drafted for the system and is in review by the Ohio Department of Natural Resources and Great Lakes Fishery Commission Lake Erie Committee. Lake sturgeon will be reared by the Toledo Zoo and Genoa National Fish Hatchery. The habitat suitability model and restoration plan will provide the foundation for the Maumee River Lake Sturgeon Restoration Program, a multi-agency, international effort leading towards the restoration of the lake sturgeon population in Lake Erie.



Project Duration: 2017 - Annually

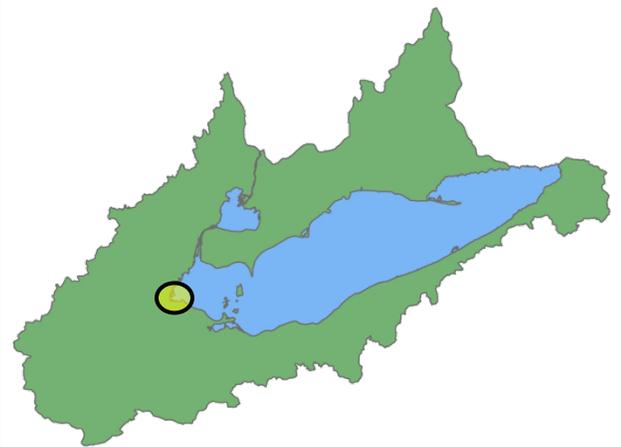
Contact Information:

- Kent Bekker - kent.bekker@toledozoo.org, Toledo Zoo
- Travis Hartman – travis.hartman@dnr.state.oh.us, Ohio Department of Natural Resources
- Richard Drouin – richard.drouin@ontario.ca, Ontario Ministry of Natural Resources and Forestry
- Chris Davis – Chris.Davis@ontario.ca, Ontario Ministry of Natural Resources and Forestry
- James Francis – francisj@michigan.gov, Michigan Department of Natural Resources
- Doug Aloisi – doug_aloisi@fws.gov, U.S. Fish and Wildlife Service
- James Boase – james_boase@fws.gov, U.S. Fish and Wildlife Service
- Justin Chiotti – justin_chiotti@fws.gov, U.S. Fish and Wildlife Service
- Christine Mayer – christine.mayer@utoldedo.edu, University of Toledo
- Chris Vandergoot – cvandergoot@usgs.gov, USGS, Great Lakes Science Center

Project Title: Supporting Lake Sturgeon Restoration in the Maumee River with Habitat Suitability Index Modeling

Location: Maumee River

Project Description: Lake sturgeon are a candidate for reintroduction in the Maumee River, Ohio, where they were historically abundant, but are now functionally extirpated. The objective of this work is to determine if current habitat quantity and quality are sufficient to support reintroduction using a spatially explicit habitat suitability index model for spawning adult and age-0 lake sturgeon for the lower Maumee River.



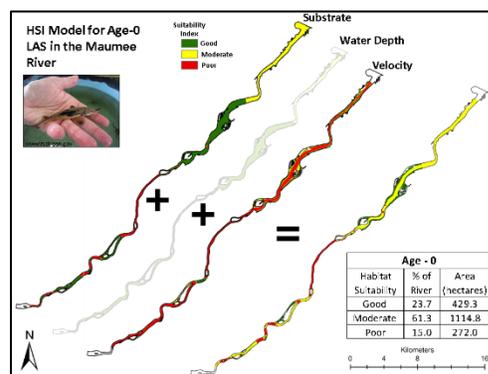
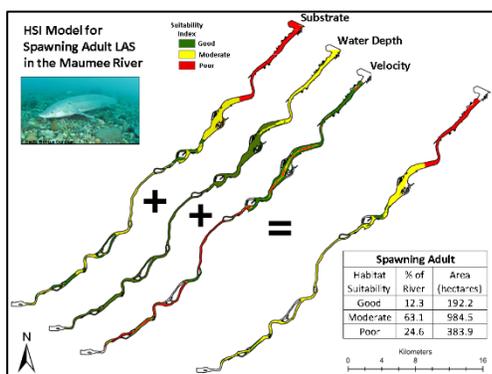
Substrate, water depth, and water velocity were assessed and integrated into a suitability index value to delineate good, moderate, and poor areas throughout the lower Maumee for each life stage. Substrate and water depth were surveyed simultaneously using side-scan sonar and ground-truthing techniques while water velocity was modeled with HEC-RAS software and discharge data from the USGS gage on the river. Each habitat characteristic was mapped as a spatially explicit layer in ArcGIS and then combined to provide an overall assessment of habitat suitability and connectivity. Model results for spawning adults indicate 12.3 % of the total habitat (192.2 hectares) in the lower Maumee River is good spawning habitat, while 63.1% and 24.6% classified as moderate and poor, respectively. Good spawning habitat is found around the Bluegrass and Audubon Island complex and further upstream between Van Tassel Island and the Missionary Island complex. For age-0 lake sturgeon, model results classify 23.7% (429.3 hectares) of habitat in the lower Maumee River as good for this life stage, 61.3% is moderate, and 15% is poor. The majority of good habitat for age-0 sturgeon is between Bluegrass Island and the Delaware and Grassy Island complex, downstream of the area designated as good spawning habitat. A total of 192 hectares of good spawning habitat could potentially support a spawning population of nearly 40,000 adults, given that spawning females require 13 – 48 m² of spawning area (Fortin et al. 2002). Results of the habitat suitability index models indicate habitat in the Maumee River is not limiting for lake sturgeon reintroduction and supports the goal of restoring their population to this system.

Project Duration: 2014 – 2017

Contact Information: Jessica Sherman Collier, University of Toledo, Dept. of Environmental Sciences

Phone: 419-530-4219, jessica.sherman2@rockets.utoledo.edu

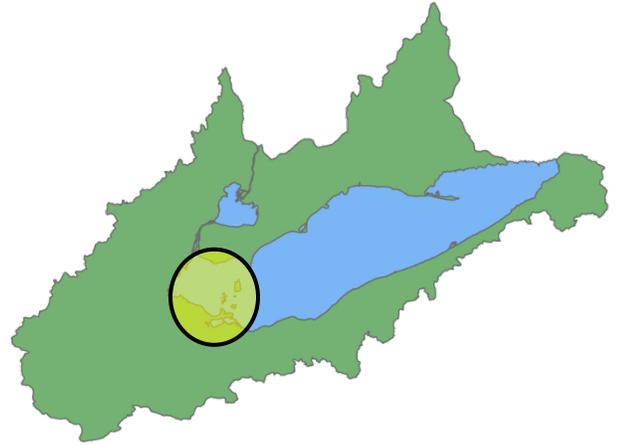
Christine Mayer, University of Toledo, christine.mayer@utoldedo.edu



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

Location: Western basin 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 512 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.

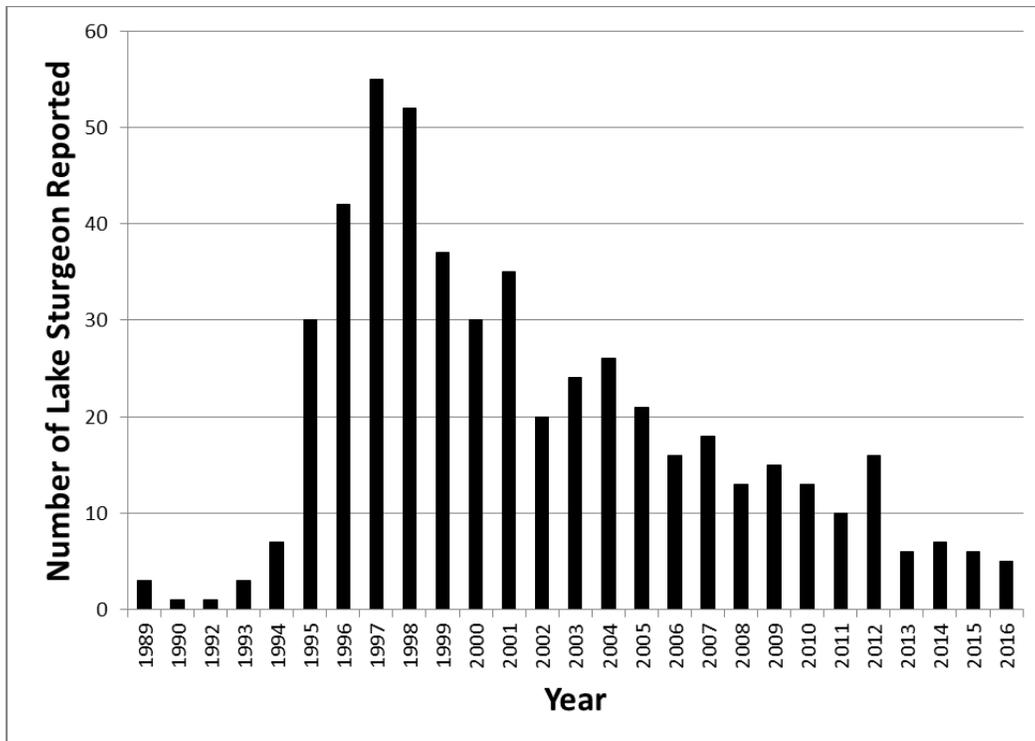


Project Duration: Annually

Contact Information:

Eric Weimer, Ohio DNR, Phone: 419-625-8062, eric.weimer@dnr.state.oh.us

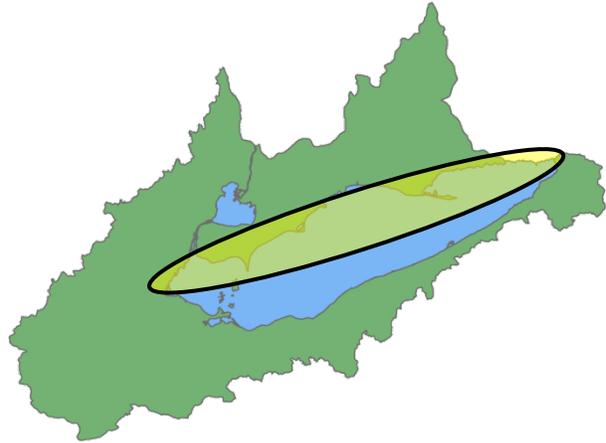
Brian Schmidt, USFWS, Phone: 248-891-1298, brian_schmidt@fws.gov



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 2016, 133 sites lake-wide were fished from August to November and catching eight lake sturgeon. Over the course of the last 27 years, this program averages approximately 2 lake sturgeon per year for a total catch of 59 lake sturgeon. The majority (56 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 7 out of the 29 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 six years, a total of 862 DCR's report incidentally caught and released lake sturgeon; of which 212 DCR's reported caught and released sturgeon in 2016. 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

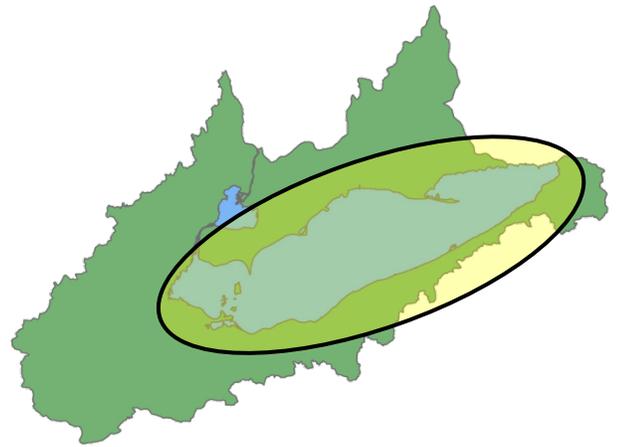
Contact Information: Rich Drouin, OMNRF, Lake Erie Management Unit (London office)
Phone: 519-873-4611, richard.drouin@ontario.ca

Project Title: Historic abundance and contemporary distribution of Lake Sturgeon throughout Lake Erie

Location: Lake Erie Basin

Project Description: Lake Erie historically supported the greatest commercial fishery of lake sturgeon in the Great Lakes. At present, two remnant groups of sturgeon are being studied: one in the Detroit River and the other in the Buffalo Harbor/upper Niagara River area. In order to gain a better understanding of historic abundance and contemporary distribution, the U.S. Fish and Wildlife Service Northeast

Fishery Center is analyzing historic commercial catch data and historic catch records from fisheries-dependent and -independent sources. A depletion-based stock reduction analysis (DB-SRA) is being applied to historic commercial catches of lake sturgeon to estimate the carrying capacity of Lake Erie prior to the collapse of the commercial fishery in the early twentieth century and to simulate potential population growth under various scenarios of contemporary carrying capacity. Records of lake sturgeon sightings and catches since the closure of the fishery are being compiled to develop an interactive map of contemporary lake sturgeon distribution. These data will also be used to develop an occupancy model to predict additional areas where sturgeon may be present within Lake Erie. These two analyses will aid in refining restoration targets for the species and guide where restoration activities may occur.



Project Duration: Calendar Year 2017

Contact Information:

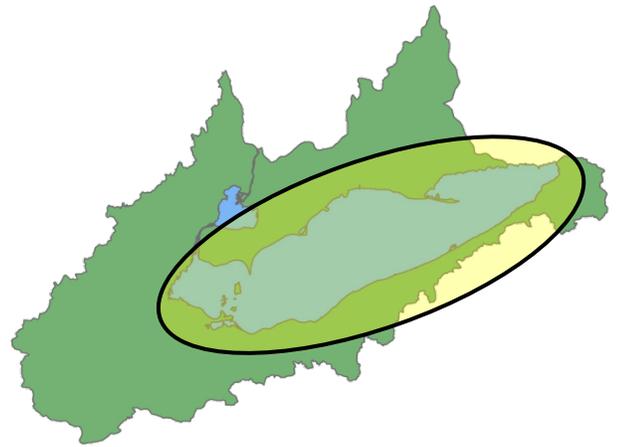
John Sweka – USFWS, Northeast Fishery Center, 570-726-4247 x 153, john_sweka@fws.gov



Project Title: Lake Sturgeon stock identification and age validation using chemical labels

Location: Lake Erie Basin

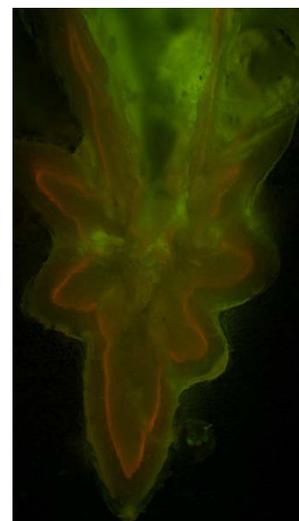
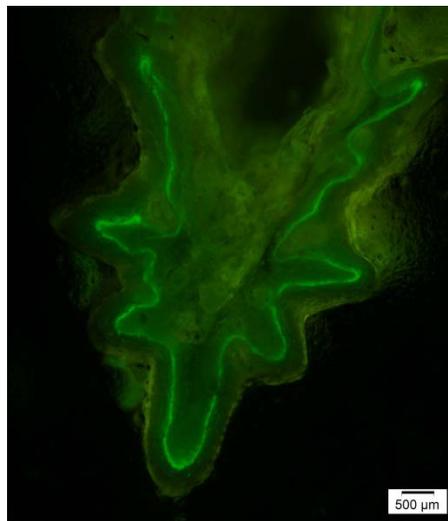
Project Description: Over the past two decades, growing interest in the recovery of lake sturgeon throughout their native range has researchers and managers interested in lake sturgeon populations' age structure, growth, and other life-history parameters. Since wild caught sturgeons' ages are unknown, osseochronometry provides an indirect method to estimate their age by interpreting the zonation of calcified structures. Like many other long-lived fish species, lake sturgeon is a species whose age is difficult to discern. Most investigators examining age structure use pectoral fin spine sections to assign ages to sampled individuals; however, few are attempting to validate readers' estimates or establish the relationship between true age and structure age. Skeletal markers can be used to validate, or partially validate, age estimates as well as mass mark propagated fish intended for stocking. Unlike external marks, skeletal markers can be applied to many fish in a short period of time and provide age assessors with identifiable marks within an age structure. The U.S. Fish and Wildlife Service Northeast Fishery Center is testing the marking efficiency and retention of three skeletal markers (Calcein, Alizarin Red S, and Oxytetracycline Hydrochloride) across multiple calcified accretions. Identifying suitable chemical labels for mass marking and age validation will provide managers and researchers with additional tools and information that will facilitate age assessment and stock identification needed for recovery.



Project Duration: Calendar Year 2017

Contact Information:

Jonah Withers – USFWS, Northeast Fishery Center, 570-726-4247 x 116, Jonah-Withers@fws.gov



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

Location: Eastern Lake Erie 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 near Buffalo Harbor. Lake sturgeon were captured with gillnets. Ten sturgeon had archival satellite transmitters applied and 35 sturgeon were surgically implanted with acoustic transmitters to analyze coarse- and fine-scale spatiotemporal movement, behavior and habitat use within Buffalo Harbor. The total number of sturgeon at large with acoustic transmitters in the system is now 53 fish and satellite tags are set to pop off in July 2017. 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 2017. Additionally, biometric, age, blood and genetic data for each individual will be used to describe population demographics and health. Setline deployment efforts were conducted in the upper Niagara River in 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; however no sturgeon were caught in the river. 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.

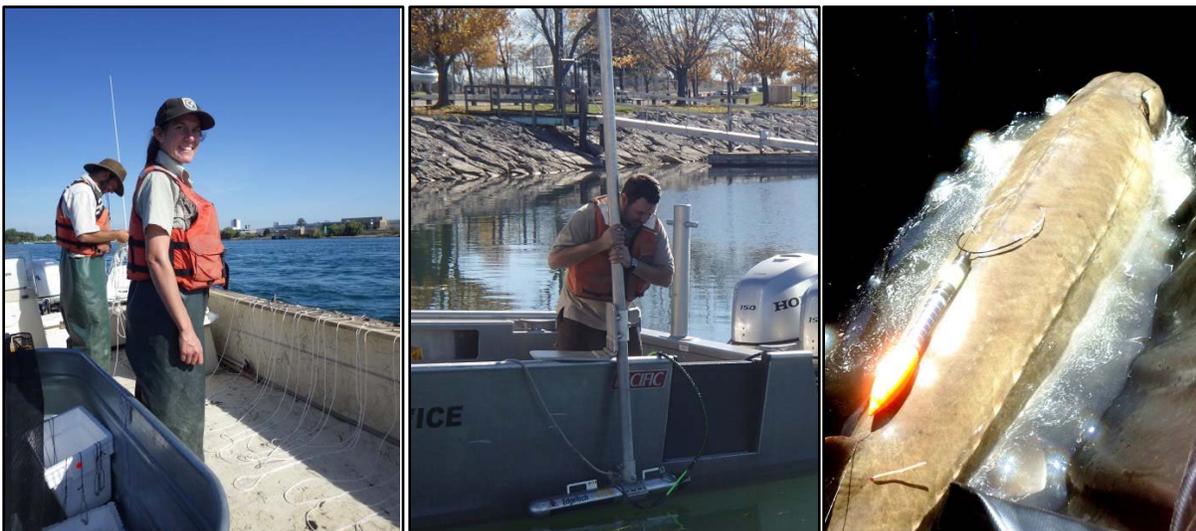


Project Duration: Annually

Contact Information:

John Sweka – USFWS, Northeast Fishery Center, 570-726-4247 x 153, john_sweka@fws.gov

Dimitry Gorsky – USFWS, Lower Great Lakes FWCO, 585-948-7045, dimitry_gorsky@fws.gov



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

Location: Eastern Lake Erie 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. In 2016, a total of 37 sturgeon (total length range of 127 – 187 cm) were captured in 256 gillnet deployments. Researchers are using a number of methods to collect and analyze morphometric data. First, fish were equipped with a PIT and anchor FLOY tag. A section of the leading spine was 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 was 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 data 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, 570-726-4247 x 153, john_sweka@fws.gov



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.

A total of 968 samples that have been collected by USFWS Lamar Fish Technology Center, USFWS Lower Great Lakes Fish and Wildlife Conservation Office, and the NY DEC have been extracted. These samples are in the process of being genotyped using 13 microsatellite loci to obtain estimates of genetic variation.

Project Duration: Annual

Contact Information: Meredith Bartron, USFWS Lamar Fish Technology Center

Phone: 570-726-4247 x155, Meredith_Bartron@fws.gov

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)

Lake Erie

Table 1. Observations or general status of lake sturgeon populations in the Lake Erie Basin. Population status definitions are: **Extirpated** or **Extant**; **Re-I** (reintroduced) = fish stocked into a system with an extirpated population; **Supp** (supplementation) = fish stocked into a system with an extant population, or **Unk** = unknown. A “**Yes**” indicates regular observation or presumed annual occurrence. Occasional (**Occ**) observations are as noted. Successful reproduction was defined as recent capture of larval or juvenile sturgeon. Notes on allowed harvest follow the table.

| Basin/Site Number | Site Name | Population Status | Population Size | Adults | Observations | | | Reproduction Successful? |
|-------------------|----------------------------|-------------------|-----------------|--------|--------------|-------|-----------|--------------------------|
| | | | | | Spawning | Larva | Juveniles | |
| Lake Erie | | | | | | | | |
| 1 | Upper Niagara River | Extant | Unk | Yes | | | Occ | Unk |
| 2 | Eastern basin (NYS) | Extant | | Yes | | | Yes | Unk |
| 3 | Cattaraugus Creek | Extirpated | | | | | | |
| 4 | Sandusky River | Extirpated | | | | | | |
| 5 | Maumee River | Extirpated | | | | | | |
| 6 | Raisin River | Extirpated | | | | | | |
| 7 | Huron River | Extirpated | | | | | | |
| 8 | Detroit River | Extant | ~6,000 | Yes | Yes | | Yes | Yes |
| 9 | Lake St. Clair | Extant | Unk | Yes | Unk | Unk | Yes | Unk |
| 10 | St. Clair River | Extant | ~25,000 | Yes | Yes | Yes | Yes | Yes |
| 11 | Portage River | Unk | | | | | | |
| 12 | Cuyahoga River | Extirpated | | | | | | |
| 13 | Conneaut, OH nearshore | Extirpated | | | | | | |
| 14 | Walnut Creek, PA nearshore | Unk | | | | | | |
| 15 | Pelee Island nearshore | Unk | | | | | | |
| 16 | Point Pelee shoals | Unk | | | | | | |
| 17 | Rondeau Harbor | Unk | | | | | | |
| 18 | Clear Creek | Unk | | | | | | |
| 19 | Long Point Bay | Unk | | | | | | |

Allowed Harvest: Commercial harvest in Ontario waters of Lake St. Clair scheduled to close January 2009. Recreational harvest in Michigan waters of Lake St. Clair and St. Clair River only, closed recreational fishery all other areas of the basin.