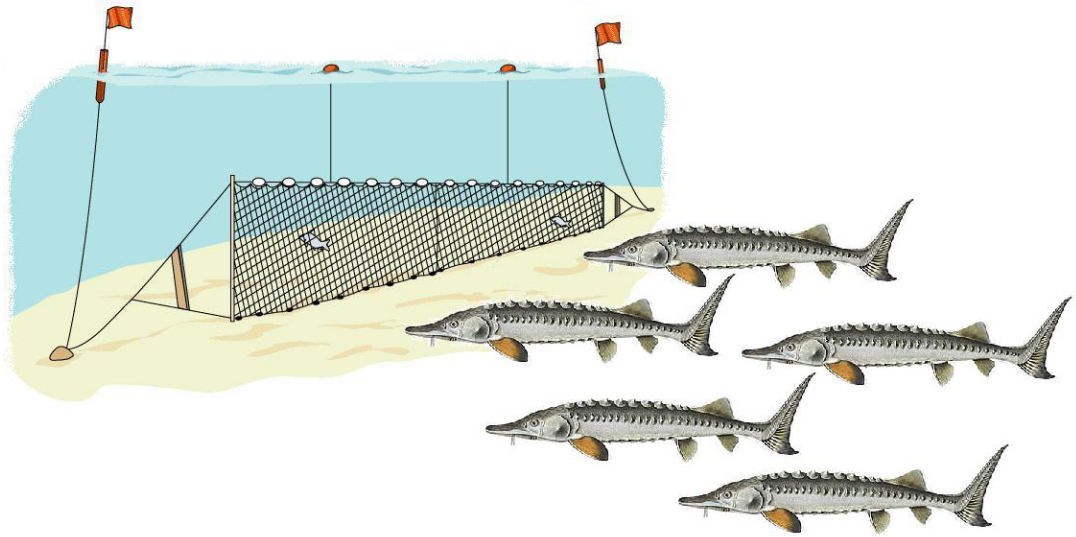
NY Lake Sturgeon Working Group

2011 Meeting Summary



Edited by

Thomas E. Brooking

Scott Schlueter

February 28, 2011 – 9 am to 4:30 pm

Embassy Suites Conference Center, Syracuse, NY 13057

Meeting funded by FEMRF (Fish Enhancement, Mitigation and Research Fund)
Administered by the USFWS – Scott Schlueter

Meeting Agenda

9:00 Welcome, Housekeeping/Logistics. **Tom Brooking** (Cornell University Biological Field Station), **Scott Schlueter** (USFWS – Cortland)

9:05 Restoration Efforts, Summary of Studies, and Need for a Repository of Catch Records. **Doug Carlson** (NYSDEC region 6 Watertown)

9:25 Black River, Lake Ontario, & St. Lawrence River Lake Sturgeon Studies 2005 – 2010. **Rodger Klindt** (NYSDEC Region 6 Watertown)

9:45 Genesee River, Oswego River, Oswegatchie River Research Update. **Dawn Dittman** (USGS Tunison)

10:05 St. Lawrence River Population Enhancement Scoping Study. **Jim Johnson** (USGS Tunison)

10:25 BREAK (15 minutes)

10:40 Status of Stocked Lake Sturgeon in Oneida Lake. **Randy Jackson** (Cornell University Bio. Field Sta.)

11:00 Lake Sturgeon Summer Habitat Use in the Erie Canal. **Errol Scheid** (SUNY-ESF Syracuse)

11:20 USFWS- Niagara River/Lake Ontario Research Update. **Betsy Trometer** (USFWS LGLFRO Amherst)

11:40 St. Lawrence River – NYPA Lake Sturgeon Constructed Spawning Bed Update. **Ben Lenz** (NYPA)

12:00 – 1:00 LUNCH – On your own – necessary to keep registration free. Map/suggestions provided.

1:00 Genetic Effects of Lake Sturgeon Stocking at Oneida Lake. **Amy Welsh** (SUNY-Oswego)

1:20 SRMT Lake Sturgeon Project Update/First Nation Perspective. **Barbara Tarbell** (St. Regis Mohawk Tr.)

1:40 Oswegatchie Relicensing/fish passage update. **Steve Patch** (USFWS)

2:00 VT F&WD Plans for Lake Sturgeon Mgt in Lake Champlain. **Chet Mackenzie** (Vermont Dept. F&W)

2:20 Sturgeon Restoration Planning for Lake Ontario. **Alastair Mathers** (OMNR)/Steve LaPan (NYSDEC)

2:40 Meeting Summary/Synthesis. **Lisa Holst** (NYSDEC Central Office)

3:00 BREAK (15 minutes)

3:15 Discussion – Next Steps/Priorities (optional). **Lisa Holst** (NYSDEC Central Office)

Speaker Summaries

9:05 Restoration Efforts, Summary of Studies, and Need for a Repository of Catch Records.

Overview of NY Lake Sturgeon

Doug Carlson, NYSDEC Region 6, Watertown, NY

Historical records compared to recent records show lake sturgeon are found in nearly all parts of their range, even though stocking has been necessary for this still to be true in about 1/10 of the area. A general sense of where they were most abundant comes from commercial catch records and the peak years as reported range from 1885-1918. Lake Erie south of Buffalo (NY only) had annual catches of 1,700 metric tonne while Lake Ontario had 175 mt (1885). The Lake Erie catches were inexplicably large. Other parts of NY with peak-year catches included St. Lawrence R in 1899 (22 mt), Niagara R in 1918, (7mt), and the VT side of Lake Champlain had 7 mt in 1902 (none from NY). Spawning area that are still used by lake sturgeon were listed at 8 places including the Grasse R at Madrid, Black R at Dexter, St. Lawrence R at Massena, Ogdensburg and Iroquois Dam, the lower Niagara R at Art Park, upper Niagara at Buffalo Harbor and in the Vermont tributaries of Lake Champlain. Several studies have been completed on lake sturgeon in several waters since 1971 and are listed in a bibliography. Hatchery production of fingerlings in 1995-2004 was followed by stocking in three focus waters, St. Regis R., Oswegatchie R. and Black Lake, and three others: Genesee R., Oneida Lake and Cayuga Lake. Other types of mobile hatchery facilities were described, and two other hatcheries assisted along with Oneida Hatchery. Collaboration with other biologists has made the many accomplishments possible. Conservation issues were mentioned, including chemical pollution, dams and Botulism E. Lastly, a plan for compiling catch records of lake sturgeon in a common storage place was described, and the cooperation of other investigators would make this possible.

List of Sturgeon references from NYS (provided by D. M. Carlson):

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9:25 Black River, Lake Ontario, & St. Lawrence River Lake Sturgeon Studies 2005 – 2010. **Rodger Klindt**

Lake Sturgeon Studies 2005-10: Black River, Lake Ontario & St. Lawrence River

Rodger Klindt and David Gordon, NYS DEC Region 6, Watertown, NY

Lake sturgeon work in Region 6 NYSDEC has been ongoing since the early 1990's. Recent work, other than egg-take for species rehabilitation, has had a limited scope. The following is a brief summary of work done on the Black River (6 years) and a synopsis of expanded tagging efforts in 2010 which was made possible by an equipment grant from the Fish Enhancement Mitigation and Research Fund (FEMRF).

Black River : 2005-2009

Sampling in 2005 was to evaluate the use of the lower Black River (Dexter, Jefferson Co.) by spawning lake sturgeon (*Acipenser fulvescens*). Historically the Black River was known for its large sturgeon. Based on anecdotal and photographic information, a fishery existed into the 1940's. Long term habitat degradation from industrial waste in combination with over fishing led to the reduction of lake sturgeon numbers in the Lake Ontario watershed.

Sturgeon had been observed by Region 6 Fisheries staff in 1995, and more recently, by anglers in 2003-2004. Substrate was mapped using an underwater video camera (Seaview®) with infrared enhancement at the first impassable barrier where observations had occurred. An area along the north shore between lower and upper turbines contains predominantly cobble gravel substrate (20,268 sq ft) appropriate for spawning. Sampling was accomplished from May 9-13 by use of gill nets (150x8', 10" mesh), egg traps, and underwater video. A total of 11 adult lake sturgeon in spawning condition (1 Female, 10 Males) were captured during daylight sets (CUE = 0.1 fish/hour). All fish were measured to nearest mm total length, and received a yellow FLOY tag on either pectoral fin. A section of dorsal fin was also removed for genetic analysis. Twenty egg traps were deployed daily in areas of suitable spawning habitat. Egg traps were efficient at capturing fish eggs, primarily suckers (*Moxostoma* sp.). A single sturgeon egg was captured indicating a spawning event had taken place.

Netting in 2006 was directed downstream to find a potentially safer area to collect brood stock in the event that an egg take would occur from this water. Underwater video was used to delineate a site with substrate commensurate with gill netting. A detailed bathymetry profile was also constructed to aid in net placement so that interaction with boat traffic would be negated.

Daylight gill netting was done predominantly the week of May 8th. A total of 5 lake sturgeon were sampled for a CUE of 0.07 fish/hour. Water temperatures ranged from 58-64°F which is the upper end of optimal spawning temperatures for this species. It is unknown whether these were pre or post spawn fish.

Discharge during the spawning run was high in both 2007-08 which did not allow for evaluation of the run. Experience gained in 2005-06 indicated that gear efficiency was compromised with discharge >6,000 cfs. A limited netting effort was done in 2009 when flows were adequate late in April. Five ripe male sturgeon were captured and tagged. One fish was recaptured from the 2006 netting effort (Floy® #1764).

Black River, Lake Ontario and St. Lawrence River: 2010

Black River

A total of 27 lake sturgeon were captured in the Black River between April 8-29, 2010. Eight net nights (183.74 net-hrs) of effort were expended giving a Catch per Unit Effort (CUE) = 0.15 fish/hr (Table 2). PIT tags purchased under the FEMRF grant were not available at the initiation of sturgeon netting in 2010. PIT tags (N=19) remaining from another project were used on the first candidate fish captured while remaining fish were Floy® tagged. All fish for which gender and stage could be determined were ripe males (N=22). Gender could not be assigned for 5 fish, however two fish presented a body form similar to that of gravid females.

Lake Ontario

Black River Bay has been productive with regard to adult fish. Adult fish (N=5) could be caught regularly throughout the field season with relatively little effort. The catch rate specific to the bay, when including all effort, provided a CUE = 0.06 fish/hr (1.5 fish/net-night). Two of these fish were captured and PIT tagged in Black River Bay by the NYS DEC Lake Ontario Unit (Cape Vincent) as part of their annual Lake Ontario Warmwater Assessment on August 5, 2010. Catches in Chaumont Bay (N=2) and at Sandy Creek (N=1) demonstrated that sturgeon could be collected in the Eastern Basin outside of Black River Bay. Juvenile sturgeon were not encountered in 2010, however specific targeted attempts to capture juveniles were limited to 10.5 net hours.

St. Lawrence River

A total of 124 sturgeon were collected from May 24-27, 2010 at three net sites below the Moses Power Dam with an effort of 275.67 net-hrs. Netting at this location is associated with an annual restoration project. The majority of fish collected were males (N=81), 40.3% ripe and 25% hard. Females comprised 3.2% of the sample (N=4). Gender for the remainder of fish (N=39) was unknown. Sturgeon used for the 2010 egg take (females N=3, males N=9) were taken from this group.

Targeted effort upstream of the power dam (Massena, NY) in 2010 consisted of 6 net-nights (133.07 net-hrs) in the Thousand Islands. One fish was collected in the Chippewa Bay area for a CUE= 0.01 fish/hr. Existing index projects consisted of 48 net-nights (916.19 net-hrs) in U.S. waters of the Thousand Islands and Lake St. Lawrence. The Coles Creek area, known to have high densities of sturgeon, produced two fish on Sept. 22, 2010.

Future

Efforts in 2011 will be similar to the previous year. New areas of the Eastern Basin of Lake Ontario will be explored with the hope of expanding our knowledge of sturgeon movements around Lake Ontario and the St. Lawrence River.

Table 1. Relative effort and success rate of lake sturgeon collection attempts on the St. Lawrence River and Lake Ontario in 2010.

Location	Dates	# Sites	Target	Effort (hrs)	Catch	CUE (fish/hr)
Targeted						
Black River	4/8-29/2010	1	Adult	183.74	27	0.15
SLR-down	5/24-27/2010	3	Adult	275.67	124	0.45
Lake Ontario	6/15/2010	2	Juvenile	10.5	0	0.00
Lake Ontario	6/15 -7/7/2010	11	Adult	374.74	6	0.02
SLR- up	6/29-30/2010	6	Adult	133.07	1	0.01
Existing project						
SLR- TI	7/26-29/2010	32	Both	637.04	0	0.00
SLR- LSL (US)	9/20-22/2010	16	Both	279.15	2	0.01

9:45 Genesee River, Oswego River, Oswegatchie River Research Update.

Genesee River Lake Sturgeon Experiment

Dawn Dittman

U.S. Geological Survey, Great Lakes Science Center, Tunison Laboratory of Aquatic Science, Cortland, NY 13045.

The Genesee River in New York was identified as a possible target water for lake sturgeon restoration based on significant historic presence. The river's lower 9km is in the EPA designated Rochester Embayment Area of Concern. One management tool used in threatened species conservation is the experimental stocking of hatchery-reared fish into areas where the original populations have been extirpated for an applied evaluation of the current available habitat suitability. After determining that habitat suitability model scores were acceptable, the river received 1,900 marked fall fingerlings, 2003-2004. By July of 2009, 733 individuals had been recaptured and tagged. Average catch rate is 2 to 4 sturgeon per net/night, with up to 18 in a single net. Multiple recaptures of marked sturgeon have allowed analysis of individual growth patterns. The average size of captured sturgeon in July 2009 was 65.8 cm & 1.589 kg. The largest 6 year old was 97.2 cm and 5.65 kg. Growth rates and catch rates are comparable to or higher than other locations in the species native range. Results of this research in the Genesee River will provide information needed for future steps in the restoration of lake sturgeon in tributaries of Lake Ontario.

Spread of Released Lake Sturgeon: Oswego Basin NY.

As part of an ongoing program to restore lake sturgeon (Acipenser fulvescens) in New York, hatchery-produced juveniles have been stocked into Oneida (8,127) and Cayuga (3,752) lakes, 1995-2004. Release of juveniles as a restoration strategy assumes movement into available suitable habitat. This part of the New York Canal system consists largely of a highly altered barge canal, with the majority habitat consisting of relatively homogenous depths and substrates maintained by regular dredging and a degraded water quality. Migration of these fish into the Seneca and Oswego Rivers (Oswego and Erie Canals) has been documented. Seasonally measurable local populations appear to be developing in the system upstream and downstream of barriers (lock/dam complexes). The 2009 average size in the Seneca River was 1.21 m and 9.03 kg. In the Oswego River it was 1.3 m and 11.94 kg. The sizes and size distributions of these relatively young fish are consistent with that of similar age sturgeon in other systems. Following the tagging of lake sturgeon in Cross Lake in October 2009, 4 of 5 sturgeon caught were recaptured in May/June 2010, 36 km upstream at the Cayuga Lake dam. Migration was observed in the opposite direction when 5 of 6 tagged lake sturgeon recaptured in Cross Lake during October 2010 had been tagged at the Cayuga Lake dam in Spring. These fish are using the available habitat and growing well. The canal system offers a suite of human impacted habitat conditions that are unfortunately not so rare within the lake sturgeon's native range.

10:05 St. Lawrence River Population Enhancement Scoping Study. **Jim Johnson** (USGS Tunison)

St. Lawrence River Lake Sturgeon Population Enhancement Scoping Study

James H. Johnson

Tunison Laboratory of Aquatic Science, Great Lakes Science Center – USGS, Cortland, NY 13045

Farrell et al. (2009)* recently completed a report funded by the Fish Enhancement, Mitigation, and Research Find for the St. Lawrence River. The report examined the utility of using annual hatchery supplementation as the means to restore lake sturgeon since field assessments have documented the absence of suitable main stem spawning sites above the dam at Massena as well as a lack of sites where spawning bed enhancement would likely work. Except for a small stretch of river near Waddington, reservoir like conditions above the dam preclude spawning habitat enhancement as a river-wide solution to population restoration. The study examined the feasibility of restoring lake sturgeon as a common species at population levels sufficient to control invasive species, particularly zebra mussels and round goby. More importantly the report also included a preliminary examination of potential sites for a lake sturgeon hatchery capable for rearing target numbers of 62,500 to 125,000 fingerling (6.5 inches) lake sturgeon. A total of twelve sites were evaluated based on hydrology, topography, proximity to brood stock, bio-security, support services, associate site preparation costs, and acreage (i.e. 5 acres minimum). Of these, four sites were identified as the best sites to be considered for further evaluation. These sites were former NYSDEC hatchery sites at Cape Vincent and Ogdensburg, a New York Power Authority site near Waddington, and a site on the lower Raquette River at Akwesasne.

Prior to funding level reductions in 2011, funds to determine the best lake sturgeon hatchery site of the remaining four sites were included in the Great Lakes Restoration Initiative (GLRI). Although there was no commitment to build a lake sturgeon hatchery, GLRI funding was to complete the final site evaluations and for the top priority site develop detailed plans, designs, and cost estimates (construction, annual operations, and maintenance). If GLRI funding is restored in 2013 the comprehensive hatchery siting analysis will proceed at that time.

*Farrell, J.H., R.T. Colesante, D.E. Dittman, and J.H. Johnson. 2009. Lake sturgeon population enhancement as a strategy for improvement of ecosystem function and controlling invasive species. Submitted to Fish Enhancement Mitigation and Research Fund, US Fish and Wildlife Service New York Field Office, Cortland, NY. 46 pp.

10:40 Status of Stocked Lake Sturgeon in Oneida Lake. **Randy Jackson** (Cornell University Bio. Field Sta.)

Status of lake sturgeon in Oneida Lake, New York

James R. Jackson, Thomas E. Brooking, Anthony J. VanDeValk, and Scott D. Krueger

Cornell Biological Field Station, 900 Shackelton Point Road, Bridgeport, NY 13030

As part of a lake sturgeon restoration program conducted by the New York Department of Environmental Conservation in the Lake Ontario watershed, nearly 8,000 fingerling lake sturgeon have been stocked into Oneida Lake since 1995. A monitoring program conducted by the Cornell Biological Field Station has indicated that sturgeon stocked into Oneida Lake have exhibited extremely high growth rates, with the largest fish captured so far weighing in at over 38 kg in spring 2010. Growth rates from age-1 to age-12 are significantly faster than other populations where length-at-age data are available for these age classes. Diet assessments show that amphipods and snails are the most common food items of smaller juvenile sturgeon, with zebra mussels becoming the dominant diet item as sturgeon grow above 700 mm. Habitat selection, based on gill net catches, shows higher use of firm substrates where zebra mussels have colonized the lake. Mark-recapture data from standardized gill net sampling during the 2002-2007 growing seasons were collected from sturgeon from the 1995 stocking cohort (initial stocking 5070 fish). While sample sizes were low and confidence intervals large, data suggest that 36% of fish stocked in 1995 were present in the lake in 2002 (95% CI: 18-53%). Ratios of captures of sturgeon cohorts in gill net samples suggest that survival is similar among all stocked year classes, despite initial differences in size at stocking.

11:00 Lake Sturgeon Summer Habitat Use in the Erie Canal. **Errol Scheid** (SUNY-ESF Syracuse)

Lake Sturgeon Summer Habitat Use in the Erie Canal System

Errol J. Scheid and Kathleen E. McGrath

SUNY-ESF, Department of Environmental and Forest Biology, 1 Forestry Drive, Syracuse, New York 13210.

Lake sturgeon is currently listed as a threatened species in New York State. Since 1994, the DEC has periodically stocked lake sturgeon in the Oswego River (Erie Canal) system, with releases in Oneida and Cayuga lakes. Relatively little is known about 1) habitat quality for lake sturgeon or 2) their habitat use within the canal in central New York. We evaluated habitat quality for foraging lake sturgeon by applying the existing habitat suitability index (HSI) during the summers in 2009 and 2010. Habitat variables of importance in the HSI are water depth, current velocity, and substrate particle size. We also captured lake sturgeon throughout the canal system using 24-hr gill net sets to test consistency of use with the HSI. Based on the HSI, every site had a lower adult index score, which is determined solely by substrate size. We have not found strong relationships between any of our habitat variables and use by sturgeon. All lake sturgeon were caught at sites with depths between 4-7m and current velocities less than .15m/s. Future analyses will examine more subtle habitat use patterns associated with interactions among variables. Proximity to lakes and barriers may also be important factors influencing lake sturgeon distribution during the summer months. Preliminary analyses suggest that use of the lake sturgeon HSI, as it was developed, may not be appropriate for the Erie Canal system.

11:20 USFWS- Niagara River/Lake Ontario Research Update. **Betsy Trometer** (USFWS LGLFRO Amherst)

Lower Niagara River Lake Sturgeon Population Status Assessment and Habitat Usage

Betsy Trometer - USFWS, Lower Great Lakes Fish and Wildlife Conservation Office (LGLFWCO), John Sweka – USFWS, Northeast Fish Tech Center (NFTC), Michelle Casto Yerty - USFWS, LGLFWCO, Dimitry Gorsky - USFWS, LGLFWCO, Gregory Jacobs - USFWS, NFTC

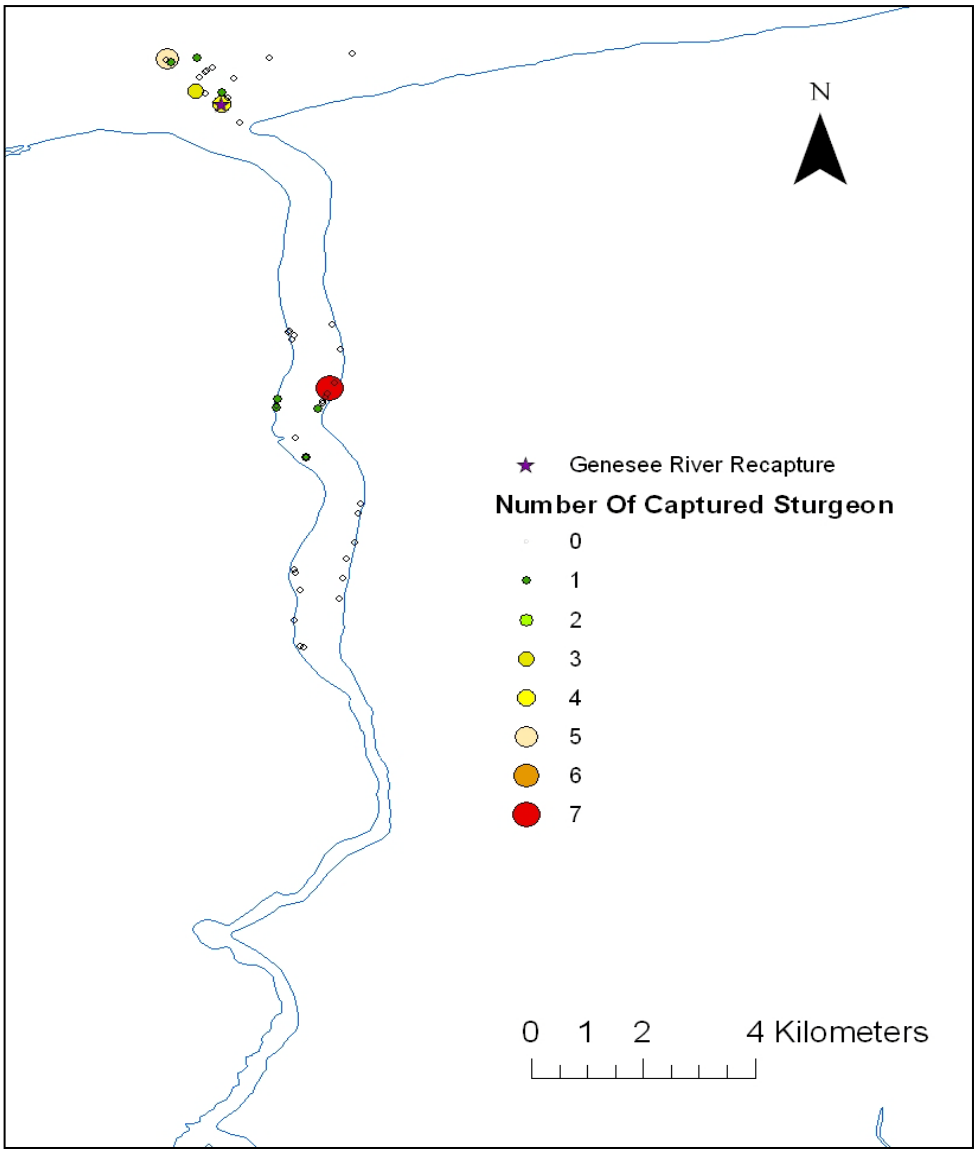
Objectives

1) To estimate the abundance and survival of lake sturgeon in the lower Niagara River and Niagara Bar.
2) To determine the age and growth of adult and juvenile lake sturgeon.
3) To determine habitat usage for identification of spawning and other important habitat

Estimate of Abundance and Survival

In 2010, 28 lake sturgeon were captured and marked (Figure 1). There were no recaptures, but one fish was a tagged lake sturgeon from the group stocked in the Genesee River.

Figure 1. 2010 lake sturgeon sampling locations with number of sturgeon collected



Sampling will continue in 2011 starting in April. Fork length, total length, weight, and girth will be measured and a section of the pectoral spine will be removed for age estimation. Lake sturgeon will be marked with a PIT Tag and T-bar external tag and released. Population size will be estimated using the program MARK. The sampling season will be stratified by monthly time periods and individual capture histories will be developed. Capture histories will be fit to various mark-recapture models and the most appropriate model will be determined by Akaike's Information Criteria (AIC values).

Age and growth of adult and juvenile lake sturgeon

Spine samples will be sent to NFTC in Lamar, PA for aging. Age class structure will be estimated from reading annuli on transverse sections of the pectoral spine. Age and growth data from the current lake sturgeon population (2010-2011) will be compared age and growth data from a decade ago (1998-2003).

Habitat Usage

Up to 30 adults (≥ 1300 mm) will be radio tagged to get more detailed data on spawning locations and habitat use. Habitat variables to be measured include: depth, surface current velocity (and bottom current velocity when practical), D.O., pH, temperature. Variables will be measured at randomly selected points within the Niagara River and Niagara Bar to compare habitat use vs. availability. Active tracking from shore and by boat will occur at least twice a week during April through June, and once a week or less the rest of the year. Continuous passive tracking will occur from two data-logging receivers located at Coast Guard station at Fort Niagara and at Devil's Hole (NY Power Authority property).

Habitat use data from radio tracking will be combined with GIS habitat mapping data (described below) and field measurements of water chemistry to improve habitat suitability models.

Benthic Mapping

Mapping will begin in spring 2011 in lower Niagara River and Niagara Bar using the Edgetech 4125 side-scan sonar system with dual frequency 400/900 kHz utilizing Sonar Wiz.map software from Chesapeake Tech. Mapping of upper Niagara River will begin after completion of the lower river.

Niagara River Larval/Juvenile Fish Survey

A general fish survey using drift nets, ichthyoplankton nets, light traps, and minnow traps was started in May 2010. In 2011, we will continue larval and juvenile surveys using the same gear and including larval seine. Drift nets will be used to target larval lake sturgeon. We will incorporate egg traps in suspected lake sturgeon spawning areas based on both survey periods (1998-2000 and 2011).

11:40 St. Lawrence River – NYPA Lake Sturgeon Constructed Spawning Bed Update.

St. Lawrence River – NYPA Lake Sturgeon Constructed Spawning Bed Update

Benjamin Lenz, New York Power Authority

In October 2007, NYPA installed two lake sturgeon spawning beds in the vicinity of Iroquois Dam near Waddington, NY, on the St. Lawrence River. Iroquois Dam is a water control dam that consists of 32-gated structures. Generally, the gates are in the full open position, resulting in full continuous flows, although they may be lowered at certain times of the year for specific purposes, such as ice formation or to reduce the potential for downstream flooding. One spawning bed was installed just upstream of the Dam and one was installed just downstream of the Dam. Each bed is approximately 30 m in width and 30 m in length and consists of number 3 and 4 clean gravel (5 10 cm diameter). In addition, 10 large boulders were placed at the downstream end of each spawning bed to act as velocity breaks that could potentially be used by staging lake sturgeon. The water at each bed varies from 9 to 12 m in depth and current velocities range from 0.80 to 1.5 m/s.

Earlier studies showed that the lake sturgeon spawning period in the St. Lawrence River, generally starts when the water temperature reaches 10°C (La Haye et al., 2003) and peaks when the temperature is around 15°C (LaPan et al., 1996). Studies conducted in Ogdensburg, NY, recorded lake sturgeon spawning at water temperatures ranging from 13.8°C to 17.0°C (LaPan et al., 1998; Environnement Illimité inc., 2005a). Temperature ranges observed in this study are similar to this range and typical for spawning lake sturgeon. These temperatures generally occur between May 28 and June 17 (Environnement Illimité inc., 1987, LaPan et al., 1996, La Haye et al., 2003; Environnement Illimité inc., 2005a). The peak spawn occurred on June 10 (water temperature: 14.9°C) in 2008, on June 8 (water temperature: 13.4°C) in 2009, and on June 2 (water temperature: 15.4°C) in 2010. These spawn dates and water temperatures are all within the typical window observed for sturgeon spawning in this region of the St. Lawrence River.

The number of lake sturgeon observed in 2010 was lower than 2009 but higher than 2008. During the peak day in the 2010 survey, 186 sturgeon were observed on the upstream bed and 75 on the downstream bed for a total of 261. The total number of lake sturgeon observed on both beds was 395 in 2009 and 116 in 2008 (Environnement Illimité inc., 2009; 2010). This represents a more than two-fold increase from 2008, and a one and half-fold decrease from 2009.

The estimate of sturgeon abundance on the peak day in 2010 indicated that 465 sturgeon (between 145 and 803 individuals) were present on the upstream bed and its surrounding area, whereas while 188 sturgeon (between 62 and 312 individuals) were present on the downstream spawning bed and its surrounding area. The methodology used to estimate the abundance in 2010 was the same that was used in 2009, thus allowing comparison. On the peak day in 2009, the estimation showed that 709 sturgeon (between 249 and 1,230 individuals) were present on the upstream spawning bed and its surrounding area, whereas 278 sturgeon (between 95 and 478 individuals) were present on the downstream spawning bed and its surrounding area (Environnement Illimité inc., 2010). Although the maximum daily abundance obtained in 2010 appears to be lower than in 2009, it is not possible to conclude that these estimates are significantly different, given the wide confidence intervals in the daily estimates.

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1:00 Genetic Effects of Lake Sturgeon Stocking at Oneida Lake. **Amy Welsh** (SUNY-Oswego)

Genetic Effects of Lake Sturgeon Stocking in Oneida Lake

Amy Welsh

State University of New York at Oswego

In an effort to increase the number of self-sustaining lake sturgeon populations, stocking has occurred in several locations in New York. However, there are several genetic risks that need to be considered when stocking. One of the risks is a loss of genetic diversity in the stocked individuals relative to the donor population. This can occur due to limited sampling of the brood stock (and thus only sampling a subset of the population's genetic diversity) or due to matings by a small number of individuals resulting in highly related stocked individuals. In Oneida Lake, 5000 individuals were stocked in 1995 from 2 females and 4 males caught from the Des Prairies River in Quebec. In subsequent years (6 years between 1996 and 2004), smaller numbers of individuals were released and the parents were caught from the St. Lawrence River in Massena. Our objectives were to 1) determine if the stocked sturgeon had the same genetic diversity as their source populations, and 2) determine whether the number of parents used had an effect on the genetic diversity of the resulting offspring. Samples collected from Oneida Lake were analyzed at 12 microsatellite loci. The stocked individuals were genetically different from their source populations due to differences in allele frequencies. There was no significant difference in heterozygosity between the source populations and their respective stocking cohorts. The 1995 cohort from Quebec had significantly fewer alleles ($p=0.000$) and higher relatedness ($p=0.001$) than its source population. The number of parents used had no effect on heterozygosity or number of alleles in the resulting offspring. However, there was a negative correlation between the number of parents and relatedness of the offspring, with the offspring being more related the smaller the number of parents used. The best stocking strategy appears to be stocking small numbers over several years instead of stocking large numbers during a single year. Stocking over several years increases the number of alleles that are represented in the stocked population, thereby increasing their genetic diversity and long-term evolutionary potential.

1:20 SRMT Lake Sturgeon Project Update/First Nation Perspective. **Tony David/Barbara Tarbell**

St. Lawrence/Akwesasne Lake Sturgeon Restoration

Tony David, Barbara Tarbell, and Jessica Jock

St. Regis Mohawk Tribe

Lake Sturgeon Restoration

The Tribe has been funded for a three year Lake Sturgeon Restoration project under the Great Lakes Restoration Initiative (GLRI). The goal is to address the St. Lawrence AOC Beneficial Use Impairments (BUI) including restriction on fish consumption; degradation of fish population; and habitat loss. The project includes collaborative efforts to achieve measurable outcomes within the Massena/Akwesasne AOC such as Habitat Mapping and Management Plan; Evaluation of reproduction of lake sturgeon; and Habitat Evaluation and Engineering design for placement or enhancement of sturgeon spawning habitat.

Collaboration-Habitat Evaluation-Reproductive Failure

The first year of the project is mainly coordination with Resource Agencies (State, Federal and Tribal) to gather and evaluate current studies, identify field monitoring needs, and prioritize restoration goals. The SRMT will host at least three focus group meetings this year to discuss the habitat delineation needs within the St. Lawrence AOC (ie. substrate analysis and velocity profiling). The first few focus group meetings will concentrate on identifying target areas and design of habitat evaluation. The intention at the end of the three year project is to identify suitable location and place new or enhance existing sturgeon spawning bed.

The need for toxicity testing of potential reproduction failure will also be vetted with resource agencies and academia. There has been anecdotal evidence of reproductive failure in the past years and through collaborative discussions will examine the root causes and if there is a need for testing.

Education Outreach

Throughout the life of this project the SRMT intend to conduct a wide range of public education. To inform the community on the biology, ecology, population status and current threats to lake sturgeon is a valuable effort for future management and stewardship in the Massena/Akwesasne AOC. Mohawks in the Akwesasne territory continue to consume sturgeon as they always have and some strive to maintain fishing as a traditional practice. Through various means of outreach and with special emphasis on the youth, who are up and coming anglers, we hope to inform and educate of the importance of this long lived species. The SRMT will target local schools incorporating fun educational activities for the children including a “Stewie the Sturgeon” costume. The distribution of various educational materials will be coordinated with local fishing events and signage at local Marina’s in Mohawk and English is anticipated to generate awareness.

For more information please contact: SRMT Environment Division 518-358-5937

Barbara Tarbell- Lake Sturgeon Restoration Coordinator: barbara.tarbell@srmt-nsn.gov

Jessica Jock- GLRI AOC Coordinator: jessica.jock@srmt-nsn.gov

Tony David- Water Resources Program Manager: tony.david@srmt-nsn.gov

1:40 Oswegatchie Relicensing/fish passage update. **Steve Patch** (USFWS)

Ongoing FERC Hydro Licensing Activities in New York

Stephen P. Patch
United States Fish and Wildlife Service

Steve discussed several recent Federal Energy Regulatory Commission (FERC) licensing activities in New York that affected lake sturgeon. The first project discussed was the relicensing of Brookfield Power's Oswegatchie River Hydroelectric Project, which consists of six developments spread over 90 miles of river from the mouth to Cranberry Lake. The two dams that affect sturgeon are Eel Weir (river mile 5.1) and Heuvelton (river mile 12.0). A settlement was filed with the FERC on 02/18/11. Each of the two developments will have fish protection in the form of 1" clear-spaced trash racks, downstream fish passage through a sluice/plunge pool combination, and upstream fish passage for sturgeon, American eels, and other species. Upstream passage may be via vertical slot fishways (Heuvelton and Eel Weir) or possibly a natural rock-ramp design (Eel Weir). Effectiveness monitoring will occur, followed by any necessary modifications to the fishways. The fishways at Eel Weir will be installed in 2015 and those at Heuvelton in 2017. When implemented, these passage facilities will open up about 60 miles of the Oswegatchie River and allow sturgeon to move between currently isolated river reaches

Despite the measurements being put into effect at the Oswegatchie River Project, fish from the St. Lawrence River will still be blocked from entering the Oswegatchie River by the dam at Ogdensburg. This hydro was licensed in 1987 and the license expires in 2027. The Service and NYSDEC are exploring the possibility of reopening the license to require passage, but must go through a process to determine the pros and cons of such an undertaking, including the likelihood of inadvertently allowing access to invasive species and diseases.

A new dam proposal for the Grasse River in Massena was recently withdrawn. This project would also have served as an ice control structure to facilitate ALCOA's PCB remediation. The dam would have been the first blockage on the river, which is currently open for about 35 miles to Madrid. The project would have restricted migration of sturgeon, eel, and other species, and flooded riffle spawning areas. With the project being withdrawn, the river should remain open for the foreseeable future.

The hydroelectric project at Hogansburg near the mouth of the St. Regis River is undergoing relicensing. The license expires in 2015. This project is also owned by Brookfield Power. It is a very small project producing only about 1,500 mwh of power annually. Brookfield would like to license the status quo as the project does not produce enough energy to support extensive mitigation costs. Therefore, dam decommissioning and removal is a viable option at this site and will be seriously considered. If the project remains, the Service will likely prescribe upstream and downstream fish passage facilities. The future of this dam should be clearer in 2-3 years.

2:00 VT F&WD Plans for Lake Sturgeon Mgt in Lake Champlain. **Chet Mackenzie** (Vermont Dept. F&W)

Lake Sturgeon Management in Lake Champlain

Chet Mackenzie

Vermont department of Fish and Wildlife

Lake sturgeon in Vermont are native to Lake Champlain and the lower reaches of several of its tributaries and are currently on the state's endangered species list. Lake Champlain supported a small commercial fishery in the late 1800's and early 1900's that harvested from 50 to 200 sturgeon annually. Harvest declined rapidly in the late 1940's, and the fishery was closed in 1967. The decline has been attributed to overfishing and habitat loss in the rivers that were used as spawning and nursery grounds. Historic spawning grounds were found in the Missisquoi, Lamoille and Winooski Rivers, and Otter Creek.

Non-lethal gillnet sampling for spawning lake sturgeon was conducted near historic spawning sites in the Lamoille and Winooski Rivers from 1998 to 2002. Gillnets were also set near spawning sites in the Missisquoi River in 2001 and 2003. Three to 11 sturgeon were caught each year in the Lamoille and Winooski rivers. No sturgeon were captured in the Missisquoi River. Fifteen and 9 individual sturgeon were tagged in the Winooski and Lamoille Rivers, respectively. Some sturgeon were recaptured multiple times in a season and in multiple years. All sturgeon were male except for two small, immature fish that could not be sexed. Sturgeon ranged in size from 960 to 1,660 mm total length. Ages ranged from 5 to 50 years old. All sturgeon had been attacked by sea lamprey with wounding rates for fresh and healing wounds averaging 255 wounds per 100 fish. Tissues samples were collected for genetic analysis.

Sampling for sturgeon eggs was conducted in the Winooski, Lamoille, and Missisquoi rivers and Otter Creek between 2003 and 2008. Sturgeon eggs were collected in all 5 years that sampling occurred in the Winooski River, 3 of the 4 years sampled in the Missisquoi River and 3 of the 5 years that sampling occurred in the Lamoille River. No sturgeon eggs were collected in Otter Creek.

Driftnets were used to sample for larval lake sturgeon in the Winooski River in 2004 and 2005, Otter Creek and the Lamoille River in 2005 and in the Missisquoi River in 2008. Larval lake sturgeon were collected in both years sampling occurred on the Winooski River and in 2005 on the Lamoille River. No larval sturgeon were collected in Otter Creek or the Missisquoi River.

Sampling has documented recent spawning activity in 3 of 4 historic spawning sites on Lake Champlain and movement of individual sturgeon between spawning sites. Sturgeon ranging from young-of-the-year to age-50 are present indicating successful reproduction has continued to occur since hydroelectric facilities were developed on the Lamoille and Winooski rivers. Analysis of tissue samples indicates that genetic diversity is still high within Lake Champlain's sturgeon population and it is genetically distinct from other North American populations (Welsh et al 2008). Lamprey attack rates are high relative to other fishes in Lake Champlain.

Lake sturgeon will continue to be protected under the Vermont fishing regulations and endangered species regulations. Spawning areas on major tributaries will continue to be closed to angling. Any sturgeon caught by anglers in Vermont must be released immediately. Public outreach efforts will continue at the present level including maintaining signage at access areas and news releases. Efforts to improve sturgeon habitat will be pursued during FERC relicensing of hydroelectric facilities and supporting the removal of barriers on tributaries used by sturgeon for spawning including the Swanton dam on the Missisquoi River. Sea lamprey control efforts will continue to be a priority. Due to the unique genetic strain of the Lake Champlain lake sturgeon population, good genetic diversity, and evidence of continued natural reproduction, there are no plans to stock sturgeon in Vermont. Management efforts are focused on improving sturgeon habitat and addressing potential sources of mortality (e.g. incidental catch, flow alterations, sea lamprey attacks).

The Vermont Fish and Wildlife Department is planning to develop a lake sturgeon restoration plan that will include measurable objectives for the restoration effort and identify critical research needs.

Prepared by: Chet MacKenzie, March 21, 2011

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2:20 Sturgeon Restoration Planning for Lake Ontario. **Alastair Mathers** (OMNR)/**Steve LaPan** (NYSDEC)

Sturgeon Restoration Planning for Lake Ontario

Alastair Mathers and Steve Lapan

Ontario Ministry of Natural Resources

New York State Department of Environmental Conservation

1. Great Lakes Fisheries Commission Recommendations for Rehabilitation of Lake Sturgeon in Lake Ontario

- Purpose is to coordinate sturgeon management activity around 'the lake' and to focus more attention and research on sturgeon
  - ☐ Management agencies include: USFWS, USGS, NYSDEC, DFO, Quebec MRNF, OMNR, Conservation Authorities
- "Lake Ontario system" is defined as: the waters of Lake Ontario, the Niagara River below Niagara Falls, the St. Lawrence River above the Beauharnois Power Dam, includes tributaries to this system that may have provided important sturgeon habitat in the past, but now have barriers to sturgeon migration (i.e. up to the first natural barrier).
- Background information includes: commercial harvest of sturgeon in Lake Ontario and upper St. Lawrence River, sturgeon catch in St. Lawrence River surveys and sturgeon catch in eastern Lake Ontario surveys.
- List of current and historic spawning populations is provided
- Potential issues for sturgeon management in Lake Ontario are identified
- Goals, indicators and strategies are suggested
- Currently trying to integrate with Ontario and Federal plans

2. Conservation status of Lake Sturgeon in Ontario and Canada:

- Canadian Species at Risk Act
  - ☐ recommended as threatened in the Great Lakes and St. Lawrence River
  - ☐ Federal government is consulting and reviewing
- Ontario Endangered Species Act
  - ☐ Great Lakes – upper St. Lawrence River population (Threatened)
  - ☐ MNR developing a long-term strategy for managing sturgeon in Ontario as part of the requirements of the ESA
    - Recovery strategy has been drafted and is undergoing agency review
    - Will be Posted for public comment
    - Government response statement will be developed
    - Products developed as part of Ontario recovery planning by MNR (available at www.mnr.gov.on.ca):
      - o Lake Sturgeon in Ontario completed
      - o Lake Sturgeon Culture and Stocking Techniques for Population Rehabilitation completed
      - o General Habitat Description drafted
    - BMP for sturgeon at waterpower projects developed by Ontario Waterpower Association (available at http://owa.ca/waterpower-information/owa-resources/)

Poster Presentations

Movement of juvenile lake sturgeon in the lower Genesee River, NY

Mananjo Jonahson
State University of New York at Brockport
Contact: mananjo.jonahson@fulbrightmail.org

ABSTRACT

As an important step in a long-term stocking program, this project investigated the movement and habitat use of juvenile lake sturgeon after they were stocked in the lower Genesee River, New York. Nine young animals were selected to represent the population, ranging from two to three years of age and from 0.180 kg to 0.910 kg in weight. The young animals were implanted with internal radio transmitters; six of the nine radio-tagged animals provided useful tracking data. Their movements were monitored during the summer and fall of 2006. These fish aggregated often, with fish gathering occurring in 21% of all observations. The young fish traveled a total of 5.57 km to 22.03 km throughout the study period between tracking periods of 28 to 103 days. Based on a 24-hour survey, the fish traveled an average of 0.806 km/day. The juvenile fish occupied the southern sections of the lower Genesee River more frequently than other sections, with 57% of all locations occurring between rkm 7 and 9. River use was not randomly distributed ($\chi 2 = 66.85$, dF = 6, p-value = 0.001). The fish occupied all depths, but most locations (49.1%) were within water 3.0 m to 5.0 m deep. A pronounced downstream movement to river kilometer 2.8 and 2.9 was recorded in mid-fall, when the water temperature dropped from 9°C to 5°C. The locations of three radio-tagged fish in early spring of the following year suggested that the juvenile lake sturgeon were sedentary during winter. Overall, the behavior of the stocked population in the lower Genesee River was comparable to other juvenile lake sturgeon naturally occurring in other systems. The findings from this study indicate that the stocked lake sturgeon move throughout the river and the stocking program is successful to the first years.

(See Poster Below)

(Use Zoom feature to enlarge)

Movement of lake sturgeon in the lower Genesee River, New York

Mananjo Jonahson
SUNY Brockport, New York 14420

Introduction

In 1999, the New York State Department of Environmental Conservation in collaboration of the USGS Tunison Laboratory of Aquatic Sciences launched a restoration program of the lake sturgeon in the lower Genesee River, New York (Dittman and Zollweg 2006). As an important step in the long-term stocking program, this project investigated the movement and habitat use of juvenile lake sturgeon after they were stocked in river.

View of the southern part of the lower Genesee River

Research questions:

- Do juvenile lake sturgeon move throughout the lower Genesee River? If so, are there any seasonal or temporal variations in the movement? Do the juvenile fish visit Lake Ontario?
- How do stocked juveniles use the river? Do they use more parts of the river compared to others?

Methods

Gillnetting of sturgeon was conducted from 24 to 27 July 2006. Nine juvenile lake sturgeon were selected for the study. Each animal was implanted with a radio transmitter with a unique frequency. Sturgeon tracking was conducted by boat using "homing in technique" and typically between 0800 and 1800 hours.

Radio tagged juvenile lake sturgeon in the Genesee Rive, NY

Fish movements were monitored during the summer and fall of 2006. Two additional tracking were conducted in March and June of 2007.

Results

Results from gillnetting and radio tracking

The nine juvenile lake sturgeon selected for the study ranged from two to three years of age and from 0.180 kg to 0.910 kg in weight. Six of the nine radio-tagged animals provided useful tracking data (Table 1).

Table 1: Characteristics of the six juvenile lake sturgeon radio tracked during the study, sorted by weight (g).

Fish	Frequency (MHz)	USGS tag	Fish weight (g)	Fish length (mm)	Girth (mm)	Year Class
1	053.376	593	180	355	142	2004
2	053.409	316	260	395	152	2004
3	053.392	589	280	391	150	2004
4	053.448	457	464	444	182	2004
5	053.469	585	590	512	180	2003
6	053.332	236	910	585	205	2003

Results

Fish movement and river use

Overall the six radio-tagged fish traveled the length of the Genesee River. Locations were recorded between river kilometer (rkm) 2.3 and 9.3.

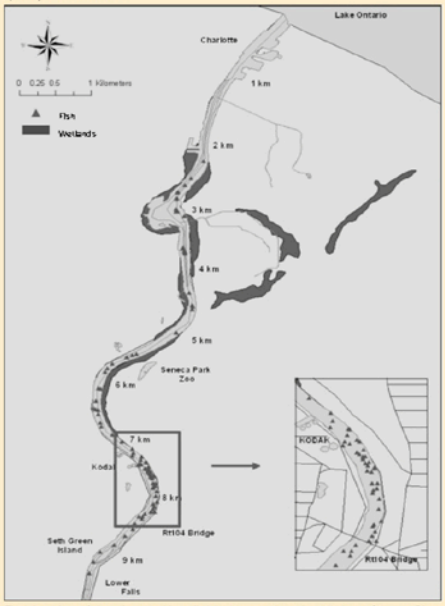


Fig.1: Locations of six radio-tagged juvenile lake sturgeon throughout the lower Genesee River, 25 July 2006 to 5 November 2006 and March 2007. Figure includes initial capture locations. The cluster between rkm 7 – 8 is highlighted.

However, the use of some regions of the river was clearly heavier compared to others (Figure 1). The sections between rkm 7 and rkm 9 were the most frequented, with the fish located in that section more than 57% of the time. An analysis of frequencies showed that the observed distribution of the fish did not follow a Poisson distribution ($\chi^2 = 66.85$, dF = 6, p-value = 0.001). Thus, the fish were not randomly located throughout each section of the river.

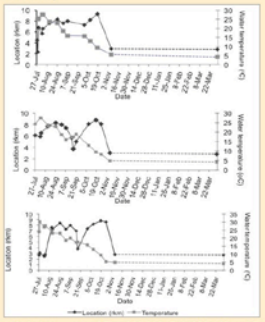
The juvenile fish did not approach the marinas or the river mouth at any time and none of the six animals was found in Lake Ontario.

The six radio-tagged juvenile fish moved an average distance of 0.806 km/day. The young fish aggregated often, with fish gathering occurring in 21% of all observations.

Results

Relationship: fish location and water temperature

During warmer months, the fish moved independently of the changes in water temperature. On the other hand, fish location was related to a drop in water temperature in the fall. The juvenile lake sturgeon moved downstream when the bottom water temperatures dropped from 10°C to about 5°C. Locations of the animals in early spring the following year suggested that the young animals might have been sedentary during winter (Figures 2,3,4).



Figures 2, 3, 4: Location of Fish 053.332, Fish 053.448 and Fish 053.469 in relation to water temperature, 26 July 2006 to 31 March 2007.

Conclusions

Findings from this study indicate that the behaviors of the juvenile lake sturgeons stocked in the Genesee River were comparable to the behavior of other natural or artificial populations in other regions. The findings also suggest that the stocking program is successful to the first years. However, some additional information is still needed to understand the movement patterns and the activity of the lake sturgeon stocked in the Genesee River.

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Email: mananjo.jonahson@fulbrightmail.org
For information about the restoration project, please contact USGS Tunison Laboratory of Aquatic Sciences, Cortland, NY

Lake Sturgeon Restoration in the Oneida – Oswego Drainage

Thomas E. Brooking, Randy Jackson, Tony VanDeValk, Scott Krueger

Cornell University Biological Field Station, Oneida Lake, Syracuse NY

(Use Zoom feature to enlarge)