2008 Lake Sturgeon Coordination Meeting Abstracts

Presentations - Wednesday, December 3

1. Michigan's St. Clair System Sturgeon Fishery: Results of an Angler Postal Survey

Gary Towns, Michigan Department of Natural Resources, Lake Erie Management Unit, Southfield, MI.
Mike Thomas, Michigan Department of Natural Resources, Lake St. Clair Fisheries Research Station, Harrison Township, MI

In 1999, based on the recommendations of the Michigan Lake Sturgeon Rehabilitation Strategy, conservative fishing regulations were implemented for Lake St. Clair and the St. Clair River. Since then, management of this fishery has been problematic since little data has been collected regarding the extent of the fishery. Michigan lake sturgeon anglers are required to register for a sturgeon harvest tag in order to fish for sturgeon. This provided the opportunity to evaluate the fishery by surveying anglers who were specifically interested in sturgeon fishing with a questionnaire sent through the US Postal Service. The objectives of the survey were to: 1) quantify the fishing effort, catch, and harvest during 2006 and 2007; and 2) characterize the demographics of the participating anglers during the same time period; and finally 3) quantify angler opinions regarding sturgeon harvest and the fishing regulations for the St. Clair System sturgeon fishery. Questionnaires were sent to 458 anglers. Non-respondents were mailed up to two follow-up letters, and eventually 300 anglers returned completed questionnaires. Sturgeon anglers were found to be predominantly male (90%) with an average age of 40.7 years. They reported catching 683 sturgeon in 2006 and 573 in 2007. The average catch per angler was 4.4 and 3.1 in 2006 and 2007, resp. Anglers reported 979 fishing trips for sturgeon in 2007. Sturgeon anglers reported harvesting 10 fish in 2006 and 4 in 2007. Some problems with registering harvested sturgeon were identified, but the authors still believe total harvest was well below of 3% of the population – the harvest level identified as the limit for a growing population. The results of this postal survey indicated that fishing for sturgeon in the St. Clair System has evolved into a primarily catch-and-release fishery. Furthermore, results indicate this fishery and associated conservative regulations have provided anglers with a unique fishing opportunity, while protecting and conserving a unique fishery resource.

2. The role that lake sturgeon play in First Nation communities across Northern Ontario; with a case study on the Namaygoosisagagun First Nation lake sturgeon project completed on the remote system of Smoothrock Lake.

Kimberley Tremblay, Anishinabek/Ontario Fisheries Resource Centre, North Bay, ON

Through time immemorial the lake sturgeon has held an important role in First Nation communities. Lake sturgeons are important spiritually and possess a mystical power in the stories that are shared from generation to generation. The role that lake sturgeon play in these communities has however evolved over time; shifting from being an important part of their diet; to a resource that was traded as a commodity for economic gain; to a time where the lake sturgeon has become less important in present day society.

The Anishinabek Ontario Fisheries Resource Centre (A/OFRC) has worked with a variety of First Nation communities (Nipissing First Nation, Mississagi First Nation, Pic River First Nation, Namaygoosisagagun First Nation) that all have a different relationship with lake sturgeon. For example, lake sturgeon have played an important role in the Namaygoosisagagun First Nation community, providing a reliable food source every spring through subsistence fishing. This however is changing with younger generations not wanting to pick up this harvesting tradition. The Anishinabek Ontario Fisheries Resource Centre (A/OFRC) along with the Namaygoosisagagun First Nation has done three consecutive years of spawning surveys. The

use of traditional ecological knowledge from elders of Namaygoosisagagun First Nation was essential in the commencement of this project. The opinion of these individuals will be important when delivering the results to the community. Since this lake is remote, it has not had the development of dams and the creation of commercial fisheries. Consequently, the lake sturgeon population has been only minimally affected and provides an interesting comparison with other more negatively affected populations. Preliminary genetic work has shown that Smoothrock Lake, lake sturgeon population originated from the Great Lakes gene pool.

3. Current development of the Lake Ontario Sturgeon Management Plan

Alastair Mathers, Ontario Ministry of Natural Resources, Lake Ontario Management Unit, Picton ON

The Lake Ontario Committee of the Great Lakes Fisheries Commission is developing a sturgeon management plan for the 'Lake Ontario system'. This talk will describe the need for a plan, its outline and describe some of the more contentious issues including: the geographic scope of the plan, development of spawning population-level goals, stocking and genetics, contaminants and fish diseases. The process for completion of the plan will also be discussed.

4. Development of a Tribal Stewardship Plan for Sturgeon

Marty Holtgren, Little River Band of Ottawa Indians, Manistee, MI

In 2002, the Little River Band of Ottawa Indians implemented a strategy to manage the Big Manistee River sturgeon population through the use of a stewardship plan. The Tribally authorized plan, "Nmé Stewardship Plan for the Manistee River and 1836 Reservation" used both cultural and biological criteria for establishing goals for restoration. A cultural context group consisting of Tribal members and Tribal government staff was formed to develop the plan. A primary goal of the plan was to restore the harmony and connectivity between Nmé and the Anishinaabe and bring them both back to the river. The plan advocated for research and restoration activities of Nmé. After three years of research that defined the biological attributes of the Manistee population we implemented strategies for restoration. The first was a large-scale effort of improving habitat for sturgeon within the watershed, specifically minimizing the input of sand into the river. Secondly, the first portable streamside rearing facility for sturgeon was designed and operated for lake sturgeon. This presentation will detail the development of the Little River Band stewardship plan and the implementation of strategies for sturgeon restoration.

5. Management lessons from ocean fisheries, can they benefit lake sturgeon and other Great Lakes species?

Nancy A. Auer, Michigan Technological University, Dept. of Biological Sciences, Houghton, MI

For many years fishery management in the Great Lakes has dealt with management plans targeting individual species and most, if not all plans, have focused on eventual harvest goals. Most plans throughout the Great Lakes share these two goals – eventual harvest and uniform management across the range of the fish. However in Ocean systems managers are developing strategies that encompass more ecosystem-community management and they are establishing reserves and no fishing zones to protect fishes which use defined habitats and movement patterns. This talk addresses the possible implications of adapting new management categories and strategies to Great Lakes Fishery management, especially in regard to lake sturgeon and other recovering Great Lake fish species.

6. Management Goals and Objectives for Lake Sturgeon

Lloyd Mohr, Ontario Ministry of Natural Resources, Great Lakes Branch, Owen Sound, ON

This presentation attempts to describe the basic structure of a management plan and gives examples of existing goals and objectives from management plans in the Great Lakes. It is intended to provoke discussion and thought around what is needed in a management plan, how the parts are integrated, and what types of questions planners should be asking themselves as these management plans are developed.

7. Lake Sturgeon Relocation at Adam Creek. Is this a sustainable management practice?

Dave Barbour, Ontario Ministry of Natural Resources, Kapuskasing Area Office, Kapuskasing, ON

The Moose River Basin in northeastern Ontario has a relatively abundant lake sturgeon population with some exceptions. The Little Long Generating Station Reservoir on the Mattagami River supports one of the most abundant known sturgeon populations in northeastern Ontario. A recent 2002 census estimated there were approximately 12,400 adult lake sturgeon in the Little Long head pond. Three large rivers; the Mattagami, Groundhog and Kapuskasing rivers contribute their waters to this large 7200 hectare reservoir. The Little Long Generating Station is the first of four hydroelectric dams in a cascading series of four facilities comprising the Mattagami Complex. The total capacity of all facilities is 480MW. The Adam Creek Diversion re-directs flows in excess of plant operating capacity around the four hydro plants along a 37 km route before being re-connected with the Mattagami River downstream of the complex. The average spring flow in the diversion channel is about 1250cms with a maximum potential of 4870cms.

Since 1963, the seasonal operation of Adam Creek diversion and the LLGS spillway have entrained fish after cessation of the spring freshet. In 1990 this issue was brought to the attention of the Ministry of Natural Resources and in that year 970 lake sturgeon were relocated back into the Little Long Generating Station head pond. Ontario Hydro now Ontario Power Generation has researched physical barrier and behavioural fish protection technologies and concluded there were no technical or economically feasible alternatives to the annual relocation program. A relocation program developed in consensus with the Department of Fisheries and Oceans and the MNR has relocated 4300 sturgeon since 1990 back into the LLGS headpond. Mortality associated with the spill events is unknown. Impacts of injury and or stress to the reproductive capacity of the once entrained and relocated fish are also unknown.

8. Montcalm Mine Initiatives to Protect Groundhog River Lake Sturgeon.

Laurent Robichaud and Pamela Reid, Montcalm Environmental Liaison Group, Xstrata Nickel Montcalm Mine, Timmins, ON

The Groundhog River in Northern Ontario still holds its status of one of a few North American rivers to have a reasonably healthy lake sturgeon population. We will go over a brief history of the start up of Montcalm Mine, public concern over the discharge of water into the Groundhog River, the initiatives the mine took to help protect and monitor the lake sturgeon and the success these initiatives have had.

9. Evaluating collection, rearing, and stocking methods for lake sturgeon (*Acipenser fulvescens*) restoration programs in the Great Lakes

James Crossman[1,2], Christine Davis[1], Patrick Forsythe[3], Kim Scribner[1,3], Edward Baker[4]

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Stocking hatchery produced lake sturgeon has been advocated as an important management and conservation strategy throughout the Great Lakes. However, prescriptions for hatchery propagation and stocking programs have been offered largely in the absence of data comparing alternative methods. We empirically determined the effects of different gamete/larval collection methods, rearing environments, and age-at-stocking on juvenile lake sturgeon growth, survival, and levels of genetic diversity. Furthermore, we examined how hatchery rearing environment and age at stocking affect survival and movements following release at 8, 13, and 17 weeks of age. Lake sturgeon were produced from direct gamete takes from spawning adults, collections of naturally produced eggs from the stream substrate, and collections of larvae dispersing downstream from spawning habitats. Offspring were reared in a streamside hatchery on the natal Black River and in a traditional hatchery. Dispersing larvae represented the highest amount of genetic diversity present in the adult breeding population. Survival and genetic diversity of offspring were significantly higher for streamside reared individuals compared to offspring reared in the traditional hatchery environment. Significantly higher recapture rates were realized for progeny reared in the streamside hatchery compared to the traditional hatchery at 8 and 13 weeks of age. Fish size was correlated with timing of movements post-stocking across all ages. Collectively, our data provide a framework for evaluating alternative strategies for managers designing conservation programs for lake sturgeon. Results indicate that supplementation protocols for lake sturgeon should be developed on a site-specific basis and demonstrate the importance of hatchery rearing environment.

Presentations - Thursday, December 4

10. Limiting Fishing Mortality, a Rehabilitation Tool

Lloyd Mohr, Great Lakes Branch, Ontario Ministry of Natural Resources, Owen Sound, ON

Fisheries resource managers have a number of tools that they can use. Controlling exploitation, fisheries mortality, is one of the most commonly used tools. There are pros and cons to using this tool and these will be discussed. A recent example of the use of controlling fishing mortality will be given from the province of Ontario.

11. Support for a Basinwide Juvenile Index Survey

Henry Quinlan, Ashland National Fish and Wildlife Conservation Office, US Fish and Wildlife Service, Ashland, WI

Development of a standardized index survey to assess the relative abundance of juvenile lake sturgeon and population biological characteristics could provide comparable data for synthesis, management, and evaluation of rehabilitation efforts. We implemented a survey approach based on the Fall Walleye Index Netting (FWIN) method used in Ontario, Canada, for Lake Superior waters. Using a standardized survey across the Great Lakes, comparable estimates for analysis of trends over time in a location as well as comparisons between different waterbodies and waterbody types can be obtained.

12. Protection of lake sturgeon through the research and development of existing and emerging traceability technologies.

Kevin Reid, Ontario Commercial Fisheries' Association, Blenheim, ON

Species at Risk (SAR) are highly valued components of the ecosystem. If a given SAR has commercial value, the threat of over-exploitation is amplified through economic incentives associated with higher prices as a consequence of a limited supply. However, some SAR populations are viable and are legally, and sustainably, harvested. For example, while some of the lake sturgeon populations in the Lake Huron/Lake St. Clair basin are considered threatened, some of these populations are viable, and conservatively exploitable. In some cases, pressure from poaching and IUU trade has lead regulators and enforcement agencies to ban all harvesting activities, as no effective supply chain traceability system is in place that practically rules out the influx from illegal sources into legal marketing channels, e.g., the recently announced 2009 ban of all lake sturgeon harvesting (commercial and recreational) in the Province of Ontario. The presentation will focus on a proposal for the research and development of both short- and long-term solutions to the problem of allowing conservative exploitation of viable lake sturgeon populations while limiting the entry of IUU sturgeon and sturgeon products into the commercial sturgeon supply chain. The proposal will detail the existing traceability technologies (labeling, bar codes, electronic databases) as well as the emerging ones (genetic tools and chemical tagging) and show how these technologies might be integrated into a traceability system that will permit legal, commercial harvest and trade of lake sturgeon, eliminate the commercial sale of poached lake sturgeon and lake sturgeon products, enhance enforcement and support convictions against IUU fishing and trade of lake sturgeon.

13. Advances on lake sturgeon recovery potential in Canadian designatable units: from allowable harm to recovery targets

Luis A. Vélez-Espino & Marten A. Koops, Great lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, Burlington, ON

Significant declines in the abundance of lake sturgeon *Acipenser fulvescens* across most of its North American range has led to abundances less than 10% of estimated minimum sustainable population sizes and, in some locations, less than 1% of historic abundances. These precipitous declines in abundance have resulted in most lake sturgeon populations being considered a conservation concern and management actions toward recovery. Here we present modelling in support of a recovery potential assessment, using stage-structured matrix models and population viability analysis, to quantitatively assess allowable harm, to determine population-based recovery targets, recovery efforts, probabilities of recovery, recovery timeframes, and to estimate required habitat for viable populations in lotic environments. From this assessment we conclude that lake sturgeon populations are most sensitive to harm on adult survival and that some designatable units are highly sensitive to any level of harm. However, the scope for recovering lake sturgeon by improving adult survival is limited; instead, larger proportional increases in population growth rates can be achieved by focusing recovery efforts on age-0 and juvenile survival. Our analyses indicate that the number of annually spawning females in discrete populations, representative of designatable units, should be between 264 and 586 for a 99% probability of persistence over 250 years or 1 188 for a 99% probability of persistence over 40 generations. The required habitat to harbour all life stages in viable populations ranges from 974 to 1 886 hectares when using the 250-year criterion. Age-0 individuals would require on average 2.3% of the total area of required habitat, juveniles 45.3%, and adults 52.3%. Required habitat for lake sturgeon populations in lentic environments is expected to be approximately twice as large as in lotic environments.

14. *In Situ* Assessment of Lampricide Toxicity to Age-0 Lake Sturgeon

Lisa O'Connor, Fisheries and Oceans Canada, Sault Ste. Marie, ON

Larval sea lampreys are controlled in streams by a chemical larvicide 3-triflouromethyl-4-nitrophenol (TFM). Laboratory and field exposure tests on caged sturgeon have demonstrated that TFM can also be toxic to age-0 lake sturgeon (<123 mm). In 2008, we collected age-0 lake sturgeon from the Mississagi and Au Sauble Rivers (tributaries to Lake Huron) and, supplementing with hatchery reared individuals, used radio telemetry and caged animals to compare the survival of age-0 lake sturgeon to two TFM treatment regimes: a) Sturgeon Protocol, 1.2 x MLC, a TFM treatment regime that is designed to have reduced toxicity to age-0 lake sturgeon, and b) Full Treatment Protocol, 1.4 x MLC the standard TFM treatment for larval sea lampreys. The treatments, on sections of the Mississagi River, were paired with the Au Sauble River, our control stream. A total of 30 radio tagged age-0 lake sturgeon, 10 in both treatments and 10 in the control, were released and 202 hatchery reared age-0 lake sturgeon, 75 in 15 cages for each lampricide application and 52 in 10 cages for the control, were distributed throughout the systems. Radio tagged fish ranged in size from 130 – 182 mm (total length), while caged sturgeon ranged from 57 – 101 mm (total length). Survival rates were the same for all three treatments, with an average of 93% for the caged fish and 99% for the radio telemetry fish. Overall, survival of age-0 hatchery <123 mm and age-0 native lake sturgeon was high for both the Sturgeon and Full Protocol TFM treatment for larval sea lampreys.

15. Assessment of a restoration stocking program on Oneida Lake

James R. Jackson, Thomas E. Brooking, and Anthony J. VanDeValk
Cornell Biological Field Station, Bridgeport, NY

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 32 kg in spring 2008. 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, show higher use of firm substrates where zebra mussels have colonized the lake. Mark-recapture data from standardized gill net sampling during the 2002-2004 growing seasons were collected from sturgeon from the 1995 stocking cohort (initial stocking 5000 fish). While sample sizes were low and confidence intervals large, data suggest that as many as 40% of fish stocked in 1995 were present in the lake in 2002. Ratios of captures of sturgeon cohorts in gill net samples suggest that survival is similar among all stocked year classes. Planning is ongoing for initiation of a large-scale lake sturgeon assessment in Oneida Lake and the Oswego River watershed through the State Wildlife Grants Program. Study objectives include telemetry of 100 fish in Oneida Lake to determine more detailed habitat use patterns and attempt to identify potential spawning sites in upstream tributaries.

16. Conservation Strategies of Acipenseridae Species in the People's Republic of China

Doug Aloisi, US Fish and Wildlife Service, Genoa National Fish Hatchery, Genoa, WI

The People's Republic of China is experiencing unprecedented pressures to native flora and fauna due to human influenced perturbations to aquatic systems. These human induced changes include the construction of the largest hydropower facility and dam in the world, the Three Gorges Dam. A recent trip to the Yangtze River in China and its existing sturgeon and paddlefish conservation sites and ongoing Chinese conservation efforts will be discussed.

Poster Presentations – Wednesday Evening, December 3

Video Assessment (using scientific divers and under water video) of the Belle Isle lake sturgeon artificial spawning bed complex

Jeffrey D. Allen, M.G. Black, G.W. Kennedy, M.A. Blouin, B.A. Manny
US Geological Survey – Great Lakes Science Center, Ann Arbor, MI

The Detroit River, Belle Isle lake sturgeon artificial spawning reef complex was constructed in June 2004. The complex consists of 3 beds each roughly 371.5 m^2 in size, and 0.6 m thick. Material used differed for each bed and consisted, by downstream order, of limestone quarry rock (40 – 60 cm dia.), rounded cobble (15 – 25 cm dia.), and coal cinders (2 – 7 cm dia.). Fisheries assessment began in the spring of 2004, before construction of the reef complex, and continued every fall and spring until 2008. Along with the fisheries assessment, annual underwater video surveys were conducted using scientific divers to document infilling of reef void space, colonization by zebra mussels and goby, and to provide direct evidence of egg deposition. Although lake sturgeon have been documented within the Detroit River system, specifically the capture of two at Belle Isle during the spring spawning migration, as yet no direct evidence of sturgeon egg deposition at the site has been documented. However, spawning activity by non-target species has shown a progressive increase in utilization of the complex as a spawning ground, and reef preference by various species has been observed. Assessment of the underwater video taken between the reef complex construction in 2004, and summer 2008 indicate a maturation pattern in sediment load infilling on these reefs. This combination of assessment techniques could give further insights into the development of protocols for future construction of artificial spawning bed complexes for sturgeon and other valued species such as lake whitefish and walleye.

Recruitment and movement patterns of lake sturgeon in the Muskegon River system

Matthew Altenritter, Grand Valley State University, Annis Water Resources Institute, Muskegon, MI

We will be presenting data on four objectives of our study of the early life history of lake sturgeon in a remnant population inhabiting the Muskegon River system. Objectives of this study are to: 1) estimate the abundance of spawning adults in the system, 2) locate spawning sites in the Muskegon River, 3) assess spawning success by collecting drift samples in the river, and 4) track the movement of juvenile lake sturgeon to determine residence and habitat preferences in Muskegon Lake. Our poster will outline the research plan for this 2-year study and present preliminary data from the first year of this on-going project.

Genetic Study of Lake Sturgeon in the St. Mary's River System

Jessica Comben and Barbara Evans, Department of Biology, Lake Superior State University, Sault Sainte Marie MI

Though the St. Marys River has been a historic spawning site for lake sturgeon (*Acipenser fulvescens*), they were thought to no longer be present in the system. In 2000, two lake sturgeon were observed in the St. Marys River system by the LSSU Aquatic Research Lab. These were thought to be migratory individuals, as no spawning site had been identified in recent times. Since that time, 196 individuals have been identified with an approximate 20% recapture rate. An ongoing radiotelemetry study of 19 tagged fish suggests that many of these fish may be year round residents of the system. The objective of this study is to assign or exclude the St. Marys lake sturgeon from populations in Lakes Superior and Huron using microsatellite DNA analyses.

We hypothesize that although some of the fish may be migratory from either Superior or Huron, many individuals may be spawning within the St. Marys system. Preliminary results suggest that there is a resident population with few migratory individuals. The St. Marys River is very suitable for lake sturgeon rehabilitation, thus an understanding of the genetics of resident, potentially spawning populations, is essential for future management decisions.

Successful stepping stones to sex identification of lake sturgeon by blood plasma hormones

Jaquie Craig, US Geological Survey, Great Lakes Science Center, Ann Arbor, MI

Blood samples were collected from lake sturgeon caught during spawning season from the North Channel of the St. Clair River to determine if sex could be identified by enzyme-linked immunosorbant assay (ELSIA) and radioimmunoassay (RIA) using reagents from the white sturgeon, for which reagents were readily available. Twelve fish were releasing gametes at time of capture, which helped to verify our results. We concluded that sex identification of pre-spawning lake sturgeon adults was possible, but that post-spawn adults or juvenile lake sturgeon were not able to be sexed confidently. This was due to the naturally low levels of circulating hormones at these stages. Results of this study were encouraging enough to move forward so that antibodies and reagents specific to lake sturgeon are currently being developed.

Lake Sturgeon (*Acipenser fulvescens)* Migration Patterns in Pic River, Ontario

Caroline Deary, Anishinabek/Ontario Fisheries Resource Centre, North Bay, ON

Although lake sturgeon are known to inhabit the Pic River, there is limited knowledge of the population and its critical habitat use. The Anishinabek/Ontario Fisheries Resource Centre collaborated with Pic River First Nation to assess the Pic River lake sturgeon population and identify critical habitat and fish movements through the use of radio-telemetry. The primary objective of the study was to target the spawning population and confirm potential spawning sites identified by community elders. Forty-seven lake sturgeon were captured between 31 May 2008 and 14 August 2008 using large mesh gill nets, set within a 25 km section of the river mouth. In addition, 18 sturgeon were captured in the vicinity of Kagiano Falls – the furthest upstream barrier to migration, a distance of approximately 100 km from the river mouth – in a collaborative study conducted by the Department of Fisheries and Oceans. Twenty five adult lake sturgeon (mean total length 116.3 cm ± 15.0 S.D.) were radio-tagged – 8 with external attachments and 17 with internal tags. Lake sturgeon were measured for fork length, total length, girth and weight, a section of the left pectoral fin ray was removed for ageing purposes and a fin punch sample was taken for genetic analysis. Captured fish also received an external FLOY tag and an internal PIT tag. Radio-tagged fish were monitored using a combination of fixed automated receiver stations and manual tracking from a boat beginning from the time of tag attachment or implantation, through to the late fall when the majority of sturgeon had left the river.

Success of Stocked Sturgeon in an Unexpected System

Dawn Dittman, US Geological Survey, Tunison Laboratory of Aquatic Science, Cortland NY

As part of an ongoing program to restore lake sturgeon (*Acipenser fulvescens*) in New York, hatchery-produced juveniles have been stocked into Oneida and Cayuga lakes since 1995. Migration of these fish into the Seneca, Oneida and Oswego Rivers (Oswego River system / Erie Canal) has been documented and local populations appear to be accumulating in the system. The Erie Canal/Oswego River system consists largely of the highly altered barge canal system, with homogenous habitat maintained by regular dredging, numerous lock and dam structures, and degraded water quality. The canal system offers a suite of habitat conditions unfortunately not so rare within the lake sturgeon's range. Ripe males from the 1995 stocking have been collected in 2007 and 2008 and have been found to migrate from a possible spawning site (spring) downstream to a lake (fall). This behavior is common in many extant populations. We document currently known habitat use and population characteristics. We will discuss the criteria and research needed to determine the relative restoration status of the fish in this system.

Discovering sex determining genes in lake sturgeon

Matthew Hale, Purdue University, Dept. of Forestry and Natural Resources, West Lafayette, IN

Mechanisms of fish sex determination are extremely labile; even closely related species may employ different means. The basis for sex determination in lake sturgeon is unknown, in part because sexual maturity can take up to 20 years and because the species has had at least one genome duplication event in its history. Here, we summarize various molecular techniques used in our attempts to uncover the gene(s) responsible for lake sturgeon sex determination.

Lake Sturgeon Spawning Habitat Restoration Efforts in the Detroit River, 2004 – 2008; Lessons learned with regard to Habitat Creation

Gregory W. Kennedy, Bruce Manny, and Jeffrey Allen, U.S. Geological Survey, Great Lakes Science Center, Ann Arbor, MI

Efforts to reestablish active spawning by lake sturgeon in the Detroit River began in earnest with the creation of three spawning beds near the southeast shore of Belle Isle. Substrate materials that made up the three beds were chosen to imitate known, active spawning areas within the Great Lakes Basin; broken limestone used in Wisconsin streams, natural rounded cobble used in the St. Clair River near Port Huron, and cinder "fly-ash" material used in the North Channel St Clair River near Algonac, MI. Monitoring of adult fish activity and egg production were conducted for 4 years following construction, as well as other physical/biological parameters such as infilling by fine sediments and encrustation by zebra mussels, to determine how these beds were aging. This talk will discuss the effects the spawning reefs had on production and fish use in the area around the head of Belle Isle, the degree to which these beds are being used by sturgeon and the physical condition of the reefs after 4 years. Habitat preference by different fish species will be examined, as well as the impacts of material selection and design on the reef maturation process. Discussion will conclude with an explanation of how these findings are being applied to new restoration efforts being conducted downstream near the northeast corner of Fighting Island.

Educating and Engaging Stakeholders: Outreach Activities in Southwest Michigan

Dan O'Keefe, Michigan Sea Grant, Grand Haven, MI

Michigan Sea Grant organized an educational public meeting to raise awareness of sturgeon rehabilitation opportunities in southwest Michigan. Subsequently, the newly-formed Kalamazoo River Chapter of Sturgeon for Tomorrow was provided with materials and expertise necessary to participate in sampling for sturgeon eggs. Efforts in 2008 did not result in the capture of sturgeon eggs from the Kalamazoo River, but did serve the purpose of engaging and energizing an emerging stakeholder group.

Montcalm Mine Initiatives to Protect Groundhog River Lake Sturgeon.

Laurent Robichaud and Pamela Reid, Montcalm Environmental Liaison Group, Xstrata Nickel Montcalm Mine, Timmins, ON.

The Groundhog River in Northern Ontario still holds its status of one of a few North American rivers to have a reasonably healthy lake sturgeon population. This poster will explain successful treatment of mine water, the sturgeon monitoring study methods and findings over the last few years.

First Record of *Polypodium hydriforme*, an egg parasite, from lake sturgeon (*Acipenser fulvescens*) in the St. Clair River, Michigan

Michael Thomas, Michigan DNR, Lake St. Clair Fisheries Research Station, Harrison Township, MI

Two lake sturgeon, *Acipenser fulvescens* (Acipenseridae), examined from the St. Clair River, Michigan in June 2008 were found infected with the cnidarian, *Polypodium hydriforme*. One female extruded both apparently infected eggs as well as the mature stolon stage of *P. hydriforme*, while the other extruded only mature stolons. The egg parasite *P. hydriforme* has been previously reported in a land-locked lake sturgeon population in Michigan's Black River, near Cheboygan, Michigan. This is the first report of *P. hydriforme* from a free-ranging population of Great Lakes sturgeon, and the first in Michigan since 1973.

Lake Sturgeon status and management in the Niagara River

Betsy Trometer, US Fish and Wildlife Service, Lower Great Lakes FRO, Amherst, NY

Assessment of the Niagara River lake sturgeon population was conducted from 1994 through 2003. There were three main parts in our assessment: angler/diver survey, population survey, and movement and habitat use assessment. The angle/diver surveys indicated that sturgeon were found throughout the Niagara River system and even indicated differences in locations of adults and juveniles. Population assessment was conducted using a combination of SCUBA divers, gill nets and set lines. Age distribution ranged from 1 to 27 with most of the fish age 10 and under. Ultrasonic transmitters were attached to 24 sturgeon to assess movement and habitat use in the lower Niagara River. Results indicated the adult sturgeon moved more and traveled between the river and Lake Ontario, whereas the juvenile lake sturgeon moved less and tended to stay in the river. Although the tracking indicated adults congregate in a couple of locations during May and June, we have been unable to identify spawning habitat. Management issues include the impacts of water level fluctuations from the operation of two Power Projects in the river on lake sturgeon reproduction and the identification and protection of critical habitat.

Manistee River Sturgeon Habitat Assessment

Radley Watkins, Northern Environmental Technologies, Park Falls, WI
Marty Holtgren, Little River Band of Ottawa Indians, Manistee, MI

During spring and summer of 2005, the Little River Band of Ottawa Indians collaborated with Northern Environmental Technologies to characterize the habitat at Suicide Bend (a known sturgeon spawning site) and Tunk Hole in the Big Manistee River, Michigan. One goal of the project was to compare and contrast the 2 sites with each other, as well as, characterize them with other documented sturgeon spawning habitats in North America. The information gathered from comparing and contrasting available data was used to determine what factors may limit habitat at Tunk Hole suitable for lake sturgeon spawning. From this, conceptual plans were developed for reclaiming sturgeon spawning habitat at Tunk Hole.

Use of otolith length in age determination of juvenile lake sturgeon

Timothy Wilson, MS candidate at Michigan Technological University;
Nancy A. Auer, Michigan Technological University, Dept. of Biological Sciences, Houghton, MI
Edward A. Baker, Michigan Department of Natural Resources, Marquette, MI

For many years fisheries managers have used otolith growth ring counts to determine the age structure of fish populations and to obtain information on biology and population dynamics. This is the first reported use of lake sturgeon otoliths in determining age of larval sizes. Sagittae otoliths removed from young-of-year (YOY) lake sturgeon, reared at a streamside rearing facility on the Ontonagon River, MI, showed no daily growth rings. Yet, a sample of 256 known age lake sturgeon, collected from 8 June to 26 August 2008, revealed an exponential relationship between otolith total length (TL) and fish age and a linear relationship between otolith TL and fish TL. This research indicates that young lake sturgeon may be aged using sagittae otolith TL and that left and right otoliths provide similar age estimations. This newly developed aging method for young sturgeon limits the amount of expertise and time needed to age individual fish, and allows fisheries managers to estimate the age of known size YOY fish while in the field.

Great Lakes Lake Sturgeon web-based Information Sites (3 posters):

Lake Sturgeon Tributary Database and GIS

Chris Castiglione, U.S. Fish & Wildlife Service – Lower Great Lakes FRO

The Lake Sturgeon Tributary Database and GIS is a unified, interactive web-based GIS application and meta-database of Great Lakes lake sturgeon information important to researchers and managers. The database is developed upon existing maps and database developed for the 2000 and 2002 GLFT Lake Sturgeon Workshops with updates from the Sturgeon Committee. This project has been a collaboration between the USFWS and numerous state, tribal, provincial, university, and other researchers. This web application functions much like a GIS database, allowing selection of various data layers and enabling the user to query available data to find specific information of interest. The web portion extends some GIS capabilities to researchers, managers, and decision makers. The long-term objective is to compile the available lake sturgeon data sources to help focus restoration and research activities on priority lake sturgeon waters.

Great Lakes Lake Sturgeon Web Page

Angie Bowen, U.S. Fish & Wildlife Service – Alpena NFWCO

The Great Lakes Lake Sturgeon Web Site was established to provide a focus for lake sturgeon restoration and management activities throughout the Great Lakes Basin. Interest and efforts directed at the recovery of this native Great Lakes fish species have been increasing without the benefits of visibility afforded to sport species. Federal, state, tribal, provincial and academic natural resource specialists have been communicating and collaborating for compilation of status and trends information on the species in numerous Great Lakes locations. A Web Site specifically focused on Great Lakes lake sturgeon was thought to be appropriate to enhance the efficiency of this information exchange.

In an effort to provide leadership for this multi-agency, interbasin collaborative effort, the U.S. Fish and Wildlife Service - Alpena National Fish and Wildlife Conservation Office secured internal funding for creation and maintenance of this Web Site through the Service's Great Lakes Basin Ecosystem Team. This site contains information from a number of agencies working on lake sturgeon management, research, conservation and restoration in the Great Lakes basin. The long-range goal of this site is to have it serve as a focal point for anyone wanting information on Great Lakes lake sturgeon.

If you or your affiliation wishes to include your activities and information on this web site, please contact Anjanette Bowen.

Great Lakes Lake Sturgeon Tag Identification Database

Adam Kowalski, U.S. Fish & Wildlife Service – Alpena NFWCO

The Great Lakes Lake Sturgeon Tag Identification Database (TID) is intended to facilitate communication between people who tag and those who recapture lake sturgeon across the Great Lakes. The database provides managers, researchers, and other interested parties the ability to determine who should be contacted when they encounter a tagged lake sturgeon. Development of the TID was initiated by the U.S. Fish and Wildlife Service's Great Lakes Lake Sturgeon Committee in 2001. The structure of the database was developed through a peer review process that involved fishery professionals from several agencies that tag lake sturgeon in the Great Lakes. Completion of the database and development of this web accessible version was made possible through funding provided by the Great Lakes Fishery Trust in 2005. The database is managed by the Alpena National Fish and Wildlife Conservation Office (Alpena NFWCO) and is posted on the Great Lakes Fishery Commission web site. Data contained in the database are limited to contact information for those who tag and recapture lake sturgeon with specified tag number (PIT tags) or other identifying marks or tags. Data are submitted electronically to the Alpena NFWCO where they are formatted and added to the database. Annual updates are completed to include new tags and recaptures. The USFWS Lake Sturgeon Committee provides oversight of the project.