PROCEEDINGS OF THE SECOND

GREAT LAKES LAKE STURGEON COORDINATION MEETING

NOVEMBER 9-10, 2004
SAULT STE. MARIE, MICHIGAN

Lake Sturgeon (*Acipenser fulvescens*)

July 2005

REPORT PREPARED BY:

MEMBERS OF THE U.S. FISH AND WILDLIFE SERVICE
GREAT LAKES BASIN ECOSYSTEM TEAM LAKE STURGEON COMMITTEE

Henry Quinlan, Robert Elliott, Emily Zollweg,
David Bryson, James Boase, and John Weisser

With Assistance from:

Dr. Nancy Auer, Michigan Technological University
Dr. Ed Baker, Michigan Department of Natural Resources
Doug Carlson, New York Department of Environmental Conservation
Brad Eggold, Wisconsin Department of Natural Resources
Marty Holtgren, Little River Band of Ottawa Indians
Lloyd Mohr, Ontario Ministry of Natural Resources

Funded by the Great Lakes Fishery Trust

These proceedings are available on CD via henry_quinlan@fws.gov.

Table of Contents

Introduction

In June, 2000, the Great Lakes Fishery Trust (Trust) sponsored a workshop to determine research and assessment needs to restore lake sturgeon in the Great Lakes (Holey et al. 2000). The Trust utilized information gathered at the workshop to develop criteria to guide future funding. At the conclusion of that workshop, participants expressed a strong desire to meet annually to continue to share information and communication of sturgeon work across the Great Lakes basin. In 2001, the U.S. Fish and Wildlife Service Great Lakes Basin Ecosystem Team Lake Sturgeon Committee submitted a proposal to the Trust to organize and convene a series of three Great Lakes Lake Sturgeon Coordination Meetings, which the Trust approved. The first Coordination Meeting was convened December 11-12, 2002 in Sault Ste. Marie, Michigan. Feedback received from participants and organizers of the 2002 Coordination Meeting recommended that subsequent meetings be held bi-annually. The second Great Lakes Lake Sturgeon Coordination Meeting was held in Sault Ste. Marie, Michigan on November 9 - 10, 2004. These are the proceedings of the second Great Lakes Lake Sturgeon Coordination Meeting.

Meeting Organization and Purpose

The meeting was organized by a steering committee of consisting of representatives from the U.S. Fish and Wildlife Service Great Lakes Basin Ecosystem Team Lake Sturgeon Committee, and state, provincial, tribal and university biologists from across the Great Lakes basin.

Dave Bryson (USFWS)	Nancy Auer (Michigan Technological University)
Rob Elliott (USFWS)	Ed Baker (Michigan DNR)
Henry Quinlan (USFWS)	Doug Carlson (New York DEC)
John Weisser (USFWS)	Brad Eggold (Wisconsin DNR)
Emily Zollweg (USFWS)	Marty Holtgren (Little River Band)
James Boase (USFWS)	Lloyd Mohr (Ontario MNR)

A meeting announcement and invitation to contribute presentations was emailed to over 400 biologists, managers, researchers, students, and the interested public from the Great Lakes region. The meeting announcement was also posted on the Great Lakes Lake Sturgeon Web Page.

The 2004 Coordination Meeting was designed to address three emerging issues identified as priority by participants at the 2002 meeting. They were: sturgeon passage issues and approaches, habitat classification (spawning, nursery, and juvenile), and habitat restoration and enhancement. In addition, several presentations were solicited and given that described progress made toward the two emerging issues covered at the 2002 meeting; the use of stocking and genetic considerations to rehabilitate populations, and development of standardized assessment techniques.

PURPOSE: **Provide a bi-annual forum to foster communication and exchange of information relating to the study, management, and restoration of lake sturgeon in the Great Lakes basin, to address priority research and assessment needs, and to address selected emerging issues.**

Meeting Summary

One hundred individuals attended the 2004 Coordination Meeting representing 32 different entities. Representatives of seven of nine Great Lake states (IL and PA not represented), eight Tribal/First Nation natural resource agencies, four U.S. and Canadian federal agencies, one Provincial agency, eight Universities, three Consulting/Private organizations, and one non-governmental organization.

Presented at the meeting were 24 oral presentations, 8 posters, and a GIS tributary database demonstration. Seven talks addressed the themes of genetic stock structure, conservation stocking considerations and hatchery rearing. Two presentations focused on techniques for sturgeon status assessment. Eight talks featured habitat classification and enhancement methodology. Four presentations addressed sturgeon passage issues such as policy and regulations, experimental approaches to upstream and downstream passage, and opportunities for removal and habitat restoration, and three presentations summarized information on regulation changes, status determination and rehabilitation progress. The presentation schedule, titles, and presenters/authors is are on pages 7 – 9, and oral and poster presentation abstracts can be found on pages 10 – 20.

The presentations addressing sturgeon passage were given by four invited experts: Dr. Luther Aadland (Minnesota DNR), Steve Amaral (Alden Lab), Dr. Boyd Kynard (USGS Conte Anadromous Fish Laboratory), and Gary Whelan (Michigan DNR). Following their presentations, these individuals comprised an expert panel, moderated by Dave Bryson (USFWS) that addressed questions and inquiries from meeting participants. The panel discussion session is paraphrased on pages 21-30.

Two facilitated breakout sessions were held to address topics pertinent to sturgeon rehabilitation in the Great Lakes and to encourage communication and interaction among participants. The first breakout session was subject oriented and the second was organized by basin(s). For the subject breakout session six topics were offered for group discussion and individuals chose which discussion topic to attend. The topics were sturgeon health and contaminants, use of GIS technology for sturgeon rehabilitation, habitat suitability and classification, sturgeon passage and hydropower operation, emerging issues or problems that could result as sturgeon populations recover, and habitat restoration and enhancement. Summary notes from the topic oriented session are on pages 31 - 40.

Four basin oriented groups were formed for the second breakout session. The basin groups were Lake Superior, Lake Michigan, combined Lake Huron and Lake Erie (including Lake St. Clair and Detroit River), and Lake Ontario combined with the St. Lawrence River. This session served as an opportunity for those working or interested in sturgeon related activities on a particular basin to gather and discuss topics of importance to participants. Summary notes from the basin oriented breakout sessions are on pages 41 – 50.

Poster presentations were displayed during an evening potluck social held in the motel atrium the evening of day one. Participants contributed home cooked and purchased foods for the potluck which drew about 75 individuals. The social provided participants an opportunity to view posters, network with fellow sturgeon enthusiasts in a relaxed social setting, and if they were lucky, to hear their name called for one of the sturgeon related door prizes.

Meeting feedback and comments submitted by participants on the evaluation form is summarized on pages 51-52. Meeting participant names and contact information is on pages 54 – 60 and biographical information provided by participants prior to the meeting is on pages 61 – 79.

2004 GREAT LAKES LAKE STURGEON COORDINATION MEETING

Agenda

Tuesday, November 9 Day 1

8-9:00 a.m.	Registration
9:00	Welcome, Introductions, Meeting Goal, Objectives and Format
9:15	Presentations: Progress on Genetic Status and Stocking Activities
10:15	Break
10:30	Presentations: Genetic Conservation Stocking and Hatchery Rearing
11:15	Presentations: Status Assessment Techniques
11:45	Lunch (on your own)
1:00 p.m.	Facilitated Discussion Groups (Participants Choose Topic)
2:30	Break
2:45	Presentations: Habitat Classification, Restoration and Enhancement
5:00	Adjourn
6:00	Poster Display
6:15	Potluck and Dessert Social (participant contributed) / Door Prizes

Wednesday, November 10 Day 2

8:00 a.m.	Day 2: Orientation
8:05	Presentations: Sturgeon Passage
10:15	Break
10:30	Panel Discussion - Sturgeon Passage Issues
12:00 p.m.	Lunch (group lunch)
1:00	Presentations: Regulations, Status Determination, and Rehabilitation Progress
1:45	Break / Door Prizes
2:15	Basin Oriented Breakout Groups
3:30 p.m.	Meeting Evaluation and Future Topic Suggestions
4:00 p.m.	Wrap-up and Adjourn

Oral Presentation Schedule, Titles & Authors

Some presentations are viewable as pdf files.

Day 1 – Tuesday, November 9

9:15 a.m. **Sturgeon Genetic Structure and Stocking Considerations**

1. Spatial population genetic structure throughout the Great Lakes – Amy Welsh, University of California – Davis
2. Linking lake sturgeon demographics and genetics – Kim Scribner, Michigan State University
3. Relative contributions of spawning stocks of lake sturgeon to populations in Lake Michigan – Kristin Bott, Michigan State University
4. Fertilization success, egg predation, deposition and post emergent survival in the lake sturgeon (*Acipenser fulvescens*): The relative importance of potential barriers to recruitment – Patrick Forsythe, Michigan State

10:30 **Genetic Conservation Stocking and Hatchery Rearing**

5. Lake Michigan rehabilitation plan - conservation genetics and rehabilitation stocking – Rob Elliott, Ed Baker, Marty Holtgren, Brad Eggold
6. Implementation of streamside rearing of lake sturgeon for rehabilitation stocking – Marty Holtgren, Little River Band of Ottawa Indians
7. Developmental indices to predict hatching, first feeding, and timing of migration of early life stages of lake sturgeon – Doug Aloisi, USFWS

11:15 **Status Assessment Technique**

8. Using split-beam hydroacoustics for assessment of lake sturgeon spawning populations – Nancy Auer, Michigan Technological University
9. Lake Champlain lake sturgeon sampling techniques – Chet Mackenzie, Vermont Dept. of Fish and Wildlife

2:45 p.m. **Habitat Classification, Restoration and Enhancement**

10. Habitat use and movement patterns of age-0 juvenile lake sturgeon in the lower Peshtigo River, Wisconsin – Trent Sutton, Purdue University
11. Spawning habitat enhancement through flow manipulation – Mike Friday, Ontario MNR
    Assessment of potential lake sturgeon habitat availability in Lake Michigan tributaries: Applications to the restoration process – Dan Daugherty, Purdue University
12. Spatial application of a habitat suitability index model for lake sturgeon – Tim Haxton, Ontario MNR
13. Classification and visualization of lake sturgeon habitat suitability using the Great Lakes GIS – Chris Geddes, University of Michigan
14. Classification of lake sturgeon spawning habitat in the Detroit River – Bruce Manny, USGS Great Lakes Science Center
15. Evaluation of underwater remote sensing technologies to survey potential lake sturgeon spawning habitat in large river systems in the Great Lakes – Greg Kennedy, USGS Great Lakes Science Center
16. Development of a management plan for lake sturgeon in the Lake St. Francis portion of the St. Lawrence River – Tim Haxton, Ontario MNR

Day 2 – Wednesday, November 10

8:15 a.m. **Sturgeon Passage**

18. Policies/Regulations and economic considerations related to sturgeon passage in the Great Lakes – Gary Whelan, Michigan DNR
19. Experimental studies at Conte AFRC on up- and downstream passage of lake and shortnose sturgeon and riverine fishes – Boyd Kynard, USGS – Conte Anadromous Fish Research Lab
20. Downstream fish passage for sturgeon: past, present, and future – Steve Amaral, Alden Lab
21. Lake sturgeon passage and habitat restoration – Luther Aadland, Minnesota DNR

10:30 **Sturgeon Passage Panel Discussion** (facilitated question / answer session)

1:00 p.m. **Regulations, Status Determination, and Rehabilitation Progress**

22. Regulatory options for managing the angling fishery for lake sturgeon in Ontario – Tom Mosindy, Ontario MNR
23. Summary of the information collection on lake sturgeon in the western basin of Lake Erie 1999-2003 – Chris Vandergoot, Ohio DNR
24. Lake sturgeon restoration in Oneida Lake, New York: stocking, habitat use, and life in the fast lane – Randy Jackson, Cornell

Poster Presentation Titles & Authors

Some posters are viewable as pdf files

Day 1 – Tuesday, November 9
6:00-9:00 p.m.

Population Assessment of Lake Sturgeon in the St. Marys River, Michigan – John Bauman, Lake Superior State University.

Assessment of Habitat Use by Stocked Lake Sturgeon in the Genesee River – Dawn E. Dittman, USGS, and Emily C. Zollweg, USFWS.

Resolving the Genetic Composition of the White River Lake Sturgeon Population: Implications for Conservation and Management – Andrea M. Drauch, Brant. E. Fisher, and O. E. Rhodes, Jr., Purdue University.

Embryogenesis and Larval Development of Lake Sturgeon *(Acipenser fulvescens)* – Amy Furman and Barbara I. Evans, Lake Superior State University.

Development of the Retina in Larval Lake Sturgeon *(Acipenser fulvescens)* – Barbara I. Evans and Amy Furman, Lake Superior State University.

Changes to a Lake Sturgeon Spawning Population Over 50 yrs – Tim Haxton, Ontario Ministry of Natural Resources.

Hook and Line Sturgeon Fishery in the Menominee River, Wisconsin-Michigan boundary water – Greg W. Kornely, Wisconsin DNR.

Lower Bad River Acoustic Mapping Project – Dan Yule and Gary Cholwek, USGS, Henry Quinlan, USFWS, and Tom Doolittle, Bad River Band of Lake Superior Chippewa.

Great Lakes lake sturgeon tributary database and Geographic Information System demonstration, – Emily Zollweg, John Weisser, Rob Elliott, Henry Quinlan, Jim Boase, Scott Koproski, and Adam Kowalski, USFWS, Nancy Auer, Michigan Tech U., Ed Baker and Mike Thomas, Michigan DNR, Doug Carlson, NY DEC, Tim Haxton, OMNR, and Jerry Weise, DFO.

Abstracts - Oral Presentations

Sturgeon Genetic Structure and Stocking Considerations Presentations:

Welsh, Amy - Spatial Population Genetic Structure throughout the Great Lakes [full presentation (855 KB pdf)]

Description: Understanding lake sturgeon population genetic structure can help guide management decisions, by taking into account genetic relationships between spawning populations. Genetic analysis has been completed for numerous populations throughout the Great Lakes basin, using standardized microsatellite and mitochondrial DNA markers. Levels of genetic variation within and between populations will be summarized. A high degree of population structure has been observed, as evidenced by significant differences in the frequency of alleles at each genetic marker. Results indicate that populations are reproductively isolated, likely due to spawning site fidelity. Differences among populations are not believed to be recent artifacts resulting from reductions in numerical abundance. Substantial population genetic structure, even among populations in close proximity within a lake basin, highlights the need for recognizing population autonomy when devising management plans. Lake basins should not be managed as single units.

Scribner, Kim - Linking Lake Sturgeon Demographics and Genetics [full presentation (350 KB pdf)]

Description: The restoration of small populations of lake sturgeon focuses attention on tradeoffs between demographic growth and maintenance of genetic diversity. Here we report on simulations that incorporate aspects of both lake sturgeon population dynamics and genetics. Starting populations comprised of only adults with less than 50 individuals face substantial risk of extinction due to demographic stochasticity. These simulations also indicate that the loss rate of unique alleles is primarily dependent on the growth rate of the population, and with little dependency on initial population size. Rates of inbreeding, however, are strongly dependent on initial population size, and accumulate rapidly for initial populations of less than 50 adults. These simulations provide a baseline for future work exploring the implications that different supplementation or reintroduction strategies have on the population dynamics and genetics of lake sturgeon.

Bott, Kristin - Relative contributions of spawning stocks of lake sturgeon to populations in Lake Michigan

Description: Historically, lake sturgeon were abundant throughout the Great Lakes, but populations have declined in both abundance and distribution due to habitat loss, water quality degradation, barriers to migration, and overexploitation. The lack of knowledge regarding their abundance, population structure, reproductive status and genetic diversity hinders rehabilitation efforts. An important issue facing managers is identifying the size and stock characteristics of remnant populations, as well as movement and habitat use of different stocks in open waters of the Great Lakes during non-reproductive periods. Spawning populations of lake sturgeon still remain in four tributaries to Green Bay in northeastern Lake Michigan. Previous genetic analysis revealed that populations are genetically distinct, likely due to a high degree of philopatry. This genetic structuring allows individuals sampled from open-water habitats to be assigned to breeding populations of origin with a high degree of confidence. Using mixed stock analyses, we determined the most likely population of origin for individuals captured throughout Green Bay, as well as a fall harvest on the Menominee River. These results will be discussed with a focus on habitat use and movements that may be

affecting these populations. This information can be of great use to managers interested in furthering restoration and conservation efforts for lake sturgeon, as it can provide information on relative recruitment rates from all lake sturgeon stocks contributing to the Green Bay mixed population, and of potential stock-specific differences in risk of mortality.

Forsythe, Patrick - Fertilization success, egg predation, deposition and post emergent survival in the lake sturgeon (*Acipenser fulvescens*): The relative importance of potential barriers to recruitment [full presentation (1.2 MB pdf)]

Description: Lake sturgeon were once historically abundant throughout their range but have experienced dramatic declines in population numbers and abundance due to overharvest, destruction of spawning habitats and barriers to migration. Management activities have resulted in some improvements to spawning habitats and restoring natural flow regimes. However, many extant populations continue to show little evidence of natural recruitment. High rates of predation on eggs could be one explanation for the low rates of recruitment. Lake sturgeon may also be subject to an Allee effect, where low recruitment is attributed to low fertilization rates due low spawner numbers. We currently lack quantitative information on factors that may be barriers to natural recruitment in lake sturgeon. The objectives of this study were to 1) estimate fertilization rate as a function of spawner number and sex ratio, 2) characterize the water velocity, depth and substrate size where lake sturgeon eggs are naturally deposited and 3) determine the sources and magnitude of egg predation prior to larval emergence at several different spawning sites and stream habitats. Results over two field seasons revealed a large amount of heterogeneity in egg deposition, high invertebrate predation, and inter-annual variability in post-emergent recruitment to the larval stage. Quantification of the relative importance of factors affecting recruitment is vital to the recovery of this species.

Elliott, Rob (Ed Baker, Brad Eggold, and Marty Holtgren) – Overview of the Lake Michigan lake sturgeon rehabilitation plan conservation genetics and rehabilitation stocking section

Description: As part of the development of a lake sturgeon rehabilitation plan for Lake Michigan, the Lake Michigan Lake Sturgeon Task Group has developed a draft document providing guidelines for the introduction of lake sturgeon within the Lake Michigan basin. The intent of these guidelines is to ensure genetic conservation of populations during rehabilitation. While these guidelines are still being reviewed and refined by the Task Group, what is currently described in the document represents a significant level of discussion and eventual agreement among the Lake Michigan resource management agencies of how introduction of lake sturgeon for purposes of rehabilitation should be implemented.

As a foundation, six guiding genetic principles for lake sturgeon rehabilitation were identified:
1. Maintaining the current level of genetic variability among populations is critically important
2. Management actions that may lead to increased inbreeding or outbreeding are to be avoided
3. Fisheries managers should maintain the genetic characteristics of river-specific locally adapted stocks
4. Fisheries managers should maximize the effective population size, reflected in the offspring of the donor population, in gamete collection operations
5. Management policies, strategies, and actions will seek to maximize homing behavior
6. Fisheries managers should perform a risk/benefit analysis for any proposed stocking

Specific guidelines and rational for when to initiate stocking, for the selection of donor populations, for the collection of gametes, for mating schemes, for numbers to stock, and for rearing and release techniques that build on these guiding principles are then described.

Specifics include the following:

> Prior to initiating rehabilitation, explore the underlying reasons why a system is not being populated or why a remnant population is at risk. Stocking should be initiated only when water quality and habitat are capable of supporting stocked fish and will be capable of supporting natural reproduction by the time stocked fish mature and return to spawn.
>
> Donor populations should be selected based on similarity in genetic lineage, life history and ecology of originating environment to the population being rehabilitated. A donor population also needs to be of sufficient size and genetic diversity to support gamete or larval collections. To protect the donor population, gamete collections should be made from no more than 5% of the annual adult spawning stock in any year, or should not exceed 10% of that population's annual production of eggs or larvae.
>
> Over the period of rehabilitation (25 years) gametes should be collected from a minimum of 250 different females and 250-1250 males. Eggs from individual females should be divided equally among available males and fertilized 1:1. An alternative is to collect naturally deposited eggs or drifting larvae so that as many families as possible contribute. Family contribution should be equalized throughout the rehabilitation or restoration process by rearing and stocking equal numbers from each contributing family.
>
> Fish should be reared and released in a manner that imprints stocked fish to receiving waters. (Streamside rearing, stocking of eggs or early stage larva and within system transfers are examples), and sturgeon should be release at locations where wild fish of that life stage are known or would be expected to occur.
>
> The number of fish stocked should be based on habitat availability and expected survival rates so that a minimum population of 750 mature adults (including males 15 years and older and females 20 years and older) is established that produces a minimum annual spawning run of 250 fish. All stocked fish should be permanently marked, and genetic analysis of parents and progeny should be conducted to document diversity of fish produced.
>
> Evaluation measures capable of documenting the success of rehabilitation actions need to be planned for and implemented prior to and concurrently with initiating rehabilitation.

Though these guidelines are still in draft form, Lake Michigan resource management agencies have and are taking actions to follow these guidelines for current reintroduction initiatives, though implementation of some actions, such as streamside rearing, will likely take a few years to implement fully as funding becomes available.

Holtgren, Marty – Implementation of a streamside-rearing facility for sturgeon rehabilitation stocking [full presentation (2.6 MB pdf)]

Aloisi, Doug - Developmental Indices to Predict Hatching, First Feeding, and Timing of Migration of early life stages of lake sturgeon

Description: Using previous literature and applying linear regression to specific temperature points, a developmental index can be applied to varying water temperatures to estimate hatch, time of first

feeding, and theoretically outmigration in natal rivers. Information may be helpful when attempting larval drift sets for assessment/culture.

Status Assessment Techniques Presentations:

Auer, Nancy - Split-beam hydroacoustics for assessment of lake sturgeon spawning populations

MacKenzie, Chet – Lake Champlain lake sturgeon sampling techniques [full presentation (2.2 MB pdf)]

Habitat Classification, Restoration and Enhancement Presentations:

Sutton, Trent - Habitat Use and Movement Patterns of Age-0 Juvenile Lake Sturgeon in the Lower Peshtigo River, Wisconsin [full presentation (745 KB pdf)]

Description: Restoration of lake sturgeon *Acipenser fulvescens* in the Great Lakes has been ineffective in part due to limited information on early life history. Characterizing habitat use and movement patterns of age-0 juvenile fish would facilitate these efforts by allowing for the identification of nursery areas. The objectives of this study were to determine the habitat preferences and movement patterns of age-0 juvenile lake sturgeon in the lower Peshtigo River, Wisconsin. Fish were captured from June through October 2002 and 2003 and radio transmitters were attached to individuals > 74 g each year (N = 4 and 11, respectively). At each capture and tracking location, water depth and current velocity were measured, and the dominant substrate type was determined from a dredge sample and preserved for later macroinvertebrate analyses. Lake sturgeon were found over sand substrates, at shallow depths (< 2 m), and low current velocities (< 0.60 m/s). Capture locations were dominated by Dipterans, with sites having a median density of 53 (range, 0 to 907) individuals/m^2 in 2002 and 33 (range, 0 to 2,013) individuals/m^2 in 2003. All fish were found over substrates with low macroinvertebrate diversity index values (< 0.44). Daily movements showed that fish were nocturnally active, while long-term movements, possibly to deeper waters, were related to declining fall water temperatures. Based on these results, nursery habitats for age-0 juvenile lake sturgeon consisted of low current velocities, shallow depths, and sand substrates dominated by Dipterans and should be protected in tributaries supporting spawning populations of this species.

Friday, Mike - Spawning Habitat Enhancement through Flow Manipulation

Description: From May 14 to June 30, 2004 Ontario Power Generation provided at least 23 m^3/sec of spill over Kakabeka Falls to allow adult sturgeon access to traditional spawning grounds and facilitate successful spawning, hatch and larval drift. This area is often dewatered during the period of spawning for power production and scenic flows for Kakabeka Falls Provincial Park. To monitor sturgeon movements into the spawning area radio telemetry was utilized. Fifteen adult sturgeons were tagged in the lower river (with external radio transmitters) when they were known to be migrating upstream to spawn. Their movement into the spawning area and migration back downstream was monitored using an ATS data logger. Larval drift netting was carried out to document spawning success under this flow regime.

Daugherty, Dan - Assessment of potential lake sturgeon habitat availability in Lake Michigan tributaries: Applications to the restoration process [full presentation (640 KB pdf)]

Description: Presentation will introduce and discuss techniques currently being utilized to determine potential availability of suitable habitat types for egg, larval, juvenile, and staging and spawning adult lake sturgeon in historically important northern Lake Michigan spawning tributaries. Information

gathered from these habitat assessments will also be discussed as a decision-making tool for restoration efforts

Haxton, Tim and William Johnson - Spatial Application of a habitat suitability index model for lake sturgeon [full presentation (1.6 MB pdf)]

Description: The Threader et al. (1998) HSI model for lake sturgeon was developed into a spatial application in ARCMAP 8.0. This presentation will describe background on the model (suitability indices), the techniques used to collect the pertinent information to populate the model, and model results. I will display example model outputs and, time permitting; a summary of the model field validation will be included.

Geddes, Christine - Classification & Visualization of Lake Sturgeon Habitat Suitability using the Great Lakes GIS [full presentation (1.2 MB pdf)]

Description: Once abundant in the Great Lakes watershed, the lake sturgeon *Acipenser fulvescens* is now listed as a threatened species under the Michigan Endangered Species Act. It has ling been understood that habitat and nursery loss from dam construction, logging practices, and poor water quality has been an important factor in the lake sturgeon decline. The Great Lakes GIS, a habitat-based aquatic GIS, is a unique tool for the Great Lakes lake sturgeon habitat visualization and decision support. The great Lakes GIS includes map-delineated spatial unites, and associated habitat and biological attributed data for terrestrial, tributary, nearshore, and offshore ecosystems. Additionally, it includes subsets of spatially explicit data from other regional GIS projects, including the National Hydrography Dataset (NHD) and the Digital Water Atlas (DWA), as well as associated tool kits. Together, these datasets allow the assessment of inland water habitat, potentially valuable as lake sturgeon spawning habitat. Using criteria from the Lakes sturgeon Rehabilitation Strategy, published by the Michigan Department of Natural Resources, and the Great Lakes GIS, Michigan inland water habitats (i.e., inland lakes and tributaries) were classified in terms of suitability to sustain lake sturgeon populations. Several digital maps, including historic distributions, historic spawning areas, estimated historic population sizes, estimates of present sizes and distributions of lake sturgeon population in Michigan, and barrier locations, were compared wit the habitat classification. The utility of this application for lake sturgeon habitat classification and management is discussed.

Manny, Bruce – Classification of lake sturgeon spawning habitat in the Detroit River [full presentation (2.7 MB pdf)]

Description: In 1999-2000, we surveyed nine reputed, historic spawning sites of lake sturgeon in the Detroit River using Side Scan Sonar (SSS) and underwater TV (UTV). Video tapes of bottom substrates present at each site were examined to determine theoretical suitability of bottom substrates for successful incubation of sturgeon eggs. Our classification was based on the percentage of the river bottom covered by rocks, plant growth, and silt, estimated interstitial void space among the rocks, and estimated water velocity. We scored each site using a standardized evaluation sheet for each video of that site and subjectively classified substrates at each site as suitable, impaired, or unsuitable for incubation of sturgeon eggs. In 2001-2003, ultrasonic telemetry revealed an active sturgeon spawning site (Zug Island) and several suspected spawning sites in the river. Those and 86 other sites chosen at random in the main channels of the river were evaluated systematically with SSS and UTV. Deployment of egg mats at the known and suspected spawning sites revealed that sturgeon spawned only at Zug Island. That site is now inundated with lethal concentrations of residual chlorine from a large (13,262 cubic feet/sec) combined sewer overflow upstream that was chlorinated in 2002. In June 2004, in partnership with Michigan Sea Grant, we constructed reefs in the headwaters of the river near

Belle Isle of broken limestone, gravel/cobble, and coal cinders to provide clean, suitable spawning substrate in the river for lake sturgeon.

Kennedy, Greg – Evaluation of underwater remote sensing technologies to survey potential lake sturgeon spawning habitat in large river systems in the Great Lakes

Description: Lake sturgeon spawning habitats in large rivers are difficult to quantify. To quantify potential lake sturgeon spawning habitat in the St. Clair River, we mapped and classified surficial substrates at eight sites (six reputed and two active spawning sites) using side-scan sonar and underwater video. At each site, the sonar images was used to obtain surficial sediment imagery, then underwater video images were obtained to ground-truth the substrate images visible on sonar records. In all, about 365 ha of river bottom (8.5% of the entire river) were surveyed using sonar and underwater video. Substrate classification maps, produced from the sonar and video data, were used to determine the extent of suitable spawning habitat within each site. Detailed examination of two sites (Point Aux Chenes in the lower river, and Port Huron in the upper river) identified 5 different substrate types, ranging from soft clay to rock/cobble. At Point Aux Chenes, substrates were primarily clay and sand (mostly on the bank and shallower portions of the main channel); gravel occupied deeper portions of the main channel. Substrate composition at Port Huron consisted primarily of rubble/cobble throughout the entire survey area. However, we found hard-pan clay on the west side and sand on the east side of the river. The results of this study increased our understanding of sturgeon spawning habitat within the St. Clair River. In addition, locations of transmittered adult sturgeon could be overlain on the substrate maps to determine which bottom substrate types are being utilized by sturgeon. Continued substrate mapping throughout the river could provide a more accurate picture of spawning habitat within the St. Clair River.

Haxton, Tim - Development of a management plan for Lake Sturgeon in the Lake St. Francis portion of the St. Lawrence River [full presentation (686 KB pdf)]

Description: Lake sturgeon are present in low abundance in the Lake St. Francis portion (below the Moses-Saunders Power Dam and upstream of the Beauharnois Power Dam) of the St. Lawrence River. Lake St. Francis has been identified as an Area of Concern by the International Joint Commission. A workshop to develop a management strategy for lake sturgeon was held on September 22 and 23, 2004. The workshop participants developed a list of the most appropriate management actions for lake sturgeon in Lake St. Francis. This workshop could provide a foundation for workshops on other waterbodies that fall within interprovincial/interstate and/or international jurisdiction. This presentation will provide a summary of the workshop, its effectiveness and an update on the progress to date.

Sturgeon Passage Presentations:

Whelan, Gary - Social, Economic and Biological Considerations Related to Lake Sturgeon Passage in the Great Lakes

Description: Fish passage is critical to the successful rehabilitation of lake sturgeon populations in the Great Lakes. There a number of social, biological, economic and engineering considerations that must be taken into account. From a social perspective a range of constituents will need to be brought into the process ranging from local residents to utilities to resource user groups to “love my dam or fish species” groups. Some of the key biological issues are the effects of fish passage on other “resident” species and fisheries, contaminant transport, aquatic nuisance species and wildlife effects.

Engineering considerations include who is going to do the engineering and what method will be used. The selection of the appropriate method that could include dam removal, fishways, elevators or lifts, natural fishways and trap/transfer methods will depend on the conditions and funds available. It is critical to keep in mind that any fish passage method other than dam removal will require annual maintenance funds that range from 0.1 to 5% of the capital cost. Both upstream and downstream passage must be considered when implementing passage for lake sturgeon. There are a range of regulatory tools to obtain passage and these include state/provincial passage laws and provincial hydropower facility licensing. A number of federal regulatory options exist for use including the Federal Fisheries Act (Canada), Fish and Wildlife Coordination Act (US), Clean Water Act using Section 401 Certification (US) and the Federal Energy Regulatory Commission hydropower licensing proceedings (US). To successfully implement a fish passage strategy a considerable amount of planning, expertise and time will be need to deal with the social, biological, engineering and regulatory issues. Even with these constraints, there is simply no choice but to deal with these issues to be successful in lake sturgeon rehabilitation in the Great Lakes.

Kynard, Boyd – Experimental studies at Conte AFRC on up- and downstream passage of lake and shortnose sturgeon and riverine fishes [full presentation (1.1 MB pdf)]

Description: The presentation will review studies at the Conte AFRC on upstream passage of sturgeons and riverine fishes in a spiral fish ladder and review ongoing studies to develop a downstream bypass for shortnose sturgeons (yearling to adult life intervals) in the Connecticut Riverupstream sturgeon passage at barriers.

Amaral, Steve – Downstream fish passage for sturgeon: past, present, and future [full presentation (5.3 MB pdf)]

Description: Fish passing downstream through hydro turbines may be subject to mortality rates between 10 and 20%, depending on fish size and turbine design. Turbine passage mortality typically is mitigated through the use of physical screening devices that reduce entrainment and guide fish to alternative downstream passage routes. Behavioral deterrent technologies have also been evaluated as means to minimize turbine entrainment, but very few successful applications have resulted. More recently, new turbine runner designs have been developed to specifically minimize injury and mortality of entrained fish. Biological studies have demonstrated that mortality rates of fish passing through these “fish-friendlier” turbines often are very low (less than 4%) and comparable to mortality rates of fish passing over spillways and through downstream bypasses. Although most downstream fish passage technologies have been evaluated with a wide variety of freshwater and diadromous fishes, relatively few studies have been conducted with sturgeon species. Because sturgeons are very unique with respect to morphology, size, life history, and behavior, results from previous fish passage studies with other species generally are not directly applicable to sturgeon. However, a review of biological, environmental, and engineering parameters that have contributed to effective downstream passage with other species can be assessed for relevance to sturgeon. Additionally, recent laboratory studies have evaluated several species of sturgeon with angled bar racks and louvers and a “fish-friendly” turbine, providing the first evidence that some traditional and experimental technologies hold promise for effectively protecting sturgeon at hydro projects. Based on the results of these studies, and those with other species, fisheries managers and scientists can begin to focus future their research efforts on specific downstream passage technologies that have the greatest potential for successfully protecting sturgeon.

Aadland, Luther - Lake Sturgeon Passage and Habitat Restoration [full presentation (178 KB pdf)]

Description: Lake sturgeon populations have diminished over much of their historic range. While over-fishing and water quality declines have been significant factors in this decline, dam construction may be the most important. Dams have both blocked migratory pathways and inundated critical spawning habitat. Traditional fish ladders were rarely designed to accommodate or effectively pass sturgeon. While dam removal is the best solution to sturgeon passage, nature-like passage may be the next best alternative. This presentation will discuss by-pass fishways and conversion of low-head dams to rapids that both pass fish and provide potential spawning habitat.

Regulations, Status Determination, and Rehabilitation Progress:

Mosindy, Tom - Regulatory Options for Managing the Angling Fishery for Lake Sturgeon in Ontario

Description: A brief overview of options that are being proposed by the Ontario Ministry of Natural Resources to regulate lake sturgeon angling fisheries throughout the province. These include changes to existing seasons, catch and possession limits, size regulations and sanctuaries. This forms part of a much broader exercise to modernize sport fishing regulations in Ontario.

Vandergoot, Chris - Summary of the information collection on Lake Sturgeon in the Western Basin of Lake Erie 1999-2003 [full presentation (5.8 MB pdf)]

Description: The western basin of Lake Erie has been referred to as the black-hole of sturgeon research because little research has been conducted in this area of the Great Lakes. Since 1992 information regarding the capture of lake sturgeon in the western basin of Lake Erie by recreational and commercial fishermen has been collected by the Ohio Department of Natural Resources (ODNR). The information collected by the ODNR suggests that the western basin plays an important role in the life history of lake sturgeon in this locale. It appears that the Bass Island area provides juvenile habitat during the spring and summer months, however, information concerning adult lake sturgeon in the western basin is lacking. Additionally, anecdotal evidence suggests that the Maumee River may be used by lake sturgeon as a spawning ground.

Jackson, Randy - Lake sturgeon restoration in Oneida Lake, New York: stocking, habitat use, and life in the fast lane [full presentation (2.7 MB pdf)]

Description: Oneida Lake is one of several waters in New York State included in a lake sturgeon restoration program initiated in 1995. To date, 7,000 hatchery-reared lake sturgeon have been stocked into Oneida Lake and data from over 400 fish sampled since 1996 indicate a fast-growing and healthy population. Length-at-age data show growth rates of 116 mm/year through age 8, faster than other systems for which data are available. Similarly, length-weight relationships show lake sturgeon in Oneida Lake to be in excellent condition, with the largest individual from our samples weighing 16.9 kg at a length of 131.5 cm. Several age-8 males readily released sperm during spring 2003 sampling, providing further evidence that conditions in Oneida Lake are very favorable. A habitat-specific gill net survey has produced overall catch rates of 0.3 sturgeon/hour over 2 years, with highest catches observed over sand and shoal substrates as compared to silt and mud bottoms. Diet samples indicate that amphipods, snails and zebra mussels are the most important foods of sturgeon in Oneida Lake and availability of these taxa is highest in sand and shoal habitats. These studies should assist in identification of habitats where sturgeon stocking might be most successful.

Abstracts - Poster Presentations

Bauman, John - Population Assessment of Lake Sturgeon in the St. Marys River

Description: Lake Superior State University's Aquatic Research Laboratory has for 5 years conducted set-line surveys from the lower to upper portions of the St. Mary's River, Michigan. This survey targeted sub-adult and adult lake sturgeon. Results will help managers conduct accurate population estimates before rehabilitation or conservation efforts can be initiated for the St. Mary's Lake Sturgeon population.

Dittman, Dawn E. and Emily C. Zollweg - Assessment of Habitat Use by Stocked Lake Sturgeon in the Genesee River [view poster (802 Kb pdf)]

Description: Lake sturgeon (*Acipenser fulvescens*) has been identified by fisheries managers as a key target species for recovery and restoration in the Lake Ontario - St. Lawrence River system. The Genesee River is one of the major tributaries to Lake Ontario and part of the Rochester Embayment Area of Concern. In September 2003, 900 juvenile lake sturgeon were released at river kilometer 9.1. Released sturgeon had an average length of 210mm and an average weight of 43.6g. Experimental gill netting was conducted from river km 3 to 9.1. In this first year of assessment 94 of the 900 stocked lake sturgeon were recaptured. The most successful recapture site was the first deep area downstream of the release site, (river km 8.2). It averages over 6 m depth and has gravelly/shelly substrate. The second most successful capture site (rkm 6) is a deep spot (9 to 10m) with gravelly, rocky substrate. In November 2003, five recaptured fish at site 1 averaged 242mm. Nine fish captured 8-31 to 9-02, 2004 averaged 347mm and 162g with the largest fish measuring 408mm and 248g. These results indicate that the juvenile sturgeon are successfully using the Genesee river habitat. Results of this research in the Genesee River will provide information needed for future steps in the restoration and enhancement of lake sturgeon in Lake Ontario and associated tributaries.

Drauch, Andrea M., Brant. E. Fisher, and O. E. Rhodes, Jr. - Resolving the Genetic Composition of the White River Lake Sturgeon Population: Implications for Conservation and Management

Description: Stocking has been employed in the rehabilitation of lake sturgeon populations for the past twenty years. A concern of particular relevance to this conservation strategy is the maintenance of genetic integrity within particular stocks. Individual lake sturgeon stocks may be adapted to local environmental conditions, and the introduction of non-native lake sturgeon to a watershed may jeopardize the survival of the released cohort, as well as the persistence of native conspecifics by contributing maladaptive genes to the gene pool. Recently, several state agencies have expressed interest in reintroducing lake sturgeon to the Ohio River drainage system. A single relict population of lake sturgeon, found in the White River, is thought to exist in this drainage. It is suspected that the population primarily consists of remnant individuals, however the possibility exists that fish from reintroduced populations in the Missouri or Mississippi Rivers have strayed into the White River system. Population assignment tests were performed using multilocus genotype data from ten microsatellite loci to resolve the genetic composition of the White River population. The results of this analysis will assist in the selection of an appropriate source population for future lake sturgeon reintroductions to maintain the genetic integrity of the Ohio River stocks.

Furman, Amy, and Barbara I. Evans - Embryogenesis and Larval Development of Lake Sturgeon *(Acipenser fulvescens)*

Description: We are interested in the early functional morphology of lake sturgeon as it applies to their survival. Fertilized lake sturgeon eggs were obtained on May 6, 2004. Males and females were captured from the Sturgeon River by the MDNR and their gametes removed. The eggs were fertilized on site and mixed with clay to prevent clumping. The fertilized eggs were then transported to LSSU and kept at 13°C on a light regimen of 15L:9D in a Lab-Life Biotronette Plant Growth Chamber. For embryonic development, 3 eggs were maintained in a petri dish filled with fresh lake water (changed daily) while the remaining eggs were reared in egg trays at the LSSU Aquatic Research Laboratory. After hatching, all larvae were transferred to aquaria in the growth chambers. Development was monitored using a Leica GZ6 dissection microscope and recorded using a Panasonic Super Dynamic WV-CP450 Color CCTV Camera. The images were then digitally captured and processed in iMovie for iMac. The sketches were drawn in pencil, then scanned and processed using HP PrecisionScan Pro and iMovie. The lake sturgeon were observed from fertilization to 70 days post hatch (dph). The heart was first seen pumping at 9 days post fertilization (dpf). Hatching occurred 10 dpf , but the yolk was not resorbed until 15 dph. The jaw and eye could been seen developing in the embryo, but were not fully formed upon hatching. Jaw articulation was first observed 9 dph, while eye movements were not observed until 21 dph. Pectoral fins are first evident after 3 dph and very small fin rays are visible 10 dph. Rudimentary barbels were first observed at 4 dph. The characteristic rostrum of the adult lake sturgeon starts to take shape 10 dph. The fish survived well past our expectations. By characterizing the early development of lake sturgeon we hope to better understand the constraints on their early survival.

Evans, Barbara I. and Amy Furman - Development of the Retina in Larval Lake Sturgeon *(Acipenser fulvescens)*

Description: The visual capabilities of lake sturgeon were assessed during their early life history. Lake sturgeon eggs from the Sturgeon River were obtained the day of fertilization, courtesy of the MDNR (E. Baker). Eggs were then reared under controlled conditions at 13^{o}C and a 15hL: 9hD light cycle. At various times during development, individuals were fixed in Bouin's, embedded in plastic resin and sectioned at 3 microns to observe the state of the retina. At hatching (10 days post fertilization) the eyes were not yet functional. The eyecup had formed, but no lamination of the neural retina was present and the photoreceptor cells had not differentiated. The lens was only partially formed, but the pigmented epithelium was present around the retina. At 10 days post hatch (dph) single cone photoreceptor cells were present; the retina showed distinct layers and the lens appeared to be fully differentiated. At 54 dph, the retina appeared to have two cone types 1) a small cone type with a tapered outer segment and an oil droplet in the inner segment and 2) a larger cone with a wide rod-shaped outer segment. No rods were apparent at this time; however, the retina has many more photoreceptors than ganglion cells, a neural pattern typical of rods. The timing of retinal development in the lake sturgeon indicates vision is not crucial to survival of the early larval stages. The apparent lack of rods, but convergent retina suggests poor visual acuity but also poor low light vision. Ongoing work will further our understanding of the limitations of vision during the early larval development of lake sturgeon.

Haxton, Tim - Changes to a lake sturgeon spawning population over 50 yrs

Description: Dubrieil and Currier assessed a lake sturgeon spawning population below Chats Generating Station (Ottawa River) in 1949 and sampled over 400 lake sturgeon. I repeated their project in 2001, 2003 and 2004. I will be presenting changes/similarities observed in the spawning

populations including size distribution, growth and timing of spawning. A general description of the spawning areas will be provided along with historical changes.

Kornely, Greg W. - Hook & Line Sturgeon Fishery in the Menominee River, Wisconsin-Michigan Boundary Water

Description: There is an annual hook and line lake sturgeon fishery that takes place on the Menominee River, the boundary water between Wisconsin and Michigan. Since 1983 registration of harvested fish has been mandatory. The annual harvest has ranged from 13 to 210 lake sturgeon. Harvest data since then will be described, highlighting changes in fishing pressure and regulations. Future management will be proposed.

Yule, Dan, Gary Cholwek, Henry Quinlan, and Tom Doolittle - Lower Bad River Acoustic Mapping Project [view poster (256 Kb pdf)]

Description: Our project goals were to map and quantify habitat in the lower Bad River and nearby coastal waters of Lake Superior and to examine habitat usage by juvenile sturgeon previously captured in trawl surveys. We surveyed the lower 9.6 km of the Bad River, Wisconsin, and a 3.2 by 2.0 km segment of Lake Superior near the Bad River mouth. Three substrate categories were identified in the Lower Bad River: clay (very densely packed with fine particles between 1/2048 mm to 1/256 mm diameter, a mixture of clay and sand and sand (1/16 to 1/4 mm). Five substrate categories in Lake Superior were identified: clay (particles between 1/2048 and 1/256 mm diameter), sand with silt (1/256 to 1/8 mm), sand (1/16 to 1.5 mm), coarse sand/medium pebbles (0.5 to 10 mm) and cobble/boulder (64 to > 256 mm). Previously captured sturgeon were associated with relatively deep water with bottom comprised largely of sand. Future fish surveys can be designed to proportionally sample all habitat types for improved description of juvenile lake sturgeon habitat preferences in the Bad River and other Lake Superior tributaries.

Zollweg, Emily, John Weisser, Rob Elliott, Henry Quinlan, Jim Boase, Scott Koproski, and Adam Kowalski, Nancy Auer, Ed Baker, Doug Carlson, Tim Haxton, Mike Thomas, Jerry Weise - Great Lakes Lake Sturgeon Tributary Database and Geographic Information System Demonstration

Description: This interactive GIS application and metadatabase have been designed to compile the available lake sturgeon data sources to help focus restoration and research activities on priority lake sturgeon waters.

The 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. All known lake sturgeon waters within the Great Lakes Basin (extirpated, historic, reintroduced, and current) are included. Where available, information is referenced for presence of adults, juveniles, and subadults, and whether spawning has been observed, egg deposition documented, and larvae surveyed for. Data fields reporting whether contaminant, genetic or age samples were collected, year(s) data collected, investigator(s) involved, and citations for available reports and publications and point of contact for additional information are included.

Sturgeon Passage Panel Discussion

Wednesday, November 10, 2004

Presenters & Panelists: Dr. Luther Aadland, Minnesota Department of Natural Resources
Steve Amaral, Alden Lab
Dr. Boyd Kynard, USGS Northeast Anadromous Fish Research Lab
Gary Whelan, Michigan Department of Natural Resources

(Presentation abstracts listed above under oral presentations for Sturgeon Passage.)

Moderator: Dave Bryson, USFWS New York Field Office

Dave:
Welcome to the Sturgeon Passage Panel Discussion session. We've got a great group of panelists with diverse knowledge and experience. I'll repeat the question when necessary. If you've got a general or what if, type question those would be good to get started. I'd ask you to hold off on the specific or detailed questions and find a time to talk with the panels later.

Question:
Around the Great Lakes most populations are small, remnants of what was once present. Most of these small populations are likely not limited by spawning habitat, but rather by too few fish and available spawning habitat is not saturated even at sites with barriers. So where should we focus our attention? Should fish passage be our first priority where suitable upstream habitat exists even though providing access to more habitats would reduce spawner density and perhaps limit production, or should we first focus on increasing the number of adults present? Conversely, where are populations great enough that passage is an obvious need at this time?

Gary:
Unless there is no suitable sturgeon spawning habitat upstream of a barrier, I don't think we can ever go wrong by providing passage. Even if the population is small or we don't know the size I still feel that we should provide access to upstream spawning habitat.

Dave:
Boyd, can you talk a little about target numbers.

Boyd:
No, I don't feel I'm able to discuss that, but I'd like to restate one action item from yesterday's fish passage breakout. That being the critical need to develop basin specific restoration plans which detail objectives such as prioritize passage issues and all other issues related to sturgeon management.

Luther:
Unless there is suitable and adequate habitat there is little reason to attempt to restore sturgeon populations. Since environmental conditions tend to vary from year to year and sturgeon spawn infrequently there will be years when spawning sites are suitable and years when they are not. Therefore, I recommend we provide as much potential spawning habitat as practical and allow the fish to choose and utilize the habitat they prefer.

Comment:
With regard to basin specific planning, in Michigan waters of Lake Superior, the two rivers with sturgeon are within the Ottawa National Forest. Currently we are under a court order to cooperatively identify and explore opportunities to improve habitat on these federal lands. So, the opportunity is here if there are some restoration ideas.

Dave:
More and more court orders are forcing federal agencies to develop partnerships and coordinate work with many parties to develop projects.

Question:
Using the new turbine design that passes juvenile sturgeon downstream, what was your turbine efficiency percentage and how does the industry accept this design?

Steve:
The efficiency of our turbine design was 89%, which is slightly below conventional turbines. This issue is being addressed now since the next step is to develop a prototype for field use which needs to be comparable in energy production to existing turbines. We are talking with folks about potential sites for these field trials. At a site in the state of New York, a settlement agreement was drafted that included the installation of our turbine as a fish passage measure. For this installation, we will need to make some design changes to improve power production, without compromising fish survival, making it more feasible from an economic standpoint.

Gary:
With most conventional hydropower facilities the place to implement modifications to pass fish are the turbines on the by-pass channels or leading/power canal. The middle of the river powerhouse offers few, if any, option to successfully pass fish at high efficiency.

Question:
Doesn't that still leave us with an impingement problem at the powerhouse with the larger fish?

Gary:
That potential exists but there may be ways to deal with the larger fish. They have better sustained swimming speeds than small fish and we may be able to utilize that capability to improve passage. Maybe even a collection gallery type system. It is not practical to utilize a 3 mile long louver type system to pass large fish, since you'll have high mortality rates. We haven't really explored how to deal with fish going over the spillway, but the survival is likely low.

Question:
Are we doing much assessment of downstream passage safety and how to improve spillway design?

Boyd:
We have done some work with shortnose sturgeon which are a good surrogate for lake sturgeon up to a certain size based on swimming ability and morphology. Back in 90's we did a lot of telemetry on adult shortnose sturgeon upstream of dam at Holyoke. Our objective was to gather info during the relicensing to determine if there was a need for downstream protection of the federally endangered and thus, protected, shortnose sturgeon. We gathered information on the mortality rate going through the turbines and over spillway. If an adult or large juvenile (30 inches or so TL) goes through the turbines there is 100% mortality, whereas we found that those fish going over the spillway had 100% survival.

We recaptured some of the fish going over the spillway and there were injuries to these fish but they did survive.

Gary:
The facility at Holyoke has a nice smooth spillway landing, which is unlike many other facilities which have large energy diffusers (concrete blocks) or retaining walls that cause very high mortality.

Dave:
Not all hydropower facilities are created equal. Some dams have gates and release structures some of which will put the stem right at the floor where the water comes out rather than off to the side. Need to talk with engineers on sight to know how the facility operates. Also need to consider whether there is enough water being spilled at the right time of year to pass fish. Some spillways only have a trickle of water which doesn't allow fish to pass over, and if they did, they would probably die upon impact.

Comment:
I visited a spillway in spring during high water and they had only 3 of 40+ gates open and water was jetting over the dam onto the diffuser. Any fish passing through was dead. I asked why only 3 gates were open and was told it was the easiest way to operate. In some cases we just need to work with the operators to make them aware of fish passage concerns.

Question:
How do we transition from lab tests to the field applicability?

Steve:
For some technologies it isn't that hard, for others it is more difficult. For example, at Hadley Falls there is a long history of developing effective fish passage facilities. They conducted louver and angled bar-rack studies in the lab and came up with some good information. Now they need to apply this information to the field where flows aren't as laminar, it is a much larger system, and environmental cues that affect fish behavior are more variable. At Hadley Falls, they put in full depth louver to test with several fish species, primarily shortnose sturgeon and American eel. Pilot studies are usually the best approach to find out if a technology will achieve goals without the expense of constructing a full-scale system. It's not an easy thing to do and there are trade-offs between the biological and engineering aspects of any project.

Boyd:
Steve and I have done small scale lab experiments and we progress from there. At Conte we are scaling up, while still in the lab we are much closer to actual flows and the environment the fish will encounter. I see this as an incremental approach to actual field work. We want to increase the probability of success to 90-95% or as much as possible before put an application in the field. We're trying to do everything possible using an incremental approach to ensure there are no unexpected setbacks. For the next 2 years, we will work on a larger scale by-pass system within the laboratory and in year 3 work with agencies to build some structure at Hadley, and then evaluate that operation. Before we ask or require a power company to spend a lot of money we want to be darn near sure we've got it worked out.

Question:
With all the dams built many years ago reaching the end of their life, how can we start to encourage decommissioning of dams?

Luther:
First, is maintenance cost. Dams cost a lot to maintain and cost will continue to increase. In Minnesota we have used that as leverage, by covering the cost of removal.

Gary:
Luther is absolutely right. Cost is the key to removal and decommissioning of dams. Economics drives the process. In many cases the dams are owned by municipalities and then the state becomes the ward of the dam and ends up paying the cost of the dam. Unfortunately, there are federal dollars available to fix and maintain, but almost never to remove them. So they get fixed with no consideration for the next time the dam fails.

Luther:
We recently had a dam failure. FEMA came in and offered to rebuild the failed dam exactly as it was previously. Minnesota DNR threatened to deny a permit to do that since we now had fish passage upriver and the intended function of the dam for ice control was questionable. Minnesota DNR proposed an alternative. The dam breach had resulted in a loss of over a mile of river that Minnesota DNR wanted reclaimed. Our proposal would restore of the river channel by creating rapids at the site of the dam and largely remove the structure. In the end FEMA changed their position and funded the removal.

Dave:
Many states are grappling with dam removal issues and who will pay for it. Some states have been more successful than others working with federal agencies to consider alternatives and secure funding.

Question:
Can you give us an estimate of costs of dam removal and by-pass channel construction?

Luther:
It can be less expensive that you would think. The two by-pass type fishways were each about 30K. The main channel rapids vary widely based on the volume of material and the hydraulic height of the dam. The Grand Forks dam modification used 80,000 tons of rock, it had a scour hole up to 30' deep, was a 400' wide river, and that cost $4.7 million. The Mid Town dam modification cost $235,000. The North Dam cost $117K. One large one required 20K tons of material and cost only $169K. In this case the city had been virtually inundated during the 1997 flood and FEMA bought out homes in floodplain. We saved a lot of money by using clean concrete materials from the destruction of the structures for the base and had them remove the rebar. The concrete base was covered by three feet of field stone so the concrete could not be seen. In western Minnesota we have a lot of glacial till nearby so cost will depend on proximity of materials. I budget $40/ yard for materials on average.

Dave:
The proximity to the stone materials can make a big difference in cost.

Luther:
The biggest main channel rapids we built had a dam hydraulic height of about 13' high. Most are around 10'. At one site we are currently removing a dam and building rapids upstream. Due to bank stability issues we are required to return river to same crest elevation so the rapids are being built upstream. Because it is upstream there are deposited materials that the large materials are placed on top using less material than if we had filled the very large scour hole in the tailwater.

Fish naturally find the main channel rapids but on the bypass channels it is critical to have the entrance in the immediate tail water area. These bypasss channels pass only a portion of the flow (one passed about 20% the other about 6% of the mean annual flow) and on larger rivers the spawning population can become bottlenecked and vulnerable at certain times of year. If a large number of migrating fish are forced into a small fishway, it is likely that only a proportion of them will be able to pass due to this bottleneck effect and vulnerability to predation.

Question
Dave:
What is the time frame for planning and what is the permit process like? In the presentation I noticed heavy equipment in stream?

Luther:
Construction does cause some disturbance but our staff from the Minnesota Pollution Control Agency recognize the long-term benefits of restored fish passage and even contributed funds to one of the projects There have been regulatory growing pains. The interstate waters (Red River) where two state agencies are involved. We have needed to develop physical model of the rapids even though we had empirical data from previously built rapids. There are hoops to jump through and just need to cover the permit process.

Planning time frame varies a lot, sometimes it happens quickly and other times really slowly. First thing you need to do is to plant the seed at which time you may get ridiculed. One needs to be patient and not get discouraged. During early meetings on the first large dam conversion, the idea of converting the dam to a rapids was not very well received. Some folks wanted a bigger dam with fencing to keep people away. But once we did the first project, subsequent projects sold themselves and community leaders helped get funding to modify other dams.

Question:
How do you figure out the entrance level of the by-pass channels when dealing with changing water levels below the dam?

Luther:
This was the key issue on the first such by-pass project. The dam had no real operational/management plan and it had a 4' fluctuation in the pool. We used a cattle crossing culvert and put boulders within culvert and staggered them to act as a baffle. A flood in 1997 washed the dam out and left the fishway behind. The dam was quickly rebuilt with FEMA funds following a Federal Disaster Declaration. I surveyed reservoir and tailwater levels under high and low pool conditions and calculated velocity and discharge that would be seen in the fishway. Based on the range of head I designed the entrance to be passable under all water levels. A large boulder was placed at the entrance to narrow it and limit the amount of flow during high reservoir elevation.

Dave:
This shows the importance of having good flow data available for the site.

Question:
Since we often don't know how many sturgeon are in a system, are there potential problems for the sturgeon with trapping and holding large numbers of large fish in a trap and transfer style fish passage device?

Boyd:
Fish ladder and trap technology and engineering is well developed. Normally during construction if separation and sorting are needed, they will build a sorting pen that shunts fish off to a sorting area. As far as damage to fish we have all N. Am sturgeon in our lab. We have sturgeon up to 30 lbs. and we handle these fish all the time similar to how they would be handled in a separate and sort and transfer facility. Sturgeons are very tolerant and hardy and I don't see that as a problem. With shortnose sturgeon we have had no problems handling up to 40 a day and they are handled a lot.

The biggest issue seems to be funding for personnel to man such a facility. The manpower and/or time required to sort or transfer fish can be costly and that is a bigger limitation than the technology aspects of fishway design. If there are issues with exotics, lampreys, etc. then the passive fishway design that Luther has shown may not be feasible. For situations where exotics are an issue, a sorting and transfer facility at the lowest dam would be a big advantage.

Question:
Are there guidelines for how much water is need in a separating facility?

Boyd:
Yes.

Dave:
There are also guidelines for fish attractant water so fish can find it as opposed to tail race. Keep in mind that with the exception of Luther's presentation, we have discussed upstream and downstream passage separately. Typically, we don't send fish back down the upstream facility. Folks need to be aware that there are generally different pathways for upstream and downstream movement.

Luther:
Regarding the exotics issue in Minnesota I have been involved with the Mississippi navigation study. In that system there are 2 Asian carp species present and the bighead have already entered Minnesoata waters. The general consensus of biologists on the fish passage team was that these Asian carp would be the first to make it through the lock system and that they ultimately would make it upstream. We believe that what we really need to do is benefit native species by providing passage so that they are able to utilize key upstream habitat. The current system favors the Asian carp since they are among the strongest swimmers and the reservoirs provide them with ideal habitat.

Comment:
Gary could you follow-up on the lamprey program. Earlier you made a comment that the current chemical control is a viable option.

Gary:
The current chemical treatment program for lamprey is very fine tuned. There are different camps of support for or against the use of chemicals for lamprey control and these will persist. Chemical treatments are very expensive especially on large systems; however, the use of barriers is also expensive especially when considering the cost of manning a facility. The duration of time needed to man a station seems to continually increase. It is no longer just March - July, but extends before and after those months. It seems as though we are asked to operate our weir facility on the Platte River, which we use for our coho program, but which also serves as a lamprey barrier, longer each year. That increases the cost considerably. In my opinion, on an ecosystem basis and at present prices chemical treatment is currently a better option than barriers or dams. There is a proposal to put in 48 sea lamprey barriers in the state of Michigan. At the present time, I am not personally in agreement

with those who are advocating the use of barriers as a means of controlling sea lamprey over maintaining passage and using chemical control.

Dave:
I guess the take home message would be that there is more than one way to solve a problem. Always need to consider alternatives, pluses and minuses for each project. Alternatives may be identified in a FERC process, a state document, or continuing with chemical control.

Comment:
No barrier would be put in place without the support of the jurisdictional agency and other partners, and all are evaluated within the Great Lakes Fishery Commission framework.

Gary:
One challenge regarding barriers is how long will we be able to maintain the effort on a sort/transfer facility? I don't know if agencies have the resolve or finances to operate one or many such facilities for 40 years.

Dave:
Another point with fishways is that when installed they need to be monitored to determine if they are functioning as planned. So, there needs to be a plan and budget in place to evaluate the fishway for several years. Often environmental conditions (e.g. high or low water years) influence how long this evaluation needs to take place.

Question
Dave:
What is the main philosophical question to be answered prior implementing a project?

Gary:
Will providing passage/access to upstream habitat to fish result in a benefit to the ecosystem?

Steve:
It is critical to thoroughly assess need and available resources to ensure that you are expending your efforts on projects that will give you the biggest gains.

Boyd:
Coming from a perspective from northeastern U.S. where for 40 years upstream fish passages devices were installed before the first downstream device was installed; you really need to consider both upstream and downstream aspects.

Luther:
My biggest concern is that we look to fish passage when we should look toward dam/barrier removal. Fish passage often is easier to implement than removal but doesn't always address the fundamental problem. If we only pass fish to more degraded reservoir habitat we've gained little. Habitat inundated by reservoirs may be key to reestablishing populations.

Comment:
I'd like to add a little perspective to working through the FERC process. Regarding dam removal, on one project I am involved with FERC did an economic analysis and under all scenarios the economics showed it to be a losing proposition. However, FERC re-licensed the facility without considering dam removal and over many concerns raised by natural resource agencies. How do we deal with that?

Dave:
There are general costs for fishway installation, and there are also ballpark costs for dam removal. It is important to have an engineer available and to work as a team to help examine the alternatives. A key is to document the decisions made along the way. We should always be able to justify our decisions and allow others to understand why we took the path we did.

Gary:
I think it is important that we continue to advocate for and press FERC to consider dam removal as an option. This is always an option for projects in Michigan. We need to provide these comments and keep it in the records that removal should be an option. It may take years, but at some point someone in charge will take notice that these projects are inefficient and costly, and they will realize that dam removal is not being explored or weighed as it should be. If we don't continue to request dam removal analysis in our comments we are as culpable as FERC for not considering it as an option. At some point it will be clear or unavoidable to some senator or someone to recognize that the licensing of a project that is losing lots of money is not a better use of public interest when a particular fishery may be worth far more than the project.

Question:
Why is relicensing often the least expensive alternative despite the fact that a hydropower projects is losing money?

Gary:
Unfortunately, from a policy perspective we are currently in a half regulated/half de-regulated world at present. That makes things difficult. If it is a regulated utility they could pass the cost of removal off to cusumer because it is a true cost of doing business. It should be no different than deregulating a gas plant or nuclear plant, but for some reason, dams are treated differently. In Michigan, the process goes through a state Public Service Commission. The reason they don't want to remove a dam even if it is losing money, from the company and short term profit perspective, is that the shareholders lose less money by relicensing the dam than they would through removal. This approach only takes into account shareholders and does not take into account the greater public interest, which FERC is required to consider.

It even gets worse than this, the unregulated utilities, which include many small hydro companies, are essentially paper companies that have no assets. We actually went to court to oppose dam licenses transfers from a viable company that had assets to deal with dam failure and removal to a company with zero assets. What will happen to public interest when the company folds/walks. The circuit court sided with the utilities sighting legal deference, a decision which I still don't agree with. The reason they give for the decision is that they say it is a prudent decision for the investors.

Dave:
We've seen situations where you may have to allow the dam operator to continue but to put money into an escrow fund. Anytime you're dealing with low economic considerations you need to find creative solutions. If you let that facility go into bankruptcy it can get really bogged down for a long time. Finding alternative solutions for low revenue project can be a key.

Boyd:
We are developing a critical lack of engineering expertise specific to fish passage and hydropower issues in the east and midwest. The USFWS has developed a very capable staff over the years, but they are retiring and moving on. Yet there appear to be no engineers replacing these individuals with the specific expertise needed. Further, I see no institutional support or interest in replacing these

individuals. I am really concerned about the lack of expertise in this area, at least in the northeast and midwest.

Dave:
The USFWS does offer some engineering training through University of Mass. at the Conte Lab. So if you have staff in your agencies with interest in hydraulics and fish passageways, have them get in touch with Boyd to learn more about what is available. This is really a specialized science so it is not just for anyone with a civil engineering background and some knowledge in hydraulics. Fishways and design require specific knowledge.

Question
Dave:
What is the status of the Michigan DNR engineering staff and what is the outlook for the future?

Gary:
In Michigan DNR our staff learned on the job with projects on the St. Joe and Grand River system, with assistance from folks from NMFS on the west coast and Ben Rizzo (USFWS) on the east coast. However, these individuals have recently retired and to my knowledge our agency has no plans to replace these individuals. So it is unclear how our agency will handle issues of fish passage, despite the fact that some of us have expressed a real concern for this lack of expertise.

Question:
Dave: Steve, would you discuss the role of a consultant as it applies to this situation?

Steve:
I'll give my phone number to everyone. In the private industry there are many who have been hired by utilities to address fish passage for many years. It is almost always in consultation with agency experts providing feedback and input. This collaboration is done on all projects. I also see a lack of upcoming young engineers. However, there are increasingly more in the private sector that are willing to help out.

Question:
Luther, what engineers have you used for your projects? Has it been the Army Corps of Engineers?

Luther:
In the Minnesota DNR, I have had to learn the language of engineers to interact and then have done a lot of the basic designs. The Army Corps of Engineers has funded a number of these projects with flood control dollars and they have been good to work with. They have a large staff with good engineering and CAD expertise. We have also worked with private consultants. In many cases I have done the calculations and basic layout and the engineers transfer it to CAD, check calculations, handled the logistics and compiled the specifications.

The training most engineers lack for our projects, has to do with fluvial geomorphology and the ecology of rivers and we teach courses in those subjects. Engineers from the Corps, other agencies, and private industry have attended these workshops and that has been very helpful for these types of projects. It is a little different from the typical civil engineer training that deals with open channel hydrology and fluid dynamics, and not much river system information. Generally, when I work with engineers we each bring our expertise and provide feedback that strengthens the final product. It would be nice to have more people specifically assigned to the dam removal projects.

Comment:
I agree with Boyd that there aren't enough passage engineers out there to help with fishways. I've looked for resources, and the northeast is the only place where I can find any. I'm with the USFWS and we continue to be asked to show the need for this specialty within our agency.

Boyd:
You're right on. Clearly the southern and midwest regions of the country have big fish passage needs and the folks in the northeast are stretched too thin. I think the need is clearly there.

Parting Comments:
Boyd:
Seems like we are on the threshold of institutionally getting to the point where you are able to take action to enact fish passage projects rather than just talk about it like we have done for the last decade or so. I am glad to see us approaching that point and implementing projects.

Steve:
From the downstream perspective, there aren't a lot of answers for lake sturgeon passage since there hasn't been a lot of work with this species. To improve downstream passage, it needs to be a collaborative effort and include multiple sturgeon species, since the problems are the same, regardless of species, and morphology and behavior are often similar. There are a lot of tools available, including laboratories studies, computational fluid dynamics modeling, field studies, and basic migrational tagging studies. For downstream passage of younger fish, we don't know enough at this point and there is more work to be done.

Luther:
I think sturgeon are a good poster child for rivers in general, and that a lot of what we are doing now will not come to fruition for years. But I also don't think we have seen the full extent of the damage we have done to our rivers nationwide. When we have fish that live to 100 years many processes continue to deteriorate over time and resilience is lost over time as well. I think we need to look long into the future for what we are doing. I believe rivers have been so damaged that we will continue to see declines in the short term and to reverse the trend we need to take action in a big way now.

Gary:
Lake sturgeon rehabilitation in the Great Lakes will not occur without fish passage, so we do need to address this issue. Hatcheries are not the solution. We need to develop self-sustaining populations. In some respects, the engineering side is the simple side, the policy and people side can be the hard side and we shouldn't overlook this. Fortunately, sturgeon is the perfect species to address fish passage issues. People are enamored with sturgeon. Other species don't grab the headlines and create the interest that sturgeons do. Just try to get someone excited about logperch. We also need to consider all potential partners, some may be strange bedfellows, but their interests can help us achieve our goal of fish passage or dam removal.

Dave:
I think we've received a wide perspective on fish passage issues, let's thank our speakers.

Breakout Session Summaries

Subject Oriented Session

1:00 - 2:30 p.m. Tuesday, November 9, 2004

1. Sturgeon Health and Contaminants
2. Utilization of GIS Technology for Sturgeon Rehabilitation
3. Habitat Suitability / Classification
4. Sturgeon Passage/Hydropower Operation
5. Issues and Problems as Sturgeon Populations Rebuild
6. Habitat Restoration and Enhancement

Sturgeon Health and Contaminants

Introductions:
The session began with a round of self-introductions and identification of topics for discussion.

Topics covered:
- Botulism
- Contaminant exposure, loadings and effects on fish
- Human consumption concerns due to contaminants
- Viral and bacterial disease and parasites.

Participant List:
Doug Aloisi, Doug Carlson, Rob Elliott (facilitator), Alexandre Litvinov, Perry McLeod-Shalougesic, Rob Mellow

Discussion Summary:
Botulism

The group discussed the recent reports and observations of botulism related mortalities of lake sturgeon around the Great Lakes. Doug Carlson gave a Powerpoint presentation on the botulism related sturgeon mortalities observed in Lakes Ontario and Erie. Elevated incidence of sturgeon mortalities were observed in Lake Erie beginning in 1999 when Type E botulism was implicated in the die-off of numerous water birds, including loons, as well as several species of fish, including lake sturgeon. In New York waters of Lake Erie, reported lake sturgeon mortalities rose from 2 in 1999 to 8 in 2000, and 27 in 2001, and then declined to 3 in 2002 and then 1in 2003. In Lake Ontario, a similar trend was observed from 2002-2004 when 6, 27 and 6 dead sturgeon reported. The timing of an apparent increase in mortalities was similar in Green Bay were 6, 23, and 8 dead sturgeon were reported in 2002, 2003 and 2004.

Botulism is presumed to be the cause of most of these mortalities though it has only been confirmed in a few specimens. The advanced stage of decomposition of most recovered fish precludes verification that botulism was the cause of death. Type E botulism is caused by exposure to the bacterium *Clostridium botulinum* which grows in oxygen-deficient nutrient rich environments. Increased growth of the filamentous alga *Cladophora glomerata*, colonization by zebra and quagga mussels, and invasion of round goby, and the combined effect on water quality and contribution to the food chain are all thought to be involved in this recently observed increase in botulism outbreaks. The reason for

the declines observed are unclear but may be related to decreased abundance of various species vectors but could possibly be related to environmental conditions.

Contaminants

Data describing contamination of lake sturgeon is limited but enough data exist to indicate that body burden levels vary greatly across the basin. Consumption advisories also vary significantly across the basin. In some waters such as Green Bay, observed contaminant levels can be extremely high and fish are under a "do not eat" advisory. Contaminant levels in other areas such as Lake St. Clair appear to be fairly low and advisories do not call for restricted consumption. However, due to the observed highly migratory behavior of these fish, the limited human consumption of lake sturgeon that does exist in various areas throughout the basin may result in very unsafe exposures due to the unknown contamination of any one fish.

Information on the effects on lake sturgeon due to contaminant exposure and/or uptake also is limited. It was suggested during our discussion that the Russian literature may have more information than is available in North America and a comprehensive literature review may be beneficial. Doyon et al. (Can. J. Fish. Aquat. Sci. 56:1428-1436, 1999) reports increased fin and craniofacial malformations consistent with possible chemical contaminant effects. Metal uptake due to exposure from mining operations is another concern and is the focus of some research and monitoring being conducted on the Groundhog River, near Timmins, Ontario. The question of contaminants being involved in observed variable hatching success often experienced when collecting gametes from the wild was also raised. However, definitive data is lacking and numerous other factors could also be involved. The need to conduct contaminant effect studies was identified. The question of how important contaminant transport up into tributaries by species like Pacific salmon was raised.

Viral and Bacterial Diseases and Parasites

Iridovirus was apparently a hot topic a few years ago but current status is unknown. There is a need to find out more about how the virus manifests itself in lake sturgeon. Sampling is being done and requires only the collection of small fin tissue samples. Screening for this and other viral and bacterial diseases (furunculosis, enteric redmouth, IPN, IHN, etc.) are conducted on cultured sturgeon following standard protocols at federal hatcheries. The La Crosse and Bozeman USFWS fish health labs are capable of conducting the necessary tissue histology. The question was raised as to the prevalence of parasites such as *Arqulus (*fish lice) in sturgeon. Little was known by the group but it was thought this was probably more common in other fish species.

Utilization of GIS Technology for Sturgeon Rehabilitation

Introductions:
The session began with a round of self-introductions and identification of topics for discussion.

Topics covered:
- What are others doing to develop management strategies for their watersheds.
- Significant software changes/useability issues- who has the experience and expertise?
- Issues converting point data to grid surface with discrete coded variables
- Need working relationship between biologists and GIS researchers
- Who are the GIS experts
- What attributes are needed by biologists/researchers
- Is there a need/benefit to field data standardization for GIS
- Types of spatial data being collected

Participant List:
Dan Daugherty, Greg Kennedy, Gary Pritchard, Kregg Smith, Emily Zollweg (facilitator)

Discussion Summary:
Who are the GIS experts?

We discussed the fact that GIS experts may specialize into various types such as warehouse, use/research, and data collection.

We generated a list of organizations/agencies and individuals with known expertise.
Great Lakes Information Network (GLIN)
Great Lakes Basin Ecosystem Team (GLBET)- Islands DSS, Sturgeon DSS
Great Lakes Environmental Research Lab-NOAA (GLERL)
USGS- Ann Arbor: Greg Kennedy, Kurt Kowalski
Midwest: Jason Rohweder et al
MIDNR- Matt Tonello, Troy Zorn- LAS habitat index
OMNR GIS office in Peterborough, Tim Haxton
Purdue- Larry Theller, Bryan Pijanowski
USFWS- Chris Castiglione, regional coordinators

What are the most important system specific attributes needed by biologists and researchers (i.e. Population Status)

Quantification, Availability, Relative Availability, and Accessibility of habitat types by life stage for whole life cycle. Includes Physical and Chemical habitat factors, food resources and carrying capacity, Flow Characteristics, Thermal Regime, Land Use, Changes, Geomorphological factors

How would we, could we, standardize field collected data?

Needed- yes- Moving toward warehouses for data, for bigger analyses with contributors only working on small part

Such as CPUE, and especially habitat info- study design, protocols, sampling scheme- can all affect useability of final data product

How? Prioritize variables, get consensus for method or consensus for reportable unit/format

What types of spatial data do you or your agency currently collect? What kinds of spatial data are relevant to lake sturgeon assessment/research?

Everything, everything- everything affordable

Would you be interested in all GIS data for your lake, all lakes or specific areas?

Depends on scale of project, all impt, including "extirpated" systems as potential restoration areas
Format- Use GAP as template
Project format- appropriate to scale of project (projections)

Action Items:

List of GIS projects for GL Basin Sturgeon
Interest in a sturgeon working group or network of GIS interested biologists and researchers

Habitat Suitability/Classification

Introductions:
We began with individual introductions and our relation/interest in the topic.

Participants:
John Bauman, James Boase (facilitator), Andy Edwards, Barabara Evans, Bill Gardner, Sue Greenwood, Tim Haxton, Adrienne Kral, Bruce Manny, Ashley Moerke, Terry Perrault, Christopher Pullen, Deborah Rajchel, Paul Ripple, John Seyler.

Topics Covered:

- What HSI models are available and in use
- Are the HSI models complete/adequate
- Information needs from larval to yearling stage

Discussion Summary:
What HSI models are available and what are people using?

HSI model written by Ontario Hydro (Ron Threader) is available in draft form only and is being used. The model was written for the Fraiser River System in Northern Ontario. An outline of the model was posted showing:

1) Adult foraging requirements including; substrate preference and benthos production)
2) Juvenile habitat requirements including; substrate type, available forage, water velocity and depth < 14m
3) Spawning habitat requirements including; water temperature, depth 2-6m, substrate composition, water velocity >1m/sec.

Is the HSI complete/adequate?

HSI model is empirical and needs updating. Much has been learned since the original draft including:

1) Access to spawning habitat by adults must exist for reproduction to take place

2) Macro vs Micro habitats – over-wintering pools in river systems, staging areas pre and post spawning in connecting waterways (St. Clair River, St. Mary's River and St. Lawrence River)
3) Flooding events may be triggering spawning in some systems
4) Spawning site fidelity/imprinting is important however, sturgeon also seem flexible in selecting suitable spawning habitat, both strategies seem to foster survival of the spp.
    a) Example was presented where sturgeon having fidelity to a specific site in a tributary of the St. Lawrence River were restricted to a very small area of a preferred spawning location due to a rock slide that buried most of the site. The fish all spawned on the small area of remaining spawning substrate piling eggs which resulted in very little recruitment that year.
    b) Spawning is taking place in shallow water near shore making sturgeon vulnerable (while engaged in spawning behavior fish are oblivious to predators and easily poached)
    c) Spawning also taking place in deep water, greater than 15m in the St. Clair River, LaHaye documented egg deposition over a large gradient in depth in the St. Lawrence River
    d) Wolf River in Wisconsin has multiple sites with a range of depths

5) Interstitial void space seems to be playing a role in spawning site selection
    a) Cooler ground water may be associated with this, sturgeon have extensive sensory organs on the ventral side of the head
    b) Egg release by the female may be associated with substrate roughness

<u>What is known about the early life stages from the time larvae enter the drift until the following spring?</u>

1) Sturgeon drift during darkness, they are difficult to catch in drift nets during this period
2) Evening drift may be timed with predator avoidance and benthic forage abundance
3) Duration of the drift is unknown, concern was expressed that an HSI model should consider duration of the drift along with current velocity to prevent larvae sturgeon drifting out of a system or past suitable habitat
4) Sturgeon seem to settle out of the drift when the reach 19mm
5) Very little is known from the time larvae reach 19mm through the following spring
6) In smaller tributaries young-of-year (yoy) sturgeon migrate to lakes by fall, while in larger systems and connecting waterways juvenile sturgeon may remain in the river until age five
7) Anecdotal evidence in the St. Lawrence suggests that yoy sturgeon drift a long distance downriver then repopulate upper reaches of the river over time as they mature
8) In the St. Lawrence sturgeon ages 2-5 occupy old river channels that are between 4-7m deep, fish move out of these refuge areas to adjacent shallow (less than 2m) to forage
9) Young sturgeon may be vulnerable to drift over dams preventing repopulation of upper reaches of rivers
10) Predation of yoy lake sturgeon (up to 30mm) by crayfish has been documented
11) Sea lamprey ammocoetes were used as bait to collect white sturgeon unknown if lake sturgeon utilize them as forage

Conclusion

1) HSI model use may be limited but does provide baseline information about sturgeon
2) The current HSI model available for lake sturgeon needs to be updated to include the current knowledge of the species

3) Information discussed seemed to demonstrate that lake sturgeon habitat requirements during all life stages occupy very dynamic environments making a "one size fits all approach" impossible
4) Lake sturgeon long term survival may be a function of the wide variation in habitat requirements/preferences during all life stages
5) HSI models need to be developed for specific species

Sturgeon Passage/Hydropower Operation

Introduction:
The session began with self-introductions, along with brief statements of job duties and how they relate to fish passage or hydropower operations and licensing.

Topics Covered:
- Importance of fish passage to sturgeon rehabilitation
- Need for population specific data

Participant List:
Stephen Amaral, Mike Donofrio, Dave Bryson, Brant Fisher, Mike Friday, Charles Hendry, Boyd Kynard, Joe Lyons, Bruce McGregor, Tom Pratt, Jeremy Pyatskowit, Don Reiter, Karen Schmidt, Larry Thompson (facilitator), Jerry Weise

Discussion Summary:

Importance of fish passage to sturgeon rehabilitation

1) the importance depends on the current status of the sturgeon populations above and below the dam in question;

2) the importance depends on the historical distribution and abundance of sturgeon in the watershed, including the area upstream of the dam;

3) the importance depends on the availability and suitability of habitat for sturgeon upstream of the dam;

4) there are measures at dams other than fish passage that could maintain or enhance conditions for sturgeon downstream of the dam, such as providing adequate instream flows, proper flow release timing, and improved channel conditions.

5) dams fragment sturgeon populations, and providing fish passage would re-connect the upstream and downstream populations.

Need for population specific data

The group discussed the need to obtain relevant information regarding the sturgeon populations in a watershed before pursuing fish passage at a dam.

This information could allow prioritization of watersheds and dam sites, where sturgeon passage would yield the most benefit to sturgeon rehabilitation.

The point was made and reinforced that a basin-specific fishery management plan should be developed for watersheds that include dams where sturgeon passage is contemplated. Such a plan should address the current sturgeon population status, historical distribution and abundance, habitat distribution and quality, and other issues.

The point was made that fish passage facilities at a dam, or dam removal, could open a vast watershed area to sea lampreys or other invasive species. The group discussed the need for a basin-specific fishery management plan to include recommendations to prevent the potential invasion by sea lampreys or other invasive species past the dam.

The issue was raised that sturgeon passage at a dam may include cultural as well as biological justifications. The potential for fish passageways to allow sturgeon to pass to Native American Reservation lands was briefly discussed.

Most of the issues discussed by our session participants could, and should, be addressed in basin-specific fishery management plans for each watershed where fish passage at dams is under consideration. It is advisable for the resource agencies to develop such plans. These plans would prioritize sites for sturgeon passage, as well as discuss the current sturgeon population status, the historical distribution and abundance of sturgeon, the distribution and quality of sturgeon habitat in the watershed, measures to prevent non-native or nuisance species invasions of the watershed, and other issues.

Issues and Problems as Sturgeon Populations Rebuild

Introductions:
The session began with a round of self-introductions and identification of topics for discussion.

Topics covered:
- What are or could be issues and problems
- What needs to be done

Participant List:
Nancy Auer (facilitator), David Bos, Kristin Bott, Dona Crist, Tim Cwalinski, Andrea Drauch, Patrick Forsythe, Brian Gunderman, Randy Jackson, Chet MacKenzie, Rod McDonald, Tom Mosindy, Jonathan Pyatskowit Steve Scott, Kim Scribner, Melvin Southwind, Amy Welsh, John Weisser

Discussion Summary:
<u>What do we think are or will be issues or problems?</u>

1) Open up harvest – and at what levels?
    1a) How do we handle harvest if stocks mix (i.e. Green Bay where several river groups seem to mix?).
    1b) How do we allocate harvest to various user groups?
2) At what level is recovery complete (see L. Superior & L. Michigan Rehab Plans)
    From an ecological aspect? From a genetic aspect?
3) What are influences of pesticides and contaminants on sturgeon?
    See OME and DEQ fishing guides.

4) How do we monitor and patrol "incidental catch" vs. folks actually fishing to catch and release sturgeon? Can we? Do we?
5) What happens if and when sturgeon become a nuisance to commercial fisherman again? Can we get commercial fishermen to report by-catch of sturgeon now so we can keep an eye on this?
6) How do we handle Black Market? Do we have enough law enforcement? Will agencies support enforcement over long term?
7) What do increased numbers of sturgeon do to other rehabilitation projects for other organisms? Canadian SAR act.
8) What are impacts of recovery of sturgeon expected to be on current fish communities such as walleye?
9) Need to work with sea lamprey control staff on barriers and chemical treatments.
10) Need for promise of money to monitor stable or increasing populations – what is long term commitment from state/provincial agencies?
11) We need to develop general management decisions and goals for growing sturgeon populations.
12) What are impacts of tournaments on sturgeon? More boats, large and faster boats, more incidental catch, mortality due to propeller damage, etc.
13) Can we establish a few refuges throughout the Great Lakes to protect adult, spawning and nursery habitat for a few populations now? These to be our reserve.

<u>What needs to be done?</u>

1) There is a need for a careful study of catch and release fishery on survival and condition of sturgeon, especially incorporating duration of time being fished.
2) Propose that the State of Michigan take contaminant samples from fish taken in fishery on Menominee River to increase knowledge of contaminants in sturgeon.
3) Public education needs to be increased to discourage the black market and increase awareness of unique value of the species and local efforts to recover species.
4) Need to set up monitoring of incidental catch in commercial fisheries and monitor over time, starting now. Need for incentive for fishers to report catch.
5) Need for more collaboration with individuals studying other species now being "recovered" – such as freshwater mussels, etc.
6) Need to know what interactions exist between lake sturgeon and other native species like walleye, lake whitefish, white sucker, etc.
7) Continue to work with sea lamprey control on individual river basis.
Some conflict with installation of additional barriers vs. fish passage issue.
8) Need to define healthy stock or population (in numbers, genetics, etc.).
9) Need to define user groups. What are the groups besides: sportfishers, [commercial fishers?], SFT/spear harvest?, subsistence needs/tribal harvest, school children-public education, general observers, etc.
10) Weigh option of protecting habitat or area vs. increasing law enforcement and public education.
11) Evaluation of protection level needs to be on case by case basis – maybe close some areas, protect some stocks or ecosystems totally, allow some harvest elsewhere.
This way one or two Great Lake stocks are protected to contribute to our knowledge of natural populations. Idea of developing 'marine sanctuary' closed fishing area was discussed at length.
12) Monitoring (assessment) of stable and increasing populations is needed, defined in Lake Superior and Lake Michigan rehab plans. Annual gillnet surveys in lakes seem to work best at this time. Is assessment with precision possible?

Habitat Restoration and Enhancement

Introductions:
The session began with self-introductions and description of work each person is currently conducting.

Topics Covered:
- Methods/ideas/challenges related to habitat improvement

Participant List:
Luther Aadland, Brenda Archambo, Tom Burzynski, Kim Carmichael, Jerry Edde, Brad Eggold (facilitator), Mitchell Eshkakga, Steve Hogler, Marty Holtgren, William Kieper, Janet Lowe, Robert McNeely, Steph Ogren, Maureen Peltier, Henry Quinlan, Kandi Schnurer, Randy Seymour, Chris Vandergoot

Discussion Summary:
Project Highlights/Experiences

Luther Aadland – Brief description of work in the Red River Basin
Brad Eggold/Tom Burzynski – Summarized work on the Milwaukee River
Marty Holtgren – Information on habitat in the Manistee River
Brenda Archambo – Habitat work in the Black River system
General comments of group

Aadland – Red River Basin. Reconnect spawning areas to main stem of the river. Rapid creation over dam sites. Rivers have been really messed up over time, channelized, straightened, etc.

Removed dams were possible, sediment load behind is a problem. Dig meandering channel through sediment load and line with rip-rap. Recovery of fish species when these are completed, no pool or riffle before this occurred. Spawning structures below dams have been installed.

Boulders or out-copping of limestone, sturgeon seem to spawn in these areas due to up-wellings, hydraulics of up-welling seem to be important. U-shaped boulder clusters to provide spawning habitat and correct flow regime.

St. Louis River system – Last spot before Fond du lac dam. It's a very short reach. Flow from dam could be critical here.

Holtgren – we only have qualitative data on sturgeon spawning in areas that have been modified but very little quantitative work. We need to move in this direction to really analyze how well the habitat improvements have worked.

Grant writing has to have things you deliver on with regards to habitat improvements. You can't just throw rock in and call it a day. There has to be assessments tied to habitat and then number of fish produced from this work back to report to the grantee.

Need to pre-assess the area, do the work, and assess the aftermath. Many times we skip the first and last steps of this procedure.

Brenda Archambo – Downstream sections also important not just at the spawning sites. Biologists need to be aware of this fact.

General Comments - Hydro-dams – FERC is re-licensing these dams but no new dams are being built. The FERC license has pretty strict rules governing flow, temps etc. Ontario may be letting hydro-dams to be built which is a little different than in the USA.

Sturgeon are recovering in the Rainy River system where tributaries with suitable spawning habitat have no or very few dams. Access to multiple spawning areas is a key to recovery.

Sturgeon spawn in high gradient streams and that is where the dams have been created. Creating more riverine type environments will probably bring back native species. It has been documented in many river systems around the USA.

Look at more species that just sturgeon. Do habitat work based on stream morphology rather than by species. Don't try and put habitat in spots that it can't support (i.e. rock and rip rap in areas that will be silted in very quickly).

Throwing rip-rap down is not just the answer. You have to place the habitat in correct location so that is can be maintained over time by the river (i.e. no siltation, low water, temperatures etc).

Need to have assessments pre and post work. This work needs to be documented and published so that all the agencies can use this body of work in grant writing and project writing.

Several main concepts came out of our discussion. These are listed below.

- If you are trying to re-establish fish communities above dams, the best solution from a fisheries perspective is to remove the dam. The next best alternative is to create fish passage around or through dams.
- Habitat work is generally installed and assessments before and after installation are rarely completed. In order to write complete grants, information needs to be published on the effects of habitat work. Projects of this type need to be conducted focusing on quantitative measures not just qualitative.
- Other factors should be considered before removal of dams including contaminated sediments, spread of exotics, riparian effects, etc.

Basin Oriented Session

2:15 - 3:30 p.m. Wednesday, November 10, 2004

1. Lake Superior Basin
2. Lake Michigan Basin
3. Lake Huron & Lake Erie Basins
4. Lake Ontario Basin & St. Lawrence River

Lake Superior Basin

Introduction:
The discussion was started with introductions by participants including a brief description of their affiliation and suggestions of topics to cover during this group discussion.

Participants:
Andy Edwards, Mike Friday, Bill Gardner, Susan Greenwood, Brian Gunderman, Alex Litvinov, Robert McNeely, Glenn Miller, Terry Perrault, Brad Phaneuf, Tom Pratt, Jonathan Pyatskowit, Henry Quinlan (facilitator), Karen Schmidt, Steve Scott, Amy Welsh.

Major Topics Covered:
- Harvest questions
- Formation of Lake Superior Lake Sturgeon Work Group
- Tagging site/location
- Genetic study status
- Stocking
- Taking of age structures

Discussion Summary:
Harvest

Steve Scott asked about significant sport or commercial harvest in Canadian waters.
The sport harvest remains rather liberal at one fish per day with size limit restrictions. There is no Provincial commercial harvest allowed. Sue Greenwood explained that among First Nations there are 2 types of catch generally occurring - subsistence catch and an "unregulated" catch. The "unregulated" catch is somewhat monitored through buyer reports. Steve asked about the need to examine regulations lakewide (either sport or commercial). Some discussion ensued with no outcome.

Formation of a Lake Superior Lake Sturgeon Working Group

Henry mentioned that a lake sturgeon work group was likely being formed under the direction of the Great Lakes Fishery Commission's Lake Superior Technical Committee (LSTC). This work group would follow up on the collaborative efforts of the former Lake Sturgeon Subcommittee which produced the reports, Status of Lake Sturgeon in Lake Superior (1996) and the Lake Superior Lake Sturgeon Rehabilitation Plan (1999). The LSTC suggested that the charge to the work group would be to monitor and report progress at achieving lake sturgeon rehabilitation in Lake Superior. Henry was tasked to identify and contact people interested in participating on the work group. This breakout session is one opportunity to identify individuals and/or agencies that would be interested in

participating. The Work Group terms of reference will be determined at the January 2005 LSTC meeting.

Tagging Site/Location

There are several locations on a sturgeon where internal tags (PIT – passive integrated transponder and CWT – coded wire tag) are being applied. There is concern that all agencies/institutions are not aware of where various agencies are placing tags and that tags may not be detected if field crews are not checking all potential sites where tags are applied. We developed the following table but lacked participation and confirmation by several agencies so it is incomplete.

Agency	PIT	CWT
USFWS	Back of Head/Nape of Neck	Not Used
Wisconsin DNR	Back of Head/Nape of Neck	Unknown
Ontario MNR	Same as above, but also belly with 22 mm ones	Not used
DFO	Back of Head/Nape of Neck	Not used
Lake Superior State Univ.	possibly head but unsure	Unknown

Knowledge Gaps: Unsure of location in Sturgeon River, Portage River, Chequamegon Bay and Minnesota.

CWTs are added to all stocked fish in the Ontonagon and Sturgeon rivers and also on some in the St. Louis River. The tag site is usually located on the snout or under the $2^{nd}/3^{rd}$ dorsal scute. Very few agencies are checking for the CWTs during assessment activities.

We discussed using a standard a site (back of head) for PIT tags, but felt that discussion/decision should take place with the Work Group being formed since some folks using other sites were not present. It was agreed upon that if inserting the 22mm PIT tags in the belly, then also place a tag in the head.

Genetics

Amy Welsh at UC-Davis has done most of the recent genetic analysis on Lake Superior lake sturgeon. Amy will be at UC- Davis for at least another 1.5 years and will continue to accept and process tissue samples. A report on the genetic status and structure of Lake Superior (and other Cdn/US Great Lakes) sturgeon populations sampled through 2003 has been completed. In general, there is a great deal genetic difference among lake sturgeon populations in Lake Superior as well as between Lake Superior and the other Great Lakes basins. Tom Pratt asked about the absolute minimum number of samples for analysis. Amy responded with “20”.

There was discussion of the ability to assign a river of origin to sturgeon captured in the open lake. Amy indicated that she can analyze lake caught tissue samples and assign them (she feels confident about this) to the most likely river of origin.

Stocking

Three (or four) stocking projects are underway in Lake Superior. They are in the Ontonagon and Sturgeon rivers, Michigan, and the lower and upper St. Louis River, MN/WI. Steve Scott noted that in the late 1990s Michigan DNR and Wisconsin DNR developed an agreement to stock eggs from the

Sturgeon River, Michigan in the St. Louis River. For 2-3 years, eggs from the Sturgeon River were reared at Wisconsin DNR Wild Rose Hatchery and stocked in the St. Louis River. The agreement called for 50% of the fish to be returned to Michigan DNR. Michigan DNR stocked those fish in the Ontonagon River which was identified as having high potential for restoration in the Michigan DNR sturgeon plan. Michigan DNR currently raises Sturgeon River eggs at their Wolf Lake Hatchery and targets stocking 5,000 fall fingerlings annually. This is a 20 year plan. The preferred life stage for stocking is 0+ to 1+.

Michigan DNR and Michigan Technological University are doing assessment of the stocking in the Ontonogan River. Other agencies would like to know more about this project.

Terry Perrault of the Fond du Lac Band described the upper St. Louis River stocking project. This project is an attempt to restore a river resident population upstream from 5 dams/barriers to Lake Superior. When they started the project in 1999 they attempted to locate a river resident population from Lake Superior but none was known to exist. They worked out an agreement with Wisconsin DNR to receive eggs from a river resident population in the Menominee River, a tributary to Lake Michigan. To improve the likelihood of developing a river resident population in the upper St. Louis River they used Astroturf nest boxes and planted 120,000 eggs in an attempt to help imprinting. They have had good hatch success but little success capturing juveniles.

A discussion ensued about the genetic background of the St. Louis River fish. Bill Gardner asked if there was any possibility of getting genetic material from old mounted fish from the area. Steve Scott asked about other egg sources. It was suggested that the topic of identifying eggs sources and stocking options for the Fond du Lac Band to consider be discussed at a Work Group meeting.

Taking Age Structures

Sue Greenwood asked about procedures used by other agencies to take pectoral fin ray structures for aging. Discussion ensued about different methods used. Brian Gunderman noted that taking the fin ray at least 5 millimeters from the joint was preferred for age accuracy. The group seemed to prefer the use of a hack saw to take a small, 1-2 cm section of ray over taking the whole fin ray. The need to take a fin ray was also discussed since it is such an invasive procedure. Generally, agencies should be sure there is a justifiable need to know the fish age before taking the structure.

Lake Michigan Basin

Introduction:
The discussion was started with introductions by participants including a brief description of their affiliation and suggestions of topics to cover during this group discussion.

Participants:
Doug Aloisi, Ed Baker, John Bauman, Andrea Drauch, Rob Elliott (facilitator), Brant Fisher, Marty Holtgren, Adrienne Kral, Steve Lennart, Stephanie Ogren, Jeremy Pyatskowit, Don Reiter, Randy Seymore, Larry Thompson, John Weisser.

Major Topics Covered:
- Assessment project updates
- Management project updates
- Fish passage activities
- General sturgeon observations
- Tagging/marking updates and issues
- Tributary Inventory meta-database status
- Lake Michigan Lake Sturgeon Task Group update
- Upcoming funding opportunities.

Discussion Summary:
Assessment Project Updates

Updates were provided for several sturgeon related projects that are ongoing around the basin.

Funding from the GLFT was secured to continue the **Lake Michigan Status Assessment project** for the 2005 field season. This project began in 2002 and involves work on nearly all known remnant populations in Lake Michigan by a large group of co-PIs. Objectives include determining reproductive status, abundance, age structure, habitat use and genetic characteristics of both known spawning populations and fish collected at large throughout the lake (contact Auer, Baker, Elliott, Galarowicz, Kornely, Lennart, Peterson, Scribner, Sutton. Genetics results presented during day 1 of this meeting). Similar genetic characterization work is being conducted in Indiana tributaries of the Mississippi drainage basin (contact Brant Fisher).

The 2002-2003 study of **juvenile life history in the Peshtigo River** was completed July 2004 (results presented during day 1 of this meeting, contact Trent Sutton and Angie Benson).

A 2003-2004 evaluation of recruitment success, habitat preference, and river retention of **young lake sturgeon in the Big Manistee River** is nearing completion (contact Marty Holtgren, Nancy Auer, and Justin Chiotti).

A 2003-2005 review of the historic written record to infer **historical distribution and abundance in the Lake Michigan basin** (contact Phil Cochran and Rob Elliott).

A **Green Bay tributaries habitat assessment and decision tool project** focusing on Green Bay tributaries is being conducted 2004-2005 (Project status presented during day 1 of this meeting, contact Dan Daugherty and Trent Sutton).

A **genetic analysis of the upper Menominee River lake sturgeon populations** is being initiated in 2005-2006 to help assess population status, abundance and reproductive success (contact Brian Sloss).

A **Great Lakes tributary inventory database** of meta-data describing the types of lake sturgeon information that have been collected or are available and associated contact people and literature references is nearing completion. Once posted on the web in early 2005, people will be able to update and submit additional information (database demonstrated during this meeting's evening social, contact Emily Zollweg).

Management Project Updates

Wisconsin DNR will be stocking fall fingerling sturgeon in the **Milwaukee River** in December. All fish will have an RV clip and many will also be PIT tagged. Larvae were stocked in the Milwaukee and Manitowoc in spring of 2003 and then a few telemetry tagged juveniles and adults were released in fall of 2003. The intent is to employ streamside rearing in future years for this long-term stocking initiative (contact Brad Eggold).

Reintroduction efforts by WDNR continue in the **upper Menominee River** where varying numbers of fall fingerling and yearling sturgeon have been stocked for many years. Further regulation changes for the Menominee River fall harvest season aimed at protecting this population continue to be planned (Poster presented during this meetings evening social, contact Greg Kornely).

Little River Band of Ottawa Indians initiated a study in 2004 to compare the early-life history performance of streamside reared and wild reared sturgeon in the **Big Manistee River**. Wild collected larvae were reared streamside to a size where they could be tagged and then released back into the Manistee R. as fingerlings. This will be an ongoing effort by the LRBOI. (Project description presented during day 1 of this meeting, contact Marty Holtgren).

Adult sturgeon were again collected from the Wolf River, tagged with transmitters, and transplanted into the **upper Wolf River** through cooperative efforts between the Menominee Tribe of Wisconsin and Wisconsin DNR as part of efforts to reestablish a spawning population in the upper Wolf River. Fingerlings raised at Genoa NFH also have continued to be stocked into an inland lake within the Menominee Indian reservation and a winter fishery may be opened on that lake in 2005 (contact Jeremy Pyatskowit and Don Reiter).

Lampricide treatments in state-designated lake sturgeon streams were managed to control sea lampreys and protect populations of lake sturgeons in the Millecoquins, Manistique, Whitefish and Platte rivers during 2004 (contact John Weisser).

Fish Passage Opportunities

There was a short discussion about various barrier and passage initiatives in some L. Michigan tributaries. The White Rapids Dam on the **Menominee River** has been discussed as a potential site for field testing the race-track design fishway described by Boyd Kynard during the morning presentations but a final decision to proceed with installation has not yet reached. The sea lamprey control program has proposed a new sea lamprey barrier on the **Cedar River**. Sea lamprey control personnel are consulting with FWS and MDNR on the type of fish passage and consideration is being given to the potential need for sturgeon passage in the future. The dam near the mouth of the **Manistique River** is failing and permitting passage of lamprey. Lampricide treatments are now

required and are very costly due to the size of the watershed (largest in the Upper Peninsula). Work is in progress to design a sea lamprey barrier. The pros and cons associated with fish passage are being discussed with the FWS and the MDNR. Excellent habitat for sturgeon exists above this barrier so passage could be very beneficial for rehabilitation in this system (contact Ed Baker).

General Sturgeon Observations and Data Collection

It was discussed that biological data should be collected from incidental captures of sturgeon whenever possible, including a genetic sample (fin tissue snip placed in scale envelope and air dried). Numbers of fish encountered incidental to other fishery assessments appear to be increasing in recent years and at numerous locations around the lake, not just in areas adjacent to known spawning rivers. If measures of total or fork length and girth at taken, weight (and age) can be estimated. Fish should be examined and scanned for several types of tags (see tagging discussion below) and characterization of sea lamprey marks may also be valuable. Genetic samples also may eventually be able to be used to determine sex, depending on success of current research efforts at Purdue University.

The occurrence of dead sturgeon in Green Bay during late summer of the past 3 years and its likely association with Botulism was described (contact Rob Elliott). A few fish have also washed up in southern L. Michigan. Doug Carlson provided a Powerpoint presentation during the sturgeon health breakout group the day before describing similar mortalities in Lake Erie and Ontario in recent years and the apparent association with zebra muscles, gobies, and increased algal growth.

Tagging/marking updates and issues

The GLFT has provided funding to supply most agencies around Lake Michigan with additional PIT tag readers and tagging materials in 2005 (contact Erik Olsen). There is also a coordinated PIT order being put together for everyone needing tags (contact Rob Elliott). The question of starting to use the ISO standard 134 kHz tags instead of the 125 kHz tags was discussed (same cost). New and future advancements in antenna technologies are being developed for the ISO tags that would be nice to take advantage of. The new PIT tag readers as well as many existing readers that people are using will read both tag frequencies, but there are some older readers that would need to be replaced if some people started to use the ISO tags. Rob Elliott will investigate further and provide more details prior to placing the coordinated tag order.

Though most people are injecting PIT tags under the anterior dorsal scutes, a few fish have apparently been tagged elsewhere in some of the other lakes so it is a good idea to scan the entire fish for possible tags. Numerous fish in L. Michigan have been tagged with various floy and monel tags, often in addition to PIT tags. Elastomere marking and microtags (CWTs) have occasionally been used for some fish stocked in the Menominee River, and fish stocked in the Milwaukee R. this year will have an RV clip. CWTs also have been used to mark hatchery fish stocked in L Superior. Be prepared to check captured fish over closely for numerous tag types.

The creation of a Great Lakes lake sturgeon tag database is back on tap for 2005. This database will provide a web based means to identify a contact person(s) for recaptures of sturgeon containing PIT tags as well as other tag types (contact Adam Kowalski or Rob Elliott).

Lake Michigan Lake Sturgeon Task Group update

This task group is organized under the GLFC Lake Michigan Committee and Lake Michigan Technical Committee structure. Membership is open to all interested. Steering committee members

are Rob Elliott (chair), Ed Baker, Marty Holtgren and Brad Eggold. A draft version of a Lake Sturgeon Rehabilitation Plan for Lake Michigan that was developed following input from the first Task Group meeting in September 2003 was circulated for review in December 2003. Comments are still welcome. A smaller work group dealing specifically with the genetic conservation, propagation and stocking section of the Plan met in June 2004. A draft of that section is currently out for review by the members of that work group, after which it will be distributed to all Task Group members for review (presentation given during day I of this meeting, contact Rob Elliott, Ed Baker, Brad Eggold or Marty Holtgren). Additional small work groups are focusing on priority rankings of rivers for rehabilitation, identifying and inventorying critical habitat, developing standardized assessment and data analysis procedures. Rob Elliott has been asked to prepare a lake sturgeon section and presentation for the upcoming State of Lake Michigan report at the March GLFC Lake Committee meetings. He will be contacting people for input and review of what needs to be prepared.

Upcoming funding sources

The Great Lakes Fishery Commission has put out a call for proposals for Great Lakes Fish and Wildlife **Restoration Act funding**. There are a number of priority research needs identified for lake sturgeon in Lake Michigan. Preproposals are due in December. The **Great Lakes Fishery Trust** request for proposals (including those for sturgeon research) should be coming out in December with preproposals due in late January, 2005. This timeline for sturgeon proposals has been moved up to match the timing for their other fisheries research categories, to allow for a longer proposal review period, and to keep the proposal submission dates from conflicting with spring field work. Fox River Natural Resources Damage Assessment **(NRDA) funds** are another potential source of funding available for sturgeon restoration work within the Green Bay basin.

Lake Huron & Lake Erie Basins

Introduction:
The discussion was started with introductions by participants including a brief description of their affiliation and suggestions of topics to cover during this group discussion.

Participants:
Brenda Archambo, Jim Boase (facilitator), Donna Crist, Roger Greil, Charles Hendry, Rod McDonald, Tom Mosindy, Chris Vandergoot, Jerry Weise

Major Topics Covered:
- Fishing regulation issues and Native harvest
- Illegal trade of sturgeon
- Public involvement
- Cooperation between agencies
- Starting a lake sturgeon task group for both basins
- Development of a management plan.

Discussion Summary:
Fishing Regulations and Native Harvest

Questions were raised about the continued disparity of harvest regulations between Ontario and Michigan. Michigan regulations include; one sturgeon/season, between 42" and 50", season open in the St. Clair River and Lake St. Clair, July 15 through September 30, anglers must posses a sturgeon tag and report when they capture a fish, no open season on the Detroit River. Ontario regulations include; one sturgeon/day, no size restriction, no closed season, open fishing in the Great Lakes and the connecting waterways, some restrictions in certain tributaries to the Great Lakes. Areas of special concern include the connecting waterways in the St. Clair and Detroit Rivers. The St. Clair River has two documented spawning sites while the Detroit River has one known spawning site and one newly constructed site at Belle Isle. Concerns were expressed that the management differences could hamper the success of the spawning reef at Belle Isle given that so few sturgeon have been captured in the Detroit River and most were captured in Canadian waters.

The issue was also raised that because lake sturgeon are protected under a C.I.T.E.S. agreement between the U.S. and Canada differences in fishing regulations compounds enforcement of the agreement. Ontario is working to bridge differences in regulations. The process requires changes in the law at the Parliamentary level of government and is much more involved than what is required to change fishing regulations in the states.

Questions were raised about harvest of lake sturgeon by Native communities in the U. S. and First Nations communities in Canada. The number of lake sturgeon harvested by both groups is unknown. Ontario typically has a good working relationship with its First Nation communities working cooperatively in areas of Georgian Bay and the North Channel of Lake Huron. Future issues and management decisions with lake sturgeon need to incorporate the interests of tribal groups.

Illegal Trade of Lake Sturgeon, Public Involvement and Cooperation Among Agencies

Concerns were discussed about the increase in lake sturgeon poaching taking place in the St. Clair and Detroit Rivers. As researchers we may be inadvertently providing information to poachers when information is posted on websites or when our research makes the news. One possible solution was to get the word out to as many people as possible with the idea that the public and other fishers would be watching and notify authorities when they saw suspicious behavior. Setting up watch groups similar to those on the Fox and Wolf Rivers in Wisconsin and the Black River in Michigan may be a solution. Law agencies on both sides of the border need to be educated about the vulnerability of stocks in areas where lake sturgeon congregate.

Formation of a Lake Sturgeon Committee and Management Plan

Issue was discussed about forming a lake sturgeon task group under the Lake Huron Technical Committee to begin development of a lake sturgeon management plan for both Lakes Huron and Erie. The goal was to present the idea to the committees so that it can be discussed at the Lake Committee Meetings in spring.

Lake Ontario Basin & St. Lawrence River

Introduction:
The discussion was started with introductions by participants including a brief description of their affiliation and suggestions of topics to cover during this group discussion.

Participants:
Dave Bryson, Doug Carlson, Randy Jackson, Boyd Kynard, Chet MacKenzie, Emily Zollweg

Major Topics Covered:
- Dams/Hydropower projects
- Lake Champlain / Richelieu Issues
- Contaminants

Discussion Summary:
Dams / Hydropower Projects

Dams at either end- Niagara Power Project, Massena Project -that have substantially compromised historic spawning capabilities;
St. Lawrence Tributary Dams - Oswegatchie River- Ogdensburg (mouth), Eel Weir (5 miles), Heuvelton (11 miles), then 47 miles of good river - Dam removal funds- NY Rivers United; Possible FDR funds to research, plan, manage;
Grass River- dam blew out at Massena (mile 7) about 8 years ago which previously isolated the population. There is also a non-hydropower dam at Madrid (mile 28) that restricts sturgeon and is a candidate for removal by NY Rivers United.

Idea/Action Item - use USFWS Coastal$$ to study Oswegatchie for potential dam removal or fish passage benefits and framework (template could come from the Oswego River fisheries enhancement plan) for a plan for all riverine spp. The license renewal process will commence in 2007. Active participants - Cortland ES (hydro connection), NYS DEC, LGLFRO – LAS experience, Cornell-review, John Farrell, Steve LaPan or Frank Flack, OMNR- Alastair Mathers?

Action Item - Meeting to Prioritize tasks for joint participation in the second 10 years of planning for sturgeon enhancement by the New York Sturgeon Task Group- TriSociety 2005 Syracuse Feb 2-4

Propagation efforts by NYSDEC are at a turning point, and a new program might draw from brood stock collections in the Black River. This would likely provide tissue samples for genetic comparisons.

Lake Champlain/Richelieu Issues

One dam with eel passage and canal around, there were LAS (lake sturgeon) in lower Richelieu near Montreal (according to P. Dumont) that were probably part of the larger sturgeon population which was historically connected to St. Lawrence, genetic testing with Lake Champlain fish ongoing by UC - Davis and Amy Welsh.

Lamoille Dam- Thought they had an agreement to remove in 20 years, possibly null now, built in sturgeon hole, flooded good spawning habitat (small falls, boulder/cobble for ¾ mile)

Mississquoi River- old mill dam 6 mi up, another dam 11 mi up, good WAE spawning habitat above first dam, would work for LAS too, laying groundwork for removal, historic preservation and landowner concerns on impoundment will be issues

Contaminants

Lake Champlain relatively clean compared to other Great Lakes
Niagara and St. Lawrence- concerns and questions about sublethal effects
DEC has data on contaminants from several sturgeon which has been summarized, lawsuits ongoing regarding impacts and cleanup responsibilities

Fish sampling- tissue plugs, sew up hole, no worries
Blood samples- easy to get, any size LAS above yearling

Meeting Evaluation

An evaluation form was distributed to all participants in their registration packet and participants were asked to turn it in upon departure from the meeting. Time was allotted at the end of the meeting to fill out and return the form. Fifty-two evaluation forms (52%) were returned. Below are summaries of the responses to the two open ended questions and to the specific questions which participants were asked to rank from strongly agree to strongly disagree. There were also suggestions that will be useful in preparing for and improving future meetings. Those suggestions are paraphrased at the end.

Question 1. What aspects of this meeting did you find most useful?

Overall, participants indicated the meeting was very beneficial to them. Most (40) respondents had only positive comments or no suggestions. Many of the comments indicated that the meeting was well planned and organized, that presenters did a great job, and that the topics addressed dealt with issues pertinent to their work. The most common response (23) was the benefit of the presentation information (all topics -10, genetics-5, sturgeon passage-4, and habitat-4). Networking (12) and breakout sessions (8) were valued for the opportunity to exchange ideas in an informal and relaxed atmosphere. The panel discussion and poster sessions were both identified six times by respondents.

Question 2. What aspects did you find least useful?

The only aspect of the meeting that was identified by more than one person was the lack of organization/structure in some breakout groups (10).

The 2004 Great Lakes Lake Sturgeon Coordination Meeting:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1. Provided me an opportunity to foster professional contacts.	28	22	2	0	0	52
2. Provided me an opportunity to learn about current research projects.	34	15	2	0	0	51
3. Provided me an opportunity to get an update on current management activities.	17	27	4	2	0	50
4. Topic oriented breakout group (Tues.) was informative and provided me an opportunity to contribute to the discussions.	7	25	15	3	1	51
5. Basin oriented breakout group (Wed.) was helpful and provided new information that will be useful to the work that I do.	8	14	12	3	0	37
6. Evening poster/display session and social was enjoyable and worthwhile.	22	16	8	0	0	46

The months which attendees at this meeting could participate in future Coordination Meetings are:

June – 15 November – 41 December – 26 No Preference – 3

Other Evaluation Form Suggestions/Comments

- Several individuals suggested they would have liked more time to view posters and suggested they be displayed for both days.
- Due to travel arrangements some folks had to depart prior to the afternoon breakout on Wednesday. It was suggested that the meeting run from noon to noon to allow ½ day for travel at the beginning and end.
- The time frame and punctuality of presentations worked well.
- Combining the social and poster session together worked well.
- Inexpensive for a well organized symposium.
- Several individuals requested presentations be made available on CD/website.
- Name tags were too small and difficult to read.
- The presentation room was too cool.
- The room set up was a little crowded and there was too much background noise.
- There was not sufficient food at the social so perhaps next time we should collect money from participants and have finger foods catered.
- Try to limit talks given recently at other venues.
- Some technical jargon was not understood.
- Not enough talk/explanation of assessment protocols/techniques for gear standardization.
- Would like to see more on public outreach/education techniques.
- Have meeting on the weekend.
- Invite subject experts to lead breakout sessions.
- Establish an information clearing house for folks interested in sturgeon management/research.
- Hold product oriented breakout sessions on particular topic/question.
- Change locations next meeting.
- By not charging to attend the meeting many undergraduates and agency folks who might not otherwise be able to attend were able to participate.
- All aspects were interesting, most balanced meeting I ever attended.
- Right number of individuals to be comfortably social.
- Encourage participation from more citizen groups as well as agency and university folks.
- Do not include special interest groups.
- What is the plural of sturgeon?
- Hold the organized lunch on the first day.

Acknowledgements

The U. S. Fish and Wildlife Service steering committee members express our gratitude to other steering committee members Dr. Nancy Auer, Brad Eggold, Marty Holtgren, Dr. Ed Baker, Doug Carlson, and Lloyd Mohr for their advice and assistance in organizing and convening this meeting. We thank Glenn Miller, Jonathan Pyatskowit, and Joan Bratley for their tremendous contribution to this meeting which included meeting material preparation, motel and meeting room arrangements, coordination with presenters, and operation of presentation equipment. We thank Amy Welsh, Dr. Kim Scribner, Marty Holtgren, Dr. Nancy Auer, Dr. Trent Sutton, Chet Mackenzie, and Mike Friday who contributed presentations on specific topics by request. Thanks to Gary Whelan, Dr. Boyd Kynard, Steve Amaral and Dr. Luther Aadland for sharing their expertise as presenters and as panelists for the sturgeon passage discussions. Thanks to Emily Zollweg, Rob Elliott, James Boase, Brad Eggold, Nancy Auer, Doug Carlson, Henry Quinlan, Bill Gardner, and Larry Thompson for serving as facilitators and recorders during the breakout sessions. A special thanks to Brenda Archambo and Dona Crist of Sturgeon for Tomorrow, Black Lake Chapter for the numbered and signed, matted sturgeon mosaic photograph, shirts, sturgeon lapel pin and 2004 Sturgeon Guard hat, and to Dr. James (Randy) Jackson for a historic sturgeon reprint that were donated for door prizes. We express our appreciation to Sue Erickson of the Great Lakes Indian Fish and Wildlife Commission Public Information Office for provision of “Sturgeon~King of Fish” posters included with registration materials. We also thank the Great Lakes Fishery Trust for provision of meeting folders, recognition of the need for regular coordination meetings, and for provision of the necessary financial support to make them possible. A final thanks to Anjanette Bowen for preparations made to post this document on the Great Lakes Lake Sturgeon Web Site.

Participant List

Luther Aadland
Minnesota DNR
1221 Fir Ave. E.
Fergus Falls, MN 56537
218-739-7576
Luther.Aadland@dnr.state.mn.us

Doug Aloisi
USFWS- Genoa NFH
S. 5689 State Road 35
Genoa, WI 54632-8836
608-689-2605, 608-689-2605 FAX
Doug_Aloisi@fws.gov

Steve Amaral
Alden Research Laboratory, Inc.
30 Shrewsbury Street
Holden, MA 01520
508-829-6000 x415

Brenda Archambo
Sturgeon for Tomorrow
1604 N. Black River Rd.
Cheboygan, MI 49721
231-625-2776, 231-625-2775 FAX
archambo@freeway.net

Nancy Auer
Michigan Technological Univ., Dept. Biol. Sci.
1400 Townsend Drive
Houghton, MI 49930
906-487-2353, 906-487-3167 FAX
naauer@mtu.edu

Ed Baker
Michigan DNR, Marquette Fisheries Station
484 Cherry Creek Rd.
Marquette, MI 49855
906-249-1611, 906-249-3190 FAX
bakerea@michigan.gov

John Bauman
940 College Dr. Huron Hall E
Sault Ste. Marie, MI 49783
906-635-2342
jbauman2@hotmail.com

Jim Boase
USFWS - Alpena FRO
1725 Pruit
Highland, MI 48356
248-894-7594
James_Boase@fws.gov

David Bos
Purdue University
Pfendler Hall
715 W. State St.
West Lafayette, IN 47907
765-494-9779
dbos@purdue.edu

Kristin Bott
Michigan State University
13 Nat. Res. Bldg
Depart. of Fisheries and Wildlife
East Lansing, MI 48824
517-432-4935
bottk@msu.edu

Dave Bryson
USFWS
3817 Luker Rd.
Cortland, NY 13045
607-753-9334
Dave_Bryson@fws.gov

Tom Burzynski
Wisconsin DNR
600 E. Greenfield Ave.
Milwaukee, WI 53204
414-382-7924
Thomas.burzynski@dnr.state.wi.us

Doug Carlson
New York State DEC
317 Washington St.
Watertown, NY 13601
315-785-2261, 315-785-2242 FAX
dmcarlso@gw.dec.state.ny.us

Kim Carmichael
Anishinabek/Ontario Fisheries Res. Centre
755 Wallace Road. Unit #5
North Bay, Ont. P1B 8G4
705-472-7888
aofrc@aofrc.org

Stephen Chong
OMNR
875 Queen St. East
Ann Arbor, MI 48105-1563
705-253-8288
Stephen.chong@mnr.gov.on.ca

Mark Coscarelli
GLFT
600 W. St. Joseph Ste. 10
Lansing, MI 48933
517-371-7468, 517-484-4954 FAX
glft@glft.org

Dona Crist
Sturgeon For Tomorrow
9100 Lake Ct.
Cheboygan, MI 49721
231-625-2667
mhd@nmo.net

Tim Cwalinski
Michgan DNR
1732 M-32 W.
Gaylord, MI 49735
989-732-3541 ext 5072
cwalinst@michigan.gov

Dan Daugherty
Purdue University
Dept. of Forestry and Natural Resources
195 Marstellar St.
West Lafayette, IN 47907-1159
765-494-3578
ddaugher@purdue.edu

Mike Donofrio - 1
Wisconsin DNR
PO Box 208
Peshtigo, WI 54157
715-582-5050
Michael.Donofrio@dnr.state.wi.us

Mike Donofrio - 2
Lake Superior State University
Fisheries and Wildlife Club
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Andrea Drauch
Purdue University
Dept. of Forestry and Natural Resources
715 West State St
West Lafayette, IN 47907
765-494-9590
adrauch@purdue.edu

Jerry Edde
USFS Ottawa NF
500 N Moore
Bessemer, MI 49911
906-667-0261 ext 522
jedde@fs.fed.us

Andy Edwards
1854 Authority
4428 Haines Rd.
Duluth, MN 55811
218-722-8907, 218-722-7003 FAX
Aedwards@1854.org

Bradley T. Eggold
WI DNR
600 E. Greenfield Ave.
Milwaukee, WI 53204
414-382-7921, 414-382-1705 FAX
Bradley.eggold@dnr.state.wi.us

Rob Elliott
USFWS - Green Bay FRO
2661 Scott Tower Drive
New Frankin, WI 54229
920-866-1762, 920-866-1710 FAX
robert_f_elliott@fws.gov

Mitchell Eshkakga
Sault College
Sault Ste Marie, Ontario

Barbara Evans
Lake Superior State Univ., Dept. of Biology
650 W. Easterday Ave
Sault Ste. Marie, MI 49783
906-635-2164
bevans@lssu.edu

Brant Fisher
Indiana DNR, Atterbury Fish & Wildlife Area
7970 South Rowe Street, P. O. Box 3000
Edinburgh, IN 46124
812-526-5816, 812-526-2892 FAX
bfisher@dnr.state.in.us

Patrick Forsythe
Michigan State University
13 Nat. Res. Bldg
Depart. of Fisheries and Wildlife
East Lansing, MI 48824
forsyt29@msu.edu

Mike Friday
Ontario MNR, Upper Great Lakes Mgt. Unit
435 South James St., Suite 221 E
Thunder Bay, Ontario P7E 6S8
807-475-1231, 807-473-3024 FAX
mike.friday@mnr.gov.on.ca

Amy Furman
Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Bill Gardner
Dept. Fisheries and Oceans
1 Canal Drive
Sault Ste. Marie, Ontario P6A 6W4
705-942-2848, 705-942-4025 FAX
gardnerw@dfo-mpo.gc.ca

Chris Geddes
University of Michigan and MI DNR
212 Museums Annex Building - 1109 N. University Avenue
Ann Arbor, MI 48109-1084
734-663-3554 ext 121
cgeddes@umich.edu

Sue Greenwood
Ontario Ministry of Natural Resources
1235 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
705-253-8288 ext 249, 705-253-9909 FAX
susan.greenwood@mnr.gov.on.ca

Roger Greil
Aquatic Research Lab, Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783
906-635-1949, 906-635-0214 FAX
rgreil@gw.lssu.edu

Brian Gunderman
Michigan DNR
West Lake Superior Management Unit
427 US 41 North
Baraga, MI 49908
906-353-6651
gunderb@michigan.gov

Tim Haxton
OMNR
P. O. Box 2002, Concession Road
Kemtpville, Ontario K0G 1J0
613-258-8240, 613-258-3920 FAX
Tim.haxton@mnr.gov.on.ca

Charles Hendry
OMNR-NE Science and Information Section
Ontario Government Complex
Hwy 101 East, P. O. Box 3020
South Porcupine, Ontario P0N 1H0
705-235-1212
Charles.hendry@mnr.gov.on.ca

Steve Hogler
WI DNR
2220 E. CTH V
Mishicot, WI 54228
920-755-4982
hogles@dnr.state.wi.us

Marty Holtgren
Little River Band of Ottawa Indians
Conservation Department
375 River Street
Manistee, MI 49660
231-723-1594, 231-723-8873 FAX
mholtgren@lrboi.com

James (Randy) Jackson
Cornell Biological Field Station
900 Shackleton Point Road
Bridgeport, NY 13030
315-633-9243, 315-633-2358 FAX
Jrj26@cornell.edu

William Keiper
Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Greg Kennedy
USGS
1451 Green Road
Ann Arbor, MI 48105
734-214-7215, 734-994-8780 FAX
Gregory_kennedy@usgs.gov

Adrienne Kral
Little Traverse Bay Band of Odawa Indians
7500 Odawa Circle
Harbor Springs, MI 49740
231-242-1672
akral@ltbbodawa-nsn.gov

Boyd Kynard
USGS
Northeast Anadromous Fish Res. Lab.
PO Box 796
Turner Falls, MA 01376
413-863-3807
boyd_kynard@usgs.gov

Steven Lenart
Little Traverse Bay Band of Odawa Indians
7500 Odawa Circle
Harbor Springs, MI 49740
231-242-1672
slenart@ltbbodawa-nsn.gov

Janet Lowe
Golder Associates
662 Falconbridge Rd.
Sudbury, Ontario P3Y 4S4
705-524-6861

Alexandre Litvinov
Lake Superior State University, College Natural and Health Science, Aquatic Research Lab
650 W. Easterday Avenue
Sault Ste. Marie, MI 49783
906-635-2093, 906-635-2266 FAX
alitvinov@lssu.edu

Chet MacKenzie
Vermont Dept. of Fish and Wildlife
317 Sanitorium Rd. West Wing
Pittsford, VT 05763-9358
802-483-2736, 802-483-9358 FAX
chet.mackenzie@anrmail.anr.state.vt.us

Bruce Manny
USGS
1451 Green Road
Ann Arbor, MI 48105
734-214-7255, 734-994-8780 FAX
Bruce_manny@usgs.gov

Justin McLeod
Lake Superior State University
Fisheries and Wildlife Club
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Rod McDonald
Fisheries and Oceans Canada
Sea Lamprey Control Center
1 Canal Drive
Sault Ste. Marie, Ontario P6A 6W4
705-941-3009, 705-941-3025 FAX
mcdonaldr@dfo-mpo.gc.ca

Bruce McGregor
Sagamok Anishnawbek
P. O. Box 850
Massey, Ontario P0P 1P0
705-865-1134, 705-865-1137 FAX
bruce@saulteauxenterprises.ca

Robert McNeely
OMNR
1235 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
705-253-8288 ext 237
bob.mcneely@mnr.gov.on.ca

Rob Mellow
Golder Associates
662 Falconbridge Rd.
Sudbury, Ontario P3Y 4S4
705-524-6861
rmellow@golder.com

Glenn Miller
USFWS Ashland FRO
2800 Lake Shore Drive, E.
Ashland, WI 54806
715-682-6185
Glenn_miller@fws.gov

Ashley Moerke
Lake Superior State University
650 W. Easterday Ave
Sault Ste. Marie, MI 49783
906-635-2153
amoerke@lssu.edu

Tom Mosindy
OMNR - Lake of the Woods FAU
808 Robertson Street
Kenora, Ontario P9N 3X9
807-468-2609, 807-468-2737 FAX
Tom.mosindy@mnr.gov.on.ca

Lisa O'Connor
Department of Fisheries and Oceans
Gr. Lakes Lab. of Fisheries & Aquatic Sciences
1 Canal Drive
Sault Ste. Marie, Ontario P6A 6W4
705-942-2848
oconnorl@dfo-mpo.gc.ca

Stephanie Ogren
Little River Band of Ottawa Indians
375 River Street
Manistee, MI 49660
231-723-1594, 231-723-8873 FAX
sogren@lrboi.com

Jessica Peacock
Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Maureen Peltier
Anishinabek/Ontario Fisheries Res. Centre
755 Wallace Rd., Unit # 5
North Bay, Ontario P1B 8G4
705-472-7888
aofrc@aofrc.org

Terry Perrault
Fond du Lac Band
1720 Big Lake Road
Cloquet, MN 55720
218-878-8088
terryperrault@fdlrez.com

Brad Phaneuf
Ontario MNR
1235 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
705-253-8288 ext 238
brad.phaneuf@mnr.gov.on.ca

Tom Pratt
Department of Fisheries and Oceans
Gr. Lakes Lab. of Fisheries & Aquatic Sciences
1 Canal Drive
Sault Ste. Marie, Ontario P6A 6W4
705-942-2848, 705-942-4025 FAX
prattt@dfo-mpo.gc.ca

Gary Pritchard
Anishinabek/Ontario Fisheries Res. Centre
755 Wallace Rd., Unit # 5
North Bay, Ontario P1B 8G4
aofrc@aofrc.org
705-472-7888

Christopher Pullen
Golder Associates
662 Falconbridge Rd.
Ottawa, Ontario

Jeremy Pyatskowit
Menominee Indian Tribe of Wisconsin
Environmental Services Department
P. O. Box 910
Keshena, WI 54135
715-799-6150, 715-799-6153 FAX
jpyat@itol.com

Jonathan Pyatskowit
USFWS-Ashland FRO
2800 Lake Shore Dr. East
Ashland, WI 54806
715-682-6186, 715-682-8899 FAX
Jonathan_Pyatskowit@fws.gov

Henry Quinlan
USFWS - Ashland FRO
2800 Lake Shore Dr. East
Ashland, WI 54806
715-682-6186 ext 203, 715-682-8899 FAX
henry_quinlan@fws.gov

Deborah Rajchel
Michigan Technological University
Biological Sciences Dept., Dow Building
1400 Townsend Dr.
Houghton, MI 49931

Don Reiter
Menominee Indian Tribe of Wisconsin
P. O. Box 910
Keshena, WI 54135-0910
dreiter@itol.com

Paul Ripple
Bay Mills Biological Services Program
12140 Lakeshore Drive
Brimley, Michigan 49715
906-248-3241, 906-248-3283 FAX
pripple@bmic.net

Ben Rook
Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Karen Schmidt
Ontario MNR, Upper Great Lakes Management Unit
435 South James St., Suite 221 E
Thunder Bay, Ontario P7E 6S8
807-475-1231, 807-473-3024 FAX

Kandi Schnurer
Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Steve Scott
Michigan DNR
5100 State Highway M123
Newberry, Michigan 49868
906-293-5131
e-mail: scottsj@state.mi.us

Kim Scribner
Michigan State University, Dept. of Fisheries and Wildlife
13 Natural Resources Bldg.
E. Lansing, MI 48824-1222
517-353-3288, 517-432-1699 FAX
scribne3@msu.edu

John Seyler
Anishinabek/Ontario Fisheries
755 Wallace Rd. Unit # 5
North Bay, Ontario P1B 8G4
705-472-7888, 705-472-6333 FAX
jseyler@aofrc.org

Randy Seymor
Little Traverse Bay Band of Odawa Indians
7500 Odawa Circle
Harbor Springs, MI 49740
231-242-1672
rseymour@ltbbodawa-nsn.gov

Perry McCleod Shabogsic
Anishinabek/Ontario Fisheries Res. Center
755 Wallace Rd., Unit # 5
North Bay, Ontario P1B 8G4
705-472-7888
aofrc@aofrc.org

Kregg Smith
Michigan DNR – S. Lake Michigan Mgmt Unit
621 N. 10th St
Plainwell, MI 49080
SMITHKRM@michigan.gov

Melvin Southwind
Sagamok Anishnawbek
P. O. Box 850
Massey, Ontario P0P 1P0
705-865-1134

Trent Sutton
Purdue Univ., Dept. of Forestry and Nat. Res.
195 Marsteller St.
West Lafayette, IN 47907-1159
765-496-6266, 765-496-2422 FAX
tsutton@fnr.purdue.edu

Larry Thompson
USFWS
2662 Scott Tower Drive
New Frankin, WI 54229
920-866-1736
larry_thompson@fws.gov

Dan Traynor
Lake Superior State University
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Chris Vandergoot
OH DNR-DOW, Sandusky Fish. Research Unit
305 East Shoreline Dr.
Sandusky, OH 44870
Christopher.vandergoot@dnr.state.oh.us

Steve Warner
Lake Superior State University
Fisheries and Wildlife Club
625 Easterday Ave.
Sault Ste. Marie, MI 49783

Jerry Weise
Fisheries and Oceans Canada
Sea Lamprey Control Center
1 Canal Drive
Sault Ste. Marie, Ontario P6A 6W4
705-941-3006, 705-941-3025 FAX
weisej@dfo-mpo.gc.ca

John Weisser
USFWS - Marquette Biological Station
1924 Industrial Parkway
Marquette, MI 49855-1699
906-226-1213, 906-226-3632 FAX
john_weisser@fws.gov

Amy Welsh
University of CA-Davis, Dep. of Animal Sci.
1 Shields Ave
Davis, CA 95616
530-752-6351, 530-752-0175 FAX
abwelsh@ucdavis.edu

Gary Whelan
Michigan DNR - Fisheries Division
P.O. Box 30446
Lansing, MI 48909
517-373-1280
whelang@michigan.gov

Martha Wolgamood
Michigan DNR-Wolf Lake State Fish Hatchery
34270 C.R. 652
Mattawan, MI 49071
616-668-2132
wolgamom@michigan.gov

Rebecca Zeibler
Purdue University
195 Marsteller St.
West Lafayette, IN 47906
765-494-3581
rzeiber@purdue.edu

Emily Zollweg
USFWS-Lower Great Lakes FRO
405 N. French Rd., Suite 120A
Amherst, NY 14228
716-691-5456 ext 24, 716-691-6154 FAX
Emily_Zollweg@fws.gov

Biographical Information

Aloisi, Doug, USFWS - Genoa National Fish Hatchery
Biographical Sketch: Genoa currently rears 3 different strains of lake sturgeon and is involved with restoration projects that supply eggs, fry, fingerlings, and yearlings to 2 state conservation agencies, three federal agencies, and 2 tribes.

Amaral, Stephen, Alden Research Laboratory, Inc.
Biographical Sketch: I am a fisheries biologist with Alden Research laboratory, Inc. located in Holden, MA. As part of Alden's Environmental Group, I have conducted extensive research on upstream and downstream fish passage technologies during the last 10 years. Several of these studies have included biological effectiveness evaluations with sturgeon species (white, shortnose, and lake sturgeon). Alden has a reputation of developing innovative fish passage solutions and we have great interest in helping to develop new ways to effectively provide sturgeon with safe downstream passage at hydro projects.

Archambo, Brenda, Sturgeon For Tomorrow
Biographical Sketch: Brenda Archambo is the founder of the Black Lake Chapter of Sturgeon For Tomorrow (SFT), a grass roots non-profit corporation. Brenda successfully argued for allowing a minimal harvest of lake sturgeon from the Black Lake population. She and SFT members convinced state fisheries managers that the cultural importance of sturgeon spearing could be used to promote efforts to recover sustainable populations of this majestic fish. Brenda was influential in developing and organizing a harvest tag lottery for sturgeon spearing season on Black Lake.
Archambo has logged thousands of volunteer hours conducting scientific research, coordinating a volunteer Sturgeon Guarding Program, created a Sturgeon Advisory Council, facilitates presentations, tours and field trips to view spawning sturgeon and organizes fundraising initiatives to support research, conservation and education programming.

Auer, Nancy A., Michigan Technological University
Biographical Sketch: My interest in sturgeon started in the late 1970s when I visited the Wisconsin lab [where Fred Binkowski first began rearing sturgeon] to view material for the Great Lakes larval fish key (Auer, ed. 1982). After seeing those young fish I was hooked. When I moved to upper Michigan in 1981 I sought out opportunities to work with lake sturgeon. In 1987 I began an investigation into the population status of lake sturgeon as they utilize the Sturgeon River in the Lake Superior watershed for spawning. The study immediately focused on operation of a small hydro facility which impacted sturgeon movement and spawning. In 1990 the facility was relicensed and now operates at near ROR which has enhanced spawning success and movement of the population. We are now (2004) beginning to see the fruits of the labors of relicensing as more untagged and sub-adult fish are being encountered in the river and surrounding watershed areas. I have worked with lake sturgeon in the Sturgeon River and Ontonagon Rivers and several Lake Michigan tributaries. I have prepared or contributed to peer-reviewed publications, book chapters, was editor of the Lake Superior Rehab Plan for Lake Sturgeon in Lake Superior (2002) and have supported 7 Master's students on research funding directly related to lake sturgeon.
- My current research work focuses on the use of split-beam, side-scan hydroacoustic assessment of the spawning lake sturgeon population in the Sturgeon River, assisting in the assessment of Lake Michigan sturgeon stocks in upper peninsula tributaries with Ed Baker of the Michigan DNR and work with the Little River Band of Ottawa Indians on larval to age-1 lake sturgeon distribution in the Manistee River.

Bauman, John, Lake Superior State University
Biographical Sketch:
- Senior in pursuit of a B.S. in Fisheries and Wildlife Management
-Two Summers of lake sturgeon experience
-Adult set-line survey (St. Mary's River, Michigan)
-Larval drift – stream side rearing facility operator (Manistee, Michigan)
-juvenile visual survey
-Juvenile set-line survey
-Extensive literature review of lake sturgeon, as well as other species of sturgeon

Baker, Ed, Michigan DNR - Marquette Fisheries Station
Biographical Sketch: I am involved in lake sturgeon research in the Sturgeon River, Black Lake, Green Bay, and other locations in Michigan. Current research focuses on lake sturgeon distribution and abundance, early life history, stocking, genetics, etc. I am a member of the Lake Michigan Lake Sturgeon Task Group and the Lake Superior Lake Sturgeon Committee.

Boase, James, USFWS - Alpena Fishery Resources Office
Biographical Sketch: Since 1997 I have been conducting multiple studies integrating ultrasonic telemetry and external tagging to determine movement patterns by sturgeon from stocks in Saginaw Bay, Southern Lake Huron, St. Clair River, Detroit River, and Western Lake Erie. In addition I am interested in the application these types of studies to inter-jurisdictional and inter-basin management of sturgeon. Working with USGS I have been looking at the response of lake sturgeon (and other species of fish) to three artificial spawning substrates in the Detroit River and future use of these substrates to other locations in the Great Lakes. In 2004 I began studying habitat requirements of juvenile (less than four years old) lake sturgeon in Southern Lake Huron and the North Channel of the St. Clair River. In 2005-2007 I will be working with Ohio DNR to determining if a remnant stock of sturgeon exists in the Maumee River and will conduct similar work with Michigan DNR in the Saginaw River.

Bos, David, Purdue University
Biographical Sketch: My work centers on using molecular genetics to research evolution, ecology and conservation in a variety of organisms. I am beginning a research project that is designed to identify gender-specific DNA markers for lake sturgeon. We will isolate previously unknown segments of DNA specific to one gender but not the other, and develop a rapid DNA-based assay that will allow us to rapidly determine the sex of many individuals. Upon completion of this research, we anticipate that a number of small tissue samples from fish of any age can be sent to the laboratory and their sex determined later that same day. This work will provide conservation and fisheries managers with the tools necessary to carry out gender-biased stocking programs or easily determine basic population parameters such as the sex-ratio of any age class.

Bott, Kristin, Michigan State University - Dept. of Fisheries and Wildlife
Biographical Sketch: After graduating from the University of Montana (Missoula) in May 2003, I began my MS at Michigan State University (working with Kim Scribner) in January 2004. My master's research deals with lake sturgeon (Acipenser fulvescens), using genetic techniques to better understand population dynamics and structure of lake sturgeon populations in and around the Great Lakes. My thesis will focus on three areas : (1) A mixed-stock analysis of samples from Green Bay and other areas in the Lake Michigan basin – past research (DeHaan 2003) has found that genetic structure is present throughout the Great Lakes, and individuals can be assigned to both a basin and a river of origin base on genetic information. (2) Estimating the number of reproductives in a river(s) in Michigan; using genetic information and statistical analysis, we can infer the number of breeders in a

given year.. (3) An analysis of size/age-based recruit strength for different sturgeon populations in the Great Lakes (this portion of the project will be done in close collaboration with Robert F Elliott of the USFWS). As part of my master's, I'm participating in the Ecology, Evolutionary Biology, and Behavior (EEBB) program offered through the Department of Fisheries and Wildlife.

Bryson, David, USFWS - Cortland Field Office
Biographical Sketch: I work as a Senior Fish & Wildlife Biologist for the U.S. Fish & Wildlife Service's New York Field Office (Ecological Services). My primary duties have involved hydropower development, aquatic habitat instream flow needs and fish passage. I have assisted the Lower Great Lakes Fisheries Resource Office in lake sturgeon sampling. In addition, I assisted the Service's Region 4 by developing "A Strategic Plan for Restoration of Lake Sturgeon in the Tennessee River Basin" and assisted with young-of-year marking. Recently, I participated in the Lake Sturgeon Workshop for Lake St. Francis and Surrounding Waters.

Burzynski, Tom, Wisconsin DNR - Milwaukee
Biographical Sketch: Our work unit is involved in lake sturgeon reintroduction to the Milwaukee River and nearshore areas of Lake Michigan. Current work involves stocking of fingerlings and yearlings, along with the transfer of adult lake sturgeon from the Wolf River near Shawano, Wisconsin to the Milwaukee River. Adult sturgeons are to be radio-tagged and tracked in the Milwaukee River, its tributaries and the Milwaukee Harbor. At present, we are tracking the initial adult stocking of seven adult fish transferred in fall 2003.

Carlson, Doug, New York State DEC
Biographical Sketch: My interests in lake sturgeon in NY are primarily as a coordinator of others doing studies. This species is threatened in NYS, and my job in the Endangered Fish Project allows me to put together and carry out the recovery plan. In the future I will also formalize any management objectives beyond our recovery efforts. I have worked with NYSDEC for 24 years and specialize in fishes outside the realm of our sportfish management.

Carmichael, Kim, Anishinabek/Ontario Fisheries Resource Centre
Biographical Sketch: The A/OFRC works collaboratively with First Nation communities across the great lakes Basin on fisheries initiatives including lake sturgeon assessment. In recent years the A/OFRC has sponsored lake sturgeon work in the Mississaugi River, Spanish River, the North Channel of Georgian Bay and Lake Nipissing.

Chiotti, Justin A., Little River Band of Ottawa Indians
Biographical Sketch: For the last two years I have been studying lake sturgeon in the Big Manistee River, MI. My work has included using egg mats to determine spawning locations, larval drift and quantifying juvenile and spawning habitat using underwater video techniques.

Chong, Steve, OMNR - Upper Great Lakes Management Unit - Lake Superior
Biographical Sketch:
- Involved with a lake sturgeon telemetry study on the Goulais River aimed at identifying critical habitat
- Conduct index netting assessment projects in Eastern Lake Superior which regularly capture young/juvenile sturgeon: 12 lake sturgeon were caught in 2 over night net sets in Our August 2004 survey in Zone 34 and were sampled, PIT tagged, and released

Cox, Doug, Menominee Indian Tribe of Wisconsin
Biographical Sketch: The work the tribe is doing on the reservation involves a lake sturgeon reintroduction program. The Tribe has been moving sturgeon onto the reservation since 1995 in at attempt to gain a self sustaining population. The transferred fish have been fitted with radio transmitters to monitor their movement in the Wolf River. Sturgeon have also been stocked in a reservation lake to provide a harvestable population for tribal members. The USFWS has been aiding in the assessments of the stocked sturgeon.

Cwalinski, Tim, Michigan DNR - Gaylord
Biographical Sketch:
Sturgeon trapping/tagging in northern lower peninsula river.
What are appropriate harvest numbers for inland lake?
Continuation of stocking program in other MI waters? Or not?
Genetic possibilities of stocking, are they overrated?

Daugherty, Dan J., Purdue University - Department of Forestry and Natural Resources
Biographical Sketch: Dan is currently a doctoral candidate in the Dept. of Forestry and Natural Resources, Purdue University. His current research involves the development of habitat availability models in historically important lake sturgeon spawning tributaries in the northern Lake Michigan basin and the implementation of this information into restoration decision-making processes. Dan has also been involved with projects aiming to determine the present status of lake sturgeon stocks in both the Lake Michigan and Lake Superior basins during his undergraduate and graduate studies.

Desson, Ed, Anishinabek/Ontario Fisheries Resource Centre
Biographical Sketch: The A/OFRC works collaboratively with First Nation communities across the great lakes Basin on fisheries initiatives including lake sturgeon assessment. In recent years the A/OFRC has sponsored lake sturgeon work in the Mississaugi River, Spanish River, the North Channel of Georgian Bay and Lake Nipissing.

Donofrio, Mike, Wisconsin DNR - Peshtigo
Biographical Sketch: Involved with lake sturgeon management and assessments through FERC projects and in Menominee River and other Green Bay tributaries

Drauch, Andrea, Purdue University
Biographical Sketch: I am a MS student working under Gene Rhodes at Purdue University. I am most interested in the application of population genetic techniques to the management of lake sturgeon populations across their historical range. For my MS thesis project I will be determining the genetic composition of the only naturally occurring lake sturgeon population remaining in the Ohio River drainage system. I will also be evaluating the success of lake sturgeon reintroductions in the Mississippi River and Missouri River drainages based on genetic criteria.

Echevarria, Carlos, USFWS - Warm Springs National Fish Hatchery
Biographical Sketch: Member of the Lake Sturgeon Recovery Team for the Upper Tennessee River, TN and the Coosa River System in Georgia. Involved in spawning, propagation and culture of lake sturgeon. Warm Springs NFH Hatchery Manager.

Edde, Jerry W., USFS - Ottawa National Forest
Biographical Sketch: I am a fisheries biologist working for the US Forest Service for 26 years. I first became involved with lake sturgeon when the Ottawa National Forest supported the pioneer research

by Nancy Auer on lake sturgeon spawning and movements (throughout Lake Superior and the Sturgeon River spawning grounds). I was involved early on during the FERC reliscensing of the Prickett Reservoir power station and resolution of an operation protocal which would minimize impact on sturgeon. My interest is in continuing cooperative work with Michigan Tech, Michigan DNR, the Fish and Wildlife Service, and UPPCO toward the complete recovery of lake sturgeon in Lake Superior, particularly the critically important existing and historic spawning areas and spawning populations.

Edwards, Andy, 1854 Authority
Biographical Sketch: A recent TWG award to the Grand Portage Band will fund lake sturgeon work in the Pigeon and St. Louis Rivers. Telemetry gear will be used to monitor juvenile and sub-adult sturgeon in the St. Louis River throughout the year to identify and delineate habitats utilized by these lifestages. Project will encompass two full years of field work. Pigeon River work will be similar in scope but at a smaller scale and may include older fish depending on what fish are actually captured. The project will be cooperative in nature, with 1854 Authority and Fond du Lac conducting the majority of the field work in the St. Louis River, along with technical assistance and consultation from the USGS, USFWS, and MN and WI DNRs. Work in the Pigeon River will be conducted primarily by Grand Portage staff with assistance from the USFWS and 1854 Authority. At this point, field work is anticipated to begin in the early summer of 2005.

Eggold, Bradley T., Wisconsin DNR - Milwaukee
Biographical Sketch: Currently, I am the Wisconsin Department of Natural Resources member on the Lake Sturgeon Steering Committee and a Fisheries Biologist/Supervisor for 14 years. I am responsible for coordinating lake sturgeon efforts in Lake Michigan for Wisconsin. Our Milwaukee work unit is involved in lake sturgeon reintroduction to the Milwaukee River. Current work involves stocking of fingerling and yearling lake sturgeon, along with the transfer of adult lake sturgeon from the Wolf River near Shawano, Wisconsin to the Milwaukee River.

Elliott, Robert, USFWS - Green Bay Fishery Resources Office
Biographical Sketch: Major interest and involvement in the status assessment of remnant populations of lake sturgeon throughout Lake Michigan with emphasis on southern Green Bay, and in the development and implementation of a comprehensive rehabilitation plan for Lake Sturgeon in Lake Michigan through the auspices of the Lake Michigan Committee of the GLFC.

Lake Sturgeon Interest and Involvement:
US Fish & Wildlife Service lead for lake sturgeon assessment, rehabilitation and restoration in Lake Michigan, 1997-present.
Chair and Steering Committee, Lake Michigan Lake Sturgeon Task Group, 2003-present.
Member, USFWS Great Lakes Basin Lake Sturgeon Committee, 1998-present.
Project Manager and Co-PI – Status Assessment of Remnant Lake Sturgeon Populations in Lake Michigan, 2001-present.
Co-PI – Characterization of Early Life History of Lake Sturgeon in the Peshtigo River and Green Bay, 2002-2004.
Steering Committee for GLFT sponsored Research and Assessment Needs Workshop, 2000, and Great Lakes Lake Sturgeon Coordination Meetings, 2002 and 2004.

Fajfer, Steve, Wisconsin DNR - Wild Rose Fish Hatchery
Biographical Sketch:
-Lake Sturgeon spawning and propagation methods.

Fisher, Brant, Indiana DNR - Atterbury Fish and Wildlife Area
Biographical Sketch: Non-game aquatic biologist with Indiana DNR studying lake sturgeon in southern Indiana rivers for last 8 years. Conducted telemetry study last two years. Interested in genetics of our southern IN population (remnant Ohio River population) in comparison to Great Lakes populations.

Forsythe, Patrick S., Michigan State University - Department of Zoology
Biographical Sketch: I am currently enrolled as a doctoral student in the Department of Zoology at Michigan State University (expected to complete in 2007). Our project involves collecting information on the fundamental and yet misunderstood aspects of the lake sturgeon early life history and reproductive ecology. Information regarding inter-annual variation in natural recruitment and of natural environmental or biotic agents that are responsible for inter-annual variation is lacking. In our study, we seek to determine the importance of potential barriers to lake sturgeon recruitment such as fertilization success, egg deposition and egg and larval predation. We also seek to determine the importance of adult body size, age, and timing of spawning events to reproductive success and the contributions of adult spawners to annual recruitment. Our study site is Black Lake, MI which is an ideal system for conducting this type of research because the adult population is small (approx 550), adults spawn in a single stream that drains into Black Lake and few adults (80-120) spawn annually. Understanding the importance of factors affecting lake sturgeon recruitment, survival, and philopatry will be critical to designs of restoration or reintroduction programs in Michigan drainages of the Great Lakes.

Friday, Mike, OMNR - Upper Great Lakes Management Unit - Lake Superior
Biographical Sketch:
Kaministiquia River: Issue with dewatering traditional spawning area. Presently monitoring the impact of flow stability on access and spawning success.

Black Sturgeon River: Issue is a lack of information concerning population size and seasonal distribution and movement. Initiatives include spring population estimates and radio telemetry work utilizing a data logger situated at the mouth of the river.

Goulais River: Issue is a lack of information concerning habitat utilization and seasonal distribution and movement. Addressing issue by utilizing radio telemetry and a shoreline based data logger situated on the river.

Geddes, Chris, University of Michigan and Michigan DNR - Institute for Fisheries Research
Biographical Sketch: The Great Lakes GIS Project aims to be a standardized, habitat-based spatial data repository for scientists and managers interested in Great Lakes fisheries. As Project Coordinator of the Great Lakes GIS Project, I am interested in fisheries-related data acquisition and management, as well as GIS applications relevant to Great Lakes scientists and managers. I have applied my training in ecology and spatial analysis to research questions involving fish-habitat relationships and to management-related questions involving data visualization, spatial data analysis, and GIS and spatial analysis education. I am located at the Institute for Fisheries Research in Ann Arbor, Michigan.

Gendron, Marc, Environnement Illimité Inc.
Biographical Sketch: Marc Gendron, senior biologist and partner in the firm Environnement Illimité inc., has been specializing in the study of fish and fish habitat since 1982, and more specifically on the impact of various projects with respect to the Federal and Provincial legislation regarding fish habitat

protection. Mr. Gendron has led a number of studies on the effects of hydroelectric infrastructures and generating facility construction on lake sturgeon populations from St-Lawrence river and other rivers of James Bay territory. Among these studies, the ones most significant ones pertaining to lake sturgeon are the following:

Project manager for a monitoring study of fish spawning and rearing (especially on sturgeon) on a man-made spawning area in the reach downstream from the Rivière-des-Prairies power plant (synthesis report 1982-1988 for Hydro-Québec).
Project manager for an impact assessment study of the hydroelectric development of the Nottaway, Broadback and Rupert rivers area on fish life and its exploitation. NBR Project. (for Hydro-Québec, 1993).
Project manager for a study on lake sturgeon reproduction in the reaches downstream from the Beauharnois power plant and Pointe-des-Cascades dam (for Hydro-Québec, 1993).
Project manager for a follow-up study on sturgeon artificial spawning bed downstream the Beauharnois power plant (for Hydro-Québec, 2002).
Project manager for the impact assessment study of the Rupert River diversion project on the sturgeon communities of more than 300 km of river systems (for Hydro-Québec, 2002-2004).
Project manager for the design of aquatic habitats, especially for sturgeons, in order to attenuate and compensate the effects of the creation of the Eastmain reservoir and generating facility (for the SEBJ, 2002-2004).

Greenwood, Susan, Ontario Ministry of Natural Resources
Biographical Sketch: The Lake Units has completed 4 years of spawning assessment on the Goulais River. (2000-2004) and contributed Goulais River population genetic tissue to the Great Lakes Fishery Trust sponsored project to develop a management plan for lake sturgeon within the Great Lakes basin based on population genetics structure.

In 2004 initiated an acoustic telemetry study to monitor sturgeon use of the Goulais River, relative to the spawning period. Habitat information will be collected in future years. The Goulais River is one of the few remaining large Lake Superior tributaries with no man-made impediments to sturgeon movement and little if any significant habitat degradation.

Greil, Roger W, Lake Superior State University
Biographical Sketch: Lake Sturgeon assessment work on the St Mary River, with the use of set lines. Started in 2000. Caught and tagged 92 sturgeon so far. We will have a poster on this work at this meeting.

Gunderman, Brian, Michigan DNR - West Lake Superior Management Unit
Biographical Sketch: During 1999-2000, I conducted lake sturgeon status assessments (population estimates and age structure) in the Manistee River (Michigan). From 2002 through spring 2004, I worked as a fishery biologist for the USFWS in Green Bay, Wisconsin. During this time, I conducted lake sturgeon research in Green Bay and surrounding tributaries (Fox, Oconto, Peshtigo, and Menominee Rivers) as part of a basin-wide effort to determine the status of lake sturgeon in Lake Michigan. Riverine work for this project included spawning run assessments, larval drift evaluations, and qualitative estimation of spawning habitat abundance. I also participated in open water trap net assessments in Green Bay, and was able to derive rough abundance estimates for Green Bay from this data. My current position is fishery management biologist for the West Lake Superior Management Unit. The Ontonagon River and Sturgeon River lake sturgeon populations fall within my management unit.

Haxton, Tim, Ontario Ministry of Natural Resources
Biographical Sketch: I have been working with lake sturgeon since 1996. My main focus is the impact of waterpower management on lake sturgeon in large rivers. I have been examining their life history traits (growth, maturity, population dynamics), worked on population assessment techniques, assessed spawning populations and more recently, have been attempting to validation a HSI model.

Hayes, Jennifer, State University of New York Environmental Science and Forestry
Biographical Sketch:
Lake sturgeon research in St. Lawrence River
Diet study to determine zebra mussel consumption
Juvenile telemetry studies to determine habitat use
Adult telemetry studies to identify spawning habitat
Population dynamics of stocks below the FDR Power Project

Hendry, Charles, Ontario Ministry of Natural Resources
Biographical Sketch:
- Aquatic Specialist with Northeast Science & Information Section since 1994
- Job duties focused largely with river-related issues
- Current focus on science support for water management planning – dam lease renewals
- Recent sturgeon related studies included juvenile lake sturgeon (0 - 1+) habitat studies on Groundhog River
- Assessing habitat suitability of the Mattagami River - re transfer of 50 adult fish to a 40km section of river
- Currently a member of the Provincial Sturgeon Toolkit Committee whose duties involved assessing the sustainability of Ontario's sturgeon sport harvest regulations. New more restrictive harvest regulations are recommended.
- Currently planning a lake sturgeon state-of-the-resource workshop to design a broad-based method for sampling and assessing sturgeon populations across the province. Plan to host workshop in March 2005.

Hogler, Steve, Wisconsin DNR - Mishicot
Biographical Sketch: As one of the Fisheries Biologists located along Wisconsin's Lake Michigan shoreline, I am interested in the reintroduction/restoration of Lake Sturgeon into Lake Michigan tributary streams that held historic populations of Lake Sturgeon. Restoration planning has been ongoing since 1995, with a Wisconsin, Lake Michigan Lake Sturgeon plan developed in 2003 and limited stocking also beginning that year.

Holey, Mark, USFWS - Green Bay Fisheries Resources Office
Biographical Sketch: -Project Leader of the Green Bay Fishery Resources Office (FRO). The Green Bay FRO staff is actively involved in all aspects of sturgeon rehabilitation in Lake Michigan and the Great Lakes, from status assessment of remnant stocks in Lake Michigan, assessment of sturgeon genetic diversity, juvenile habitat use, assess available habitat in Green Bay tributaries, and development of a rehabilitation plan for Lake Michigan through the Lake Michigan Committee. Member of the Great lakes Fishery trust's Scientific Advisory Team that reviews projects for funding.

Holtgren, Marty, Little River Band of Ottawa Indians
Biographical Sketch: Have conducted assessments for egg doposition, larval drift, young-of-year, and juvenile lake sturgeon. Juvenile surveys included radio telemetry. In 2004 designed and operated streamside rearing facility on Manistee River.

Jackson, James R, Cornell University - Cornell Biological Field Station
Biographical Sketch: Senior Research Associate. Current sturgeon research includes assessment of feeding, growth, habitat preferences and movements of lake sturgeon stocked into Oneida Lake, New York. The stocking program was initiated by New York DEC in 1995, and currently ~8,200 sturgeon have been stocked in the lake. Current sampling is primarily directed at assessment, but a large scale telemetry study is in the planning stages.

Kapuscinski Kevin, Wisconsin DNR - Green Bay
Biographical Sketch: Before coming to the WI DNR in May 2004, I served as the pallid sturgeon biologist for the state of Montana. I was responsible for overseeing recovery efforts in the Missouri River below Fort Peck Dam, and the lower Yellowstone River. Most of the recovery work revolved around capturing brood for hatchery propagation and monitoring hatchery-reared pallid sturgeon that were released into the wild. I have not conducted any sturgeon work in Wisconsin, but I am interested in monitoring lake sturgeon in the Fox River downstream from Lake Winnebago and in lower Green Bay.

Kennedy, Gregory W., U.S. Geological Survey - Great lake Science Center
Biographical Sketch: (Greg has...) Conducted fish habitat classification and mapping in the Great Lakes for over 15 years and has conducted assessment of lake sturgeon spawning habitat in the St. Clair - Detroit river connecting channel for roughly 5 years. He is currently involved in a collaborative project between the Great Lakes Science Center, Michigan Sea Grant, and others to create and evaluate artificial spawning habitat for lake sturgeon near Belle Isle, MI, in the Detroit river.

Kornely, Greg W., Wisconsin DNR - Peshtigo
Biographical Sketch: I have worked for the State of Wisconsin as a fisheries technician for the past 27 years. Throughout that time I have worked on the lake sturgeon fishery in the Menominee River, the boundary water with Michigan. I have worked on population assessments, gamete collection, telemetry studies, stocking evaluations and monitoring the annual hook and line sturgeon season on the Menominee River.

Kral, Adrienne, Little Traverse Bay Bands of Odawa Indians
Biographical Sketch: Our agency has monitored incidental captures of lake sturgeon in the Little Traverse Bay Region of Lake Michigan since 2000 since that time we have collected biological data from more than 20 animals and have provided 14 tissues samples for inclusion in the genetic work being done on Lake Michigan. Future work will include targeted assessments to determine the seasonal distribution of lake sturgeon in Little Traverse Bay.

Kynard, Boyd, USGS - Conte Anadromous Fish Research Center
Biographical Sketch:
-My staff and I have conducted experimental studies in 1999-2000 on the early life history of two populations of lake sturgeon comparing them to other North American sturgeon species and showing variation in dispersal style between populations (local adaptation).

-We have conducted seasonal studies of year-0 lake sturgeons for preference of substrate type and water velocity to compare with other North American sturgeons.

-We have conducted experimental studies on response of upstream moving lake sturgeon to fish passage structures and constructed a prototype fish ladder and tested large juvenile lake sturgeon for passage success and behavior during 3 years.

Lenart, Stephen, Little Traverse Bay Bands of Odawa Indians
Biographical Sketch: Our agency has monitored incidental captures of lake sturgeon in the Little Traverse Bay Region of Lake Michigan since 2000 since that time we have collected biological data from more than 20 animals and have provided 14 tissues samples for inclusion in the genetic work being done on Lake Michigan. Future work will include targeted assessments to determine the seasonal distribution of lake sturgeon in Little Traverse Bay.

Litvinov, Alexandre G., , Lake Superior State University
Biographical Sketch: Assistant Professor, interest in Ectoparasites of Lake sturgeon

Lowe, Janet, Golder Associates Ltd.
Biographical Sketch: - project manager for a sturgeon study in northern Ontario looking at the effect of mine effluent on the sturgeon population in the river, using habitat use pattern of spawning lake sturgeon, Spawning Adult Census and Tagging, Genetic, Size, Sex, and Age Data, Egg/Larval Survival and Development, Egg Number Index

Lyons, Joseph, Menominee Indian Tribe of Wisconsin - Environmental Services
Biographical Sketch: The work the tribe is doing on the reservation involves a lake sturgeon reintroduction program. The Tribe has been moving sturgeon onto the reservation since 1995 in at attempt to gain a self sustaining population. The transferred fish have been fitted with radio transmitters to monitor their movement in the Wolf River. Sturgeon have also been stocked in a reservation lake to provide a harvestable population for tribal members. The USFWS has been aiding in the assessments of the stocked sturgeon.

MacKenzie, Chet, Vermont Department of Fish & Wildlife
Biographical Sketch: Project leader for Lake Champlain Lake Sturgeon restoration/management project. Involved with designing and carrying out sampling programs for spawning adults, drifting larvae and eggs in Lake Champlain tributaries.

Manny, Bruce, U.S. Geological Survey
Biographical Sketch: Lake sturgeon status and restoration in the Huron/Erie corridor, including collaborative research with U.S. Fish and Wildlife Service, Michigan DNR, and Ontario MNR on lake sturgeon numbers, movements and habitat requirements in these waters since 1999.

McClain, Jerry, USFWS - Alpena Fishery Resources Office
Biographical Sketch: Jerry McClain is the project leader of the U.S. Fish & Wildlife Service (Service) Alpena Fishery Resources Office (FRO) and has been involved in lake sturgeon restoration activities in the Great Lakes since 1992. McClain initiated an interagency collaborative effort to compile status and trends information on lake sturgeon in the Lake Huron to Lake Erie corridor in 1994 and the collaboration has continued to expand. This collaborative effort includes participation by biologists and researchers from Ontario Ministry of Natural Resources, Michigan Department of Natural Resources, Ohio Division of Wildlife, U.S. Geological Survey, Central Michigan University, Ohio State University, Michigan State University and University of California-Davis.

The Alpena FRO provides Service leadership for lake sturgeon recovery efforts in Lake Huron, the St. Clair River, Lake St. Clair, Detroit River and the western basin of Lake Erie and has been involved in several grant funded projects in these waters.

McDonald, Rod, Dept Fisheries & Oceans (Canada)
Biographical Sketch:
- Adult Sea Lamprey Unit Supervisor at the Sea Lamprey Control Centre
- As such, responsible for trap and fishway operations of the Centre on the Canadian side of the Great Lakes
- Therefore, a vested interest in any activities which, in the course of permitting fish (including sturgeon) passage at existing or proposed dams, may influence sea lamprey passage/production as well.

McNeely, Robert, Upper Great Lakes Management Unit - Ontario Ministry of Natural Resources
Biographical Sketch:
- I am a fisheries technician and I have been associated with the lake sturgeon program with our unit since we began in 2000.
- Sturgeon work for our unit has been directed on the Goulais River which flows into eastern Lake Superior
- Tagging of sturgeon and pelvic fin ray removal for aging has been completed for 3 years
- This past field season (2004) we placed pit tags and performed radio telemetry on spawning lake sturgeon.

Mellow, Rob, Golder Associates
Biographical Sketch: Rob Mellow is a member of the Golder Associates Bioscience group working as an environmental scientist based out of Sudbury, Ontario. His biological skills have focused on performing various biological field studies related to the characterization of water, sediment, fish and aquatic invertebrates at numerous sites throughout Northern Ontario.

Mr. Mellow's work experiences are often related to the permitting and approval processes required by provincial and federal agencies for the mining and forestry industries.

Recent projects relating to lake sturgeon include habitat utilization and spawning assessments (including an incubation study) of populations in northern Ontario.

Mensch, Gene, Keweenaw Bay Indian Community
Biographical Sketch: Adult indexing in Keweenaw Bay area. Information/project share with USFWS adult and juvenile by-catch monitoring in KBIC commercial fishery efforts. Interest in joining Lake Superior Steering Committee.

Miller, Glenn, USFWS - Ashland FRO
Biographical Sketch: Fisheries Biologist for Lake Superior. Work details include surveys for lake trout, lake whitefish, coaster brook trout and lake sturgeon. Lake sturgeon surveys include spawning surveys and juvenile surveys on the Bad and White River, Ashland County, WI, and surveys in Ontario rivers looking for spawning adults on the Pic, Black, White, Batchawana, Chippewa and Michipicoten Rivers with OMNR and DFO. Also involved with commercial fishers on incidental take of lake sturgeon.

Moerke, Ashley, Lake Superior State University
Biographical Sketch: I am an Assistant Professor of Biology at Lake Superior State University (LSSU) and the Co-Director of LSSU's Aquatic Research Laboratory (ARL). For the past few years, LSSU students working at the ARL have conducted assessments of lake sturgeon populations in the St. Marys River. We plan to continue these assessments in the future, and we would like to expand our efforts to identify critical spawning habitats.

Mosindy, Tom, Ontario MNR - Lake of the Woods Fisheries Assessment Unit
Biographical Sketch: I presently work as a fisheries assessment biologist/Unit supervisor with the Lake of the Woods Fisheries Assessment Unit, Ontario Ministry of Natural Resources, in Kenora. Our unit has been involved in long-term studies documenting the recovery of lake sturgeon populations into the Rainy River and Lake of the Woods over the last two decades. Areas of study have included population dynamics, habitat preferences, and seasonal movement patterns of lake sturgeon in this system. I am currently involved in a co-operative study with Minnesota DNR and Rainy River First Nations to re-evaluate the status of this population and to determine its current position on a recovery trajectory. I am also the chair of a provincial committee that is recommending changes to angling regulations for lake sturgeon in Ontario.

Mudrak, Vincent, USFWS - Warm Springs Regional Fisheries Center, GA
Biographical Sketch: My name is Vincent Mudrak. I direct R&D work at the USFWS Regional Fisheries Center in Warm Springs, GA. I and other Center biologists work with various sturgeon species (shortnose, Atlantic, lake, pallid, shovelnose). We currently are initiating work in cryogenics, genetics, animal health, and propagation. With regard to lake sturgeon, our Center's staff biologists work with several Great Lakes fisheries managers, where we request and acquire lake sturgeon for captive propagation and restoration stocking for the Tennessee River system. We also assist with lake sturgeon fish health analysis, quarantine of sturgeon eggs/progeny entering the southeast Region, cryopreservation of lake sturgeon gametes, and collection of lake sturgeon tissue samples for future genetic identification (of founder population).

I am interested in participating at the Great Lakes Lake Sturgeon Coordination Meeting (GLLSCM) since I believe USFWS and other partners may need to formalize and enhance our lake sturgeon restoration plan, and our collective work strategies, for lake sturgeon restoration in the Tennessee River system. The information presented at the GLLSCM would benefit me. In turn, some of our southeastern issues and concerns might provide contrasting insights, and be useful information for some of our more northern partners in sturgeon conservation.

Ogren, Stephanie, Little River Band of Ottawa Indians
Biographical Sketch: I have worked on the Manistee River Sturgeon project for the past 3 years. I have focused on habitat assessments and have worked on design and implementation of the streamside rearing facility.

Peltier, Maureen, Anishinabek/Ontario Fisheries Resource Centre
Biographical Sketch: The A/OFRC works collaboratively with First Nation communities across the great lakes Basin on fisheries initiatives including lake sturgeon assessment. In recent years the A/OFRC has sponsored lake sturgeon work in the Mississaugi River, Spanish River, the North Channel of Georgian Bay and Lake Nipissing.

Phaneuf, Brad, Ontario MNR - Upper Great Lakes Management Unit
Biographical Sketch: Throughout the last 4 years the UGLMU has captured Sturgeon from the Goulais River. This year was the first year that we added a telemetry portion to the project to track the fish as they leave the River.

Pratt, Tom, Fisheries and Oceans Canada
Biographical Sketch: Involved in Great Lakes basin-wide lake sturgeon collection on four Lake Superior tributaries for the USFWS led genetics initiative. A member of the recently formed Lake Superior Lake Sturgeon working group of the Lake Superior Technical Committee.

Pritchard, Gary, Anishinabek/Ontario Fisheries Resource Centre - Fisheries Technician
Biographical Sketch: The A/OFRC works collaboratively with First Nation communities across the great lakes Basin on fisheries initiatives including lake sturgeon assessment. In recent years the A/OFRC has sponsored lake sturgeon work in the Mississaugi River, Spanish River, the North Channel of Georgian Bay and Lake Nipissing.

Pullen, Chris, Golder Associates
Biographical Sketch: Chris Pullen is a member of the Golder Associates Bioscience group working as an aquatic biologist. Mr. Pullen provides expertise and support in areas of aquatic habitat, fisheries and water quality relating to provincial and federal permitting applications, environmental impact assessments and monitoring programs. Chris has an extensive background as a wilderness guide and has specialized expertise in the instruction of river, wilderness and rescue skills.

Since joining Golder Associates, Mr. Pullen has been involved in a wide range of projects with the mining development and aggregates resources sector, the pulp and paper industry, forestry operators, solid waste management sector and municipal infrastructure projects in Ontario and the Northwest Territories.

Recent projects relating to lake sturgeon include habitat utilization and spawning assessments of populations in northern Ontario.

Pyatskowit, Jeremy, Menominee Indian Tribe of Wisconsin
Biographical Sketch: The work the tribe is doing on the reservation involves a lake sturgeon reintroduction program. The Tribe has been moving sturgeon onto the reservation since 1995 in at attempt to gain a self sustaining population. The transferred fish have been fitted with radio transmitters to monitor their movement in the Wolf River. Sturgeon have also been stocked in a reservation lake to provide a harvestable population for tribal members. The USFWS has been aiding in the assessments of the stocked sturgeon.

Pyatskowit, Jonathan, USFWS - Ashland Fishery Resources Office
Biographical Sketch: I am involved in spawning assessment of the Bad/White River population in Wisconsin. I also work with commercial fishermen to get data from sturgeon caught incidentally during the whitefish/lake trout commercial fishery. My master's research dealt with the inheritance of microsatellite loci in the lake sturgeon.

Quinlan, Henry, USFWS - Ashland Fishery Resources Office
Biographical Sketch: I have been involved in lake sturgeon assessment and management in the Lake Superior basin since 1995. Recent activities include assessment of spawning runs in tributaries that historically or currently support self-sustaining populations, identification and description of juvenile

and adult habitat, description of larval and yoy movement and growth, and technical assistance to other agencies involved with management and assessment of lake sturgeon. I was a member of the Lake Superior Sturgeon Subcommittee that developed the Lake Sturgeon Rehabilitation Plan for Lake Superior (2003) and the Wisconsin Sturgeon Management/Assessment Team that developed a management plan sturgeon in Wisconsin.

Rajchel, Deborah, Michigan Technological University
Biographical Sketch: I am a graduate student at MTU working on lake sturgeon to determine spawning locations on the Cedar and Manistique Rivers. While an undergraduate at Purdue University, I participated in lake sturgeon research and husbandry in the laboratory.

Reiter, Donald J., Menominee Indian Tribe of Wisconsin - Fish and Wildlife Conservation
Biographical Sketch: Lake sturgeon had been extirpated from the Menominee Indian Reservation until 1994 when federal, state, and tribal biologists began implementing strategies to reintroduce lake sturgeon to reservation waters. The lake sturgeon is an important part of the Menominee Indian Tribe culturally and also has provided subsistence in years past. The lake sturgeon re-introduction project allows my department to reintroduce adult lake sturgeon, stock yearling lake sturgeon, monitor behavior and habitat use using radio-telemetry, and conduct annual population assessments on reintroduced populations.. These activities will enable the identification of preferred habitat for lake sturgeon on the Menominee Reservation and bring the population to a self-sustaining level. Biological monitoring of movement behavior, habitat use and population status will allow adaptation of current management strategies as needed. The other portion of this project is to establish and maintain a put-grow-take lake sturgeon fishery in Legend Lake which will be used by enrolled tribal members in the future.

Schmidt, Karen, Ontario MNR - Upper Great Lakes Management Unit - Lake Superior
Biographical Sketch:
Kaministiquia River: Issue with dewatering traditional spawning area. Presently monitoring the impact of flow stability on access and spawning success.

Black Sturgeon River: Issue is a lack of information concerning population size and seasonal distribution and movement. Initiatives include spring population estimates and radio telemetry work utilizing a data logger situated at the mouth of the river.

Goulais River: Issue is a lack of information concerning habitat utilization and seasonal distribution and movement. Addressing issue by utilizing radio telemetry and a shoreline based data logger situated on the river.

Scott, Steven, Michigan DNR - Newberry
Biographical Sketch: I do not conduct sturgeon research but as a manager, I am interested in the information provided at this workshop.

Seyler, John, Anishinabek/Ontario Fisheries Resource Centre – General Manager
Biographical Sketch: The A/OFRC works collaboratively with First Nation communities across the great lakes Basin on fisheries initiatives including lake sturgeon assessment. In recent years the A/OFRC has sponsored lake sturgeon work in the Mississaugi River, Spanish River, the North Channel of Georgian Bay and Lake Nipissing.

Seymour, Randy, Little Traverse Bay Bands of Odawa Indians
Biographical Sketch: Our agency has monitored incidental captures of lake sturgeon in the Little Traverse Bay Region of Lake Michigan since 2000 since that time we have collected biological data from more than 20 animals and have provided 14 tissues samples for inclusion in the genetic work being done on Lake Michigan. Future work will include targeted assessments to determine the seasonal distribution of lake sturgeon in Little Traverse Bay.

Shabogesic, Perry McLeod, Anishinabek/Ontario Fisheries Resource Centre
Biographical Sketch: Community Liaison Specialist. The A/OFRC works collaboratively with First Nation communities across the great lakes Basin on fisheries initiatives including lake sturgeon assessment. In recent years the A/OFRC has sponsored lake sturgeon work in the Mississaugi River, Spanish River, the North Channel of Georgian Bay and Lake Nipissing.

Smith, Kregg, Michigan DNR- Southern Lake Michigan Management Unit
Biographical Sketch: Kregg Smith, Fisheries Management Biologist, MDNR -Southern Lake Michigan Management Unit has worked on lake sturgeon population dynamics and larval production in Black Lake, Michigan. My experience is in collecting and quantifying larvae, YOY, Juvenile, and adult lake sturgeon; using drift nets, trawling, gillnet, setlines, electrofishing, and ultrasonic telemetry. I am a member of the Lake Michigan Lake Sturgeon Task Group, MDNR lake sturgeon committee, and currently working on lake sturgeon in the Kalamazoo River in conjunction with Purdue University. My work is interested in rehabilitation of lake sturgeon populations in the Saint Joseph, Kalamazoo, and Grand Rivers. Some of the work currently ongoing in these river systems include inventorying habitat for different lake sturgeon life stages, obtaining and evaluating archaeological lake sturgeon remains to gain knowledge of historic genetic diversity in conjunction with current population information and genetic diversity that will assist fisheries managers in understanding the changes within these populations as well as between populations in southern Lake Michigan, coordinating and assisting in sampling efforts for biological data in each river as well as along the St. Joseph Reef in Southern Lake Michigan.

Starzl, Nick, USFWS - Genoa National Fish Hatchery
Biographical Sketch: Lake sturgeon culture

Sutton, Trent, Purdue University
Biographical Sketch: Currently, my research crew is conducting the following lake sturgeon related projects:
1. Assessment of remnant population status in the St. Joseph and Kalamazoo Rivers in southeastern part of Lake Michigan
2. Potential for Lake Sturgeon Habitat Rehabilitation in Green Bay Tributaries of Lake Michigan
3. Influence of water temperature and suture strand diameter on transmitter retention of juvenile lake sturgeon.

In addition to these projects, we have also recently completed the following lake sturgeon projects:
1. Effects of Mortality Sources on Population Viability of Lake Sturgeon Based on Model Simulations
2. Characterization of Early Life Stages of Lake Sturgeon in the Peshtigo River and Green Bay

Vandergoot, Chris, Ohio DNR - Sandusky
Biographical Sketch:
-Compiled a lake sturgeon sightings database for Ohio waters of Lake Erie
-Attempted to sample juvenile lake sturgeon in the western basin via set-lines

-Sampling the Maumee River to determine if this river is still used as a spawning ground

Vecsei, Paul, University of Georgia
Biographical Sketch: I have worked on stock assessment and telemetry of remnant Lake Michigan stocks of lake sturgeon. My current work focuses on the Muskegon River lake sturgeon stock. My research began in 2002 and has the following primary objectives: 1) Estimate spawning run size of lake sturgeon during annual migration in Muskegon River 2) Describe population age structure to predict future population trend
3) Determine if successful reproduction is still occurring. This research is part of my PhD work at UGA.

I am also interested in the taxonomy and ecomorphology of sturgeons. I have traveled throughout Russia, visiting hatchery facilities and historic fisheries.

Weise, Jerry G, Fisheries and Oceans Canada, Sea Lamprey Control Centre
Biographical Sketch:
- worked with the sea lamprey control program for 34+ years
- currently conducting fish assessments in streams proposed for low-head barrier construction
- prepare environmental assessments for planned barrier streams
- maintain fish data base for Ontario streams that we have worked on
- provide advice to lampricide treatment supervisors on lake sturgeon production in Great Lakes tributaries
- experience with lampricide applications, lampricide analysis, conducting and summarizing bioassays to assess sea lamprey and non-target mortality, and lamprey surveys
- studied the potential of lampricide induced mortality on young of the year lake sturgeon

Weisser, John, USFWS - Marquette Biological Station
Biographical Sketch:
I serve as a Fishery Biologist and lead the Risk Management Team of the Sea Lamprey Management Program (Program) in the United States.

I assist others in the coordination of lake sturgeon assessments in streams where lampricides are applied and serve as a member of the following work groups: the Lake Sturgeon Committee of the U.S. Fish and Wildlife Service Great Lakes Basin Ecosystem Team, Lake Sturgeon Committee of the Lake Michigan Committee of the Great Lakes Fishery Commission, Green Bay Lake Sturgeon Work Group, Central Great Lakes Binational Lake Sturgeon Group, and New York Lake Sturgeon Research Group.

Since the "Protocol for Application of Lampricides to Streams with Populations of Young-of-Year Lake Sturgeon (*Acipenser fulvescens*)" was implemented in 1998, no mortality of lake sturgeons has been observed during 34 lampricide treatments in state-designated lake sturgeon streams.

The Great Lakes Fishery Commission contracts field operations of the Program to the U.S. Fish and Wildlife Service and Department of Fisheries and Oceans of Canada according to the Convention on Great Lakes Fisheries between the United States of America and Canada, 1954.

Welsh, Amy, University of California - Davis
Biographical Sketch: I am a Ph.D. candidate at the University of California – Davis, with the focus of my dissertation being the genetic analysis of lake sturgeon population structure throughout the Great

Lakes basin. We have developed microsatellite markers, and have standardized these markers among several genetic laboratories. Synthesis of genetic data from multiple laboratories will result in the creation of a comprehensive dataset. This data will then be used to develop genetic guidelines that can be incorporated into lake sturgeon management plans. I am also interested in the policy issues surrounding the management of interjurisdictional species, such as lake sturgeon.

Whelan, Gary E., Michigan DNR - Fisheries Division, Lansing
Biographical Sketch: Currently, I am the Sturgeon Committee Chair for the Michigan Department of Natural Resources and am responsible for coordinating lake sturgeon efforts statewide along with ensure that sturgeon information is disseminated to the committee. I have been involved in lake sturgeon work for 15 years in many areas including habitat protection, propagation, genetics, reestablishment efforts and rehabilitation planning.

Whiting, Benjamin, Grand Portage Chippewa
Biographical Sketch:
-Assessment of Pigeon River and Pigeon Bay remnant lake sturgeon populations.
-Radio-acoustic tracking of sub-adult and juvenile sturgeon in Pigeon River and St. Louis River estuaries.
-Habitat delineation (sediment, aquatic vegetation, water quality) in each river system.
-Set-up PIT tagging systems for both rivers and PIT tag all catch.

Wolgamood, Martha, Michigan DNR - Wolf Lake State Fish
Biographical Sketch: I am the hatchery manager at Wolf Lake State Fish Hatchery in southwest Michigan. We raise up to 10,000 sturgeon from eggs obtained from the Sturgeon River and larval fish obtained from the Black River. Sturgeon are reared to fall fingerlings (approx 5-7 inches) at which time they are coded-wire tagged and stocked in late October.

Zollweg, Emily C., USFWS - Lower Great Lakes Fishery Resources Office
Biographical Sketch: Fishery Biologist (Lake Sturgeon Coordinator) for Lake Ontario and eastern Lake Erie, also current chair of Great Lakes Basin Ecosystem Team Lake Sturgeon Committee. Ongoing projects: Commercial Fisher tagging in Lake Erie, stocked sturgeon habitat use and contaminant uptake experiment in the Genesee River, Great Lakes Basin Lake Sturgeon Tributary Database GIS and Webpage development project. Provide support, advice, and develop projects with partners (USGS, DFO, NYS DEC, OMNR, universities).