

**Minutes of the  
Lake Superior Technical Committee  
Summer Meeting  
August 1-2, 2001  
Grand Marais, Michigan**

**Table of Contents**

Agenda Item 1 – Bioenergetics Modeling in Chequamegon Bay .....	2
Agenda Item 2 – Lake Trout Movement in Lake Superior.....	3
Agenda Item 3 – Statistical Catch at Age Analysis in WI-2 .....	3
Agenda Item 4 - Statistical Catch at Age Analysis in 1836 Waters .....	4
Agenda Item 5 – Lakewide Lake Trout Model Development .....	4
Agenda Item 6 – Soak Time for Spring Lake Trout Surveys .....	5
Agenda Item 7 – Depth and Temperature Study of Lake Trout .....	6
Agenda Item 8 – Success of Lake Trout Plants in MI-4.....	6
Agenda Item 9 – Whirling Disease in Michigan .....	6
Agenda Item 10 – Fish Identification Workshop.....	7
Agenda Item 12 – State of Lake Presentations .....	8
Agenda Item 13 – Lake Sturgeon Movements .....	11
Agenda Item 15 – Analysis of Fish Diets in Lake Superior .....	13
Agenda Item 16 – Quantification of Bias in USGS Bottom Trawl Surveys .....	13
Agenda Item 17 – Needs and Expectations of USGS Big Boat Program.....	14
Agenda Item 18 – Funding for Acoustic Program.....	14
Agenda Item 19 – GIS coverage of Spawning Shoals.....	14
Agenda Item 20 – IMSL .....	15
Agenda Item 21 – LSTC Protocols.....	15
Agenda Item 23 – Time and Place of Next Meeting .....	16

**Attendees:**

Canadian Dept. of Fisheries & Oceans - Tom Pratt, Doug Cuddy  
Chippewa/Ottawa Resource Authority - Mark Ebener  
Bay Mills Indian Community - Ken Gebhardt  
Great Lakes Indian Fish & Wildlife Commission – Bill Mattes, Estabon Chiriboga  
Bad River Natural Resources Dept. - Rick Huber  
Keweenaw Bay Indian Community - Mike Donofrio, Gene Mensch  
Red Cliff Fisheries Dept. - Tom Fratt  
Michigan Dept. of Natural Resources – Shawn Sitar, Jan Fenske, Phil Schneeberger  
Minnesota Dept. of Natural Resources - Don Schreiner, Steve Geving, Ted Halpren  
Ontario Ministry of Natural Resources - Mike Petzold, Tom Stewart, Marilee Chase, Jeff Black, Mike Friday, Karen Schmidt  
U.S. Fish & Wildlife Service - Henry Quinlan, Glen Miller, Lee Newman, Mike Fodale, Jessica Richards  
U.S. Geological Survey – Mike Hoff, Gary Cholwek, Lori Evrard  
Wisconsin Dept. of Natural Resources - Stephen Schram, Chris Zunker, Scott Hulse, Scott Sapper  
Great Lakes Fishery Commission - Jeff Slade  
University of Minnesota-Duluth - Tom Hrbik  
University of Wisconsin-Madison - Sean Cox  
University of Wisconsin-Stevens Point - Mike Hansen, Kevin Kapuscinski, Jeni Devine, Brian Linton  
Michigan Sea Grant - Ron Kinnenun  
Purdue University - Trent Sutton

### **Agenda Item 1 – Bioenergetics Modeling in Chequamegon Bay**

Jennifer Devine from UW-Stevens Point presented initial results from her graduate thesis to develop a bioenergetics model of fish populations in Chequamegon Bay, Lake Superior. The objectives of her work are to model the bioenergetics of cool- and colderwater predators to determine the impact of predators on the fish community, and to evaluate the effects of fishery management strategies on food web dynamics.

Jeni has basically been concentrating on estimating population size, growth, and mortality parameters, along with diet. Diet samples were collected during 1998-2001 and predators were collected with fyke nets, gill nets, trap nets, and angling. In addition, temperature loggers were set in the Bay from May through November of 2000 at depths of 16 and 30 ft.

She has made population estimates for adult walleye, smallmouth bass, and northern pike, but she has not made estimates of the number of juvenile fish of each species, nor has she developed population estimates for the salmonids species like lake trout, lake whitefish, brown trout, and splake. She hopes to be able to use the estimates of lake trout abundance in WI-2 being generated through a statistical catch at age model and use the ratio of lake trout to other species caught in the summer gill net surveys in the Bay to determine abundance of the cold-water predators. Growth is being estimated using the von Bertalanffy model, while total mortality is being estimated using catch curves. Fishing is being estimated from exploitation rates where possible, but if  $F$  can't be estimated in this way, she will determine  $F$  as the difference between  $Z$  and  $M$ , where  $M$  is calculated using Pauly's equation.

Jeni has developed diet information for most predators that is split between spring and summer. Smelt make up the largest proportion of the diet of most predators including lake whitefish.

Her next step is to determine age composition of brown trout, splake, and northern pike. Finalize diet information and input data into the bioenergetics model.

### **Agenda Item 2 – Lake Trout Movement in Lake Superior**

Kevin Kapuscinski from UW-Stevens Point presented some results from his graduate thesis to define movement patterns of lake trout in Lake Superior. The objectives of Kevin's work are to determine the rate at which lake trout move across jurisdictional boundaries, and to determine if total length, origin, age, and gender are related to distance moved.

A total of 46,707 lake trout were tagged by seven different agencies throughout U.S. waters of Lake Superior during spring, summer, and fall assessments in 21 different years. Tagged fish were recaptured during agencies surveys, and in commercial and sport fisheries.

Analysis included standardizing recoveries by effort, calculating the distance and direction moved by lake trout with vector-based GIS, and quantifying the relationships between length, origin, age and gender and distance moved with ANCOVA. Distance and direction moved were calculated from the center of the tagging grid to the center of the grid of recapture for each fish. All distance measurements were made "as the crow flies", therefore, in some instances movement does not take account movement of fish around the Keweenaw Peninsula.

There were a total of 2,763 useful tag recoveries, much less than Kevin had hoped for. An average of 6% of the tagged lake trout were recovered. Tag recoveries were concentrated in the western basin and central Michigan waters where most of the fish were tagged and released. There were very few recoveries in eastern Lake Superior. Kevin's principle results so far are that:

- On average, lake trout travel less than 21 miles while at large, and
- Distance traveled does not differ significantly with gender, age, length, or origin.

Kevin had expected to find that lake trout move across jurisdictional boundaries at substantial rates. He found for example, that for lake trout tagged in MI-4 80% or so were subsequently caught in MI-4.

Kevin's continues to need fishing effort by gear, month, grid, and year from everyone on the LSTC.

### **Agenda Item 3 – Statistical Catch at Age Analysis in WI-2**

Brian Linton from UW-Stevens Point gave a presentation summarizing the results to date of his MS Thesis to develop a statistical catch at age model of lake trout in Wisconsin waters of Lake Superior. His objective is to develop a model of lake trout populations in WI-2 that can be used to set short term fishery harvest quotas, and to evaluate long term fishery management strategies.

Data inputs to the model include:

- commercial and recreational fishery harvest, effort, and age composition,
- CPUE and age composition from large- and graded-mesh gill net surveys,
- trawl survey CPUE in the Gull Island Refuge

There will be separate models for stocked and wild lake trout that covers 1980-1999 and includes ages 3-15+ fish. The model will estimate age and year specific standing stock size and mortality rates from the catch, effort, age composition, and surveys data. Baranov's Catch equation is used to estimate catch and stock size. Estimates of natural, commercial, sport, and sea lamprey-induced mortality rates will be calculated from the model. As well, the model will estimate gear specific catchability and selectivity.

Dealing with the refuges has been a difficult issue. Brian and Mike Hansen decided to deal with refuge by:

- separating refuge and non-refuge survey CPUE and age composition data
- scaling refuge and non-refuge survey catchability by area
- estimating refuge and non-refuge recruitment separately, and
- accounting for movement between the refuge and non-refuge.

Recruitment to age 3 is being estimated by a scaling method. This involves estimating a vector of deviations around a standard mean recruitment, then estimating a parameter to scale deviations in recruitment to population size. Refuge recruitment is indexed at age-0 in trawl catches.

Movements of the refuge were based on Kevin Kapuscinski's analysis of tag recoveries. Brian estimated that 40% of the lake trout in the refuge move out to other areas and that 27% of the lake trout move into WI-2 non-refuge areas, but this data has not been corrected for fishing effort.

Thus far, Brian has not been very success in getting the model estimates of harvest and CPUE to match well with observed values. He still needs to construct the hatchery lake trout model as well as get better fits between predicted and observed values.

#### **Agenda Item 4 - Statistical Catch at Age Analysis in 1836 Waters**

Shawn Sitar distributed a handout that described the status of lean lake trout stocks and statistical catch at age analysis for these stocks in management units MI-5, MI-6, and MI-7. TAC estimates by management unit are 65,000 kg for MI-5, 11,400 kg for MI-6, and 63,000 kg for MI-7. These TACs were first estimated for wild fish only, then the proportion of hatchery-fish caught in spring surveys was added to the total population size. Total mortality of ages 6-11 year old fish was 28% in MI-5, 38% in MI-6, and 32% in MI-7. Average spawning stock biomass was 22,500 kg in MI-5, 13,000 kg in MI-6, and 51,000 kg in MI-7. A report describing the status of lake trout and whitefish stocks in the 1836 ceded waters will be forth coming within the next few months.

#### **Agenda Item 5 – Lakewide Lake Trout Model Development**

Ebener asked the LSTC for direction on ways to help move the lakewide model development process forward. Ebener suggested that to complete the task the LSTC would need to find person to write a Visual Basic Simulation Model, as well, a post-doc student will be needed to help with development of the lakewide population model. Ebener indicated that Norine Dobiesz, a doctoral student of Jim Bence, has indicated she might be willing to help with the Visual Basin Simulation Tool. Norine has recently

taken her comps at MSU and she has completed chapter 1 of her dissertation. The LSTC currently has three ongoing projects related to the lakewide population model, these are:

- A MS Thesis by Kevin Kapuscinski to determine lake trout movement between management units,
- A MS Thesis by Brian Linton to conduct statistical catch at age analysis in WI-2, and
- A report by Tim Johnson and Doran Mason on compensatory growth of lake trout in WI-2.

Mike Hansen stated that he currently has two more years of Sea Grant funding for statistical catch at age analysis in Minnesota as well as for development of a lakewide simulation model. Sean Cox suggests that we could use ECOSIM to evaluate lakewide strategies such as sea lamprey control, but since our spatial scales are based upon the smaller management units ECOSIM does not function that well. Dr. Jim Kitchell will be hiring a post-doc with a specialty in stock assessment models that could help with the lakewide model. It appears that between Kitchell and Hansen we have the ability to work towards our goal.

Lastly, Sean Cox indicated that he could, within a month, develop a lakewide ecological model of the lake using ECOSPACE if we could provide him the bathymetric data and some habitat overlap values for the specific species. The Lake Superior GIS project has bathymetric data in it that could be used for the work Sean is suggesting. The habitat values range from 0 to 3 and indicates whether that a particular species uses that habitat.

#### **Assignments:**

1. Mark Ebener agreed to draft a proposal to the GLFC Coordination Funds or the USFWS Restoration Act to hire a person to build the Visual Basic Projection Tool. Ebener will bring a copy of that proposal to the winter LSTC meeting.
2. Mike Hansen will attempt to seek additional funds for his Sea Grant project in order to hire a post-doc student to develop the lakewide model. The post-doc would become involved in model development at least one year prior to completion of the catch at age models.
3. Mark Ebener will provide Sean Cox with a contact person for the bathymetric data.
4. Sean Cox will provide the LSTC with an outline of what data he needs from us for this model.

#### **Agenda Item 6 – Soak Time for Spring Lake Trout Surveys**

Gene Mensch from the Keweenaw Bay Indian Community has had problems fitting the Hansen et al. soak-time model to catches of lake trout in lower Keweenaw Bay because Gene's data are outside the parameters defined by Hansen et al. There is some concern among the LSTC that the three-night set protocol for the spring survey is too long and maybe should be modified. The three-night set has been the standard since 1959 and the LSTC has adopted this protocol. The argument for abandoning the three-night set is that we may be reaching net saturation with the three-night set so that we may

not really be measuring true abundance of lake trout. The protocol also call for CPUE to be reported in terms of one-night sets.

**Action Item:** The LSTC agreed that individual agencies could determine the appropriate number of nights between lifts for the spring lake trout survey as long as the data is reported in number of lean lake trout caught per 1,000 ft. per night. Ebener will look through old LSTC files to locate a copy of the protocol for the soak-time study published by Hansen et al. for discussion at the winter meeting.

### **Agenda Item 7 – Depth and Temperature Study of Lake Trout**

Bill Mattes reported that his study to insert depth and temperature sensors into lake trout caught during spawning surveys in MI-4 was funded by the USFWS Great Lakes Restoration Fund. Bill is purchasing 125 tags and putting them in 100 fish. The lake trout will be tagged and released at Traverse Island in lower MI-4. Bill will work with other agencies to inform fishermen about the tags and the need to get them back.

### **Agenda Item 8 – Success of Lake Trout Plants in MI-4**

Mike Donofrio provided an handout to the LSTC that summarized stocking rates, recoveries, and estimated survival of lake trout planted into lower Keweenaw Bay by the and the USFWS and Keweenaw Bay Band. Mike reported that they began stocking about 100,000 fish annually in lower Keweenaw Bay beginning in 1994 and beginning in 1997 all fish stocked in the Bay were produced by the Keweenaw Bay Band. The fish are stocked at night from shore. Contribution of hatchery-reared fish to the survey nets has been increasing steadily since 1991 and was greater in 2001 than any other year since 1991. Abundance of wild fish has been more variable, yet relatively stable during 1991-2001. CPUE of hatchery fish was greater than for wild fish in lower Keweenaw Bay in 2001. Survival index for the hatchery fish has also been increasing in lower Keweenaw Bay from the 1984 to 1993 year class. The survival index for the 1993 year class was greater than that for other year classes from 1984-1993, and was greater than the threshold index of 1.0 described in the lake trout rehabilitation guide. The survival index of all other year classes was below the threshold of 1.0.

CPUE of hatchery fish has exceeded that of wild fish caught in small mesh gill net surveys in conducted in lower Keweenaw Bay in three of the last six years during the summer of 1995-2000

Schreiner and Donofrio will consolidate their respective data on survival of special lake trout plants in MI-4 and Minnesota.

### **Agenda Item 9 – Whirling Disease in Michigan**

Phil Schneeberger from the Michigan DNR gave a presentation and distributed a handout on whirling disease in Michigan. Phil reported that much of this information on Whirling Disease was obtained off a website of the Whirling Disease Foundation Newsletter at [www.whirlingdisease.org](http://www.whirlingdisease.org) and from John Hnath the MiDNR Fish Health Specialist. Whirling Disease was detected in two Michigan tributaries to Lake Superior, Au Train River and East Branch of the Ontonagon River. The positive test result in the Ontonagon River was the result of finding one single spore in a single fish. On the Au Train River Whirling Disease was found in a test of 20 brook trout and 10 rainbow trout.

There has been no outbreak, i.e. mortalities, associated with whirling disease in Michigan.

Michigan's strategy to deal with Whirling Disease involves monitoring and containment and consists of the following:

- a 3-yr program during 1999-2001 to survey stream sites through Michigan
- working with Dept. of Agriculture to monitor and control private hatcheries and aquaculture facilities,
- keeping current with research, and
- proposing research initiatives to better understand Whirling Disease in Michigan.

### **Agenda Item 10 – Fish Identification Workshop**

The LSTC discussed what direction we should be embarking on as a consequence of the fish identification workshop held the previous two days. The goal of the LSTC is to:

1. to keep track of the relative abundance of the various forms of both lake trout and deepwater ciscoes caught in assessment fisheries, as well as,
2. develop a standard key that illustrates either the lakewide or regional characteristics of the various species and their morphotypes.

The immediate need is to develop a usable possibly dichotomous keys that describe the characteristics of the various forms of lake trout and the species of deepwater ciscoes. After developing a usable key, the second phase would be a study to relate morphometrics to genetics of the species.

Mike Hoff is willing to write a proposal to conduct the morphometric work for both lake trout and deepwater ciscoes. Mike will bring that proposal to the winter meeting for evaluation.

Meanwhile, every agency should by the next summer meeting produce a CD-ROM presentation that contains pictures, both external and internal, of all the various forms of lake trout they catch both during spring surveys and fall spawning surveys.

Mike Petzold will distribute copies on CD-ROM of his presentation to each agency, and each agency should in-turn have all their field staff classify the lake trout on the presentation.

### **Agenda Item 11 – ECOPATH/ECOSIM Modeling Efforts**

Sea Cox from UW-Madison gave a presentation on single-species and ecosystem model assessments for Lake Superior lake herring. Sean is essentially estimating historic fishing mortality and abundance for the primary species in Lake Superior for more advanced ECOSIM modeling efforts.

For the single species analysis he is trying to determine what was the historical pattern of fishing mortality and recruitment and estimate the ranges of biomass and mortality for lake herring, chubs, whitefish, smelt, and siscowet. The data will be used in an ecosystem model to evaluate the trade-off in harvest that are needed to achieve total fish community restoration goals and sustainable management.

Sean illustrated his approach with analysis of the lake herring fishery, although Don Schreiner was quick to point out that the effort data prior to 1970 is probably a dramatic underestimate of the actual effort. Sean is using a biomass dynamics model that includes a growth/survival factor ( $g$ ) and a recruitment estimator ( $R$ ). Recruitment is estimated either from a stock-recruitment relationship or as a constant.

Sean was able to get a good fit between the observed and predicted CPUE values and he did not try to have the model chase widely variable data points, particularly in the early part of the time period. The mean 1990 exploitation rate was about 0.10 and the predicted mean 1990 biomass based on relative likelihood estimates using MCMC was about 70 kg/km<sup>2</sup>. The USGS trawl estimates of biomass are 306 kg/km<sup>2</sup>. Sean predicted that historically fishing mortality rate ( $F$ ) was as high as 0.45 in the early 1970s. Sean was also able to fairly consistently estimate recruitment.

Sean was able to develop fairly good fits between predicted and observed values for chub, whitefish, smelt, herring, siscowet, and sculpin CPUE using the Lake Superior Ecosystem Model by accounting for:

- invasion of sea lamprey
- lamprey control
- invasion of smelt
- lake trout stocking
- lakewide commercial fishing.

The lakewide model suggested that lake trout predation on juvenile lake herring and high fishing mortality combined to produce the present state of the lake herring population in Lake Superior. He still needs reliable independent indices of biomass or recruitment and age-structure.

Sean Cox is requesting information from each of the agencies. This data should include:

- 1) Complete fishing effort and harvest
- 2) Recruitment estimates
- 3) Age structure information from 1973 Lake Herring subcommittee report

### **Agenda Item 12 – State of Lake Presentations**

Ebener reported that the State of Lake Presentations will be March 19-20, 2002 in Duluth, Minnesota. The LSTC recognized the need to leave a couple blocks of time after a group of presentations for questions from the audience. Mike Hoff suggested that the written version of the report should include an abstract for each section. Ebener agreed to talk to Krueger and Eshenroder about including abstracts in the written version. Ebener will also talk to GLFC about CD version of presentations and making copies for distribution at the meeting.

Oral Presentation: The outline for the state of the lake oral presentation will be as follows along with individual assignments. All individuals giving oral presentations should come to the winter meeting of the LSTC prepared to give a dry run, complete with slides/overheads/presentations, to the rest of the group so we can comment and critique the presentation before the Lake Committee meeting in March.

Presentation Topics

Ecological Interactions

Fish Community Structure

Contaminants

Binational Program

Habitat

GIS project

Wetlands

Tributaries

(stream & inflake restoration)

Spring Plumes

KITS overview

Thermal Changes

Zoo\phytoplankton/benthos

Exotics:

Unintentional

Sea lamprey

Description of Fisheries

Prey Fish

Game Fish

Lake trout

Presenter or contact person

UW-Madison (Cox, Kitchell, Harvey) -  
Suggestion that discussions on diet should  
be part of the ecological interactions section.

Mike Hoff

Kory Groetch

Jim Cantrill

Carl Richards (Schreiner talk to Carl)

Pat Collins

Ken Cullis and Tom Pratt

Faith Fitzpatrick & Ron Kinnunen -  
Schram will contact Fitzpatrick about fish  
Creek sediments loads to Lake Superior  
Gene Mensch will contact Marty Auer at  
MTU

Schreiner & Tom Hrbik will try to  
contact Else Ralph about a presentation that  
describes changes in the thermal history of  
the lake and links with thermal preferences  
of major fish species.

Hoff, Tuchman, Nalepa. This presentation  
should have emphasis on comparison to  
lower lakes, particularly the changes in  
Diporeia, and effect for fish. Hoff will  
contact Tuchman and Nalepa to discuss this  
presentation.

Dryer - Smelt, non-native salmonines, and  
sea lampreys must be included in the  
presentation. Discussion on future issues at  
end of presentation.

Fodale

Ebener and Schreiner

Hoff - Section should focus on fact that most  
species are in state of decline.

Sitar and Ebener - Suggestion to place  
recruitment as major section like growth,  
and mortality. Report model outputs or  
stock size and mortality where they exit,  
otherwise use relative values and catch  
curve. Use the Wilberg and Doemel studies

to discuss where we are in comparison to where we want to be in terms of lake trout rehabilitation.

Lake trout genetics Other Salmonids	Kim Scribner of MSU Schreiner - Use lakewide perspective in this section, do not organize by jurisdiction. Don would like his co-authors to provide him with comments on the written section he handed out.
Brook trout	Marilee Chase & Lee Newman - Follow format provided in lake sturgeon outline; Abstract, background, current status, rehabilitation efforts.
Lake Sturgeon Walleye	Quinlan & Friday Schram - Follow format provided in lake sturgeon outline; Abstract, background, current status, rehabilitation efforts.
Lake Whitefish	Petzold - LSTC recommends that whitefish be part of the oral presentations at the March lake committee report. Include diet in the written section
Where do we go from here	Horns, Ebener, Hansen

Written Report: Each section of the written report should include a list of recommendations to the Lake Superior Committee. These recommendations should include both management and research issues. Species diversity will be a part of the written section. Bill Mattes will take the lead on the species diversity section and Stephen Schram will assist Mattes by writing the burbot section. The LSTC intends to give Mattes plenty of freedom in drafting this section. Because there is not much data on this FCO.

Mark Ebener provided a handout of his section on description of the commercial fishery as well as the over page, table of contents, and references section for the written portion of the state of the lake report. Ebener also described how each section of the written report should be provided to him to make his editing job go smoothly:

- Provide text in Word for Windows95 ver. 7.0, ASCII, or Rich Text Format (\*.rtf)
- Try not to exceed 4 written pages of double-spaced text if possible, except for sections on habitat, lake trout, and ecological interactions
- Do not number your pages
- Do not format the document
  - leave everything left justified including the references,
  - do not bold or underline headings
  - no section or page breaks

- If figures are to be included, please provide the data to Ebener in the form of an EXCEL or LOTUS spreadsheet, or ASCII file, not QuattroPro files!
- Figures should be attached to the end of the written section and no more than one figure per page,
- Table should follow format of Canadian Journal of Fisheries and Aquatic Sciences
- References should be written in the format used by the Canadian Journal of Fisheries and Aquatic Sciences, see CJFAS guide to authors
  - last name first, then first and middle initials for all authors (no space between initials)
  - abbreviate journal names,
  - bold volume number of journal

### **Agenda Item 13 – Lake Sturgeon Movements**

Bill Mattes gave a brief verbal update on the lake sturgeon project that is being conducted on the White River. Objective of the project is to determine the presence or absence of sturgeon spawning in White River, a tributary to the Bad River. Money from this project was obtained from the U.S. EPA CEM funds. No spawning sturgeon were observed in the White River in 2001 because of a 100 yr flood event on the river, but larval sampling below the hydroelectric facility did capture six fish.

### **Agenda Item 14 – Aquatic Committee**

Ebener distributed several handouts related to the Aquatic Committee, Lake Superior Work Group, and LaMP 2002. The handouts included:

- A description of the Bi-National Program to Restore and Protect the Lake Superior Basin
- A Description of the Federal Energy Regulatory Commission (FERC) licensing/relicensing Projects on Michigan tributaries to Lake Superior
- Comments on Aquatic Community section of LaMP 2002 provided by the Bi-National Forum
- The draft outline for LaMP 2002
- E-mail message from MaryBeth Giancarlo to Mark Ebener outline her efforts to input aquatic committee information to the Lake Superior GIS Project

The handout describing the Bi-National Program was provided only for informational purposes.

The list of FERC projects in Michigan and their present status was written and provided by Jessia Mistak of the Michigan DNR. There are three projects currently in the relicensing phase on the Dead River Ontonagon rivers, and four projects that have completed relicensing on the AuTrain, Sturgeon, and Montreal rivers. In addition to listing the FERC projects, Jessica's compilation also describes both water quality and temperature standards that must be met by the hydroelectric facilities. Jan Fenske indicated that the strategies adopted in the FERC relicensing projects only exist because the Michigan DNR pushed for these strategies to help restore tributary habitat, otherwise, the water quality and temperature standard probably would not have been incorporated

into the relicensing process. There are no FERC relicensing projects in Minnesota or Wisconsin.

The chemical, sustainability, outreach, and habitat committees of the Bi-National Forum drafted comments on the LaMP 2000 document created by the Lake Superior Work Group. Each committee of the Superior Group is responsible for responding to the Forum comments. The specific comments on the Aquatic Community section of the LaMP were;

- there is no clear means to track progress of the action plans listed in figure 8.1,
- there is poor linkage with priority pollutants and fish consumption advisories,
- a more comprehensive view of contaminant levels relative to fish consumption advisories,
- expanded discussion on exotic species
- expanded discussion on RAPs
- discussion on the evidence and interactions between cormorants and pelicans on fishery resources.

Ebener will respond to the Forum comments. The LSTC indicated that there is no perceived problem with cormorants and pelican on fishery resources. Pelican numbers are low and they do not appear to be permanent residences of Lake Superior. Cormorant numbers maybe increasing, but they also are not perceived as threats to fishery resources of Lake Superior.

Each committee of the Superior Work Group is responsible for providing a paragraph that describes what has been done since LaMP 2000 to develop sustainable resources in the forest/wetlands, lakes/streams, and near shore/open lake habitat zones of Lake Superior. Each committee is charged with providing bullet points and short takes regarding how their foci and efforts relate to the specific habitat zones. The Aquatic Committee is expected to list one significant project for each the lakes/streams and near shore/open lake zones that address:

- stressors and indicators,
- summary of strategies,
- accomplishments since LAMP 2000
- challenges remaining,
- relationship to human health issues
- how we will meet the challenges in the next few years,

The LSTC suggested the following projects as success stories since LaMP 2000 for inclusion in LaMP 2002:

- Sturgeon study on White River
- Habitat Restoration Project on Salmon-Trout
- Funds from Environment Canada for lake sturgeon study on Kaminisitiquia River
- State agencies getting FERC to adopt strategies that can help restore tributary habitat.

MaryBeth Giancarlo was an intern with the Water Division of U.S. EPA in Chicago. During her internship she was given the responsibility of helping the Aquatic Committee get information on aquatic habitat into the Lake Superior GIS project. For her part, MaryBeth was successful at getting the following information into the GIS database:

- management unit boundaries in U.S.
- statistical grids
- shoreline data from Minnesota including substrate mapping of nearshore areas,
- CD of temperature and ice cover model from Ray Assel of GLERL,

Information not in the GIS database includes:

- stream descriptions and water chemistry available from Sea Lamprey Control,
- USGS DRG quadrangle maps,
- environmental data available from moored offshore buoys,
- extraction of data from temperature and ice cover models.

Mike Fodale reported that the Sea Lamprey Control Program has copies of the USGS DRG maps, and considerable data on stream that have been treated or surveyed.

**Action Item:** Mike Fodale will make sure the USGS and stream data is input to the Lake Superior GIS project. Ebener will provide Fodale with a name and address to contact about transferring the data.

#### **Agenda Item 15 – Analysis of Fish Diets in Lake Superior**

Tom Hrbik from UMD described the proposal that is supposedly being funded by the USFWS Great Lakes Restoration Act. Tom is proposing to consolidate all the agency diet information across the lake and provide up-to-date description of the diet of predatory fish in Lake Superior. The analysis will evaluate spatial and temporal differences as well determine preference of predators by comparing diet information with prey fish abundance. The LSTC that Tom either provide additional analysis or output as follows:

- make recommendations for collection of diet information in the future,
- provide copies of the diet data to each agency,
- conduct additional analysis of predator data to evaluate competition.

#### **Agenda Item 16 – Quantification of Bias in USGS Bottom Trawl Surveys**

Tom Hrbik described the work conducted as part of the spring 2001 forage survey to evaluate bias of the USGS bottom trawls. The evaluation was conducted at 12 locations in the western arm of Lake Superior in 2001. Tom reported that the acoustics data showed high levels of weak bias and low levels of strong bias in the trawl catches. The trawl estimates are good for shallow trawls, but the bias gets strong at deeper than 50 m. The bottom line is that at greater depths the trawls are missing more fish because many

fish are higher than 6 m off the bottom at depths >50 m. Tom also reported finding that the trawl is missing the large fish mainly over 200 mm total length.

There is a need to expand the study lakewide and over time. Tom indicated will need about 150 transects which would mean three years of lakewide surveys. Need pilot project. Will need money to pay salary of person to accompany cruise each year. Cost for this project would be about \$25-27,000 over three years.

#### **Agenda Item 17 – Needs and Expectations of USGS Big Boat Program**

The council of Lake Committees is establishing a panel to review the role of the USGS Great Lakes Science Center big boat program in the context of Great Lakes wide fishery management and research. In addition, LSC member Gorenflo has requested that the LSTC identify our assessment needs and expectations of the USGS Great Lakes Science Center big boat program on Lake Superior.

The LSTC produced the following prioritized list of research needs that the GLSC of USGS should be conducting on Lake Superior each year. The projects are listed in order from highest to lowest priority.

- 1) Lakewide estimates of forage fish biomass on an annual basis using both bottom trawls and acoustics that should be reported and available to all agencies.
- 2) Lakewide estimates of total fish biomass in the offshore portions of the lake not currently part of the lakewide forage survey; for example lake trout stocks around Isle Royale.
- 3) Mapping of bottom substrates throughout the nearshore waters.
- 4) Collection and analysis of zooplankton and benthic samples lakewide in the nearshore waters.
- 5) Ability to partner on special research projects using the large research vessel, i.e. being able to absorb the costs of vessel time, fuel, crew for these projects
- 6) Maintenance and analysis of existing and future databases; forage base, diet, etc.

#### **Agenda Item 18 – Funding for Acoustic Program**

The LSTC has been trying for nearly 10 years to integrate hydroacoustics into routine USGS prey fish surveys on Lake Superior. The only success has been a pilot project being conducted in 2001 and 2002.

Mike Hoff was asked by the LSTC to investigate what the costs would be to conduct the four-year pilot acoustics project on Lake Superior like the project drawn-up by Doran Mason and Mike several years ago that was estimated to cost \$600,000 if USGS was to pay for the fuel, overtime, and gear.

There was also a suggestion by the LSTC that individual agencies buy the acoustics equipment and implement acoustics sampling within their jurisdictions and leave the trawling to USGS.

#### **Agenda Item 19 – GIS coverage of Spawning Shoals**

Esteban Chirigoba from GLIFWC updated the LSTC on his progress at developing the GIS coverage for historic fish spawning shoals in Lake Superior under the U.S. EPA GLNPO grant. He is looking for suggestions on additions to the attribute list as well as potential disclaimers for specific spawning sites or text. Detailed maps will focus only

on sturgeon, whitefish, herring, lake trout and walleye, but he can do maps for any of 46 species. Users will also be able to go to a website and download maps for any species. The maps and database were created in Arcview. Agencies will have the ability to make changes to the maps once they are available. Esteban is providing the base map for agencies to use. The website should be up and running by the end of August or early September 2001. GLIFWC will maintain the original database. Data from the project will be distributed in CD form to members of the Aquatic Committee and data will also be available through GLIFWC's Internet map server.

### **Agenda Item 20 – IMSL**

Jeff Slade provided the LSTC with an update of IMSL. The goal of the Emperic Stream Ranking System (ESTR) is to produce short-term lamprey versus control curves that will be used to determine the suite of streams to treat in a given year that will maximize suppression of sea lampreys.

Jeff outlined changes or modification ESTR. They are incorporating an electrofishing algorithm to account for changes in depth, conductivity, density, and size of lampreys. They (GLFC and control agents) will also be incorporating a bootstrap procedure into the model to estimate uncertainty for the number of transformers entering the lake.

Jeff also discussed the Sea Lamprey Selection System (LCSS) in which the goal is to produce long-term lamprey versus control curves that measure the response of long-term lamprey abundance to various control measures, and determine adequate level of long-term suppression. Jeff is currently involved in modifying the LCSS to replace egg deposition and survival with a stock-recruitment relationship, incorporate empiric measures of habitat and growth from ESTR, update barrier locations, and calibrate the model with empiric estimates of production.

### **Agenda Item 21 – LSTC Protocols**

Mark Ebener distributed a copy of the document he produced that outlines the various protocols adopted by the LSTC for:

- predator diet protocol,
- siscowet surveys,
- spring lake trout surveys,
- sea lamprey marking,
- fish ageing, and
- summer gill net surveys.

Mark will modify the protocol to reflect the change in number of nights between lifts for the spring lake trout survey.

### **Agenda Item 22 – Brook Trout Issues**

There are several ongoing genetic studies that are attempting to coordinate with each other. Ken Cullis and Mark Ebener has discussed the idea of applying for GLFC CAP funds for a workshop on brook trout research priorities. Don Schreiner asked if we

wanted a presentation from Silvia Demarko on brook trout genetics. Tom Pratt will ask Chris Wilson and Silvia for permission to present the results of her work to the LSTC winter meeting.

**Agenda Item 23 – Time and Place of Next Meeting**

The winter meeting of the LSTC will be held in Duluth, Minnesota on January 15-17, 2002. Don Schreiner will make arrangements for the meeting.