Minutes of the
Lake Superior Technical Committee Meeting
July 29-30, 2003
USFWS Marquette Biological Station
Marquette, Michigan

Attendees
Tom Pratt, Dept. of Fisheries and Oceans
Neville Ward, Dept. of Fisheries and Oceans
Jay Glase, National Park Service
Mark Romanski, National Park Service
Owen Gorman, U.S. Geological Survey
Jeff Jorgenson, University of Wisconsin - Madison
Mike Fodale, U.S. Fish and Wildlife Service
Doug Cuddy, Dept. of Fisheries and Oceans
Henry Quinlan, U.S. Fish and Wildlife Service
Stephen Schram, Wisconsin Dept. of Natural Resources
Stephen Chong, Ontario Ministry of Natural Resources
Mike Hansen, University of Wisconsin – Stevens Point
Lisa, University of Wisconsin – Stevens Point
Dale Bast, U.S. Fish and Wildlife Service
Mark Dryer, U.S. Fish and Wildlife Service
Ted Halpern, Minnesota Dept. of Natural Resources
Bill Mattes, Great Lakes Indian Fish and Wildlife Service
Shawn Sitar, Michigan Dept. of Natural Resources
Ron Kinnunen, Michigan Sea Grant
Trent Sutton, Purdue University
Mark Ebener, Chippewa/Ottawa Resource Authority
Gavin Christie, Great Lakes Fishery Commission
Gene Mensch, Keweenaw Bay Natural Resources Dept.
Matt Symbal, Red Cliff Fisheries Dept.
Phil Schneeberger, Michigan Dept. of Natural Resources
Gary Klar, U.S. Fish and Wildlife Service

Agenda Item 1 – State of Lake Superior in 2000 Report
The LSTC reviewed recommendations to the LSC that are found at the end of each section in the July 28, 2003 draft of the State of Lake Superior Report. The group modified many of the recommendations. Ebener provided everyone with an electronic copy of the state of lake report after reviewing and editing the recommendations sections. Ebener asked all the lead authors to thoroughly review their respective sections and edit each section appropriately. Mark asked that each edited section be returned to him by August 30, 2003.

Other items of discussion are outlined below:

1) Owen Gorman will add a text and figures or tables to the section on Phytoplankton, Zooplankton, and Benthos that describes the near-shore plankton community based on spring surveys by USGS.
2) Owen also agreed to edit the sections on benthic fish community structure and prey fishes.
3) Mark Ebener and Mike Hansen will review the current version of the report and consolidate all the recommendations into the last chapter titled "Future Considerations."
4) Bill Mattes and Mike Donofrio will add to the Species Diversity section.

Agenda Item 2 – Larval Lake Herring Survival

Trent Sutton of Purdue University summarized results of his study to evaluate factors influencing the over-winter survival of age-0 lake herring. Objectives of the study where to evaluate the role of body size, physiological condition, energy stores, and food ration on over-winter survival of juvenile lake herring. Lake herring in spawning condition were obtained from a commercial fisherman in the Keweenaw Bay area of Lake Superior and fertilized eggs were placed in the Red Cliff Hatchery. After the eggs were sufficiently water hardened, they were transferred to the Purdue University laboratory for hatching and rearing. In the lab juvenile herring were separated into small fish of 50-85 mm and large fish of 85-129 mm. Two tanks of small fish containing 30 fish per tank and two tanks of large fish containing 15 fish per tank were created. Fish in one tank of each size class was fed *Artemia* nauplii ad libitum while fish of the same size in the second tank were starved.

The study simulated the 225-day winter period of Lake Superior by simulating the lakes water temperature and photoperiod regime. They sampled 25% of the fish on day 75 and day 150. The remainder of the fish was sampled on day 225. Total mortality, total length and weight, condition factor and lipid, protein, and caloric content of the fish were estimated at the end of the experiment.

Mortality rates of all sizes were lower than anticipated and did not exceed 30% in any day of the experiment. Mortality rate of large fed fish was lowest, followed by small fed fish, large starved fish, and lastly mortality was greatest on small-starved fish. This general pattern was observed for all parameter, with large fed fish experiencing the best growth and condition, followed by small fed fish, large starved fish, and small-starved fish. In summary:

- overwinter mortality was strongly influenced by body size and food ration,
- mortality appears to have resulted from a decline in condition and depletion of energy reserves, and
- smaller fish with less initial lipid, protein, and caloric content had a greater overwinter demand than larger individuals.

The extent of over-winter mortality in their study was less than in other studies and over-winter mortality in Lake Superior would probably be higher because of predation, disease, and environmental variability.

Agenda Item 3 – Lakewide Acoustics Project

Ken Cullis has obtained money through the Canada/Ontario Agreement (COA) to conduct a two-year acoustic study primarily in Ontario, but also Michigan and Minnesota waters of Lake Superior. The project will begin August 2003 with Tom Hrabik as the principle investigator. The USGS vessel Kiyi will be the platforms for the acoustics and trawling work.

Owen Gorman provided the LSTC with a handout describing the proposed acoustic survey. The objective is to implement a hydroacoustic survey that will provide accurate an biomass estimate of pelagic prey fish in Lake Superior over a four-year period as well as provide information that will allow development of a long-term survey. A 120-Khz split beam acoustics system will be used to estimate pelagic fish target strength, density, and biomass using a stratified-random sampling design. Lake Superior will be divided into four quadrants (northwest, southwest, northeast, and southeast) and a survey will take place in each quadrant once in four years.

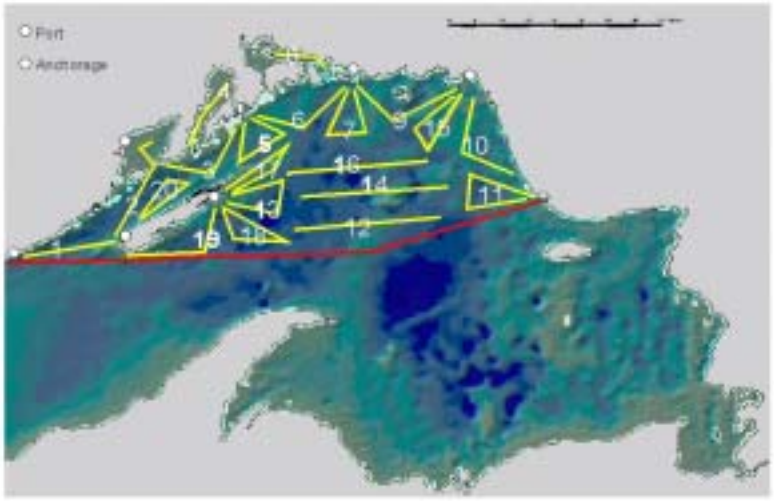

Figure 1. Proposed transect lines for hydroacoustic sampling to be performed in August of 2003. This design assumes a mean sampling speed of approximately 5 knots and 20 sample dates.

Strata for the design will be depths of 0-100 m, 100-199 m, 200-299 m, and >300 m. Unfortunately, the acoustic equipment can only penetrate to depths of 250 m, so will not

be able to estimate biomass in water deeper than 250 m waters. Will be doing 20 transects if weather is conducive to the trawling, and nearly all the transects will be done in Canadian waters in year 1.

Doran Mason is expected to finish the analysis and report of results from the first acoustics project funded by USFWS Restoration Project to develop acoustics targets. The investigators will report on this survey at the winter LSTC meeting. USGS is currently absorbing the costs of fuel and overtime for the crew of the Kiyi.

The expected products and deliverables will include: 1) the recommended design for a long-term integrated acoustics and mid-water trawl prey fish assessment program for Lake Superior, 2) estimates, with measures of variance, of abundance and biomass of pelagic prey fishes in Lake Superior, 3) summer spatial distribution of pelagic prey fishes in Lake Superior, and 4) associations of pelagic prey fishes to thermal structure and other habitat in Lake Superior.

Issues for doing the lakewide survey in years 3 and 4 is how to get it done in the remainder of the lake. On Lake Michigan they have conducted a coordinated lake-wide survey using vessels from multiple agencies, but they also need the ability to do mid-water trawling down to 250 m. Each of the fishery agencies on Lake Superior has the ability to do the acoustics work, but not the trawling.

Action Item: The LSTC suggested that Ebener and Gorman talk to Hrabik about logistics for finishing the work in 2005 and 2006 and thereafter defining the commitment needed by each agency.

Agenda Item 4 – Deepwater Trawling

Owen Gorman reported that USGS just finished deepwater trawling in western Lake Superior in 2003. They trawled at 21 sites in the lake between Minnesota and western Keweenaw Peninsula. Depth range was 6 to 300 m and some sites were as far as 20 km from shore. Picked offshore site close to near-shore trawling site. Whitefish were most abundant in 80-120 m depth range. Kiyi replace bloater at about 160 m. Only caught deepwater sculpin in the 250-300 m depth strata. Over 160 m deepwater sculpin become the dominate species. Siscowets were most abundant in the 160-200 m depth range. Leans most abundant in the 60-80 m depth range.

Agenda Item 5 – Status of Lake Herring in Lake Superior

At the winter 2003 meeting the LSTC agreed to proceed with development of a document detailing the status of lake herring in Lake Superior. The charge was that at the summer 2003 LSTC meeting each agency should come prepared to report on their respective agencies lake herring information. The data should include but is not limited to commercial catch and effort data, biological data, surveys data, etc. Each agency described the data they possess on lake herring:

GLIFWC – Bill Mattes provided an overview of their lake herring data. GLIFWC has possession of the commercial fishery data for the 1842 ceded waters. Peak harvest was 40,000 lb. in early 1990s but average about 15,000 lb. and mostly from MI-4 during 1985-2002. Bill reported that they try to sample at least 150 fish per year for age data in he commercial harvest. Age composition data going back to 1985, but they started to collect otoliths only in 2000. Age-6 was dominant age class in the harvest. Since 1996 sample at least 100 fish per year from the targeted herring fishery. Took scales and otoliths only in one year. They have only commercial harvest monitoring data, no survey data.

MiDNR – Shawn Sitar presented the Michigan data. Annual sport fishery harvest is about 1,000 fish in Michigan waters of Lake Superior, but was as high as 4,000 fish. Mean weight in sport fishery averages about 2 lb. The MiDNR summer small-mesh gill net survey, conducted primary in August, catches lake herring so they have CPUE data from 1985-2002. Herring are caught primarily in 2, 2 ¼ and 2 ½ inch mesh nets. Best catches in MI-2, MI-3, and MI-4, much fewer in other areas. They have some age information, but not all fish have been aged in the last few years. Shawn reported that they have archived otolith and scale samples. Female appear to be mostly mature by age 4 around 250 mm total long. There may be some problems with identification of herring versus other deepwater ciscoes in some of their samples.

KBIC – Data is mostly pooled into GLIFWC data. No survey work, but catch them incidentally to lake trout surveys.

MnDNR – Ted Halpern described the MnDNR data. Minnesota is developing SCAA models for lake herring in MN waters so have compiled considerable data. Harvest, effort, and CPUE are estimated annually for the commercial fishery. From 1980-2002 they have monthly totals that will allow separation of the fishery into the general season from January through August, and the roe fishery from September through December. Biological data acquired through sub-sampling is available from 1972-1998 based on scale ages. From 1999 to 2002 ages are based on otolith samples. They do try and collect biological data from 300 fish per year from each management unit. Do regularly catch herring in summer small mesh gill net surveys.

MnDNR has regularly conducted an assessment fishery targeting lake herring during the fall in MN-1 annually since 1980. They use mesh sizes of 38-76 mm and the total length of net is 726 m and the sets are one night.

WiDNR – Wisconsin does monitor catches in the commercial fishery and recreational fishery, but they have no age data from either fishery. They do conduct a fall spawning assessment and catch herring regularly during the summer small mesh survey. Steve suggested that historic recruitment was probably variable as it currently is, just that growth was much slower historically.

USGS – They have assessment data going back to the 1950s from the Apostle Islands. They also have an extensive scale collection from that time period and during the 1940s.

There was also an historic scale data set in Ann Arbor. The trawl data set does not have many individual weights, but USGS does have maturity data. All ages mostly from scales and not otoliths, they just recently began collecting otoliths. Current trawl survey data have ages for going back to 1978.

Owen reported that fish community biomass in Lake Superior is driven largely by lake herring. Mean biomass of lake herring was 0.88 kg/ha during 1978-2002. Year-class strength of lake herring varied by a factor of 4,400 during 1978-2002. Bloater show very similar, but not exact pattern, of year class strength as lake herring. Bloater biomass most concentrated in Michigan waters. Identification of bloaters and herring is problem with some years of data.

OMNR – Most of their data is from spawning assessments. They have age and size structure data, otolith versus scale data, and fecundity data.

CORA – The CORA fishery harvests about 25,000 lb. annually mainly from district MS-6. They have age composition data from both survey and commercial harvest monitoring, but only from scales, no otoliths. Unlike other areas of the lake, CPUE in the commercial fishery has been increasing since 1985 and was higher in 2002 than other years. Found little differences in mean length or weight at age of female and males, but females outnumbered males by close to 2:1.

MI Sea Grant - Ron Kinnunen distributed a handout summarizing his presentation on lake herring life history presented at the Lake Herring Workshop in Ann Arbor in early July.

Table 1. Availability of various data from each agency for the lake herring report.

	Fishery catch/effort		Age composition		Otoliths			Herring survey data	
Agency	comml	recrl	scales	otoliths	v. scales	Maturity	Fecundity	incid.	target
GLIFWC	X		X	X	X				
MiDNR	X	X	X	X	X	X		X	
KBIC	X	X	X					X	
MnDNR	X		X	X	X			X	X
WiDNR	X	X	X	X	X			X	X
USGS			X	X				X	X
OMNR	X		X	X	X	X	X		X
CORA	X		X			X			
RCFD	X		X					X	

Action Item: Assignments were given out to various LSTC members who will be responsible for various sections of the report. Mike Hansen suggested that the herring report be organized by geographic areas of the lake. This way we could compare growth, maturity, condition, age structure, and relative abundance between areas.
The assignments are as follows:

Owen Gorman and Tom Todd – description of the fish
Mike Hansen & Owen Gorman – stock recruitment relationship
Owen Gorman – age, growth, maturity based on trawl catches and mortality
Bill Mattes – summarize commercial harvest and effort data
(provide summaries of harvest and effort by grid, gear, season, depth)
Jeff Black – age, growth and maturity
(agencies provide biological data for individual fish to Jeff that includes information on gear, grid, district, length, weight, age, sex, maturity)
Mark Ebener – species interactions and diet reviews of literature & maybe zooplankton dynamics (species interactions is both upward and downward)
Shawn Sitar - Relative abundance estimates from agency surveys
(need individual lift information as well as identification of the mesh sizes used for identification of appropriate index gear)

Agenda Item 6 – Lake-wide Finclip Rotation for Lake Trout

Marg Dochoda recently provided the technical committee chairs of the upper Great Lakes with a new finclip rotation for lake trout. Ebener distributed a copy of the new clip rotation for the upper Great Lakes.

Agenda Item 7 – Committee of Technical Committee Chairs

The CLC recently approved creation of a committee of technical committee chairs to help facilitate CLC activities and help technical committees deal with basin-wide issues. LSTC suggestions for the technical committee chairs would be:

1 – CWT mass marking trailers from Northwest Marine. Dale Bast has had a chance to review the mass marking trailers currently sold by Northwest Marine and should be contacted by the review panel looking into purchasing them for the Great Lakes.
2 - Suggestions for how to move the EIL process forward and set lamprey targets.
3 – Risk characteristics of inter-basin exchange of fishes (i.e. disease transfer).
4 – Marking of all sturgeon stocked in the Great Lakes.
5 – How to move environmental objectives forward.
6 – Data repository for Great Lakes (i.e. GIS, fish habitat, harvest)
7 – Protocols for international exchange of data (e.g. GIS data from Ontario)
8 – Common recommendations from state of lake reports.

Ebener will report this to the technical committees and CLC.

Agenda Item 8 – Lake Trout Photo ID

Shawn Sitar provided a CD to people at the winter 2003 meeting as asked everyone to identify the various lake trout forms on the photos. Only two agencies did so. Everyone should take the time to review Shawn's photos and provide him with each agency's classification before the winter 2003 meeting.

Agenda Item 9 – Assessment of Lake Trout Stocks in Wisconsin and Minnesota

Mike Hansen and his new graduate student will update the LSTC on their proposed works to assess lake trout growth and reproduction in Wisconsin and Minnesota waters.

Lisa Corradin from UW-Stevens Point gave a presentation on her proposal for her Master Thesis on growth and recruitment of lake trout in Wisconsin and Minnesota waters of Lake Superior. The objectives of her study are to determine if hatchery and wild lean lake trout contribute equally to natural reproduction, and to determine if there are any differences in growth rate of hatchery and wild fish. She expects to find that wild fish obtain a larger L-infinity value than hatchery fish, wild fish contribute more to natural reproduction than hatchery fish in Wisconsin, and hatchery fish contribute more to reproduction in Minnesota. Lisa will use a modified Ricker stock-recruitment relationship to measure the contribution of wild and hatchery fish to reproduction.

Agenda Item 10 - Lake Trout Model Development Project

Gavin Christie and Mark Ebener had previously obtained GLFC and USFWS Restoration Act monies to three workshops that could assist with developing a lake-wide lake trout population model for Lake Superior. The first two workshops had been held and a final completion report filed with the GLFC. Gavin and Mark recently found out that they have $5,600 remaining in the account. What would be the most appropriate use of the remaining money in the opinion of the LSTC.

The LSTC discussed two options. The first would be providing additional money to Hansen so that Lisa would have money to finish here project. The second idea was to provide money to OMNR to hire Petzold to help the new staff. Gavin and Mark will make a final decision soon.

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Agenda Item 11 – Results from Spring and Siscowet Surveys

Each agency reported on results of their spring lean lake trout and siscowet surveys.

MnDNR – Conducted spring lean lake trout survey in MN-3, MN-2, and MN-1 and siscowet survey MN-1. Provided handout. CPUE in spring survey was lower in 2003 than 2002 and lower than low in 1998. Marking rates were similar to previous year. Siscowet survey CPUE about similar to previous surveys during 1996-2000.

MiDNR – Conducted spring lean lake trout survey in MI-3, MI-4, MI-5, and MI-6 and siscowet survey in MI-5 and MI-6. Shawn Sitar reported that Michigan went to one night sets this year during the spring lean lake trout survey, except at some stations where they did the three night sets. Sea lamprey marking rates on 21-24 inch lake trout averaged

about 5-7 marks per 100 fish. Abundance of hatchery-reared leans was much lower than wild fish. Wild fish CPUE were about the same in 2003 as 2002. Set Big Reef again in 2003. Wild fish at Big Reef were considerably larger than more near-shore areas around the reef. Big Reef fish seemed to be larger at age than wild leans from more inshore areas.

This was the first year that the siscowet survey was conducted in MI-6. In MI-5 siscowet abundance increased dramatically with depth, but did find significant numbers of siscowets in shallow water. Siscowet abundance in MI-6 did not show the same dramatic increase in abundance with depth as in MI-5. Surveyed the 840-960 depth strata in MI-6. Found lake herring at almost all depths except shallowest strata in MI-6. Size structure of siscowets seemed to increase with depth. Wounding rates were substantial on siscowets fish averaging 20 marks per 100 fish on 636-737 mm long.

WiDNR – Conducted both spring lean lake trout survey and siscowet survey in WI-1 and WI-2 in 2003. Provided handout. Spring assessment catches were much lower than previous year when also fished one night. They observed a similar pattern of increased catches with increased depth for both leans and siscowet as MnDNR.

GLIFWC – Conducted siscowet survey in MI-4in 2003 and provided handout.

KBIC – Held in by ice until late May this year but conducted spring lean lake trout survey in MI-4in 2003.

OMNR – Conducted spring lean lake trout survey in zone 33 this year.

RCFD – They conducted spring lean lake trout and siscowet survey in MI-2 with USFWS in 2003.

CORA – Conducted both the spring lean lake trout and siscowet survey in MI-7 in 2003. Assisted Bay Mills Biological Program with spring lean lake trout survey in MI-8.

For the year the LSTC conducted the siscowet surveys in MN-1, WI-1, WI-2, MI-2, MI-4, MI-5, MI-6, and MI-7 and the lean lake trout surveys in MN-3, MN-2, MN-1, WI-1,. WI-2, MI-2, MI-3, MI-4, MI-5, MI-6, MI-7, and MI-8 m (see table 2, page 10).

Agenda Item 12 – Activities of the Aquatic Committee

Henry Quinlan updated the LSTC on the activities of the Aquatic Committee. The Work group is using a contractor in Thunder Bay to combine the aquatic, terrestrial, and habitat ecosystem chapters into one report. This will be a stand-alone document. The Aquatic Committee will be reporting progress on achieving work plan objectives to the Superior work group meeting on September 9-10, 2003 in Saul Ste. Marie.

Agenda Item 13 – Environmental Objectives

Tom Pratt updated the LSTC on progress at developing Environmental Objectives. A conference call was held to discuss structure and make assignments, but no progress was made. The group is trying to develop environmental objectives for major ecological groups; tributaries and near-shore, open water, and other (sea lamprey, diversity,). Tom will report to the LSTC their progress at the winter meeting.

Table 2. Lean and siscowet catches made during June 2003 siscowet surveys.

Agency	Mgt unit	Depth strata (ft)	Effort	No. caught		CPUE	
				LLT	SLT	LLT	SLT
MnDNR	MN-1	0-119					
		120-239	2,250	11	5	4.9	2.2
		240-359	2,250	13	14	5.8	6.2
		360-479	2,250	3	14	1.3	6.2
		480-599	2,250	1	56	0.4	24.9
		600-719	2,250	0	33	0.0	14.7
		720-839					
		Total	11,250	28	122	2.5	10.8
WiDNR	WI-1	0-119	8,100	45	7	5.6	0.9
		120-239	8,100	27	45	3.3	5.6
		240-359	8,100	8	84	1.0	10.4
		360-479	8,100	2	62	0.2	7.7
		480-599					
		600-719					
		720-839					
		Total	32,400	82	198	2.5	6.1
	WI-2	0-119	8,100	22	4	2.7	0.5
		120-239	8,100	34	30	4.2	3.7
		240-359	8,100	12	103	1.5	12.7
		360-479	8,100	8	91	1.0	11.2
		480-599					
		600-719					
		720-839					
		Total	32,400	76	228	2.3	7.0
GLIFWC	MI-4	0-119	2,700	3	0	1.1	0.0
		120-239	2,700	2	2	0.7	0.7
		240-359	3,300	5	120	1.5	36.4
		360-479	2,700	3	79	1.1	29.3
		480-599	2,700	1	39	0.4	14.4
		600-719					
		720-839					
		Total	14,100	14	240	1.0	17.0
CORA	MI-7	0-119	2,700	2	0	0.7	0.0
		120-239	2,400	7	5	2.9	2.1
		240-359	3,000	0	27	0.0	9.0
		360-479	2,700	2	13	0.7	4.8
		480-599	2,700	0	40	0.0	14.8
		600-719	2,700	0	19	0.0	7.0
		720-839					

Agenda Item 14 - Habitat Mapping in Lower Keweenaw Bay

Mike Donofrio updated the LSTC on the habitat mapping study being conducted by the Keweenaw Bay Natural Resources Department (KBRD). The KBRD obtained money from the Administration for Native Americans in the U.S. Dept. of Human Health to map the bottom substrates in near-shore areas of lower Keweenaw Bay. The rationale is to provide the community, tribal council, and staff with documentation of critical habitats and demonstrate the need for habitat protection. The goal of the Fisheries Program is to facilitate sustainable harvests of fishery resources within the Lake Superior 1842 ceded territory for tribal members. The KBRD developed benchmarks for the program and they are to:

- Formulate and adopt 5-year management plans for the 1842 ceded waters of Lake Superior, and
- Perform periodic biological surveys on watersheds impacting the Reservation and develop management plans addressing the watershed needs.

A contract was developed between Environment Canada and the KBRD to map bottom substrates in the area from Pequaming south in waters less than 30 m. Five days of fieldwork were conducted in 2002 and a draft report was received by December 2002. Total cost of the project was $20,000.

The project was conducted using the RoxAnne seabed classification device, substrate sampling with a Shipek sampler to collect surface sediments, and underwater video. A total of 114,000 sounding were recorded and five primary substrates classified including: mud/muddy sand, compact sand, sand, cobble, and woody debris. A six substrate describing the transition zone along substrates was also classified.

Future projects will involve a GLNPO funded project for 2004 to map substrates from Little Carp River north to South Entry along the west side of the Keweenaw Peninsula. Mike reported that they also hope to secure funding in 2005-2006 to conduct similar work on the west and east sides of the Pt. Abbaye Peninsula.

Agenda Item 15 – WiDNR Diporeia Sampling

Stephen Schram described the WiDNR Diporeia sampling program they initiated in 2003. Steve started the sampling in response to concerns by biologists from the lower lakes about declines in abundance and condition of whitefish and the link due to declines in abundance of Diporeia. The objective of the study is to monitor benthic invertebrate populations in Wisconsin waters of the Great Lakes. The hypothesis is that energy transfer occurs from diatoms to Diporeia to whitefish, but zebra mussels have interrupted that process and reduced the amount of Diporeia available for whitefish consumption. WiDNR established four sampling sites in the Apostle Island; southeast, east, north, and west. The sampling sites corresponded to depth strata of <30 m, 31-50 m, 51-70 m, 70-90 m, and >90 m deep. They have not analyzed the data yet, but report on the results at the winter meeting.

Agenda Item 16 – Stable Isotope and Sea Lamprey Damage

Mark Ebener discussed the progress being made on his and Chris Harvey's research project to assess sea lamprey damage to fish in Lake Superior using stable isotopes. Their primary research question is how is sea lamprey damage allocated within the fish community of Lake Superior. In his Ph.D. dissertation Chris concluded that coregonines were the primary source of production for sea lampreys in the Whitefish Bay area of Lake Superior, but he also questioned whether the same conclusion could be applied lakewide. The objectives of Chris and Mark's study are:

- To validate assumptions about stable isotope dynamics,
- To measure isotope ratios throughout the lake and identify the most likely source of sea lamprey production, and
- To develop an IBM of sea lamprey feed to estimate host mortality.

They subdivided the lake into six eco-regions: Whitefish Bay, central Michigan, western Keweenaw, Apostle Islands, Duluth-Superior, and northwestern Ontario. The objective is to collect all life stages of sea lampreys from transformers in streams to returning adults. The methods were divided into four parts;

1. Field collections from each eco-region,
2. A laboratory validation experiment,
3. A starvation experiment, and
4. Seasonal dynamics of isotopes.

Field collections of fish have already been made in most eco-regions and include lean lake trout, whitefish, lake herring, chubs, burbot, siscowets, suckers, and sea lampreys. Mark is offering a $10 reward for parasitic sea lampreys in order to get lakewide coverage and simulate lamprey collections. The validation experiment involves holding live lake trout, whitefish, and suckers in holding tanks and allowing recently transformed sea lamprey to feed only on one species and then measuring the isotope ratios in lampreys to get fish-specific isotope signatures. The starvation experiment is being conducted at the same time as the validation experiment and involves measuring changes in isotope ratios through time for fish being starved. Lastly, samples of the primary fish species are being collected from Whitefish Bay to measure seasonal variation in isotope signatures.

Mark reported that the validation experiment and the starvation experiment have already been completed at the Hammond Bay Biological Station. Attachment times varied from 0 to 37 days on whitefish, 1 to 49 days for lake trout, and 0 to 59 days on white sucker. Sea lamprey growth was similar among species; 0.028 g/day on lake trout, 0.021 g/day on whitefish, and 0.026 g/day on white sucker. Weight gain of sea lampreys in the validation experiment ranged from 0 to 59 gram and averaged about 13 grams. In comparison, weight of sea lampreys in field collections from Lake Superior ranged from 3 to 530 grams. About ½ of the sea lampreys collected from Lake Superior have been attached to lake trout, while the other ½ have been attached to herring and whitefish. Most of the sea lamprey have been collected from Whitefish Bay, but those collections

span 1998-2002. Many sea lampreys have been collected from northwest Ontario units 1, 7, 9, and 10.

Mark reminded everyone that he is still in need of sea lampreys from the lake, particularly the Apostle Islands area. `

Agenda Item 17 – Attendence and reports to Lake Committee

The LSTC briefly discussed travel restrictions and the ability of it membership to attend annual LSC meetings. The 2004 meeting will be held in Ann Arbor, Michigan. Ebener informed the LSTC that LSC member Gorenflo was concerned about the apparent lack of presentations at the annual meeting the last several years and the low attendance due to travel restrictions. The LSTC did compile a list of potential presentations for the annual meeting and they are:

- Summary of hydroacoustic work – Tom Hrbik UM - Duluth
- Sea lamprey management – Doug Cuddy, DFO
- Siscowet study – Mark Ebener, CORA
- Over-winter mortality study of lake herring – Ron Kinnunen, Michigan Sea Grant
- Fish-way effectiveness study – Tom Pratt, DFO
- Prey fish assessment – Owen Gorman, USGS
- Laboratory validation portion of isotope study – Mark Ebener, CORA
- Report of LSTC – Mark Ebener, CORA
- Report on harvest – Bill Mattes, GLIFWC
- Food habits study – Brad Ray, UM - Duluth
- Deep water trawling – Owen Gorman, USGS
- Assessment of lake sturgeon – Henry Quinlan, Tom Pratt, Bill Mattes
- Marine conservation areas along the Canadian waters – Gorenflo find someone
- Isle Royale Fishery Management plan – Jay Glase, National Park Service

Item for In-common session might include:

- Depth temperature study with lean lake trout, sturgeon, whitefish, and sea lamprey – Bill Mattes, GLIFWC, Henry Quinlan, USFWS, and Roger Bergstedt, USGS
- Implementation of larval review- Mike Steeves, DFO

Agenda Item 18 – Outside Agency Requests for Data

Ted Halpern informed the group Nick Mandrak of DFO in Burlington is undertaking a study of freshwater fish distribution in the Great Lakes. Nick is looking for fish distribution information from each agency. The LSTC agreed that Ted will provide a copy of the e-mail to Ebener and Ebener will distribute the message to the LSTC membership.

Ebener discussed a request he received via Randy Eshenroder from a genetics lab for collections of *Kiyi*. Ebener will also forward that e-mail to LSTC membership.

Agenda Item 19 – Time and Place of Winter 2004 Meeting

The winter LSTC meeting will be January 13-14, 2003 in Ashland, Wisconsin. Henry Quinlan will make arrangements for the meeting.

Agenda Items for the winter LSTC meeting will include:

- Environment objectives – Tom Pratt
- Lake herring report - everyone
- Fishway study – Tom Pratt
- Photo ID study – Shawn Sitar
- Sea lamprey update – USFWS, DFO
- Diporeia update - Schram
- Sediment core sampling in Keweenaw Bay – Charlie Kerrfoot/KBIC
- Zooplankto results from Kites – Charlie Kerrfoot/KBIC
- Review integrate LaMP chapters - Quinlan
- State of lake report - Ebener