

Great Lakes Regional Research Information Network

Lake Michigan Coordination Team

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How it all began

- * Requested by NOAA in 2006 through Sea Grant programs in all regions.
- * Great Lakes proposal called for 5 committees (one for each lake).
- * Each lake was to form a committee, conduct a needs assessment, and implement a strategy to coordinate/focus research in each of the respective lakes.

Task 1: Establish a regional coordination group to oversee the planning and implementation of the research and information strategy.

- * Anders Andren - Wisconsin Sea Grant (academic)
- * Marie Colton- National Oceanic and Atmospheric Administration (NOAA) (agency)
- * Paul Horvatin – Environmental Protection Agency (EPA) (agency)
- * Brian Miller - Illinois-Indiana Sea Grant (academic)

Task 2: Conduct a bottom-up needs assessment with broad user and stakeholder input.

- * Web site searches revealed 294 organizations with a strong interest in Lake Michigan.
- * All 294 were contacted to review priorities/goals or to add some
- * 379 priorities/goals identified.
- * The most frequently listed priorities fell into five categories

5 Major Categories & Associated Topic Areas

Category	% Org. N=52	Topics/Subcategories – N (154 total priorities in 5 cat.)	% of priorities in category (N)
Ecosystem	36.5	Protection/Restoration - 13 Management/Stewardship - 5	78.3 (23)
Pollutants	34.6	Non-point Sources - 7 Atmosphere - 6 Toxics – 5	40.0 (45)
Education	30.8	Miscellaneous - 7 Appreciation - 4 Stewardship - 3 Students - 3	68.0 (25)
AIS	26.9	Prevention - 13 Control - 8	55.3 (38)
Water	25.0	Quality - 7 Quantity - 6 Use - 5	78.3 (23)

Focus turned to identifying high priority research needed in 5 Categories

- * Problems encountered by management agencies
- * Monitoring and indicator trends
- * Researcher and institutional direction


Top priority issue selected

- * **Changing Food Webs and Influence Aquatic Invasive Species have on these changes**
- * Addresses priorities in all 5 categories

Task 3: Develop a research and information plan for the region that prioritizes actions according to management-critical needs

- * Workshop convened Lake Michigan scientists and funding agency officials to determine critical research questions, time and space scales, and data gaps to be addressed in the 2010 field season.

Predicting Impacts of Invasive Species on Food Webs
in Lake Michigan Workshop



Agenda

June 3, 2008

1:00 - 1:15 pm *GLRRIN - Background and Implementation*
Brian Miller, Director, Illinois-Indiana Sea Grant

1:15 - 1:30 pm *Why are we here? Perspectives on Cooperative Monitoring and Research*
Paul Horvatin, Director, USEPA Great Lakes National Program Office

1:30 - 1:45 pm *What do we mean by prediction?*
Steve Brandt, Director, NOAA Great Lakes Environmental Research Laboratory

1:45 - 2:15 pm *Affect of Invasive Species on Lake Michigan Food Webs Affecting Fish Production*
Doran Mason, Research Ecologist, NOAA Great Lakes Environmental Research Laboratory

2:15 - 2:45 pm *Affect of Invasive Species on Lake Michigan Water Quality*
To be Announced, Organization

2:45 - 3:00 pm Break

3:00 - 3:30 pm *Fundamental Ways to Look at Food Webs*
To be Announced, Organization

3:30 - 5:00 pm Brain Storm Session 1 - What are the critical research questions?

6:30 - 9:30 pm Dinner at Italian Village

June 4, 2008

8:30 - 9:00 am *A Retrospective Look at the Impacts of Alewife on Great Lakes Fish Communities: Lessons Learned*
Chuck Madenjian, USGS Great Lakes Science Center

9:00 - 9:15 am *The Asian Carp*
Phil Moy, Fisheries and Aquatic Nuisances Specialist, University of Wisconsin Sea Grant Institute

9:15 - 9:45 am *Nutrient Food Web Modeling Pre and Post Zebra Mussels*
Ruse Kneis, US Environmental Protection Agency

9:45 - 10:00 am Break

10:00 - 12:00 pm Brain Storm Session 2 - What are the time and space scales? What are the data gaps?

12:00 pm Workshop Adjourns

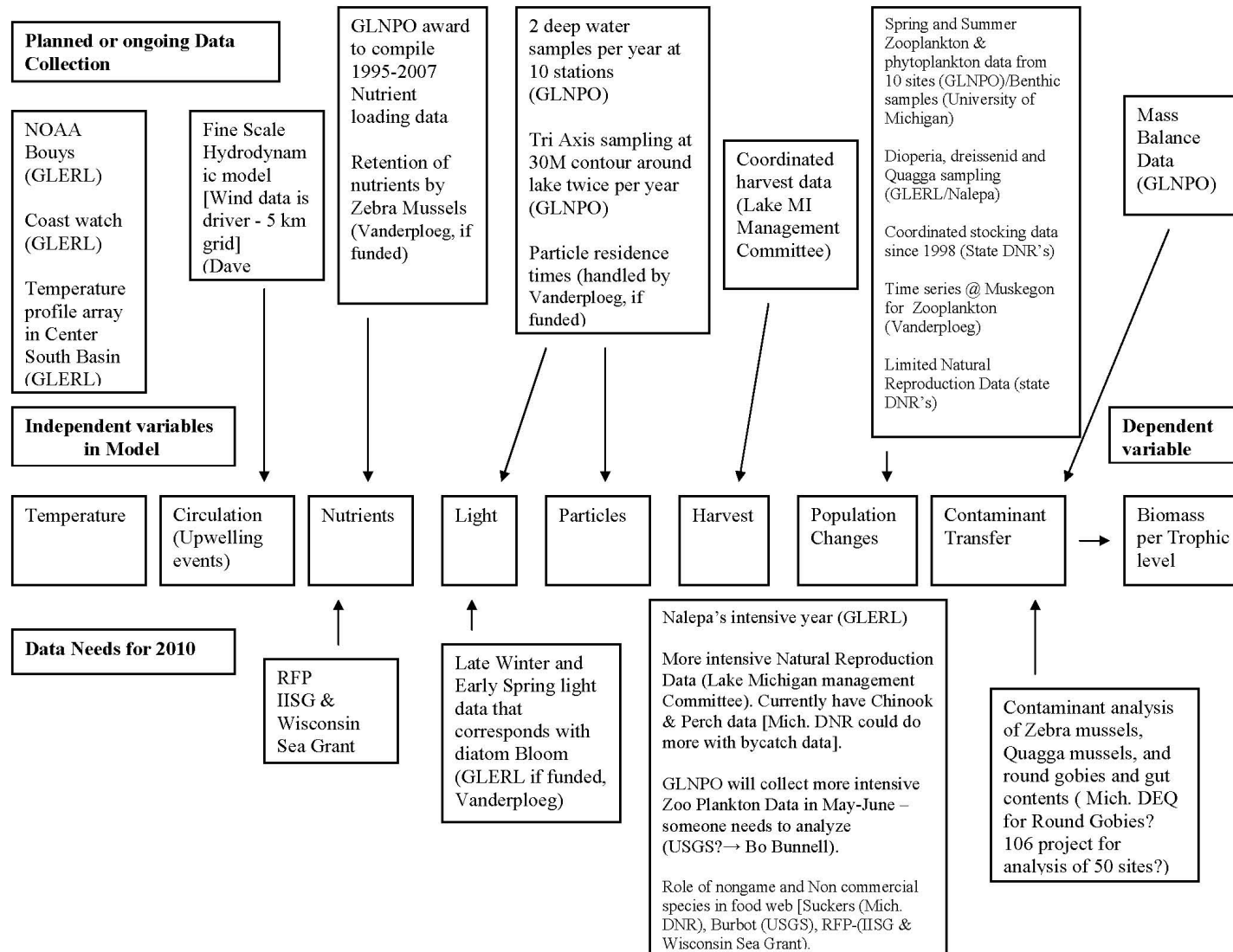
Agencies and participants conclusion:

- * We need to develop an integrated **Lake Michigan Food Web Management Model.**

Implementation:

- * A Lake Michigan GLRRIN steering committee was formed (composed of the Lake Michigan GLRRIN co-chairs and key agency representatives from state and federal agencies conducting monitoring and research in Lake Michigan in 2010)
- * Steering Committee met monthly between June and December of 2008 to develop a conceptual modeling framework for the Lake Michigan food web project.

Management Model



Research gaps not covered by agencies were identified

- * The Illinois-Indiana Sea Grant and Wisconsin Sea Grant programs joined together to issue a joint RFP in 2009 focused on:
 1. Bioenergetics, trophic status, and food web relationships of non-commercial and non-recreational fish species
 2. Current status and trends of nutrient inputs to Lake Michigan with an emphasis on large rain events and processes at the land-water interface

3 Proposals Funded

(IISg and Wisconsin SG invested 400K and EPA through GLRI invested \$904k)

- * Constructing the Nearshore Lake Michigan Food Web Using Multiple Trophic Indicators - S.Czesny, T. Hook, G. Bowen, and J. Rinchard (IL-IN) H. Bootsma, J. Janssen (Wisc.)
- * Predictability of Nutrient Loads Delivered to Lake Michigan Based on Large Storm Events, Alena Bartosova, Momchio Markus, Illinois Natural History Survey, Timothy Ehlinger, Univ. of Wisconsin Milwaukee
- * Monitoring Episodic River Inflow Plumes Using In-situ and Remote Sensing Data, Keith Cherkauer, Indrajeet Chaubey, Cary Troy, Purdue University

Coordination: 2010 field season

- * The Lake Michigan steering committee continued to meet periodically in 2009 to coordinate research and monitoring plans for the 2010 field season, to facilitate university researchers accessing agency vessel time as needed, and to discuss sampling timing and locations to the extent practical.

Post 2010 field season

- * Ann Arbor workshop held in Dec 2010 to develop a framework for coordination and collaboration of modeling and forecasting activities.
- * A **Lake Michigan Modeling and Forecasting Working Group** was formed to coordinate agency modeling efforts and to determine information needs which inform model development and product delivery. – coordinated by GLOS

2011 LM Co-chairs identified additional university research needed to fill in gaps for a Lake Michigan management model

- * A second joint RFP was issued by Illinois-Indiana and Wisconsin Sea Grants for projects to begin in the 2012 field season. RFP priorities were:
 1. Nutrient dynamics within Lake Michigan, including spatial variation across basins and habitats (e.g. offshore reefs)
 2. Variation of physical, chemical and biological dynamics, especially during the winter isothermal period

1 Proposal Selected (IISG and Wisconsin SG invested 400k)

- * Alteration of Nutrient Cycling and Food Web Structure for Profundal Quagga Mussels in Lake Michigan, Harvey Bootsma, University of Wisconsin—Milwaukee, Qain Liao, University of Wisconsin—Milwaukee, Cary Troy, Purdue

Wrap up

* April 2012 3rd LM GLRRIN workshop held in Ann Arbor

1. Univ. researchers & agency scientists collecting data and developing models related to the Lake Michigan food web project discussed results of coordinated sampling efforts
2. Identify future research needed to develop Lake Michigan food web management model

5 emerging themes requiring future investigation

- * Variability of biological dynamics in the nearshore (< 20 m) region vs. the offshore region
- * Roles that physical dynamics play in shaping biological dynamics., e.g. differences in substrate, effects of upwelling events, influence of tributaries
- * Roles that movement of organisms, e.g., round goby, play in shaping the food web
- * Role of understudied winter dynamics in affecting cumulative foodweb interactions, e.g., role of dreissenids during unstratified period
- * How physical, chemical and biological patterns in Lake Michigan compare to those in other Great Lakes

Next Steps

- * Researchers are developing a session on Lake Michigan Food Webs for IAGLR 2013 at Purdue University.
- * Informational needs for further research competitions and the 2015 CSMI year on Lake Michigan are being identified.
- * Possible ongoing meeting structure