



Lake Erie Millennium Network Historical Review

- **1993—CGLRM Call for Lake Erie Reference**
- **1994—Lake Erie Task Force—Completed activities in 1997. Recommended the CGLRM continue to host annual ecosystem modeling summits.**
- **2/1998—GLFC News Releases on phosphorus**



- **4/1998— Jeff Reutter convenes first Lake Erie Phosphorus Group meeting at Kent State University**
- **6/1998—Phosphorus Group meets at SUNY Buffalo. Jan Ciborowski proposes and receives approval for Millennium Plan.**
- **11/1998—Univ. Windsor hosts Management Needs Identification Workshop**



Lake Erie Millennium Network (LEMN)

<http://www.uwindsor.ca/erie2001>

Binational Network - formed November 1998

Convening Organizations:

F.T. Stone Lab - Ohio State University (Jeff Reutter)
NWRI - Environment Canada (Murray Charlton)
Large Lakes Research lab - US EPA (Russ Kreis)
GLIER - University of Windsor (Jan Ciborowski)

Sponsors: Federal, State, Provincial, Regional organizations

Collaborators: Groups active in research/information exchange



Stimulus for Formation

Accelerating ecosystem change ('crises') –
trophic status & oligotrophication
contaminant issues
fisheries issues
invaders

Evidence of close linkage among issues

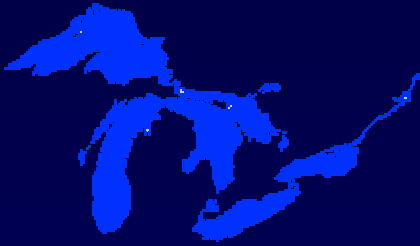
What Prompted the Effort?

Researchers: Loss of research funding sources to address lake-wide questions needing collaborative, multidisciplinary expertise

Agencies: LAMPs formed – mandated to ask questions, but poor link between mandates & research knowledge base.
(recent research findings & tools)

Public: uninformed lobbying for changes in management strategies to resolve ‘crises’.

Initial actions: Independent, informal 1-day meetings discuss issues & summarize knowledge/needs (Kreis, Haffner, Reutter, Charlton)



Goal & Strategy

Goal: Develop framework for a binational research network to

- a) address management needs
- b) understand the ecosystem

Step 1) acquire support from managing agencies

- solicit membership (Sponsors & Collaborators)
 - sponsors – funds for meetings, publications, etc.
 - collaborators – contrib. to data needs, etc.
- invite research participation (univ. & agency scientists)



Coordination

Steering Committee
(representatives of Sponsoring Agencies)



Codirectors (2 in US; 2 in Canada) at
4 nodal institutions: (2 univ.; 2 gov't research labs)



Agency working personnel
(issues/problems)



Univ. & lab researchers
(processes/unknowns)



Larger Lake Erie Community
(conferences; reports)



Supporting Groups

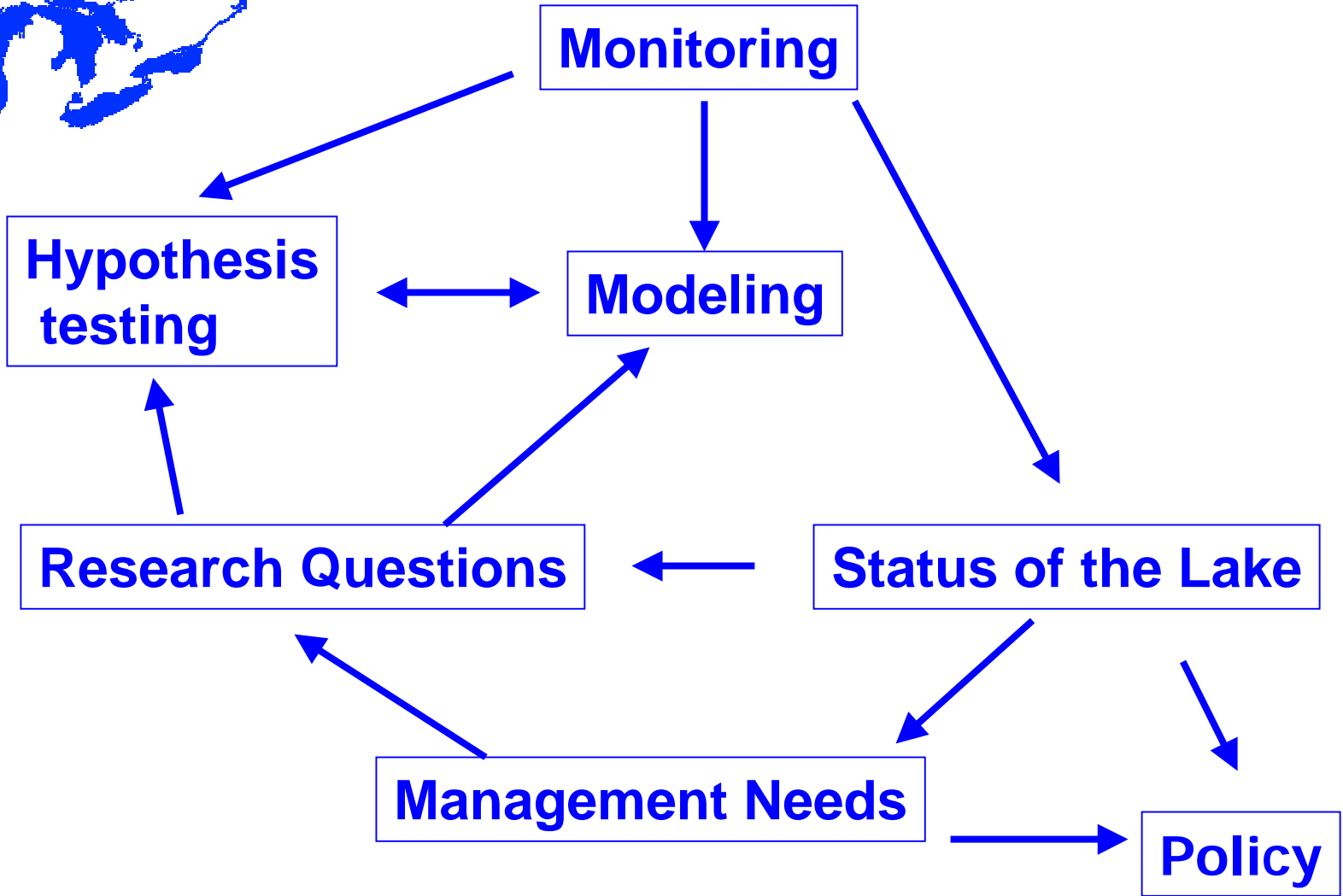
Sponsors

Great Lakes Fishery Commission
International Joint Commission
Lake Erie Lakewide Area Management Plan
through Environment Canada & US EPA
Lake Erie Protection Fund
Michigan Sea Grant
New York Sea Grant
Ontario Ministry of the Environment
Ontario Ministry of Natural Resources
Pennsylvania Dept. Environmental Protection
Pennsylvania Sea Grant
US Geological Survey - Gt. Lakes Sci. Ctr.

Campbell Scientific
DTE Energy, Inc.
Hoskin Scientific

Collaborators

Citizens Environment Alliance
Cornell University Biological Station
Ducks Unlimited
Essex County Stewardship Network
Essex Region Conservation Authority
Great Lakes Commission
Great Lakes Research Consortium
Great Lakes Environ. Res. Lab - NOAA
Great Lakes Lab Fisheries & Aquatic
Sci. - Fisheries & Oceans Canada
Ontario Commercial Fishery Assoc.
Ontario Fed. of Hunters & Anglers
Ohio Dept. Natural Resources
Ohio Environ. Protection Agency
Ontario Ministry Agriculture & Food
Water Environment Federation



Relationship among management, research, & monitoring needs within LEMP.



11/1998—Research Issues Identification Workshop

- **71 Issues Identified in 6 broad categories**
 - • **Eutrophication/Primary Production**
 - • **Exotic Species/Nuisance Aquatic Species**
 - • **Upper Food Web Exploitation**
 - • **Ecosystem Stability**
 - • **Habitat Structure and Function**
 - • **Contaminants**
- **4/1999—Millennium Plan Research Workshop**



Strategy

- what do we know?
- what do we understand?
- what do we need to know/understand?

Binational Conference (April 1999)

Lake Erie at the Millennium: Changes, Trends, and Trajectories

- 46 invited speakers; 13 contributed papers; 175 attendees
- compile current knowledge of Lake Erie processes
- forecast trends for the next 3-5 years
- identify critical research gaps

Outcome:

- “Research Needs” workshop --> summarized consensus on the 7 subject areas
- *Lake Erie at the Millennium: Changes, Trends, & Trajectories*. Monograph (still in press. . .)



Clarifying Research Questions

“Research Needs” Workshops

1. *Limits on Energy Transfer in the Lake Erie Ecosystem - Critical Tests of Hypotheses* (October 1999 - Grosse Ile, MI)

2. *Contaminant Processes in Lake Erie*
 - *Part I. Loadings, Spatial Patterns, and Temporal Trends*
(September 2000 - Erie, PA)
 - *Part II. Mechanisms and Processes*
(Forthcoming - Buffalo, NY)
 - *Part III. Ecosystem Implications*
(Forthcoming - TBA)

3. *Habitat Structure, Function, and Change*
(May 2002 - Windsor, ON)

“Research Needs” Workshop Philosophy

Identify data needs that

- test hypotheses generated by strong inference approach
- provide necessary values for modelling needs

Strong Inference: multiple hypotheses that distinguish among alternative explanations.

Research: “Monitoring with an hypothesis”. (Planning to use monitoring data to test expectations of hypotheses).

Strong inference challenge for research questions:

- Summarize possible explanations.
- For each explanation, what unique prediction could be made that would distinguish it from the other explanations?
- What would happen if explanation is correct?
What other explanations could produce the same result?
- What key variable(s) would change to support the prediction?
- How large a change (X) is needed to be biologically meaningful?
- How many measurements would be needed for 'X' to be statistically significant (unlikely to have occurred by chance)?
- What density of data are needed to model the question?

Strategy

Binational Conferences

Lake Erie in the Millennium: Progress & New Issues

(March 2001; with 1st *Detroit R. State of the Strait Conference*)

3rd Biennial meeting of the L. Erie Millennium Network

(May 2003)

4th Biennial meeting of the L. Erie Millennium Network

(autumn 2005)

Future Workshop Themes

Regulation of Energy Flow at the Top of the Food Web

Invasion Processes and Control

Human Health Issues

Ecosystem-level Consequences of Climate Change



Developing a Lake Erie Habitat Strategy - May 2002

- **Brainstorm with experts**
- **Decide “how to slice the Lake Erie habitat pie” into reasonable pieces for research & management**
- **Each slice to be a future workshop**



Workshops in the “Habitat” Series

LEMN Workshop 3.1

Development of an Integrated Habitat Classification System for the Lake Erie Basin [December/02].

Funded by GLNPO - 2004

LEMN Workshop 3.2

Habitat Restoration and Protection Issues [Feb/03]

Sponsored by GLNPO

LEMN Workshop 3.3

Assessment and Influence of Developed Lands [forthcoming]

Sponsored by Env. Cda.

Research arising from workshops

1. *Lake Erie Ecosystem Trophic Status (LETS) - Critical Tests of Hypotheses, Erie Comprehensive Cooperative Study (ECCS)*
EPA, EC & MOE -funded; multiple cooperators

2. *Contaminant Processes in Lake Erie* [dormant]
 - *Part I. Loadings, Spatial Patterns, and Temporal Trends*
 - *Part II. Mechanisms and Processes*
 - *Part III. Ecosystem Implications*

3. *Habitat Structure, Function, and Change*
Anticipating effects of water level changes on habitat distribution & quality
Binational Mapping Strategy for Lake Erie watershed
GLNPO & USFWS funded