



Lake Erie Millennium Network (LEMN)

<http://www.LEMN.org>

Binational Network - formed November 1998

Convening Organizations:

F.T. Stone Lab - Ohio State University (Jeff Reutter)

NWRI - Environment Canada (Chris Marvin)

Large Lakes Research lab - US EPA (Russ Kreis)

University of Windsor (Jan Ciborowski)

Sponsors: Federal, State, Provincial, Regional organizations

Collaborators: Groups active in research/information exchange

Supporting Groups

Sponsors

(funds for meetings, publications, etc.)

Essex Region Conservation Authority
Great Lakes Fishery Commission
International Joint Commission
Lake Erie Lakewide Area Management Plan
through Environment Canada & US EPA
Michigan Sea Grant
Lake Erie Protection Fund
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

(contribute to data needs, etc.)

Citizens Environment Alliance
Cornell University Biological Station
Ducks Unlimited
Essex County Stewardship Network
Great Lakes Commission
Great Lakes Environ. Res. Lab - NOAA
Great Lakes Research Consortium
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

Strategy

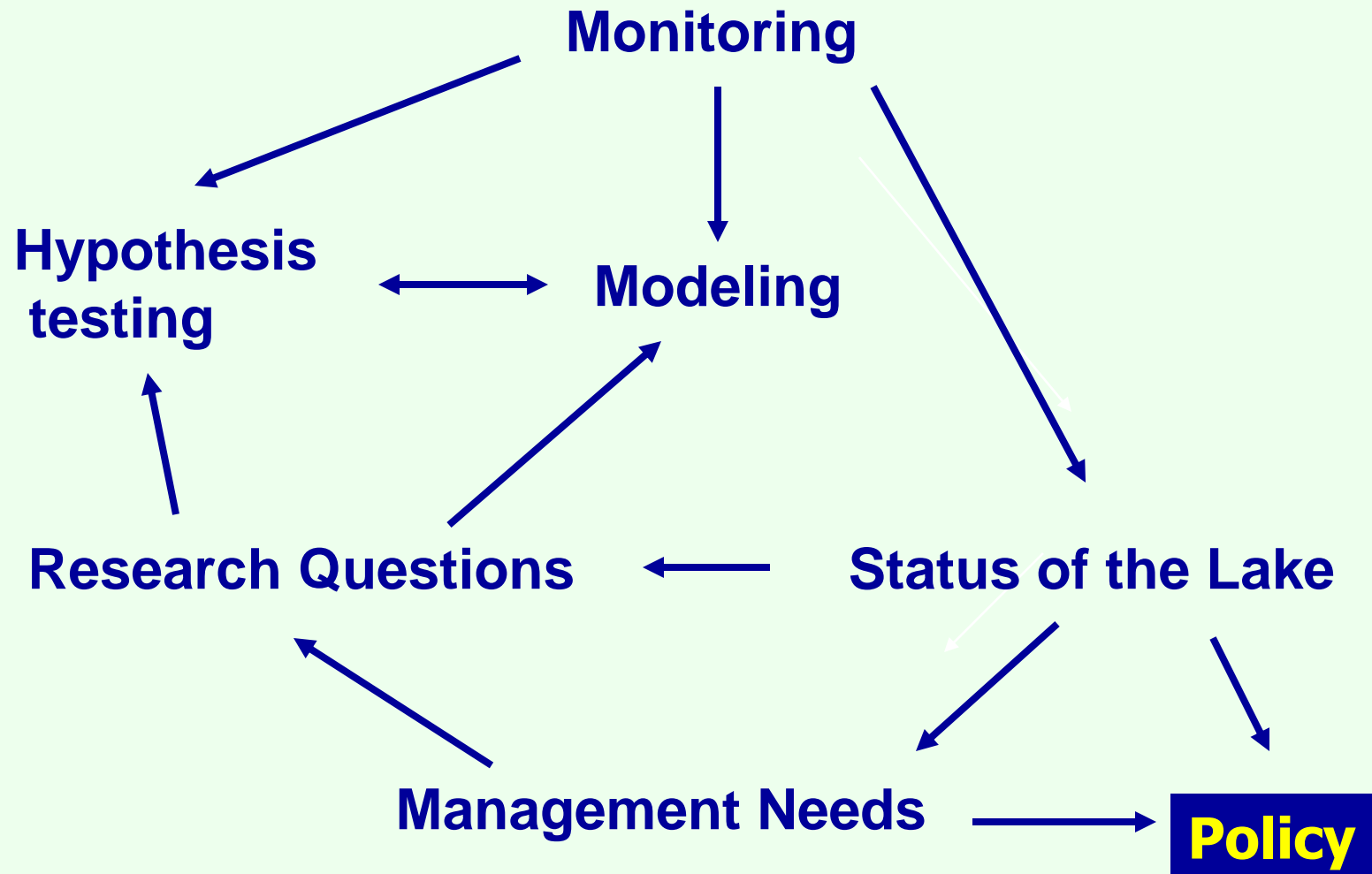
1. Binational Conferences (1999; 2001; 2003; 2006; 2008; 2010)

- 30-45 invited speakers + contributed posters; 175+ attendees
- no concurrent sessions
- compile current knowledge of Lake Erie processes
- forecast trends for the next 3-5 years
- identify critical research gaps
- take stock:
 - what do we know?
 - what do we understand?
 - what do we need to know/understand?

Outcomes:

- “Research Needs” workshops --> summarize consensus on the 7 subject areas
- status reports & proposals
- collaborative research teams

2. forming collaborative groups (open to all)



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

3. Convening Workshops and Research Arising

1. *Limits on Energy Transfer in the Lake Erie Ecosystem - Critical Tests of Hypotheses*

EPA-funded Lake Erie Trophic Status project (2002):

- 28 PI's funded by US EPA (\$500K)
- all agency collaboration → \$2M in kind support
- *Journal of Great Lakes Research* special issue (June/06)

2. *Contaminant Processes in Lake Erie* (2000)

- **Part I. Loadings, Spatial Patterns, and Temporal Trends**
- **Part II. Mechanisms and Processes**
- **Part III. Ecosystem Implications** [review papers]

3. *Habitat Structure, Function, and Change*

Anticipating effects of water level changes on habitat distribution & quality in the Huron-Erie Corridor

- funded by GLFC; 5 PI's & cooperators; models proposed (2004)

Binational Mapping Strategy for Lake Erie watershed

- funded by US EPA & Envir. Cda. (2005/06)
- 12 PI's & cooperators
- all agency collaboration

Workshops and Research Arising

4. Land-Lake Loadings

IJC & OMAFRA Sponsored workshops (2008-2010):

- 28 PI's funded by US EPA (\$500K)
- all agency collaboration → \$2M in kind support
- *Journal of Great Lakes Research* special issue (June/06)

5. Understanding Causes of Nearshore Eutrophication (2009)

- BEC Intensive monitoring year (EPE, EC, MOE, OMNR, etc.)
- 7 integrated projects funded by US EPA & LEPF
- parallel studies in Ontario
- SERA 17 Phosphorus forum

6. Collaborative Research under GLRI (& EC support)

- update landuse/landcover for habitat classification
- continuing nearshore research
- monitoring wetland condition & ecological services



Charge to the LEMN Conference – Apr/08

Nutrients & Trophic Structure

Open lake nutrient dynamics & trophic structure seem to be regulated by regional processes.

Weather likely plays a significant role

- **Assess at basin-scale, with integrative sampling & observing systems?**

Nearshore nutrient dynamics & trophic structure are regulated by local coupling & feedback loops. Local nutrient sources & dreissenids are likely important.

- **Assess at contributing watershed scale?**

What are the key research questions?

What key variables/processes should we measure?

Where? How often? For how long?

Is the proposed habitat zone system suitable for these studies?

The Nearshore and Offshore Lake Erie Nutrient Study (NOLENS) (EPA GLNPO funded)

Sources & transport of bioavailable phosphorus (Winston et al.)

Central & eastern basin studies of nearshore/offshore nutrient pools, fluxes and their interactions (Pennuto et al.)

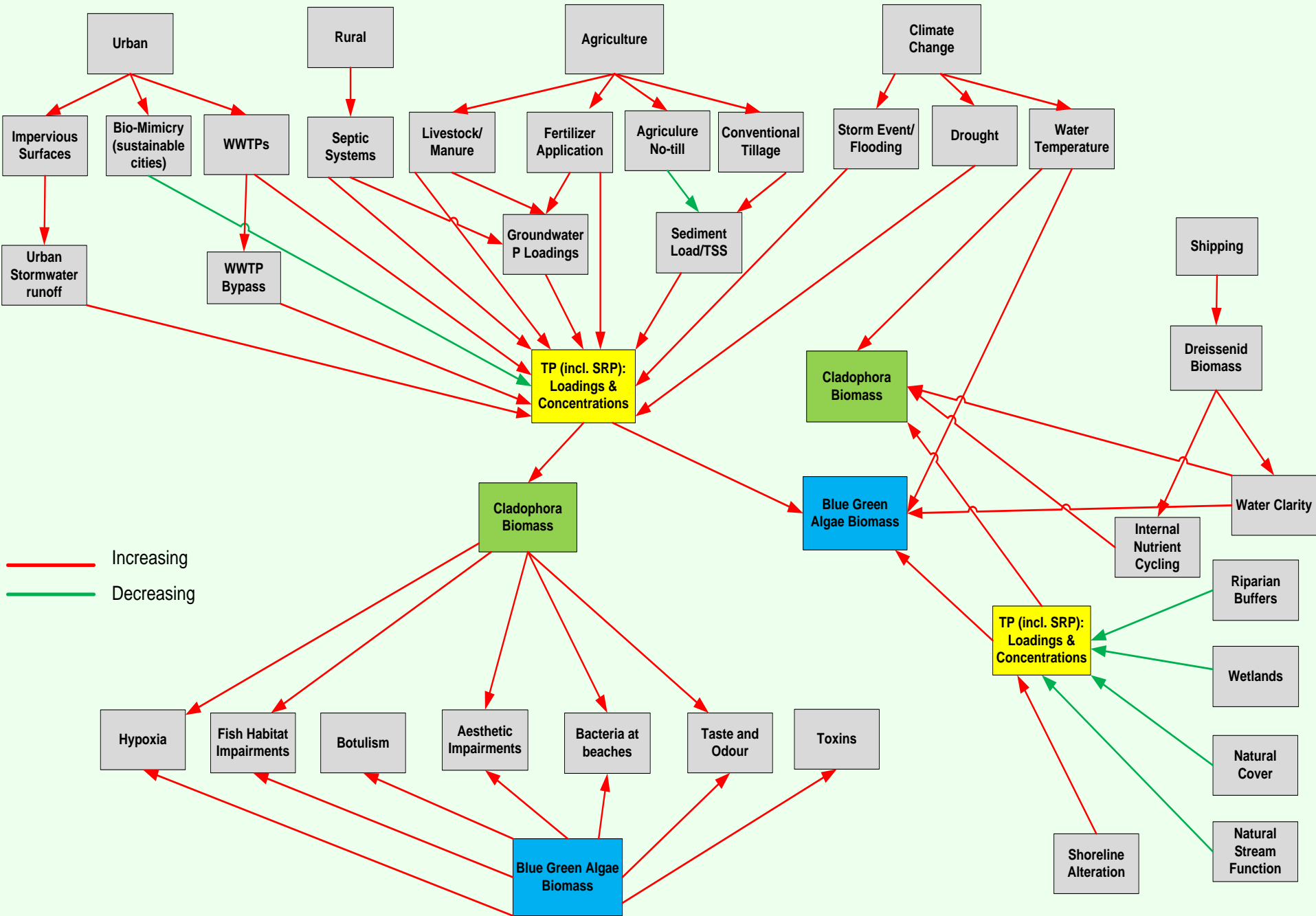
Movement of phosphorus from agricultural fields (Mullen et al.)

Linking soil test phosphorus with agricultural runoff phosphorus (Dayton et al.)

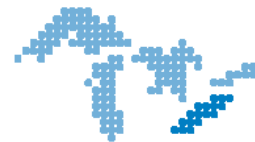
Connecting phosphorus load, transport, and biological use: how does *Microcystis* use phosphorus and where is the bloom trigger point? (Conroy et al.)

Lake Erie Algal Source Tracking (LEAST) (Bridgeman et al.)

Fuzzy Logic Model: Nutrient Dynamics



<http://www.LEMN.org>



Lake Erie
Regional Research and Information Network

Lake Erie Millennium Network 2001

Lake Erie Millennium Network The Network Workshops Conferences Resources

Welcome to the new Lake Erie Millennium Network website...click [here](#) to find out about the network.



The Lake Erie Millennium Network is a series of events dealing with Lake Erie environmental issues. It is a cooperative approach, benefiting from the expertise and concerns of the public, regulatory agencies and the academic community.

Our goal is to define and understand Lake Erie's most pressing problems, propose solutions, and track the changes.

The Lake Erie Millennium Plan (LEMP), was initiated in 1998 by scientists at the University of Windsor, National Water Research Institute - Burlington, F.T. Stone Lab of Ohio State University, and US-EPA Large Lakes Lab at Grosse Ile, MI, to foster and coordinate research that will identify and solve basic ecological questions relevant to the Lake Erie Ecosystem through a binational, collaborative network.

Lake Erie News

[State plans to offer quieter experience at 2 Lake Erie islands - Akron Beacon Journal](#)

[Wildlife Officials, Residents Concerned About Major Lake Erie ... - WIVB](#)

[Lake Erie vs Waynesburg \(Sep 01, 2006\) - Waynesburg College Athletics](#)

[Lake Erie helicopter rescue for Michigan family members - WLNS](#)

[Boaters rescued during trip to cross Lake Erie - Toledo Blade](#)

GLRC News

[WETLANDS TO SLOW OR GROW GLOBAL WARMING?](#)

[TREES UNDER THE INFLUENCE OF OZONE AND CO₂](#)

[STEERING CARS OUT OF NATIONAL PARKS](#)

[CALI OUT FRONT ON GREENHOUSE GAS REGS](#)

[FISH-EATING BIRD DISRUPTING FOOD CHAIN](#)

GLIN News

[GLIN Daily News](#)

[Wisconsin mute swans are safe until January](#)

[Isle Royale: island wilderness](#)

[Could bills lead way to oil drilling in the Great Lakes?](#)

[Safety equipment slow to appear on waterfronts](#)

Summary

1. The LEMN is an open network of interested participants working to develop a binational research framework
2. Nearshore water quality & habitat reflect timing, amount & quality of materials transported from the watersheds
 - opportunity for closer ties with RAPs in AOCs & associated funding for research
3. Maintaining a balance of university & agency/institutional researchers ensures that research initiatives combine fundamental knowledge with agency needs.

RECENT ACCOMPLISHMENTS

- NOLENS Awards–GLNPO/LEPF Apr 2009
- CSMI Lake Erie Intensive Year 2009
- All Hands GLRRIN Meeting Nov 2009
- GLRI RFP Responses Jan 2010
- Lake Erie Phosphorus Research Forum Feb 2010
- Clarifying the Agriculture-Eutrophication Linkage Workshop (OGLP/OMAFRA) Mar 2010
- OH Acad Sci Special Lakes (LE) Symp Apr 2010
- 6th Biennial LEMN Conference Apr 2010

Lake Erie Millennium Network: 2010 and Forward

LEMN 5-Year Strategy:

- Revisit Advisory Membership and Structure
- Reconvene Executive Advisory and Steering Committees
- Evaluate Co-Directors Composition
- Examine Research Series, Themes and Sub-themes
- Re-new Sponsorships and Collaborators

LEMN Guiding Principles/Objectives

- ❖ Research Planning, Strategy, and Structure
- ❖ Science Forum for Scientific Exchange
- ❖ Collaboration and Coordination
- ❖ Resource Awareness and Sharing
- ❖ Communication-
 - Website and Email Lists
- ❖ Outreach and Education

Near-Term Actions

Concurrence/Approval by Committees:

- Science Priorities
- Planning Process/Implementation Process
- Biennial Meeting Schedule/Format
- Theme Workshops/Format

Outreach, Collaboration, and Education

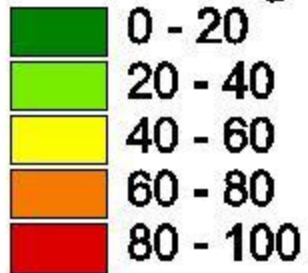
- **Academic Research Community**
 - Integration Opportunities with Federal, Provincial, and State Agencies
 - New Investigators Meetings
 - IAGLR
- **Public, Managers, Policy-Makers**
 - Great Lakes Water Quality Agreement
 - Right information, at the right time, in the right way
- **Agricultural Community, Economists, and Social Economists**

Lake Erie Millennium Network: Outreach and Collaboration

Build Upon and Strengthen Relationships:

- ❖ Cooperative Science and Monitoring Initiative
- ❖ Binational Executive Committee
- ❖ Environment Canada and USEPA-GLNPO
- ❖ International Joint Commission and CGLRM
- ❖ Lake Erie LAMP Committees/RAPs
- ❖ Great Lakes Regional Research and Information Network
- ❖ SOLEC/ SOLEC Indicators
- ❖ Provincial and State Agencies

Percent Agriculture

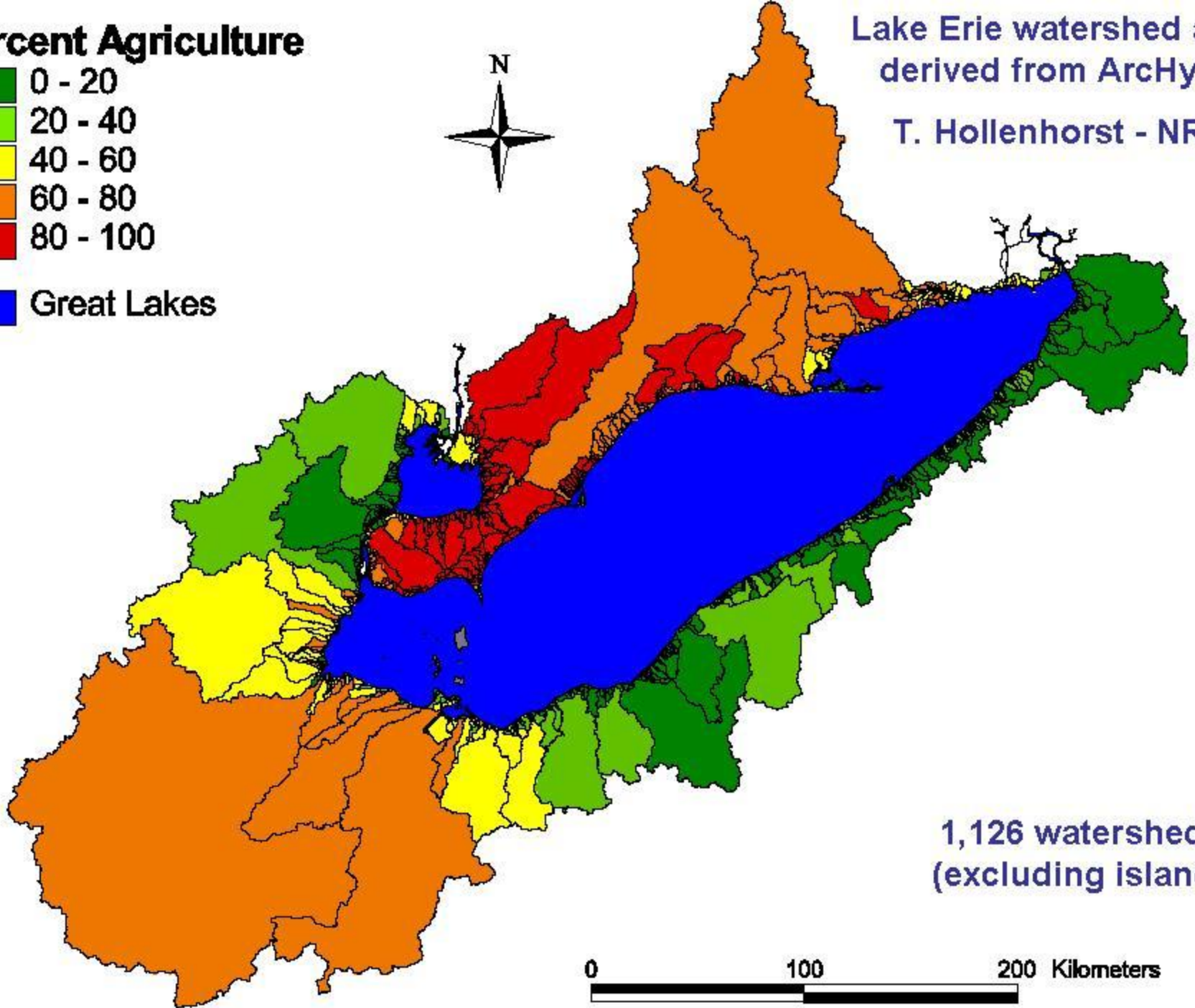


Great Lakes



Lake Erie watershed areas
derived from ArchHydro

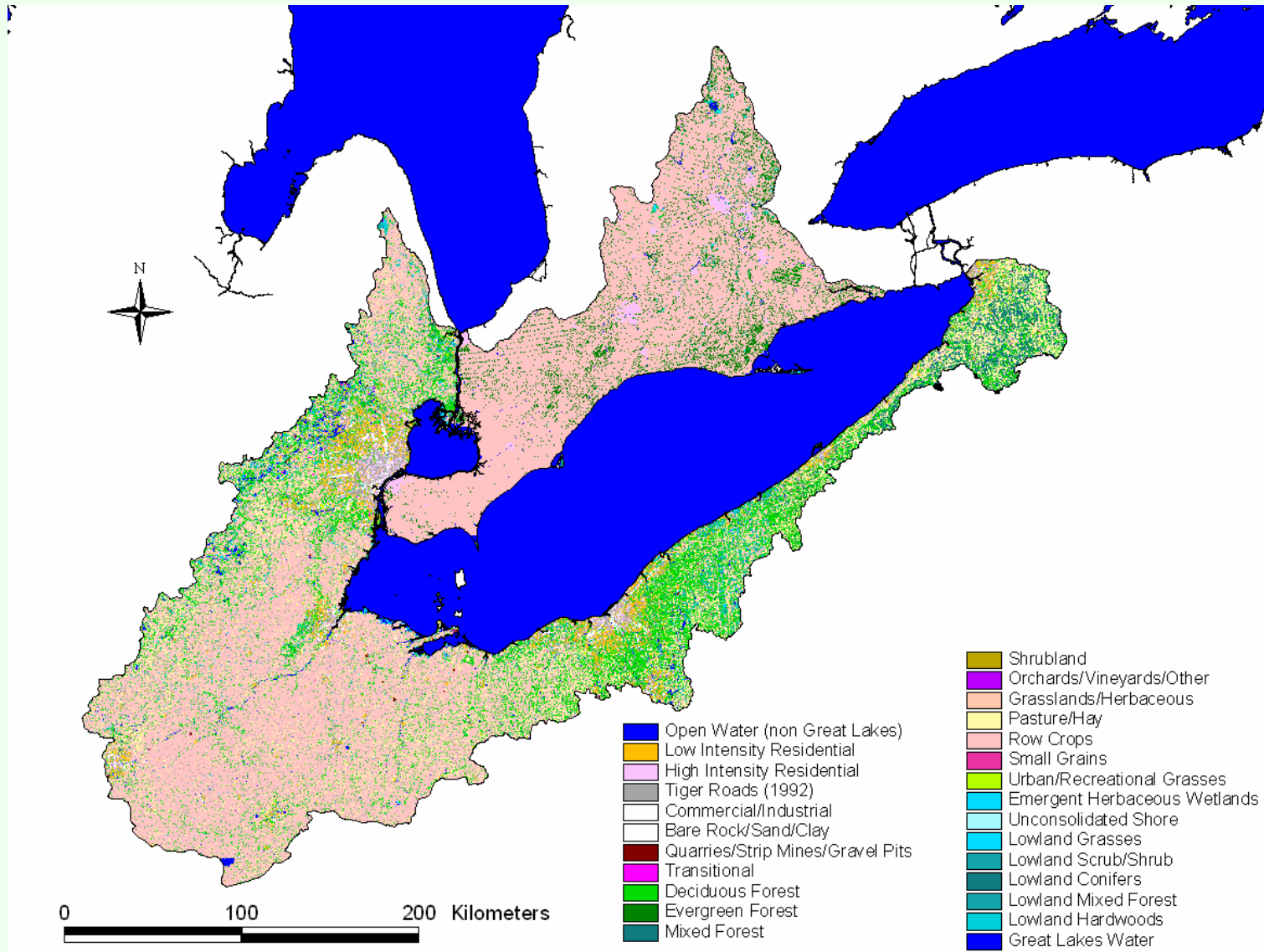
T. Hollenhorst - NRRI



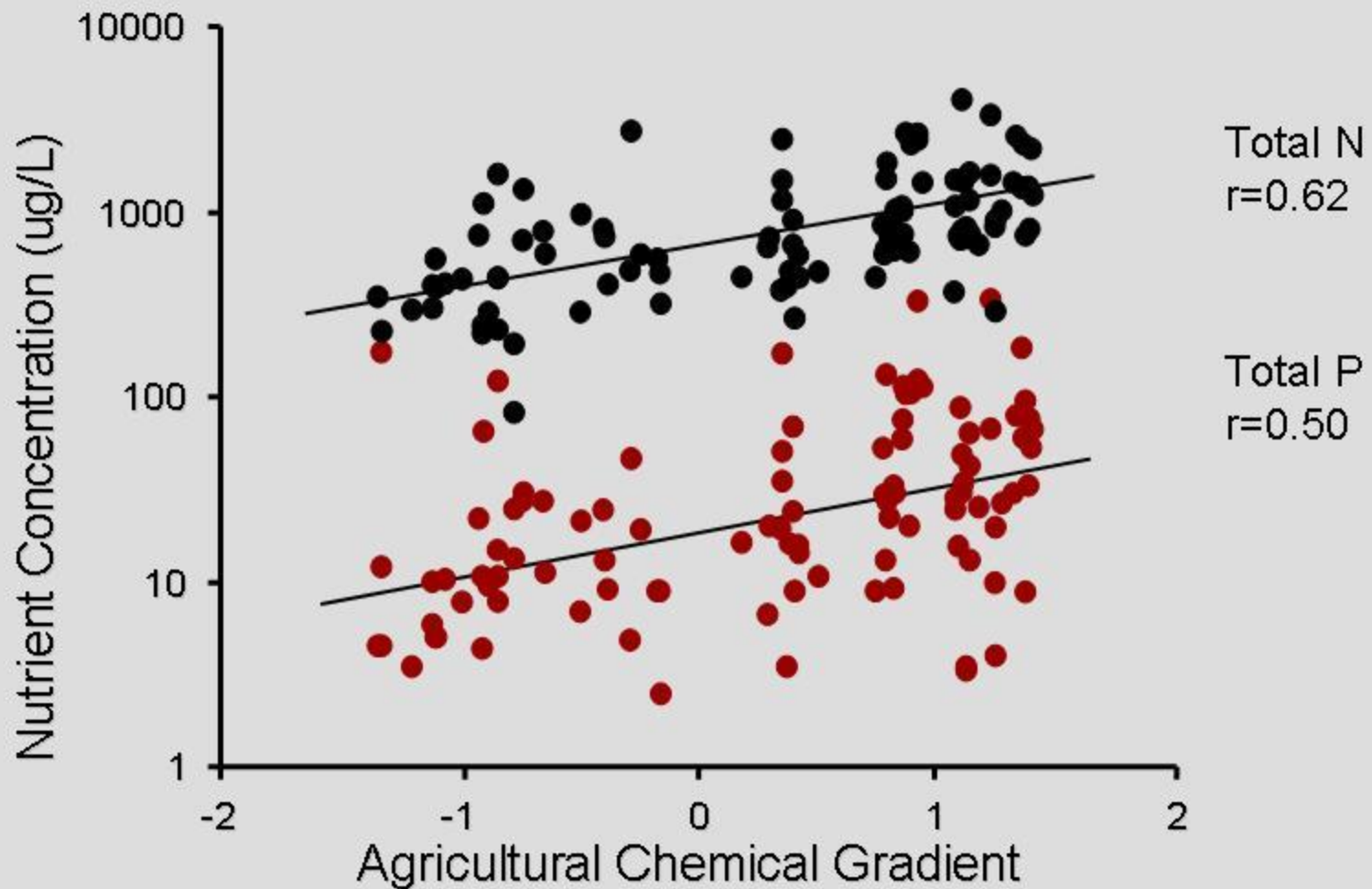
1,126 watersheds
(excluding islands)



Integrated Land Cover – Lake Erie









Nutrient concentrations in Great Lakes coastal wetlands



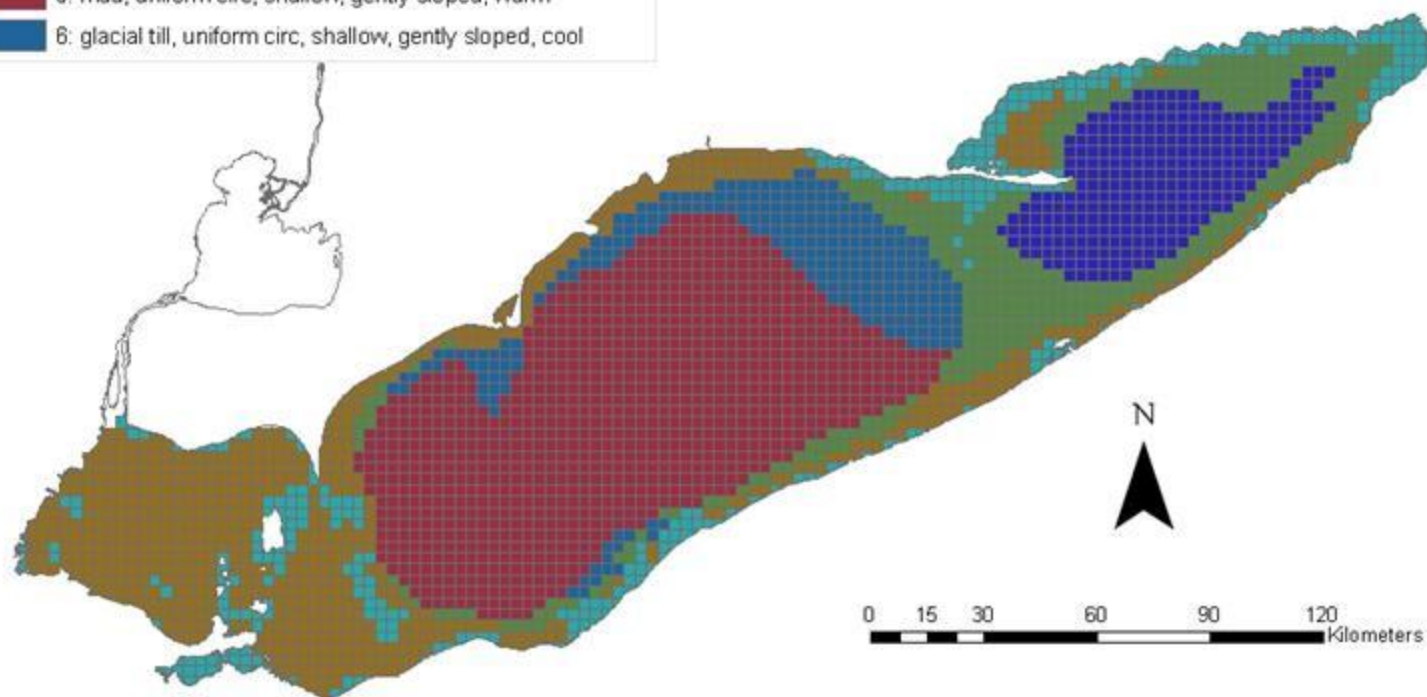
Fish Habitat Characteristics – Lake Erie

Results (nearshore and offshore)

Cluster

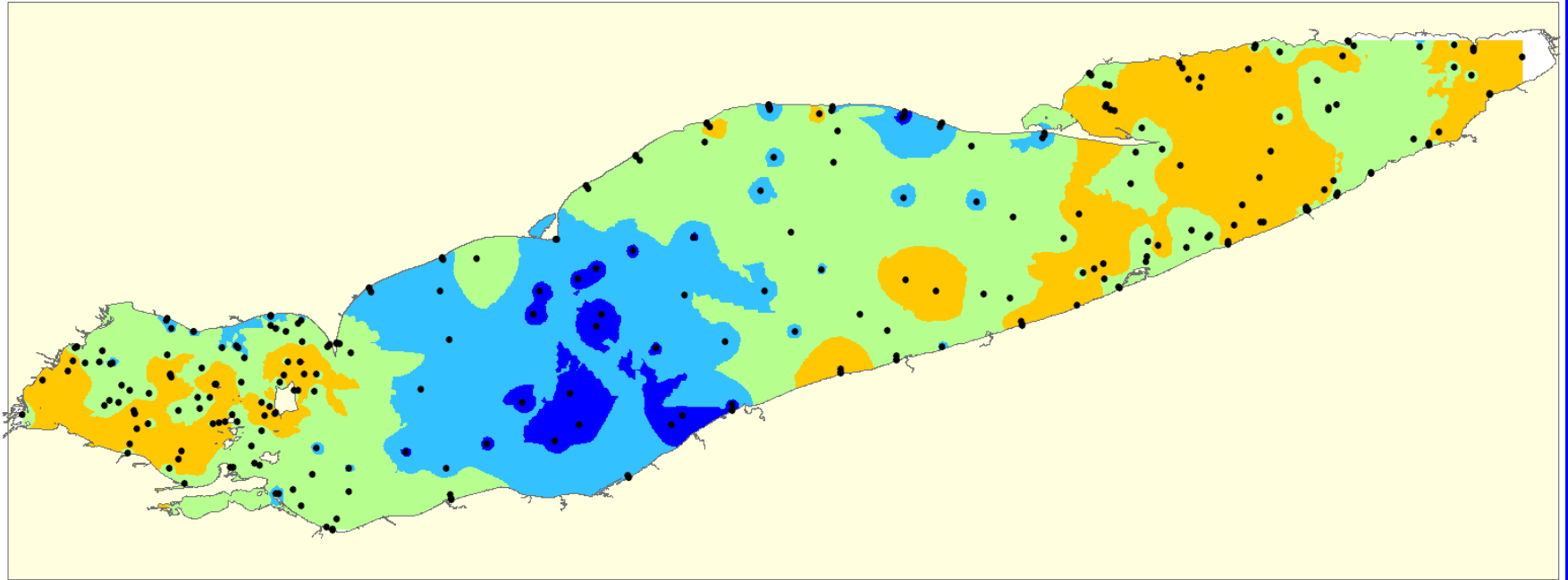
	1: mixed subs, not close to river, deep, gently sloped, warm
	2: mixed subs, close to river, shallow, highly sloped, cool
	3: mixed subs, uniform circ, shallow, highly sloped, cool
	4: mud, uniform circ, mixed circ, deep, highly sloped, cool
	5: mud, uniform circ, shallow, gently sloped, warm
	6: glacial till, uniform circ, shallow, gently sloped, cool

Water Depth
Slope
Substrate
Circulation
Temperature (warm, cool)
Proximity to Tributary Mouth

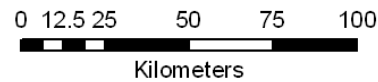
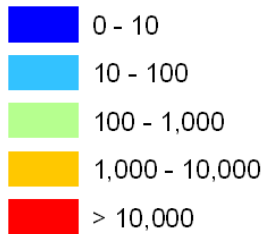


Overlay Fisheries Data to Detect Affinities, Correlations, and Patterns

Distribution of *Dreissena bugensis* in Lake Erie



D. bugensis Density (No./m²)



2004