

Report on the Workshop for Developing a Research Agenda for New York's Participation in Great Lakes Restoration

Sponsored by
Center for Environmental Information
Great Lakes Research Consortium
New York State Sea Grant
Congressman James Walsh

Joseph C. Makarewicz
Department of Environmental Science and Biology
SUNY Brockport

This workshop was convened to bring together participants to discuss the research necessary to support future restoration and remediation activities of New York's Great Lakes (Appendix A for the Announcement and background). On 18 March 2005 (8:30 to noon), a workshop for Developing a Research Agenda for New York's Participation in Great Lakes Restoration was held at the State University of New York College of Environmental Science and Forestry. Thirty-five scientists attended from State Agencies (NYDEC, NYSDOH, NYS Sea Grant) and several colleges (Binghamton, Brockport, Buffalo State, Cornell, ESF, Hobart and Smith, Oswego, RIT and the University at Buffalo) (Appendix B). The program was highlighted by four talks on the North Coast Initiative, Open Water Research, Sea Grant Priorities, and the Lake Ontario LAMP (See Appendix C for the Agenda). This was followed by two sets of breakout sessions as follows.

Set 1	Set 2
Persistent Bioaccumulative Toxics	Sustainable Development
Invasive Species Research	Habitat Species/Research
Coastal Health	Areas of Concern
Indicators and Information Research	Nonpoint Sources Research

Participants were asked to divide themselves by interest area. Within each group, the participants identified and ranked the research priorities.

Two sessions "Coastal Health" and "Non-point Sources" were identified to participants as applying to the Lake Ontario Coastal Initiative (North Coast Initiative) and are reported on here. Thirty one percent of the participants (11 of 35 people) attended and

provided input to each of these “LOCI sessions”. The ranked participant results are summarized in Table 1. In addition, each participant was asked to rank a list of projects developed by LOCI (Table 2). Appendix D provides a complete explanation of each topic listed in Table 2.

Sixty percent of Workshop participants identified long term monitoring (26.7%), ranking of watersheds by nutrient loading (13.1%), segment analysis (10.4%) and GIS mapping of the North Coast (10%) as their top research priorities for the coastal region and for non-point source research. Ten other categories were identified. Of this group, refinement of a nearshore hydrodynamic model (6.8%), identification of causes of algal mats (6.8%) and fishery issues (5.9%) were the next three most important areas of research.

The participant’s ranking of the list of potential projects developed by LOCI provided some similar results and some unique issues not developed by the participants. For example, as with the participant developed list, monitoring was by far the highest ranked project goal, followed by quantification of the natural resources and GIS mapping. However, the third highest ranked need was the development of a central library for housing publications on Lake Ontario.

Combining the two lists, the top five ranking for projects on the coastal zone of Lake Ontario and its embayments would be as follows.

1. Long-term monitoring of the coastal zone and embayments.
2. Creating a rank order of watersheds for remediation based on nutrient loading, RAP status, etc.
3. Segment analysis of sub-watersheds to identify location of pollution sources.
4. Development of a central location of literature, especially “grey” literature, pertaining to Lake Ontario coastal zone and embayments.
5. Quantification of natural resources through GIS of the coastal and embayment areas.

Table 1. Coastal Research Priorities
Derived from the Lake Ontario Research Priorities for Restoration, Syracuse, NY.
Results are based on 220 votes cast by participants.
March 2005

1. (26.7%) Long-term monitoring from a diverse set of sampling locations to adequately represent the coastal areas in terms of habitat, physical topography and geography including phosphorus, discharge and loading for the tributaries, chlorophyll a, Secchi disk, microcystin, anatoxin, macrophyte beds for the embayments, phytoplankton and zooplankton
2. (13.1%) Prioritize the watersheds by discharge nutrient loading, (future impact) RAP status, PWB listing, land use, soil loss, toxic discharge, and remediation impact.
3. (10.4%) Segment analysis of watershed - source of coliforms, nutrients, etc/
4. (10%) GIS mapping of the North Coast. A digital database of both the aquatic and near shore areas.
5. (6.8%) Refinement of hydrodynamic model for near coast areas.
6. (5.9%) Fishery issues. Restore native species and spawning habitat restoration especially in the watersheds. Forage fish base, access for fishermen, and promotion of underutilized species
7. (5.9%) Quantify the problem, identify causes and suggest remediation efforts of near shore algae mats – beach closings.
8. (4.5%) Global warming effects on coastal resources.
9. (3.6%) Upwelling and seiches and Lake Ontario. What affects to these phenomena have on the North Coast? Are the causes of fish kills, algae die-offs, beach closings, etc...? What is the frequency and economic impacts of upwelling and seiches? Can we better forecast these events? Modeling.
10. (3.2%) Potential Human Impacts: Neurotoxins, pharmaceuticals, pathogens, bacterial levels in the near shore and embayment? How high? Do they exist? Spatial and seasonal occurrence.
11. (2.7%). Develop white papers on economic potential and environmental impact of wind farms, aquaculture potential, Boat races, promotion of underutilized fish species, preservation of critical habitat, bluff preservation, lighthouse preservation, diving on shipwrecks.
12. (2.2%). Beach closings? Cause and consequences. Investigate the predictive model used by the City of Rochester?
13. (2.2%). Quantification of the natural resources in coastal areas. The assigning of both a geographic component (i.e. square miles or percent of the nation's coastal marshes) as well as an economic component to this quantification will serve to help determine the 'worth' of this ecosystem. Identification and quantification (environmentally and economically of the coast's

resources.

14. (1.8%) Watershed soil transport - sediment/turbidity.

Table 2. Prioritization of research ideas developed from the "Developing a Research Agenda for New York's Participation in Great Lakes Restoration", March 2005. Results are ranking of a list of potential issues developed by LOCI.

	Respondents	Mean	Mode
Structure and Function			
Monitoring	11	3.7	4.0
Quantification of the Natural Resources in the North Coast	11	3.2	4.0
Creation of a central location / library	11	3.1	3.0
GIS Mapping of the North Coast	11	2.8	3.0
Research			
White papers and position papers on North Coast issues or topics	10	3.1	3.0
Coastal food webs and chemistry and the transition to offshore and embayments	11	3.1	3.0
Invasive species	11	3.1	4.0
Prioritize the watersheds draining into Lake Ontario	11	3.0	3.0
Remediation and restoration of critical wetland habitat within the coastal zone	11	3.0	3.0
Research that spawns economically viable industries	11	3.0	3.0
Fishery issues	11	2.9	3.0
Persistent toxics	11	2.7	2.0
Nearshore algae mats	11	2.5	3.0
Dam removal in the Lake Ontario watershed	11	2.5	3.0
Potential human impacts: neurotoxins, pharmaceuticals, pathogens	11	2.5	2.0
Beach closings - causes and consequences	11	2.5	2.0
Evaluation of existing regulations affecting the North Coast	11	2.5	3.0
Restoration of Atlantic salmon spawning runs from Lake Ontario	11	2.4	2.0
Restoration of endangered bird species and maintenance of the Lake Ont. Flyway	11	2.4	2.0
Upwellings and seiches on Lake Ontario	11	2.4	3.0
Global warming effects on the North Coast	11	2.4	2.0
Water level issues	11	2.0	2.0
Facilities / Networks			
Develop a GLIN-type network for North Coast (or partner with GLIN)	11	3.2	4.0
Lake Ontario research facility	11	3.1	4.0

Figure 1. Ranking of Lake Ontario coastal research ideas from "Developing a Research Agenda for New York's Participation in Great Lakes Restoration", March 2005.

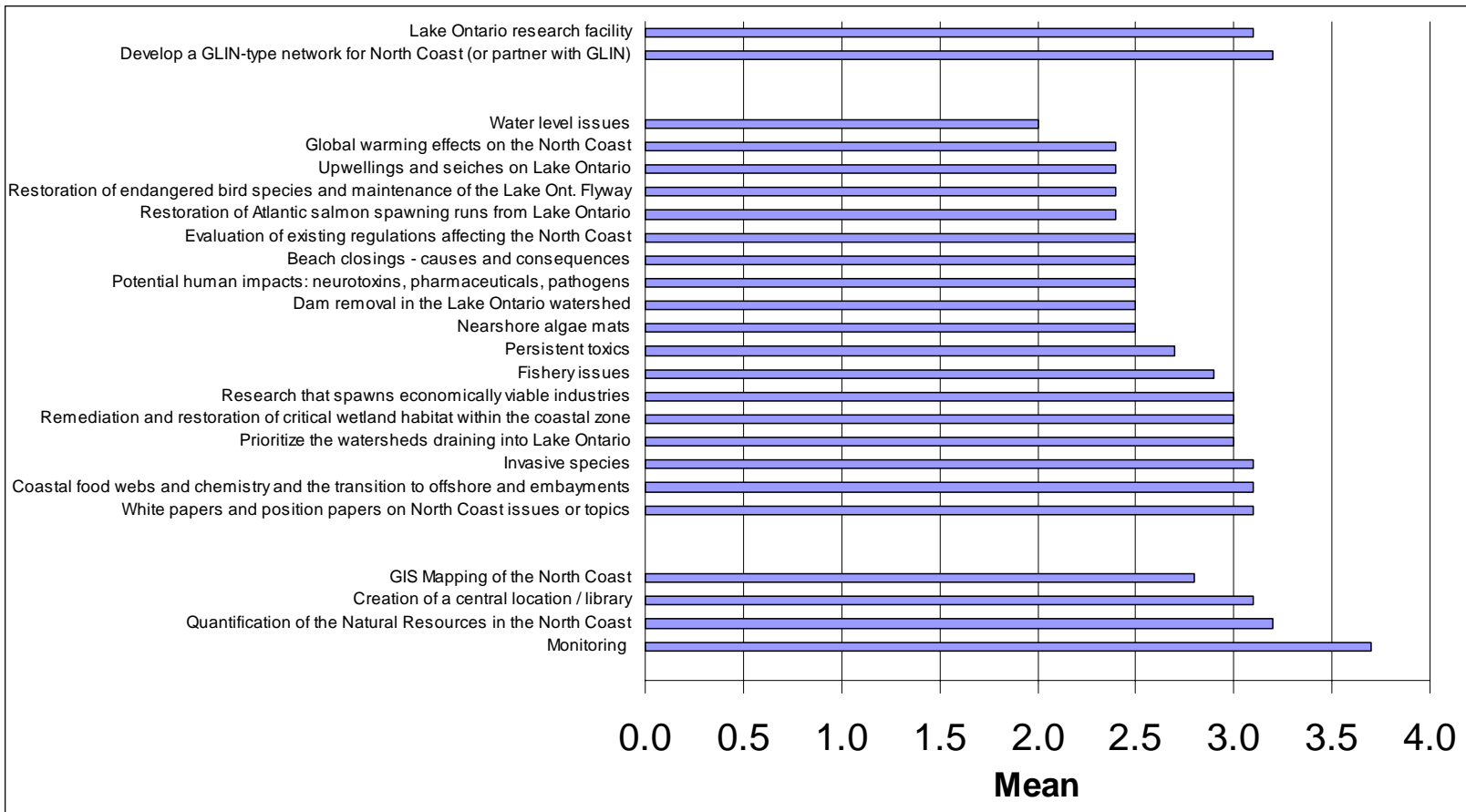


Figure 1. Ranking of Lake Ontario coastal research ideas from "Developing a Research Agenda for New York's Participation in Great Lakes Restoration", March 2005.

Appendix D. Survey questions and rankings from participants in the workshop.

General Ideas/Outline of Thoughts/Starting Places for a Research, Restoration and Remediation Agenda

Center for Environmental Information
Lake Ontario Coastal Initiative – The North Coast Initiative

Structure and Function

1. Two types of research should be funded: long-term monitoring of sites to determine trends and topical short-term projects.
2. Identification research ideas / priorities
 - a. A list of current research ideas and topics should be compiled
 - i. The list should be separated into categories such as immediate need, medium time-frame, long term need
 - ii. Research should also be identified as to the time frame needed to complete a project such as:
 1. One-time only
 2. Multiple years or field season
 3. Ongoing long term
 4. Permanent
 - iii. Levels of necessary funding needed to complete each project should be addressed such as:
 1. Compilation of existing information
 2. Can be funded from existing North Coast research budget
 3. Requires additional funding from an outside source
 - b. Where do future research ideas / topics / priorities come from?
 - i. Workshops
 - ii. RFP process initiated by the North Coast research group
 - iii. Priorities identified by other granting agencies such as Sea Grant, USEPA, USFWS, USDA, NYSDEC, etc.

Research, Restoration and Remediation ideas / priorities

SCALE 4 = high priority
1 = low priority

Creation of a central location/library 11 respondents
Average =3.1
Mode =3.0

1. **Compilation of research, results and data that completed on the North Coast.** There is a lot of information in the gray literature. By consolidating this information, we will be able to analyze and archive this information. This will also aid in the historical database that can be used for trend analysis as well as prevent redundancy in further research.

- a. From local universities
 - i. Master's and PhD theses
 - ii. Research projects
- b. Government Agencies
 - i. NYSDEC
 - ii. USFWS
 - iii. USGS

- c. Great Lakes Research Consortium
- d. FL-LOWPA projects at the County level
- e. Lake owner and bay associations
- f. Anecdotal history

MONITORING/MAPS/INFORMATION

11 Respondents

Average =3.7

Mode =4.0

1. Long term monitoring. There is a need for the establishment of a sustained long-term data set from the North Coast of Lake Ontario. No grant money exists for long-term monitoring which is the basis for adaptive management. The data set should establish a baseline or benchmark from which to measure future trends.

- a. The data should come from a diverse set of sampling locations so as to adequately represent the variations of the North Coast in terms of habitat, physical topography and geography
 - i. Sites should be located along the shoreline of Lake Ontario
 - ii. Include the major tributaries
 - iii. Include the major embayments and ponds
- b. Links to other historical databases should be considered when selecting site locations and parameters. This will add to the significance of the data set.
 - iv. GLNPO phytoplankton, water chemistry and zooplankton
 - v. SUNY Brockport's historical sampling stations
 - vi. USGS cruise data
- c. Parameters that could be monitored
 - vii. Phosphorus
 - viii. Other nutrients
 - ix. Discharge and loading for the tributaries
 - x. Chlorophyll a
 - xi. Secchi disk
 - xii. Harmful algae blooms – microcystin, anatoxin
 - xiii. Macrophyte beds for the embayments – photography?
 - xiv. Phytoplankton and zooplankton
 - 1. Samples should be collected – expensive to analyze
 - 2. May not have samples analyzed but rather archived.
 - xv. Near shore algal mats
 - xvi. ?

2. Quantification of the natural resources in the North Coast. 11 Respondents

Average =3.2

Mode =4.0

The assigning of both a geographic component (i.e. square miles or percent of the nation's coastal marshes) as well as an economic component to this quantification will serve to help determine the 'worth' of this ecosystem. This data will be important for leverage in subsequent discussions with politicians as well as for future proposals for funding for North Coast projects.

- a. Identification and quantification (environmentally and economically) of the North Coast's resources
- b. Coastal Wetlands
- c. Inland wetlands
- d. Coastal marshes
- e. Near shore islands
- f. Embayments
- g. Drown river mouths
- h. Safe harbor ports
- i.

3. GIS mapping of the North Coast.

Eleven Respondents

Average =2.8

Mode =3.0

A digital data base of both the aquatic and near shore areas of the North Coast will aid this group in presentations, research analysis, maps, and proposals.

- a. Do they exist already?
- b. Having digital files of the North Coast available for documents, reports, maps, web site and proposals would be invaluable.

RESEARCH

1. Prioritize the watersheds draining into Lake Ontario. Eleven Respondents

Average =3.0

Mode =3.0

The "health" of the North Coast is determined in large part by the magnitude of the components in the discharges of watersheds in the system. By prioritizing the watersheds in terms of the parameters listed, we can best determine where and how to remediated the offending watersheds.

- c. Discharge
- d. Nutrient loading
- e. RAP status
- f. PWB listing
- g. Land use
- h. Soil loss
- i. Toxic discharge
- j. Remediation impact

2. White papers and position papers on North Coast issues or topics.

Ten Respondents

Average =3.1

Mode =3.0

Presented is a partial list of issues or topics that may be of interest to users of the North Coast. By commissioning white papers or position papers on miscellaneous topics, the North Coast group will be on the forefront with respect to information on North Coast issues.

- k. Wind farms
- l. Aquaculture potential of Lake Ontario and the North Coast
- m. Boat races on Lake Ontario
- n. Promotion of underutilized fish species on Lake Ontario
- o. Preservation of critical habitat
 - i. Should be identified
 - ii. Nature Conservancy
- p. Bluff preservation
- q. Lighthouse preservation
- r. Diving on shipwrecks
 - i. Economically viable?
 - ii. Park or historical designation
 - iii.

4. Nearshore algae mats.

Eleven Respondents

Average = 2.5

Mode = 3.0

Nearshore algal mats are increasingly becoming one of the major complaints of North Coast residents and resource users.

- a. Quantify the problem
- b. Identify causes
- c. Suggest remediation efforts

5. Coastal food webs and chemistry and the transition to offshore and embayment waters. What affects them? How important are they?

Average =3.1

Mode =3.0

6. Research related to restoration of Atlantic salmon spawning runs in Lake Ontario. Some work has been attempted in Irondequoit Creek and Johnson Creek (dam removal).

Eleven Respondents

Average =2.4

Mode =2.0

7. Research on dam removal in the Lake Ontario watershed. There has been a push for dam removal in many areas of the country with the hope to return to a more 'natural' ecosystem. This group should be aware of the possibility that a call for this type of change may occur in the North Coast of Lake Ontario.

- a. Is there a call for this?
- b. What is the ecological and economic impact of removing dams in the Lake Ontario watershed?

Eleven Respondents

Average =2.5

Mode =3.0

7. Research related remediation and restoration of critical wetland habitat within the coastal zone of Lake Ontario.

Eleven Respondents

Average =3.0

Mode =3.0

8. **Research related to the restoration of endangered bird species such as the Black Tern and the maintenance of the Lake Ontario flyway.** How do we maintain biodiversity with increasing human use of the coast and its wetlands.

Eleven Respondents

Average =2.4

Mode =2.0

9. **Invasive species.** The assault of non-native species on aquatic and nearshore terrestrial areas is one of the most pressing environmental issues of our time.

Eleven Respondents

Average =3.1

Mode =4.0

- a. Prevention of new introductions
- b. Study the modes of introductions to Lake Ontario
- c. What is the potential for new introductions?
- d. What is the ecological and economic impact of current and spreading exotic species
 - i. *Cercopagis*, ruffe, goby, purple loosestrife, zebra mussels
- e. Asian carp prevention

Eleven Respondents

Average =2.4

Mode =3.0

10. **Upwellings and seiches on Lake Ontario.** These physical limnological phenomena have been cited as causes of fish kills, beach closures, erosion, widespread lake fog, etc. and affect their impact is primarily on nearshore areas. They are poorly understood on Lake Ontario and are not being forecasted as they are in other Great Lakes.

- a. What affects do these phenomena have on the North Coast?
- b. Are they the cause of fish kills, algae die-off's, beach closings, etc?
- c. What is the frequency and economic impacts of upwellings and seiches?
- d. Can we better forecast these events? Modeling.
- e.

11. **Potential Human Impacts: Neurotoxins, pharmaceuticals, pathogens,** bacterial levels in the nearshore and embayments? How high? Do they exist? Spatial and seasonal occurrence.

Eleven Respondents

Average =2.5

Mode =2

12. **Beach closings? Causes and consequences.** Investigate the predictive model used by the City of Rochester?

Eleven Respondents

Average =2.5

Mode =2.0

13. **Evaluation of existing regulations affecting the North Coast.** The following topics represent some of sociological and societal aspects to issues on the North Coast.

Eleven Respondents

Average =2.5

Mode =3.0

- a. Are our current regulations for STP's, SPEEDES permits, etc. adequate?

- i. Eg. What levels of phosphorus can Lake Ontario handle?
 - ii. Model increases or decreases?
- b. Evaluate the Lake Ontario watershed for TDML's for phosphorus and other nutrients, soil and toxics
- c. Evaluate the Lake Ontario watershed for nutrient or pollutant trading potential
 - i. Grants have been available that target this approach
- d. Re-evaluate the fish consumption advisories for the North Coast region
- e. What is the impact on humans to pollutants in Lake Ontario?
- f.

14. **Global warming effects on the North Coast.** The effects of global warming will be most evident on nearshore areas.

Eleven Respondents
Average =2.4
Mode =2.0

- a. Study the impact of global climate change on North Coast
- b. Grant money has recently been available for this type of research.

15. **Persistent Toxics.** Has there been any improvement in PBT in AOC along the coast? What are the release rates? Where are they? Bioavailability to nearshore food webs?

Eleven Respondents
Average =2.7
Mode =2.0

16. **Fishery issues.** The Lake Ontario fishery is a shining light and an important economic success story. The fishery should be closely monitored, vigorously promoted and improved.

Eleven Respondents
Average =2.9
Mode =3.0

- a. Restore native species and spawning habitat restoration especially in the watersheds
- b. Forage fish base
- c. Access for fisherman on the North Coast
- d. Promotion of underutilized species
- e. Impact of goby and ruffe introductions on endemic and economically desirable fish species
- f.

17. **Research that spawns economically viable industries.** There has been a push for research that can add an economic component to its results. This is especially true for New York State

Eleven Respondents
Average =3.0
Mode =3.0

- a. Open water aquaculture
- b. Using the lake for energy – i.e. wind power, cooling water
- c. Commercial fishing
- d. Charter boat fishing
- e. Sea-camps
- f. Scuba diving destinations
 - i. Ship wrecks, battle ships, parks, tours
 - ii.

18. **Water level issues.** No other issue is more vocally addressed by lakeshore property owners than lake water level.

- a. Ties in with wetland restoration, biodiversity, etc

Eleven Respondents

Average =2.0

Mode =2.0

Facilities/ Networks

1. Develop a GLIN-type network for North Coast (or partner with GLIN). GLIN is the Great Lakes Information Network run out of the Great Lakes Commission and supported by organizations like Ameritech Foundation, U.S. Department of Commerce, National Telecommunications and Information Administration, U.S. Environmental Protection Agency-Great Lakes National Program Office, U.S. Army Corps of Engineers, Detroit District, Environment Canada, U.S. Geological Survey, Federal Geographic Data Committee, Great Lakes Protection Fund, Council of Great Lakes Governors. The network compiles and disseminates Great Lakes information via a web site and email subscription lists.

Eleven Respondents

Average =3.2

Mode =4.0

- a. Currently very little of this information is about Lake Ontario.
- b. Compiles all current North Coast information from research, newspapers, media
- c. Export via the media –
 - i. Radio - i.e. Great Lake Radio network
 - ii. Web site
 - iii. Or partner with GLIN to raise the profile of information from Lake Ontario
- d. Align current like-minded organizations
 - i. Great Lake united
 - ii. Great Lakes protection fund
 - iii. Great Lakes Commission
 - iv. IJC
 - v. Etc.

2. Lake Ontario Research Facility. The realization of a state of the art lakeside research facility on Lake Ontario will greatly enhance mission of the North Coast. The facility will allow a platform and vessels for North Coast research projects as well as increase the likelihood of large-scale research dollars flowing into the Lake Ontario system. Lake Ontario is the only Great Lake that does not have a dedicated research facility of this type on its United States shore.

Eleven Respondents

Average =3.1

Mode =4.0