

(Rev. Aug 8, 2005)

DRAFT

**Great Lakes Research Coordination Strategy
Workshop**

Workshop Proceedings

Chicago, Illinois

April 28 – 30, 2004

Sponsored by the International Joint Commission's Council of Great Lakes Research Managers,
Environment Canada and the NOAA Great Lakes Environmental Research Laboratory

Hosted by the U.S. Environmental Protection Agency Great Lakes National Program Office,
Chicago, Illinois

Executive Summary

The Great Lakes Research Coordination Strategy workshop was held at the U.S. Environmental Protection Agency Great Lakes National Program Office in Chicago from April 28 through the 30th, 2004. There were 33 attendees representing both U.S. and Canadian organizations throughout the Great Lakes basin. This included 14 members of the Council of Great Lakes Research Managers (CGLRM).

The need for improving overall coordination of Great Lakes, Coastal and Ocean activities has been emphasized repeatedly in recent reports from the IJC, the U.S. Government Accountability Office, the Canadian Auditor General, the Pew Oceans Commission and the U.S. Commission on Ocean Policy. The CGLRM chose this issue as a priority activity for the 2003 -2005 reporting period, recognizing the opportunity for the two governments to address improved research coordination during the upcoming review of the Great Lakes Water Quality Agreement.

The purpose of the workshop was to address the need for a binational Great Lakes research coordination strategy. This was defined as an overarching framework for Great Lakes research management and a mechanism for international cooperation to describe how the region will collaborate, organize and coordinate large scale research projects. The workshop provided a basis for Council advice and recommendations to the International Joint Commission.

The workshop was organized in two sessions. The first day and a half public session consisted of U.S. and Canadian perspectives on regional coordination. Presentations were made about lessons learned from regional or problem driven coordination efforts, lake-wide coordination efforts and collaborative approaches. During the two half-day sessions that followed, members of the CGLRM and other advisors met to identify the elements of the research strategy and how to move forward with the initiative.

Findings:

The goals of the strategy include: promoting effective collaboration, avoiding duplication, applying a holistic ecosystem approach and effectively communicating science with a consistent message throughout the basin. The strategy will promote and facilitate collaborative research proposals and provide for an informed research funding process that can address all categories of research in a strategic, effective and flexible manner.

An effective research strategy should include the following attributes:

- Guiding principles

- Clearly defined terms, roles and processes, including a list of cooperating agencies and organizational chart(s).
- A role for a key coordinating body
- A communications plan or sub-plan regarding how agency plans will be communicated to all participating agencies around the basin and how urgent issues/needs will be communicated to the public and decision makers.

The plan should address requirements for effectively carrying out both long term projects and short term thematic or problem driven research involving rapid response and pooling of resources. The strategy should take advantage of existing organizations and avoid reinventing things that are working well. It should also address the process of setting research priorities; providing some basic principles, structure, and mechanics of how priorities are looked at and set.

Three sources of research should be addressed:

- Management driven research (focused on recognized needs);
- Thematic issues (not yet recognized by managers);
- Emerging issues (the surprises)

The workshop participants used a process employed by the Lake Erie Millennium Group to identify specific activities that should be incorporated in the plan. This process is defined by addressing a series of questions regarding the origin and fate of ideas about areas of research to be pursued in the Great Lakes basin.

Questions addressed:

1. Where will the ideas come from?
2. Where will the issues come from?
3. Who will synthesize the ideas into a theme?
4. Who will promote the theme?
5. Who will advertise the theme and get participants?
6. Who will organize the logistics of the theme?
7. Who will coordinate the resources?
8. Who will coordinate the reporting/databases, etc?

1. Where will the ideas come from?

Three sources of research typically drive activity in the region. Management driven research ideas come from well recognized needs such as fisheries management and control of lamprey. Thematic research ideas come from issues such as chemicals, pathogens, invasive species, habitat loss and anthropogenic effects that are not fully understood. Emerging issues are surprises, such as unexpected bird and fish kills that need to be studied in

order to answer public concerns and to inform management decisions. Recommendations from participants included:

- Consulting with Science Advisory Groups (expert consultations);
- Developing a stable funding source for Great Lakes research workshops;
- Coordinating with existing workshops/conferences such as those sponsored by the International Association for Great Lakes Research (IAGLR); Sponsoring new research oriented thematic workshops;
- Using the internet to gather input from "Cyber Seminars".

2. Where will the issues come from?

An effective communications plan should be used to ensure rapid and effective communication at all levels. Researchers in touch with what is happening in the field need to be assured that new ideas will receive the attention and full consideration of decision makers. It was recommended that the strategy include developing a well known forum where people know they can bring an idea that will be discussed through the entire Great Lakes community.

3. Who will synthesize the ideas into a theme?

The outcome of the workshops, cyber seminars and teleconferences would be a recommended research theme that could be considered for funding.

4. Who will promote the theme?

Participants suggested this as a possible role for the CGLRM, as well as facilitating peer review, media events and other public promotions.

5. Who will advertise the theme and get participants?

It was recommended that the CGLRM serve as a "Clearing House" where Requests for Proposals (RFP's) from agencies could be easily accessed and publicized using the Council website. The CGLRM list server could be used to advertise when and how RFPs would be released; early pre-award planning information. Partnerships would be formed with existing research consortiums, academic institutions, the Great Lakes Commission, the Council of Great Lakes Governors, individual government agencies and non-governmental organizations to gain broad support.

6. Who will organize the logistics of the theme?

Recommendations included: contracting with experts from the scientific community, designating a separate coordinating entity at the choice of partnering agencies that would be structured to receive funding, partnering with private industry and equipment suppliers. It was also suggested that

existing agency logistics personnel and database managers be utilized as much as possible, with well-defined work plans, timelines and funding.

7. Who will coordinate the resources?

Recommendations for resource coordination included the CGLRM as a workshop sponsor, forming a committee to coordinate Great Lakes Resources and a coalition of agency heads. It was suggested that the Council consider the National Oceanographic Partnership Program as a model interagency working group for this purpose.

8. Who will coordinate the reporting/databases, etc.?

It was recommended that a portal for data housed at other agencies be provided and that the strategy align with the data management plan for the Great Lakes Observing System (GLOS).

It was suggested that the CGLRM or a reformulated research coordination council be established where issues & themes (for example from a workshop) could be reported. The coordinating body would discuss the pros and cons of the workshop recommendations; obtain a consensus; identify agencies that wish to contribute and funding sources. The result would be a truly coordinated research project that could be of substantial scale.

The Council members decided to incorporate the attributes described above in a draft research coordination strategy. Participants recommended that the U.S. and Canadian governments consider including a research coordination process as part of a revised Great Lakes Water Quality Agreement as they proceed with the review of the agreement.

Table of Contents

<i>Executive Summary</i>	2
<i>Table of Contents</i>	6
<i>Acknowledgements</i>	7
<i>Introduction</i>	7
Background	8
<i>Presentations and Discussions</i>	10
Welcome and Workshop Logistics.....	10
Workshop Goals and Objective	10
<i>United States and Canadian Perspectives on Research Coordination</i>	11
Coordination Needs – U.S. Congressional Perspective	11
Questions, Answers & Comments	11
The Need for Regional Coordination - Canadian Perspective	13
Questions & Answers	15
<i>Regional/Problem Driven Coordination Efforts</i>	16
Large Scale Ecosystem Restoration: Preliminary Lessons and Guidance for the Great Lakes.....	16
Questions & Answers	17
Coordination of Large Scale Assessment of Hypoxia in the Gulf of Mexico.....	17
Coordination of the Green Bay and Lake Michigan Mass Balance Studies	18
International Coordination of Coral Reef Research	19
Panel Discussion	20
<i>Lake-wide Coordination Efforts</i>	23
International Field Year of the Great Lakes (IFYGL)	23
Questions & Answers	24
Great Lakes Fisheries Commission-Fisheries Research Coordination	24
Questions and Answers.....	25
Lake Erie Millennium Network (LEMN)	25
Questions and Answers.....	27
EEGLE Project - Episodic Events – Great Lakes Experiment	28
Questions, Answers and Comments	29
Panel Discussion	29
Summary of Day One and Wrap-up	32
<i>Goals & Objectives for Day Two</i>	32
<i>Collaborative Approaches/Partnerships</i>	33
Canada-Ontario Water Use and Supply Project.....	33
Upper Lakes Environmental Research Network	34
Pollution from Land Use Activities Reference Group (PLUARG) Study	35

Panel Discussion	36
The New York Great Lakes Research Consortium	39
National Oceanographic Partnership Program (NOPP) & the National Ocean Research Leadership Council	39
Questions and Answers.....	41
Council of Great Lakes Governors	41
Sea Grant	42
Panel Discussion	44
Concluded Public Session.....	46
Coordination Strategy	48
<i>Summary of Major Points and Recommendation</i>	48
<i>Observations & Workshop Summary, Plan for Moving Forward & Concluding Remarks</i>	51
<i>Attachments</i>	52
(1) List of Attendees	52
(2) Workshop Agenda	55
(3) Workshop Presenters	60
References	65

Acknowledgements

The Council thanks the International Joint Commission, Environment Canada – Ontario Region, and the National Oceanic and Atmospheric Administration’s Great Lakes Environmental Research Laboratory for sponsoring this workshop and the United States Environmental Protection Agency’s Great Lakes National Program Office (GLNPO) for hosting the event at their office in Chicago, Illinois. We appreciate all the extra effort put forward by the staff at GLNPO especially Pranas Pranckevicius for preparing a CD of all workshop presentations for the Council of Great Lakes Research Managers and all workshop attendees. We appreciate the professional manner in which the administrative support staff and technicians at GLNPO handled all of the details associated with the workshop. We thank Amber Lahti, Project Coordinator for the Upper Lakes Environmental Research Network in Sault Ste. Marie, Ontario for facilitating a lively and opinionated discussion and Angie Wagner, Administrative Assistant/Special Events Coordinator for the Upper Lake Environmental Research Network for helping to capture these proceedings in the report.

Introduction

The Great Lakes Research Coordination Strategy Workshop was held at the U.S. Environmental Protection Agency Great Lakes National Program

Office in Chicago from April 28 through the 30th. There were 33 attendees representing both U.S. and Canadian organizations throughout the Great Lakes basin. This included 14 members of the Council of Great Lakes Research Managers. A complete list of attendees is included at the end of this report.

The purpose of this workshop was to address the need for a binational Great Lakes research coordination strategy. The strategy is defined as an overarching framework for Great Lakes research management; a mechanism for international cooperation that describes how the region will pull together to organize and coordinate large scale research projects. This workshop report provides a basis for Council advice and recommendations to the International Joint Commission.

Great Lakes research is carried out on all aspects of the Great Lakes ecosystem by more than 130 public and private organizations within the 2 countries, 8 states, and 2 provinces around the basin (Great Lakes - St. Lawrence Research Inventory). The complex needs of the future demand that these organizations nurture a strong collaborative spirit and create mechanisms for cost-effective national and international cooperation. Additionally, the Great Lakes region as a whole needs a coordinated approach in order to successfully obtain federal support for large scale restoration efforts. In the past, the greatest advances in science have been achieved in the Great Lakes when the entire region pulled together all of the resources of the Great Lakes community to address a given problem. These successful collaborative efforts can help guide the future. This workshop aimed to capture lessons learned and identify a blueprint for future binational collaboration.

Background

The research coordination strategy workshop took place during a period of intense interest in improving overall coordination of Great Lakes, Coastal and Ocean activities. The Pew Oceans Commission had released its report to the nation with recommendations for a new ocean policy in May 2003. In April 2004 the U.S. Commission on Ocean Policy released its preliminary report, which was widely read and commented on by numerous organizations including the International Joint Commission. Shortly after the workshop, a May 2004 Presidential Executive Order created a cabinet-level interagency Task Force and a "Regional Collaboration of National Significance" in the United States. Many of the workshop participants are involved in the Great Lakes Regional Collaboration, the Canada – Ontario Agreement, the U.S. Policy Committee's Great Lakes Strategy 2002, Annex

2001 work and the State of the Lakes Ecosystem (SOLEC) conference. The workshop participants therefore have a great deal of perspective to share with the Council to temper its recommendations and advice to the International Joint Commission.

Past experience has shown that early and effective response to new threats to the Great Lakes ecosystem can help the region avoid expensive, long term control measures. There is a widely recognized need for a well defined binational coordination mechanism to help focus the efforts of U.S. and Canadian researchers as they react to, and address Great Lakes research needs. In addition, several recent, large scale funding proposals for Great Lakes restoration and protection have been proposed, prompting discussion about how such basin-wide or lake-wide projects can be better coordinated between multiple jurisdictions. The Council sees the development of a research coordination strategy as a key step towards effective management of such projects.

Presentations and Discussions

Wednesday, April 28, 2004

Welcome and Workshop Logistics

Paul Horvatin of the EPA.

Workshop Goals and Objective

*Stephen Brandt, Director, Great Lakes Environmental Research Lab -NOAA, Ann Arbor, MI
Harvey Shear, Regional Science Advisor, Environment Canada, Downsview, ON*

The Council co-chairs welcomed all of the participants to the workshop and discussed goals and expectations.

Key points:

- This workshop will set the stage and spearhead the effort for coordination of Great Lakes research.
- Issues in the Great Lakes have become far more complex over the years.
- Conflicting uses are important issues now, as well as international cooperation.
- Great Lakes Observations, and an integrated system for communicating those observations, are critical elements necessary to enable ecosystem forecasting and ecosystem understanding.

Purpose of the workshop:

- To define needs (including sensor technology and deployment) for an open-water Great Lakes observing system that is required to address key scientific questions related to the Great Lakes ecosystem.

Goals of workshop:

- Assess State-of-the-Art and Future Sensor Technology
- Assess Data Transmission and Observing System Networks
- Evaluate what may be applicable to and needed for future research in the Great Lakes

Recommendation:

- Once the Council comes up with an overarching framework, that it be tested by developing an International Field Year of the Great Lakes II (IFYGL II) focusing on Lake Erie and that ecosystem forecasting be used as an overarching concept.

United States and Canadian Perspectives on Research Coordination

Coordination Needs – U.S. Congressional Perspective

Amy Carroll, U.S. House of Representatives Committee on Science, Washington, DC

Key points:

- Provided Congressional perspective as to why Congress keeps asking for coordination strategies.
- The Science Committee has jurisdiction over a number of organizations involved with the Great Lakes.
- Always try to focus on the strong science needs for coordination and research programs.
- No new money is available for programs not related to defense or homeland security.
- There will need to be strong justification for Great Lakes funding due to the fact that budgets are being curtailed for the next few years.
- This workshop will discuss how to coordinate around priorities but it is important to decide what those priorities are and how they are laid out.
- The Great Lakes region needs to articulate who is responsible for management decisions, science decisions, etc.; Congress favors this approach.
- This approach will also help State and local research managers.
- Congress hasn't yet seen a plan for the Great Lakes that everyone has bought into.

Questions, Answers & Comments

The Great Lakes community really pulled together back in the 70's. What went wrong in the interim is that we have identified a whole range of lake issues & problems. It is difficult to come up with a consensus on which are most important. Does Congress feel we can't decide which problem to focus on?

Yes, this is a major problem.

The 2002 Great Lakes Strategy was just an accounting of what was out there, but there was no prioritization. There is a need to narrow down the number of indicators to monitor. We need expert input to help format decisions.

There is often confusion about issues and research priorities that people have been dealing with. Research priorities are somewhat easier and

usually interconnected. How do you sell a multi-agency collaboration without tying it to issues?

It needs to be tied in to the mission of the management agencies in the region. It needs to be clear how it will help the mission of the agency by using the words from the mission of the groups. It needs to have performance goals that can be measured, some kind of measurable goal that you can get to.

The Great Lakes has a great coordination research plan but it is not a selling plan. Congress expects us to do that but you have to identify a priority and that will make a difference as to whether funding will be increased or not.

EPA coordinates water quality issues; the Great Lakes Environmental Research Lab is coordinating U.S. research issues in the Great Lakes. NOAA is responsible for coordinating activities of coastal oceans. This is different than the Great Lakes. No one is identified as a leader for coastal and oceans research in the Great Lakes. Ecosystem based management makes sense to everyone when the whole watershed is taken into account. Land-based expertise, ocean-based expertise, etc. is needed.

Great Lakes managers should go with what is specified in the law and conduct stronger oversight to make sure people are doing what they are supposed to do.

To build a good strong science program that serves multiple management needs, there needs to be an influx of management money for the Great Lakes.

What about money for solving problems? Not much hope that the restorations bills will have it. I don't see \$800M more dollars coming to the Great Lakes for management in the near future; there will need to be a much smaller number for priorities. The region needs to identify what can specifically be done with funding.

There were 120 indicators identified as part of the State of the Lakes exercise. That number has been reviewed and the number of indicators is now less. SOLEC managers are trying to identify the highest priority indicators that have to be measured. The indicator set will help drive monitoring and research.

There is a need to articulate a focused plan in order to convince Congress to act. Is there any value at all in articulating what will happen if the current situation and levels of funding continues? The amount of money going into

the Great Lakes lately has been going down; there are also population issues.

Use this to catch someone's attention. You need to identify both the problem *and* how to solve it.

The Chesapeake Bay watershed is perceived as a much bigger problem than the Great Lakes. Yet the Great Lakes are a national treasure and worth fighting for. How do you get this across to a representative? One could approach an individual politician but that may not always be the answer.

It appears that things are coordinated by the IJC but when other small groups come up with strategies, they try to convince Congress that their way is the best way to go. The Science Committee has many people with experience but many times if you go to the personal office of a member, this person doesn't have time to evaluate all the different voices involved in the situation.

The Great Lakes region doesn't speak with one voice. Each organization has its own role; there are certain groups better at bargaining and lobbying. The Council should consider speaking with one voice so a composite picture can be coordinated with a strategy and presented to Congress. Different Congressional committees require different levels of convincing. The Council should clarify or define its role on how it may interact (or help the IJC interact) with Congress.

The Need for Regional Coordination - Canadian Perspective

James Lynch, Canadian Consulate General, Chicago

The Consulate General provided general impressions about the Great Lakes region and the need for coordination between Canada and the United States.

Key points:

- The Great Lakes are primarily in Ontario and part of the basin includes Quebec.
- Quebec has about 7M people with 3M in the Montreal area.
- There are 2 provinces and 8 states bordering the Great Lakes.
- It is important to find out where the need is and go forward with it.
- Canadians are in general not as involved with as many levels of intensity as in the U.S.
- Most Canadians do not understand the American system with regard to restoration, etc. and vice-versa.

- The Canadian level of complexity is less.
- The variety of political representatives is less complex when compared to the U.S.
- Although environmental issues are important, when most think about Great Lakes cooperation, they think "trade".
- More trade goes across the Windsor/Detroit bridge and tunnel than between the U.S. and Japan.
- Canada has a different political structure and a slightly different economic background: Trade represents 40% of Canada's GNP; autos make up about half of that trade.
- There are a huge number of issues related to the Great Lakes basin; the thrust of many of the initiatives comes from the U.S.
- There is a difference in terms of population involvement - Environment is not a main political issue in the U.S. but is higher on the agenda in the Great Lakes area.
- The Great Lakes is one of the top issues to Mayor Daly of Chicago.
- In contrast, Canada does not have the same source of public activity groups to push concerns forward.
- Needs have been identified to a certain extent, but more needs to be done to get the resources to deal with the problems.
- Invasive species is a top concern in the Great Lakes; shipping and widening the canals is another.
- From a Canadian point of view, the challenge is to take the needs identified by scientists and to make them more popularized.
- Health is the number one priority and needs additional funding.
- There may be a Canadian election this year.
- Canadian mayors may become more involved with the U.S. government, and then try to move Great Lakes issues forward (Great Lakes and St. Lawrence Cities Initiative.)
- There is a need for coordination; to make work relevant with limited dollars.
- Need to look at what's been done before in the U.S.; what's being done in Canada and fit it into the existing structure, look at the problems, and make more impact on the voting population, primarily in Ontario so all levels of government will be able to go forward.
- Need to focus on what joint scientific work can be done; identify areas where people can move forward in terms of money and effort regarding shared resources.
- Bear in mind differences in levels of involvement
- Great Lakes Annex2001 is an example, Bill C6 and water diversion problems; the approach adopted was a total prohibition of water diversions outside the basin.
- The federal government prefers a trigger that allows for diversion in order to implement solutions to identified problems.

- Remember the national differences that Canada and the U.S. have that will affect budgets.
- Environmental organizations need to publicize more with the Canadian public.
- In order to move forward with environmental issues, organizations must be able to defend all recommended actions and explain to the public why we should be doing it.

Questions & Answers

In 70's and 80's Canadians were farther ahead with environmental issues than the Americans. Losses occurred in many areas since then; what happened to the resources?

- We don't know for sure, but there has been quite a population growth in Ontario. Canada takes in about 250K people per year; most go to Ontario and it's putting demands on the system.

Trajectory for the future; what will it look like? I thought that Canadians were much more aware of Great Lakes issues.

- Perhaps the U.S. population is more engaged than we are right now. The real difference is that Canadian priority areas are different than the US. However the Great Lakes may be further ahead due to a focus on the issues at hand.

Ontario is looking at a number of issues, one of which may be air pollution. If coal power plants are replaced by natural gas, nuclear, etc., effects will be felt environmentally. The air pollution problem has increased due to the increase in population and may be a higher priority than pollution of the Great Lakes. In Ontario, there are approximately 5,000 premature deaths each year from urban smog. Many people feel pollution in the Great Lakes was already focused on in the past and there has been a decline in heavy industry and the deposit of pollutants into the Great Lakes in the 2 provinces and 8 states. Solutions from 20 years ago were supposed to result in better water quality but it's not working – we need a binational partnership with all scientists involved.

Regional/Problem Driven Coordination Efforts

Large Scale Ecosystem Restoration: Preliminary Lessons and Guidance for the Great Lakes

Karen Vigmostad, Great Lakes Policy Analyst-Ecosystem Team, Washington, DC

Key points:

- Dr. Vigmostad provided a handout: Preliminary Comparison of Six Large-Scale Ecosystem Restorations. (Note: At the time of the workshop, the National Sea Grant Program funded study was not yet complete; however it is now complete and available from the Northeast Midwest Institute's web site at www.nemw.org/restoration.htm.)
- The purpose of study includes what we can learn from other large scale ecosystem restoration initiatives to guide Great Lakes restoration.
- The study is looking at seven U.S. Eco-regions, components and methods.
- There are some critical events leading to restoration and funding: we need clear scientific understanding and consensus of significance and source of problems. "Understanding is the beginning of action"
- To make restoration easier and faster, the region needs buy-in by high level elected leaders; broad popular support; and aggressive measurable goals with dates.
- Factors that slow down or make restoration more difficult: Not enough money to get the job done; no penalty if deadline is missed; hard to sustain political momentum and no recognition that an individual's contribution is significant. Society is also reluctant to regulate farmers; and there is no recognized direct benefit from the investment of dollars and political commitments.
- What would move restoration forward? More money and knowledge; federal dollars and federal law; bold moves by top governors and senators; research, pilot studies and implementation. Other measures include re-energizing and focusing local efforts; requiring buffers through zoning, environmentally friendly building and "Change the way we do business in the watershed, the way we use land and resources."
- How will you know restoration efforts are successful? Meet goals, understand the status of the living resources; develop sophisticated statistics to couple long-term monitoring with modeling that can incorporate variation.
- Lessons for Great Lakes: Leaders must be the governors and senators; the voters drive these politicians; involve upstream local communities from the beginning; institute a limited voluntary phase and then start

regulatory action if voluntary fails. Focus efforts where the clean-up matters most and focus on the resource, not the organizations. The science must be credible and consensual; integrate research, monitoring, and modeling.

- Science is contested; don't hide controversy; look to social scientists, research, evaluation, conflict resolution, policy, systems thinking and economics.
- Package studies and present them to key leaders; get them to visit the lakes and foster political involvement at the highest levels.
- Science is necessary but not sufficient justification in itself; the region needs a plan with dollars and deadlines.
- The issue involves more than just impacts on human health; people care about the living resources and the region needs to report on the status of living resources.
- Solutions are forged at the local level.
- The region needs ecosystem "outcomes-based" measures and it needs comparable monitoring programs.

Questions & Answers

- When will the report be completed? Hopefully by the end of the summer.

Coordination of Large Scale Assessment of Hypoxia in the Gulf of Mexico

Don Scavia, Professor of Natural Resources and Environment and Director, Michigan Sea Grant, Ann Arbor, MI

Key points:

- Integrated Assessments (IA) can help shape a research agenda - Set the stage for basis of action plan success, outline scientific integrated systems approach and the implications for Great Lakes research.
- Context for this study: Setting was the Gulf of Mexico hypoxia problem; had an end point goal with specific dates - Was very tough getting to the goal, but the IA was essential.
- Process engaged all stakeholders; there were regular interactions between science and policy; open access to all information; a strong scientific integrated assessment (IA) was created.
- Integrated assessment is a formal science/policy bridge; steps involved:
 - Document status and trends
 - Describe causes and consequences of trends
 - Predict future outcomes under action scenarios
 - Provide guidance for potential actions

- Document uncertainties and science needs
- Scientific information gathered has to be related to the policy.
- An Integrated Assessment was drafted by five federal agencies; offered for public comment, public meetings were held
- Integration of Social Sciences, Natural Sciences, and Management needs helped make the IA successful
- Questions to address regarding development of an IA:
 - What initially prompted the effort? What is the policy question?
 - Who is the primary driver/organizer/sustainer?
 - How will it be coordinated?
 - What is the end point?
 - What is needed to improve future IAS?
- Address recommendations; identify key uncertainties/gaps

Coordination of the Green Bay and Lake Michigan Mass Balance Studies

Glenn Warren, U.S. EPA, Chicago, Environmental Monitoring & Indicators Team Leader

Key points:

- Green Bay is on Lake Michigan and is a recipient of effluent from the Fox River and industrialized areas, especially paper manufacturing. (Note: see <http://www.foxriverwatch.com/> for details)
- Polychlorinated Biphenyl (PCB) concentrations in fish tissue were high and not suitable for human consumption in the 1970's.
- Paper mills on the Fox River contributed to only 1% of PCBs and PCBs were there previously due to other factors.
- Paper companies were ordered to pay \$308 million dollars for the Fox River cleanup.
- Studies are needed to address specific environmental problems which require multi media, multi-collaborator research and monitoring to answer data needs, and provide a sound, scientific basis for environmental decisions.
- PCB concentration in Lake Michigan Lake Trout declined considerably in the 1980's
- The Green Bay and Lake Michigan Mass Balance Studies partnered monitoring data with the modeling group to provide information to managers.
- Planning efforts included numerous scientists and modelers; solicited input and cooperation; management structure development and timely requests for proposals that addressed sampling and analytical needs.
- Initial estimates on the quality of data were necessary as well as monitoring plans based on water quality needs and peer reviews.
- Planning participants/partners/collaborators were all listed.
- Mass Balance Study objectives were defined.

- Modeling results will be peer reviewed this summer.
- Recommended developing a database for the data by first choosing the simplest, usable database design.
- The Chicago/Gary area is a large source of contaminants to Lake Michigan.
- Cooperation among agencies is most often driven by dollars
- Studies must define the recommendations.

International Coordination of Coral Reef Research

Peter Sale, Professor, Biological Sciences, University of Windsor

Key points:

- Coral reef research has traditionally been done at a local scale, by single investigators, in contrast to open-water marine science.
- International coordination of coral reef research began in the late 60's with an international conference held in India; the international coral reef symposia now occur every four years with the 11th international symposium this summer in Japan.
- Problems and scientific questions concerning coral reefs are becoming bigger and need new kinds of analysis.
- Need new scientific answers for sustainability.
- Some of the problems include over fishing, uncontrolled coastal development, global climate change, and pollution.
- Don't know how corals respond to particular kinds of pollutants.
- Connectivity is central to most of these problems (a measure of the flux between local areas of reef).
- One of the biggest questions is how coral reef systems are connected to one another and to neighboring aquatic and terrestrial ecosystems. This question is central to the project I am describing.
- What prompted the effort? Had to build larger projects; there was little time to waste; how do you fund million dollar projects in a system used to spending thousands? - Few developed countries have coral reefs – why spend millions of dollars on projects with no national payoff?
- Rain forests have more species in them than coral reefs do.
- This project was driven by the World Bank, Environment Department, and people concerned about the fate of coral reefs.
- Healthy reefs are of immense economic development to the surrounding areas, so human quality of life is bound to reef health.
- Discussions were initiated among scientists; what were the most critical issues that needed answers if management of reefs was to be improved?
- Much consulting took place resulting in six core topics being identified.

- A plan was developed by 2001 which included the six components, six critical topics, for a demonstration approach that could be used at a later date.
- Detailed planning then took place; a working group was convened to plan each of the six components. The connectivity group met three times over 18 months.
- Collaborators were also involved.
- A proposal was developed for a five year research project.
- Preliminary approval for funding has been given; final decision will be in June of 2004.
- Implementation is planned for late 2004
- Structure includes a synthesis panel, 6 working groups, regional Chairs of Excellence, and other collaborators.
- Components are depending heavily on matching funds.
- It is difficult to maintain participation by a large globally distributed set of scientists when funding sources are diffuse.
- The approach is dictated by the funding sources being targeted.

Note: Received an update from Dr. Sale in May 2005: Project funding was approved in September 2004, the official start date was 1 Dec 2004, funding actually flowed in April 2005. The first phase is 5 years to Nov 2009.

Panel Discussion

Don Scavia, Karen Vigmostad, Peter Sale, Glen Warren, moderated by Steve Brandt

Comments, Questions and Answers:

- The Gulf of Mexico zone was unexpectedly charismatic.
- Part of the integrated assessment could not demonstrate any economic impact but it didn't stop the public from declaring that 7,000 sq. miles of low oxygen was a bad thing.
- It helps to have a crisis to prompt action.
- Need to come up with 80% of the money to keep things healthy.
- People have a sense there is something unhealthy here and they don't want it.
- If the Gulf of Mexico study had been done 25 years ago, the Great Lakes would have been the entity doing the teaching for all the others.
- Where did we go wrong? What's changed such that the Great Lakes are now in a position to be on the receiving end of lessons learned instead of where we were 25 years ago?
- The Chesapeake Bay people always look to the Great Lakes for answers.
- Invasives, nutrients, atmospheric – they are so complex; how do you get a single story?

- It's a real challenge to shift baselines.
- The public and media are looking at the world relative to last year, not 30 years ago.
- People think the Great Lakes have been fixed because Lake Erie has come back to life but Mercury levels are still high.
- The environmental community in the Great Lakes has not done a good job in general in informing the public how great the problem is.
- The population is double what it was 40 years ago and has had adverse effects.
- Were there sliding scales for matching funds for different organizations?
 - 50% is funded; 50% has to be found (salaries, time, banks, philanthropic organizations, etc.)
- Is the issue of the Great Lakes becoming so complex that we need to subdivide in order to have usable models?
 - Yes; the complexity of the issue is what's killing us.
- What happened with zebra mussels? There was not a huge influx of money.
 - This issue may have come at the wrong time. Across the board cuts of 30% were happening ('93-94) in order to reduce the Canadian deficit. Now there is the issue of homeland defense.
 - We didn't have scientific conversation already going on about invasives.
 - Times were hard for money; many became experts on zebra mussels; became a feeding frenzy; nothing was coordinated as far as obtaining funding.
- One of the problems is the complexity of the issue; do you focus on invasives, pollutants or something else?
 - Need to focus on the complexity of the situation.
 - Take a careful look at climate change and the impacts; things that will become a problem for the Great Lakes.
 - We may have a handle on building an approach for a program that is broader than a single issue.
- What kinds of climate change are going to happen in this part of North America?
- Lake Erie emphasis on phosphorous and the anoxic area of the lake has received no press or public interest to make a difference.
- Other nutrient related issues are visible to the public (e.g. wash-ups on shore)
- Need to be tracking disasters as well as good news stories in the media to promote public awareness.
- It is frustrating going to meetings where there are so many plans for the Great Lakes.

- The region needs integrated work for the Great Lakes in order to have Congress fund a serious integrated plan for the Great Lakes.
- The reason people will want to come and stay in the area depends on the health of the Great Lakes.
- We need to address the problem. We need to get the public and Congress excited.
- Scientists can't make a case directly to agencies or Congress; the public needs to make the case.
- Restoration is becoming a victim of not having a problem identified.
- We need to have a focus, whether it is geographical or topical.
- The Great Lakes represent a spectrum of aquatic environments.
- We could still focus an effort on Lake Erie; involve comparative studies in the Great Lakes.
- Ontario is focusing on air quality due to premature deaths.
- Had a lot of ecosystem based research, but the only areas funded were hot spots due to potential political payoff.
- If we're going to sell the Great Lakes issue for research, we need to look at what the issues are.
- In Canada, there has been a big shift to government spending on universities. Perhaps universities should take the lead and solicit government compliance.
- Sometimes research dollars are not available in the U.S. to continue Great Lakes projects.
- There are about 20 Great Lakes projects at present; the targeted research is not here.
- On the U.S. side, research budgets are way up but not necessarily on Great Lakes and ocean issues.
- There was some consensus among the group for accessing funding through universities.
 - Focus would be research and education
 - Would university professors be able to commit their time? What about funding grants that span 2-3 years?
 - EPA can't allow potential grantees to be involved in the planning process.
 - We need to develop a strategy to make this work with regard to the appropriate access and flow of funds for large targeted projects.
- There are 3-4 long term issues on the table; what happens when other crises develop?
 - Have a set of process driven plans available of which a crisis is one aspect
 - Proper proposals take 2-3 years to develop.
- How do you implement the planning process and bring the researchers in?

- If you ask a funding agency, outline a problem with existing data, you might be more inclined to access funding.
- With respect to university research, the MOE does support it. There are 4-5 universities in Ontario interested in Great Lakes research but there is no mechanism in place to coordinate activities.
- Funding and support is largely directed toward issues management and is more issue oriented.
- Have supported ecosystem management in the past and is now more issue oriented.
- If issues are raised at the local level (public, municipalities, etc.) and brought to the governments, it seems there is more inclination to provide answers to those issues.

Lake-wide Coordination Efforts

International Field Year of the Great Lakes (IFYGL)

Jim Bruce, Global Change Strategies International Inc., Ottawa, ON

Key points:

- The question we face is, "Are the circumstances so different today that the model of the Field Year isn't very relevant or are there some things we can learn from IFYGL to help plan coordinated research in the near future?"
- Jim reviewed a brief history of IFYGL
 - 1965 marked the beginning of the International Hydrologic Decade and first proposal of IFYGL.
 - The first IFYGL steering committee meeting was held in 1966.
 - Initially, four bilateral scientific advisory groups were established; three more were added in 1970.
 - IFYGL involved 600 scientists and technicians, 8 US agencies, 6, Canadian agencies, plus universities, etc.
- This effort was motivated by a desire to get a solid data baseline by which any kind of progress in reducing pollution in Lake Ontario could be measured
- The baseline data peaks in 1973 for phosphorous in the near shore surface waters, which steadily declined with pollution control measures put in place.
- One of the major accomplishments was the international organization and cooperation over 15 years of a technical plan, data management, archiving, and publication of results.
- The situation in 2004 has changed; funding is not as available; no agreement is in place.

- Current issues include: how has Lake Ontario changed over the past 35 years; energy production and conservation issues; invasive exotic species; changing water demands; changes in toxic substance issues – e.g. continue important: How to control trophic states in our changing world (e.g. a 100% increase in heavy rain events in the southeastern USA); other impacts of the changing climate.
- There has also been a significant increase in 30 minute heavy rainfall events in southern Ontario.
- Have these changes been affecting recent trends in trophic state being observed in Lake Erie?
- Is there a possibility of examining these changes within the basin and projecting them with greater confidence?

Questions & Answers

- What effect in terms of future funding politically; what annual changes were there as a result of it?
- It's hard to say whether the maintenance of a high level of funding was influenced by the demonstration model.
- One issue worth pointing out in IFYGL is the word 'year,' as one could be very different from the other, although monitoring before and after was conducted to support IJC.
- Maybe we should be thinking in terms of more than one year, with an intensive year in the middle.
- Good idea and that should be taken into account when an analysis is being done.
- Sometimes dollars are refocused to other projects.
- What happened to the data after the year was over? The data were well achieved and used in many reports and papers. Instrumentation was taken out and most equipment was used in the Upper Lakes in response to the Reference to the IJC.

Great Lakes Fisheries Commission-Fisheries Research Coordination

Charles Krueger, Science Director, Great Lakes Fishery Commission, Ann Arbor, MI

Key points:

- The Commission was established in 1954 by the Convention on Great Lakes Fisheries (Canada & U.S.)
- Research coordination was needed in order to sustain the Great Lakes Basin.
- The purpose of the Fishery Research Program is to conduct research and develop recommendations for a healthy great lakes basin.
- Coordination among research scientists is provided.

- A thematic structure provides for better research coordination.
- Have developed collaborative partnerships to join resources together.
- Annual and bi-annual research coordination meetings take place.
- Coordination among fishery research programs across the basin (USFWS Restoration Act).
- Proposals are peer reviewed.
- Researchers are encouraged to address priorities generated by the Lake Committees (uses 25% of the research budget).
- The Council of Lake Committees reviews pre-proposals and endorses those with the most relevant concerns.
- Major coordination challenge: integrating scientific research with delivery of a sea lamprey control.
- Great Lakes Fisheries Commission facilitates coordination among research scientists, other funding agencies, integration of research programs, etc.
- Challenges include research topic breadth; time and commitment to facilitate communication; cross purposes or schedules of research programs; reluctance of managers to serve on review panels; non-collaborative organizational behavior; proprietary research personnel behavior.

Questions and Answers

- The Great Lakes Fisheries Commission's responsibility is to coordinate activities of Lake Committees; how does this work with respect to research priorities?
 - There is one committee for each lake which includes one representative from each organization that has fishery management authority on the lake. Supporting each of these committees is a Lake Technical Committee. Research priorities are developed through the technical committees. Technical Committees meet in July to review their lists. The Chairs of the technical committees have also formed a committee to define research priorities. The actual setting of priorities is done by Technical Committee members. Consensus from the Technical Committees is generally agreed to by the Lake Committees.

Lake Erie Millennium Network (LEMN)

Jan Ciborowski, Great Lakes Institute for Environmental Research, University of Windsor

Key points:

- The Lake Erie Millennium Network (LEMN) is a consortium of federal state, provincial, and regional organizations.

- What prompted the effort? - Research funding was lost, and organizers recognized problems that needed to be attacked.
- The public was uniformly lobbying for changes in management strategies to resolve the crisis.
- Meetings were held to discuss issues and to summarize knowledge.
- It depends on one's point of view as to whether phosphorus is a good indicator of Lake Erie's trophic status.
- Collaborative actions help to address different points of view.
- The steering committee is made up of 2 co-directors in the U.S., 2 in Canada, 2 universities, and 2 government research labs.
- The goal was to develop a framework for a binational research network to:
 - a) address management needs and,
 - b) understand the ecosystem
- Response was very positive with funding from 13 groups and several others participating in meetings.
- Acquired instant credibility
- A prevailing issues workshop was held that identified major questions and management sessions to shortlist the issues.
- The first binational conference was held in 1999 which summarized consensus on seven subject areas.
- Research needs:
 - identify data needs that test hypotheses and provide necessary values for modeling needs.
 - Identify research questions that need answers.
 - Form collaborative groups to address the questions.
- A positive response was received from all agencies and many scientists.
- Formal collaborations occurred at meetings/conferences.
- Developed a high profile for issues and needs.
- Research needs were aligned to address management issues and guide agency policy.
- Implementing research is still a challenge
 - Matching timing of proposals and opportunities is challenging
 - Funds are available for executing research, not planning, synthesis, or reporting
 - U.S. conflict of interest guidelines impede information transfer to provide guidance to those applying for research grants.
 - The voluntary organization of LEMN limits the rate of progress.
- Communicating current research is an important issue.
 - Need a hierarchical report/coordination structure.

Recommendations:

- Great Lakes have regional issues and flavors due to societal & biogeographic variation
 - need a hierarchical report/coordination structure; regional -> integrative basin-wide
- Communicating current research is bottom-up
 - Synthesis & pattern recognition is an emergent property of open discussion & consensus-building; but needs planning.
 - alternate open scientific forums (information inputs & comment) with carefully structured planning/synthesis sessions (strong inference / modeling); facilitators must be experts
- Anticipate a funding & timing framework that supports planning, reporting, guidance & research (travel & time are expensive). The plans must be ready when the funding opportunities arise.

Questions and Answers

- Regarding the 4 Step process:
 - Step 1) Acquire support from managing agencies
 - Step 2) Document research & management needs of users and agencies
 - Step 3) Take stock: - What do we know? - What do we understand? - What do we need to know/understand?
 - Step 4) Clarify research questions

Is the Millennium network making this paradigm work?

- We're doing everything we can.

- Regarding priority setting and coordination strategy: if someone had \$200K and said "pick a priority and form a group", what would you do?
 - I would say thanks very much and then rework how to define and address multiple problems. It's achievable, but not easy. Get specific people together, list contrasting hypothesis and realize their research may not be the top priority.
- How would the Millennium Network work together to pick the top issue? - We would have to convene a steering committee or equivalent panel that can rely on the objectivity of those that have been around for a while.
- How responsive is the Millennium Network to any new research priorities? - The Network would need about a year (due to voluntary nature of membership and multiple demands on time) to identify key research needs.
- Have you tried to get more stable long-term research funding through NSERC, etc.? - Have tried to access several funding agencies around the Great Lakes. Many agencies require matching funding from the Canadian side and a resubmission of the proposal, and we don't always have the time to do it.

- Has this network worked due to its focus on a single lake? If so, should we clone it for the other lakes or use existing organizations? - Work from strength; there may be other similar initiatives on the Great Lakes.
- There is a Lake Michigan Monitoring Council which is attempting with 4 States, federal agencies and universities, to form a moderate council to coordinate monitoring and research activities on Lake Michigan.
- In each case, this is one way to gain perspective throughout the whole system in terms of common issues, to identify problems that are specific to the lakes and to establish priorities on a lake-wide basis.
- There is a need to spice up press releases in order to draw attention to specific issues; and for a regular scientific release.
- Political action might result from increased publicity.
- The staffs of U.S. agencies have concerns about a potential for a conflict of interest arising from identifying and funding priorities. This may look like a problem up front but potential conflicts can be considered and avoided.

EEGLE Project - Episodic Events – Great Lakes Experiment

Brian Eadie, NOAA-GLERL, Ann Arbor, MI

Key points:

- EEGLE: Episodic Events – Great Lakes Experiment
- This program was designed to look at the connection between overlying water and the large inventories of chemicals in the sediments.
- EEGLE was prompted by recommendations from several major workshops, Great Lakes Environmental Research Lab research workshops in 1974 and 1992, and NSF workshops in 1987 and 1995. Over 20 years of effort and discussions among colleagues about sediment-water coupling; questions about processes that could help interpret LMMB (Lake Michigan Mass Balance) and earlier sediment and contaminant transport results.
- The goal is to assess the impact of episodic events on the transport and transformations of biogeochemically important materials and on lake ecology.
- EEGLE selected the southern basin of Lake Michigan.
- Basically all the new particles coming into the lake are coming from bluffs.
- What prompted the effort? The time was right and tools (moorings, models, etc) were becoming available.

- The program originated in 1992; a joint GLERL – Cooperative Institute for Limnology and Ecosystem Research (CILER) – NOAA - COP (Coastal Ocean Processes) Great Lakes Issues Workshop.
- A successful proposal was developed in 1996-97 and funding initiated in August 1997.
- Three years of field work and 2 years of Synthesis were funded.
- EEGLE total budget was \$17M (including reprogramming) over four years; much coordination and collaboration was involved.
- An integrated proposal took several years to write and was reviewed by peers.
- Annual meetings were held to review progress, some with external peer review teams.
- A data and information policy was developed; web-based and user-friendly.
- Modeling was a strong component of the program.

Recommendations:

- Identify clear objectives;
- Program needs to be openly competitive to researchers inside and outside the Great Lakes community;
- Build an integrated program from the beginning;
- Incorporate serious peer review;
- Build in multiple field years.

Questions, Answers and Comments

- The effects on the number of players, institutes, universities, consortia, etc. could benefit from a broader review; should we consider some sort of peer review of coordinating mechanisms? There are many large programs around the world and a lot of skills out there that we don't tap into. Need to bring both approaches together in order to provide a useful program.

In the Great Lakes, the real challenge is to bring issues together.

Panel Discussion

Jim Bruce, Charles Krueger, Jan Ciborowski, Brian Eadie
Moderator: Harvey Shear

Questions, answers and comments:

- Advice on development of a research strategy:
 - Organizationally, it has to be simple and comprehensible.

- Organize it by lake but package it as one; each Lake should pitch for the other so each person in the community can see the benefit.
- Have to connect ecosystem to the people, i.e. dead fish on beaches.
- Enormous public investments into the Great Lakes have paid off; if we invest more it will pay off as well.
- More investment = more benefit.
- The year doesn't make a difference in whether or not you go for a slice of the pie.
- If taxes are increased, we could do more with more money. Would you be able to sell this argument to people? - What would they get for it (additional taxes)? We need to clarify this, e.g. more fish, less beach closings, less contaminants, etc.
- No one wants to pay more taxes but it's an investment for our children and future generations.
- There has to be a "hook" to interest the public and the politicians.
- We don't want to be known as the generation that hopelessly screwed up Lake Erie.
- Need a scientifically well thought out program that appeals to the research granting agencies.
- That's where the ecosystem concept applies – identify where the trends and factors are that are causing the problems.
- What will it look like 20 years from now?
- Most issues seem chronic, not acute.
- Need to communicate the idea that we're dealing with systems that we'll be working with forever, not just one year from now.
- There is much time involved in developing programs.
- Focus on a set of issues we want to collaborate on within the next year or two, even if we're talking about no new money.
- If we (government agencies) can build the platforms, the academic institutions can go to the National Science Foundation (NSF) and other funding agencies with a research proposal.
- Build on small steps first.
- In the present federal system on the U.S. side, they are working on the FY06 budget right now.
- There has to be lead time in order to have alignment with national programs; with government performance act-type things.
- There may be some budget flexibility at a local level to cover short term needs; however sustained 3, 4, or 5 year efforts need to be planned far in advance.
- If we're looking to plan a long term strategy we should consider how current resources may be reallocated.
- Prevention is much cheaper than restoration.

- At least 1/3 of congressional funding dollars should be allocated for prevention efforts; restoration dollars are huge.
- The academic community must also find ways to start things now.
- The National Science Foundation (NSF) has been putting forward a National Ecological Observatory Network (NEON) program, not funded through congress yet. (Note: see <http://www.mpcer.nau.edu/neon/history.html> for more information on NEON)
- Regional NEON's are being created as pilot projects to demonstrate that it can be done; this sort of action needs to be taken with Great Lakes Research in order to move forward.
- The bulk of the International Field Year of the Great Lakes (IFYGL) resources was redirected from existing resources.
- Lay out a rough idea; obtain general acceptance; then seek commitment from the agencies.
- Redirect funds within the agency to get things done.
- Without key leaders in each component of the project, nothing will get done and there will be no economic benefit.
- The recommended LEMN strategy for long term planning is to have research plans that are ready to implement. Develop broad areas of understanding and skill sets that are ready to pull "off the shelf" to apply to a particular problem that requires those skill sets and knowledge.
- If dealing with ecosystem level approaches and issues could pull out that module and look at it. It may take years to plan an ideal strategy but this approach could provide something ready in the short term.
- The Great Lakes Fisheries Commission tried an approach where they would hold back approximately \$200K/year to address operations of an immediate crisis nature. They also have an advisory structure in place; not necessarily "off the shelf" plans.
- One option that could work with constrained resources would be organizing research working teams consisting of experts from different disciplines that could be pulled together in the event of a crisis.
- Redirecting resources: if we could develop a base level research report on the state of the basin and if good, important research or intensive study themes are defined, existing resources could be allocated to key issues.
- Risk management should be part of the longer term, overall strategy; so you must have the data needed to understand the risk and to deal with it.
- How well are universities set to produce the next generation of research scientists and managers?
 - Universities are producing some extremely bright graduates but some are having trouble finding work, especially in government

agencies. There is a low level of financial support from the Natural Science and Engineering Council and from government agencies to support our graduates and they must compete with oceanographers for research dollars. Some organizations have to turn away graduates due to low funding dollars.

- We must establish stronger U.S.-Canada linkages for monitoring in the Great Lakes and research coordination could also be improved.
- The clue to what's happening in the lakes is in the basin; hopefully any new programs would take a basin-wide approach.
 - Look at effects of land use and forestry in order to be able to identify their impacts on water quality and quantity.
 - There is more research needed in this area, especially on groundwater.
 - One of the trends in the Ontario part of the basin is for more factory farms and high intensity feed lots.
 - Combined with intense rains, this could be a subject of high importance for the Great Lakes.
 - The waste equivalent of thousands of animals in a small area is equivalent to a small town and is definitely an issue.

Summary of Day One and Wrap-up

Stephen Brandt, Harvey Shear

All presenters for day one were thanked for providing many good ideas that would be considered further during the course of the workshop. In addition, it was announced that all presentations would be collected and saved to a CD. A copy of the CD would be prepared for each attendee to take with them at the conclusion of the workshop.

Thursday, April 29, 2004

Goals & Objectives for Day Two

Stephen Brandt, Harvey Shear

The Council Co-Chairs noted that the CGLRM should be able to use much of the material from day one of the workshop over the next few years as the research coordination strategy is developed and implemented. They briefly reviewed the agenda for day two which focused on multifaceted collaborative approaches that could provide models for a regional coordination strategy and inform the development process.

Collaborative Approaches/Partnerships

Canada-Ontario Water Use and Supply Project

Wendy Leger, Environment Canada, Burlington, ON

Key points:

- The main focus of the Canada-Ontario water use and supply project was the water supply and its use on a sub-watershed basis.
- What prompted the project? Dry conditions in the Great Lakes Basin in 1998-99 and the lowest water supplies seen in a long time.
- In addition, the Nova Group proposed to withdraw water out of Lake Superior.
- Ontario passed new regulations prohibiting the taking of water out of Ontario's three water basins.
- The states and provinces failed to maintain adequate databases in order to make appropriate decisions. There was incomplete information and nothing had been done to provide a context across the Great Lakes Basin.
- The project started working at the staff level, and then brought in appropriate agencies to discuss common goals. A 5-year project plan was developed that was supported by in-kind resources. A shared vision included a collaborative effort; linked with other water and environmental agencies.
- Dedicated staff from all agencies was required in order to keep the new project going, while building on existing projects as well.
- A project management team was set up with representatives from all the primary agencies involved. An advisory committee and other committees were also established.
- Much information is being gathered and it became necessary to bring the water quality component into the study in addition to the water quantity issue. The project managers intend to look at Climate Change but they need to start integrating data first.
- The Shared vision is working well and the model of community practice is also working (sharing data, ideas, keeping informed and communicating). They are continuing to meet and share information to the benefit of everyone involved.
- Sub-watershed context is working well, as is building on information management structures.
- Collaboration is the key (combining resources-no competition).
- Yearly planning and documentation is being carried out with support from all agencies involved. This documentation (work plans, progress reports, web-site metadata, etc.) is important. It provides a story that

gets people interested, demonstrates a need for action and helps to secure more funding.

- Focus on 3-4 indicators; and define some extreme cases.
- The mechanics of integration are okay but work needs to be done on the spatial coverage of the data (spatial and temporal scales, and the science of integration).
- Funding is a challenge; the project could use a formal reporting structure, help with communications and more support staff.

- Wendy is also involved with the IJC Lake Ontario St Lawrence River Study. It is a well funded binational effort; with a shared vision planning approach (system based planning). Using advanced public involvement and stakeholder built models; modelers work with stakeholders and experts and are building an ownership.

Recommendations:

- A multi-agency, multi-level collaborative effort must be carried out.
- Stakeholder and public involvement is the key to building a strategy; the project must build an ownership within your community.
- The project should have shared vision planning from the outset.
- Need to establish goals and objectives, establish performance indicators, and then build the project around them.
- Integrate the project outcomes to see how it's all related.
- Establish a tracking mechanism to see if you're meeting your objectives.
- Establish a decision making process.
- Build risk assessment into your strategy.
- Use coordinated information management.
- Set up external advisory committees and a peer review process.
- Establish a formal reporting structure with progress reports.
- Establish a funding mechanism and a money manager.
- Develop a communications/consultation strategy to share data and information.

Upper Lakes Environmental Research Network

Amber Lahti, Project Officer, Upper Lakes Environmental Research Network (ULERN), Sault Ste. Marie, Ontario

Key points:

- Canada is heavily involved in research.
 - Federal funding priorities are health care, climate change, and technology related, but some funding is available for aquatic research.

- Canada Foundation for Innovation will be investing \$10B in research for infrastructure.
 - Natural Sciences and Engineering Research Council will have at least \$771 million invested by 2005.
 - Ontario Innovation Trust will invest another \$500M plus another \$300M.
 - Ministry of Economic Development and Trade – Ontario Research and Development Challenge Fund has \$800M to invest.
 - A number of universities, private research institutions, government, etc tend to be the main proponents of funds.
 - Canada was looking for projects with an international flavor.
 - Two years ago \$200M was provided for an international fund; divided between two funds and 9 research projects.
- Upper Lakes Environmental Research Network (ULERN) membership includes government (federal and provincial) academia, corporations, non-profit and First Nations.
 - Research ideas are brought forward; members with expertise are invited to participate.
 - Project proposals are forwarded to appropriate funding agencies.
 - ULERN has more than 250 individual members among the 11 membership organizations.
 - ULERN is located among a cluster of high profile researchers; provides quality service while remaining flexible.
 - Investment in natural resources and environmental research has declined.
 - Finding operational funding is an ongoing challenge.

Recommendations for a coordination strategy

- Identify a coordinating body to drive the Great Lakes Research Coordination Strategy.
- Identify a clear mission, goals, and objectives.
- Coordination needs to be adequately funded.
- Need a work plan and strategic direction.

Pollution from Land Use Activities Reference Group (PLUARG) Study

Harvey Shear, Regional Science Advisor, Environment Canada, Downsview, ON

Key points:

- Dr. Shear started his career with the IJC working on the Pollution from Land Use Activities Reference Group (PLUARG) Study.
- PLUARG was a multi agency research effort.

- Studies in the 1960's showed degradation of the Lower Lakes from nutrient runoff.
- The governments needed to know from where it was originating.
- PLUARG was established pursuant to the 1972 Great Lakes Water Quality Agreement as a reference from governments to IJC.
- Initially the issue was nutrient pollution but it grew to include contaminants.
- Comprised of 9 U.S. and 9 Canadian members with a secretary for each side as well as a secretary from the regional office.
- Tasks were broken down into four main areas.
- Assess the problems, set priorities, create an inventory of land use and land use practices, pilot watershed study, assess degree of water quality impairment.
- PLUARG worked well and was perhaps 10-15 years ahead of its time in terms of approach and results, coordination, integration of diverse studies into a final report and for the IJC, in terms of involvement.
- 161 IJC reports were produced through the PLUARG studies which were honed down to a final report.
- The need to report back to the public as to what we're doing and why; is very important to keep them informed.
- PLUARG's success was due to dedicated people with the same purpose and lots of money (\$15-20M US in 1972 for the PLUARG study).
- The follow-up to PLUARG was not as successful as had been anticipated by the PLUARG members. Land use as an issue did not really surface in the Great Lakes basin for almost 20 years until 1996 at the State of the Lakes Ecosystem Conference.
- Many PLUARG recommendations are still relevant and timely.
- The Great Lakes Research Coordination Strategy should stress clarity of purpose as a guiding principle.

Panel Discussion

Wendy Leger, Amber Lahti, Harvey Shear

Key points:

- Are there U.S. counterparts that you work with? There is nothing official at the moment with the Canada-Ontario Water Use and Supply Project, but we do try to keep up with our counterparts. ULERN has collaborated with the United States Environmental Protection Agency and Lake Superior State University on collaborative projects.
- The Great Lakes Protection Fund is a possible source of funding; ULERN would like to partner with power stations located on the international border on a research project to determine the impacts of hydro dams on aquatic communities.

- How do you maintain momentum on long-term programs?
- PLUARG had a very well defined mandate and time frame, lots of money and it was well-staffed.
- Momentum is definitely there on the Great Lakes St. Lawrence River Study but keeping it going is a challenge.
- A lot depends on individuals; make sure you meet on a regular basis, move forward, try to make progress; also document what's been done and achieved.
- What sustains ULERN momentum is the fact that if they don't keep going, ULERN staff will lose their jobs. ULERN does not receive any core funding and therefore must raise money to pay for salaries via fee-for-service(s).
- All mentioned the importance of integration of activities and coordination of tasks.
- It is important to include monitoring, research, and modeling with the research coordination strategy.
- The potential for monitoring as an integration tool is something we should consider as important in our strategy development.
- The integration is where you start to see the linkages and develop an ecosystem approach.
- PLUARG had regular meetings where presentations from tasks groups were done; a tremendous amount of information flow made the integration task easier.
- Question for Wendy: Do you see any signs that the Ontario government is using material produced for determining water withdrawals and licenses? We are not going to be directly influenced by the take water process; the level or scale we're working on doesn't mean there is a permit for any one area. Hopefully support will be gained for that initiative.
- PLUARG money was received from Treasury Board back in 1972. IJC studies are still well funded. When considering a large project, there is an advantage on the Canadian side for a strong IJC endorsement or request that the study be carried out as it may facilitate getting new Canadian funding.
- To maintain momentum, it is helpful to tie project goals and objectives to a new political agenda or initiative.
- Ontario government is interested in developing new measures to initiate nutrient management of agricultural/urban sources mainly due to Walkerton recommendations; and to develop a source protection plan for watersheds.
- The Canada-Ontario water use and supply project could be tied to source protection plans to gain funding for the work being done; we are hoping those kinds of linkages will be made.

- Collaborative efforts help keep things energized; the Department of Indian Affairs and Northern Development (DIAND) was found to be very successful; has anyone else noticed this? Yes, absolutely. Projects with co-leaders for partners, gain momentum and are better sustained.
- The Social Sciences and Humanities Research Council (SSHRC) was approaching ULERN to meld hard/soft sciences but nothing developed; it could perhaps look at this issue again for a research proposal.
- On the IJC Great Lakes St. Lawrence River Study there are some stakeholders that have chosen to pull out for the time being; however we are still actively pursuing those groups and it is an issue that has to be addressed. On other projects, those who can be involved have chosen to be involved; it all depends on time constraints.
- Were there any agencies not wanting to be part of PLUARG? Anyone that needed to be part of it was.
- The IJC and PLUARG studies were well funded. Can things like this be driven without the money? It's difficult. Helps to have committed funding which provides the organizing mechanism.
- Example: When the State of the Lakes report was done, 6 people were driving it with a very small budget.
- Some things can be done without advance planning if there is a will and desire to make it happen but funding is the key.
- It costs money to include the public in the process; modeling costs money and there are other components that also cost money.

The New York Great Lakes Research Consortium

Ed Mills, Director, DNR Biological Field Station, Bridgeport, NY

Key points:

- The New York Great Lakes Research Consortium started in 1986 centering on Great Lakes issues and problems.
- It started out with 5 academic institutions, and now has 16 on the U.S. side and 8 on the Canadian side.
- It has a Director and a Research Director.
- Brings together expertise from the universities and colleges to form task groups to look at various research issues.
- Holds a seminar series where professors give seminars at other schools; this creates an important connection.
- Holds research planning workshops.
- The Consortium brings together seed money to start projects; then it goes to granting agencies to bring in larger grants.
- Has a board of governors, each campus has its own representative which meet twice a year.
- Has an annual meeting/student conference.
- Next generation to present results and interact with colleagues.
- Has had good chemistry among the units and ideas/information are shared.
- For the seed money grants that are given out, one of the requirements is multi-institutional involvement with projects. This had much to do with building chemistry and collaboration.

National Oceanographic Partnership Program (NOPP) & the National Ocean Research Leadership Council

Reginald Beach, National Oceanographic Partnership Program (NOPP) Office, Washington, DC

Key points:

- Reginald Beach is the Research Director for CORE (Consortium for Oceanographic Research & Education)
- Represent 83 oceanographic institutions.
- Carry out policy development and manage large programs.
- NOPP was established in 1997 to promote the national goals of assuring national security, advancing economic development, to coordinate and strengthen oceanographic efforts in support of those goals.
- NOPP identifies areas of research and education that would most benefit from a partnership approach.

- The goal is to achieve more together than a single agency or subset of agencies could accomplish alone.
- All topics require at least two agencies to fund them and 2-3 partnership entities (govt. academia, industry).
- You get more impact and return from putting money into NOPP than funding projects on your own.
- If funding through NOPP, it's a good thing (cost sharing, etc.).
- A multi-agency effort is a great benefit as are industry partnerships; address gaps.
- NOPP is made up of 15 agencies that have oceans somewhere in their Charter or some sort of ocean mission.
- NOPP Structure:
 - Excom: Ocean.US Executive Committee
 - Ocean.US: NOPP Office that manages the integration of long-term, routine, consistent ocean observing systems for research and operations.
 - NORLC: National Ocean Research Leadership Council
 - IWG: Interagency Working Group
 - ORAP: Ocean Research Advisory Panel
 - FOFC: Federal Oceanographic Facilities Committee
- IOOS: National Integrated Ocean Observing System
- The former NORLC is now the Committee on Ocean Sciences Education
- Other changes have been made as well in order to better coordinate four major recommendations put out by the Council.
- Report is very positive and is in review by the Governors.
- NOPP has a new draft strategic plan that contains five goals: To implement the integrated observing system; Increase student and public awareness, knowledge and understanding of the oceans; Modernize the oceanographic infrastructure; Collaborate to strengthen interagency initiatives in research and their connection to operations; Remove obstacles to partnering.
- NOPP had \$10M in 1997, over \$25M in 2002, and just under \$25M in 2003.
- Ocean science has the worst demographic of any science; it won't change for at least a decade; needs to be addressed as a community.
- 60% of funding goes to academia, 24% to government, 11% to industry, and 7% to NGO's or other.
- If no integration, no impact.
- Larger projects are about \$11M over five years, some only \$300K per year.
- Potential NOPP Research Themes: Ecosystem-based Management of Fisheries & Other Natural Resources; Ocean Exploration; Human

Activities & Marine Mammals; Autonomous and Lagrangian Platforms & Sensors; Ecogenomic Sensors for Ocean Observing.

- Suggested that Great Lakes research funding from NOAA be pursued.
- Doesn't know why the Great Lakes aren't highly represented in NOPP but recommends that the region "go for it".
- There will likely be a National Ocean Council if approved by President Bush.

Questions and Answers

- Are all available funds only for US agencies? - No. All review panels include international representation. Requests For Proposals (RFPs) come from the interagency working group.
- To what extent are those ideas coming from the science community, i.e. bottom up vs. top down? - They are well tuned into what's going on in the science world; researchers are well aware of what's going on.

Council of Great Lakes Governors

Peter Johnson, Council of Great Lakes Governors, Chicago, IL

Key points:

- The Council of Great Lakes Governors (CGLG) has had a long standing relationship with the IJC.
- The CGLG also operates a shared trade office on behalf of the Great Lakes States in 7 countries.
- The Council of Great Lakes Governors was formed in 1983.
- The mission of the CGLG is to encourage and facilitate environmentally responsible economic growth.
- The Council is a private, non-profit corporation that reports directly to the Governors of the eight Great Lakes States; the provinces of Ontario and Quebec are associate members.
- Past projects include Development of Great Lakes Ecosystem Protection; Spill Protection Initiative.
- Current projects include:
 - Aquatic Invasive Species Task Force;
 - Great Lakes Priorities Initiative;
 - Great Lakes Water Management Initiative.
- Coordinated planning is needed to achieve comprehensive restoration and protection of the Great Lakes while making efficient use of limited resources.
- The CGLG also wants to seek long-term, large-scale funding from Congress for Great Lakes protection and restoration.

- A list of nine Great Lakes protection and restoration priorities was developed by the Governors.
- 1985: Great Lakes Charter; Great Lakes Charter Annex was signed later on June 18, 2001. The Charter Annex addresses the first of the Governors nine priorities.
- 1986 U.S. federal statute the Water Resources Development Act (WRDA) prohibits diversion of Great Lakes water unless approved by the Governors of all the Great Lakes States.
- In 1998 the Nova Group put forth a proposal to extract water from the Great Lakes in order to export it.
- In 1999 there were recurring lower lake levels.
- The Annex process includes: Council of Great Lakes Governors Water Management Working Group (Governors and Premiers representatives); Advisory Committee, Resource Group and Observers.
- Need the political support of the Governors and Premiers with what is put forward.
- Have an Advisory Committee of approximately 26 organizations that provide a regional and national perspective. Resource Group members are governmental or quasi-governmental representatives who provide assistance on technical issues. Observers include such entities as the State Department, the Canadian Foreign Ministry and the IJC.
- The Governors' and Premiers' Working Group meets on a regular basis.
- Annex goal is to release draft agreements for public comment in June 2004.
- The CGLG is developing a good-faith agreement between States and Provinces that would be implemented into law by each of the States and Provinces. The States would implement that law most likely through a Compact.
- For more information, see: www.cglg.org.
- The working group has regular meetings that are posted on the website.

Sea Grant

Jeff Reutter, Director, Ohio Sea Grant College Program, Columbus, OH

Key points:

- The National Sea Grant Program started with the National Science Foundation (NSF) 1966.
- Forges partnerships between academic, government and the private sector.
- Uses a combination of research, education, and outreach.
- Focus on the Environment, Economy and Education.

- There are seven Sea Grant programs within the Great Lakes that interact with between 5-15 colleges and universities within their State.
- It's a very competitive review process for proposals.
- The Great Lakes group is considered the strongest and most effectively collaborative.
- Has to be problem solving research; rationale is important; collaboration is good; supporting students is good; multi-year projects are acceptable.
- Obtaining multi-year funding for projects is difficult.
- There are 11 theme areas within the Sea Grant Program:
 - Aquaculture;
 - Biotechnology;
 - Coastal Communities;
 - Coastal Hazards;
 - Digital Ocean;
 - Ecosystem & Habitats;
 - Fisheries;
 - Marine Science Library;
 - Seafood Science;
 - Urban Coasts;
 - Aquatic Invasive Species
- Plan to take the 11 theme areas and merge into a matrix with the Governor's 9 priorities.
- The next theme to be formed may be Ocean Observations.
- Maximum funding is usually \$7,500 for small grants.
- Several examples of cooperative efforts include: Fisheries Extensions, Economic Evaluation, Education Programs, and Outreach Programs.
- Challenges to cooperative efforts: 7 separate programs; matching funds can make collaboration difficult; and we have 5 very different lakes.

Recommendations:

- In the Great Lakes region we should take advantage of the Sea Grant program to build in a plan where 10-25% of the funding deals with outreach education and communications.
- Allow the private sector to influence the kinds of research being done.
- This will influence the decision making support structures.
- Separating research and management from the allocation process is a smart move.

- Collaborative proposals and RFP's may have a better chance for funding. It has been enjoyable working with the Millennium Program; it has been very effective.
- There is not a counterpart for Sea Grant on the Canadian side; need to work on that.
- NOAA, EPA, USGS need more collaboration.

Panel Discussion

*Moderator: Paul Horvatin, Senior Advisor, U.S. EPA, Chicago, IL;
Reginald Beach, Peter Johnson, Jeff Reutter, Ed Mills*

- How many representatives on the various Congressional committees have a Great Lakes history? - I don't know the background of those sitting on the committees. Do we (the Great Lakes region) need to be more proactive about getting involved with the committees? Yes, we should be more proactive.
- I wasn't sure of the relationship between CORE (Consortium for Oceanographic Research & Education) and NOPP (National Oceanographic Partnership Program). There aren't many Great Lakes institutions that are part of CORE (and it does cost money to become part of CORE). Are you more likely to be on a NOPP committee if you become part of CORE? - No. Note that CORE has both a full membership (\$11K), and consortia memberships (\$3K).
- Are the Great Lakes really on the "radar screen" in the national oceanic community? We have incredible commonalities and interests in which this is needed but we aren't very visible in the report of the U.S. Commission on Ocean Policy. We recommend that the report should say "Marine, Coastal, and Great Lakes" as one never knows if the Great Lakes are included in references to Marine or Coastal. Making comments either directly or through your Governors about getting the Great Lakes up front is well advised.
- NOAA's strategic plan hearings were held in places away from the Great Lakes. There were 28 different mentions in the plan; the Great Lakes only occasionally. Make it uniform to say Coastal, Oceans, and Great Lakes. We're asking to be included in all the elements.
- Canada needs to coordinate between the universities and develop a Centre of Excellence for Environmental Research linked to human health. It needs political support in order to obtain funding in the way that Sea Grant does. Cross-disciplinary programs can foster collaboration, such as the biodiversity specialization internship

program at McMaster University, where the program is looking for ways in which a medical student could work as a Fellow.

- Is a program like that fundable? i.e. cross country visits to give new recruits experience working in cross-disciplines and cross-countries? There are several fellowships on the U.S. side, but not sure of how funding is allocated. We need to take it to the next step regarding an exchange program. A scholarship program could be put in place through universities with partnering to include both countries.
- The Ontario Environment Science Network could be set up to be a virtual network and a possible funding body. It has received good feedback so far and will be meeting with universities in the fall to discuss further.
- Science requirements were not identified. How is the whole Annex program proceeding absent of that knowledge? You do what you can with what you have. Decisions have to be made. Once a framework is developed, it can be incorporated. Is anything being done via the Annex program to do something in that area? - The Great Lakes Protection Fund focuses on the issue of improvement. The States have talked to make sure they better collect and provide information. The Great Lakes Priority Initiative is looking to secure funding; the region needs better monitoring and that will require substantial funding.
- Comment: We have serious scientific gaps in our data and understanding. Everyone is focused on diversion and withdrawals from the lakes but the real problems will occur in the watershed. This issue is one that could potentially serve as a case study of how we can organize and coordinate research in the Great Lakes. Think about using it as a model. Once implemented, industry will be heavily involved as they will be the applicants for permits to withdraw water and will be crying for better science and assessments of ecological impacts. Industry will want accountability from the regulators. Municipalities are also major users of water.
- Yes, there are a lot of gaps that need to be filled which will be a long process. It will take a while to get a full understanding of them. From a flexibility standpoint we want to be able to incorporate new research studies but don't want it too detailed as we will need buy-in from the public/stakeholders (industry, public, etc.)
- There will be an ongoing demand for better understanding as implementation starts to take place.

- Would governors or council be willing to comment on strategy regarding the need for scientific research data? Will governors respond back? Not sure if they will respond individually or in a coordinated fashion. Better data and better support data is essential to programs.
- There is a program in NOPP where biological data is associated with physical parameters.
- There is representation through the Ocean Biogeographic Information System (OBIS) an on-line, worldwide atlas of biological data that has 2.8 million records globally. Suggest that you look it up as there is much relevant information. It has had interaction with Canadian DFO, and will be a pivotal tool in upcoming programs. OBIS might serve some of the data to the USEPA Environmental Monitoring and Assessment Program (EMAP), a research program to develop the tools necessary to monitor and assess the status and trends of national ecological resources.

Concluded Public Session

The public session concluded following the panel discussion. The Council reconvened during the afternoon of April 29 and again during the morning of April 30 to deliberate on the research coordination strategy. Council members participated in facilitated discussions and brainstorming sessions for the purpose of identifying elements of a Great Lakes Research Coordination Strategy.

The facilitator summarized points made in the previous discussion including:

- Have a Leadership Council or Research Council as the organizing body
- Provide for a technical group to provide science expertise (gap analysis, modeling)
- Ensure public input
- Use flow diagrams
- Use a separate process to prioritize research needs once they are identified.
- The costs of not having a coordinated effort include duplicated efforts and missed opportunities to form something like International Field Year of the Great Lakes II (IFYGL II).

- The strategy should include how agencies can communicate with each other, plan the research together, and go after funding together.
- Use IFYGL as an example in the development of a research coordination strategy.
- Need adequate lead time to make plans; some projects need a 3-5 year time frame.
- Provide structure; coordinating mechanism for collaborative projects so agencies don't have to work alone; will help us identify the gaps
- Need to look at the bigger benefits; not create something that will cure everything.
- Identify all the major players, a list of agencies willing to cooperate, their planning schedules; constraints.
- Need coordinated research proposals; can't effectively compete with other regions without them.
- The Great Lakes Community needs a single direction on where it's going.
- The overall coordination strategy should stand on its own and be useful for 20 years.
- Current informal communications through friends, bilaterally, list-server, etc.; are not fully effective or adequate.
- Select a research topic and then find out how we get the agencies, academia to come on board; develop a timeline and engage the community in an exciting way.
- For example - form a research coordinating committee from members of the CGLRM or else take EPA, USGS, Great Lakes Environmental Research Lab, EC and maybe DFO, MNR, or MOE. Three US and three CDN agencies. Take those six agencies and form the research coordinating committee; meet monthly or bi-monthly; make each other aware of what they're doing in order to avoid duplication.
- Much was learned from the issue of the Lake Erie dead zone. It was communicated via list servers and E-mail. People met and called people they knew who had historically worked on Lake Erie issues; brainstormed for three days; put out an RFP three weeks later, and the Lake Erie Millennium Group responded back. The media didn't come out until afterwards.
- Communication could be the operational part of the strategy.
- The coordinating body needs to be in touch with the "on the ground" research that's going on around the region.
- Need a mechanism to properly address an emergent issue, something that surprises you; that gets the publics' attention & politicians' attention.

- Also need to address management and thematic issues.
- Do not grow new governance structures; find ways to use existing organizations and structures.
- Act as an integrator for existing research advisory groups.
- Need to include the entire Great Lakes basin watershed.

Coordination Strategy

Summary of Major Points and Recommendation

The goals of the strategy include: promoting effective collaboration, avoiding duplication, applying a holistic ecosystem approach and effectively communicating science with a consistent message throughout the basin. The strategy will promote and facilitate collaborative research proposals and provide for an informed research funding process that can address all categories of research in a strategic, effective and flexible manner.

An effective research strategy should include the following attributes:

- Guiding principles
- Clearly defined terms, roles and processes, including a list of cooperating agencies and organizational chart(s).
- A role for a key coordinating body
- A communications plan or sub-plan regarding how agency plans will be communicated to all participating agencies around the basin and how urgent issues/needs will be communicated to the public and decision makers.

The plan should address requirements for effectively carrying out both long term projects and short term thematic or problem driven research involving rapid response and pooling of resources. The strategy should take advantage of existing organizations and avoid reinventing things that are working well. It should also address the process of setting research priorities; providing some basic principles, structure, and mechanics of how priorities are looked at and set.

Three sources of research should be addressed:

- Management driven research (focused on recognized needs);
- Thematic issues (not yet recognized by managers);
- Emerging issues (the surprises)

The workshop participants used a process employed by the Lake Erie Millennium Group to identify specific activities that should be incorporated in the plan. This process is defined by addressing a series of questions regarding the origin and fate of ideas about areas of research to be pursued in the Great Lakes basin.

Questions addressed:

1. Where will the ideas come from?
2. Where will the issues come from?
3. Who will synthesize the ideas into a theme?
4. Who will promote the theme?
5. Who will advertise the theme and get participants?
6. Who will organize the logistics of the theme?
7. Who will coordinate the resources?
8. Who will coordinate the reporting/databases, etc?

1. Where will the ideas come from?

Three sources of research typically drive activity in the region. Management driven research ideas come from well recognized needs such as fisheries management and control of lamprey. Thematic research ideas come from issues such as chemicals, pathogens, invasive species, habitat loss and anthropogenic effects that are not fully understood. Emerging issues are surprises, such as unexpected bird and fish kills that need to be studied in order to answer public concerns and to inform management decisions.

Recommendations from participants included:

- Consulting with Science Advisory Groups (expert consultations);
- Developing a stable funding source for Great Lakes research workshops;
- Coordinating with existing workshops/conferences such as those sponsored by the International Association for Great Lakes Research (IAGLR); Sponsoring new research oriented thematic workshops;
- Using the internet to gather input from "Cyber Seminars".

2. Where will the issues come from?

An effective communications plan should be used to ensure rapid and effective communication at all levels. Researchers in touch with what is happening in the field need to be assured that new ideas will receive the attention and full consideration of decision makers. It was recommended that the strategy include developing a well known forum where people know they can bring an idea that will be discussed through the entire Great Lakes community.

3. Who will synthesize the ideas into a theme?

The outcome of the workshops, cyber seminars and teleconferences would be a recommended research theme that could be considered for funding.

4. Who will promote the theme?

Participants suggested this as a possible role for the CGLRM, as well as facilitating peer review, media events and other public promotions.

5. Who will advertise the theme and get participants?

It was recommended that the CGLRM serve as a “Clearing House” where Requests for Proposals (RFP's) from agencies could be easily accessed and publicized using the Council website. The CGLRM list server could be used to advertise when and how RFPs would be released; early pre-award planning information. Partnerships would be formed with existing research consortiums, academic institutions, the Great Lakes Commission, the Council of Great Lakes Governors, individual government agencies and non-governmental organizations to gain broad support.

6. Who will organize the logistics of the theme?

Recommendations included: contracting with experts from the scientific community, designating a separate coordinating entity at the choice of partnering agencies that would be structured to receive funding, partnering with private industry and equipment suppliers. It was also suggested that existing agency logistics personnel and database managers be utilized as much as possible, with well-defined work plans, timelines and funding.

7. Who will coordinate the resources?

Recommendations for resource coordination included the CGLRM as a workshop sponsor, forming a committee to coordinate Great Lakes Resources and a coalition of agency heads. It was suggested that the Council consider the National Oceanographic Partnership Program as a model interagency working group for this purpose.

8. Who will coordinate the reporting/databases, etc.?

It was recommended that a portal for data housed at other agencies be provided and that the strategy align with the data management plan for the Great Lakes Observing System (GLOS).

It was suggested that the CGLRM or a reformulated research coordination council be established where issues & themes (for example from a workshop) could be reported. The coordinating body would discuss the pros and cons of the workshop recommendations; obtain a consensus; identify agencies that wish to contribute and funding sources. The result would be a truly coordinated research project that could be of substantial scale.

The Council members decided to incorporate the attributes described above in a draft research coordination strategy. Participants recommended that the U.S. and Canadian governments consider including a research

coordination process as part of a revised Great Lakes Water Quality Agreement as they proceed with the review of the agreement.

Observations & Workshop Summary, Plan for Moving Forward & Concluding Remarks

Stephen Brandt, Harvey Shear

Discussion points/decisions:

The Council Co-Chairs thanked all the participants and each was provided with a compact disk containing a copy of all of the workshop presentations. It was recommended that a follow-up workshop would be a good place to discuss the facilitator's table of desired outcomes. It was noted that even though much was accomplished during the workshop, a draft research coordination strategy document needed to be produced in order to move further ahead with this initiative.

Action items:

- Map out the eight questions and come up with a draft research coordination strategy document as a starting point for further discussion.
- Develop one or two proposals for the strategy;
- Council Secretary to develop a follow-up workshop (if needed).
- Dr. Harvey Shear volunteered to initiate a draft plan.
- Next workshop/meeting would focus on review and validation of the document that is produced.
- Should consider holding a "signing ceremony".
- Consider possible funding sources.
- Decide how to obtain "buy-in" from relevant agencies

Attachments

(1) List of Attendees

NAME/TITLE	ADDRESS	PHONE/FAX/E-MAIL
Beach, Reginald	National Oceanographic Partnership Program Office 1755 Massachusetts Avenue, NW Suite 800 Washington, DC 20036-2102	Phone: 202-332-0063 Fax: 202-332-9751 rbeach@coreocean.org www.coreocean.org
Bertram, Paul	U.S. Environmental Protection Agency Great Lakes National Program Office 77 West Jackson Blvd. Chicago, IL 60604 United States of America	Phone: (312) 353-0153 Bertram.Paul@epamail.epa.gov
Bielak, Alex T. Director	Science Liaison Branch National Water Research Institute Environment Canada 867 Lakeshore Road, P.O. Box 5050 Burlington, ON L7R 4A6	Phone: 905-336-4503 Fax: 905-336-6444 alex.bielak@ec.gc.ca
Brandt, Stephen Director	Great Lakes Environmental Research Laboratory National Oceanic & Atmospheric Administration 2205 Commonwealth Blvd. Ann Arbor, MI 48105-2945	Phone: 734-741-2244 Fax: 734-741-2003 brandt@glerl.noaa.gov
Bruce, Jim P.	Global Change Strategies International Inc. 1875 Juno Avenue Ottawa, ON K1H 6S6	Phone: 613-731-5929 Fax: 613-731-3509 jpbruce@sympatico.ca
Burrows, Mark J. Secretary	Council of Great Lakes Research Managers IJC Great Lakes Regional Office 100 Ouellette Avenue, 8 th Floor Windsor, ON N9A 6T3	Phone: 519-257-6709 or 313-226-2170 Fax: 519-257-6740 burrowsm@windsor.ijc.org
Carl, Leon M. Center Director	Great Lakes Science Center U.S. Department of the Interior U.S. Geological Survey 1451 Green Road Ann Arbor, MI 48105	Phone: 734-214-7200 Fax: 734-214-7201
Carroll, Amy Chairman's Designee/ Professional Staff	U.S. House of Representatives Committee on Science Subcommittee on Environment Technology Standards 2320 Rayburn HOB Washington, DC 20515	Phone: 202-225-8844 Fax: 202-225-4438 amy.carroll@mail.house.gov
Chow-Fraser, Patricia	Department of Biology McMaster University 1280 Main Street, West Hamilton, ON L8S 4K1	Phone: 905-525-9140, X27338 Fax: 905-522-6066 chowfras@mcmaster.ca

Ciborowski, Jan J.H.	Department of Biology Great Lakes Institute for Environmental Research University of Windsor Windsor, ON N9B 3P4	Phone: 519-253-3000, X2725 Fax: 519-971-3609 cibor@uwindsor.ca
DePinto, Joseph V. Senior Scientist	Limno Tech, Inc. 501 Avis Drive Ann Arbor, MI 48108	Phone: 734-332-1200 Fax: 734-332-1212 jdepinto@limno.com
Eadie, Brian J.	NOAA – Great Lakes Environmental Research Laboratory 2205 Commonwealth Blvd. Ann Arbor, MI 48105	Phone: 734-741-2281 Fax: N/A brian.eadie@noaa.gov
Fleischer, Fred Manager	Surface Water Environmental Monitoring & Reporting Branch Ontario Ministry of Environment 125 Resources Road Etobicoke, ON M9P 3V6	Phone: 416-235-6222 Fax: 416-235-6235 fred.fleischer@ene.gov.on.ca
Horvatin, Paul Senior Advisor	U.S. EPA Great Lakes National Program Office 77 West Jackson Street Chicago, IL 60604	Phone: 312-353-3612 Fax: 312-886-2403 horvatin.paul@epa.gov
Johnson, Peter	Council of Great Lake Governors 35 East Wacker Drive, Suite 1850 Chicago, IL 60601	Phone: 312-407-0177 Fax: 312-407-0038 pjohnson@cglg.org
Johnson, Thomas C. Director	Large Lakes Observatory University of Minnesota Duluth, MN 55812	Phone: 218-726-8128 Fax: 218-726-6979 tcj@d.umn.edu
Kreis Jr., Russell J.		
Krueger, Charles C. Science Director	Great Lakes Fishery Commission 2100 Commonwealth Blvd., Suite 209 Ann Arbor, MI 48105-1563	Phone: 734-662-3209, X12 Fax: 734-741-2010 ckrueger@glfc.org
Lahti, Amber Project Officer	Upper Lakes Environmental Research Network (ULERN) c/o Great Lakes Forestry Centre 1219 Queen Street, East Sault Ste. Marie, ON P6A 2E5	Phone: 705-541-5735 Fax: 705-253-9986 alahti.ulern@nrca.gc.ca
Lawrence, John Director	Aquatic Ecosystem Management Research Branch National Water Research Institute Environment Canada Canada Centre for Inland Waters 867 Lakeshore Road, P.O. Box 5050 Burlington, ON L7R 4A6	Phone: 905-336-4913 Fax: 905-336-6430 j.lawrence@ec.gc.ca
Leger, Wendy	Environment Canada-Ontario Region 867 Lakeshore Road Burlington, ON L7R 4A6	Phone: 905-336-4949 Fax: N/A wendy.leger@ec.gc.ca
Lynch, James Canadian Consulate General	2 Prudential Plaza 180 North Stetson Avenue Suite 2400	Phone: 312-616-1860 Fax: 312-616-1877

	Chicago, IL 60601-6714	
Mankin, Phil		
Miller, Jan A.	Great Lakes & Ohio River Division U.S. Army Corps of Engineers 111 North Canal Street Chicago, IL 60606-7205	Phone: 312-353-6354 Fax: 312-353-3138 jan.a.miller@usace.army.mil
Mills, Edward Director	Department of Natural Resources Cornell Biological Field Station 900 Shackelton Point road Bridgeport, NY 13030	Phone: 315-633-9243 Fax: 315-633-2358 elm5@cornell.edu
Nicholas, James R. District Chief	U.S. Geological Survey District Office 6520 Mercantile Way, Suite 5 Lansing, MI 48911-5991	Phone: 517-887-8906 Fax: 517-887-8937 jrnichol@usgs.gov
Reutter, Jeffrey M. Director	Ohio Sea Grant College Program Ohio State University Research Centre 1314 Kinnear Road, Area 100 Columbus, OH 43212	Phone: 614-292-8949 Fax: 614-292-4364 reutter.1@osu.edu
Sale, Peter Professor, Biological Sciences	Great Lakes Institute for Environmental Research University of Windsor Windsor, ON N9B 3P4	Phone: 519-253-3000 Fax: 519-971-3609 sale@uwindsor.ca
Scavia, Don Director	Michigan Sea Grant One Great Lakes plaza 401 E. Liberty, Suite 330 Ann Arbor, MI 48104-2298	Phone: 734-615-4084 Fax: 734-936-4391 scavia@umich.edu
Shear, Harvey Regional Science Advisor	Environment Canada 4905 Dufferin Street Downsview, ON M3H 5T4	Phone: 416-739-4704 Fax: 416-739-5691 Harvey.shear@ec.gc.ca
Vigmostad, Karen E. Great Lakes Policy Analyst- Ecosystem Team Director of U.S.-Canada Great Lakes Island Project	Northeast Midwest Institute 128 D. Street, S.E. Washington, DC 20003	Phone: 202-464-4016 Fax: 202-544-0043 www.nemw.org
Wagner, Angie Administrative Assistant/ Special Events Coordinator	Upper Lakes Environmental Research Network (ULERN) 1219 Queen Street, East Sault Ste. Marie, ON P6A 2E5	Phone: 705-541-5762 Fax: 705-253-9986 awagner.ulern@nrca.gc.ca
Warren, Glen	U.S. EPA Great Lakes National Program Office 77 West Jackson Street Chicago, IL 60604	Phone: 312-353-3612 Fax: 312-353-3612 warren.glen@epa.gov

GREAT LAKES RESEARCH COORDINATION STRATEGY WORKSHOP**International Joint Commission
Council of Great Lakes Research Managers****APRIL 28-30, 2004**

Sponsors: International Joint Commission Council of Great Lakes Research Managers, NOAA Great Lakes Environmental Research Laboratory, USEPA Great Lakes National Program Office

Location: U.S. Environmental Protection Agency, Great Lakes National Program Office, 77 West Jackson Street, Chicago, Illinois

Background

The Council of Great Lakes Research Managers (Council) was created by the International Joint Commission (IJC) to serve as a principal advisor on research programs and needs. Originating in 1984 as part of the Science Advisory Board, the Council was placed directly under the IJC in 1991. The Council's purpose is to enhance the ability of the IJC to provide effective leadership, guidance, support and evaluation of Great Lakes research as it applies to the provisions of the Great Lakes Water Quality Agreement. The Council's responsibilities include:

- promoting effective communication and collaboration between researchers and agencies in Canada and the United States;
- encouraging researchers to share their findings;
- compiling a summary of current and planned research programs related to the Great Lakes Water Quality Agreement, particularly those called for by Annex 17 - Research and Development;
- identifying and prioritizing research needs to identify gaps and encourage the U.S. and Canadian governments, the Parties to the Agreement, to shift funding toward studies directly relevant to the Agreement's purpose; and reviewing the impact of research recommendations made by itself, the Great Lakes Science Advisory Board, the Great Lakes Water Quality Board and the IJC.

Article VII of the Great Lakes Water Quality Agreement specifically charged the IJC to render assistance and advice to the Federal, State and Provincial governments in the U.S. and Canada on matters related to research in the Great Lakes ecosystem. In turn, in Article V of the Agreement, the Parties agreed to use their best efforts to ensure that their principle research funding agencies would orient programs in response to research priorities recommended by the IJC. The governments also agreed to develop mechanisms for appropriate cost-effective international cooperation; and to ensure that research priorities are undertaken in accordance with the list provided in Annex 17 of the Agreement. The governments of Canada and the United States are required to conduct a comprehensive review of the operation and effectiveness of the GLWQA on a periodic basis to ensure that it continues to be effective. The next review is due following the release of the Commission's 12th biennial report in 2004. Accordingly, the IJC has requested that the Council provide advice on the review of the GLWQA as it relates to research. In addition, several recent, large scale funding proposals for Great Lakes restoration and protection have been introduced in Congress, prompting discussion about how such basin-wide or lake-wide projects can be better coordinated between multiple jurisdictions. The Council sees the development of a research coordination strategy as a key step towards effective management of such projects.

Workshop Purpose

The purpose of the workshop is to address the need for a binational Great Lakes research coordination strategy. This strategy will be defined as an overarching framework for Great Lakes research management; a mechanism for international cooperation that describes how the region will pull together to organize and coordinate large scale research projects. The workshop discussion and report will inform the Council and provide a basis for advice and recommendations to the International Joint Commission.

Problem Statement

Great Lakes research is carried out on all aspects of the Great Lakes ecosystem by more than 130 public and private organizations within the 2 countries, 8 states and 2 provinces around the basin. (CGLRM Research Inventory) The complex needs of the future demand that these organizations nurture a strong collaborative spirit and create mechanisms for cost-effective national and international cooperation. Additionally, the Great Lakes region as a whole needs a coordinated approach in order to successfully obtain federal support for large scale restoration efforts. In the past, the greatest advances in science have been achieved in the Great Lakes when the entire region pulled together all of the resources of the Great Lakes community to address a given problem and these successful collaborative efforts can help guide the future. The benefits of anticipating needs and carrying out advance planning have been highlighted by several recent successful collaborative efforts in different parts of the basin. The need for well coordinated basin-wide research efforts has also been underscored by General Accounting Office and Auditor General reports released during the past 2 years. It is widely recognized that early and effective response to new threats to the Great Lakes ecosystem can help the region avoid expensive, long term control measures. Smaller scale plans exist at the local, state/provincial and national levels; however there is currently no plan that harmonizes these efforts. Accordingly, there is a clear need for a well defined coordination mechanism that stands ready to engage individual agencies in the U.S. and Canada and bring resources in across the board to quickly react to, and address Great Lakes research needs.

Workshop Structure

This is the first of two workshops envisioned by the Council to address this issue. The first workshop is intended to identify a structure for research implementation and coordination. The second workshop will address a process for identifying research issues and setting priorities on a regional scale.

The April workshop will:

- Review the challenges faced by research managers and the expectations of the governments regarding research management.
- Discuss how these challenges have been addressed in other large projects and hear recommendations from model organizations.
- Identify the key features of a binational Great Lakes research coordination strategy.

The April 28-30th workshop is organized in two sessions, an open session with a series of presentations and panel discussions followed by a closed working session for Council members. The working session will identify common features of successful coordination efforts, discuss what should be incorporated into a binational strategy, and help decide on findings and recommendations. An agenda is attached.

The second workshop (date TBD) will provide recommendations as to how the Great Lakes region identifies/prioritizes significant issues that multiple agencies hold in common, forms a consensus and joins together to express common concerns and funding needs.

In addition to these two workshops, the Council will be studying the feasibility of conducting a large scale research project similar to the International Field Year of the Great Lakes that would test the research coordination strategy.

Expected Outcome

The April 28-30th workshop will provide the Council with the information they need to recommend the design and constraints of a binational Great Lakes research coordination strategy. It will inform the Council's advice to the IJC regarding factors to consider when addressing the adequacy of the Great Lakes Water Quality Agreement and other legislation to accommodate present and future research needs.

Focus Questions

Since this workshop is all about management and coordination, the Council has requested that each of the speakers address a set of focus questions to help keep the discussion on track and to make it easier to organize the results. Speakers were asked to address the following questions as they apply to their particular situation:

- What initially prompted the effort? (e.g. nature of the problem – human health danger, urgent environmental crisis, endangered resources, some other crisis, etc.)
- What/who was the primary driver that brought people together, got the project organization started and kept it going?
- How was it coordinated?
- What worked, what didn't (doesn't) work? – Why?
- Based on your experience, what do you recommend incorporating in a Great Lakes research coordination strategy?

**GREAT LAKES RESEARCH COORDINATION STRATEGY WORKSHOP
APRIL 28-30, 2004**

International Joint Commission
Council of Great Lakes Research Managers

AGENDA

April 28, 2004

08:30	Goals, Objectives & Workshop logistics	Stephen Brandt & Harvey Shear
08:40	Coordination Needs - U.S. Congressional Perspective	Amy Carroll
09:00	The Need for Regional Coordination- Canadian Perspective	James Lynch
09:20	Questions & Answers	
Regional/Problem Driven Coordination Efforts		
09:30	Large Scale Ecosystem Restoration: Preliminary Lessons and Guidance for the Great Lakes	Karen Vigmostad
10:00	Break	
10:15	Coordination of Large Scale Assessment of Hypoxia in the Gulf of Mexico	Don Scavia
10:40	Coordination of the Green Bay and Lake Michigan Mass Balance Studies	Glenn Warren
11:05	International Coordination of Coral Reef Research	Peter Sale
11:30	Panel Discussion	Stephen Brandt
12:00	Lunch	
13:00	Introduce Afternoon Session	Paul Horvatin
Lake-Wide Coordination Efforts		
13:10	International Field Year of the Great Lakes	Jim Bruce
13:35	Great Lakes Fisheries Commission –Fisheries Research Coordination	Charles Krueger
14:00	Lake Erie Millennium Network	Jan Ciborowski
14:25	EEGLE Project	Brian Eadie
14:50	Break	
15:05	Panel Discussion	Harvey Shear (Moderator)
16:00	Summary of Day 1 and Wrap Up	Stephen Brandt & Harvey Shear
16:30	Adjourn	

**GREAT LAKES RESEARCH COORDINATION STRATEGY WORKSHOP
AGENDA (Continued)**

April 29, 2004

8:30	Goals & Objectives for Day 2	Brandt & Shear
Collaborative Approaches/Partnerships		
8:30	Canada-Ontario Water Use and Supply Project	Wendy Leger
8:50	Upper Lakes Environmental Research Network	Amber Lahti
9:10	Pollution from Land Use Activities Reference Group (PLUARG) Study	Harvey Shear
9:30	Panel discussion	
10:00	Break	
10:15	National Oceanographic Partnership Program & The National Ocean Research Leadership Council	Reginald Beach
10:40	Council of Great Lakes Governors	Peter Johnson
11:05	Sea Grant	Jeff Reutter
11:30	Panel Discussion	Paul Horvatin
12:00	Conclude Public Session - Lunch	
IJC Council & Board Representatives Sessions		
13:00	Identify Common Themes & Review Recommendations - ULERN Report Out – Amber Lahti, Angie Wagner	Moderator Paul Horvatin, Facilitator Angie Wagner
14:00	Board/Council Discussion	SAB, HPTF, Air Board Reps
14:30	Discussion – Brainstorming session Recommendations for Research Strategy	Stephen Brandt
15:30	Discussion - Recommendations for Research Strategy – Outline	Harvey Shear
16:30	Adjourn	
Friday, April 30, 2004		
8:30	Goals & Objectives for Day 3	Brandt & Shear
8:45	Review Strategy Outline – Reach Consensus & Develop Council Recommendations - Facilitated Session with Council Members & board liaisons	Amber Lahti & Angie Wagner
10:00	Break	
10:15	Observations & Workshop Summary, Plan for Moving Forward & Concluding Remarks	Brandt & Shear
12:00	Adjourn	

(3) Workshop Presenters

Amy Carroll grew up in the Seacoast area of New Hampshire. In 1992 she moved to northern Indiana and majored in biochemistry and environmental science at the University of Notre Dame in South Bend. In 1996, she graduated from Notre Dame with a B.S. degree. After obtaining her undergraduate degree, Amy chose to perform a year of service work with the program Holy Cross Associates. She spent the year working at a women and children's shelter in Portland, OR. Making her way back towards the Northeast, Amy enrolled at Cornell University in the fall of 1997 to pursue a Ph. D in environmental microbiology, with a focus on bioremediation of groundwater pollution. Upon completion of her degree in August 2002, she moved to Washington, D.C. and worked for the House Committee on Science as a Congressional Fellow sponsored by the American Society for Microbiology. In June of 2003 she joined the staff of the Committee as Chairman Ehlers' designee on the Environment, Technology and Standards Subcommittee.

James Lynch Served abroad as an officer in the Canadian Foreign Affairs Department in four Canadian diplomatic missions: two Embassies -- Tel Aviv and The Hague, the Permanent Mission to the United Nations in Geneva, and the Canadian High Commission in London. He also, served at headquarters in the Legal Bureau, Western Europe, Middle East and UN Divisions. Most recent headquarters posting was as Deputy Director of the Cabinet and Parliamentary Relations Division. In August 2003 began his current posting as Consul in the Canadian Consulate General in Chicago responsible for political, economic relations, and public affairs. He was Awarded Minister's citation for foreign policy excellence 1996, a BA from Carleton University, and LLB from University of Ottawa.

Karen E. Vigmostad is a policy analyst with the Northeast-Midwest Institute, a nonpartisan, nonprofit policy research center in Washington, D.C. Dr. Vigmostad specializes in Great Lakes water management, ecosystem restoration, and coastal policy. She serves on the Council of Great Lakes Governors' Water Management Working Group's Resource Group, the U.S. Fish and Wildlife Service's Great Lakes Basin Ecosystem Team, and the State of the Lakes Conference Steering Committee. Dr. Vigmostad is also the director of the U.S.-Canada Great Lakes Islands Project. Dr. Vigmostad holds a doctorate in resource development from Michigan State University, a M.S. in natural resource and environmental policy from the University of Michigan and has been a visiting specialist at Michigan State University's Institute of Water Research and Department of Resource Development, a Great Lakes specialist with Michigan Sea Grant, a senior

policy specialist within Michigan's Office of the Great Lakes, director of the Rouge River Watershed Council, and consultant to many organizations.

Dr. Donald Scavia Dr. Scavia is Professor of Natural Resources and Environment at the University of Michigan and Director of the Michigan Sea Grant Program. He is Associate Editor for journals of the Ecological Society of America and the Estuarine Research Federation, and has served on the Boards of Directors for the American Society of Limnology and Oceanography and the International Association for Great Lakes Research. Dr. Scavia holds Bachelors, Masters, and Doctorate degrees in Environmental Engineering from Rensselaer Polytechnic Institute and the University of Michigan. He has published over 60 articles in the primary literature and led development of dozens of interagency scientific assessments and program development plans.

Dr. Glenn Warren, Dr. Glenn Warren is the Environmental Monitoring and Indicators Team Leader for the U.S. EPA, Great Lakes National Program Office. He is the project officer for the Lake Michigan Mass Balance Study, and was involved with the Green Bay Mass Balance Study. His involvement is with chemical and biological monitoring of the open waters of the Great Lakes. Dr. Warren received his undergraduate degree from the University of Wisconsin-Madison and his Ph.D. from the University of Wisconsin-Milwaukee.

Dr. Peter Sale is a Professor of Biological Sciences at the University of Windsor's Great Lakes Institute for Environmental Research, and also serves as Chair of the World Bank/GEF Working Group on Coral Reef Connectivity, is a member of the International Society for Reef Studies, the Australian Coral Reef Society, and many other societies and boards.

He is Ecology Editor for Coral Reefs, and has conducted research in Stock discrimination and recruitment of Great Lakes percid fishes, Recruitment dynamics and connectivity of coral reef fishes, Community ecology and recruitment dynamics of fishes and Tropical coastal marine management. Dr. Sale holds a PhD. Zoology, University of Hawaii, and a M.A. & B.Sc. in Zoology, from the University of Toronto.

Dr. James P. Bruce: Jim Bruce's early research career was in hydrometeorology. Subsequent positions with Environment Canada, beginning in 1967 include Director, Canada Centre for Inland Waters, Burlington, Director-General Inland Waters, Ottawa, and Assistant Deputy Minister, Atmospheric Environment Service, Toronto. On retirement from the Canadian government, he served as Deputy Secretary General, World

Meteorological Organization, Geneva, and more recently as an Environmental Consultant associated with Global Change Strategies International, Ottawa. Jim's honours include appointment as Officer of the Order of Canada, Fellow of the Royal Society of Canada and honorary Doctorates from Waterloo and McMaster Universities.

Charles C. Krueger: Dr. Krueger is currently Science Director for the Great Lakes Fishery Commission in Ann Arbor, Michigan. Responsibilities include development of fishery research priorities focused on the Commission's ecosystem, sea lamprey, and partnership vision statements, promotion of science-based fishery and ecosystem management programs for the Great Lakes, and the conduct of research and direction of graduate studies in support of Great Lakes research priorities. In addition, he holds an adjunct appointment as an associate professor of fishery science with Michigan State University, University of Michigan, and Cornell University. He has a long-term research interest in the restoration of lake trout to the Great Lakes. In 1988, he was appointed by the President as a U.S. Commissioner with the Great Lakes Fishery Commission and was chair of the Commission from 1989-1991. He was re-appointed to a six-year term in 1992 and served as its chair in 1997.

He attended the University of Minnesota (B.S. 1974; Ph.D. 1979) and Iowa State University (M.S. 1976) specializing in fishery science and has authored 80+ scientific and technical publications in fishery science and management

Dr. Jan Ciborowski is a member of the CGLRM and a Professor of Biological Sciences at the University of Windsor's Great Lakes Institute for Environmental Research. Jan serves as CoDirector of the Lake Erie Millennium Network, is a member of the State of the Lakes Environment Conference (SOLEC) Steering Committee, Associate Editor of the Journal of the North American Benthological Society and also serves on the Board of Directors for the International Association for Great Lakes Research. He holds a Ph.D. in Zoology from the University of Alberta, Canada, a M.Sc. in Zoology from the University of Toronto and a B.Sc. Biology, from the University of Toronto.

Dr Brian Eadie began his career using stable isotopes to study processes in the Antarctic – a very large interdisciplinary NSF program that remains active. His interests are in carbon and nutrient geochemistry and sediment-water exchange processes. For the past 25 years he has been a senior researcher at NOAA-Great Lakes Environmental Research Lab where he has participated in the organization and management of several large, coordinated programs – the most recent being the Impact of Episodic Events which he will discuss this afternoon.

Wendy Leger is a Senior Analyst on Water Projects with the Boundary Waters Issues Division of the Meteorological Service of Canada-Ontario Region, Environment Canada. She has been involved in numerous multi-agency and binational projects and is the federal co-lead on the Canada/Ontario Water Use and Supply Project.

Amber Lahti serves as a Project Officer for the Upper Lakes Environmental Research Network. Amber joined ULERN in 2000. She graduated from Sault College's Fish & Wildlife Technician Program in 1995, and has had eight years of natural resource and environmental experience in the federal, provincial, private and not-for-profit sectors. Amber is managing \$4,000,000 in funds received from Canada Foundation for Innovation and Ontario Innovation Trust for initiatives involving Sault College and ULERN partners.

Dr. Harvey Shear, serves as Regional Science Advisor for the Ontario Region of Environment Canada, and is the Canadian Co-Chair of the Council of Great Lakes Research Managers. As the Regional Science Advisor, he is responsible for the provision of scientific advice on priority issues to the Regional Director General and the Regional Management Board. Dr. Shear leads the Canadian part of the biennial State of the Lakes Ecosystem Conference, and the State of the Lakes report and is also responsible for the Ontario Region portion of the national Ecological Monitoring and Assessment Network (EMAN). EMAN provides scientific information to senior management on Canada's international commitments in areas such as Acid rain, Biodiversity and Climate Change. Dr. Shear holds a Ph.D. in Physiology from the University of London, UK, M.Sc. & B.Sc., in Aquatic Ecology from the University of Toronto.

Dr. Reginald A. Beach is Research Director for the Consortium for Oceanographic Research and Education in Washington, DC. In 1997, CORE was awarded the contract to serve as the Program Office for the National Oceanographic Partnership Program. The National Oceanographic Partnership Program (NOPP) is a collaboration of fifteen Federal agencies to provide leadership and coordination of national oceanographic research and education programs. An innovative program established by Congress in Fiscal Year 1997, NOPP facilitates new interactions among federal agencies, academia and industry; increases visibility for ocean issues on the national agenda; and achieves a higher level of coordinated effort and synergy across the broad oceanographic community. Under the guidance of the National Ocean Research Leadership Council (NORLC), NOPP has supported forty-eight cutting-edge research and education projects.

Peter R. Johnson, Senior Program Manager, Council of Great Lakes Governors.

Pete has worked at the Council of Great Lakes Governors since April 1998. Prior to joining the Council, he worked at Trudy Nichol and Associates, a grassroots and fundraising consulting firm. He taught law and business at the Guangdong University of Foreign Studies located in Canton, China in 1996. Prior to that, he practiced commercial litigation with the firm of Bischoff, Maurides & Swabowski, Ltd. for three and a half years, appearing in both Federal and State courts throughout the Chicago metropolitan region on a wide variety of issues ranging from superfund litigation to antitrust defense. Pete has also served as a research consultant on two U.S. Senate races in Illinois. He has a B.A. in Political Science from North Park University and a J.D. from Boston College Law School, and has been a member of the Illinois Bar since 1991.

Dr. Jeff Reutter directs four programs at Ohio State University: Stone Laboratory, Ohio Sea Grant College Program, Center for Lake Erie Area Research, and Great Lakes Aquatic Ecosystem Research Consortium, a consortium of 12 Ohio colleges and universities. Dr. Reutter is an aquatic biologist and received all three degrees from Ohio State.

He is: President of the National Association of Marine Laboratories; member of the Board of Directors of the Great Lakes Protection Fund and the Ohio Academy of Science; member of the National Steering Committee for the Global Ocean Observing System; and, U.S. Co-Chair of the Lake Erie Millennium Network.

Dr. Stephen B. Brandt, has served as the Director of the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory (GLERL) in Ann Arbor, Michigan since 1997 and is the U.S. Co-Chair of the Council of Great Lakes Research Managers. GLERL conducts research into the sources, pathways, fates and effects of toxicants in the Great Lakes, natural hazards such as severe waves, storm surges and ice, Great Lakes hydrology and water levels, the regional effects of global change, and ecosystems and their interactions, including research into the causes, effects and techniques for ameliorating the impact of invasive aquatic species. Prior to becoming GLERL Director, Dr. Brandt was the director of the Great Lakes Center for Environmental Research and Education at Buffalo State College, Buffalo, New York where he was also a professor of biology. He also has been a professor at the College of Environmental Science and Forestry at the State University of New York at Syracuse, a professor at the University of Maryland's Chesapeake Biological Laboratory in Solomons, Maryland, and a senior research scientist with the Division of Fisheries Research for the Commonwealth Marine Laboratories in Cronulla, Australia. He earned a bachelor's degree in zoology and mathematics and a

master's and Ph.D. in oceanography and limnology from the University of Wisconsin.

Angie Wagner is an Administrative Assistant/Special Events Coordinator for the Upper Lakes Environmental Research Network. Angie joined ULERN in 1999 and has over 20 years experience in administration and operations management. Angie manages the ULERN office, is responsible for planning and organizing symposia, workshops, committee and project meetings.

Paul Horvatin, Program Manager, USEPA Great Lakes National Program Office

Monitoring, Indicators and Reporting Branch. Paul is responsible for indicator development and monitoring programs for USEPA in the Great Lakes including: open lakes monitoring, Integrated Atmospheric Deposition Network (IADN), contaminated fish monitoring, biological monitoring (phytoplankton, zooplankton and benthic), Research Vessel Lake Guardian management, and health and safety management for GLNPO. He is also U.S. Co-Chair for State of the Lakes Ecosystem Conference (SOLEC), Program Manager for the Lake Michigan Mass Balance Project and is a member of the CGLRM.

References

- "America's Living Oceans: Charting a Course for Sea Change", June 2003, Pew Oceans Commission, <http://www.pewoceans.org/>
- "An Ocean Blueprint for the 21st Century", U.S. Commission on Ocean Policy, <http://www.oceancommission.gov/>
- "12th Biennial Report of the International Joint Commission", Sept., 2004, http://www.ijc.org/php/publications/html/12br/pdf/12thbrfull_e.pdf
- "Great lakes Organizational Leadership and Restoration Goals Need to be Better Defined for Monitoring Restoration Progress", United States Government Accountability Office Report, GAO-04-1024, September, 2004, <http://www.gao.gov/cgi-bin/getrpt?GAO-04-1024>
- "2001 Report of the Commissioner of the Environment and Sustainable Development – A Legacy Worth Protecting: Charting a Sustainable Course in the Great Lakes and St. Lawrence River Basin", Office of the Auditor General of Canada Report, http://www.oag-bvg.gc.ca/domino/reports.nsf/html/c2001menu_e.html

"Great Lakes Regional Collaboration Draft Report", July, 2005,
<http://www.glrc.us/index.php>

"Canada-Ontario Agreement, Respecting the Great Lakes Basin Ecosystem,
2002-2003 Biennial Progress Report", <http://www.ene.gov.on.ca>