



## IJC Science Advisory Board – Science Priority Committee Eighteenth Meeting Summary

The Metcalfe Hotel (Edwards Room)  
123 Metcalfe Street, Ottawa  
**October 25, 2017 – 8:00 – 11:30am**

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<b>U.S. Members</b>	<b>Canadian Members</b>	<b>Commission Staff</b>
Carol Miller (Co-Chair)	Jeff Ridal (Co-Chair)	Matthew Child (Secretary)
Dave Allan	Andrea Kirkwood	Victor Serveiss (U.S. Liaison)
Mike Murray	Christina Semeniuk	Glenn Benoy (Canadian Liaison)
Scott Sowa	Clare Robinson (by phone)	Mark Burrows
Dale Phenicie	Henry Lickers	Trish Morris
Lucinda Johnson	John Livernois	

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Regrets: Joe DePinto, Bob Hecky

### 1. Welcome and Approval of Draft Agenda

The Canadian Co-Chair welcomed everyone to the meeting. The draft agenda was approved by consensus.

### 2. Work Group Updates

Information on the progress of each Work Group is summarized in the attached SPC Appearance PowerPoint, which was reviewed during the meeting.

#### Interacting Stressors (Dave Allan)

A draft Work Plan has been prepared for Commissioner consideration. The project is proposed for completion by March, 2019 and identifies a project budget of \$85,000. Through discussion, there was general agreement on the following:

- Defining terms early on will be important.
- The DPSIR (driver-pressure-state-impact-response) conceptual framework will be useful for the project, including the linkage between drivers and stressors.
- Consider involving other advisory boards in the project once it is approved e.g., HPAB and their interest in stressors impacting human health.

A Work Group has already been formed for this project, and their input has been incorporated into the Work Plan. Andrea Kirkwood, Dale Phenicie and Carol Miller volunteered to join as additional members of the Work Group.

*Information Coordination and Flow (Scott Sowa)*

The project report has been submitted to the Commission for approval, and the Work Group co-chairs hosted a webinar earlier in October to present the report to Commissioners, board members and staff. Through discussion, it was clarified that the Annex 10 Data Management and Sharing Task Team has been briefed on the project.

Note: subsequent to the SPC meeting, Commissioners approve the report for posting to the SPC website, and directed staff to collaborate with the Work Group co-chairs to prepare a letter to the Great Lakes Executive Committee co-chairs outlining the report findings and recommendations that apply to governments.

*Fertilizer Application Work Group (Mike Murray)*

The project report has been submitted to the Commission for approval. During the discussion, it was noted that economics and farmer behavior are important drivers of agricultural nutrient use, and although phosphorus fingerprinting is still at an experimental stage, the science is much better developed for other contaminants that move with agricultural sources of P e.g., bacteria. The project is expected to be useful for the Water Quality Board's Animal Feeding Operations project.

Note: subsequent to the SPC meeting, Commissioners provisionally approved the report. They requested two minor changes to the report for consideration by the Work Group, and that the revised report be brought back to the Commission for their December, 2017 Executive Meeting where they may adopt it as an IJC report for public release in January, 2018.

*Energy Transport & Water Quality Work Group (Dave Allan)*

The contractor has prepared a draft technical report, which has been reviewed by the Work Group. A revised draft report will be produced for Work Group review, prior to the final contractor technical report. Through discussion, there was general agreement on the following:

- The draft technical report would benefit from additional input on ecological impacts.
- The report should include a discussion of spill response capability.
- Vulnerability of habitats and species should be included in the assessment, although there will be less emphasis on risk.

*Declining Offshore Lake Productivity Work Group (Andrea Kirkwood on behalf of the Co-Chairs)*

The contractor has substantially completed their literature review of phosphorus-productivity relationships, and most available data have been obtained to update the analysis of bottom-up regulation of ecosystem structure completed by Bunnell et al. (2014).

*Great Lakes Early Warning System (Lucinda Johnson)*

Proposals from three qualified bidders were received, and AECOM was selected. The contract will be finalized soon and the project initiation meeting with the Work Group and the contractor will be held in November.

### 3. Status of Collaborative Projects

Brief updates on other advisory board projects that are proceeding collaboratively with SPC were provided.

#### HPAB's Harmonized Fish Consumption Advisory Work Plan (Jeff Ridal)

A Work Plan is being prepared to work with Indigenous communities and other partners to develop fish consumption guidelines that consider the benefits of fish consumption, and the effects of harmful chemical mixtures, with a geographic focus on fishers and Indigenous communities on the upper St. Lawrence River. HPAB is the project lead, with the participation of SPC. The Work Plan will be submitted to the Commission in late 2017 or early 2018 and the project is expected to take two years to complete.

#### WQB's Animal Feeding Operations (Dale Phenicie)

A contractor has been selected and work is underway to complete a comparative study examining regulations/policies in all Great Lakes jurisdictions, and a limited number of other jurisdictions, related to confined animal feeding operations (CAFOs).

#### RCC's Great Lakes Surface Water-Groundwater Integration

This project will develop an integrated modeling platform for combined representation of surface and subsurface hydrological processes. A contractor has been selected and project completion is expected in fall, 2018. Through discussion, it was clarified that the focus is primarily on water quantity, with a lesser emphasis on water quality. The link between this project and the SPC fertilizer project was noted, particularly as it relates to legacy phosphorus from agricultural sources.

#### RCC's Great Lakes Nutrients Adaptive Management (Scott Sowa)

This project will develop an inventory and comparative assessment of nutrient-related models, identify gaps and sources of uncertainty, and determine how well management actions are incorporated in the models. A contractor has been selected and work has recently started. Through discussion, it was clarified that the project will consider both lake and watershed models at a basin-wide scale. The linkage with the SPC's Declining Lake Productivity project was noted.

### 4. Proposed Multi-Board Nutrients Workshop

The workshop outline included in the agenda packet was reviewed. The attachment provided an overview of a proposed multi-Board workshop that Commissioners have requested to assess and synthesize the nutrients-related projects of the IJC's advisory boards, as well as the recent work of others e.g., various governments' Domestic Action Plans. There was general support for continuing to develop the workshop outline, and it was noted that some of the SPC's Information Coordination and Flow analysis is instructive e.g., considerations of where to invest, how to track progress, how to communicate progress, etc.

Mike Murray volunteered to provide periodic advice to staff as workshop plans evolve.

### 5. Potential Work Plan Topics

Scott Sowa provided a brief presentation on aquaculture. There is a growing demand for fish protein, which is expected to be met through aquaculture. Although at a global scale aquaculture

now exceeds the mass of wild caught fish, aquaculture in the Great Lakes is relatively limited. The main systems being used in the Great Lakes include open net-pens, flow-through systems and recirculating systems. The project could provide a science summary of each of the aquaculture systems to inform policy. It could also assess the environmental and water quality impacts of aquaculture versus other forms of animal protein production. Through oral and written input received during the meeting several related documents were identified:

- A Strategic Plan for a Thriving and Sustainable Aquaculture Industry in Michigan (available at [http://www.miseagrant.umich.edu/wp-content/blogs.dir/1/files/2012/09/2014-MAA-Strategic-Plan\\_Final\\_141215.pdf](http://www.miseagrant.umich.edu/wp-content/blogs.dir/1/files/2012/09/2014-MAA-Strategic-Plan_Final_141215.pdf))
- Great Lakes Net-Pen Commercial Aquaculture: A Short Summary of the Science (available at [http://www.michigan.gov/documents/mdard/AquaRprt\\_504335\\_7.pdf](http://www.michigan.gov/documents/mdard/AquaRprt_504335_7.pdf))
- Synthesis Report Regarding Net-pen Aquaculture in the Great Lakes (available at [https://www.michigan.gov/documents/mdard/Synth-Paper-NetPENS-09Mar2016\\_516439\\_7.pdf](https://www.michigan.gov/documents/mdard/Synth-Paper-NetPENS-09Mar2016_516439_7.pdf))

Through discussion, it was noted that other groups may have important contributions to make to the topic (e.g., Great Lakes Fishery Commission, IJC WQB), and a consideration of economic viability is important for the aquaculture sector. The issue is potentially quite divisive – for example, although net pen aquaculture is active on Lake Huron’s North Channel in Ontario, in the synthesis report above the Michigan agencies recommended against pursuing commercial net-pen aquaculture in the Great Lakes. The SPC would need to carefully consider what it could add to the topic.

A number of other potential Work Plan topics were briefly discussed:

- Alternative energy – the need for (and installation of) alternative energy sources throughout much of the Great Lakes is growing, including hydro, wind, solar, and biomass. The SPC could examine the risks, opportunities and tradeoffs associated with different energy technologies.
- Link between ecosystem health and economic health – this topic delves into the realm of social-economic modeling. An example includes the link between nearshore water quality and tourism.
- Fertilizer Application report follow-on – The SPC report includes several recommendations that could be considered for additional analysis. For example, some European jurisdictions limit the mass of manure-sourced phosphorus to no more than 90% of crop agronomic needs. Some of the fertilizer report recommendations could be advanced by other Boards, or through the proposed multi-Board workshop.
- Non-agricultural sources of nutrients – the contribution of non-agricultural sources of nutrients in some watersheds can be significant. A project could be undertaken to examine the efficacy of non-agricultural BMPs, and other approaches to mitigating non-agricultural nutrient impacts.

## **6. Board Operations Review**

Due to time limitations this agenda item was not discussed, although there was general agreement that it is a topic that should be discussed at a subsequent meeting. Any review should also consider the degree to which the SPC is having an impact on the topics it examines.

## **7. Next Meeting and Adjournment**

A Doodle poll will be sent out to schedule a conference call meeting for early 2018.

There being no other business, the meeting was adjourned at 11:30 a.m.

*Meeting record prepared by Matthew Child and reviewed by Carol Miller and Jeff Ridal.  
Please forward any errors or omissions to [childm@windsor.ijc.org](mailto:childm@windsor.ijc.org)*



# **Science Advisory Board**

## **Science Priority Committee**

**Report to IJC Commissioners**

**Carol Miller & Jeff Ridal, SPC Co-Chairs**

**Ottawa, ON**  
**October 26, 2017**



# Science Advisory Board Members

## Science Priority Committee

### *Canadian Members*

Jeffrey Ridal, Co-Chair

Bob Hecky

Henry Lickers

Andrea Kirkwood

John Livernois

Clare Robinson

Christina Semeniuk

### *United States Members*

Carol Miller, Co-Chair

David Allan

Lucinda Johnson

Joe DePinto

Michael Murray

Dale Phenicie

Scott Sowa



# Presentation Outline

- New Work Plan – Interacting Stressors
- Work Group Updates
  - Information Coordination and Flow Work Group
  - Fertilizer Application Work Group
  - Energy Transport and Water Quality Work Group
  - Declining Offshore Lake Productivity Work Group

*Note: GLEWS (SAB project) presented by RCC*





# Stressor Interaction Work Group

Chair:

Dave Allan



# Work Group Members

- TBD
- The following SPC members have expressed interest:
  - Dave Allan (chair), Joe DePinto, Bob Hecky, Henry Lickers, Lucinda Johnson, Mike Murray, Scott Sowa, Andrea Kirkwood, Dale Phenicie, Carol Miller
  - Additional WG members including external to the SPC will be sought
- Staff support: Matthew Child, Glenn Benoy, Victor Serveiss



# Objectives

***Objective: synthesize existing information on the potential for interactions among stressors to increase harm to the Great Lakes ecosystem, resulting in 'ecological surprises'***

**Key questions:**

1. Which stressor combinations are thought to be of greatest concern in the Great Lakes ecosystems?
2. Which stressor combinations are commonly documented in scientific literature?
3. How strong are these effects across different aquatic environments and biological response variables?
4. How reliable is this evidence with regard to the underlying data quality?
5. How common are non-additive, i.e., synergistic and antagonistic effects?
6. What additional research, surveillance, and monitoring is needed to better address these questions in the Great Lakes?



# Project Status

- Work Plan is completed
- Workgroup is partially assembled
- Project awaits Commissioners' approval  
(project cost: \$85,000)



# Timeline & Next Steps

If project is approved....

- Seek additional WG members
- Prepare RFP (~ Dec 15, 2017)
- Call for proposals (~Jan 15, 2018)
- Project launch (~May 2018)



# Information Coordination & Flow (ICF) Work Group

Co-Chairs:

Scott Sowa

Lucinda Johnson



# ICF Work Group Members

## SPC Members

- Scott Sowa (Co-chair)
- Lucinda Johnson (Co-chair)
- Carol Miller
- Jeff Ridal
- David Allan
- Henry Lickers
- Chris Metcalf
- Dale Phenicie
- Steven Renzetti
- Christina Semeniuk

## Contractors

- Great Lakes Commission
- LimnoTech

## Other Members

- RCC Liaison: Norm Grannemann
- WQ Board Liaison: Dave Ulrich
- Annex 10 DMS Work Group Liaison: Jen Read
- GLOS Liaison: Kelli Paige
- GLC Blue Accounting Liaison: Steve Cole

## IJC Staff

- Antonette Arvai
- Glenn Benoy
- Matthew Child
- Victor Serveiss



# Project Goal

- Develop and apply methods for assessing and identifying barriers to the flow of information needed to;
  - assess programs and progress towards GLWQA objectives, and
  - support resource allocation decisions that seek to help achieve the objectives of the GLWQA.



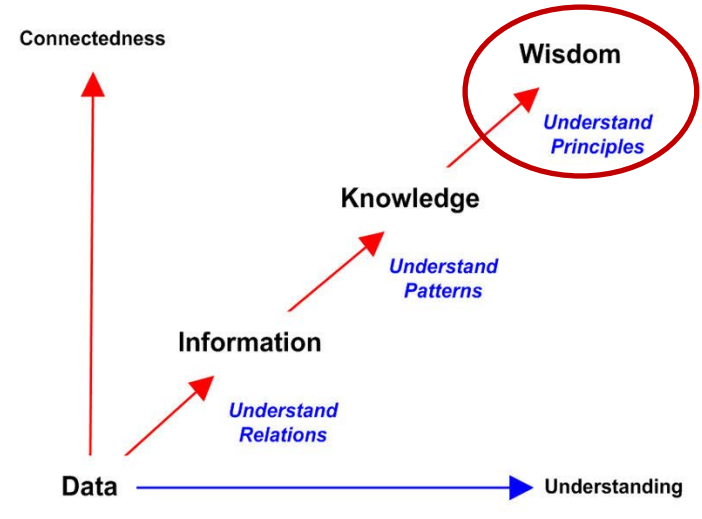
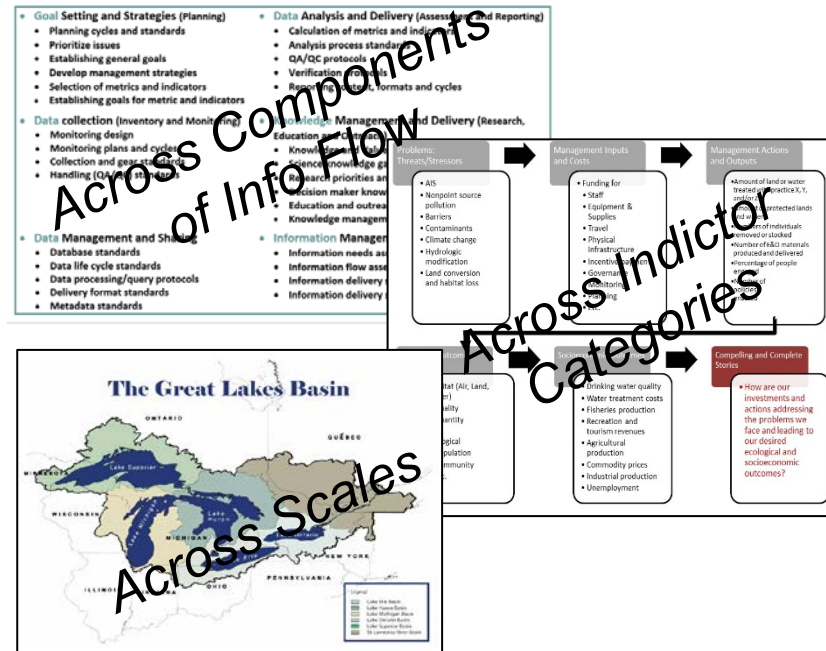


# Project Objectives

1. Identify and assess programs that collect, manage and deliver data and information to Great Lakes decision makers

2. Conduct information flow assessments for 2 General Objectives of the GLWQA

3. Assess opportunities to include traditional ecological knowledge into the information available to Great Lakes decision makers





# Project Status

- Project deliverables complete

<ul style="list-style-type: none"><li>• Goal Setting and Strategies (Planning)<ul style="list-style-type: none"><li>• Planning cycles and standards</li><li>• Prioritize issues</li><li>• Establishing general goals</li><li>• Develop management strategies</li><li>• Selection of metrics and indicators</li><li>• Establishing goals for metric and indicators</li></ul></li><li>• Data collection (Inventory and Monitoring)<ul style="list-style-type: none"><li>• Monitoring design</li><li>• Monitoring plans and cycles</li><li>• Collection and gear standards</li><li>• Handling (QA/QC) standards</li></ul></li><li>• Data Management<ul style="list-style-type: none"><li>• Database standards</li><li>• Data life cycle</li><li>• Data processes</li><li>• Delivery formats</li><li>• Metadata standards</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Data Analysis and Delivery (Assessment and Reporting)<ul style="list-style-type: none"><li>• Calculation of metrics and indicators</li><li>• Analysis process standards</li><li>• QA/QC protocols</li><li>• Verification protocols</li><li>• Reporting content, formats and cycles</li></ul></li><li>• Knowledge Management and Delivery (Research, Education and Outreach)<ul style="list-style-type: none"><li>• Knowledge and Value Assessment</li><li>• Science knowledge gaps</li><li>• Research priorities and strategy</li><li>• Decision maker knowledge gaps</li><li>• Education and outreach strategy</li><li>• Knowledge management strategy</li></ul></li></ul>
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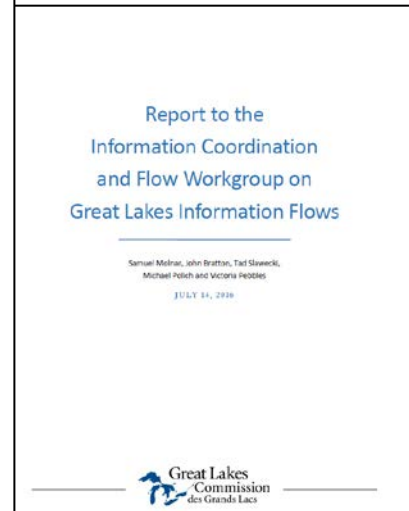
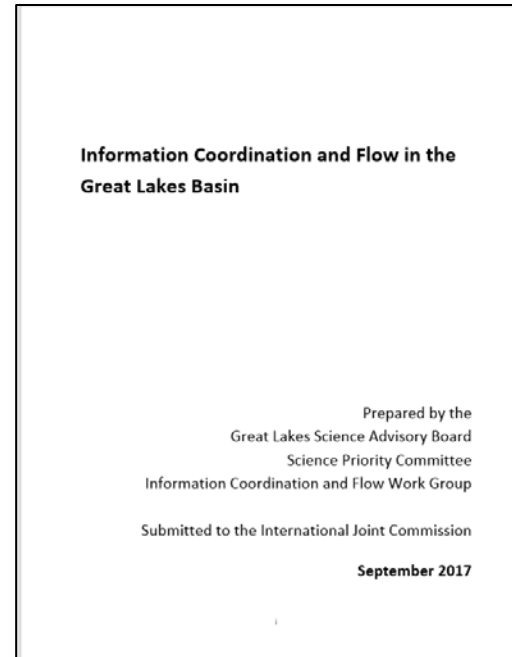


Project Name	Start Date	End Date	Status	Lead	Team	Notes
...	...	...	...	...	...	...

Step	Description
1	Identify specific metrics and indicators that enable answering the three focal questions of this project for each of the General Objectives of GLWQA. Adhere to the principle of the "fewest that tell us the most". Incorporate TK into the selection of these metrics and indicators
2	Whenever possible establish specific goals/benchmarks for each of these metrics and indicators. Incorporate TK into the establishment of these goals
3	Develop and implement new approaches for engaging decision makers, including indigenous peoples. These assessments should be focused by assessing the relevance of the selected metrics and indicators to their resource allocation decisions, their information needs for rapid response decisions, and the desired formats and reporting needs for this information.
4	Use the process established by CIW to identify and prioritize barriers to the delivery of individual metrics and indicators to decision makers. However, expand the CIW process to include forecasting of metrics and indicators.
5	Identify and prioritize knowledge gaps for the inherent natural variation in each of the selected metrics and the relations among these metrics. When possible work with existing science prioritization processes such as those conducted by the IJC's SAB
6	Use the process being developed by the Annex 10 Data Management and Science Team to identify and prioritize barriers to the integrated delivery of all the metrics and indicators identified for each of the general objectives of GLWQA
7	Develop specific recommendations and strategies to address the highest priority barriers to information flow

- Final report submitted

- Briefing webinar for Commissioners

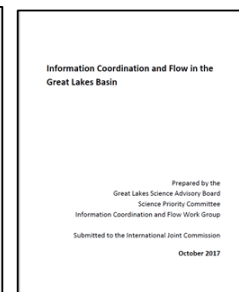
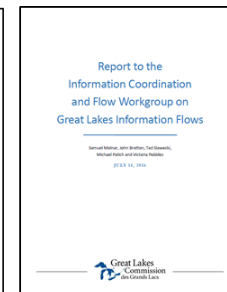
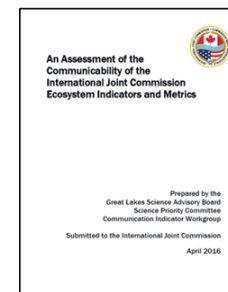




# Recommendations

- The IJC and Parties should...
  - ..more equitably invest in all 6 components of information flow
  - ...make long-term commitment.. develop binational forum
  - ..foster collaboration with recent initiatives focused on broader set of indicators
  - ..conduct info flow assessments for all general objectives of GLWQA
  - ..incorporate TEK into all facets of these assessments
  - ..take immediate steps to address barriers identified in 3 reports

<ul style="list-style-type: none"> <li>• <b>Goal Setting and Strategies (Planning)</b> <ul style="list-style-type: none"> <li>• Planning cycles and standards</li> <li>• Prioritize issues</li> <li>• Establishing general goals</li> <li>• Develop management strategies</li> <li>• Selection of metrics and indicators</li> <li>• Establishing goals for metric and indicators</li> </ul> </li> <li>• <b>Data collection (Inventory and Monitoring)</b> <ul style="list-style-type: none"> <li>• Monitoring design</li> <li>• Monitoring plans and cycles</li> <li>• Collection and gear standards</li> <li>• Handling (QA/QC) standards</li> </ul> </li> <li>• <b>Data Management and Sharing</b> <ul style="list-style-type: none"> <li>• Database standards</li> <li>• Data life cycle standards</li> <li>• Data processing/query protocols</li> <li>• Delivery format standards</li> <li>• Metadata standards</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Data Analysis and Delivery (Assessment and Reporting)</b> <ul style="list-style-type: none"> <li>• Calculation of metrics and indicators</li> <li>• Analysis process standards</li> <li>• QA/QC protocols</li> <li>• Verification protocols</li> <li>• Reporting content, formats and cycles</li> </ul> </li> <li>• <b>Knowledge Management and Delivery (Research, Education and Outreach)</b> <ul style="list-style-type: none"> <li>• Knowledge and Value Assessment</li> <li>• Science knowledge gaps</li> <li>• Research priorities and strategy</li> <li>• Decision maker knowledge gaps</li> <li>• Education and outreach strategy</li> <li>• Knowledge management strategy</li> </ul> </li> <li>• <b>Information Management and Delivery</b> <ul style="list-style-type: none"> <li>• Information needs assessment</li> <li>• Information flow assessment</li> <li>• Information delivery strategy</li> <li>• Information delivery standards</li> </ul> </li> </ul>
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# Closing

- In 2014 the SPC was asked to help the IJC and Parties tell “complete and compelling stories”
- We have provided recommendations for enhancing the flow of data and information relevant to implementation of the GLWQA

## Information Coordination and Flow in the Great Lakes Basin

Prepared by the  
Great Lakes Science Advisory Board  
Science Priority Committee  
Information Coordination and Flow Work Group  
Submitted to the International Joint Commission  
October 2017

Step	Description
1	Identify specific metrics and indicators that enable answering the three focal questions of this project for each of the General Objectives of GLWQA. Adhere to the principle of the "fewest that tell us the most". Incorporate TK into the selection of these metrics and indicators
2	Whenever possible establish specific goals/benchmarks for each of these metrics and indicators. Incorporate TK into the establishment of these goals
3	Develop and implement new approaches for engaging decision makers, including indigenous peoples. These assessments should be focused by assessing a) the relevance of the selected metrics and indicators to their resource allocation decisions, their information needs for rapid response decisions, and the desired formats and reporting cycles for this information.
4	Use the process established by CIW to identify and prioritize barriers to the delivery of the <b>individual</b> metrics and indicators to decision makers. However, expand the CIW process to include forecasting of metrics and indicators.
5	Identify and prioritize knowledge gaps for the inherent natural variation in each of the selected metrics and the relations among these metrics. When possible work through existing science prioritization processes such as those conducted by the IJC's SAB
6	Use the process being developed by the Annex 10 Data Management and Science Team to identify and prioritize barriers to the <b>integrated</b> delivery of all the metrics and indicators identified for each of the general objectives of GLWQA
7	Develop specific recommendations and strategies to address the highest priority barriers to information flow

## An Assessment of the Communicability of the International Joint Commission Ecosystem Indicators and Metrics



Prepared by  
Great Lakes Science Advisory Board  
Science Priority Committee  
Communication Indicator Work Group  
Submitted to the International Joint Commission

## Report to the Information Coordination and Flow Workgroup on Great Lakes Information Flows

Prepared by  
Samuel McNeil, John Bratton, Ted Stawicki,  
Michael Pettit, and Victoria Pridemore  
JULY 11, 2018



# Fertilizer Application Work Group

Co-Chairs:

Michael Murray

David Allan



# Work Group Members

Name	IJC Affil.	Name	Affiliation
Michael Murray, Co-Chair	SPC	Tom Bruulsema	IPNI
Dave Allan, Co-Chair	SPC	Irina Creed	Western
Patricia Chambers	RCC	Steve Davis	USDA/NRCS
Anne Cook	WQB	Brad Glasman	UTRCA
Joe DePinto	SPC	Pradeep Goel	Ont. MOECC
Bob Hecky	SPC	Laura Johnson	Heidelberg U.
Andrea Kirkwood	SPC	Pamela Joosse	AAFC
Jeff Ridal	SPC	Joe Kelpinski	MI DARD
Clare Robinson	SPC	Kevin King	USDA/ARS
Chris Winslow	RCC	Craig Merkley	UTRCA
Matthew Child	Staff	Rebecca Muenich	UM/ASU
Glenn Benoy	Staff	Craig Stow	NOAA
Mark Gabriel	Staff	Santina Wortman	USEPA



# Objectives

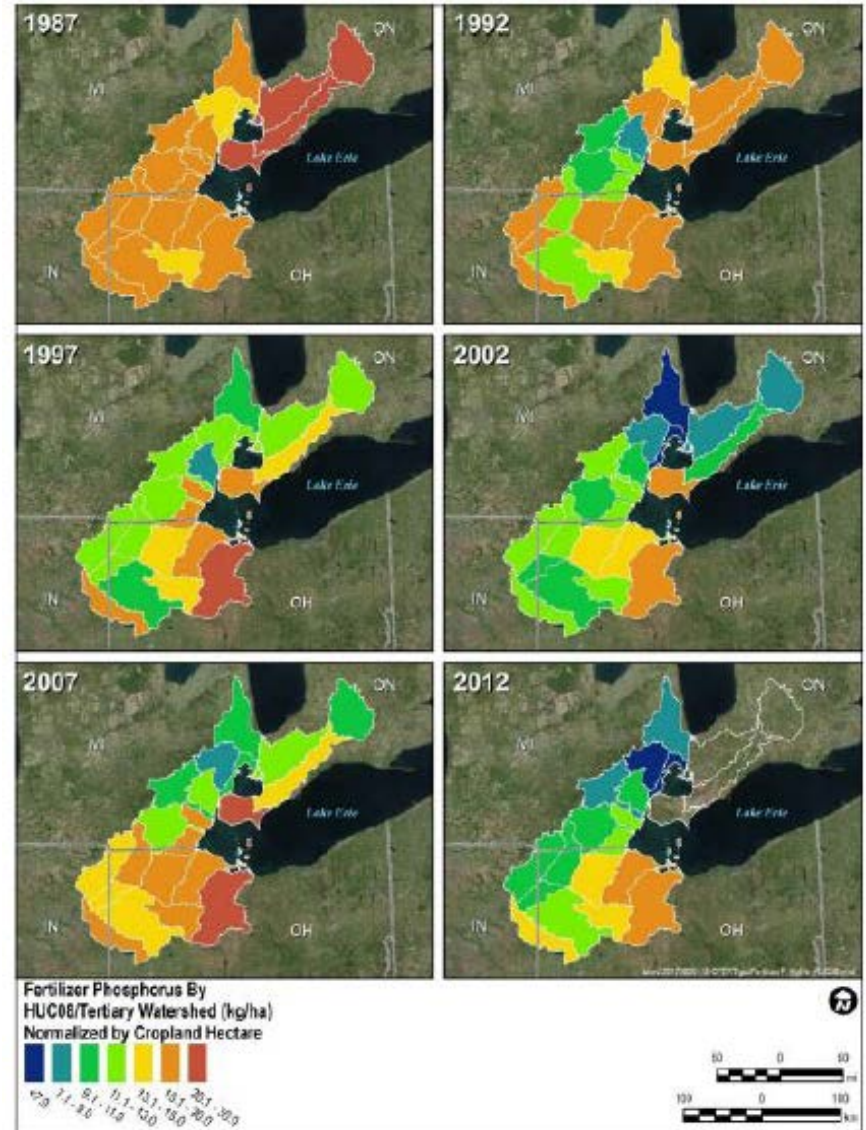
- Summarize state of knowledge on commercial fertilizer vs. manure use (& other P sources) in western Lake Erie basin
- Assess potential of existing watershed models to distinguish contributions to Lake
- Assess potential of current monitoring programs to quantify contributions to Lake
- Identify knowledge gaps, including to help improve potential for management response to reduce loadings, impacts



# Key Findings

- Commercial fertilizer P application dominant (72%) in WLEB (2006-07)
- Manure generation P relatively more significant in Ontario
- No data or methods for distinguishing P loads into lake from different P sources

## Commercial Fert. P Application Rate



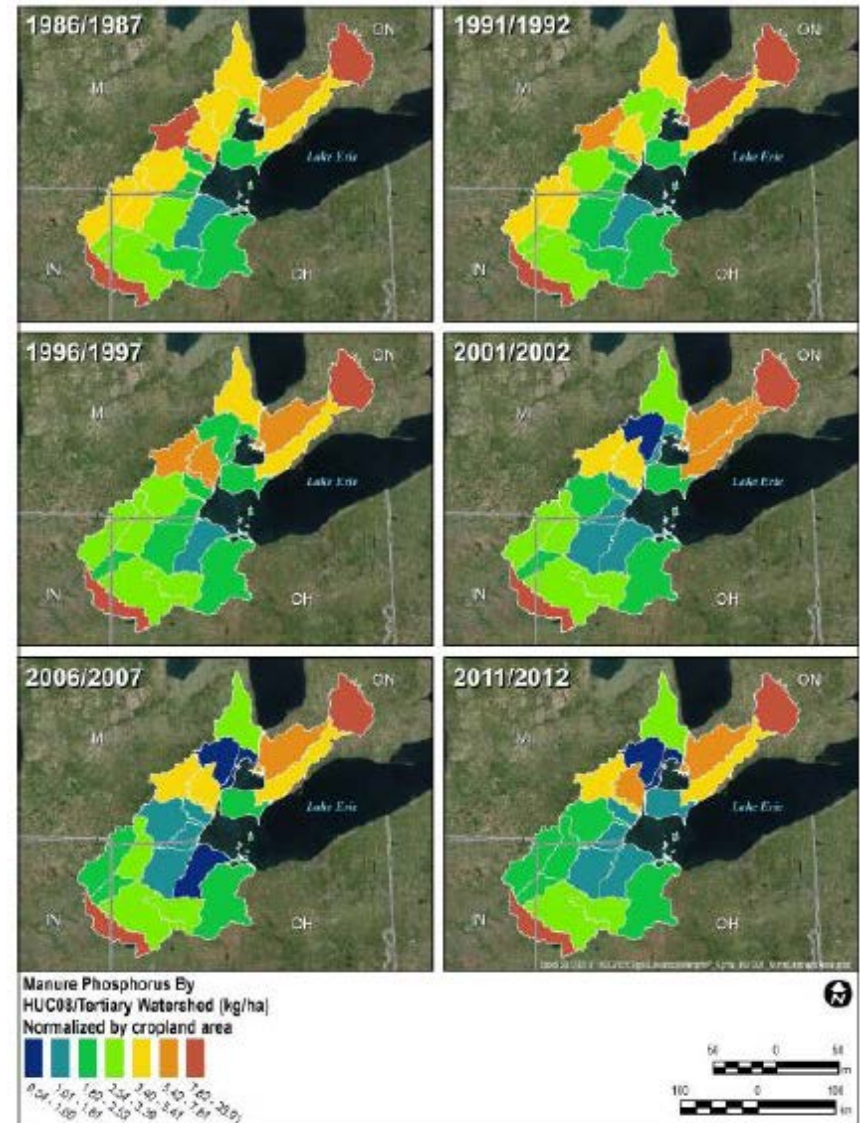




# Key Findings – 2

- Models and monitoring programs decent; still limitations w/r discriminating commercial fertilizer vs. manure P
- Additional important issues are cropping techniques, artificial drainage, and legacy P

## Manure P Production/Area





# Recommendations & Next Steps

- Multiple WG recommendations, including:
  - More comprehensive data on fertilizer and manure application, and soil P data (agencies)
  - Continuing research on emerging approaches to assess P sources
  - More research on impacts of drainage tiles, cropping systems (e.g. no till), legacy P, and BMPs on P export
- Request opportunity for project webinar for Commissioners, address questions, and ideally subsequent approval and release of report



# Energy Transport and Water Quality Work Group

Co-Chairs:

Dave Allan

Mike Murray



# Energy Transport Work Group

- ***Objective: synthesize existing information on potential water quality implications of petroleum transport risks in the Great Lakes region and identify research, monitoring, and information needs, in light of potentially changing transport modes.***

## *SPC Members*

## *External Members*

<b>Name</b>	<b>Affiliation</b>	<b>Name</b>	<b>Affiliation</b>
Michael Murray, Co-chair	Natl Wildlife Fed	George Arhonditsis	Univ Toronto
David Allan, Co-chair	Univ Michigan	Dale Bergeron	Minnesota Sea Grant
John Livernois	Univ Guelph	Stephen Brown	Queen's University
Carol Miller	Wayne State Univ	Allen Burton	Univ Michigan
Dale Phenicie	Council Great Lakes Industries	Lisa Frede	Chemical Industry Council of Illinois
Jeff Ridal	ST Lawrence River Inst	Larissa Graham	Mississippi-Alabama Sea Grant Consortium
Clare Robinson	Univ Western Ontario	Steve Hamilton	Michigan State Univ
Christina Semeniuk	Univ Windsor	Bruce Hollebone	ECCC
		Valerie Langlois	INRS-ETE (Institut national de la recherche scientifique - Centre Eau Terre Environnement)
		Michele Leduc-Lapierre	Great Lakes Commission
		Steve Lehmann	NOAA
		Jerome Marty	Council of Canadian Academies
Staff: Matthew Child, Paul Allen, Mark Gabriel		Patrick McCaffrey	Marathon Petroleum Company
Contractor: LimnoTech		Mark Ripley	Chippewa Ottawa Resource Authority



# Energy Transport Work Group: Timeline and Outputs

The science synthesis and summary reports will address:

- The potential water quality and ecological impacts to the Great Lakes associated with unrefined liquid hydrocarbons.
- Best current assessment of research, monitoring, and other information needs to better understand the hazards of unrefined liquid hydrocarbons in the Great Lakes region
- Recommendations (science and/or science-policy) that could form the basis of advice to the Parties.



# Energy Transport Work Group: Project Status

- January 2017: Teleconference #1. Review role of WG and seek input on scope of work
- March 2017: reviewed bids, awarded contract to LimnoTech
- April 2017: Teleconference #2. Included contractor and additional WG members. Contractor outlined approach, WG provided further guidance
- July 2017: LimnoTech distributed its literature compilation
- August 2017: Teleconference #3. Update on related activities (Crude Moves Symposium in Cleveland, release of three GLC white papers, release of Michigan Pipeline Safety Advisory Board's alternatives report). WG provided input on literature compilation
- September 2017: LimnoTech distributed draft Technical Report
- October 2017: Teleconference #4. Review of draft Technical Report



# Timeline and Next Steps

Contractor and WG leads incorporate input from October teleconference

Review and input on revised draft, finalization of technical report (November)

WG summary report drafted, reviewed, finalized (December)



*Impacts of Liquid Hydrocarbons on Water  
Quality and the Aquatic Ecosystem*

Table of Contents

Executive Summary

Project Description

Science Synthesis

Introduction

Fate and behavior of oil

Methods of oil transportation in the Great Lakes

Great lakes-St Lawrence region overview

Toxicity and impacts of oil on aquatic receptors

Oil spill response

Recommendations and knowledge gaps

References



# Declining Offshore Lake Productivity Work Group

Co-Chairs:

Joe DePinto & Bob Hecky

Andrea Kirkwood - Presenting





# Work Group Members

- **SPC members**

Bob Hecky, Co-chair, UMN-Duluth, emeritus

Joe DePinto, Co-chair, LimnoTech, retired

Andrea Kirkwood, Univ. of Ontario Inst. of Tech

- **RCC member**

Val Klump, UW-Milwaukee

- **IJC staff support**

Mark Burrows, IJC-GLRO

- **Contractor**

LimnoTech

- **External members**

Alice Dove, ECCC

Bo Bunnell, USGS

Ed Rutherford, NOAA-GLERL

Euan Reavie, UMN-Duluth

Harvey Bootsma, UW-Milwaukee

Hank Vanderploeg, NOAA-GLERL

Jim Bence, Michigan State

Marten Koops, DFO-Canada

Rick Barbiero, CSRA at USEPA

Roger Knight, retired

Tim Johnson, OMECC

Todd Howell, OMECC

Glenn Warren, USEPA-GLNPO

Yingming Zhao, OMECC

Michael Rennie, Lakehead University



# Goal

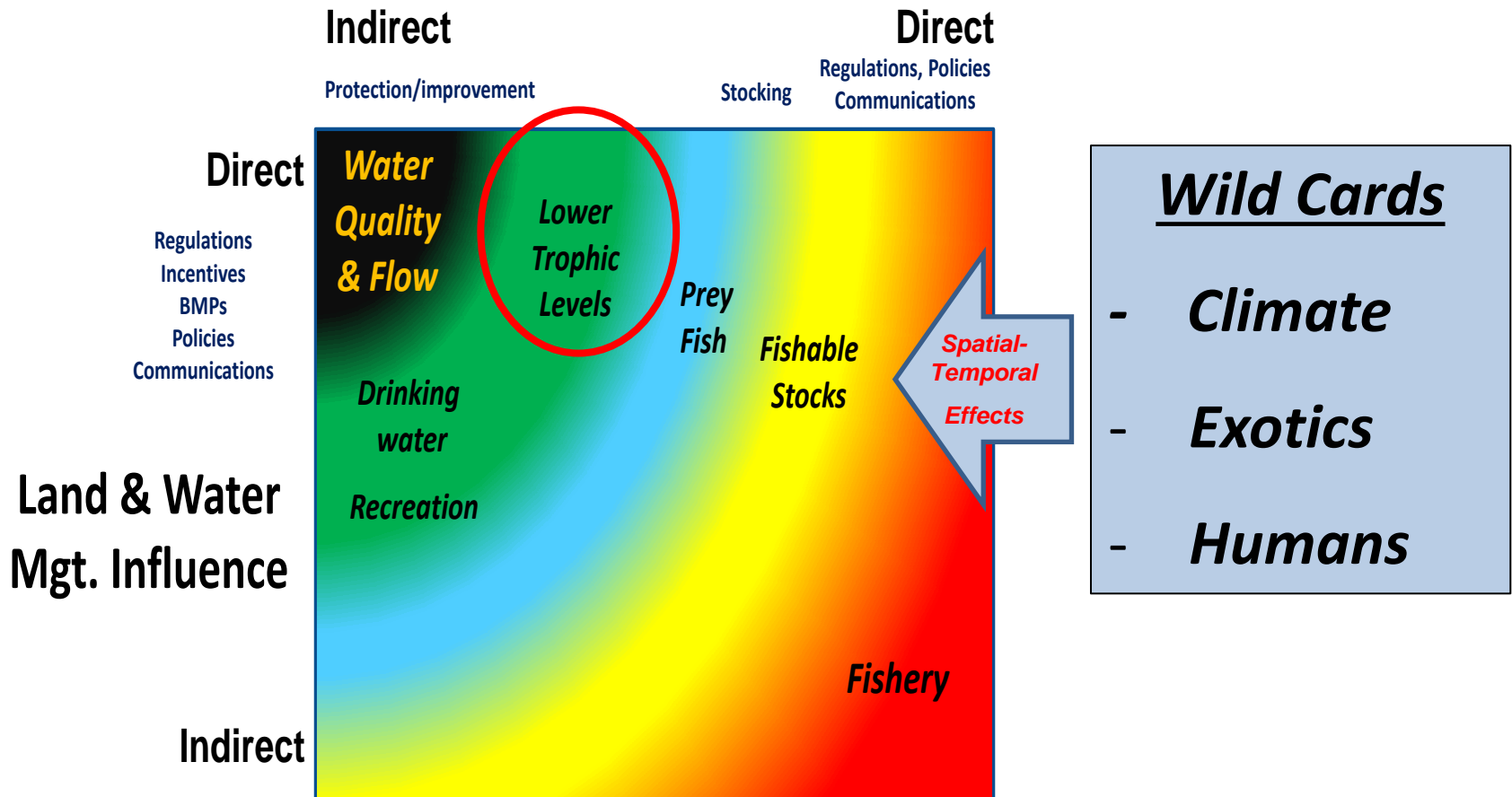
Confirm and bring some understanding to the phenomenon of declining offshore productivity in the lakes that are at the same time experiencing nearshore eutrophication

 Inform Management Decisions; especially decisions on nutrient targets



# Ecosystem Management Spectrum

## Fisheries Mgt. Influence





# Objectives

(motivated by nutrient mgmt. concerns)

- Literature review of Phosphorus/productivity relationships, including for non-Laurentian large lakes
- Update of Bunnell et al., 2014 *Bioscience* data
- Review of ecosystem model capabilities and recent studies
- Synthesis report by March 2018

Overview Articles

## **Changing Ecosystem Dynamics in the Laurentian Great Lakes: Bottom-Up and Top-Down Regulation**

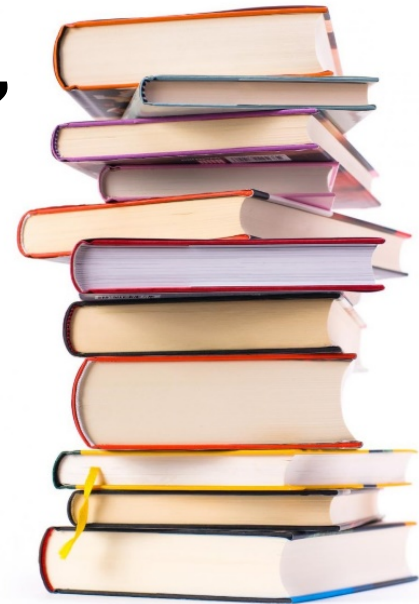
DAVID B. BUNNELL, RICHARD P. BARBIERO, STUART A. LUDSIN, CHARLES P. MADENJIAN, GLENN J. WARREN, DAVID M. DOLAN, TRAVIS O. BRENDEN, RUTH BRILAND, OWEN T. GORMAN, JI X. HE, THOMAS H. JOHNGEN, BRIAN F. LANTRY, BARRY M. LESHT, THOMAS F. NALEPA, STEPHEN C. RILEY, CATHERINE M. RISENG, TED J. TRESKA, IYOB TSEHAYE, MAUREEN G. WALSH, DAVID M. WARNER, AND BRIAN C. WEIDEL

*Understanding the relative importance of top-down and bottom-up regulation of ecosystem structure is a fundamental ecological question, with implications for fisheries and water-quality management. For the Laurentian Great Lakes, where, since the early 1970s, nutrient inputs have been reduced, whereas top-predator biomass has increased, we describe trends across multiple trophic levels and explore their underlying drivers. Our analyses revealed increasing water clarity and declines in phytoplankton, native invertebrates, and prey fish since 1998 in at least three of the five lakes. Evidence for bottom-up regulation was strongest in Lake Huron, although each lake provided support in at least one pair of trophic levels. Evidence for top-down regulation was rare. Although nonindigenous dreissenid mussels probably have large impacts on nutrient cycling and phytoplankton, their effects on higher trophic levels remain uncertain. We highlight gaps for which monitoring and knowledge should improve the understanding of food-web dynamics and facilitate the implementation of ecosystem-based management.*



# Literature Review

- Over 200 citations, focus since 2010
- Includes research from Denmark, France, Germany, Italy, Sweden, Switzerland, and Africa
- Topical categories: fishery response, diet, trophic status, phytoplankton, zooplankton, invasives, modeling, other (including older), non-peer-reviewed





# Status, Timeline & Next Steps

1. Form work group Completed
2. Select contractor Completed
3. Perform literature review Completed; created web-based compendium
4. Update of Bunnell et al. data Over 60% complete as of Sept 1st & on track to complete Oct 31, 2017
5. Inventory and review ecosystem models Over 60% complete as of Sept 1<sup>st</sup> & on track to complete Dec 31, 2017
6. Prepare technical synthesis report Complete by March/2018



**Questions?**