

Watershed Management of Nutrients in Lake Erie



Credit: Tom Archer

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Acknowledgements

The Great Lakes Water Quality Board (WQB) gratefully acknowledges the contributions of the Legacy Issues Work Group (LIWG) in leading this project and developing this report. Thank you also to the WQB members and the IJC staff support of Antonette Arvai, John Wilson, Cindy Warwick and Victor Serveiss. The WQB also wishes to recognize the excellent work of the workshop facilitator who produced a summary of the workshop proceedings, which was used to develop the recommendations. A special thank you is extended to the participants of the workshop, who provided their valuable time and input during the workshop itself as well as in the review of the workshop summary report. Finally, thank you to those who provided their feedback during the webinar and through the followup questionnaire.

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Executive summary

This report presents the recommendations of the Great Lakes Water Quality Board on the topic of how watershed management plans should be used to manage nutrient pollution in Lake Erie. The implementation of effective watershed management plans is an important tool in a holistic approach to reducing nutrient loading to Lake Erie. The recommendations summarized below have been identified based on the findings and outcomes obtained through a workshop and webinar. While the findings and recommendations of this report are specific to the Lake Erie basin, the principles outlined are applicable and may be of benefit to other watersheds dealing with nutrient issues.

Recommendation 1: Building upon the work of Annex 4, the federal governments, in partnership with Great Lakes States, Province of Ontario, First Nations, Tribes and Métis, should use existing monitoring data and identify a preferred model(s)/tool for determining nutrient loading to the lake that integrates both tributary nutrient loading as well as inlake nutrient processes. This can be used to assist in identifying and prioritizing those watersheds and subwatersheds where implementation of management efforts would garner a significant reduction in loadings in relation to the effort applied.

Recommendation 2: A lakewide plan should include basin-by-basin plans for the western, central and eastern basins, which coordinates all watershed plans to avoid any duplication of service. The primary purposes of the lakewide plan should be to translate the binational targets upstream to the watersheds and subwatersheds, and to assist in identifying subwatersheds that are of highest priority for nutrient/phosphorus reduction. The governments must then ensure that each priority subwatershed has a sufficiently empowered watershed planning authority.

Recommendation 3: The federal, provincial and state governments should provide half of the long-term funding support, with the other half to be provided by funding from the local level by municipalities, local agencies, water users and landowners. There should also be a funding source dedicated specifically for managed and coordinated monitoring.

Recommendation 4: Drawing from the work undertaken by the Annex 4 subcommittee, the federal governments, in partnership with Great Lakes States, Province of Ontario, First Nations, Tribes and Métis, should identify a few key common parameters to be measured in all watersheds to assess progress towards the larger Lake Erie targets. At minimum, total phosphorus, nitrogen, dissolved reactive phosphorus and dissolved oxygen should be monitored; however, a more comprehensive program is desirable including atmospheric loading of phosphorus and the impacts of climate change on the entire basin.

Recommendation 5: Through an existing agency, a communications plan should be drafted that outlines how continuous information on nutrient management/reduction efforts should be distributed to the Great Lakes implementation agencies. This plan should identify the type of information to be shared, including Traditional Ecological Knowledge, message distribution timelines and tools to be used, such as newsletters, social media, webinars, workshops, etc. A media relations plan should be incorporated into the communications plan.

Project background

History

The IJC is a binational organization that prevents and resolves disputes over boundary waters of the United States and Canada, including the Great Lakes, and is served in an advisory capacity by the Great Lakes Water Quality Board (WQB). One of the responsibilities of the IJC is to provide advice and recommendations to the governments on matters related to the water quality of the Great Lakes and approaches and options that governments may consider to improve effectiveness in achieving the purpose and objectives of the Great Lakes Water Quality Agreement (GLWQA).

The issue of excess nutrients and resulting algal blooms has plagued Lake Erie for more than 50 years. Spurred by public outcry and concern, significant efforts were undertaken in the 1970s that resulted in marked reductions in phosphorus inputs. Lake Erie showed visible improvements and a remarkable recovery. However, by the early 2000s Lake Erie was again experiencing increasingly severe eutrophication problems and a resurgence of severe algal blooms due to excessive nutrient enrichment.

Recommendation 1: The Canadian and United States federal governments as well as the provincial and state governments should ensure that lakewide basin, sub-basin, watershed and subwatershed management plans (including plans to manage bays, islands and the nearshore) are developed for nutrient management in Lake Erie.

Recommendation 2: There are several key success factors that the Canadian and United States federal governments as well as the provincial and state governments should ensure are included in the lakewide basin, sub-basin, watershed, and subwatershed management plans for nutrient management. These factors include science-based watershed characterization, clear goals and milestones, adaptive management, consistent watershed wide approach, partnerships for implementation, public awareness strategy, and a monitoring program.

Recommendation 3: The Canadian and United States federal governments as well as the provincial and state governments around Lake Erie should ensure that funding is available to support planning activities and implementation of watershed management plans for nutrients.

Figure 1: Recommendations from the WQB's 2016 report, *Evaluating Watershed Management Plans-Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Basin*

In 2015 the WQB formed the Legacy Issues Work Group, which undertook a project to assess the state of watershed management plans for nutrient management in the Lake Erie basin. In August 2016 the WQB released a report, *Evaluating Watershed Management Plans -- Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie*

Basin that included recommendations on how watershed management plans should be used to manage nutrient pollution in Lake Erie (Figure 1).¹

Workshop and webinar

On February 1-2, 2017 the LIWG convened a binational workshop that brought together approximately 30 experts working in the field of watershed management planning and implementation, representing federal, state and provincial governments, nongovernment organizations, Ontario Conservation Authorities, and the Chippewas of the Thames First Nation. The objectives of the workshop were to build support for the recommendations in the WQB's August 2016 report (Figure 1); to identify ways in which watershed planning, among the various efforts undertaken, could be better coordinated/optimized; and to provide a forum for those involved in watershed planning and implementation to better understand their connection to each other and to begin building the relationships for coordinated watershed planning. The summary of the workshop proceedings is provided in Appendix A, with the list of workshop participants provided on page 20 of the appendix.

A webinar was subsequently held in May 2017 as a means to obtain additional insights on some of the key outcomes that arose from the workshop. Following the webinar, participants were requested to complete a questionnaire as a means of obtaining additional feedback on the material presented in the webinar. The webinar presentation slides, the webinar discussion summary, the list of webinar participants, and the responses to the webinar followup questionnaire are provided in Appendix B, Appendix C, Appendix D, and Appendix E, respectively.

Findings and recommendations

Water quality is impacted by land-based activities and, in the case of nutrients, can result in problems such as eutrophication, hypoxia, and harmful algal blooms. Watersheds are an appropriate scale at which to manage those land-based activities. The implementation of effective watershed management plans is an important tool in a holistic approach to reducing nutrient loading to Lake Erie. The recommendations summarized below have been identified based on the findings and outcomes obtained through the workshop and webinar and are intended to assist the federal governments, in partnership with states, Province of Ontario, First Nations, Tribes, Métis, agriculture and other stakeholders to build upon the work of the Annex 4 subcommittee. These recommendations are offered as a supplement to those made in the WQB's August 2016 report (Figure 1). They are provided for the consideration of the IJC Commissioners.

Consistency

Watershed plans among the various jurisdictions are inconsistent, as requirements for watershed planning have changed through the years, as have the elements required for watershed management plans. Where watershed plans do exist there are similar but not identical elements

¹ Great Lakes Water Quality Board (August 2016). *Evaluating Watershed Management Plans-Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Basin*

within them among the various jurisdictions. Watershed plans are developed quite differently in the United States and Ontario, which has led to inconsistency in the final product. Plans are developed under different legislation/regulation, different funding models, and by differing organizations. Despite this, attendees at the workshop and webinar agreed that consistent guidelines to developing watershed plans would be helpful. Elements do not need to be reinvented or harmonized, because they all include components of good planning principles as identified in the WQB's 2016 report, such as identifying nutrient sources and amounts; establishing targets; and monitoring to assess progress.

However, to support the achievement of these principles to manage phosphorus in Lake Erie, watershed plans should utilize decision support tools to identify best management practices that will achieve nutrient reduction targets and use a common model or modelling approach for nutrient loading to the Lake Erie basin. There are a number of models used to estimate nutrient loading (e.g. SWAT, CANWET, STEPL), but there is a need to use a common approach for comparison of results across jurisdictions in the basin. The GLWQA's Annex 4 subcommittee has developed loading models to calculate watershed loading contributions of nutrients, which has allowed for the identification of priority tributary watersheds that produce the largest contributions of phosphorus to Lake Erie and that should be targeted for nutrient management and reduction. While this is a good framework, there needs to be specific identification of sources and amounts within these priority watersheds. In addition, the Annex 4 Domestic Action Plans should be part of this overall management framework.

Recommendation 1: Building upon the work of Annex 4, the federal governments, in partnership with Great Lakes States, Province of Ontario, First Nations, Tribes and Métis, should use existing monitoring data and identify a preferred model(s)/tool for determining nutrient loading to the lake that integrates both tributary nutrient loading as well as inflake nutrient processes. This can be used to assist in identifying and prioritizing those watersheds and subwatersheds where implementation of management efforts would garner a significant reduction in loadings in relation to the effort applied.

Coordination of planning and implementation

The structure and organization of watershed management and implementation for nutrient management differs between the United States and Canada. For example, in Ontario watershed plans are developed by Conservation Authorities, whereas in the United States they may be completed by political jurisdictions or nonprofits, (an example is state soil and water conservation districts). The United States and Canada, through the work of the Annex 4 subcommittee, have prioritized watersheds in the basin and identified eight watersheds where phosphorus control is needed to address algal blooms in Lake Erie. However, there is a need to incorporate the open waters and remaining watersheds to have a complete basinwide assessment. In order to coordinate watershed management planning and implementation, there needs to be an entity that oversees that coordination. Because there are already so many existing entities that work on nutrients in Lake Erie, it would be preferable for an existing entity (rather than a new organization) to facilitate the coordination and communication of various watershed planning and implementation activities to manage nutrients in Lake Erie.

Recommendation 2: A lakewide plan should include basin-by-basin plans for the western, central and eastern basins, which coordinates all plans to avoid any duplication of service. The primary purposes of the lakewide plan should be to translate the binational targets upstream to the watersheds and subwatersheds, and to assist in identifying subwatersheds that are of highest priority for nutrient/phosphorus reduction. The governments must then ensure that each priority subwatershed has a sufficiently-empowered watershed planning authority.

Funding

The lack of adequate, well managed, sustained multi-year funding was identified as a significant barrier to effective watershed planning and implementation to manage nutrients. Workshop participants expressed support for the WQB's Recommendation 3 (Figure 1), regarding the need for funding support. Workshop participants further noted that in addition to the need for reliable, adequate funding for the development and implementation of watershed management plans, there is also a need for reliable and adequate funding for long-term monitoring to measure progress. The funding mechanisms for planning and implementation differ between the United States and Ontario. In Ontario, funding is obtained largely from local governments, whereas in the United States it is primarily from federal grants/funds usually administered through the states. The funding to undertake planning and implementation will always be finite; as a result, it is important to prioritize where those limited resources should go. Additionally, effectively communicating the value that watershed planning can bring to communities is necessary to justify sustained funding and support.

Recommendation 3: The federal, provincial and state governments should provide half of the long-term funding support, with the other half to be matched by funding at the local level by municipalities, local agencies, water users and landowners. There should also be a funding source dedicated specifically for managed and coordinated monitoring.

Monitoring and reporting

Consistent, long-term monitoring is a top priority to establish baselines, establish targets and measure progress in achieving those targets. Additionally, having long-term monitoring data with which to illustrate the progress and achievement of targets will assist in securing continued funding. There is also a need to establish standard protocols for modelling, water sampling and analysis to allow for comparison of data and performance measurement across watersheds and on a lakewide basis. It is recognized that water quality monitoring conducted in watersheds is in response to specific, local issues. However, there should be a few key common measures included in all watershed plans, if not already included, to help align to the larger Lake Erie targets. The Annex 4 subcommittee under the GLWQA has identified a suite of parameters that are to be standardized for all priority, nearshore Lake Erie tributaries. These parameters as well as details on tracking and monitoring need to be included in the Domestic Action Plans. Before a final monitoring program is established, targets for nutrient loading from subwatersheds should be discussed and established.

Recommendation 4: Drawing from the work undertaken by the Annex 4 subcommittee, the federal governments, in partnership with Great Lakes States, Province of Ontario, First Nations, Tribes and Métis, should identify a few key common parameters to be measured in all

watersheds to assess progress towards the larger Lake Erie targets. At minimum, total phosphorus, nitrogen, dissolved reactive phosphorus and dissolved oxygen should be monitored; however, a more comprehensive program is desirable including atmospheric loading of phosphorus and the impacts of climate change on the entire basin.

Communication

Both the US and Canadian/Ontario governments involved in the oversight of watershed planning should develop a list of communications tools for review and comment by the IJC, Tribes, First Nations, Métis and the public. Communication regarding the state of watershed planning and monitoring is important in order to share successes and gain feedback on where improvements are needed. These tools should facilitate sharing and communication of information among watershed planning and implementation partners in the Lake Erie basin. This can include the sharing of: information about nutrient issues in Lake Erie and the subwatersheds; watershed management plans; watershed data; traditional ecological knowledge; and best practices for nutrient management. Workshop participants noted a number of mechanisms that could coordinate information sharing of nutrient issues among watershed agencies/groups, including creating a Lake Erie forum, creating a senior coordinating committee, and connecting with the Ontario Great Lakes Guardians' Council. However, participants emphasized that we do not need yet another organization to serve these functions, and that appropriate existing entities should be identified to serve these functions as much as possible.

Recommendation 5: Through an existing agency, a communications plan should be drafted that outlines how continuous information on nutrient management/reduction efforts should be distributed to the Great Lakes implementation agencies. This plan should identify the type of information to be shared, including Traditional Ecological Knowledge, message distribution timelines and tools to be used, such as newsletters, social media, webinars, workshops, etc. A media relations plan should be incorporated into the communications plan.

APPENDIX A – WORKSHOP SUMMARY REPORT

Great Lakes Water Quality Board
Legacy Issues Work Group

*Watershed Management of
Nutrients in Lake Erie*

Workshop Summary Report

Final Report
APRIL 2017

Acknowledgements

This report is the product of a binational workshop that involved experts from Canada and the United States, discussing how watershed management plans should be used to manage nutrient pollution in Lake Erie in a manner that will achieve meaningful nutrient load reductions. The International Joint Commission's Great Lakes Water Quality Board expresses its sincere appreciation to the experts from multiple governments, watershed planning groups, nongovernmental organizations, and the Chippewas of the Thames First Nation, who participated in the workshop. Their efforts have provided advice and insights for the consideration of the Water Quality Board in providing advice to the Commission who may, in turn provide advice to the Governments of Canada and the United States. This report is based on the workshop report prepared by Susan Hall (Lura Consulting., Toronto, Ontario), which was reviewed and modified by the Legacy Issues Work Group of the Great Lakes Water Quality Board. Revisions were made based on comments and feedback received on the report from workshop participants.

GREAT LAKES WATER QUALITY BOARD
Watershed Management of Nutrients in Lake Erie Workshop
Summary Report

Executive summary

Workshop purpose and objectives

The IJC is a binational organization that prevents and resolves disputes over boundary waters of the United States and Canada, including the Great Lakes, and is served in an advisory capacity by the Great Lakes Water Quality Board (WQB). In 2015 the WQB formed the Legacy Issues Work Group (LIWG), which undertook a project to assess the state of watershed management plans for nutrient management in the Lake Erie basin. In August 2016 the WQB released a report, *Evaluating Watershed Management Plans-Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Basin* that includes recommendations on how watershed management plans should be used to manage nutrient pollution in Lake Erie and identifies key success factors necessary for watershed management plans to achieve meaningful nutrient load reductions.

On February 1st and 2nd 2017 the LIWG convened a binational workshop that brought together approximately 30 experts, to build support for the findings of the WQB report and by defining and developing standard components that should be part of watershed management plans, including key factors critical to the successful development and implementation of watershed management plans.

The workshop objectives were:

1. To identify standard components that should be part of watershed management plans for nutrient management.
2. To build support for the findings of the WQB report, which include recommendations on key factors that will be critical to the successful development and implementation of watershed management plans for the management of nutrients.
3. To identify recommendations on how to better coordinate/optimize watershed planning with the various related efforts being undertaken both under and outside the GLWQA.
4. To provide a forum for watershed management planning stakeholders to:
 - a. Better understand their relationship with each other and their downstream connection with and impacts to Lake Erie; and
 - b. Begin building the relationships and options for continued communication necessary for coordinated watershed-based planning to be successful.

Workshop highlights of feedback received

The following highlights the key messages from the discussions:

General

- Collaboration between Canada and the United States has been long-standing and effective to addressing nutrient issues in Lake Erie.
- There is a need to think outside-the-box and outside conventional ways of knowing and doing and integrate traditional ecological knowledge in our thinking and approaches.

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- There is a great sense of urgency to solve the issue of nutrients and the resulting impacts, particularly those impacted economically (e.g., fisheries, commercial boaters), recreational water users, drinking water and cottagers.

Recommendations and key success

- Ensuring that lakewide basin, sub-basin, watershed and subwatershed management plans are developed for nutrient management in Lake Erie and that these plans consider the recent binational target of a 40 percent reduction of phosphorus entering Lake Erie, as one of the goals the (Recommendation 1) generated significant discussion and dialogue.
 - Limited planning and implementation resources should be targeted to subwatersheds that are identified as a priority for phosphorus reductions
 - Watershed plans need to consider how they will impact Lake Erie in terms of nutrient reductions.
 - Plans will vary in their actions and targets (e.g. agricultural/rural vs. urban).
 - Understanding the baseline condition and allocations for each source is an important first step towards identifying gaps and hotspots and more fully develop targets.
- The key success factors: (1) science-based watershed characterization; (2) clear goals and milestones; (3) consistent watershed-wide approach; (4) establish partnerships and define responsibilities; (5) develop a strategy for public awareness; and (6) establish an effective and efficient monitoring program (Recommendation 2) were supported.
 - Numerous ideas for a public education and awareness strategy were discussed.
 - Efficient and effective monitoring program requires resourcing and consistent protocols across watersheds so data can be compared on a lakewide basis.
- The need for funding for planning, implementation and monitoring (Recommendation 3) was supported, noting the need for sustained multi-year funding.
- Several additional key ingredients were identified to successfully address nutrient issues through watershed management planning, including:
 - Integrating an iterative process and adaptive approach
 - Focusing on long-term thinking and approaches
 - Celebrating the inherent value of water
 - Establishing a value proposition that investing in protection is important and needed, and fostering a cultural shift
 - Relying on science-based data to build business cases for funding and programming
 - Improving communication with First Nation, Métis, Tribal partners; involvement of First Nations and Tribes that have historical treaty and an inherent rights-based relationship with the land and water surrounding the Great Lakes
 - Developing strong relationships and partnerships with implementation partners
 - Improving monitoring and ensuring monitoring data is collected over the long term
 - Securing a diversified, multi-year, continuous funding base for planning, implementation and monitoring; and
 - Using report cards to assess phosphorus reduction progress and the effectiveness of actions.

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Standard Components

Key components were discussed with a goal to identify standard elements under each component, and how these components can be advanced.

- **Nutrient causes and sources:**
 - A number of point and nonpoint sources were identified that should be consistently considered across watersheds; however, cause and sources are varied by watershed.
 - Watershed characterization is an effective approach to prioritize sources and amounts.
- **Standard Best Management Practices (BMPs):**
 - A number of considerations to help inform BMP selection were identified, including requiring BMPs to be proven, locally applicable, maintenance-free and stackable.
 - BMPs should be accompanied by decision-support tools, and recognize existing regulatory and legislative tools.
- **Mechanisms to estimate nutrient load reductions:**
 - There are a number of models to estimate nutrient load reductions.
 - There is a need to find a common or standardized modelling approach to be able to compare across Lake Erie.
- **Criteria to determine if nutrient load reductions are being achieved:**
 - A number of standard indicators were identified that could strategically measure progress at the watershed level including total phosphorus and dissolved reactive phosphorus as well as a number of other measures such as chlorophyll-a, microcystin, cyanobacteria, and dissolved oxygen.
 - Other measures such as public opinion could also measure progress but participants cautioned that the number of indicators should not overwhelm the process.
- **Determining if targets are being achieved:**
 - Much of the discussion built on the previous criteria discussion noting that stakeholder engagement is needed to be able to track process on the ground, and that funding is needed to maintain strategic monitoring over the long term.

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Coordination of watershed planning with the various binational and domestic nutrient-related efforts

Key mechanisms to stay informed, learn about the work of others and coordinate watershed planning activities were discussed. Highlights include:

- A number of mechanisms to receive and share information about nutrient issues in Lake Erie are available, including: organizations (i.e.: IJC, Environmental Protection Agencies (EPA)), networks (i.e.: Great Lakes Information Network, International Association of Great Lakes Research), partnerships (i.e.: Western Lake Erie Basin Partnership), websites, listservs, bulletins, social media, conferences, academic institutions and discussions with elders (a practice within First Nation communities).
- There are a number of additional key stakeholders to engage in watershed management planning and implementation as it relates to nutrient issues, including: regional planning agencies, local governments in the United States, public health units, and various other stakeholder groups.
- First Nations, Métis², Tribes should be engaged in watershed management planning and implementation as it relates to nutrient issues.
- There is a need to identify mechanisms to better understand, share and integrate First Nations', Tribes' and Métis' traditional ecological knowledge into our approach to understanding the health of Lake Erie, impacts of nutrients, and impacts to communities.
- There is a need to share information from the GLWQA Annex 4 process with watershed organizations.
- There are a number of mechanisms to coordinate activities relating to nutrient issues that can be created, including: having meetings around professional development; creating a Lake Erie forum; creating a senior coordinating committee; and connecting with the Ontario Great Lakes Guardians' Council. It was suggested that leveraging existing channels may be the best option rather than creating a new mechanism.
- There is a need to develop communication tools that put evidence based information in layman's terms, particularly when communicating with the public

The outcomes of the workshop will be used by the WQB to further develop the findings and recommendations from the WQB's report (August 2016) and to ultimately provide advice and recommendations to the Commission for their consideration in forwarding to the Governments of Canada and the U.S.

² First Nation and Métis nation involvement in matters related to constitutionally protected rights are those having a historical relationship and presence in the Lake Erie region further documented via treaties and historical occupation of the land by a people

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DAY 1

Introduction and purpose

Trish Morris, Director, IJC Great Lakes Regional Office

An overview of the International Joint Commission (IJC), its history originating with the Boundary Waters Treaty (1909), and the establishment of the Great Lakes Water Quality Agreement (GLWQA) (1972/renewed 2012) were provided. The GLWQA identifies that the best means of protecting the Great Lakes Basin Ecosystem and improving water quality is to adopt common objectives, cooperative programs and assign responsibilities to the GLWQA signatories. The Great Lakes Water Quality Board (WQB) provides advice to the IJC regarding progress towards implementation of the GLWQA, identifies emerging issues, and recommends strategies and approaches for preventing and resolving the complex challenges facing the Great Lakes. The long-standing collaboration between Canada and the United States has fostered an environment for both the IJC and the participants in the room to discuss and realize progress on nutrient issues in Lake Erie.

Gayle Wood, Co-Lead of the WQB Legacy Issues Work Group and Chief Administrative Officer of Nottawasaga Valley Conservation Authority (NVCA)

Members of the WQB's Legacy Issues Work Group (LIWG) were introduced. The LIWG identified watershed management plans as important tools for achieving progress on nutrient management. As such, the LIWG undertook a project to assess the state of watershed management plans for nutrient management in the Lake Erie basin. The work included the identification of key success factors that could be used to achieve nutrient load reduction targets and thereby restore and protect Lake Erie. In August 2016, the WQB released a report that provides recommendations on how watershed management plans should be used to manage nutrient pollution in Lake Erie and identifies key success factors necessary for watershed management plans to achieve accountable meaningful nutrient load reductions. The project examined best practices both inside and outside the Lake Erie basin to begin to identify common elements or components of watershed management plans in Ontario and the United States. One of the key findings from the report is the lack of a consistent framework for developing and implementing a lakewide nutrient management plan. The purposes of the workshop were to review the report recommendations, discuss the standard components of watershed management plans, and provide opportunities for networking and continued Lake Erie watershed communication.

Workshop overview and participant introductions

Susan Hall, Facilitator, Lura Consulting

The workshop purpose and format were reviewed (see Appendix A for workshop agenda). The session was designed to engage binational experts in nutrient issues in an exploration of the findings and recommendations from the WQB's report and identification of standard components of watershed management plans that address nutrient management in the Lake Erie basin.

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 - a. Better understand their relationship with each other and their downstream connection with and impacts to Lake Erie; and
 - b. Begin building the relationships and options for continued communication necessary for coordinated watershed-based planning to be successful.

A round of participant introductions followed (see Appendix B for list of workshop participants).

Setting the context

Part 1: Water Quality Board recommendations on Lake Erie watershed management plans for nutrient management

Sandy Bihn, LIWG, Lake Erie Waterkeeper and Gayle Wood, Co-Lead LIWG, NVCA

Assessing the state of watershed management plans for nutrient management in the Lake Erie basin is a mandate of the Legacy Issues Work Group in response to the 2015 WQB Priority Issue. An indepth review of selected watershed management plans within and outside the Lake Erie basin was completed that resulted in the August 2016 WQB report findings and recommendations. Terminology – including basin, sub-basin, watershed and subwatershed – was reviewed. The six standard components to achieving nutrient reductions were also reviewed including: (1) sources and amounts; (2) upstream and downstream impacts; (3) establishment of criteria to set targets; (4) establishment of reduction targets; (5) strategies and best management practices (BMPs); and (6) monitoring to access progress. The key success factors were highlighted including: (1) science-based watershed characterization; (2) clear goals and milestones; (3) consistent watershed-wide approach; (4) establish partnerships and define responsibilities; (5) develop a strategy for public awareness; and (6) establish an effective and efficient monitoring program.

Questions, comments and discussion

Questions are noted with **Q**, responses are noted by **A**, and comments are noted by **C**. Please note this is not a verbatim summary.

Q: What is meant by a “consistent watershed” approach?

A: A consistent watershed approach is meant to apply to the larger Lake Erie watershed and the intent is that the watersheds and subwatersheds have consistent elements in their watershed

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plans that will help contribute to the target of a 40percent reduction in phosphorus for Lake Erie.

- Q: How do you link the 40percent reduction target for Lake Erie across the watersheds?
- A: Part of the focus of this workshop is to figure out how the various watershed groups/agencies will work together to contribute to this target (for example through the Domestic Action Plans (DAPs) under Annex 4 of the GLWQA) through the GLWQA Lakewide Action Management Plans (LAMPs) and through watershed plans developed in the U.S. under the Clean Water Act and in Canada under the Conservation Authorities.
- Q: What is the scope of the watershed management plans in terms of the discussions at this workshop (i.e.: is it intended to be inclusive of all issues within a watershed or just nutrients)?
- A: The focus of the workshop is on finding common components relating to nutrient management. However, it is recognized that watershed management planning and implementation is much broader (e.g. inclusive of other water quality issues and/or flows).
- C: There is a need to change the attitudes of citizens in the Great Lakes to assist prevention and reduction efforts. Citizens need to have a better connection to water to inspire change. Additionally, excessive nutrients in the water are a public health issue and the governments need to more fully recognize this by appropriately budgeting to protect human health.

Part 2: Watershed management planning and implementation – United States and Ontario perspectives

Jo-Anne Rzadki, Business Development & Partnerships, Conservation Ontario: Integrated Watershed Management in Ontario and Lake Simcoe Subwatershed Planning Case Study

Conservation Ontario is a non-profit association that represents the network of 36 Conservation Authorities. Conservation Authorities (CAs) are non-profit, corporate organizations, operating at the watershed level. They have a Board of Directors appointed by local municipalities of which the majority of representatives are elected municipal officials. CAs are legislated by the *Ontario Conservation Authorities Act* and are responsible for watershed management planning and implementation (including monitoring and reporting) as well as other responsibilities such as science, protection, restoration and education. Funding for CAs comes from municipal levies and self-generated revenues (90percent) and provincial/federal grants and funding (10percent). Conservation Ontario (CO) promotes the use of Integrated Watershed Management (IWM) approach, which uses a variety of policy and program tools to continually manage human activities and natural resources and that CO is advocating for IWM to be more explicit in the *Ontario Conservation Authorities Act*.

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Ben Longstaff, Integrated Watershed Management, General Manager, Lake Simcoe Region Conservation Authority (LSRCA): Integrated Watershed Management in Ontario and Lake Simcoe Sub-watershed Planning Case Study

Lake Simcoe is unique in Ontario as its protection is legislated by the province through the *Lake Simcoe Protection Act* as well as the Greenbelt Plan (2005), Places to Grow: Growth Plan for the Greater Golden Horseshoe (2006), and the Oak Ridges Moraine Plan. The Lake Simcoe Protection Plan provides some funding for planning and implementation by the province, which has been crucial to the success of protection activities. The LSRCA sub-watershed program approach includes: developing the sub-watershed and implementation plan; completing implementation; producing an annual progress report; and conducting a plan review and update every five to ten years. Typical plans include an introduction; description of the study area and physical setting; water quality and quantity data; aquatic habitat; terrestrial natural heritage; and integration elements.

LSRCA is currently seeking innovative funding models (e.g., establishing requirements for new developments and re-developments to ensure a zero-phosphorus load from the development site). If zero-phosphorus cannot be achieved, a price will be set to support the offsite payment for phosphorus reduction initiatives/actions (such as low-impact development).

Key success factors based on LSRCA's experience include: seamless transition from plan development to implementation; applying a phased approach with prioritized recommendations; securing base funding and dedicated staff; developing decision making tools; establishing transparent reporting mechanisms; building partnerships and fostering agricultural stewardship.

Laura Rubin, Huron River Watershed Council (HRWC), Michigan: Middle Huron Watershed Management Planning

HRWC was originally formed in 1965. The importance of phosphorus, its impacts, the Huron River drainage area, and the council's specific goals relating to phosphorus reduction for Ford Lake and Belleville Lake were reviewed. One of the greatest challenges in managing nutrients is determining load allocations (sources and amounts).

A number of key actions are taken in the Huron River area to reduce phosphorus including: partnerships and plans; wastewater treatment plant upgrades and improvements; local phosphorus ordinances; education and information programs; and implementation of BMPs to demonstrate success. Obtaining funding for watershed planning and implementation requires approval by the US EPA under Section 319 of the *US Clean Water Act*. HRWC has been successful over the years in obtaining these funds, due to good partnerships with all stakeholders.

In the case of the Huron River watershed, a nutrient management plan was developed first, which became the basis of the broader watershed management plan. Total phosphorus (TP) data from various streams and creeks has been used to monitor and demonstrate progress in reducing TP loadings, as well as helping to direct investments in reduction actions. Re-evaluation and review of the plan is critical with

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a review occurring every five to ten years. Monitoring data plays a critical role in being able to acquire funding, report on progress, and build a business case for both.

Janette Marsh, Environmental Protection Agency: US EPA Approach to Watershed Planning (EPA 9-Element Watershed Plan)

Watershed management is identified under the *US Clean Water Act*, Section 319, as amended in 1987 to require the development of a management program on a watershed basis. Watershed management is also included as a specific goal under the US EPA's strategic plan.

The US EPA has nine elements that must be included in watershed plans requesting funding under Section 319 of the US Clean Water Act to address water quality impairments. These include:

- Identification of the causes and sources;
- Description of the nonpoint source BMPs that will be needed;
- Estimate of the water quality-based goals expected to be achieved by implementing BMPs;
- Estimate of the amounts of assistance – both technical and financial for implementation;
- An information and education component to enhance public understanding;
- Schedule for implementing the BMPs;
- Description of the interim, measureable milestones;
- Set of criteria that can be used to determine if the water quality goals are being achieved; and
- Monitoring component to evaluate the effectiveness of implementation efforts.

Stakeholders are needed for implementation of BMPs and partnerships are critical to success.

Questions, Comments and Discussion

Questions are noted with **Q**, responses are noted by **A**, and comments are noted by **C**.

Q: Within the Section 319 program, is there funding available for watershed management plan development or just implementation?

A: The focus is on the implementation aspect as there are other funding programs to support watershed management planning activities.

Q: Can you provide an example of ordinances that have been produced as a result of the Huron River Watershed Council work on phosphorus?

A: HRWC's work on phosphorus pollution produced numerous ordinances to protect natural areas, provide stronger protection of wetlands, and to reduce conversion of land and natural habitat to pavement and buildings. HRWC's work on phosphorus has also produced ordinances issued for the protection of natural features or establishing set-backs. There is a similar process in Ontario, under regulations of the *Ontario Conservation Authorities Act* that limit development in floodplains and wetlands.

C: In New York, all nonpoint source programs are driven by the EPA 9-element plan, and that is integrated into their funding applications. As a result, there cannot be too much of a deviation from this (based upon what is recommended out of this workshop and by the WQB). We need to

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determine where there are synergies between what is currently done by states, Ontario and what is being recommended by the WQB.

Discussion #1: Essential Ingredients of Successful Watershed Management Plans

Common and Different Elements and Approaches to Nutrient Reductions in Watershed Management Planning

Participants brainstormed the following common and different elements among the watersheds' approaches to planning for nutrient management:

Common Elements
<ul style="list-style-type: none">• Goal and target setting (although processes to establish them are different)• Monitoring requirements/needs• Public education (particularly youth)• Recognition that partner/stakeholder buy-in is needed at various levels• Some guidance through U.S. Clean Water Act and Ontario/Canadian water laws• Inclusion of an iterative process/adaptive management approach• Lack of flexibility in plans, in terms of the specific elements to be addressed• Lack of enforcement for maintaining on-site septic systems in the United States and Ontario• Need for funding and resources to do the on-the-ground work; funding needs to filter down to the local level to have an impact• Domestic Action Plan (DAPs) (under Annex 4) are not expected to have the force of law in either the United States or Canada• Agriculture and other nonpoint sources are linked to water quality
Different Elements
<ul style="list-style-type: none">• Some watershed plans have specific targets (e.g. 40percent reduction of TP loading) and others do not• Capacity to do strategic monitoring; needs to be in place long-term and funding for the monitoring should not be subject to change with a change in politics• Funding mechanisms: funding for planning and implementation is largely from local governments in Ontario, whereas in the U.S. it is from federal funds/grants• U.S. EPA's 9-Element Criteria and program; there is no equivalent Canadian program• Inclusion of implementation details• Scale of watershed plans• Total Maximum Daily Loads (TMDL) listings give "teeth" to the watershed plans in the United States.• The structure of watershed management in Ontario and the United States differs. In Ontario there are CAs created by the CA Act. In the U.S. there are watershed coordinators and soil and water conservation districts (which don't necessarily work/come together)• Degree of flexibility in the process; CAs have lots of flexibility whereas US watershed plans are much more prescriptive• In the United States there are watersheds that do not have any plans in place. For example in the Maumee watershed, there is a gap between the Upper and Lower Maumee• In Ontario watershed plans are developed by CAs (where there are CAs) and according to watershed or

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Different Elements
<p>priority subwatershed, not all watersheds in Ontario have watershed or subwatershed plans and there are a few locations where there are not CAs where nonprofit organizations have developed watershed plans. Whereas in the US it may be done by nonprofit, political jurisdiction (i.e. soil and water conservation districts)</p> <ul style="list-style-type: none">• Issues such as stormwater and animal feeding operations are addressed at a federal level in the United States and a provincial level in Ontario

Key ingredients to successfully address nutrient issues through watershed management planning

Participants identified the following key ingredients to watershed management planning approaches for nutrient management:

- Considering long-term and interim assessments sustainability perspective, plan for 20+ years, recognizing that it may take a number of years before a response to verified P reductions as a result of implemented BMPs is manifested (i.e. set-up the plan for sustainability);
- Fostering a relationship with water that celebrates the inherent value of water; establishes a value proposition that investing in protection is important and needed, and fosters a cultural shift;
- Identifying both sources and amounts of loading in order to address the worst issues with greatest contributions first (i.e. prioritize) using cost, technology and best available science;
- Undertaking an economic assessment in terms of cost to water users, business impacts, and the cost to reduce phosphorus;
- Improving communication with First Nation, Métis, Tribal partners;
- Improving communication with multiple NGO stakeholder sectors;
- Identifying who is responsible for watershed planning (e.g., watershed coordinator, CA, etc.) as well as necessary watershed champions;
- Planning in a way that fosters buy-in from the stakeholders who will be implementing actions;
- Improving monitoring through the development of strategic approaches which align at different scales and ensuring monitoring data is collected over the long term;
- Using report cards to assess phosphorus reduction progress and the effectiveness of actions;
- Securing a diversified, multi-year, continuous funding base for planning, implementation, and monitoring;
- Assigning responsibility for implementation at appropriate levels;
- Ongoing communications and reporting of progress with the public;
- Building on past successes that helped Lake Erie to recover previously; and
- Recognizing that watershed management plans are not the only effective tool to address nutrient management in Lake Erie, and recognizing ongoing dialogue is needed to identify other approaches and levers for change that foster action to protect Lake Erie. As a result ensure effective integration or alignment of plans and actions between the different tools and frameworks – e.g. municipal with watershed, regional, basin and provincial or state, etc. and at different scales

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Discussion #2: Roles in watershed planning and implementation – spotlight on nutrients

Mechanisms to stay informed about nutrients issues in Lake Erie

Participants identified the following information sources:

- Great Lakes Information Network (GLIN)
- IJC
- Facebook
- Ohio Watersheds listserv
- Soil and water communication listserv (for Ohio)
- Ohio Central Lake Erie Watersheds Groups listserv
- US EPA
- Ohio EPA
- International Association of Great Lakes Research (IAGLR)
- Western Lake Erie Basin Partnership
- National Oceanic and Atmospheric Administration (NOAA) harmful algal bloom (HAB) Bulletin and Sea Grant programs
- Great Lakes Executive Committee meetings (as part of the GLWQA)
- Networking and conferences
- Lake Erie Millennium Network
- Great Lakes Public Forum
- Healing Our Waters Coalition (HOW)
- Academic institutions, such as University of Michigan Water Center, The Ohio State University, National Water Quality Research Center at Heidelberg University
- Lake Erie LAMP calls
- Binational.net (for status and updates on activities undertaken by the governments under the GLWQA)
- Elders discussions (practice within First Nations communities) – monthly discussions with elders and youth to discuss how life was before compared to now (e.g. fishing, food harvesting, social well-being, sustenance maintenance)

Mechanisms to stay informed about the work of other organizations on nutrients in Lake Erie

Participants identified the following information sources:

- Face-to-face talks/discussions;
- Individual discussions with stakeholders (e.g., with those who implement actions);
- In Canada, information sharing occurs through the various Annex committees under the Canada Ontario Agreement on Great Lakes Water Quality and Ecosystem Health;
- Central Lake Erie Collaborative (of watershed coordinators)– sharing of projects, plans and priorities;
- Natural field workers (e.g. hunters, fishers, canoers); observers of the changes in water quality and its impacts on cultural well-being;
- Western Lake Erie Basin Partnership;
- Huron-Erie Corridor Initiative/ St. Clair-Detroit River Corridor Initiative Partnership website - groups/stakeholders work together/harmonize efforts; and

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- Thames River Clear Water Revival (ON) – a watershed collaborative that includes federal and provincial government, municipalities, CAs and First Nations.

There is a need to identify mechanisms to better understand, share and integrate First Nations', Tribes' and Métis' traditional ecological knowledge into our approach to understanding the health of Lake Erie, impacts of nutrients, and impacts to communities. There is a need to share information from the GLWQA Annex process with watershed organizations.

Public education initiatives need to find a new language (e.g. not “40percent phosphorus reduction target”) to resonate with the general public and foster a philosophical connection to water that fosters protection.

Other organizations to include in discussions about nutrient reductions through watershed management planning in Lake Erie

Participants identified the following groups or organizations who should take part in discussions relating to nutrient management within a watershed management planning context. Participants noted that stakeholders involved in implementation would be significantly broader. Stakeholders include:

- Several other First Nations, Metis, Tribes including the Saginaw Chippewa's (on the US side);
- Regional planning agencies, local governments in the United States (i.e. drinking water and wastewater);
- Public health units and EcoHealth Ontario to integrate health objectives;
- The research community to transfer knowledge to the policy practitioners (e.g. impacts/influence of dissolved reactive phosphorus);
- Academic planners who study watershed planning;
- Tristate watershed alliance (MI, OH, IN); and
- Agricultural groups, municipalities and subwatershed groups that work at the local level and/or implement BMPs/reduction actions (for implementation in particular).

DAY 2

Overview

Jessica Dexter, Co-Lead Legacy Issues Work Group, Environmental Law & Policy Center

Issues of nutrients in Lake Erie are complex. The LIWG recommendations and key success factors were developed with the principle that watershed management planning is an important and effective tool to advance nutrient management across Lake Erie. Participants were reminded that watershed planning can be used as a holistic approach to reducing nutrients and that it is not necessarily the only tool available, but remain the focus of this workshop.

Key recommendations and key success factors

Key recommendations from the WQB report

Sandy Bihn- LIWG, Lake Erie Waterkeeper

Gayle Wood - Co-Lead LIWG, NVCA

The recommendations and key success factors as summarized from the WQB's report "*Evaluating Watershed Management Plans - Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Watershed*" were reviewed. The recommendations include:

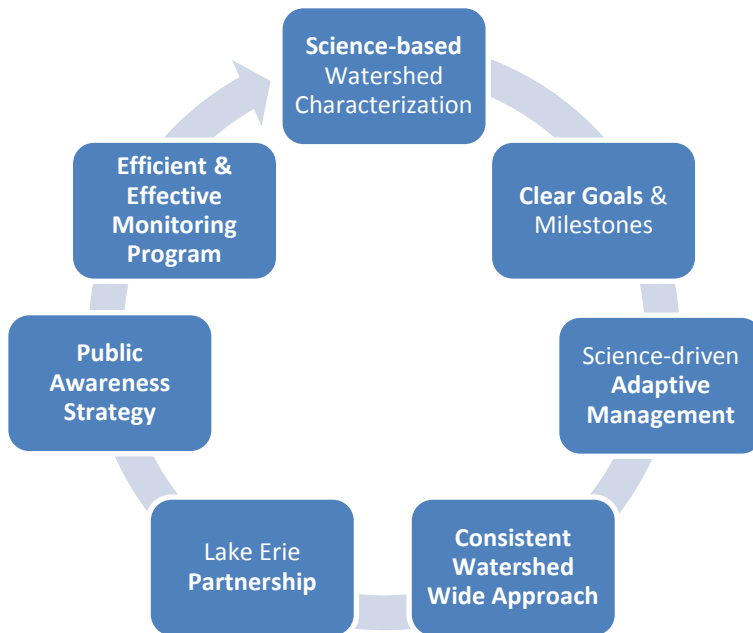
Recommendation 1: The Canadian and United States federal governments as well as the provincial and state governments should ensure that lakewide basin, sub-basin, watershed and subwatershed management plans are developed for nutrient management in Lake Erie. These plans should clearly identify downstream water quality goals, especially for nutrients. The recent binational target of a 40percent reduction of phosphorus entering Lake Erie, committed to by the governments of Canada and the United States (and recently agreed to by the Lake Erie states and Ontario), via Annex 4 of the GLWQA, is one of the goals the plans should be designed to achieve.

Recommendation 2: There are several key success factors that the Canadian and United States federal governments as well as the provincial and state governments should ensure are included in the lakewide, sub-basin, watershed and subwatershed management key success factors identified below are included in lakewide basin, sub-basin, watershed and subwatershed management plans for nutrient management (see below for condensed key success factors from "*Evaluating Watershed Management Plans – Nutrient Management Approaches in the Lake Erie Basin and key locations outside of the Lake Erie Basin*").

Recommendation 3: The Canadian and United States federal governments as well as the provincial and state governments around Lake Erie should ensure that funding is available to support planning activities and implementation of watershed management plans for nutrients.

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Key success factors from the WQB report



Discussion #1: Key factors critical to the successful development and implementation of watershed management

Participants provided their thoughts on the LIWG recommendations and key success factors. Each group discussed the key recommendations to some degree, while all participants provided input to how to advance the recommendations and key success factors.

Comments relating to Recommendation 1 (Watershed management plans as contributors to 40percent nutrient reduction target)

Participants provided the following feedback relating to Recommendation 1:

- Recommendation 1 provided the most discussion and dialogue. Participants felt that the recommendation implies that each watershed, subwatershed and sub-basin requires a plan to meet a 40percent phosphorus load reduction which does not recognize the unique elements of the sub-basins that form this composite target or the capacity and needs of the watershed planning agencies up and downstream.
- LIWG members clarified that Recommendation 1 is not meant to imply that all watersheds, sub-waters, and sub-basins need to meet this target, but intends to identify how these watersheds can work together towards this larger lake target.
- Participants agreed that watershed plans need to consider how they will impact Lake Erie in terms of nutrient reductions, but cautioned that plans will vary in their actions and targets (e.g. agricultural/rural vs. urban). Understanding the baseline conditions and allocations for each source are an important first step towards identifying gaps and hotspots and more fully develop targets.

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- Participants also indicated that not every watershed and subwatershed needs a plan, but that the objective should be to target those watersheds that will have the greatest impact on reducing nutrient loading to Lake Erie.

Comments relating to Recommendation 2 (key success factors)

Participants provided the following feedback relating to Recommendation 2:

- In general participants were supportive of the key success factors identified in the recommendation.
- One participant noted a need for more detailed information under each of key success factors to give them more weight.
- Another participant identified the need to distinguish how these key factors are different from what is currently being done/exists.
- Champions are needed to implement watershed management plans at all levels.
- Participants noted the need for a strong Public Awareness Strategy that:
 - Connects people to the water and foster an emotional attachment;
 - Develops key messaging that resonates with people;
 - Recognizes water as a living entity and legacy;
 - Engages and educates youth;
 - Creates a value proposition;
 - Explains how stakeholder actions impact the larger Lake Erie scale;
 - Recognizes the positive contributions of all stakeholders (including agricultural sector);
 - Incentivizes funding (e.g. get people to pay more for food that comes from a “sustainable” resource – Great Lakes certified); and
 - Participants noted that using “place for life” concept that focuses on health, sustainable watersheds and a personal connection to people that centres on home and place which resonates with the public.
- Participants noted that efficient and effective monitoring program requires:
 - Resources for monitoring at the watersheds and sub-watershed levels; and
 - Consistent protocols to be followed across watersheds so data can be compared on a lakewide basis.

Comments relating to Recommendation 3 (funding)

Participants provided the following feedback relating to Recommendation 3:

- Participants were very supportive of the need for sustained multi-year funding to complete watershed management plans and emphasized a need for funding dedicated to implementation and monitoring and reporting as well as planning.
- Requirements for funding should be determined at the local level to allow for greater flexibility for actions.
- Innovative funding mechanisms be explored (e.g. In New York there is the Environmental Protection Fund, which uses land transfer taxes for actions such as land preservation, purchase of lands for protection, forestry tracts, implementing agricultural practices, watershed planning and implementation; Minnesota has the Land and Water Legacy fund resulting from a referendum to amend the state constitution that dedicates a portion of sales tax to the fund).

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Standard components of watershed management plans for nutrient management

Sandy Bihn- LIWG, Lake Erie Waterkeeper

Gayle Wood - Co-Lead LIWG, NVCA

The key components (as summarized in the WQB's report "*Evaluating Watershed Management Plans - Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Watershed*") include:

1. Identification of the nutrient causes and sources;
2. Description of the strategies and BMPs needed to achieve the proposed nutrient load reductions;
3. Indication or consideration of how implementation of the plans will impact upstream and downstream water quality;
4. Estimation of the nutrient load reductions expected from the proposed management measures;
5. Criteria to determine whether or not nutrient load reductions are being achieved; and
6. Monitoring to evaluate the effectiveness of implementation.

Discussion #2: Standard components of watershed management plans for nutrient management

Participants discussed the key components with a goal to identify standard elements under each component, and how these components can be advanced.

Standard Nutrient Causes and Sources

Participants identified that the following standard nutrient causes and sources be included in watershed management plans:

- The nutrient causes and sources will vary by watershed.
- There is a need to prioritize sources/amounts – not all sources are equally important to impacting Lake Erie nutrient levels. These elements can be identified through watershed characterization.
- Impacts after heavy rains and runoff from the land upstream of the Lake were noted.
- Issues or drivers such as climate change, pesticides, dams, impoundments, imperviousness, land uses can influence impacts.

Point Sources	Nonpoint Source
<ul style="list-style-type: none">○ Combined sewer overflows and/or bypasses○ Wastewater overflows○ Wastewater treatment facilities○ Package plants○ Greenhouse operations○ Other industry inputs	<ul style="list-style-type: none">○ Commercial/lawn fertilizers○ Agricultural practices (row vs hay pasture)○ Golf courses○ Swimming pools○ Manure○ Septic systems○ Wildlife (e.g. Canada Geese)

Upstream activities and local and downstream impacts

Participants identified that the following common upstream activities have local and downstream impacts to water quality (be considered as part of watershed management plans):

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Upstream Activities	Local and Downstream Impacts
○ Macroinvertebrates	○ Eutrophication
○ Food web	○ Aquifer impacts
○ Wildlife	○ HABs
○ Headwater residence time	○ Added costs for water treatment
○ Drainage ditches	○ Swimmability/fishability/drinkability
○ Flooding	○ Fish and wildlife kills
○ Channel modification	○ Decreased property values
○ Imperviousness/hardening – overall impact	○ Aquatic Invasive Species (AIS) as a result of ecosystem changes
	○ Soil changes
	○ Cladophora
	○ Microcystin

- The sources and impacts will differ across watersheds and will be ranked/ prioritized differently.

Standard BMPs

Participants listed common elements that should be considered in the selection of BMPs (in watershed management plans) to achieve the proposed nutrient load reductions:

- The BMPs identified need to:
 - Be research-proven;
 - Allow for innovation;
 - be flexible in the plan;
 - Be locally focused and applicable to each watershed for both urban and rural areas;
 - Be accompanied by decision support tools and resources that have multiple benefits – i.e. landowner can apply BMPs to different scenarios and help inform their decisions;
 - Include maintenance-free BMPs;
 - Be relatable (e.g. fishable, swimmable, drinkable);
 - Recognize that there are regulatory and legislative tools that exist and need to be effectively implemented and enforced;
 - Consider the impacts of climate change; and
 - Provide amounts of phosphorus/nutrient reductions expected;
 - Be stackable (i.e. offer a suite of complementary BMPs).
- Participants noted there is still a lot of research being done on the effectiveness of various BMPs and the selection and implementation of BMPs is very specific to the watershed.

Mechanisms to Estimate Nutrient Load Reductions

Participants identified the following standard components to estimate nutrient load reductions:

- Participants noted there are a number of models to estimate nutrient load reductions, listed below, and that there is a need to find a common or standardized modeling approaches to compare across Lake Erie.
 - RUSLE - Revised Universal Soil Loss Equation
 - STEPL (US EPA based) – Spreadsheet Tool for Estimating Pollutant Loads
 - SWAT – Soil and Water Assessment Tool
 - CANWET - Canadian ArcView Nutrient and Water Evaluation Tool
- There is recognition that models have limitations as they are easily manipulated.

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- Participants suggested that models should be scalable, standardized and fundable.
- One participant indicated that the Great Lakes Watershed Management System is a model that is scalable from farm-level to watershed and is an integration of RUSLE and STEPL.

Criteria to determine if nutrient load reductions are being achieved

Participants identified the following criteria to determine whether or not nutrient load reductions are being achieved:

- Standard indicators for measuring progress at the watershed level could include:
 - Total phosphorus;
 - Dissolved reactive phosphorus; and/or
 - Particulate phosphorus.
- Standard indicators for measuring progress at the lakewide level could include:
 - Phosphorus (as noted above);
 - Chlorophyll a;
 - Microcystin;
 - Cyanobacteria;
 - Dissolved oxygen;
 - Safe drinking water;
 - Extent of dead zone over time in Central Lake Erie; and/or
 - Beach closures or fish die-offs.
- Indicators could also include:
 - Level of engagement of stakeholders (e.g. the rate of BMP uptake/implementation, # of public education workshops);
 - Public opinion recreational-use survey;
 - Tracking of media/social media;
 - Measure of political action (or inaction), levels of funding; and/or
 - Tracking of rewards/recognitions, success stories within watersheds.
- Participants noted there is a need:
 - For a standard approach to water chemistry sampling and analysis for comparable reporting;
 - For year-round, multi-year data collection for long-term trend analysis recognizing that the quality of monitoring improves over time;
 - To understand what data/monitoring is currently available to be able to identify consistent long-term measurement and monitoring approaches; and
 - To have a mechanism to tie actions taken upstream to impacts at the lake.

Determining if targets achieved

Participants identified the following standard components to determine if targets are being achieved:

- Participants cautioned that the number of factors to be tracked should not overwhelm the process, but provide meaningful indicators of progress.
- Participants suggested monitoring could include nitrogen; and/or water clarity testing.
- Participants noted that there is a need for:
 - A phosphorus testing program for soils across the region;

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- Stakeholder engagement to be able to track activities on the ground, recognizing that citizen science is a way to engage communities, but there can be issues with quality control; and
- Funding for long-term monitoring and an adequate and strategic monitoring network.

Discussion #3: Coordination of watershed planning with the various binational and domestic nutrient-related efforts

Participants identified the best ways to coordinate and optimize efforts to address nutrient issues in Lake Erie. Participants identified a number of key elements that would enhance coordination and collaboration, including:

- Sharing watershed planning contact information, web links and a searchable database and synopsis of watershed plans in the Lake Erie Basin to allow watershed managers to learn from others. This should be housed in a centralized location and have interactive forms.
- Outlining the roles and responsibilities of groups involved in watershed management and implementation (in both the United States and Canada).
- Establishing a reporting mechanism relating to actions for smaller watersheds.
- Participants identified a number of mechanisms to coordinate activities relating to nutrient issues in Lake Erie, including:
 - Having meetings around professional development, conference calls, webinars, etc.;
 - Creating a Lake Erie wide forum (for example there are biennial meetings regarding issues facing Lake St. Clair);
 - Creating a senior coordinating committee with technical practitioners; or
 - Connecting with the Great Lakes Guardians' Council facilitated by the Ontario Ministry of Environment and Climate Change as there are several sub-groups being formed.
- A number of participants noted there are existing avenues for coordinating activities such as the Annex 4 Committee or LAMP committees and that these channels should be leveraged before establishing new forums. Currently there is little dialogue between these groups and watershed groups.
- A number of participants also noted that there needs to be time to get implementation work done, not only coordinate, plan and report on activities.

Next steps and closing remarks

Gayle Wood, Co-Lead of the WQB LIWG, NVCA

Jessica Dexter, Co-Lead of the WQB LIWG, Environmental Law & Policy Center

The next steps for the Legacy Issues Work Group were outlined, noting that there will be a webinar in the spring relating to the findings from the workshop. Participants were also informed that the workshop report would be shared with them as an opportunity for them to provide further thoughts and insights for the consideration of the WQB Legacy Issues Work Group. The outcomes from the workshop and the webinar will be considered in the development of a WQB report, which will be provided to the Commission for their consideration in forwarding advice and recommendations to the governments of Canada and the United States. Participants were thanked for attending and contributing their knowledge and expertise.



Appendix A: Workshop Agenda

GREAT LAKES WATER QUALITY BOARD ***Watershed Management of Nutrients in Lake Erie Workshop***

February 1-2, 2017

Holiday Inn Select, 1855 Huron Church Road, Windsor, Ontario
LaSalle Meeting Room

Workshop Purpose:

The IJC is a binational organization that prevents and resolves disputes over boundary waters of the United States and Canada, including the Great Lakes, and is served in an advisory capacity by the Great Lakes Water Quality Board (WQB). In 2015 the WQB formed the Legacy Issues Work Group (LIWG), which undertook a project to assess the state of watershed management plans for nutrient management in the Lake Erie basin. In August 2016 the WQB released a report *“Evaluating Watershed Management Plans-Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Basin”* that includes recommendations on how watershed management plans should be used to manage nutrient pollution in Lake Erie and identifies key success factors necessary for watershed management plans to achieve meaningful nutrient load reductions.

The work group wishes to convene a binational workshop, bringing together approximately 30 experts, to build support for the findings of the work group report by defining and developing standard components that should be part of watershed management plans, including key factors critical to the successful development and implementation of watershed management plans. The outcomes of this workshop will be used by the WQB to further develop the findings and recommendations from the WQB’s report (August 2016) and to ultimately provide advice and recommendations to the Commission for their consideration in forwarding to the governments of Canada and the United States.

Workshop Objectives:

1. To identify standard components that should be part of watershed management plans for nutrient management.
2. To build support for the findings of the WQB report, which include recommendations on key factors that will be critical to the successful development and implementation of watershed management plans for the management of nutrients.
3. To identify recommendations on how to better coordinate/optimize watershed planning with the various related efforts being undertaken both under and outside the GLWQA.
4. To provide a forum for watershed management planning stakeholders to:
 - a. Better understand their relationship with each other and their downstream connection with and impacts to Lake Erie; and
 - b. Begin building the relationships necessary for coordinated watershed-based planning to be successful.



Workshop Preparation:

In preparation for this workshop we request that you please take some time to review the WQB's "[Evaluating Watershed Management Plans-Nutrient Management Approaches in the Lake Erie Basin and Key Locations Outside of the Lake Erie Basin](#)", upon which this workshop is based. Participants may also wish to review the longer, more detailed [contractor report](#), which is also provided as a link in the WQB report.

DAY 1: February 1, 1:00 PM – 5:00 PM

Time	Agenda Item	Who
12:30	Registration	All
1:00	Welcome & Opening Remarks	Trish Morris - Director, IJC Great Lakes Regional Office Gayle Wood – Co-Lead Legacy Issues Work Group, NVCA
1:10	Workshop Overview & Introductions	Susan Hall - Lura Consulting
1:20	Setting the Context – Part 1 <i>Presentation: Water Quality Board Recommendations on Lake Erie Watershed Management Plans for Nutrient Management</i>	Sandy Bihn - Legacy Issues Work Group, Lake Erie Waterkeeper and Gayle Wood - Co-Lead Legacy Issues Work Group, NVCA
1:50	Setting the Context – Part 2 <i>Presentations: Watershed Management Planning and Implementation – U.S. and Ontario Perspectives</i>	<u>Ontario</u> Jo-Anne Rzadki - Business Development & Partnerships, Conservation Ontario Ben Longstaff - Integrated Watershed Management, General Manager, LSRCA <u>United States</u> Laura Rubin - Huron River Watershed Council Janette Marsh - EPA
3:10	Break	All
3:30	Discussion #1: Essential Ingredients of Successful Watershed Management Plans	All
4:00	Discussion #2: Roles in Watershed Planning and Implementation – Spotlight on Nutrients	All
4:30	Discussion #3: Collective Mapping – Basin-Wide Action on Nutrients	All
4:55	Day 1 Wrap-up	Susan Hall - Lura Consulting Antonette Arvai – IJC GLRO
5:00	Adjourn	
6:30+	Social Dinner (Grill 55, Holiday Inn Select Restaurant)	All



DAY 2: February 2, 8:30 AM – 3:00 PM

Time	Agenda Item	Who
8:30	Morning Refreshments & Networking Opportunity	All
9:00	Review of Day 1; Agenda, Purpose and Objectives for Day 2	Jessica Dexter - Co-Lead Legacy Issues Work Group, Environmental Law & Policy Center Susan Hall - Lura Consulting
9:15	Discussion #1: Key Factors critical to the successful development and implementation of watershed management plans	All
10:00	Report Back and Discussion	All
10:30	Break	All
10:45	Discussion #2: Standard Components of watershed management plans for nutrient management	Sandy Bihn and Gayle Wood - Legacy Issues Work Group
11:00	Discussion #2: Standard Components cont'd	
12:15	Lunch (provided)	All
1:00	Report Back and Discussion	All
1:45	Discussion #3: Coordination of watershed planning with the various binational and domestic nutrient-related efforts	All
2:15	Report Back and Discussion	All
2:45	Next Steps and Closing Remarks	Legacy Issues Work Group
3:00	Adjourn	

Appendix B: List of Participants

Sandy Bihn (*WQB Member*), Lake Erie Waterkeeper

Bob Burns, Detroit Riverkeeper

Luca Cargnelli, Environment and Climate Change Canada

Tom Copeland, City of London

Dorienne Cushman, Ontario Ministry of Agriculture, Food and Rural Affairs

Jessica Dexter (*WQB Member*), Environmental Law and Policy Center

Peter Dragunas, Catfish Creek Conservation Authority

Angus Eaton, New York State Department of Environmental Conservation

Heather Elmer, Chagrin River Watershed Partners

Joe Farwell, Grand River Conservation Authority

Peter Graham, Niagara Peninsula Conservation Authority

Councillor George E. Henry, Chippewas of the Thames First Nation

Sandra Kosek-Sills, Ohio Lake Erie Commission

Beth Landers, Wood County Soil and Water Conservation District

Ben Longstaff, Lake Simcoe Region Conservation Authority

Karen Maaskant, Upper Thames River Conservation Authority

Phil Martin, Blanchard River Watershed Partnership

Janette Marsh, Environmental Protection Agency

Bereket Negasi-Isaac, University of Waterloo

Dave Richards, Ontario Ministry of Natural Resources and Forestry

Laura Rubin, Huron River Watershed Council

Jo-Anne Rzadki, Conservation Ontario

Michelle Selzer, Michigan Department of Environmental Quality

Tara Tchir, Thames River Clear Water Revival Collaborative

Matt Uza, Ontario Ministry of Environment and Climate Change

Chief Leslee White-eye, Chippewas of the Thames First Nation

Jason Wintermute, Lower Thames Valley Conservation Authority

Gayle Wood (*WQB Member*), Nottawasaga Valley Conservation Authority

Richard Wyma, Essex Region Conservation Authority

Nicole Zacharda, Great Lake Commission

International Joint Commission

Antonette Arvai, International Joint Commission Great Lakes Regional Office

Trish Morris, International Joint Commission Director, Great Lakes Regional Office

Cindy Warwick, International Joint Commission Ottawa Office

John Wilson, International Joint Commission Great Lakes Regional Office

Facilitator

Susan Hall, Lura Consulting

APPENDIX B – WEBINAR PRESENTATION SLIDES

Watershed Management of Nutrients in Lake Erie

Webinar Presentation

International Joint Commission Water Quality Board Legacy Issues Work Group

Gayle Wood (Work Group Co-Lead)
Nottawasaga Valley Conservation Authority

Jessica Dexter (Work Group Co-Lead)
Environmental Law and Policy Center

Sandy Bihn (Work Group Member)
Lake Erie Waterkeeper

May 10, 2017



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Webinar Purpose

2015
WQB Legacy
Issues Work
Group Project

Aug. 2016
WQB Report
Released

Feb. 2017
Workshop

May 2017
Webinar

★ **YOUR
INPUT**

Input will be considered in the development of a WQB report, which will be provided to the Commission for their consideration in forwarding advice and recommendations to the governments of Canada and the United States.



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Providing Your Input

- Verbally at the end of the webinar presentation
- By completing a follow-up questionnaire via e-mail to arvaia@windsor.ijc.org



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3

International Joint Commission and the Water Quality Board



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Water Quality Board Legacy Issues Work Group

2015 WQB Priority Issue

The need to assess the state of watershed management plans for nutrient management in the Lake Erie basin.

Are the watershed management plans robust enough to lead to water quality improvements?

Are watershed management plans consistently being developed and implemented in the basin?

Assessment

In-depth review of select watershed management plans from within and outside the Lake Erie basin

August 2016 WQB report

Findings and Recommendations

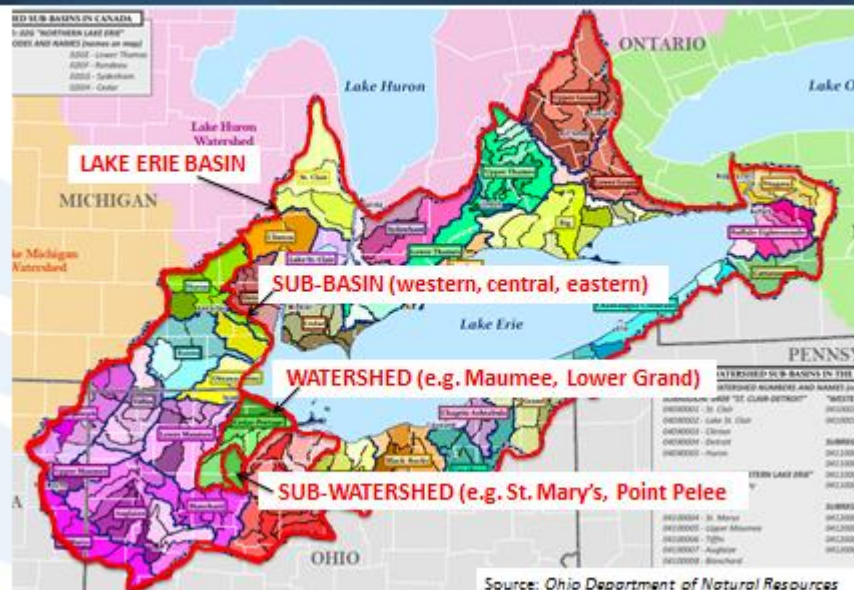
How watershed management plans should be used to manage nutrient pollution in Lake Erie and the identification of key success factors necessary for watershed management plans to achieve nutrient load reductions.



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Common Terminology



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WQB Report – Key Finding

Lake Erie is lacking a consistent framework for developing and implementing a lake-wide nutrient management plan that incorporates the eastern, central and western sub-basins, as well as watershed and sub-watershed plans that consider downstream/upstream water quality impacts.



Source: Great Lakes Fishery Commission



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Standard Components of Watershed Management Plans for Nutrient Management



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WQB Report Recommendation – Key Success Factors

There are several key success factors that the Canadian and United States federal governments as well as the provincial and state governments should ensure are included in the lake-wide basin, sub-basin, watershed, and sub-watershed management plans for nutrient management.



- ✓ Science-based watershed characterization
- ✓ Clear goals and milestones
- ✓ Science-driven adaptive management process
- ✓ Consistent watershed-wide approach
- ✓ Establish partnerships and define responsibilities
- ✓ Develop a strategy for public awareness
- ✓ Establish an effective and efficient monitoring program



Common and Different Elements in Watershed Management Planning for Nutrient Management (Workshop Outcome)

Common Elements	Different Elements
<ul style="list-style-type: none"> ▪ Need/requirement for monitoring 	<ul style="list-style-type: none"> ▪ Some plans have specific targets; others do not
<ul style="list-style-type: none"> ▪ Need for partner/stakeholder buy-in at various levels 	<ul style="list-style-type: none"> ▪ Funding mechanisms <u>Ontario</u>: largely from local governments <u>U.S.</u>: federal grants
<ul style="list-style-type: none"> ▪ Need for iterative process/adaptive management approach 	<ul style="list-style-type: none"> ▪ U.S. EPA's 9-Element Plan; no equivalent Canadian program
<ul style="list-style-type: none"> ▪ Need for funding and resources to do the on-the-ground work 	<ul style="list-style-type: none"> ▪ Structure of watershed management <u>Ontario</u>: conservation authorities created under the Conservation Authorities Act <u>U.S.</u>: watershed coordinators and/or soil and water conservation districts
<ul style="list-style-type: none"> ▪ Setting goals, targets and measurements (although the process to establish them is different) 	<ul style="list-style-type: none"> ▪ Degree of flexibility in the process (more prescriptive in the U.S. than Ontario)
<ul style="list-style-type: none"> ▪ Need for public engagement 	



Key Workshop Outcomes

OVERALL

Watershed plans are not prescribed, nor are the elements required for watershed management plans. Where watershed plans do exist there appears to be similar but not identical elements (e.g. identification of nutrient sources and amounts, establishing targets, monitoring to assess progress).

There is a need to identify which watersheds and sub-watersheds are of highest priority for nutrient reduction and will have the greatest impact on reducing nutrient loading to Lake Erie.

INFORMATION SHARING

Tools should be developed to facilitate sharing and communication of information among watershed planning and implementation partners in the Lake Erie basin. This can include the sharing of: information about nutrient issues in Lake Erie and the sub-watersheds; watershed management plans; watershed data; traditional ecological knowledge; and best practices for nutrient management.



Key Workshop Outcomes

COORDINATION

In order to coordinate watershed management planning and implementation, there needs to be an entity that oversees that coordination. However, because there are already so many existing entities that work on nutrients in Lake Erie, it would be preferable for an existing entity (rather than a new organization) facilitate the coordination and communication of various watershed planning and implementation activities to manage nutrients in Lake Erie.

The structure and organization of watershed management and implementation for nutrient management differs between the US and Canada (for example in Ontario watershed plans are developed by Conservation Authorities; whereas in the US it may be done by political jurisdictions, such as soil and water conservation districts within states).



Key Workshop Outcomes

CONSISTENCY

Consistent, long-term monitoring is a top priority to establish baselines, establish targets and measure progress in achieving targets. There is also a need to establish standard protocols for modelling, water sampling and analysis to allow for comparison of data and performance measurement across watersheds and on a lake-wide basis.

FUNDING

The need for sustained, multi-year funding was identified as a significant barrier to effective watershed planning and implementation to manage nutrients. Reliable, adequate funding is needed for the development of watershed management plans; the implementation of the watershed management plans; and long-term monitoring to measure progress.



QUESTIONS



APPENDIX C – LIST OF WEBINAR PARTICIPANTS

**Watershed Management of Nutrients in Lake Erie Webinar Presentation
Participant List**

Name	Affiliation
Tom Copeland	Corporation of the City of London
David Copplestone	Ontario Ministry of Natural Resources and Forestry
Heather Elmer	Chagrin River Watershed Partners, Inc.
Joe Farwell	Grand River Conservation Authority
Katie Flahive	US Environmental Protection Agency
Ken Gibbons	Great Lakes Commission
Peter Graham	Niagara Peninsula Conservation Authority
Joseph Hudson	Erie County Conservation District
Bereket Negasi Isaac	University of Waterloo
Kristin Jenkins	Hull & Associates, Inc.
Janette Marsh	US Environmental Protection Agency, Region 5
Phil Martin	Blanchard River Watershed Partnership
Edwin Martinez	US Department of Agriculture – Natural Resources Conservation Service
Gregory Nageotte	Ohio Department of Agriculture - Division of Soil and Water Conservation
Jennifer Orr	Pennsylvania Department of Environmental Protection
Jenn Richards	Ontario Ministry of Agriculture, Food and Rural Affairs
Jo-Anne Rzadki	Conservation Ontario
<i>Water Quality Board Members</i>	
Gayle Wood	Nottawasaga Valley Conservation Authority
Jessica Dexter	Environmental Law and Policy Center
John Jackson	
Anne Cook	The Andersons, Inc.
Sandy Bihn	Lake Erie Waterkeeper
<i>IJC Staff</i>	
Antonette Arvai	IJC Great Lakes Regional Office
Cindy Warwick	IJC Ottawa Office

APPENDIX D – SUMMARY OF WEBINAR DISCUSSIONS

WATERSHED MANAGEMENT OF NUTRIENTS IN LAKE ERIE WEBINAR

May 10, 2017

Summary of Discussion

NOTE: [Indicates points made by a work group member]

QUESTION TO PARTICIPANTS: Have we hit on the key findings/recommendations as presented?

PARTICIPANT RESPONSES:

- Yes, but need to properly package/message it to gov't, regarding why watershed management is important. Need to clearly articulate what does it mean for them and their election campaign/re-election. Explain what it means to them.

[Government decision makers are not experts (including Commissioners). Need to make a complex topic and package it in an understandable way so that decision makers can understand the importance of WMP and implementation and why it is important in nutrient management.]

- Bang on with results of the work undertaken in the last couple of years and highlighting the importance of monitoring and testing and the importance of consistent protocols across border. However, funding this is a concern. When on the Ontario side, with the Domestic Action Plan, the language says "Canada and Ontario will...", but from a municipal perspective, there is concern that the commitments of Canada/Ontario will get downloaded to the local municipal level. Who is going to be responsible for carrying out what is in these DAPs, where is the funding going to come from?

QUESTION TO PARTICIPANTS: Do you think from a municipal perspective, mentioning a cost-share initiative/burden (between federal-state/provincial-local governments) for watershed planning and implementation would have more appeal? Should it be mentioned in the work group report?

PARTICIPANT RESPONSES:

- There is only one tax payer. Where is the money going to come from (e.g. municipalities increasing rates)? The Ag sector needs to make the biggest improvements to lead to improved water quality in the Thames River (for example) and ultimately Lake Erie. How do you get funding or make gains in the Ag community and what is best way to move forward is a bigger question.

[Integrate the significance of the Ag community into the work group report and what roles or activities they may undertake and cost-sharing in terms of land owner contributions.]

- With the US side accounting for 94percent of reductions needed, a better expenditure would be to give money to the US side for reduction activities if the ultimate goal is the reduction of nutrients overall in Lake Erie.

- The OH framework is very tied into the US CWA and USEPA 9-element planning. Watershed coordinators have been funded and seated across the state and this has been very effective in integrating programs and bringing funding from different sources.
- When talking about a new funding stream attached to watershed planning, there would be sensitivity to creating a new framework or criteria to jump through to obtain funding.
- The USEPA 9-element planning is very robust and aligns well with those criteria identified by WQB. There are different watershed-based planning processes for different purposes (e.g. balanced watershed growth planning, USDA rapid assessment watershed protocol). Introduce people to different frameworks based on needs, but it is really the 9-element plan that drives what is being done in OH, down to the smallest watershed scale (HUC 12). Don't create a new document that people need to develop to access funding, but filter existing documents through a new lens to meet needs.

[Not necessarily trying to create a new process, we are trying to figure out how to connect the watersheds and collectively respond to the needs of Lake Erie. Currently they are written specific to the watershed and not necessarily linked to the Lake or upstream/downstream watersheds. Bigger issue to address is how does this get coordinated, funded and sustained.]

- Agree that the USEPA 9-element plans are very focused on obtaining targets within the hydrologic unit. However, they don't turn a blind eye to downstream goals. Need to prioritize at a larger scale – these are the watersheds that need a comprehensive plan for nutrient management, tie them together and recruit local interests to help. This may be where value can be added to the 9-element plan and combined into a larger watershed plan that can access funding. But don't set back to zero, forget about what you have done and develop this new plan to access funding. Integrate and leverage the work being done. 9-elements plan is being pushed by EPA to access GLRI and/or CWA funds. Potentially aggregate sub-watershed plans into a larger overall plan for nutrient management.

[Need to be sensitive to the existing watersheds and how to build what they have into a more regional or lakewide program.]

- The Chagrin River watershed partners are working in collaboration with other watershed organizations in the central Lake Erie basin of Ohio. They have begun to have discussions about how to collectively look at how individual watershed planning efforts are meeting Lake Erie targets including the 40percent reduction target. These groups would be supportive of being able to continue plugging into a larger regional framework and targets for Lake Erie, but not have to reinvent the wheel with their individual watershed plans.

[There is access to federal funds in the US but not in Ontario in terms of watershed planning. A lot of the initiatives in Ontario are funded at the local level.]

[In the US there isn't much funding for integrative approaches for watershed planning at the lake-level.]

QUESTION TO PARTICIPANTS: Is anyone involved in the Lake Erie LAMP and how watershed groups are going to work (or not work) with the LAMP? Does not seem there is coordination among the watershed groups under the LAMP and the facilitation necessary from the lakewide down to the sub-watershed and everything in between.

PARTICIPANT RESPONSES:

- The Chagrin River watershed partners are aware of the LAMP, but have not had direct participation in the LAMP.

QUESTION TO PARTICIPANTS: Are you in agreement with the key outcomes that emerged from the workshop? Is there anything you would add?

-In the coordination section, first bullet, the entity that oversees does not need to be a new entity, ensure to capture this idea. Don't have to create another level of bureaucracy. Just need apportioning of responsibilities/who is doing what.

-With regard to the "entity that oversees" is that at local level or globally/internationally? Could see the role of a larger organization aggregating and setting a clearinghouse for the local efforts. What is the scale?

[Trying to coordinate at lakewide level and connect the watersheds (upstream/downstream). Seems there is a lot of delegation to the states to do programs, but not much at federal level to coordinate (although there is Annex 4) – that seems to be a large gap.] [Need to ensure it is clear at what scale/level this coordination is to happen]

-We have all these WMPs, but how do we know that the nutrient reductions achieved through these plans is enough to meet the Lake target? Who takes the responsibility for checking/ensuring this? Most important is the need to know that when combined they will be enough to take care of Lake nutrient problems. Need some predictability from the science and monitoring to know that what is being will be enough (rather than waiting years and years to see that it wasn't enough).

-Important to have testing and monitoring long term. There is legacy P, so even with these actions in place you may not see improvements in the lake for years and years. Continue to test and monitor to see if those improvements are making changes over time.

[Need to have accountability. Areas in US with report cards seem to have better success at public support and better funding (e.g. Oldwoman Creek).]

-Most nutrient management in OH is happening outside of local watershed planning (thru USDA, NRCS, SSA, SWCDs, Lake Erie Collaborative). The USEPA 9-element planning directs funding for special projects on a smaller scale, demonstration projects, crucible of new technologies and BMPs. It is a nested approach. Trying to encapsulate it all in local watershed planning (at least in Ohio) is not going to capture the whole picture when it comes to reducing nutrients.

[In the work group report it will be important to identify that programs/activities are fragmented and there needs to be measurement numbers in a coordinated effort to ensure that the resources provided actually result in helping the Lake. The problem comes from the land (e.g. runoff). There needs to be integration of those programs to achieve the goal of Lake Erie.]

APPENDIX E – RESPONSES TO WEBINAR FOLLOW-UP QUESTIONNAIRE

Responses to Webinar Follow-up Questionnaire

QUESTION	RESPONSE (<i>US State Government</i>)	RESPONSE (<i>Ontario Conservation Authority</i>)	RESPONSE (<i>US Watershed Group</i>)
How should subwatersheds be identified as priorities for planning and implementation?	<p>The GLWQA Annex 4 Subcommittee identified 14 priority Lake Erie tributaries for nearshore water quality improvements specifically tied to excess nutrients and nuisance algae growth. Water quality and loading models have been developed to calculate subwatershed loading contributions of nutrients, which will allow prioritization of subwatersheds based upon model outputs. Additionally, each specific model should be run by multiple independent modelers utilizing their own judgement and opinion on variable assignment and parameter assumption. This allows an “averaging” of modeler opinion and may provide a balanced, more representative output. This concept was utilized in research completed by the University of Michigan Water Center in their paper “Informing Lake Erie Agriculture Nutrient Management via Scenario Evaluation.”</p>	<p>At a bi-national level, the priority basins/subwatersheds were identified by the GLWQA Nutrient Annex and Objectives & Targets Task Team. This process was based on extensive modelling, and monitoring data where they existed and substantive effort by the task team members to bring together local knowledge and expertise on watershed inputs to the western, central and eastern basins. There is no need to redo this work at a binational level. If the question pertains to smaller scale work, for example within the Maumee or Grand River (ON), then local watershed/water managers should have the knowledge, gained through data analysis or knowledge acquisition through research or experience, to identify priority subwatersheds for a particular objective (e.g. streams and rivers that have high phosphorus levels). This expert knowledge cannot be discounted as the local context differs from region to region or from watershed to watershed. And, there is no single approach that recognizes the local context.</p> <p>All watersheds are different and this uniqueness requires different approaches. Consequently, it is not surprising to see different approaches to watershed plans. Watershed plans must be used locally for local planning purposes. However, when</p>	<p>I used the Ohio EPA 2009 TMDL Report for the Blanchard River Watershed to create a grading system based on the identified impairments. Since our watersheds are over 80percent agriculture, there are some impairments that will never be restored completely. Using this point system, a letter grade was assigned to each 14-digit HUC watershed. Writing of the Nine Element Plans will start with the watersheds having lowest letter grade.</p>

starting a watershed plan, it can be aligned to a larger goal like the goal to reduce phosphorus loadings to Lake Erie. This alignment does not necessitate that all watershed plans be similar, but rather include common measures like, for example, annual phosphorus loads. However, these common measures must use common methodologies or standard operating procedures, which are agreed to and set out by the leading agencies (e.g. US/Canada). This way, data / information on the common measures can be compared across the larger geography. The alignment of watershed plans requires a strong voice, leadership and advocacy. The IJC can provide this role by identifying and promoting the common measures (e.g. annual phosphorus loads) and endorse a common methodology as set out by either Country. There are likely a few key common measures that all watershed plans could include, if they are not already in their plans, that would help their work align to the larger Lake Erie scale.

<p>What existing entities could serve the role of overseeing and coordinating lakewide watershed management plans for nutrients, including sub-basins, watersheds and subwatersheds?</p>	<p>This role requires a significant investment of time and personnel to coordinate watershed planning efforts and track implementation activities. This has proven difficult for the Parties to the GLWQA to manage due to the complex differences in governance structures of various jurisdictions and partners that are involved in these activities. Interstate compact commissions such as the Great Lakes Commission, and international commissions such as the IJC, are uniquely qualified to fulfill this role by devoting staff to these activities if provided the means to do so by the Parties and jurisdictions.</p>	<p>As with any collaborative effort that has many different stakeholders around the table, there is a need to support – not oversee – the collaboration. Successful collaborative efforts require dedicated resources (staffing, operational budgets etc.) to maintain engagement and to build trust and cooperation among the key implementers who will undertake the actions to achieve the outcome (e.g. reduced phosphorus loads). Given that this is a binational issue, Canada and the United States should identify the appropriate mechanisms (e.g. agency, organization) nationally to support these collaborative efforts. For Canada/Ontario, whatever agency is identified to support and facilitate the collaborative effort, it must be provided funding for a nominal staff complement and funds to support collaboration (e.g. meeting space, office supplies, communication tools, etc.). Current entities, such as the Lake Erie Lakewide Management and Action groups are likely the best entities to undertake this effort. A review of their roles and responsibilities and membership may be needed as sectors that are key implementers of actions – those people who have influence over the actions that can reduce phosphorus levels in tributaries draining to Lake Erie, are engaged meaningfully. The IJC should remain an active voice at the collaborative table for such an initiative but their position is best suited to being one of the champions at the table or the sponsor or supporter of such an effort.</p>	<p>If I had to choose one in the states, I would pick National Resources Conservation Service (NRCS). My main reason is that NRCS policy does permit them to share some of their data with other organizations. The local SWCD and others don't have this limitation. So, NRCS would be the logical agency since they would be able to gather all the data needed. If they are too busy, but would be willing to share their data on, at least a ten-digit watershed level, than another group could compile and share the information.</p>
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<p>What kinds of things should that entity do to ensure that the sum effect of watershed management planning and implementation in the basin achieves nutrient reduction targets? What kinds of things should that entity not do? Would anything about that entity need to change in order for it to effectively play that role?</p>	<p>Cataloging and hosting of watershed plans by HUC on the US side. Coordinated, standardized reporting of implementation activities to track reductions by HUC. United States, Canada, state, and province agreement on standardized reporting methods. Conducting annual assessments of subwatershed progress to meeting individual reduction targets based upon nutrient reduction reporting and tracking.</p>	<p>I encourage the Lake Erie LAMP review its role and responsibilities and the membership of the participants. The Lake Erie LAMP will require staffing, operational funding to facilitate and support a collaborative effort. A framework for engagement and alignment of activities to consider is the Collective Impact framework (see www.tamarackcommunity.ca). Various aspects of this framework has been applied in the Grand River Watershed (Ontario) successfully including staff time to support the ongoing implementation of the Plan through the Grand River Conservation Authority. This support facilitates the tracking of efforts and reporting annually on actions that the collaborative effort is implementing. In addition, this entity could also coordinate funding requests and distribute the funds for implementation. The entity should not have the authority to require the implementers to take action without providing corresponding funding.</p>	<p>That is a tough question to answer. In Ohio, the National Water Quality Center for Research at Heidelberg University in Tiffin, Ohio has testing sites at four points that are very near the mouth of four of the six ten-digit watersheds. Adding two more sites near the mouth of the other two ten-digit watersheds would give that data needed to know what loadings are occurring. In addition, funding for local groups or universities to regularly test near the mouth of the 14-digit watersheds would provide the data needed to know the loading from these watersheds. This testing would only need to be done when there is flow. Most of the stream in the 14-digit watershed dry up to the point there is little or no flow occurs from July 1st through October.</p>
<p>Are there specific Lake Erie subwatersheds that lack an adequate structure and organization framework to undertake watershed management planning?</p>	<p>Pennsylvania subwatersheds have adequate structure and organizational frameworks, both governmental and nongovernmental, to address the size and scope of watershed management planning.</p>	<p>There are Conservation Authorities on the Ontario side of Lake Erie. The organization structure and framework are in place, but the funding is not.</p>	<p>In the Blanchard River watershed, this is not a problem, as long as, the coordinator position is being funded. Most of the SWCDs don't have enough personal to do the plans. The Auglaize watershed has never had a watershed coordinator and may be a watershed that needs to have help.</p>

<p>Do we have the necessary structures and organizations in place to implement watershed management plans once they have been developed? How do we ensure we have the necessary entities in place to implement watershed plans?</p>	<p>Pennsylvania subwatersheds have adequate structure, organizational framework, and delivery mechanisms to address the size and scope of watershed management planning implementation.</p>	<p>Again, with Conservation Authorities (CAs), we have the right organizations in place to implement plans in Ontario. Many CAs have stewardship programs in place that are scaled to match existing implementation funds. Additional funds would require scaling up program delivery resources, but the foundation is in place to do so. This would allow for addressing the nutrient loading from rural land uses. Additional resources would be required to address efforts to optimize performance of wastewater treatment facilities, if this is a local priority.</p>	<p>In the Blanchard River watershed, this is not a problem, as long as, the coordinator position is being funded. Most of the SWCDs don't have enough personal to do the plans. The Auglaize watershed has never had a watershed coordinator and may be a watershed that needs to have help.</p>
<p>How do we ensure the monitoring, collection and reporting of data is consistent between the US and Canada and across jurisdictions? What specific water quality parameter(s) need to be consistently monitored? What types of performance measures are needed, that are similar on both sides of the border, to measure progress towards achieving lakewide targets?</p>	<p>The GLWQA Annex 4 Subcommittee, Tributary Monitoring Task Team has identified the scope and frequency of all current monitoring activities on tributaries across the basin. Additionally, the analysis parameter suite identified in the Heidelberg Protocol is being standardized for all major priority nearshore tributaries. A derivation of that method should be tailored to smaller tributaries to allow for proper characterization of nutrient loading while considering effort and cost.</p>	<p>The water quality monitoring that is done in watersheds is in response to the issues identified by local water managers within the watershed. Given the overarching need to understand and report on phosphorus loadings to Lake Erie to achieve the binational target for load reductions, then it is suggested that annual phosphorus load monitoring be the common measure (or performance measure) that is promoted across all jurisdictions through a collaborative effort. As mentioned above, standard protocols and methods should be developed by lead agencies – US and Canada. The lack of monitoring data should not preclude efforts to implement no-regrets actions including rural best management practices (e.g. no winter manure spreading, planting of cover crops over winter, etc.)</p>	<p>Based on the name of this committee, Watershed Management of Nutrients in Lake Erie, the specific water quality parameters would focus on the amount of sediment, phosphorus (both TP and DRP) and nitrogen being loaded into Lake Erie. A mutual agreed plan for monitoring, collection and reported of data would need to be developed between Canada and the US. Performance goal(s) should be a part of the plan for each country.</p>

<p>How can we tie the actions taken at a local, upstream level to the impacts in Lake Erie?</p>	<p>Lake Erie's response to nutrient reductions will take a concerted effort over many years, and improvements in Western Basin algae and Central Basin hypoxia/anoxia may be slow to occur depending on a variety of factors. It's important to set short, medium, and long-term reduction goals and highlight the actions that contribute to meeting goals within the tributaries until the improvements manifest in Lake Erie.</p>	<p>Multi-scaled effort, patience and managing expectations are needed! Specific/individual upstream actions are likely difficult to correlate to effects in Lake Erie, however, maintaining a watershed 'ethic' of best practices and a commitment to continuous improvement is needed at the local levels to facilitate long-term change in measurable conditions in Lake Erie. Therefore, support for watershed-based collaboration is fundamental to achieving watershed and Lake Erie goals.</p>	<p>Lake Erie has a retention/replacement time of 2.6 years. This time is even less for the Western Lake Erie Basin (WLEB). If there was no additional loading into the lake, the nutrient problem would disappear after 3 years. So, it is evident that the problems in the lake will continue to occur, as long as, there are loadings from the watersheds in the WLEB that empty into the lake. The action(s) taken at the local level are a direct effect on the algal bloom in Lake Erie.</p>
<p>How can we ensure there is sustained, adequate funding for the watershed management planning to manage nutrients? How can we ensure there is sustained, adequate funding for the implementation of those plans? How can we ensure there is sustained, adequate funding for water quality monitoring to support planning and progress-tracking?</p>	<p>The current US model for managing nutrients in each state jurisdiction is a mixture of federal and state funds directed through various agencies and programs. Due to myriad agencies and programs on the state level, the delivery mechanisms generally are dependent on state law and governance organization. The funding sources, both state and federal, are continuously subject to appropriations and priorities of the individual funding programs. The US and Canadian governments should look to innovative methods for future funding of projects and programs. The GLRI currently is authorized at \$300 million per year, but instead of appropriating on an annual basis with all of the inefficiencies of riding the appropriations rollercoaster (program start/stop, inability to long-term plan), three annual one-time installments of \$2 billion could be made into an endowment</p>	<p>The conservation authority model provides some good insight into establishing equitable cost sharing for watershed water management. In Ontario, costs are levied to municipalities on the basis of assessed property values. This model creates a sharing of costs between those who benefit from watershed management. Given the scale of Lake Erie, and the benefit it creates at a provincial, state or national level, it seems appropriate to share costs among these senior levels of government.</p>	<p>Means funding watershed management planning will depend on ideas and policies in each state and in Ontario. One question that should be asked in any funding is, "How can we ensure the money is being used in the most efficient manner?" For example, I know one group that charges twice the amount for doing the same BMP as another group. One charging more is a federal group and may have more hoops to jump through. Let's eliminate the unnecessary hoops. Flexibility in a grant implementation will allow the grantee use the BMPs that would serve their watershed the best. Thus, all the grant money will be used more efficiently. Funding for the programs will vary from area to area. I know that Canada uses a \$10 per real estate transfer. Assessing each parcel in a watershed could be another method. An added tax on any activity using Lake Erie or a waterway</p>

	that would fund activities in perpetuity through interest and dividends. An investment of this size would assure that the most difficult Areas of Concerns have the long-term funding security necessary to complete restoration actions, but it would also give assurance to Lake Erie nutrient reduction activities. This endowment concept also could be down-scaled to address individual GLRI programs or need areas that require fiscal assurance such as addressing AOCs, long-term monitoring and assessment, etc.		could be considered.
Are there examples of innovative funding mechanisms that could be used as a model?	The model of an endowment for Great Lakes environmental funding can be seen in the Great Lakes Protection Fund, which could be an important partner or advisor in the creation of an investment fund. There are many successful endowments and funds across the United States that could serve as models.	Collective Impact is currently being supported by the Ontario Trillium Foundation. This agency may be able to provide information on how they have approached supporting collaborative initiatives.	I am not aware of any.
What are the best mechanisms for sharing and communicating information about nutrients in Lake Erie within the watershed management and implementation community?	Internet clearinghouses, GIS tool and data accessibility and ease of use, existing Annex 4 governance structures, Lake Erie LAMP Partnership, creation of a reporting and tracking protocol and format.	Rolling up the reporting of actions can be done (and is done somewhat) through the Lake Erie LAMP. The oversight bodies can also post monitoring results and track progress.	Posting information on an internet site that interested parties can join. The site will list information day that a party can download and read. A great example of this is the Great Lakes Information Network (GLIN). The web address is, http://www.great-lakes.net/news/ . Each day I get an email that allows me to go to the page and check out the articles and information. Having a Facebook group page would be another possibility. Any interest party could join the group and any post would show up on their page.

How can we better share and communicate First Nations', Tribes' and Métis' traditional ecological knowledge?	Pennsylvania currently does not have any federally-recognized tribes within the Commonwealth's Great Lakes basin.	Invite them to the (sub) watershed / local table and work hard to keep their engagement and input. This will take time to build trust.	This is a Canada issue that I don't feel I can respond to due to lack of knowledge.
What two or three pieces of advice or priorities would you communicate to the Commission regarding how the US and Canada can work together in reducing nutrient loading to Lake Erie using watershed management as a tool?	<ol style="list-style-type: none"> 1. Monitor the priority nearshore tributaries for flow and chemical parameters as identified through the Annex 4 Subcommittee so that the same methodology is used in the U.S. and Canada for sampling and analysis. The employment of the Heidelberg method of flow-weighted mean concentration development and monitoring currently is underway on all major priority nearshore tributaries. 2. Development of a tool that incorporates tributary nutrient loading modeling and integrates inlake nutrient processing in a way that identifies implementation and reduction priorities on the tributary sub-watershed level. This would identify those subwatersheds that are hot-spots where the jurisdictions would get the most "bang-for-their-buck." 3. Create a common and easy-to-use tracking and reporting structure that can account for nutrient reduction BMP implementation. Identify a third-party (other than the federal or state governments) that has the responsibility to coordinate data collection, tracking, and reporting. 	<ol style="list-style-type: none"> 1. The IJC should communicate the vision of what is needed for Lake Erie and specific calls to action from bi-national partners and their partners. A specific call to action could be that all water managers start to monitor phosphorus going into Lake Erie. 2. Water quality problems are a clear product of activity on the land. Watersheds are the most appropriate scale for managing water quality challenges. 3. Although establishing monitoring programs and modelling are important for dealing with the water quality problems in Lake Erie, there is a need to initiate support locally-driven action in the watersheds now. 	Watershed coordinators play a vital role and should be funded. Their work is done behind the scenes.

