

Expectations for Domestic Action Plans under the Great Lakes Water Quality Agreement

Alliance for the Great Lakes, Canadian Freshwater Alliance, Environmental Defence Canada, Freshwater Future, Michigan League of Conservation Voters, National Wildlife Federation, and the Ohio Environmental Council.

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Purpose

Seven regional and national organizations from Canada and the United States working in the Lake Erie basin have participated in the development of this document. These groups are the Alliance for the Great Lakes, Canadian Freshwater Alliance, Environmental Defence Canada, Freshwater Future, Michigan League of Conservation Voters, National Wildlife Federation, and the Ohio Environmental Council.

Annex 4 of the Great Lakes Water Quality Agreement calls for binational coordination to manage nutrient concentration and loadings into the Great Lakes. In 2015, the Governments of the United States and Canada (the “Parties” to the Agreement) adopted the ecosystem and substance objectives (the “targets”) for Lake Erie. The Agreement calls on the Parties to define programs and other measures to be undertaken to achieve the nutrient targets. The Parties indicated they intend to cooperate with the jurisdictions in the Lake Erie basin to develop Domestic Action Plans (DAPs) to identify programs and measures to achieve the targets. The purpose of this document is to recommend actions that the aforementioned organizations believe should be included in the forthcoming DAPs that will be developed to achieve the targets.

This document articulates our expectations for the content in the DAPs to the Parties and to participating jurisdictions. This document will serve as a tool for the author organizations to evaluate the draft DAPs as they are released, and to communicate with Lake Erie stakeholders about the actions and investments needed for a clean, restored Lake Erie. The Parties have indicated they expect the DAPs to be “living documents”, to be adjusted and elaborated over time as more information and resources are brought to bear on the issue of harmful and nuisance algal blooms in Lake Erie. Similarly, we anticipate revising this document to address the needed programs and measures to restore Lake Erie as implementation moves forward and more is learned about gaps, options and opportunities.

Introduction

The Great Lakes are a continental and global treasure – their waters sustain millions of people, thousands of communities, a vibrant economy and a truly remarkable ecosystem. Harmful and nuisance algal blooms caused by excess nutrient runoff are among the top threats to the Great Lakes, posing risks to drinking water supplies, quality of life and economic vitality. Nowhere is this more obvious than in the Lake Erie basin, where nearly half a million Americans in the surrounding Toledo, Ohio area went without drinking water for three days, and hundreds of Canadians on Pelee Island went without potable water for nearly two weeks. In addition, recurring algal blooms have negative impacts on tourism and travel, which generates more than \$12.9 billion in annual economic impact in Ohio alone and sustains more than 120,000 jobs. In addition, the commercial fishery on Lake Erie, which accounts for about 80% of the total value of the province of Ontario’s \$234 million Great Lakes commercial fishery, could be hit especially hard since it relies heavily on species that are vulnerable to the effects of algal blooms.

Canadian and U.S. federal, provincial and state governments have committed to managing phosphorus concentrations and loadings in Lake Erie as a means of reducing algal growth. Phosphorus loading targets for western and central Lake Erie have been adopted under Annex 4 of the Great Lakes Water Quality Agreement of 2012 and under the 2015 Western Basin of Lake Erie Collaborative Agreement signed by

the governors of Ohio, Michigan and the premier of the Province of Ontario. This document provides information on the content we expect to see in the DAPs to be developed and adopted by the Parties to meet the obligations under the Great Lakes Water Quality Agreement. We understand the DAPs to be the defining documents for outlining the actions to be taken to meet the loading reduction targets¹.

The author organizations gratefully acknowledge the outline provided by U.S.EPA, *Common Elements for U.S. DAPs* (September 16, 2015). The outline covers a broad range of topics and includes recognition of the need for inclusion of items such as triggers for adaptive management, new policies and programs (both within and outside of existing authority), and accountability mechanisms that include timelines, benchmarks and reporting. Additionally, Susan Humphrey, Annex 4 Co-Lead (Canada) presented a similar outline at the June, 2016 Great Lakes Executive Committee meeting. This document builds on these outlines and includes recommendations and narrative to provide more context and specificity.

The re-emergence of harmful and nuisance algal blooms in Lake Erie is a stark reminder of the need for ongoing vigilance and steadfast commitment to the protection and conservation of the Great Lakes. Despite decades of effort and progress by local, state, provincial and federal governments – and a network of non-government organizations (NGOs) – our actions have failed to keep pace with major sources of pollution such as stormwater and agricultural runoff. While we expect the DAPs to demonstrate how existing actions will be scaled up and out across the basin, more of the same is unlikely to address the problem. DAPs must also include new and innovative approaches and policies, especially in light of the increasing challenges that are expected in a future of unpredictable climate change. Without such a comprehensive approach, decades of work to revitalize the economy, environment and quality of life in the Great Lakes region are at risk.

The DAPs can be an important catalyst for actions that enhance resilience and capacity to protect Great Lakes waters. As harmful algal blooms and other water quality issues become increasingly common and severe around the world, there is a unique opportunity in the Lake Erie watershed to demonstrate leadership on sustainable land use management practices, particularly in the agricultural sector. Transforming the way cities are built and land is farmed is not just needed in priority watersheds or the western Lake Erie basin. The DAPs can demonstrate how to encourage change across all landscapes, and how doing so can address multiple water quality issues and advance sustainable economic development.

The author organizations appreciate that the DAPs must account for varying amounts and quality of data and information, and different legal and policy frameworks in each of the Lake Erie jurisdictions. While many of the actions and policies required will need to be implemented at a local scale, the DAPs are an opportunity to provide guidance for needed actions, and to encourage consistency in measuring progress, across the entire Lake Erie basin.

To accomplish the reductions called for in the Annex 4 targets, the following eight components are required to be included in the DAPs. Though this is not an exhaustive list of all possible actions to address phosphorus loading, these recommendations provide a framework for collective action critical to move toward solving the nutrient-related problems facing Lake Erie.

¹ Note: U.S. jurisdictions have also included actions in the plans they submitted under the requirements of the 2015 Western Basin

Monitoring and Modeling

A. Monitoring

An integrated monitoring network across all jurisdictions in the Lake Erie basin will be necessary to assess progress towards improved water quality and ecosystem outcomes. An integrated network should apply accepted protocols for data collection and analysis and allow for comparisons across the Lake Erie basin. An integrated network is necessary to not only support ongoing measurement of progress towards compliance with the adopted targets, but also to provide sufficient information to support an adaptive management approach. Therefore, jurisdictions should seek to establish a robust monitoring network that is capable of tracking change in water quality in the watersheds draining to Lake Erie, as well as monitoring ecosystem change in the lake itself.

The recently released report and associated addendum from the Northeast-Midwest Institute (Betanzo, et al., 2015) provides an in-depth analysis of the gaps and needs for water data in the Maumee River basin. The report addresses the monitoring and information necessary to answer the question: How effective are management practices at reducing nutrients from nonpoint sources at the watershed scale in the Lake Erie drainage basin? The Parties and the jurisdictions must have scientifically credible data to answer this question, and to inform and guide policy solutions in order to fully implement the adaptive management approach called for in the adopted targets for Lake Erie. The report identifies critical monitoring recommendations for scale, sampling frequency and duration, monitoring parameters as well as data documentation and sharing.

Two other reports also identify limitations of current monitoring programs. The 2014 report by the International Joint Commission, *A Balanced Diet for Lake Erie, Reducing Phosphorus Loadings and Harmful Algal Blooms*, identified data gaps in monitoring networks across the Lake Erie basin. And in 2009, Conservation Ontario published *An Evaluation of Water Resource Monitoring Efforts in Support of Agricultural Stewardship in Watersheds of the Great Lakes Basin*, identifying the need for more coordinated and targeted water resource monitoring.

While these two reports do not include the level of detail in the Northeast-Midwest Institute report, they do highlight the need to address monitoring design scale and frequency (including seasonal temporal scales) in the jurisdictions in the Lake Erie basin.

Limitations of current monitoring networks highlight the need for all jurisdictions to undertake an assessment of current monitoring capabilities and identify gaps in order to align water quality monitoring with the adopted targets to meet the ecosystem objectives called for in the Agreement. This analysis should inform the commitments by the jurisdictions to update monitoring networks that will be used to monitor water quality conditions and track progress towards the target reductions. In addition, the assessments should address the extent to which common and accepted protocols for data collection and analysis are currently in effect and where adjustments and additions may be needed.

The DAPs should include a summary of the assessment of monitoring capabilities and gaps described above. Specifically, the DAPs should include the plans and commitments to address any shortfalls, incorporating the recommendations from the Northeast-Midwest Institute report and addendum (Betanzo, et al., 2015). The DAPs should include a description of the monitoring networks that will be implemented and are capable of supporting the data necessary to identify water quality and ecosystem trends and guide program investments.

The DAPs need to present monitoring network information by jurisdiction (i.e., states and province) as well as an overview for each respective country, which will facilitate an integrated network across jurisdictions. Clear information on how monitoring and modeling programs work together will enable consistent reporting on progress and trends, and will simplify reporting to the stakeholders and to the public. Consistent, reliable information will streamline assessing progress toward improved water quality, making strategic conservation and restoration investments.

The adopted targets for Lake Erie identify the top tributaries (i.e. priority watersheds) critical to nutrient loading to the Lake. Monitoring at the tributary mouths needs to be comparable across jurisdictions. Monitoring at these tributaries should include annual *and* spring loading data on total phosphorus, soluble reactive phosphorus and suspended sediments. Data collection should be sufficient to calculate flow weighted mean concentrations to enable comparisons of loadings in a consistent manner across the different river basins in the Lake Erie basin. An expansion of data collection on the Detroit River will also be necessary to refine information on Detroit River loads.

Lake Erie Targets

The targets adopted by the Parties to meet the goals of the Great Lakes Water Quality Agreement are based on the best available monitoring and modeling data. These targets are intended to meet the ecosystem objectives in the Agreement including:

- Large harmful algal blooms in the western basin;
- Nearshore algal blooms associated with 8 priority tributaries;
- Hypoxic conditions in the central basin; and
- Nuisance algae (while there is insufficient information to establish a target for *Cladophora* fouling the eastern basin, scientists believe that phosphorus reductions in the western and central basins will have a beneficial effect in the eastern basin.

The phosphorus targets for Lake Erie make a distinction between spring and annual loading depending on the ecosystem objective of the target. While the targets for both spring and annual loading call for a 40% reduction, the distinction is important in establishing the monitoring regimes necessary to measure and track progress towards meeting the nutrient reduction goals.

The *spring* phosphorus targets are linked to the ecosystem objectives of both the large harmful algal blooms in the western basin (solely for the Maumee River basin) and the smaller, nearshore blooms in eight priority tributaries. The target for a 40% reduction in *spring* loading applies to dissolved reactive and total phosphorus.

The *annual* phosphorus target is linked to the ecosystem objective of reducing the hypoxic area (low oxygen) in the central basin. This also calls for a 40% reduction target and this target applies to all tributaries around the basin draining to the western and central basins and is specific to total phosphorus. The numeric annual target to meet this goal is 6000 metric tons (the recommended limit for the central basin). A 40% reduction amounts to a reduction from the United States and Canada of 3,316 metric tons and 212 metric tons, respectively.

The total phosphorus loads for the major tributaries to Lake Erie have been identified for the 2008 water year (October 1, 2007 to September 30, 2008). We recommend that subwatershed allocations be

established for the eight priority tributaries identified in the *Recommended Phosphorus Loading Targets for Lake Erie* final report based on the 2008 loads (excluding the Leamington tributaries).

This report recommends subwatershed allocations be made for all HUC 12 or HUC 10 watersheds within the priority tributaries. The scale for subwatershed allocations (HUC 12 or 10) should be consistent across the jurisdictions. This framework provides the basis for establishing “sub-target” reductions to achieve for each of the HUC geographic areas. Targets for subwatershed allocations will serve to focus local and regional nutrient reduction efforts. This approach facilitates a sense of shared responsibility toward meeting the broader goal while providing a narrower focus for ownership of a smaller “piece of the pie”.

This report recommends subwatershed allocations be made for all HUC 12 or HUC 10 watersheds within the priority tributaries.

The sub-allocations will provide a framework whereby the progress on implementation can be tracked and reported within jurisdictions. Understanding where reductions are being achieved (or not being achieved) at the subwatershed level will be fundamental to taking swift action in areas lacking demonstrable progress.

In addition, a framework based on sub-allocations for the major tributaries will allow jurisdictions and stakeholders to measure, report and verify effectiveness of phosphorus reduction programs.

Such a process would include identifying nutrient pollution sources by category, utilizing emerging technologies such as phosphorus fingerprinting, and quantifying the amount of reduction from each source necessary to meet the allocated targets (at subwatershed scale). It would also help define the priorities within each subwatershed to meet its allocated targets.

The subwatershed framework should serve as the mechanism to support source identification and allocation, track implementation of best management practices (BMPs) and assess BMP effectiveness.

Monitoring is at the heart of demonstrating success and as such related data and the synthesis of results should be publicly available and communicated in a manner easily understood by the public. The DAPs should specify how monitoring results from each jurisdiction will be made available in a manner that is transparent and publicly accessible.

The Northeast-Midwest Institute report identifies data sharing and accessibility as critical issues and calls for a coordinating entity to facilitate collaboration among monitoring agencies and organizations. Towards this end, the DAPs should identify such an entity to facilitate more efficient and consistent data sharing while acknowledging there may be limits with data collection not conducted or sponsored by public entities.

B. Open Lake Modeling

The sensitivity of Lake Erie to environmental change makes it necessary to monitor and model ecosystem condition and ecological responses on a periodic, regular cycle. The Parties and the jurisdictions have embraced an adaptive management approach to meet the targets; monitoring and modeling of ecosystem conditions and responses will be necessary to fully understand the ramifications of implementation investments. These analyses are also needed to capture other changes to the system including the impacts of invasive species, climate change and land use change.

The development of the targets for Lake Erie was based on a suite of nine models to quantify phosphorus loads and eutrophication response relationships for the Lake Erie ecosystem. The authors of this report support the recommendations in the *Recommended Phosphorus Loading Targets for Lake Erie* final report that these models be applied every five years and synchronized with the data collection efforts during the Coordinated Science and Monitoring Initiative (CSMI). The CSMI is a bi-national initiative that brings together over 150 federal, state, academic, and non-governmental institutions to coordinate intensive sampling on a single Great Lake every year on a five-year cycle.

The *Recommended Phosphorus Loading Targets for Lake Erie* report also recommends two additional open water modeling initiatives critical to understanding nutrient impacts on Lake Erie. These are: 1) modeling to determine the nearshore nutrient concentration interactions and quantifying the ecological response relationships; and, open water modeling for *Cladophora* in the eastern basin. We support these recommendations.

C. Tributary Modeling

Tributary modeling can be an invaluable tool for understanding phosphorus loss into surface water and its transport and delivery into the lake. In spring, 2016, the results from three separate modeling projects were announced, all yielding important insights about nutrient losses and need for conservation practices in the Maumee River basin. The three projects include:

- Western Lake Erie Conservation Effects Assessment Project (CEAP) – Cropland; conducted by USDA-ARS using detailed input data to model impacts of conservation practice adoption strategies at the edge of agricultural fields;
- Maumee Watershed Multi-Model; convened by the University of Michigan using six models to forecast likely changes in TP and DRP loads under potential conservation scenarios; and
- Western Lake Erie CEAP – Wildlife; conducted by The Nature Conservancy in partnership with USDA – ARS to estimate impacts of potential impacts of conservation practices on stream health (as indicated by biological indices).

Together, these modeling efforts provide invaluable information about the scope of conservation practices that will be necessary to meet phosphorus reduction targets. Going forward, additional data, particularly the edge-of-field projects underway in Ohio, will provide more detailed data and information for model input that will further refine the ability to simulate land management practices and water quality impacts.

The DAPs should include commitments to continuing investments in simulations of agricultural conservation scenarios. As more data becomes available, future applications of watershed-based modeling will be crucial to understanding where and how land management practices need to change to ensure meeting targets. While most modeling efforts to date have focused primarily on the Maumee River basin, comparable efforts need to be applied to other high phosphorus loading streams to Lake Erie. In particular, streams in the Province of Ontario should seek the data collection and model capability within its jurisdiction to apply these or similar models.

Monitoring and Modeling Recommendation Summary

- Undertake an assessment of current monitoring capabilities and identify the gaps to align water quality monitoring with the adopted targets to meet the ecosystem objectives called for in the Agreement.
- DAPs should include the plans and commitments to address any shortfalls, incorporating the recommendations from the Northeast-Midwest Institute report and addendum (Betanzo, et al., 2015).
- DAPs should include a description of the monitoring networks that will be implemented, making sure the networks are capable of supporting the data necessary to identify water quality and ecosystem trends and guide program investments.
- DAPs need to present monitoring network information by jurisdiction as well as an overview for each respective country.
- Tributary monitoring at the mouths should include annual *and* spring loading data that includes total phosphorus, soluble reactive phosphorus and suspended sediments. Data collection should be sufficient to calculate flow weighted mean concentrations to enable comparisons of loadings in a consistent approach across the different river basins in the Lake Erie basin.
- Data collection on the Detroit River should be expanded to refine information on its loads.

Monitoring and Modeling Recommendation Summary continued

- Subwatershed allocations should be established for the eight priority tributaries based on the 2008 loads (excluding the Leamington tributaries) utilize the subwatershed framework to support source identification and allocation, track BMP implementation¹ and assess BMP effectiveness (BMP tracking is discussed in the section on Tracking and Reporting).
- DAPs should identify a coordinating entity to facilitate collaboration among monitoring agencies and organizations. DAPs should specify how monitoring results from each jurisdiction will be made available in a manner that is transparent and publicly accessible coordinating entity.
- DAPs should incorporate commitments to the recommendations in the *Recommended Phosphorus Loading Targets for Lake Erie* final report that the models utilized to develop the targets be applied every five years and synchronized with the data collection efforts during the Coordinated Science and Monitoring Initiative (CSMI).
- DAPs should include commitments to continuing investments in simulations of agricultural conservation scenarios.

Tracking, Adaptive Management and Reporting

A. Tracking

The DAPs should describe how jurisdictions will track actions implemented to reduce phosphorus loading in the lake and subwatersheds. Reductions from all phosphorus sources should be tracked including (but not limited to) improvements to home sewage treatment systems, lowering allowable effluent discharge limits, projects to reduce combined sewer overflows and implementation of agricultural best management practices so that adoption rates can inform the adaptive management process. The Great Lakes Commission's Blue Accounting system has potential to assist in the aggregation and analysis of data to help account for data from these phosphorus sources and track progress towards nutrient reduction goals.

Tracking nutrient loading at the tributary mouths into Lake Erie will not be sufficient to determine the efficacy of programs and policies. Information and data on land management actions across the landscape is needed to understand and evaluate the scale and effectiveness of land-based implementation investments. There are many limitations to tracking management practices in agricultural landscapes in

both the U.S. and Canada. However, this information will be critical to understanding changes on the landscape and the resulting effects on nutrient loading to Lake Erie. An adaptive management approach needs to rely on data and information on land *and* water to ensure program delivery that is efficient and effective. Scientists and policymakers alike will need this information to understand year-to-year changes in loadings and resulting algal blooms in the western basin and nearshore areas. This information is also critical to guide ongoing investments for watershed-scale change.

The Ohio Lake Erie Phosphorus Task Force (August 2013) acknowledged this need and identified several opportunities to track the installation/implementation of land management practices. The Task Force concluded that information needs could be while also meeting the needs of the agricultural sector, who are concerned with maintaining information privacy. A similar analysis needs to be conducted to identify tracking options in Ontario. For both Parties, specific mechanisms need to be identified and implemented. The DAPs need to define by jurisdiction what methods will be employed to track BMP installation.

Tracking of BMP installation will be absolutely critical for policy makers and land managers to understand the extent of nutrient management practices across the landscape, the rate of adoption of practices and sustainability over time. This information will be necessary to determine if the investments being made, both public and private, need to be adjusted and in what ways. Governments cannot know how to manage adaptively without the information to understand the actions that have been taken.

Our organizations recommend establishing BMP tracking that will include practices supported through state, provincial and federal assistance programs. Additionally, the Parties should initiate a program that utilizes third party data collection to inventory the significant number of BMPs that farmers have installed without technical or financial assistance from the public sector. A comprehensive accounting of practices needs to accurately reflect all conservation efforts in order to understand what drives water quality change. The Maryland Department of Agriculture Nutrient Management Program² may provide useful insight for this type of tracking and accounting.

In addition to tracking BMP utilization, the author organizations recommend the jurisdictions establish an independent auditing program of BMPs that evaluates installation and functioning. A BMP audit program will serve to verify properly functioning practices that can be evaluated against water quality benefits. Independent audits will ensure taxpayer supported practices are used wisely and increase public confidence for implementation efforts. It will also ensure efforts to monitor BMP benefits are accurate and not undermined by poorly functioning equipment or lack of maintenance.

B. Adaptive Management

The promise of an adaptive management approach is that if something is not working - if actions are not achieving the desired effect - those actions will be adjusted. DAPs should identify specific “trigger” mechanisms that will initiate evaluation and modification of programs and actions based on results and new information. As one example, the DAPs should identify and commit to a 5-year review of the results of nutrient loading at the tributary mouths and a periodic review of the subwatershed allocations. Lack of

² http://mda.maryland.gov/resource_conservation/Pages/farmer_information.aspx

progress toward nutrient reduction goals should prompt a review of the implementation approaches, management practice effectiveness and consideration of new priority areas. One approach to a trigger mechanism might be to track BMP implementation and if a certain adoption is not achieved by a certain time, a change in our approach may be needed.

Furthermore, the Western Basin of Lake Erie Collaborative Agreement establishes a 20% reduction interim target for 2020. The DAPs should include a commitment by the participating jurisdictions to that Agreement and an evaluation of existing policies and programs triggered should the 20% reduction not be realized. Finally, the U.S. EPA should include a specific trigger to apply the authority of the Clean Water Act if after five years of DAP implementation monitoring results indicate western basin load reductions will not achieve the 40% target by 2025. This would include developing a Total Maximum Daily Load (TMDL) for the western basin that applies to the whole watershed, along with a tri-state (Indiana, Michigan, Indiana) watershed implementation plan that would restore beneficial uses for assessment units already designated as impaired on state 303(d) lists. Such a TMDL could be developed from the western Lake Erie basin targets and the watershed sub-allocations called for in this report. We recognize the Clean Water Act does not apply in Canada, however, the U.S. EPA can work with the provincial and federal governments to establish an appropriate target and action plan. There could be appropriate authority to do so under Ontario's Great Lakes Protection Act.

C. Reporting

To ensure plans and proposals will be implemented the DAPs need to include:

- Timelines for accomplishing tasks with clearly identified milestones;
- Clear roles and responsibilities for the multitude of agencies and partners involved in implementation;
- Measures of success - quantifiable ways of tracking progress; and
- Funding needs and potential funding sources.

Communicating progress and providing publicly available results is paramount for demonstrating success and recognizing areas for further improvement. An effective reporting process that incorporates relevant data and information from the jurisdictions and other partners will be crucial for tracking progress. The DAPs should include commitments and a plan for annual reports that detail the status of Domestic Action Plan implementation and progress toward reaching the targets. Such reports would have sections dedicated to each goal, objective, tactic as well as adherence to timelines and benchmarks. Within these sections the annual report should summarize monitoring results and include load reductions achieved in each subwatershed and in each lake basin. It should also detail progress implementing best management practices necessary to achieve target load reductions, and the level of success administering programs and policies. Finally, the report should discuss how the annual results align with the adaptive management framework, including a review of recent advancements in our understanding of the problems and solutions and their implications for the DAPs. There should also be an evaluation of how close we are to trigger points.

As monitoring programs and implementation actions are underway, the DAPs should identify a process to maintain an ongoing list of gaps in knowledge and science (including monitoring and modeling) that need to be addressed to direct future actions. Priorities should be identified and plans be developed to address these gaps. Our ability to address harmful and nuisance algal blooms in Lake Erie will require ongoing improvements in our understanding of land management and the impact on water resources. Ongoing science, monitoring and research will be necessary to inform which policies will move us toward meeting our phosphorus reduction targets.

Tracking, Adaptive Management and Reporting Recommendation Summary

- Track nutrient reductions from all sources.
- Identify and implement tracking mechanism(s) for a comprehensive accounting of all BMP installation funded by both public sector programs and private, independent sources.
- Establish an independent auditing program of BMPs that evaluates installation and proper functioning.
- DAPs should identify specific trigger mechanisms that will initiate evaluation and modification of programs and actions based on monitoring results and new information.
- The DAPs should identify and commit to a trigger mechanism that includes a periodic review of the results of nutrient loading at the tributary mouths and the subwatershed allocations.
- The U.S. DAPs should include a trigger that utilizes the Clean Water Act authorities, including development of a western Lake Erie basin TMDL and a tri-state watershed implementation plan should monitoring indicate the western basin target reduction will not be met by 2025.
- DAPs should include commitments and a plan for annual reports that detail the status of implementation and progress toward reaching the targets.
- DAPs need to include timelines, roles and responsibilities, measures of success and funding needs and funding sources.
- The DAPs should identify a process for maintaining an ongoing list of gaps in knowledge and science (including monitoring and modeling) that need to be addressed to direct future actions. Identify priorities and plans to address these gaps.

Eastern Basin of Lake Erie

The DAPs need to address the actions needed in the eastern Lake Erie basin to meet the ecosystem objective for the reduction of nuisance algae and the specific issues related to *Cladophora*. We appreciate that gaps in scientific understanding and inadequacy of available monitoring pose challenges in adopting a reduction target for the eastern basin, however ideally the draft targets would be released at the same time as the draft DAPs. If such timelines are not feasible, governments should be open and transparent about why. The DAPs should include the timelines for data collection, analysis and projected timeframe for establishing a target(s) for the eastern basin. If eastern basin targets are not set before the DAPs are released, the DAPs should be modified to incorporate action required to meet the eastern basin targets, where appropriate.

Funding

The DAPs should include a section detailing funding needs for each aspect of the plan and include a budget table outlining what resources are available and what resources are required to implement the actions identified in the plans. This would help demonstrate shortfalls under existing levels of funding. Additionally, this section should explain funding priorities and describe various scenarios that identify what actions and achievements are possible under different funding levels.

Among the top funding priorities, the author organizations recommend resources be made available to expand monitoring capacity and implement new programs, policies and authority. Jurisdictions should be investigating how to ensure ongoing funding is made available to support these programs at least until 2025. Such funding would support increases in each jurisdiction's technical capacity and support efforts to ensure compliance with plans and rules over the long term.

Ultimately, funding DAP implementation needs to go beyond supporting programs in priority watersheds, and transition into a comprehensive approach that will achieve holistic, sustainable agricultural practices across the region. A comprehensive approach will require an evaluation of all tools and approaches, whether they be voluntary or prescriptive through mandatory programs. Resources should be prioritized to account for current and new high nutrient loading areas and watersheds.

Funding Recommendation Summary

- DAPs should include a section detailing funding needs for each aspect of the plan and include a budget table outlining what resources are available and what resources are required to implement the actions identified in the plans.

Compliance and Enforcement

The DAPs should include commitments to ensure adequate compliance and enforcement of the programs and authority that will be applied to implementation of the Plan. Many programs rely on a complaint-based system by citizens for reporting suspected violations. These approaches often only apply to events after they have already polluted waterways, or when a neighbor actually witnesses a violation. Effective enforcement must utilize a proactive system that does not place the burden solely (or mostly) on citizen reporting. The author organizations recommend the DAPs specify how each jurisdiction will achieve the following:

- Establish fair, clear and consistently enforced consequences and penalties (i.e. fines, withdrawal of funding) for non-compliance with policies and plans.
- Dedicate adequate human and financial resources committed to support compliance monitoring and regulatory enforcement.
- Create an inspection program that will randomly assess compliance with plans, programs and rules targeted at key times when nutrient pollution risk is highest.

Tactics to Meet Nutrient Reduction Targets

The ability to reduce phosphorus entering the lake relies on the successful implementation efforts of each of the Lake Erie states and the province of Ontario. The core of any plan is the specific actions that define current and future steps to address both point and nonpoint sources. While there is variability of program and policy authority across the jurisdictions in the Lake Erie basin, the following describes top priority actions that should be undertaken that are essential for reaching nutrient reduction goals.

The DAPs should include specific information on measurable actions and timing for those actions by jurisdiction. The DAPs should also identify responsible entities for implementation. These details will ensure the plan establishes clear expectations and provides the necessary transparency to hold jurisdictions accountable for their implementation.

The focus on the watershed characterization of loads and call for specific programs, actions and delivery mechanisms with timelines and accountability metrics in the Objectives and Tactics sections in the USEPA Annex 4 Domestic Action Plan Outline (September 16, 2015) provide a useful framework for the inclusion of specific actions and authority. The Canadian plan should also include similar sections to add clarity and the requisite specificity necessary to ensure success. Such a framework aligns well with the recommendation earlier in this report for the jurisdictions to provide subwatershed allocations based upon a 40% reduction of the 2008 phosphorus loading identified for each of the major tributaries. Allocations by subwatershed, and associated source identification, will facilitate the ability to align the appropriate actions and authority to meet the allocated targets.

The DAPs should include a timeline to establish the framework and achieve load reductions within each subwatershed. Our organizations also recommend aligning specific tactics to address both point and nonpoint sources identified within each subwatershed proportionate to the amount of phosphorus contributing to the overall subwatershed load. In this manner the DAPs will appropriately address pollution sources both diffuse and discrete from urban areas as well as rural.

Section 5, titled “Tactics” of the US EPA outline document is reserved to detail how DAP implementation will occur and includes the evaluation of actions and programs both current and new to reduce nutrient pollution, as well as a section devoted to proposing necessary future tactics. These elements will be critical components of the DAPs. As noted above, there is wide variability in the programs and authority that exists across the jurisdictions, and the DAPs should include an inventory of these.

In addition, the DAPs should also include an analysis of program and policy gaps for those areas lacking in sufficient authority or funding to meet the reduction targets. Such an analysis should inform future tactics, specifically programs, processes or policy needs which may require new authority, funding, or other solutions beyond 12 months but within 36 months. Additionally, any new programs or policies should achieve both lake and subwatershed loading targets.

As stated, the DAPs must include specific tactics in proportion to the contributing sources.

Numerous studies and models show phosphorus from farm fields and livestock operations as the dominant source of western Lake Erie’s harmful algal bloom and the most significant contributor to total lake loads. Historically, the main approaches to reducing agricultural pollution have been through voluntary adoption of conservation practices, which thus far have been insufficient to reduce phosphorus loads to the levels necessary to address algal blooms in the lake. Recent actions within some jurisdictions have attempted to strengthen voluntary programs and implement new policies. However to effectively reduce agricultural pollution, broad scale application of best management practices will be necessary. As stated, the DAPs must include specific tactics in proportion to the contributing sources. Therefore it is understandable the plans will have some solutions to address loads from urban and residential areas, but the overall emphasis must be on achieving significant reductions from the agriculture sector.

Furthermore, though the Parties ultimately are responsible for drafting the DAPs and overseeing their implementation, this work is being completed through the Annex 4 subcommittee, which includes participation from Lake Erie states and the Province of Ontario. As such, it is both reasonable and necessary for the DAPs to include specific actions that take place at the jurisdictional level such as promulgating new regulations, or working to enact new laws. Therefore the author organizations recommend the following for future tactics that take place between 12-36 months:

- The states and province should establish new mechanisms that require agricultural producers to identify and implement best management practices that effectively reduce both total and dissolved reactive phosphorus runoff from field surfaces and tile drains.

- The states and province should develop regular uniform standardized soil test sampling, methods and reporting protocols to ensure test results are consistent throughout the Lake Erie watershed.
- The states and province should enact new, or revise current authority, to ensure nutrient applications adhere to appropriate agronomic rates.
- Policies should be enacted or revised that eliminate nutrient application on frozen, snow-covered, and saturated ground, or when the weather forecast calls for heavy precipitation. Not all jurisdictions currently have this requirement, or do with problematic exemptions.
- Where viable or necessary, policies and programs should incentivize land conversion to low phosphorus contributing uses such as switchgrass on marginal agricultural lands, wetland restoration and construction, wood lots, etc.
- The federal, state and provincial governments should promote green infrastructure solutions to reduce urban stormwater pollution by providing funding, regulatory direction and technical support to municipalities and urging the use of green infrastructure as an alternative to more expensive stormwater controls where feasible and appropriate.
- The states and province should provide funding for and direction to local governments to conduct inspections of home sewage treatment systems to identify those that are poorly maintained or failing.
- The states and province should adopt jurisdiction-wide uniform septic code and inspection requirements.
- The states should establish allowable average phosphorus effluent limits of 1 mg/L for publicly owned treatment works (POTW) (1 million gallons per day & up), and growing season (April through September) average phosphorus effluent limits of 0.6 mg/L.
- Conduct an analysis to understand relative contributions of nutrient loading from all sources (including but not limited to home sewage treatment systems, wastewater facilities, combined sewer overflows and nonpoint source agriculture) in the Lake Erie watershed on the Canadian side. That analysis should inform targeting of investments to achieve nutrient reductions in the most efficient and effective manner
- End the dumping of dredged sediments from harbors and river mouths into Lake Erie.

Our organizations acknowledge it is the responsibility of each jurisdiction to implement these policies or programs and the Parties have limited ability to ensure their adoption. However, inclusion in the DAPs demonstrates jurisdictional support, though not necessarily success in actual implementation of each item. As such we ask the Parties to identify specific tools available under federal authority to spur adoption of the specified jurisdictional policies and programs. For example, the U.S. EPA could withhold Great Lake Restoration Initiative funding should the states fail to make the requisite changes in law or policy. Doing so will ensure the DAPs are effective and offer clear direction for the jurisdictions.

Tactics to Meet Nutrient Reduction Targets Recommendation Summary

- The DAPs should include specific information on measurable actions and timing for those actions by jurisdiction with identification of responsible entities for implementation.
- The Canadian Domestic Action Plan should include sections specifying objectives and tactics similar to the USEPA Annex 4 Domestic Action Plan Outline (September 16, 2015).
- A wide variability of programs and authorities available to implement the DAPs exists across the jurisdictions, and the DAPs should include an inventory of the relevant authorities by jurisdiction (perhaps as an appendix).
- The DAPs should include an analysis of program and policy gaps for those areas lacking in sufficient authorities or funding to meet the reduction targets, and incorporate analysis results into future actions.

In the section devoted to future programs, policies, funding, etc. necessary to achieve target reductions, the DAPs should include the following direction for each jurisdiction in order to address both municipal and agricultural sources of phosphorus pollution:

- The states and province should establish new mechanisms that require agricultural producers to identify and implement best management practices that effectively reduce both total and dissolved reactive phosphorus runoff from field surfaces and tile drains.
- The states and province should develop uniform standardized soil test sampling, methods and reporting protocols to ensure test results are consistent throughout the Lake Erie watershed.
- The states and province should enact new, or revise current, authorities to ensure nutrient applications adhere to appropriate agronomic rates.
- Policies should be enacted or revised that eliminate nutrient application on frozen, snow-covered, and saturated ground, or when the weather forecast calls for heavy precipitation. Not all jurisdictions currently have this requirement, or do with problematic exemptions.

Tactics to Meet Nutrient Reduction Targets Recommendation Summary continued

- Where viable or necessary, policies and programs should incentivize land conversion to low phosphorus contributing uses such as switchgrass on marginal agricultural lands, wetland restoration and construction, wood lots, etc.
- The states and province should promote green infrastructure solutions to reduce urban stormwater pollution by providing funding, regulatory direction and technical support to municipalities and urging the use of green infrastructure as an alternative to more expensive stormwater controls where feasible and appropriate.
- The states and province should provide funding for and direction to local governments to conduct inspections of home sewage treatment systems to identify those that are poorly maintained or failing.
- The states should establish allowable average phosphorus effluent limits of 1 mg/L for publicly owned treatment works (POTW) (1 million gallons per day & up), and growing season (April through September) average phosphorus effluent limits of 0.6 mg/L.
- Conduct an analysis to understand relative contributions of nutrient loading from all sources (including but not limited to home sewage treatment systems, combined sewer overflows and nonpoint source agriculture) in the Lake Erie watershed on the Canadian side. That analysis should inform future investments to achieve nutrient reductions.

The Parties should identify specific tools available under federal authority to spur adoption of future jurisdictional programs and policies necessary to achieve target reductions. For example, the U.S. EPA could withhold Great Lake Restoration Initiative funding should the states fail to make the requisite changes in law or policy.

Public Consultation

The GLWQA 2012 contains many places where the Canadian and U.S. federal governments commit to “cooperation and consultation” with the public. The author organizations interpret this as a government commitment to meaningful engagement of the public throughout the development and implementation of all aspects of the Agreement.

In the development of the DAPs, the parties should ensure involvement of all Lake Erie stakeholders. The ultimate success of restoring and maintaining the Lake Erie ecosystem depends on the efforts of everyone. As such, the DAP writing team should ensure ongoing dialogue with a number of stakeholder groups throughout the writing process to help develop recommendations and implementation plans for the identified actions.

Unfortunately, there are a number of examples of inadequate public consultation processes to point to in the implementation of the GLWQA 2012. For instance, the public was not consulted on the Lake Superior Draft LAMP in 2015, until after the document was fully drafted. It is in the development stage that one can have most impact on direction and contents. When working together with stakeholders, governments are more likely to come up with creative and implementable solutions.

Governments should also consider how to create circumstances that will result in the most valuable input and ideas from stakeholders. For instance, it is difficult for stakeholders to understand how they could contribute to collecting data that could help decision making without understanding what data the government has and where gaps in understanding exist.

Public Consultation Summary

- Involve stakeholders at an earlier stage and continuously through the DAP writing process.
- Share information where gaps in science and monitoring exist so that stakeholders can be part of the process that defines ways of addressing the gaps.
- Host a public consultation period that is no shorter than 60 days once the DAPs are drafted. This should be accompanied by in person meetings in key communities across the basin.
- Respond to the public consultation comments received.
- Consider hosting biannual webinars through the implementation process to keep stakeholders apprised of progress.
- Host webinars to complement each written annual progress reports.

Conclusion

Our organizations provide this collective input to help guide creating successful Domestic Action Plans. Toward this end, several key components deserve emphasis: robust, detailed monitoring and modelling requirements; ongoing tracking and reporting that informs a clear adaptive management approach; adequate and consistent funding; proactive compliance and enforcement mechanisms; and specific tactics that extend beyond traditional approaches that have failed to date to solve the problem. The DAPs must also address Lake Erie's entire basin, including the eastern portion. Finally, the public needs to be part of the whole process - including the development of the plans through to implementation.

The success of these Domestic Action Plans is absolutely crucial, not only in order to help restore Lake Erie's water quality, but to serve the millions of Canadians and Americans that rely on a healthy Lake Erie for their drinking water, recreation, employment and overall wellbeing. Excessive nutrient loading and algal blooms are a direct threat to their quality of life and strong local economies. Fortunately, federal, state and provincial governments in the basin have made a number of commitments to reduce phosphorus loading to the lake, and our organizations support the spirit of these efforts.

We would like to thank the Annex 4 leads and team for the opportunity to submit this document. We look forward to working with the team throughout the development and implementation of the DAPs. We view this document as a discussion piece that can act as a starting point for further constructive dialogue.

References

Betanzo, E.A., Choquette, A.F., Reckhow, K.H., Hayes, L., Hagen, E.R., Argue, D.M., and Cangelosi, A.A., 2015, Water data to answer urgent water policy questions: Monitoring design, available data and filling data gaps for determining the effectiveness of agricultural management practices for reducing tributary nutrient loads to Lake Erie, Northeast-Midwest Institute Report, 169 p., <http://www.nemw.org>

Betanzo, E.A., Choquette, A.F., and Hayes, L., 2015, Water data to answer urgent water policy questions: Monitoring design, available data and filling data gaps for determining the effectiveness of agricultural management practices for reducing tributary nutrient loads to Lake Erie., Addendum describing new, expanded, and planned monitoring sites, Northeast-Midwest Institute, 27 p., <http://www.nemw.org>

International Joint Commission (2014). A Balanced Diet for Lake Erie: Reducing Phosphorus Loadings and Harmful Algal Blooms. Report of the Lake Erie Ecosystem Priority.

Annex 4 Objectives and Targets Task Team Final Report to the Nutrients Annex Subcommittee. May 11, 2015. Recommended Phosphorus Loading Targets.

Annex 4 Domestic Action Plan (DAP) Outline, Common Elements for U.S. DAPs, September 16, 2015.

Great Lakes Commission, September, 2015. A Joint Action Plan for Lake Erie. A report of the Great Lakes Commission Lake Erie Nutrient Targets Working Group.

Ohio Lake Erie Phosphorus Task Force II Final Report, August, 2015. Ohio Lake Erie Commission, Ohio Department of Agriculture, Ohio Department of Natural Resources, Ohio Environmental Protection Agency.

Conservation Ontario, 2009. An Evaluation of Water Resource Monitoring Efforts in Support of Agricultural Stewardship in Watersheds of the Great Lakes Basin.