PROGRESS REPORT OF THE PARTIES
NUTRIENTS ANNEX CHAPTER

OVERVIEW

Algal bloom image

Excessive nutrients entering the Great Lakes are one of the primary causes of the development of algal blooms, which can be harmful to human health and the environment. Of all the lakes, Lake Erie in particular has been experiencing increasing algal growth since the 1990s.

Through the Nutrients Annex of the 2012 GLWQA, Canada and the United States commit to coordinating binational actions to manage phosphorus concentrations and loadings in the Waters of the Great Lakes. The focus of the implementation of the commitments from the Nutrients Annex over the first three years is the completion of revised binational phosphorus reduction targets for Lake Erie and work with others to manage phosphorus concentrations and loadings in Lake Erie as a means of reducing excessive algal growth.

Water quality is in fair condition and is deteriorating. Trends in harmful and nuisance algae are worsening in nearshore areas and are impacting human and ecosystem health. Increasing water clarity is accelerating the proliferation of nuisance algae along some shorelines and signifies a lack of food for fish offshore. Low oxygen levels in the central Lake Erie basin are causing seasonal “dead zones” for aquatic life. Levels of many legacy chemicals are declining in offshore waters; however, while declining, levels in fish and waterbird eggs still exceed guidelines in some areas. Mercury levels in fish have been slowly increasing since 1990. New substances of concern are being detected in the environment.

Aquatic-dependent life is in fair condition and is deteriorating. No new non-native species have been detected in the lakes since 2006, but earlier invaders continue to impact the ecosystem. In some areas, native species are struggling to survive in an ecosystem where invasive species have altered the food web and habitats have been lost or degraded. Coastal wetland plant and animal communities are diminishing due to loss of habitat; however, protection and restoration of wetland habitats have begun.

The landscapes (and landscape-related natural processes) that influence the Great Lakes are in fair condition and are improving. Dams and other barriers continue to prevent fish access to spawning and nursery habitats, but access is improving through dam removals and riparian restoration. Some positive signs in watersheds include marginal increases in forest cover and better land management. Water levels in Lakes Superior, Huron and Michigan have been below average since the 1990s, and there are concerns that climate change will cause greater fluctuations and possibly lower water levels.

ACTIONS TAKEN TO MEET KEY COMMITMENTS

During the reporting period, binational and domestic actions were undertaken to address the following key commitments from the Agreement's Nutrients Annex.

KEY COMMITMENTS:

- By 2016, develop binational substance objectives for phosphorus concentrations, loading targets, and loading allocations for Lake Erie.
- By 2018, develop binational phosphorus reduction strategies and domestic action plans to meet the objectives for phosphorus concentrations and loading targets in Lake Erie.
- Assess, develop, and implement programs to reduce phosphorus loadings from urban, rural, industrial and agricultural sources. This will include proven best management practices, along with new approaches and technologies.
- Identify priority watersheds that contribute significantly to local algae development, and develop and implement management plans to achieve phosphorus load reduction targets and controls.
- Undertake and share research, monitoring and modeling necessary to establish, report on and assess the management of phosphorus and other nutrients and improve the understanding of relevant issues associated with nutrients and excessive algal blooms.

The Nutrients Annex Subcommittee developed the following 2014-2016 Priorities for Science and Action to focus binational efforts to address these commitments.

Binational Priorities for Science:	• Undertake science to support the establishment of phosphorus concentration objectives, loading targets and loading allocations. • Identify sources of phosphorus and priority watersheds for action. • Improve understanding of how aquatic invasive species, lake dynamics, climate change and other factors affect phosphorus concentrations and algae growth. • Improve monitoring techniques and approaches to enable tracking progress towards objectives.
Binational Priorities for Action:	• By 2016, update the 1987 offshore phosphorus concentration objectives for Lake Erie and develop new nearshore phosphorus concentration objectives. • By 2016, determine the phosphorus loading targets for Lake Erie, apportioned by country, required to achieve the above phosphorus objectives. • Assess the effectiveness of current programs and practices to manage phosphorus inputs to Lake Erie. • Develop and implement phosphorus reduction strategies and domestic action plans to ensure measures to manage phosphorus produce maximum results.

Binational Actions Taken

The primary action taken in support of these commitments was the establishment of revised binational phosphorus loading targets for Lake Erie. In the span of just three years, the US and Canada were able to work collaboratively and in consultation with stakeholders to conduct a comprehensive science-based assessment of the phosphorus reductions needed to meet Lake Ecosystem Objectives, and reach consensus on new phosphorus limits for the Lake. The Parties have agreed that significant reductions in phosphorus are needed to combat Western basin algal blooms and Central basin hypoxia. Specifically, the US and Canada have agreed to reduce phosphorus loading to the Western and Central basins by forty percent. A new target load of 6,000 metric tons annually was allocated [insert amount once final] U.S. and [insert amount once final] Canada. This load is expected to raise the dissolved oxygen levels in the bottom waters of the Central basin to 2 mg/L. The Parties also identified priority watersheds for phosphorus control to address nearshore blooms. Finally, because the modeling showed that spring loading of phosphorus from the Maumee River in Ohio is the determining factor in the production of cyanobacteria in the Western basin, specific seasonal targets were identified for the Maumee River. A forty percent reduction Maumee spring phosphorus loads is expected to lower cyanobacteria biomass in the Western basin to mild levels in 9 years out of 10.

The revised phosphorus targets, summarized below, were vetted with the public during the summer of 2015 and ratified by the U.S. and Canada in February 2016. These targets address all but one of the Lake Ecosystem Objectives identified in the Agreement. More work is needed to address the second Lake Ecosystem Objective, "Maintain the levels of algae below the level constituting a nuisance condition," which is of particular importance in the Eastern basin of Lake Erie, and in other parts of the Great Lakes. While models were used to explore the impact of phosphorus reduction on nuisance algae (Cladophora) growth in the Eastern basin, the confidence in the model predictions is not adequate to recommend a specific target at this time. Additional research is required to link phosphorus loadings to changes in algal production prior to recommending phosphorus reduction targets to address *Cladophora*.

Binational Phosphorus Load Reduction Targets		
Lake Ecosystem Objectives *Great Lakes Water Quality Agreement Annex 4, Section B*	Western Basin of Lake Erie	Central Basin of Lake Erie
Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie	40 percent reduction in total phosphorus entering the Western Basin and Central Basin of Lake Erie – from the United States and from Canada – to achieve 6000 MT Central Basin load	
Maintain algal species consistent with healthy aquatic ecosystems in the nearshore Waters of the Great Lakes	40 percent reduction in spring total and soluble reactive phosphorus loads from the following watersheds where localized algae is a problem:	
	Thames River - Canada Maumee River - US River Raisin - US Portage River - US Toussaint Creek - US Leamington Tributaries – Canada	Sandusky River - US Huron River, OH – US
Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes	40 percent reduction in spring total and soluble reactive phosphorus loads from the Maumee River (U.S.)	N/A

While in general there was strong public support for these targets, stakeholders expressed valid concerns with the lack of a phosphorus target to address nuisance Cladophora in the Eastern basin of Lake Erie. The US and Canada are committed to continue supporting research, monitoring and modeling efforts that will improve our scientific understanding of Cladophora growth and propose further phosphorus reductions to ameliorate nuisance algae impacts in the Eastern basin, if warranted. Recent actions toward this goal include:

- The Nutrients Annex Subcommittee worked with the Science Annex Subcommittee to convene a workshop on the state of the science of Cladophora in early 2016. The results of this workshop …
- Environment Canada research expected to wrap up march 2016
- The US and Canada formed a new workgroup with representatives from EPA, EC, NYSDEC, OMOEE, OMNRF, and USGS to initiate nutrient target development in Lake Ontario. The group will start by examining current trends and data gaps particularly with respect to nearshore Cladophora growth as a response to nutrient levels in Lake Ontario.

Binational strategy {expected draft in Feb 2016}

The US and Canada prepared a binational strategy for implementation of the Lake Erie phosphorus reductions moving forward. The strategy identifies binational priorities for research and monitoring, with a focus on coordinating our efforts to track progress through an active adaptive management process.

Finally, the US and Canada have begun work to develop domestic action plans and anticipate releasing draft action plans by the end of 2016. These plans will outline in more detail the specific implementation strategies needed to achieve the 40% reductions.

Text re. GLEC webinar possibly before Public Consultation txt [include?]: **[JH opinion: no. It was a bureaucratic exercise; not real action.]** On May 29, 2015, Canada and the United States held a webinar to brief Great Lakes Executive Committee members on the draft revised phosphorus objectives for Lake Erie in advance of the public consultation on these targets. Well over 100 people attended the webinar from GLEC member agencies and organizations and GLEC observer organizations, as well as others from the agricultural sector, non-governmental and non-profit organizations, academia, and the public.

Text re. Public Consultation: Over June 30 to August 31, 2015, Canada and the United States [longer period for US?] electronically solicited public comments on the recommended binational phosphorus load reduction targets to combat Lake Erie algal blooms.
A factsheet, which outlined the recommended binational phosphorus targets to combat Lake Erie algal blooms, and technical report, which formed the basis of these recommendations, were posted on www.binational.net, as well as domestic sites (www.nutrientsbinational.net; [US pg?]) in order to provide the public with background information on the development of the targets.
A series of questions were posed on www.nutrientsbinational.net and [US pg?] to assist in soliciting feedback on the targets. Over 25 written submissions were received from environmental non-governmental organizations, the agricultural, farming and landscaping sector, the tourism sector, conservation authorities, municipalities, public and citizens of concern.
In addition to the public webinar, Canada and the United States met with specific interest groups regarding the Lake Erie phosphorus reduction recommendations. Environment Canada over

July 14 to August 14, 2015, held 6 meetings with 26 organizations representing the agricultural sector and resource managers who work closely with the agricultural community; 10 Conservation Authorities; 8 special interest and environmental groups; municipal water managers from 3 municipalities; the Steering Committee for the Thames River Clear Water Revival Initiative; and the First Nations Engagement Committee of the Thames River Clearwater Revival Water Management Plan. [Insert US specific mtgs?]
[note re incorporation of input >] All the input received was considered in the finalization of the targets… [on/by February 2016]
[Whatever comes out of the GLEC ppt's re. how the public input was incorporated into final targets could be summarized too]

Domestic Canadian Actions Taken

- GLNI (significant new science to support the development of binational targets in Lake Erie);
- AAFC Growing Forward II
- GLASI (the Great Lakes Agricultural Stewardship Initiative) – fed/prov funding
- Health Canada – microscystin guidelines
- Ontario's entering into the Western Basin of Lake Erie Collaborative Agreement (with Michigan and Ohio), as well as the Great Lakes Commission's Lake Erie Nutrient Targets Working Group
- Grand River watershed management plan and associated efforts; development of Thames River watershed management plan
- Lake Simcoe /Georgian Bay fund
- GLNI interagency policy options work to support the development of Canadian domestic action plan for Lake Erie begins (through COA)

Domestic U.S. Actions Taken

- start of domestic action plans
- domestic program efforts to address nutrients