Comments and Recommendations
On Governance and Specific Issues for Consideration During the 2010 Renegotiation of the Great Lakes Water Quality Agreement
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Introduction

Thirty-six citizens' groups submit the following comments on the Canadian and U.S. Federal Governments second round of consultation as they renegotiate the Great Lakes Water Quality Agreement (GLWQA).

As we have repeatedly stated during this consultation process, we are distressed with the governments' consultation processes thus far around the renegotiation of the GLWQA. Our shared view is that the renegotiation process is too shallow, lacks rigor and is happening too fast.

To improve the rest of the consultation process, we urge you to carry out each of the following:

1. Provide detailed draft language of the proposed new Agreement to the public for their comment and ensure that the consultation stage after the release of draft language is long enough to allow people to conduct full assessments and provide detailed comments back to the governments.
2. Conduct dialogue sessions – not just listening sessions – so we can have a thorough discussion with the negotiators of issues and options under consideration.
3. Set up an expert table that includes both government and non-government people for each issue area to develop the draft Agreement language.
4. Hold more than just the two public meetings that have been promised for late September and provide adequate advance notice of these meetings, including making materials available, so people can reserve the dates and adequately prepare for the meetings.

We have many other thoughts on how to improve the consultation process, which we have sent to you previously. Shortly, we will send you a letter detailing the status of your responses to those concerns and detailing our experiences with this consultation process.

The following are our recommendations on Agreement governance as well as the specific issue areas that the federal governments put out for consultation in May. We would appreciate the opportunity to meet with you to discuss these recommendations with you.

Section I: Governance and the Great Lakes Water Quality Agreement

Introduction

In the first round of the governments' consultation on governance, the 32 citizens' groups who submitted shared recommendations emphasized the importance of dramatically improving governance in the Great Lakes:

> If substantial reform is not made to governance in the Great Lakes-St. Lawrence River basin, the potential of the changes that are made to the Agreement during these negotiations around issue-specific matters, such as toxics, invasives, and climate change, will fail to achieve their hoped for positive impacts on the basin. [ENGO Submission on February 15, 2010]

That understanding still is at the base of our comments to you.

In this, our second submission on Governance, we address the specific governance areas that you put out for consultation on your binational.net website at the end of May 2010. There is considerable overlap between these and the comments we submitted in February. Instead of repeating these, we have referred you to our previous governance submission and attach it for easy reference.

Government Issue Area: Participation in Binational Management Process

The Binational Executive Committee (BEC) or a New Binational Coordinating Committee

In our earlier submission, we explained why we believe that the BEC must be substantially reformed [p. 20]. To summarize, it has failed to develop shared workplans and programs; it needs to become a body that has responsibility for decision-making, and it needs to have accountability mechanisms. Also it has failed to seriously engage the range of stakeholders. We believe that the BEC is so seriously flawed that it should be replaced with a new Binational Coordinating Committee, unencumbered by the negative reputation that the BEC has acquired.

- **Recommendations**: Article X, 3 of the GLWQA should be amended in the following ways:
    - A new Binational Coordinating Committee (BCC) should develop a comprehensive binational Great Lakes-St. Lawrence River basin work plan by a specified date, using an open and transparent process. This work plan should be based on the commitments in the GLWQA. The section should also state a frequency with which the workplan will be updated. The Agreement should specify that the binational work plan will identify

prescriptive programs for both present and emerging needs and will include timetables for regular review and reporting on progress on the work plan.

- The Agreement should state that the provincial, state, first nation, tribal, Métis and municipal governments shall be members of the new BCC. Representatives of the public, including industry, ENGOs, etc, should also be fully included as members of BCC for discussion purposes, but they should not be part of the final decision voting. As an alternative, the governments could set up a formal multi-sector advisory committee.

- All BCC activities should be conducted in an open and transparent manner. This should include having all meetings public and the conduct of a formal consultation process on the binational plans as well as on all matters that would change existing programs or processes.

- The BCC should restructure and use the State of the Lakes Ecosystem Conference (SOLEC) and the process around it to develop and report on indicators that measure progress toward meeting identified endpoints, the objectives and the purposes of the GLWQA. SOLEC should be more active at including public participants in its processes than it currently is.

- The BCC should report to Parliament and Congress every two years. This report should be sent to a legislative committee for a public hearing.

Government Issue Area: Principles, Governing Concepts, & Tools Applicable to Implementation of the GLWQA

We addressed this issue in our submission to you on February 15 on pages 4 to 6. Please see our recommendations for principles on those pages.

In regards to "Tools Applicable to Implementation of the GLWQA", we urge you to reread pages 14 to 19 of our attached February brief.

Government Issue Area: Review of the GLWQA

See Page 13 of our February brief for our recommendations and explanation on the process and timing for review of the GLWQA.

Government Issue Area: Lakewide Management Plans (LaMPS)

To achieve our goals concerning the condition of the Great Lakes and St. Lawrence River, it is essential that a watershed approach be taken throughout the basin. We see

this as integrating into the LaMP process. We made specific recommendations on the watershed approach in our February brief [pages 6 and 7].

We here add three recommendations specific to LaMPS:

Recommendation: The watershed plans that we discuss later under nearshore should be integrated with the LaMP program for each Lake and their connecting waterways. One objective of the watershed plans should be to ensure that the whole lake needs are properly addressed. The governments should commit to implement these plans.

We are very dissatisfied with the current public involvement in the LaMP process. It is very inconsistent from lake to lake.

Recommendation: In the GLWQA the governments should commit to strong public engagement in each LaMP. The Agreement should commit the governments to have a multi-stakeholder forum that acts as an advisory body to the governments in the development and implementation of each LaMP. The LaMP Forums should also advise the governments on public involvement mechanisms for the LaMP.

Recommendation: A governance mechanism should be put in place to ensure that proper linkages are made between the LaMPS and the St. Lawrence River management processes such as the St. Lawrence Plan. The linkages should be encouraged through this mechanism not only at the government level but also between the municipalities and the community groups involved in the protection, conservation, restoration, and enhancement of the St. Lawrence River.

Government Issue Area: Areas of Concern

A major emphasis should be put in the GLWQA on cleaning up the areas of concern at a much more rapid pace. The AOCs should be focused on dealing with historic pollutants and pollutant sources rather than being broadened into whole watershed plans. We do not recommend expanding the scope of RAPs. We believe that the RAP scope should remain focused on contamination problems. Our focus should be on doing better—not doing more. The broader range of issues in an area should appear under the watershed management planning components in Annex 13 of the Agreement. Instead of expanding the RAP program, the watershed management plans section in Annex 13 should be developed to require the development and implementation of watershed management plans for all parts of the Great Lakes and St. Lawrence River Basin. The RAP process in Annex 2 should remain focused on addressing areas with higher than average degradation.

Recommendations:

- Annex 2 of the GLWQA should be amended to ensure that the AOC program is focused on the most severe existing contamination problems and sources and upon cleaning up these areas rapidly.

- The watershed approach recommended elsewhere should be applied in watersheds that include AOCs, but should be much broader in their work and not draw focus away from the core AOC problems until those AOC problems have been corrected.

- The urgency to complete the RAPs and the frustration around RAPS is so substantial that we urge the formation of a Basin-wide citizens' committee under the auspices of the IJC to be a watchdog on the implementation of Annex 2 and Annex 14 (Contaminated Sediment) of the Agreement. In addition, the Binational Toxics Strategy should take a more active role in the contaminated sediments program since this is listed as one of the issues in the BTS agreement.

- The wording of some of the impairments listed in Annex 2, Sec 1 should be clarified or expanded. For example, "beach closings" could be expanded to refer to all recreational uses—not just those at beaches. Human health impacts should also be considered.

- If the Governments propose an "an area of recovery" stage to be recognized in Annex 2 (for areas where remedial actions have been taken and beneficial uses are not yet restored), the Annex should clearly specify that certain conditions must be met for this classification to be accepted. These should include showing that all necessary pollution sources have been eliminated and that all necessary clean-up actions have been taken. It also should require an on-going funded monitoring system, periodic reporting on recovery progress, and a mechanism for undertaking additional actions, if monitoring indicates the need for such or if cleanup criteria change. A proposal to enter a recovery phase should go to the IJC for comment prior to such a designation. The public should be included throughout the recovery time.

- The Agreement should clearly state that an area in recovery stage still retains its area of concern status. It is an area of concern until impairments resulting from conditions within the area of concern have been removed.

- Since there is often 10 or more years between the stage reports that the RAPs submit to the IJC for comment, the annex should be amended to set up a new reporting schedule to the IJC so the public doesn't have to wait so long to hear the IJC's views. The IJC should be required to provide their comments within a specified timeframe after receipt of the RAP documents to ensure that their comments come at a useful time to affect the next stage of work.

- Section 2(e) of Annex 2 should be strengthened to require a strong public role in decision-making in the RAP process, recognizing the bodies such as the public advisory committees as leaders and co-decision-makers. The Agreement should also include a commitment to fund serious public involvement.

- The Agreement should state that RAP and LaMP goals should be assessed taking into account whether the goals for one are strong enough to support the goals of the other. RAPs and LaMPs should be required to cross reference and share information with each other.

Government Issue Area: Addressing the Nearshore Zone
The first issue that needs to be addressed is to come to a shared definition of "nearshore."

Recommendation: The governments should enter into a dialogue with stakeholders to come to an agreement on the definition of "nearshore" for inclusion in a renegotiated GLWQA and to inform the other parts of the Agreement concerning nearshore.

One core component for addressing the nearshore should be to implement the watershed approach throughout the Great Lakes basin. We refer you to our February brief for an explanation of how and why we have concluded that the watershed approach should be applied throughout the Great Lakes St. Lawrence River basin [p. 6 & 7]. Please see our recommendations on the watershed approach in our previous submission.

There is tremendous variety in terms of the condition of the nearshore areas throughout the Great Lakes basin.

Recommendations:

- The governments should commit in the GLWQA to classify the current status of all nearshore areas.

- The governments should also commit to develop and implement restoration plans for those that are showing degradation.

- The governments should commit through the GLWQA to give a special designation to high quality nearshore areas and to implement protections that will ensure that the high quality nearshore areas do not become degraded.

- An adaptive management framework for experimentation, learning, and reduction of uncertainties should be an integral part of watershed plan implementation, to improve understanding of best management practices

Section II: Addressing Specific Issues in the Agreement

Toxic Substances

Introduction

Today, the Great Lakes face significant chemical threats from a variety of sources, such as consumer products, industrial sources, sewage treatment plants, landfill leachates, contaminated sediments, and radioactive waste storage sites. The Great Lakes Water Quality agreement is a model for the international management of a large freshwater ecosystem – a model that has been replicated in many other countries and regions in the world. This is because the Agreement framework and specific objectives challenge the parties (US and Canada) to innovate and implement leading edge approaches to protect the Great Lakes from chemical threats. Because the Great Lakes ecosystem is fragile and complex, the Agreement guides both nations to take action beyond their domestic programs to protect the ecosystem.

Overarching Issues/Objectives in the Agreement
Recommendations:

- It is absolutely critical that the Agreement retain the virtual elimination and zero discharge goals.

Once harmful chemicals are released into the environment, it is extremely difficult, if not impossible, to manage these chemicals. The goals of virtual elimination and zero discharge acknowledge this reality and seek to prevent irreversible harm and related economic expense of clean ups. They are fundamental to the Agreement and every effort must be made to assure that these philosophical cornerstones are not eroded or diluted in the renegotiated Agreement.

- Substances of concern in the Agreement should be expanded to include those substances that are not technically PBTs but are regularly released and therefore persistent through repeated and regular exposure.

The concern here is that even if a substance does not persist in the environment because of being long-lived, if it is regularly released, there can be constant exposure that is harmful to humans and wildlife.

- Specific objectives in the agreement should be retained

The concern here is that the Agreement could become too vague without specific objectives.

- The Agreement should explicitly reference human health protection as a goal of the Agreement (with objectives).

- Emphasize the principle of **prevention** as a fundamental value in the Agreement.

Monitoring

Recommendations

- The Agreement must require comprehensive, long-term ongoing surveillance of ecosystems to monitor the status of existing chemicals, provide an early warning system for recognizing emerging chemicals and materials of concern, and assess the efficacy of interventions.

- The Agreement should require a comprehensive biomonitoring plan of people and wildlife in the basin. New emerging chemicals/substances of concern including nanochemicals, endocrine disruptors, pharmaceuticals, flame retardants, and other emerging chemicals of concern should be monitored as well as existing substances of concern such as PCBs, mercury, and radioactive isotopes.

Chemicals and Chemical Lists

Recommendations:

- Within a year of the signing of the Agreement, Annex 1 and Appendices 1 and 2 of Annex 10 should be reviewed and updated. The Agreement should include an explicit provision for updating and adding new chemicals on a designated regular schedule which includes reporting requirements to facilitate accountability. A protocol for adding new chemicals should be developed that is precautionary. This is critical to coordinate with emerging scientific understanding of the impacts of chemicals cumulatively and synergistically – the role of complex interacting factors in health of organisms and ecosystems. This listing must also recognize the new science on toxicity of compounds related to timing of exposure, genetic susceptibility, etc. These issues are addressed in the 2009 National Academy of Science report "Science and Decisions: Advancing Risk Assessment".

- The Agreement should create a mechanism to allow citizens to petition for additional chemicals to be added to the list.

- The Agreement should create a mechanism to prioritize chemicals based on inherent hazard. Prioritization should trigger the development of chemical action plans by Governments where they are required to provide a plan that will demonstrably reduce the loading of the pollutant of concern with benchmarks and timelines.

- The Parties should initiate regulatory mechanisms to require the phase-out and sunsetting of hazardous processes and chemicals for which viable, safer substitute technologies and approaches exist.

- There should also be a provision for automatically listing chemicals under the Agreement if they are added to other authoritative lists, two examples would be the European Union's REACH RoHS list, and the Stockholm Convention on Persistent Organic Pollutants (POPs) list.

- Evaluation of chemical toxicity, fate and transport must be grounded in "real world" low dose and age related sensitivity to repeated exposures, degradation byproducts, toxic metabolites, and additive and synergistic toxicity with other substances. Evaluation of toxicity, exposure, fate, and transport of chemicals – including measures of persistence - must reflect current toxicological findings addressing factors such as timing of exposure, non-linear dose-response relationships, and pseudo-persistence of chemicals for which there is repeated and ubiquitous exposure.

On Leading Edge and Precautionary Approaches
Recommendations:

- The Agreement should require governments to develop research programs to develop safe, non-dispersive clean up technologies to address the significant existing contaminants in the basin.

- The Agreement should explicitly reference and support the development of Green Chemistry practices and implementation perhaps through an Annex on Green Chemistry (see Appendix 3)

- The Agreement should require producer responsibility for retrieving and properly reusing, recycling or, if necessary, disposing of products they made or sold after their use should be required.

Specific Sources
Recommendations:

Persistent toxic contaminants in waste water

- The Agreement should require wastewater treatment plants to use their authority to restrict the discharge of chemicals of concern with a focus on critical pollutants

- The Parties should harmonize their assessment and prioritization processes to better understand and reduce persistent contaminants of concern from WWTPs

- Strategies should be developed to address persistent toxic substances entering the Great Lakes ecosystem in sewage effluent, through combined sewer overflows or via land application of biosolids (e.g., sewage sludges or manure). See "land application" section below. Examples of promising strategies include source control through comprehensive municipal sewer use by-laws and U.S. "pretreatment programs" through which industrial effluent is first treated on site before being released into sewers. Programs directed at reducing household chemical use and improving household hazardous waste collection can also reduce toxic chemicals in sewage effluents and biosolids.

- The governments should adopt and apply consistently the precautionary approach (as applied in the U.S. Toxic Substances Control Act and the revised Canadian Pest Control Products Act) to require manufacturers to assure the safety of new chemicals (including cumulative and synergistic effects) prior to manufacture and use. These programs should also be fully funded to regain their effectiveness.

- For existing chemicals that remain in the ecosystem after their discharge, such as PCBs, new technologies must be developed to assure their complete destruction so they are not simply moved from one medium to another (e.g., landfilling or incinerating) or do not produce other toxic substances (i.e., heavy metals, dioxins and furans, etc.). The U.S. Great Lakes Legacy Act takes this approach by giving preference to funding for contaminated sediment cleanup projects that destroy contamination instead of just moving it.

Pharmaceutical and endocrine disrupter contaminants in waste water

- We recommend new language in the articles of the Agreement or the addition of a new annex that will result in the reduction of pharmaceutical and endocrine disrupter contaminants in the Great Lakes particularly from sewage treatment facilities. The strategies needed to manage nonpersistent contaminants include:
    - Developing Basin-wide programs to return unused substances to manufacturers.
    - Improving treatment of domestic sewage to remove these substances and manage biosolids and sewage sludges.
    - Regulating select contaminants known to be wastewater contaminants (beginning with those that are persistent, bioaccumulative and toxic). For example, regulations can target for removal and replacement select chemicals such as NPs and NPEs by industry and consumers as close to the source of generation as possible.
    - Require labeling for products that are known to contain substances such as PBDEs, phthalates, and other significant Great Lakes contaminants listed under the Agreement Annex noted above.
    - Require take-back programs for all household pharmaceuticals to ensure proper and safe disposal.

Land application of sewage sludge

- Require Waste Water Treatment Plants to implement complete anaerobic digestion of sewage sludge (or use a comparable sludge treatment technology), and encourage methane gas capture and use as a fuel source.

- Require that the remaining residues be treated to remove toxics (after complete digestion) and be disposed through permanent destruction or in a secure manner (such as landfilling with pump and treat assurances).

- If complete digestion of sludge takes place, sludge should be safer to apply to land. As such, land application of digested sludge should only be approved if the jurisdiction from which the sludge originates has source control (e.g., a comprehensive and enforced sewer use law) and industrial effluent pretreatment requirements to ensure that toxics loadings and pathogens are controlled.

Industrial Point Sources

- The Agreement should establish benchmarks for the Parties to re-commit sufficient resources for enforcement of programs such as the U.S. Great Lakes Water Quality Initiative, and sufficiently staff discharge permit programs to eliminate backlogs and "rubber stamping" without thorough review of permit re-issues.

- The Agreement should require proponents using and releasing substances listed under the Agreement Annex to prepare toxic use reduction plans, including timelines for reduction and elimination of toxic substances.

- The Agreement should require the expansion of pollutant release and transfer registries to collect information on all the substances of concern and from a broader range of facilities and release an annual report combining Toxics Release Inventory and National Pollutant Release Inventory information to the Great Lakes St Lawrence River basin.

Airborne Sources of Toxic Chemicals

- The IJC should conduct an assessment of the adequacy of the Stockholm Convention on Persistent Organic Pollutants ("POPs" treaty) in reducing deposition of airborne toxic chemicals to the Great Lakes-St. Lawrence River basin from elsewhere in the world and make recommendations for further action based on those findings to the Parties.

- The Parties should re-commit resources to comply with Annex 15 of the 1987 Agreement, especially with regard to establishing controls and reduction strategies for sources of mercury.

Releases of Radioactive substances, Radioactive waste storage sites

- The Agreement should commit to using the same principles for the release and management of those radionuclides that are persistent and bioaccumulative as for other PBTs in the GLWQA. This means that the principles of virtual elimination and zero discharge should be stated as goals for persistent radionuclides.

- The Agreement should commit the Parties to conduct full cost accounting studies on buried radioactive waste sites as was completed in 2008 for the West Valley, NY nuclear waste repository.

- The Agreement should ban the siting of nuclear reprocessing or storage sites in the Great Lakes-St. Lawrence River basin.

Toxic releases from mining/metallic mining operations

- The Agreement should address contamination from mining operations and clean up of legacy contamination at mining sites.

Aquatic Invasive Species

Introduction

The Great Lakes and St. Lawrence River are now home to at least 186 nonnative aquatic species. Of these, the aquatic invasive species (AIS) have radically altered the lakes' and St. Lawrence River biological systems and water quality, and caused severe economic damage. The 2005 "tipping point" paper signed by more than 100 prominent Great Lakes scientists points out, "Invasive species are the most likely principal source of food web disruptions now occurring in the Great Lakes, and are implicated in the reproductive failures of some fish species," including walleye, lake trout, yellow perch, and lake herring.

Moreover, invasive species have been responsible for billions of dollars cumulatively, in water utility infrastructure maintenance and repair and hundreds of millions of dollars annually in public investments in control programs.

In recent years, zebra and quagga mussels have played a significant role in radically altering the ecological balance of the lakes. These species are efficient "filter feeders" that strip the waters of the plankton upon which native species depend. Lake Erie has been particularly affected; the mussels, in combination with the round goby, are implicated in outbreaks of botulism among the lake's fish and birds - compromising the region's water quality.

Inadequate controls

In 2002, reports from the United States and Canada found, among other things, that:

-- The federal governments of Canada and the United States have not responded effectively to the invasive species threat;

-- Measures put into place to prevent aquatic introductions have not prevented new introductions;

-- Canada and the United States have neither a binational approach to invasive species nor do they have a single agency in charge of managing the problem.

We have no choice but to manage the aquatic invasive species already in the Great Lakes system, but failing to prevent new invasions is sheer folly. Biological pollution may be the most serious threat to the Great Lakes ecosystem today, and thus requires priority attention and a commitment by both nations.

The four major pathways of invasion are well known:

- Commercial Shipping: AIS introductions from global waters carried in the ballast water or fouling the hulls and anchors of ocean-going ships that trade in international ports. Transfers of AIS from port to port within the lake system can also be facilitated in the ballast water of "lakers," ships that travel only around the Great Lakes;

- Artificial Canals and Waterways: AIS migration into the Great Lakes from channels connected to other watersheds such as the Chicago Sanitary and Ship Canal; and

- Importation for Trade: Commercial trade of species for aquariums, aquatic gardening, etc results in hundreds of millions of live wild plants and animals arriving in North America each year, some of them harmful non-native species, which are often intentionally released or escape into the wild.

- Recreational Activity: Boaters and anglers can inadvertently transport invasive species from an infested waterbody to an uninfested waterbody.

New prevention and control programs must address each of these vectors.

Recommendations
Overall:

- Recommend development of a separate annex for Aquatic Invasive Species in the Great Lakes Water Quality Agreement. This annex must set specific goals and timelines to prevent the introduction and spread of Aquatic Invasive Species in the Great Lakes – St. Lawrence River basin.

- For preventive policies dealing with unintentional introductions via pathways such as shipping, canals and waterways, the potential future invaders may be predicted, but are also often a mystery. Under these scenarios, the precautionary principle and zero discharge should be the basis for policy development. For intentional introductions via the importation pathway, the potential future invader is often a known species destined for a market. Under this scenario, policies that emphasize risk assessment and risk-based management approach on individual species should be pursued.

- Fully integrate U.S. federal goals articulated in the Great Lakes Regional Collaborative AIS Strategy into the binational Great Lakes Water Quality Agreement. The AIS Strategy Team Implementation Actions and Milestones articulates detailed recommendations, which we support, see: http://www.glu.org/sites/default/files/GLRC AIS-Appendix.pdf .

Preventing AIS introductions via Ocean-going Vessels
Declare as a goal of the Agreement:

- Complete prevention of the introduction of any additional non-native aquatic species to the Great Lakes-St. Lawrence River system via ocean-going vessels through adoption of a zero discharge goal.

- Binationally coordinated federal policies to meet the above goal no later than 2016.

- Binationally coordinated federal policies applying to the Great Lakes-St. Lawrence

River system to achieve the above goal, which could require: 1) sufficiently strict ballast water discharge standards to achieve the above goal, or 2) closure to ocean-going vessels of the Great Lakes – St. Lawrence Seaway System. Regional goals should be set in the event that national standards fail to be set in a timely fashion or prove too lax for meeting the goals of the Great Lakes region.

- Identification and protection of unique and largely pristine shorelines and waters (for example, such areas may include Isle Royale and the northeast shore of Lake Superior) through a moratorium on ballast water release until 2016, or which time regulations are implemented to prevent the introduction of AIS from commercial vessels.

Preventing the Spread of Already-introduced AIS by Lakers

Declare as a goal of the Agreement:

- Complete prevention of movement of already-introduced aquatic invasive species to new sites in the Great Lakes by "lakers"—ships that travel solely around the Great Lakes.

- Binationally coordinated federal policies implemented no later than 2016 that assure that "lakers" do not transport AIS to Basin sites where they are not already established.

Preventing AIS introductions via Inter-Basin Connections

Declare as a goal of the Agreement:

- Complete prevention of the movement of live organisms via canals and other artificial inter-Basin waterways that connect the Great Lakes Basin to a non-Great Lakes watershed. Artificial connections include, but are not limited to, Ogoki and Long Lac in northern Ontario, Chicago Sanitary and Ship Canal in Illinois and associated Indiana waterways, New York State Canal System, the Portage Canal in Wisconsin, and the Ohio and Erie and Miami and Erie canals in Ohio.

- Complete prevention of intra-basin movement of AIS through artificial connections of hydrologically distinct waterbodies, such as the connection between Lake Ontario and the upper lakes via the Welland Canal.

Declare as objectives of the Agreement:

- Establishment of binational responsibility for and oversight of aspects of inter-Basin connections that pertain to AIS introduction.

- Permanent hydrological separation of the Great Lakes and Mississippi River Basins and other pertinent inter-Basin connections.

- No construction of new inter-Basin connections and the closure of existing cross-Basin connections that have fallen into disrepair or disuse so that AIS transfers are no longer possible.

Preventing AIS introduction via trade in Live Organisms
Declare as a goal of the Agreement:
- Complete prevention of AIS introduction through international and domestic trade in and possible release of live non-native organisms.

Declare as an objective of the Agreement:
- Establishment of a binational screening process at the federal level related to live organisms in trade that classifies such organisms into three categories of injuriousness—prohibited, permitted, and conditionally permitted—with the burden of proof as to injuriousness placed on the prospective trader.

Preventing AIS introduction or spread by recreational activity
Declare as a goal of the Agreement:
- Long-term financial commitment to recreational education and outreach programs that aim to prevent the transfer of invasive species.

Integrating into the Agreement prevention of AIS introduction and spread
- Include in Article 2 purpose and Article 3 objectives of the Agreement, the need for prevention of AIS introduction and spread.

- Include the need for AIS research in Annex 17, integrating the recommendations from, among other sources, the Research Coordination Committee of the Great Lakes Panel on Aquatic Nuisance Species.

- Include in Annex 11 the need for AIS surveillance and monitoring, and regular reporting of this information to the public every 2 years.

- Ensure regular status updates of government AIS prevention programs every 2 years.

Ship Source and Non-Ship Source Pollution

Recommendations:

1) Existing Annexes 4, 5, and 6 on ship source pollution should be updated and combined into one annex to provide for a more integrated approach to ship source pollution. Some of the changes that should be made to update these annexes when they are combined, include:

    - Add Air Emissions from ships to this annex. As we have learnt, air emissions are major contributors to water contamination in the Great Lakes-St. Lawrence River system. Therefore, all sources of air emissions to the Great Lakes should be addressed. One of the components of this annex should be the requirement that ships use the same improved standards for fuels that the truck transportation sector is now required to use. Low-grade heavy bunker fuel must be phased out of use.

    - Add a section on the need to develop methods of transferring and storing materials from ships to shore facilities that does not risk contamination of adjacent water bodies. This includes coal, road salt, etc.

    - Add section on biofouling of ship hulls, etc., to require that toxic substances now in use be phased out and replaced with tested safe alternatives. For example, tributylin is currently the most commonly used anti-fouling agent. It is a highly persistent toxic substance that in very low concentrations has major impacts on marine life, especially mollusks.

    - Add a section banning the transportation of radioactive wastes and other highly toxic substances on the Great Lakes. If a spill of radioactive wastes or other highly toxic substances were to occur from a ship into the Great Lakes or St. Lawrence River or the connecting channels, it would be impossible to recover them since they would be so quickly distributed through the system and the impacts would be devastating for the very long term.

    - The reference to Aquatic Invasive Species currently in Annex 6 of the Agreement should be replaced with a new annex dedicated solely to aquatic invasive species. Our proposals for this new annex appear elsewhere in our comments.

2) The existing Annex 8 is focused on onshore and offshore oil-handling facilities. We propose that this annex be renamed and expanded to include additional non-ship sources of pollution from facilities operating on, in or under the lakes, the St. Lawrence River and the connecting channels. Annex 8 should include sections on:

- On-shore and off-shore oil handling facilities, as it currently does;
- Under-lake gas pipelines;
- In-lake aquaculture;
- In-lake wind farms;
- Submerged transmission lines; and,
- In-lake natural gas and oil drilling operations.

  Such projects should not be considered until the Parties, in full engagement with the public and all other levels of government, have developed bi-national guidelines, including possible bans or development of exclusions zones, for each type of operation.

  Once the Parties have developed guidelines, full environmental assessments should be required for each of the projects listed above with full public engagement from the earliest stages at which the project is being considered. At a minimum, the environmental assessment should include: 1) a needs assessment to determine whether the project is needed, including an alternatives assessment to determine whether there is a more appropriate way to address the need; 2) assessment of potential environmental impacts, including clear statements on the unknowns in terms of potential impacts because of current lack of data and studies; 3) decommissioning and restoration plans; 4) detailed specific action plans in case the facility does not act as predicted. This should include plans for immediately stopping pollution in case an accident occurs as well as remediation and restoration plans. The approval for each facility should also include financial bonds.

3) Other:

- Require compatible goals and targets throughout the basin;
- At a minimum use the most stringent international marine environmental conventions, and assess whether more stringent requirements are necessary to protect the Great Lakes – St. Lawrence River system;
- Similar reporting requirements to the IJC and to the public as in other annexes to the GLWQA.

Climate Change

Introduction

Climate change has potentially catastrophic implications for water quality in the Great Lakes-St. Lawrence River system because it will exacerbate existing chemical, physical, and biological stressors and create new problems on top of the current problems. Warmer water, increased nutrient and sediment loadings from intense storms, increased winter evaporation, and the likelihood of more extreme fluctuations in water levels are all consistent with predicted climate change impacts. These and other climate-related impacts, and their overall effect on the ecosystem– existing and eventual--are not well understood. The Agreement must acknowledge the scope and scale of climate change impacts and the serious gaps in understanding and the need for strategies to mitigate the effects.

Recommendations:

- The GLWQA should be updated to state a commitment to climate change issues.
    - It should be specifically referred to as 'climate change' not 'global warming' to use a more scientifically accepted and widely adopted and understood term by the public and policymakers.

- The governments should commit to developing a binational Great Lakes and St. Lawrence River visionary guidance and plan for the Great Lakes region to set goals and visions for dealing with climate change.

- The governments should create a board of experts and stakeholders with a standing reference to assess on a regular basis, perhaps every 2 years (as changes are happening quickly and the science is changing quickly), the state of regional climate change knowledge, models, and adaptation measures to determine priorities for programs and projects and commensurate funding, and to recommend policies and strategies for adaptation, resilience, and mitigation of ecological impacts from a changing climate based on the latest state of knowledge. These priorities should align with and inform national greenhouse gas reduction strategies in both nations. The program should also include a public education component. At a minimum, educational material should be made available in both English and French. The IJC should form a binational task force to coordinate these efforts and alignment with other binational and international agreements, treaties and research efforts related to climate change and ecological resilience and adaptation.

- There is a need for supporting/funding this regional science and a mechanism for communicating the information to stakeholders and managers, therefore, we would like to see strengthened Great Lakes climate change research:

- Identify priorities for research topics, data gathering and modeling systems that could underpin needed research.
- Place a significant emphasis on adaptation measures and resilience strategies and their implementation
- Create a central place for scientists to apply for research support. This would be valuable even if there were no net increase in resources.
- Additional research we recommend:
  - An inventory of threatened habitats and vulnerable species and an analysis of how changing habitat viability in the region will affect the chemical, physical and biological integrity of the Great Lakes, and ecosystem services and functions essential for ecological vitality and human health and safety. This study should include an analysis of the viability of and regional capacity for protecting and restoring connecting habitats for wildlife refuge and how to facilitate transitions for plants and animals as the weather conditions change.
  - Economic impact assessment of loss of habitat, fish and other species.
  - Impacts of inter-basin and intra-basin transfers of water.
  - Impacts of climate change on existing water and wastewater infrastructure in the Great Lakes Basin and water intakes
  - Climate change monitoring should be expanded to cover the entire Great Lakes-St. Lawrence River Basin.

- Integrate climate change research into all other GLWQA issue areas in the Agreement

- Information Exchange: The governments should commit in the GLWQA to:
  - Create a central repository and distribution system for relevant new research related to climate and the integrity of the Great Lakes-St. Lawrence River and the health and safety of its human population.
  - Organize regular conferences on Great Lakes-St. Lawrence River system climate change trends, impacts and adaptation strategies to foster communication among climate change researchers.
  - Create institutional discussion forums for providing input to national and international efforts that are planning new or enhanced sensing networks, so that Great Lakes regional research needs are best met.
  - Provide meteorological or synthetic climate data sets for each of the existing weather stations in the Great Lakes-St. Lawrence River Basin, such that the data sets have been adjusted by incorporating reasonable climate-change assumptions that have been standardized across the Basin. Such adjusted data sets should be:
    - Available to planners, consultants, and others who routinely run air dispersion and other types of computer models for regulatory

and policy purposes, and would provide these users with modeling predictions under reasonably foreseeable climate conditions.
        - Made available in at least two versions, representing distinct levels of climate change within the range considered likely by experts. The data sets should be based on assumptions that are standardized binationally across the Basin, and should be updated every five years to reflect new information. Parties should initiate, expand and enhance requirements for Great Lakes-based facility reporting on Greenhouse gas emissions.

- Communication and Education. The governments should commit in the GLWQA to:
    - Design and implement public education programs including an education program on water conservation as an adaptation strategy.
    - Enhance the region's global climate change profile by supporting regular participation by Great Lakes-St. Lawrence River system climate change scientists in world climate change forums such that global climate change research projects are designed to better serve Great Lakes-St. Lawrence River system regional research needs

- Response Actions. The governments should commit in the GLWQA to:
    - Protect the public by planning for and responding to extreme events (flood, drought, etc). Extreme events reduce freshwater quality in an instant, therefore the following actions should be committed to:
        - Development of both a proactive and reactive plan for dealing with extreme events.
        - Work with local municipal and state authorities to require shoreline development to be able to withstand extreme storm events (including appropriate setback requirements)
        - Monitor weather forecasts. Prioritize improving and maintaining technology infrastructure for observation/data collection that will inform climate modeling and weather forecasting (nowcasting, short term, and long term capacity); this data should be regionally dispersed to inform local communities with relevant information (information downscaling). Past climatic averages are not sufficient for adaptation planning.
        - Implement green infrastructure and practices, including leafy green infrastructure in Great Lakes-St. Lawrence River watersheds to reduce and mitigate large amounts of storm water runoff
        - Re-label '100-year storm' events to make them more understandable by the public.

        - Look into plans such as the Local Governments for Sustainability (ICLEI) Climate Resilient Communities Program and assess application opportunities in the region.
        - Develop recommendations for growth planning in the face of climate change uncertainty. More specifically, municipal level infrastructure capacity planning, accounting for both population growth and increase in storms/weather events.

- The governments should commit to develop a strategy for reducing bacteria that thrive on warmer temperatures or survive longer seasons as a result of warmer winter water temperatures.

- The governments should commit to implement an energy efficiency standard to reduce air pollution and deposition into waterways and to emphasize renewable, clean energy to reduce climate change greenhouse gas releases. A full, comprehensive environmental assessment must be completed to ensure the energy system is safe for water quality.

- Adaptation to climate change should not be used as an excuse for inaction or poor environmental decision-making.

- In order to reduce human use of water, which may become more scarce as a result of climate change, the governments should commit to develop and implement aggressive water conservation and efficiency programs throughout the Great Lakes and St. Lawrence River basin.

Habitat and Species

Introduction

The loss and degradation of habitat throughout the Great Lakes poses a serious threat to water quality. Vital ecosystem services such as filtration, silt trapping, flood water storage and oxygen enrichment must be preserved and restored to not only support the human and wildlife populations and provide for livable communities, but also to enrich the landscape and character that makes the region attractive to tourists.

Recommendations:

- The Great Lakes Water Quality Agreement should contain a major goal of protecting and restoring habitat that enhances water quality. An annex on habitat, species and biological integrity, including wetlands protection, conservation, and resilience, should be added to the Agreement.

- The fundamental principle in the habitat annex should be protection.

- The annex should commit the International Joint Commission or another independent binational institution to advise on the means for achieving the annex's goal. The annex should call for the IJC or the other binational body to facilitate the development of goals and programs for habitat protection and restoration, including:
    1. Assessing the actual and potential water quality benefits of protecting and/or restoring specific shoreline and riparian areas;
    2. Identifying goals and objectives for protecting and restoring such places so that they can serve to protect water quality;
    3. Evaluating the capacity of federal programs and existing authorities to achieve the goals and objectives, and;
    4. Recommending to the Parties means of using or strengthening existing programs, and creating new ones as needed, to achieve these goals and objectives, with full awareness of the multi-jurisdictional cooperation needed as well as a timeline for completion and specific objectives related to area per given year that is protected and restored.
    5. Developing a process (or utilizing an existing process) to prioritize habitats in both countries for protection and restoration focus.

- The annex should call for the development by the Parties of an overarching biological integrity plan for the Great Lakes-St. Lawrence River with principles & specific objectives

- The choice of wetlands to be restored should be based on their contribution to improving water quality. The IJC or another binational body should recommend minimum targets for wetlands restoration in each country and in each subarea

within the basin. In the U.S. at a minimum this should mean adopting the Great Lakes regional Collaboration Strategy goal of 550,000 acres of wetlands restored or protected over the next 15 years.

- The annex should call for periodic region-wide condition assessments of wetlands and other significant nearshore habitat.

- As part of the prioritization process noted above, wetlands identified as "Outstanding National Resource Waters " under the U.S. Clean Water Act and Canadian equivalent and headwater habitats should be protected and restored. Identify the "most precious" return for funding.

- The Agreement should require a prohibition on open-lake disposal that degrades water quality and degrades or alters habitat.

The Agreement should address the following:

- The need for informational/mapping and analytic tools for management of biodiversity

- The need for a "Pristine Habitat/Biodiversity Area of Concern" designation as an incentive for habitat protection and restoration

- The potential of International Resource Water designations to help protect more pristine areas (including from new discharges)

- Defining species preferences, to drive management funding

- Potential habitat restoration practices (e.g., priority wetland restoration, offshore reef rehabilitation) that can promote restoration of native species, including lake trout, lake sturgeon, and other species.

- Affirming that any commercial or public development of bottomlands should be done in a way that does not impair the physical, chemical or biological integrity of lake habitat

- The impacts of electric transmission lines, including electromagnetic impacts, on habitat

- Threats of logging operations to water quality in the Great Lakes Basin.

- Effects of climate change on habitat.

- Increased monitoring of populations of aquatic life and wildlife dependant on the Great Lakes, including for recreationally important fish species as well as mammals and birds, and also including citizen monitoring contributions.

- Potential impacts of mining (in particular metal mining) on Great Lakes tributaries and broader water quality.

Nutrients

The original GLWQA passed in 1972 was largely a response to the devastating impacts of excess amounts of nutrients being released to some parts of the Great Lakes, especially Lake Erie. One of the prime successes of the governments under the GLWQA has been increased controls on nutrients, especially phosphorus, and the dramatic recovery of Lake Erie. Unfortunately, excess nutrients are once again being seen as a major threat. This decade the scientific literature is full of reports on the devastating return of algae problems to Lake Erie and to nearshore areas in the other Great Lakes, except for Lake Superior. These surface blooms include toxin-producing algae. [See for example, *Prescription for Great Lakes Ecosystem Protection and Restoration (Avoiding the Tipping Point of Irreversible Changes) 2005* and *Ohio Lake Erie Phosphorus Task Force 2010*. Unless aggressive actions are taken now, these negative effects of nutrients will become even more widespread as climate change warms the waters of the Great Lakes and creates more widespread shallow areas. Therefore, it is essential that the new GLWQA build upon Annex 3 of the current GLWQA to create a more widespread and aggressive nutrients management program.

Recommendations:

1. Annex 3 on nutrients in the GLWQA should be revised and updated.

2. The annex should contain targets for phosphorus concentrations in the water that must not be exceeded. These should include:
   - Targets for the concentrations that phosphorus should not exceed background conditions of the open waters of the lake. These targets should be specific for each lake.
   - Targets for phosphorus concentrations not to be exceeded in nearshore areas, embayments and tributaries. These targets should be developed specific to each area with a particular focus on those areas and tributaries that are the largest sources of phosphorus to the Great Lakes.
   - The States and Provinces should be required to adopt and enforce these numeric targets as water quality standards for phosphorus.

3. The annex should include loading targets for phosphorus and timetables for achieving those targets. These loading targets should be set for:
   - Each lake as a whole; and
   - Each priority nearshore area, embayment or tributary.
     In reporting on the loading target, the governments should break down the loading by each source of the nutrients, e.g., municipal sewage systems, farm operations, landfill leachate, open netcage aquaculture, etc. This will help us better understand the sources of the problems and help us determine where it is most important to take corrective action.

4. The annex should include discharge concentration targets for phosphorus that are not to be exceeded for the following sectors and timetables for achieving those targets:
   - Municipal and industrial sewage treatment plants;
   - Agricultural operations;
   - Other sectors should be added as we gain a more complete understanding of the sources of nutrients.
   - The States and Provinces should be required to adopt and enforce these discharge standards.

5. Other comments on targets:
   - As our scientific understanding improves of the significance of other nutrients, targets should be developed for nutrients other than phosphorus, such as nitrogen.
   - The governments should report on the status of each of the targets listed above every three years. These reports should provide the actual numbers.
   - All the targets listed above should be developed based solely upon the ecological needs of the Great Lakes and St. Lawrence system. These targets should not be weakened by economic considerations specific to a nutrient pollution source.

6. The governments should commit to develop nutrient management action plans for each of the lakes and priority nearshore areas, embayments and tributaries for which phosphorus loading targets have been set. The Annex should commit to have completed development of these action plans within two years of the signing of the Agreement. These should be developed and implemented in full consultation with the public. These should be integrated through watershed plans coordinated among the tributaries for each lake and the downstream connecting water way.

7. The GLWQA should include a commitment to develop and implement basin-wide action plans with timetables for addressing specified nutrient sources. At this point, these should include municipal sewage systems, agricultural operations, including concentrated animal feeding operations, and open netcage aquaculture. The Annex should include a commitment to develop and implement these action plans in full consultation with the public. It also should include a commitment to complete development of each action plan within one year of the time that it has been designated for an action plan.

8. Among other items, basin-wide plans and sector specific action plans should include: 1) preventive approaches that reduce the generation of nutrients; 2) use of green infrastructure mechanisms appropriate to the sector, such as wetlands, riparian buffers, green roofs, raingardens, protection of both urban and rural tree cover; 3) landuse planning and land management tools to ensure that development is carried out in such a way as to reduce nutrient discharges to the Great Lakes and its tributaries; 4) pretreatment requirements for pathogens, and 5) movement of open

netcage aquaculture operations to landbased operations where the water is treated to meet discharge standards and standards that are to be adopted and enforced by the governments.

9. The governments should identify, within their domestic legal and regulatory frameworks, the actual domestic programs that will implement and achieve the nutrient reduction objectives established under the Agreement. Progress on these implementation programs for tributary, embayments and near-shore (coastal) waters, and open lake waters should be incorporated into the status reports noted above in item 5, including levels of funding, agency staffing, and specific projects and activities.

10. Commit to develop, finance and implement a research and monitoring system, including on-site field data, to be able to assess whether annex targets are being met;

11. Conduct scientific research to deepen our understanding of the changing impacts of nutrients in addition to phosphorus on the Great Lakes and St. Lawrence River. In particular research is needed on the impact of Quagga and Zebra mussels' impact on nutrient problems, the role that climate change influences will have on water chemistry, biological activity, and physical changes in the lake ecosystem.

12. Commit to adaptive strategies if the programs show signs of being inadequate to restore and protect the Great Lakes from nutrient problems.

13. Commit to ensure that funding mechanisms, incentives, and enforcement mechanisms will be put into place to achieve the goals of this annex.

14. Commit to reducing the airborne transfer of nutrients from agriculture by educating the agriculture community on the benefits of irrigation in the early evening and then using farming equipment so that dust is reduced significantly.

Science Coordination

Introduction

One of the strengths of the GLWQA has always been its emphasis on science to help in decision-making. We make the following recommendations to strengthen the science component of the Agreement.

Research Priorities

Recommendations: The governments should commit to:

- Revise research priorities to meet revised objectives. For example, research priorities may be expanded to include research related to prevention of species invasions and development of "rapid response" methods for eliminating new invasions before they become established.

- Include better understanding of natural functioning of the Great Lakes-St. Lawrence River ecosystem as a research priority. Annex 17 focuses on pollutants— the natural functioning of the ecosystem is implied, at best. Understanding of the natural processes of the Great Lakes and St. Lawrence ecosystem in their own right should be a priority research topic.

- Include as a research priority approaches to determining the value of ecosystem services in the Great Lakes region.

Research Coordination

Recommendations: The governments should commit to:

- Designate the Council of Great Lakes Research Managers (CGLRM) or the most appropriate binational institution as the chief Great Lakes research coordination and review body. If the CGLRM is selected, its relationship with the Science Advisory Board must be clarified (Articles 7 and 8).

- The CGLRM or another selected institution should be charged with responsibility for maintaining a Great Lakes research inventory and identifying and reporting on research gaps and priorities (Articles 7 and 8).

- Charge the institution with identifying additional research priorities on an ongoing basis between Agreement review processes (Articles 7,8 & Annex 17).

- Charge the governments with making participation in the research inventory program mandatory for all agencies receiving federal research funding (Article 5).

Research Funding
Recommendations: The governments should commit to:

- Provide funding sufficient to meet research priorities (Article 5) and to adequately fund the research coordination and review body (Article 8).

Monitoring
Recommendations: The governments should commit to:

- Revise monitoring programs to meet revised Agreement objectives (Annex 11). For example, monitoring responsibilities should be expanded to include aquatic invasive species, including a coordinated early detection system.

- Improve monitoring coordination by clarifying federal vs. state, provincial, municipal and industrial monitoring obligations.

- Identify and charge the governments with adequately funding a monitoring coordination and review body (Article 7 and/or 8 and Annex 11). This body could be a subgroup or committee reporting to the Binational Coordinating Committee, the Water Quality Board, and/or other appropriate committees or boards. This body would be responsible for:
    - Ensuring maintenance of a comprehensive monitoring inventory, whether hosted directly or through partners such as the Great Lakes Commission or another regional entity;
    - Advising the governments on monitoring gaps and needs;
    - Identifying a minimum set of parameters to be monitored, and identifying and working to implement standardized monitoring protocols;
    - Periodically assessing effectiveness of government monitoring programs;
    - Charging the Parties with meeting their commitments to participate in the development of the Global Earth Observation System of Systems (GEOSS) and its components. This should include reference to expansion of and adequate support for the Great Lakes Observing System, and coordination with the St. Lawrence Global Observatory.

- Provide for monitoring and data sharing with the St. Lawrence Global Observatory (see: http://ogsl.ca/en.html) to make sure science is shared through out the basin and research priorities and results are exchanged on a regular basis upstream and downstream.

Indicators

Recommendations: The governments should commit to:

- Specify a formal selection process that identifies the indicators and endpoints necessary for assessing Agreement objectives (as noted above, the SOLEC process should perform this function but does not evaluate progress on meeting the purpose of the agreement, and is not acknowledged in the Agreement). Aspects of the process that should be identified in the Agreement include general quality of selection criteria, the involvement of experts on various geographic areas and issues, and the participation of stakeholders from non-governmental organizations and all levels of government (Articles 7 and 8 and Annex 11).

- Specify and charge the governments with defining and monitoring indicators for each Agreement objective;

- Apply the above selection process, specify ecosystem objectives (Annex 1) and related ecosystem health indicators for each lake including separate indicators for the nearshore and the offshore zones (Annex 11);

- Apply the above selection process, specify chemical and physical indicators that are well-established and widely valued throughout the Great Lakes policy and scientific communities; and

- Give a credible institution, such as the Science Advisory Board the authority to specify additional indicators (through the application of said indicator selection process) *on an ongoing basis*—that is, outside of the Agreement review process (Articles 7 and 8 and Annex 11).

- Charge the governments with collecting sufficient data for addressing all indicators specified in the Agreement and by designated institution (Article 6 and Annex 11).

- Ensure adequate coordination between monitoring program managers and institution identifying/developing Agreement objective indicators.

Funding for monitoring and research

Recommendations: The governments should commit to:

- Provide timely and sufficient funding for monitoring programs (Article 6 and Annex 11) and scientific research

- Establish a joint endowed monitoring fund for select number of monitoring purposes particularly sensitive to funding interruptions (e.g. fish contaminant monitoring). The fund would serve to minimize any short-term funding

interruptions but is not intended to replace the governments' commitment to provide sufficient ongoing funding (Article 6 and Annex 11).

Other Recommendations: The governments should commit to:

- Increase public involvement in science advisory committees

- Increase reporting mechanisms to improve transparency

APPENDIX 1 Governance: ENGO Governance comments February 15, 2010

[Document begins on next page]

Preliminary Comments and Recommendations on Governance Issues for Consideration During the 2010 Renegotiation of the Great Lakes Water Quality Agreement

February 15, 2010

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Introduction

Increasingly those involved in Great Lakes Water Quality Agreement (GLWQA) matters assert that one of the prime reasons for our failure to achieve more under the GLWQA is the flawed nature and functioning of government institutions and processes around the Agreement. For example, the review carried out in 2006 and 2007 by the governments, with substantial public input, emphasized the following problems with governance in the Great Lakes and St. Lawrence River basin:

- "The Agreement lacks a clear and strong management and implementation framework which has hindered implementation for some binational activities."
- "There was widespread concern amongst Reviewers that inadequate and inconsistent funding has hampered the overall success of the current Agreement."
- "The community that coalesced around the existing Agreement has fragmented, undermining concerted action."
- There is "a sense that governance functions as now being carried out by the Parties have weaker links and accountability to the Agreement, decreasing its effectiveness."

It is because of our recognition of the central importance of governance reforms that the 32 citizens' groups who have signed this submission worked together to create the following comments and recommendations on governance issues for submission to the negotiators of the GLWQA.

If substantial reform is not made to governance in the Great Lakes-St. Lawrence River basin, the potential of the changes that are made to the Agreement during these negotiations around issue-specific matters, such as toxics, invasives, and climate change, will fail to achieve their hoped for positive impacts on the basin.

The following are our preliminary comments and recommendations on governance matters. Within the one-month time frame that the governments provided for input on this crucial aspect of the GLWQA, we did not have time to develop all the detail in some of our recommendations. Also, until we have feedback from the governments on our proposals, we cannot address the questions and concerns that the negotiators may have with some of our recommendations.

We look forward to having the opportunity to dialogue with the GLWQA negotiators on governance matters before a renewed Agreement is finalized.

Vision, Principles, and Management Approaches

A Vision for the Agreement

We believe a new binational vision for the Agreement is important to ensure multi-sectoral engagement, ownership, and hence, better implementation.

Recommendation: amend Article II of the GLWQA to add the following vision statement:

The GLWQA is a catalyst for water quality protection, improvement where needed, and proactive elimination of existing and emerging threats to the physical, chemical, and biological integrity of the waters of the Great Lakes and St. Lawrence River ecosystem.

Principles in the Agreement

In order to build on the emerging successes of the Agreement's call for "zero discharge" and "virtual elimination," principles and practices must be embedded in the Agreement that embrace and implement a more proactive approach to existing and emerging water quality threats.

Recommendation: amend Article II of the GLWQA to add the following principle:

Be Preventive in its Ecosystem Approach through the following practices:

- **Preemptively identifying threats;**
- **Taking preventive action in the face of uncertainty;**
- **Shifting the burden of proof to demonstrate lack of harm on the proponents of an activity;**
- **Exploring a wide range of alternatives to possibly harmful actions;**
- **Increasing public participation in decision-making and providing more effective means of participation; and**
- **Employing the principles of green chemistry to drive pollution prevention and reduce harm.**

The prevention of new problems must occur in conjunction with recovery from existing problems that jeopardize water quality. Every action taken should be aimed at improvement of the situation – not just minimization or elimination of further deterioration. Recovery is more than just 'clean up'; for example, it involves rehabilitating habitat alongside remediating contamination.

Recommendation: amend Article II of the GLWQA to add the following principle:

Strive for Ecological Protection & Recovery in its Ecosystem Approach
This includes, for example:

- **Protection and rehabilitating habitat, such as wetlands, to aid in the reduction of pollution runoff and to improve the Great Lakes physical and biological attributes; and**
- **Remediating contaminants by way of elimination strategies rather than after-the-fact storage solutions such as warehousing contaminated sediments on the near shore or in the water.**

Implementation of Agreement goals and objectives should be delegated to specific institutions or agencies and include reasonably frequent public reporting and multiple opportunities for the public to comment and review progress. These accountability mechanisms should be spelled out in the body of the agreement - who reports to whom, when, and on what. The Agreement's emphasis should be on achieving end goals; however, watershed planning, materials use policies, and toxic use reduction policies should be encouraged for adoption by the Parties to ensure that responsible agencies are making progress. All of these should include timeframes for implementation and clear routes of accountability. Flexibility for such planning and milestones is important for the Parties to achieve end goals and objectives in the manner most fitting for their own jurisdictions. To aid in this process, we strongly recommend that the next generation of the Agreement be "outcome based". Using existing reports and data, the Agreement should articulate quantifiable, measurable ecosystem outcomes and identify specific Parties accountable for that work. For example:

-- Number of wetland acres restored with precise functions measured and monitored to improve water quality and biological health;

-- Reductions in specific toxic chemicals to help allow restoration of sustained natural reproduction of lake trout in Lake Michigan by a certain date.

Remedial Action Plans, Lakewide Management Plans, etc. are beneficial to the system only to the extent that they achieve quantifiable ecosystem outcomes. Since 1987, too much attention has been spent developing and refining plans and progress reports without sufficient attention on ensuring the reports and plans are carried out.

Recommendation: amend Article II of the GLWQA to add the following principle:

Provide for Implementation with Public Accountability

- **The Parties' will provide an Implementation Action Plan that:**
  - **Sets goals and objectives with timeframes;**

- **Delegates Agreement goals and objectives to specific institutions or agencies;**
- **Includes a budget for this plan;**
- **Includes frequent public reporting and opportunities for public comment; and**
- **Provides milestones and benchmarks to ensure that ultimate goals and objectives are met within established timeframes.**

- **The IJC should then evaluate progress**

Watershed Approach

To achieve our goals concerning the condition of the Great Lakes and St. Lawrence River, it is essential that a watershed approach be taken throughout the basin.

The watershed approach should be given much more emphasis in the Agreement than it has in the present Annex 13. A watershed approach focused on the major tributaries to the Great Lakes should be the core organizing mechanism for protecting the waters of the Great Lakes because it is through these tributaries that many of the stressors enter the Great Lakes and St. Lawrence River.

Recommendation: The GLWQA should be amended to make watershed planning and implementation a core organizing mechanism for action in the Great Lakes and St. Lawrence River basin.

One of the major goals of the watershed approach should be to ensure that the tributaries to the Great Lakes do not contaminate the open waters of the Great Lakes and St. Lawrence River. Following a watershed approach can ensure that all sources of pollutants (both point and nonpoint) are addressed so that the open waters can be restored and protected.

Recommendation: The GLWQA should contain a provision on the watershed approach indicating the governments should work jointly on large watersheds to ensure that pollutant loadings do not result in exceedance of water quality standards in the open waters of the Great Lakes ecosystem. This should include a commitment not to discharge waters from the Great Lakes into the St. Lawrence River that may pollute or degrade waters downstream of Lake Ontario.

Recommendation: Annex 13 of the Agreement should be amended to detail the watershed approach.

The watershed approach should not replace the need to finish the pollutant-related aspects of the AOC's program. Regarding AOCs, a major emphasis should be put in the GLWQA on cleaning up these toxic hotspots at a much more rapid pace. The

AOCs should be focused on dealing with historic pollutants rather than being broadened into whole watershed plans.

Combining the watershed approach with the AOC program has had two negative aspects: 1) it diverts attention from rapidly addressing the most severe contamination problems in the AOCs, and 2) watersheds that do not have designated AOCs in them receive virtually no attention under the GLWQA. The broader watershed approach should be applied throughout the basin to include both preventive actions and restoration actions.

The Lakewide Management Plans (LaMPs) should continue to be a component of the GLWQA. The watershed plans that we have recommended earlier should be integrated with the LaMP program for each Lake and their connecting channel(s).

Recommendation:

1) Annex 2 of the GLWQA should be amended to ensure that the AOC program is focused on the most severe existing contamination problems and upon cleaning up these areas rapidly.

2) The watershed approach recommended should be applied in watersheds that include AOCs, but should be much broader in their work and not draw focus away from the core AOC problems until those AOC problems have been corrected.

3) The watershed planning exercise should be integrated with the LaMP programs.

The Role of Adaptive Management

The preventive principle and the ecological recovery principle should be the guiding management strategies for Great Lakes water quality, coupled with an assumption that achieving ecological health and resilience should be the fundamental goal for management decisions.

Adaptive management, when used to its best purpose, can be a useful tool for incorporating experience, new data, and unforeseen influences into management strategies. It is a "reflect, learn and apply" approach. It would logically be part of the range of implementation strategies we expect the Parties might consider to meet the goals and objectives of the GLWQA. It complements the setting of high goals and aggressive objectives, against which implementation successes (regardless of their level of adaptability) should be measured and uncertainty reduced.

At its worst, adaptive management can be misrepresented as a reactive excuse not to continue some programs or actions. This creates an "eddy" in management approaches where challenges may be repeatedly revisited, but where reflection fails

to lead to action that addresses original objectives and becomes postponed indefinitely.

Complex challenges such as climate change illustrate what the many stakeholders need from management strategies: leadership and development of action plans that informs and tells them what to do to prepare in advance to minimize the impacts and protect the resilience of the ecosystem. This preparatory approach is sound anticipatory management, and experimentation on adaptive processes in the face of uncertainty means that agencies are enabled to adapt programs and policies to better address matters with greater knowledge based on learning. In the case of climate disruption, we will need precautionary and anticipatory approaches for potential reduced flows, more intense precipitation and winter rain, possible increased algal blooms resulting in health and odor concerns in water systems, and we may have to change distribution, timing, permitting, and address water allocations in parts of the Great Lakes and St-Lawrence River system. To mainstream climate change adaptation into decision-making management requires planning, informed scenarios and monitoring. These approaches will build resilience and informed constituencies.

Recommendation: Adaptive management should have a role in the implementation of programs to meet Agreement objectives and could be noted as one approach the Parties should consider (in addition to aiming towards robust decisions, as recommended to the Science Advisory Board in Findings of an Expert Consultation on Strengthening Science Under A Renewed Great Lakes Water Quality Agreement 2006). But, the Agreement should have a markedly greater emphasis on the precautionary principle and ancillary efforts to avoid creating major problems in the first place than on adaptive management.

The Scope of the Agreement

Issues Included in Agreement

There is considerable discussion as to whether the scope of the Agreement should be changed and on the extent of any such changes.

Some have proposed that it become a Great Lakes Sustainability Agreement, which would balance social, economic and environmental considerations. We believe that this is inappropriate since this balancing inevitably understates the primary importance of clean water for the health of the ecosystem, basin residents and all activities dependent on clean water. Other efforts are underway to revive the economy of the Region.

Others have proposed that it become a Great Lakes Ecosystem Agreement, which would address all environmental issues in the basin. We believe that the GLWQA should not become the only or even the primary agreement for addressing Great Lakes issues. We are concerned that an agreement that tries to address a complex of environmental issues would become an agreement that in practice would be unable to address anything. There is a risk that it would be so dense and expansive that it would be impossible to fund and implement, or, it would be so general in nature it would have no strategic focus on priorities. In addition, there are many other existing agreements, such as the Convention on Great Lakes Fisheries and the Great Lakes—St. Lawrence River Basin Sustainable Water Resources Agreement, and binational bodies, such as the Great Lakes Fishery Commission, and the Great Lakes Panel on Aquatic Nuisance Species, that have valuable roles to play. We believe that communication among those responsible for each of these agreements and bodies is critical, and that the maximum effort should be made to ensure that these agreements work in concert to assure an integrated holistic approach. At the same time, we believe it is more efficient and effective to keep the agreements separate so as to assure maximum focus by those agencies responsible for the challenges at issue.

Therefore, we concur with the International Joint Commission (IJC), that the GLWQA should retain its focus on water quality, but with a broader view of human activities that impact water quality.

The understanding by scientists and policy makers of the factors affecting water quality has increased since the Agreement was last revised. Consequently, we recommend that the GLWQA be revised to add new stressors and reflect a better understanding of stressors already in the Agreement. The stressors that we believe should be added or given a greater emphasis include: invasive species, chemicals of emerging concern (such as endocrine disruptors, carcinogens, neuro-developmental toxicants, flame retardants, pharmaceuticals, phthalates, perfluorinated compounds,

perfluorooctane sulfonate, bisphenol A, nanoparticles), air pollution from sources beyond the Great Lakes basin, radionuclides, copper and nickel sulfide mining sources, groundwater pollution, fish farms, intensive agricultural operations, urban development, water levels insofar as they affect water quality, and climate change.

We also recommend that in addition to new problem areas, new approaches to preventing water quality degradation be included in the Agreement, particularly those consistent with precautionary, preventive and ecosystem-based approaches. They should include approaches that have been successful elsewhere, especially in the European Union, including life cycle analysis and management, extended producer responsibility, reverse onus, zero discharge of persistent toxic pollutants, pollution prevention and regulating classes of compounds, particularly chlorinated, brominated and fluorinated organics, based on common chemical structures and activity.

Recommendation: We recommend that the GLWQA retain its focus on water quality, but that it include a broader consideration of stressors that impact water quality than is in the current Agreement. Therefore, we recommend that the Agreement be expanded to include the issues listed two paragraph before this.

Recommendation: Provisions should be put into the GLWQA committing to cooperation with bodies responsible for implementing other Great Lakes agreements.

Understandably, work under the GLWQA has focused on restoring and improving water quality. We also believe, however, that more emphasis should be put on protecting those areas where water is already of high quality and a zero degradation approach should be taken. This is consistent with the prevention approach that we recommend elsewhere as a guiding principle for the GLWQA, and some efforts that have been pursued in the Basin, including the Lake Superior Zero Discharge Demonstration Zone.

Recommendation: We recommend that the GLWQA place higher emphasis on protecting and maintaining high quality waters and those mechanisms critical to protecting water quality, such as wetlands, than it currently does in addition to maintaining its present focus on restoring water quality, and that it include a zero degradation provision.

Geographic Scope of Agreement

Currently the GLWQA includes the St. Lawrence River only up to the point where it ceases to be the border between Canada and the U.S., which is near Cornwall and Massena. This is inconsistent with the ecosystem approach in the GLWQA. Therefore, we urge that the entire St. Lawrence River, including the gulf and estuary, be included in the Agreement.

The Agreement is based on the *Boundary Waters Treaty* of 1909. As a result, some argue that the Agreement can apply only to boundary waters, which means that the St. Lawrence River cannot be included once it passes Cornwall-Massena and is wholly located within Canada. However, Lake Michigan, which is wholly within the United States, is already included in the Agreement as it is part of the Great Lakes Basin ecosystem. Therefore, it is inconsistent to artificially chop off the ecosystem part way down the St. Lawrence River.

Recommendation: Revise Article 1, sections (g) and (h) of the GLWQA to include the entire St. Lawrence River. In addition, section (s) should be revised to include the Province of Quebec.

Water Scope of Agreement

Most of the work under the GLWQA until recently has focused on the off-shore areas of the lakes. The major exception to this, of course, is the work on AOCs. Recently there has been considerable discussion of including nearshore, groundwater, and surface waters flowing into the Great Lakes and the St. Lawrence River. It is clear that the Lakes cannot be protected so long as the waters that flow into them are not cleaned up and protected.

Recommendation: The GLWQA should be revised to make sure that monitoring, protection, and clean-up plans for nearshore waters, groundwater and surface waters flowing into the Great Lakes and St. Lawrence River are emphasized.

Annex 16 "Pollution from Contaminated Groundwater" was added to the Agreement in 1987. However, this annex has had limited effect since it lacks goals and commitments to specific actions.

Recommendation: Annex 16 of the Agreement should be developed in much more detail, including goals and action plans, to strengthen the groundwater protection component of the GLWQA. Definitions in the agreement should be changed to add groundwater. This is important not only to accurately include all geographical portions of the Basin ecosystem, but also to ensure that groundwater is covered by all of the protections in the Agreement that are extended to all of the surface waters of the Basin.

Partners in the Agreement

Provincial, State and Municipal Governments

Although the Agreement is a commitment made by the Canadian and U.S. governments, these governments cannot achieve the goals of the Agreement without considerable work by the provincial, state and municipal governments, who

play a critical role in implementation of the Agreement. For example, cities in the Great Lakes and St. Lawrence River basin invest an estimated $15 billion each year on programs essential for achieving the goals of the GLWQA.

Recommendation: The provincial, state, and municipal governments should be recognized in the Agreement as essential partners and should be included in deliberations around GLWQA activities.

Tribal, First Nation and Métis Governments

Approximately 350,000 descendants of the first peoples of the Great Lakes basin live in 110 nations on approximately three million hectares of federally recognized reserve land and sovereign territory in the Great Lakes-St. Lawrence River basin. Many more of their descendants live off the reserves and territories, most of them in urban centres. These aboriginal peoples have rights as sovereign independent governments.

The unique role of the Tribes, First Nations and Métis in protecting and restoring the Great Lakes should be recognized in the GLWQA. The specific provisions related to the Tribes, First Nations and Métis should be worked out through extensive discussions with these peoples. This unique role should be recognized as distinct from "public participation" in GLWQA matters.

Recommendation: The GLWQA should include mechanisms for government-to-government consultations between the US and Canada, and First Nations and Tribal and Métis Governments. This should include recognition that prior and informed consent be required for actions that may threaten the quality and availability of clean water on the reserves and territories. It also should require that the First Nations and Tribal and Métis governments be part of any renegotiation of the Agreement.

Citizens of the Great Lakes-St. Lawrence River basin

A substantial community of citizens has developed engaged in activities directly related to GLWQA activities. For example, thousands of citizens have given countless volunteer hours to the Areas of Concern program. This is only one of many such examples that could be listed.

In *Evolution of the Great Lakes Water Quality Agreement*, Lee Botts and Paul Muldoon list "development of community" as one of the prime reasons for the success of the Agreement: "The success of the Great Lakes regime depends on the shared commitment to the goals of a community that includes governments, the scientific community, and nongovernmental participants."

It is essential that the public be recognized as partners in the development and implementation of the Agreement.

Recommendation: The GLWQA should recognize the importance of the role of the public and specify mechanisms for their engagement. Detailed recommendations on this follow later.

Reviewing & Amending the GLWQA

One of the recurring obstacles to full implementation of the 1987 GLWQA has been the impression that it cannot be updated without an overwhelming lengthy process. In the past this led to calls for a reopening and renegotiation of the Agreement even to address relatively minor issues. This is unnecessary since the mechanism, Article 13, already exists in the Agreement to review and update each of the annexes:

> 1. This Agreement, the Annexes, and the Terms of Reference may be amended by agreement of the Parties. The Annexes may also be amended as provided therein, subject to the requirement that such amendments shall be within the scope of this Agreement. All such amendments to the Annexes shall be confirmed by an exchange of notes or letters between the Parties through diplomatic channels which shall specify the effective date or dates of such amendments.
> 2. All amendments to this Agreement, the Annexes, and the Terms of Reference shall be communicated promptly to the International Joint Commission.

Therefore, we support the present structure of the Agreement, where the goals, objectives, processes including public involvement, institutional arrangements, reporting and accountability mechanisms, review process, etc., are in the body of the Agreement, and the more detailed commitments and plans around specific stressors are attached in Annexes. As the Agreement currently states, these Annexes can relatively easily be amended to keep the Agreement up to date.

Recommendation: In the new Agreement, a regular schedule of review and amendment should be explicitly included and acted upon so that the Agreement stays timely. We recommend that the governments review and consider updating the Annexes at least every three years, starting immediately after the IJC's triennial report on Great Lakes water quality. These changes can be made through an exchange of letters.

Accountability, Enforcement, Compliance & the Citizens' Role

The GLWQA inspires people in the United States and Canada to remember that the Great Lakes are shared by two countries, as well as first nations, tribal and Métis governments, and has driven important public health and water quality improvements for Great Lakes residents. Historically, the GLWQA has been a key mechanism for shared coordination and activities for ecosystem restoration. Unfortunately, over the years, the Agreement has become increasingly irrelevant and ineffective due to the failure of the Parties to meet their obligations to achieve objectives and goals.

Effective implementation and accountability are fundamental to a successful GLWQA and real water quality improvement in the Great Lakes. The public has been clear that they want more accountability and this is a critical issue in any renegotiation. Since its establishment in 1972, with changes in 1978 and 1987, in the United States the GLWQA has been considered by some to be an unenforceable "executive agreement." To help correct this situation, Congress amended the Clean Water Act in 1990 to require the federal government, in partnership with the states, to "achieve the goals embodied in the Great Lakes Water Quality Agreement."

Even grounding the GLWQA in the Clean Water Act has proven insufficient to compel action. In 1995, the U.S. Environmental Protection Agency (EPA) promulgated water quality standards under the Great Lakes Water Quality Initiative for toxic pollutants. In ensuing litigation before the U.S. Court of Appeals for the District of Columbia Circuit, EPA argued against using the GLWQA as a rationale for phasing out toxic pollutants, arguing that the GLWQA was voluntary. The Court of Appeals agreed, although EPA eventually issued final standards under the Initiative, which has led to more restrictive permitting requirements.

In preparing for the renegotiation of the current agreement, the Canadian and U.S. governments have stated that they intend to draw heavily from their 2006 and 2007 GLWQA review in crafting the new GLWQA. During the 2007 review, as stated in *Synthesis of Public Comment*, accountability was a "major theme." A key recommendation included the following statement:

> "The IJC should do everything possible to ensure that any future version of the Great Lakes Water Quality Agreement includes enforcement measures that allow outside entities to hold governments accountable, in court if they fail to meet the specific goals, action and timelines that should be part of the new Agreement. This increase in meaningful accountability might help rebuild public trust in the institutions charged with protection of the Great Lakes... (p.34)

However, the IJC is not the enforcing body. The domestic agencies of the two nations are. Failure of the parties to achieve accountability within these agencies to date compels us to recommend that the Parties, as part of the renewal of the GLWQA, develop a comprehensive program and plan to implement the new agreement, designed with full public engagement. This plan should:

- publicly delineate priorities, stated actions and associated funding needs;
- improve access to information by requiring regular reporting on the implementation of action items and delivered funding; and
- have this information open to the public through a frequently updated Web site designed to track progress on objectives, open records to the citizens of both nations, and reported on at IJC biennial or triennial meetings.

Recommendations: We urge that, through the Agreement process, the Parties publicly commit to establishing a legislative and regulatory framework (on a specified timeline) for achieving and monitoring progress towards Agreement goals and objectives. This framework should include:

1. A comprehensive review of domestic law as it relates to protecting and restoring water quality and the chemical, physical and biological integrity of the Great Lakes ecosystem, and specific recommendations for revisions to domestic law that will support compliance and enforcement with Agreement objectives.

2. Specific requests to Parliament and Congress to undertake the process of enacting legislation to achieve Agreement compliance within the timelines of appropriate reauthorization schedules and other legislative processes.

3. Development of commensurate regulatory programs within appropriate federal agencies, and agreements with implementing enforcement agencies in state, provincial, first nation and tribal governments that clarify roles and responsibilities for meeting Agreement objectives, public review processes, and reporting to the Parties, the IJC and the public.

4. Funding strategies and sufficient appropriations to support enforcement capacity at the federal, state and provincial levels.

5. Periodic public review by administrative agencies, and legislative bodies.

6. Independent review by agencies such as the Auditor General of Canada, the Government Accountability Office in the U.S., and by independent scientific bodies such as the U.S. National Academy of Sciences and the Royal Society of Canada.

7. Each Party should specifically identify and make publicly known the domestic public official who carries the responsibility for domestic compliance with the GLWQA. This responsibility should be articulated in the official governmental job description for this public servant.

Recommendation: Article XI Section 2 of the GLWQA should be amended to state that the Parties commit themselves to:

1. Appropriate funds required to implement this Agreement, including the funds needed to develop and implement the programs and other measures provided for in Article VI of this Agreement, and the funds required by the International Joint Commission to carry out its responsibilities effectively;

2. Enact any additional legislation that may be necessary in order to implement the programs and other measures provided for in Article VI of this Agreement; and

3. Coordinate with the State, Provincial, tribal, first nation and Métis Governments, and stakeholders in all matters relating to this Agreement.

The possibility for accountability is dramatically weakened by words that do not specifically say "commit."

Recommendation: All phrases that grant governments generic flexibility in implementing the GLWQA, such as "shall seek to" and "will make their best efforts to," should be removed from the GLWQA and replaced with clear commitments.

Citizen Roles and Rights

The success of the GLWQA has depended on strong citizen participation to stimulate the political will of the governments. All forms of public involvement have declined in recent years. The trend away from public engagement is inconsistent with other international agreements, which aim toward increased public engagement, accountability and access to justice.[1]

Recommendation: The GLWQA should contain specific provisions to guarantee transparent pubic access to GLWQA processes and decision-making.

[1] Two examples are: the North American Agreement on Environmental Co-operation (NAAEC) under the North American Free Trade Agreement and the United Nations Economic Commission for Europe (UN/ECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). The NAAEC contains both a citizen petition process and a government-to-government dispute resolution process. The petition process can trigger an independent review of claims that one of the governments is "failing to effectively enforce its environmental laws". The dispute resolution process can lead to "monetary enforcement sanctions" for persistent patterns of weak environmental enforcement. The Aarhus Convention (which came into force in 2009 and to which Canada/United States are not signatories) contains provisions relating to the "three pillars" of access to information, participation in the environmental decision-making process, and access to justice through an independent review process. The latter includes provision for both direct and indirect enforcement of national environmental laws.

Access to Information
Access to information is essential to effective participation in environmental-decision-making. Full, timely access to information should include both passive and active mechanisms for information disclosure. Passive mechanisms provide that information be made available on request. Active mechanisms provide that information be collected and disseminated in the public interest. Both types of mechanisms should be reflected in the GLWQA.

Recommendation: Provisions should be added to the GLWQA that include, but are not limited to, the following:

- **Commitments to providing access to information affecting policies and decisions in a timely fashion, allowing for meaningful citizen and local government participation in decision-making;**
- **Regular government reporting on progress toward achieving specific goals and objectives; and,**
- **Clear government reporting on budget allocations and actual expenditures.**

Advisory board participation
The public also should be assured of more meaningful participation in IJC activities. Citizen experts in the appropriate fields and representatives of the basin's environmental groups, at least one from each country, should be appointed to the IJC's existing boards, that is, the Water Quality Board, the Science Advisory Board, and the Council of Great Lakes Research Managers. Nominations for environmental group representation on the boards should be solicited from a body of all environmental groups in the basin reasonably characterized as being regional in nature. As specified for other representatives in the IJC's Mission Statement and Guiding Principles, environmental group representatives would be expected to perform as advisors in their personal and professional capacities rather than in their organizational capacities.
In addition, a new Citizens Advisory Board should be instituted by the IJC. This board should advise the IJC commissioners on the adequacy of government programs and the partnerships enabled through government facilitation to achieve the goals of the GLWQA and make recommendations on how these programs could be improved.

Recommendations: The GLWQA should be revised to require environmental citizen representatives on all existing IJC boards. In addition, the Agreement should require the IJC to set up a Citizens Advisory Board to advise the IJC on the adequacy of government programs and to make recommendations to the IJC on these matters.

Public participation in reporting
The IJC and, perhaps more importantly, the governments should assure ample opportunity for public participation in all reporting and information exchange processes, and in particular the IJC biennial or triennial meetings. The GLWQA

should specify that the IJC biennial or triennial and board reports will be completed substantially in advance of the biennial or triennial meeting, and that commissioners, report authors, and government officials will all be present to accept comment and to answer questions from the public about the reports.

Recommendation: The GLWQA should specify that the IJC should provide for public participation in its biennial or triennial meetings in a matter that facilitates meaningful involvement, for example, through a process such as that outlined in the previous paragraph.

Public Petitions

The Agreement should specify a public petition process by which any resident of either country can claim a failure to implement the Agreement. Such petitions would be required to meet screening criteria, as judged by the IJC to ensure that they are not frivolous or duplicative of existing litigation, and that alternative domestic procedures applicable to the petition topic have been tried. If a petition is valid, the Agreement should require an investigation of the petition topic by the IJC, a public response from the relevant governments, recommendations by the IJC for action, and a commitment by the governments to be bound by the IJC's recommendations as a result of a public petition process.

Recommendation: The GLWQA should be amended to require the IJC to set up a citizen public petition process. The IJC should consult with the public as it develops this petition process.

Binational Institutions

As threats to the ecosystem grow, binational responsibilities have been blurred and unbalanced between the two countries. Rather than strengthening Great Lakes binational institutions, which are essential for a true cooperative ecosystem approach, the shifts in power in the Great Lakes-St. Lawrence River basin since 1987 have resulted in confusion. For example, the oversight powers of the IJC have substantially lessened in the past twenty years. Government accountability for their commitments in the Agreement has waned at the same time.

Since the 1987 revisions to the GLWQA, there has been incomplete implementation of a number of the provisions of the Agreement. Some of these can be attributed to inadequate efforts at the binational level. The Governments created several new implementation mechanisms not in the Agreement such as the Binational Toxics Strategy (BTS) established in 1997, the State of the Lakes Ecosystem Conferences (SOLEC) started in 1994 and, in 2004, the U.S. government established a Great Lakes Regional Collaborative (GLRC). The BTS does not have binding commitments and has few mechanisms to deal with new pollutants or synergistic effects. The Governments created their State of the Lakes Ecosystem conference as a binational opportunity to update and review data and report on indicators, but there is insufficient linkage between state of the lakes indicators and government commitments under the GLWQA. In the U.S. the GLRC strategy identified goals and objectives for a Great Lakes restoration in eight issue areas; however, there was only very limited involvement of Canada, threatening to undermine the binational cooperation needed for an ecosystem approach.

Leading up to the 1987 renegotiation of the GLWQA, environmental groups sought to increase the accountability of governments for progress toward achieving the objectives of the agreement. They did this by advocating for more specific actions on issues and calling for more public involvement in binational decision-making**.**

The renegotiated 1987 GLWQA contained many new obligations for action and for reporting to the public on critical pollutants, point source impact zones and the RAPs and LAMPS [Annex 2], contaminated sediments [Annex 13], non point-source pollution [Annex 13], airborne toxic substances [Annex 15] and contaminated groundwater [Annex 16].

Despite these new focuses, in the past twenty-three years, there has been a serious weakening and confusion of the accountability mechanisms and responsibilities for Great Lakes water quality and a lack of coordinated strategic bi-national programs to address the long-existing crises in the Great Lakes as well as failure to keep up with the growing threats to the ecosystem.

Binational Executive Committee (BEC)

The 1987 Agreement added a new requirement for the Parties to meet twice a year "to co-ordinate their respective work plans with regard to the implementation of this Agreement and to evaluate progress." The BEC was set up to fulfill this new commitment.

Over the past twenty years BEC has failed to adequately fulfill this task. Their meetings, based on our observations and assessment, have primarily become opportunities for information exchange between the two countries – not times at which problems are worked through and new solutions developed.

In a few cases, BEC has developed and/or overseen joint programs to address matters in the GLWQA. One of these is the BTS. This was created to fulfill a commitment in the 1987 GLWQA for such a program – a commitment that the IJC had to repeatedly remind them of before they created it in 1997. The problem, however, is that if one country or the other becomes stubborn on a matter, the joint programs falter. Increasingly we have seen these programs stalled by national head offices that fail to recognize the importance of jointly developing and overseeing the implementation of programs at the Great Lakes-St Lawrence River basin level - programs that may need to differ from national programs to suit regional needs and goals.

The danger in such a situation is that the needs of the shared Great Lakes and St. Lawrence River ecosystem are not necessarily reflected in national programs and financing. BEC has failed to be much more than a place where the two governments inform each other of what they are doing rather than assessing whether the programs are adequate to address shared needs and determining additional actions needed to address these needs. As a result, even though the BEC's name implies that it operates "binationally", for the most part BEC operates "bilaterally," i.e., not working jointly.

Another problem with the BEC is that is not a very open process; it fully includes only federal, state and provincial agencies. The tribal, first nation, ENGO, industrial, and municipal attendees have the status of "official observers." They get to comment on items BEC is discussing. When BEC makes decisions on items, e.g., the recent changes in reporting procedures and timing in the LaMPs, they do not put the proposals out for public consultation before making decisions. In the case of the recent changes to LaMPs, for example, not even the lakewide public forums were consulted.

Recommendation: Article X, 3 of the GLWQA should be amended in the following ways:

1. **Revise description of role of BEC to include development of a comprehensive binational Great Lakes-St. Lawrence River basin work plan by a specified date using an open and transparent process. This work plan should be based on the commitments in the GLWQA. The section should also state a frequency with which the workplan will be updated.**
2. **The Agreement should specify that the binational work plan will identify prescriptive programs for both present and emerging needs and will include timetables for regular review and reporting on progress on the work plan.**
3. **The Agreement should state that the provincial, state, first nation, tribal, Métis and municipal governments shall be members of the BEC. Representatives of the public, including industry, ENGOs, etc, should also be fully included as members of BEC for discussion purposes, but they should not be part of the final decision voting.**
4. **All BEC activities should be conducted in an open and transparent manner. This should include having all meetings public and the conduct of a formal consultation process on the binational plans as well as on all matters that would change existing programs or processes.**
5. **BEC should utilize the SOLEC process to develop and report on indicators that measure progress toward meeting the specific objectives of the GLWQA. The SOLEC process should be more active at including public participants in its processes.**

The International Joint Commission

The IJC is seen as a critical institution for the success of the GLWQA. Unfortunately, there is currently a strong and near unanimous opinion that the IJC is not adequately fulfilling its responsibilities.

According to the Agreement, the roles of the IJC are:

- Collation, analysis, and dissemination of data and information on the condition of the boundary waters and on pollution;

- Collection, analysis, and dissemination of data and information concerning the General and Specific Objectives and the operation and effectiveness of the programs and other measures established pursuant to this Agreement;

- Tendering advice and recommendations to the Parties and State and Provincial governments on matters in the Agreement and its annexes;

- Assisting in the coordination of joint activities under the Agreement;
- Assisting and advising on research in the Great Lakes basin; and,

- Investigation of matters referred to it by the two federal governments.

A prime part of the recent criticism of the IJC in regards to its activities under the GLWQA is that it is failing to evaluate and to provide leadership as an independent voice for the Great Lakes. The roles currently listed certainly allow for and encourage the IJC to play those roles, but they need to be more explicit to make the parties' and public's expectations of the IJC and the roles and responsibilities of the Great Lakes regional office clearer.

Recommendation: Revise Article VII on the role of the IJC to add the following role at the beginning of the list: Evaluation of the condition of the Great Lakes and St. Lawrence river ecosystem and of the government programs affecting the basin, and leadership in finding solutions to Great Lakes-St. Lawrence River problems. The main purpose of SOLEC should be to provide the IJC with an assessment of the condition of the Great Lakes and St. Lawrence ecosystem. The SOLEC process should be designed to provide the IJC with the evaluation of conditions and progress towards meeting the purpose of the Agreement, through the development of and reporting on established endpoints.

The previous valuable role of the IJC's Water Quality Board (WQB) has lessened over the past twenty-three years. It used to put out excellent evaluations of the state of Great Lakes programs. With its regional office substructure seriously weakened by the parties, it now focuses more on specific issues instead of giving such a thorough analysis of the whole range of programs. The IJC's Water Quality Board needs to have its mandate and membership re-expanded and more explicitly described in the GLWQA.

When the WQB was conducting assessments of government programs, it sometimes came under criticism because the WQB was solely made up of federal, provincial and state government people. This was seen by some as a conflict of interest, making it difficult for them to provide an honest evaluation of the programs. To give more credibility to the work of the WQB, its membership should be expanded beyond the federal, provincial and state governments.

Recommendations: The WQB's mandate in the GLWQA should be amended to specifically say that it will assess the state of the government programs in protecting and restoring the Great Lakes and St. Lawrence River basin. The GLWQA should be amended to specifically state that the membership of the WQB will include members of the federal, provincial, state, first nation, tribal, Métis, and municipal governments, as well as the public.

One of the valuable roles that the IJC plays is to hold a biennial meeting in the Great Lakes to draw together people from throughout the basin. This meeting should focus on the state of the lakes' and their response to protection and restoration initiatives and on the state of the government programs to carry out the commitments they made in the GLWQA. The prime roles of this meeting should be to provide the public with the opportunity to assess, comment on and make recommendations on the IJC board's reports and the State of the Lakes report on

these matters. This meeting is not now required in the GLWQA, but has been happening as a matter of established practice.

The IJC's biennial meetings currently include a session where the governments report on their activities since the last IJC biennial meeting. These sessions have proven frustrating for the public since the public is not given adequate time to ask questions of or make comments directly to the governments. These sessions would be more meaningful if the public's concerns about government action were directly addressed to the governments with an opportunity for the governments to respond. These would in effect become accountability sessions. The session where the IJC Commissioners were hearing directly from the public would then focus on the public's suggestions for recommendations that they would like the IJC to make in their next report.

Considerable concern has also been raised about whether reporting in this detail every two years is necessary. We believe it makes more sense to set this on a three-year cycle for the SOLEC and IJC meetings in order to focus government attention on the implementation of programs rather than merely reporting. However, the cycle should not be less frequent than three years because assessment and reporting are critical components of good governance, providing essential information for making course corrections and improvements, and providing accountability to the public.

Recommendation: Article VII 3 of the GLWQA should be changed so as to require a full report from the IJC to Parliament and Congress as well as to the public every three years, instead of every two years. In addition, this article should be amended to require the IJC to hold a public meeting prior to writing that report to obtain input on the work the IJC has done over the previous three years and to obtain input on the condition of the lakes and of the adequacy of government programs. This should include a government accountability session.

Government Response to IJC Reports

Article X of the GLWQA requires the two federal governments to "consult on the [IJC's] recommendations." The governments interpret this "consult" to mean consult with each other - not with the public.

Recommendation: Article X of the GLWQA should be amended to require the two federal governments to hold public hearings in each of their countries within 3 months of the release of a report by the IJC and to forward the report from those hearings to their respective legislatures. The federal agencies responsible for implementation of the GLWQA should appear at these hearings. In addition, representatives of the public should be invited to speak at the hearings.

The Agreement currently does not require the governments to respond to the IJC on their recommendations or to the public. As a matter of practice both governments have been publishing responses to each of the IJC's recommendations. However, it frequently has been a year or more after the IJC made the recommendations that the responses are released.

Recommendation: Article X of the GLWQA should be further revised to require the governments to publicly respond to the IJC's recommendations and to do so within 6 months of the release of the IJC report.

Some of the reasons analysts have given for the failure of the IJC to more adequately fulfill its mandate include matters such as the processes by which commissioners are appointed, and funding control by the two federal governments. These matters cannot be addressed through the GLWQA.

Science and Binational Decision-Making

A strong science underpinning to bi-national decision-making in the Great Lakes-St. Lawrence River basin has always been a critical foundation to the implementation of the GLWQA. A state of the science needs assessment and gap analysis should be done for the Great Lakes so a strategic, integrated and informative science agenda can be framed for the Basin.

The BEC set up the biennial SOLEC process as a mechanism to pull together diverse scientific information. BEC holds biennial conferences on the state of the lakes. A State of the Great Lakes Ecosystem Report is then produced based on information presented at the conference and on indicators of ecosystem heath.

In the last decade, the State of the Great Lakes ecosystem reports have used a report card style assessment, and consistently reported that the status of the ecosystem is "mixed", although what this means is vague and value laden. Some conditions are reported "good" and "poor" but the majority of conditions in the 2008 report such as human health, biotic, land use-land cover, climate change, resource utilization, coastal zones and aquatic habitats were reported to be of **unknown status**. This is a clear acknowledgement that insufficient science is being brought to bear on these issues, due to limited funding within each country. Furthermore, while the reporting approach may be more intuitive for many readers in showing a qualitative assessments of particular indicators, the absence of targets and trend data make it challenging to assess how much closer we are to a healthier ecosystem. Coupled with incomplete data for many indicators, this situation limits the ability to make informed decisions. This points to the need to strengthen Annex 17 of the GLWQA.

Recommendation: Annex 17 of the GLWQA should be strengthened, including with specific recommendations on reporting approach, to ensure that we have an adequate and constantly updated understanding of the state of the Great Lakes and St. Lawrence River.

APPENDIX 2 Toxic Substances: Green Chemistry and Green Engineering Annex

[Document begins on next page]

Great Lakes Water Quality Agreement
GREEN CHEMISTRY and GREEN ENGINEERING ANNEX
Submitted July 9, 2010

Introduction

The philosophy adopted for the elimination and reduction of toxic and hazardous substances under the Great Lakes Water Quality Agreement shall be green chemistry, incorporating the use of substitution, alternatives and sunsetting to eliminate and reduce the generation, use and disposal of hazardous substances in the Great Lakes.

The cornerstone of the Great Lakes Water Quality Agreement has been the recognition that preventing the entry of hazardous and toxic substances into the Great Lakes is the most effective way of restoring the quality of the Great Lakes ecosystem and protecting it from further contamination and harm.

While recognizing that legacy contamination must also be a priority in restoring the integrity of the Lakes, and end-of-pipe efforts are still required in the short-term to minimize the enormous continuing loading of chemicals into the Basin through all media, it is unarguable that the only long-term solution to protecting the largest system of fresh-water seas on the planet is an explicit strategy of prevention. This Agreement has recognized this from the beginning, with its emphasis on zero discharge and virtual elimination, supplemented by the need for early warning systems, rigorous surveillance, and regulatory mandates.

Green chemistry and green engineering (GC&E), in the words of a recently-released document from Yale University, are "systems-based approaches that promote
design for reduced hazard across the entire life cycle of chemicals, from design, manufacture, and use to end of life. They integrate knowledge from across chemistry, engineering, environmental science, and toxicology in order to reduce and, ideally, eliminate adverse impacts on health and the environment. GC&E provide a framework for a preventative approach based on innovation that improves technical performance, profits, and social benefit."[1]

At a time when thousands of chemicals remain in the environment, and thousands of tons of contaminants continue to pour into the Great Lakes in spite of the dramatic advances by the Parties in reducing these loadings, Green Chemistry and Green Engineering offer a dynamic new approach to operationalizing the goals of zero discharge and virtual elimination. It is the purpose of this Annex to describe how these tools can be most effectively applied to the challenges in the Great Lakes.

The Yale report characterizes three key areas in which GC&E can be useful, which are quoted here in their entirety with slight modifications to enhance their relevance to the specific needs and process of the GLWQA.

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[1] Matus, Kira MJ, Beach, Evan, Zimmerman, Julie B., *Integrating Green Chemistry and Green Engineering into the Revitalization of the Toxics Substances Control Act*, Center for Green Chemistry and Green Engineering, Yale University, New Haven, CT, June, 2010, p.3.

1. Technical: The development and deployment of metrics, tools, education, knowledge sharing and communication to support the continuous development and implementation of GC&E-based innovations.
2. Policy: The use of regulatory authorities in a variety of ways, including (but not limited) to help remove market distortions that protect or favor more hazardous alternatives, to provide incentives for GC&E-based alternatives, and to engage in voluntary agreements and collaborations.
3. Financial: The leveraging of funds by the governments of both Parties to support green chemistry and engineering research, development, and implementation.[2]

1. **Purpose of Annex**

The purpose of this Annex is to outline detailed strategies, policies, plans, and commitments for the adoption of Green Chemistry and Green Engineering in the Great Lakes Water Quality Agreement.

2. **Definitions**. As used in this Annex:

(a) "Green Chemistry" is the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture, and application of chemical procedures.[3] The application of the principles of Green Chemistry is dynamic to ensure progress is achieved towards eventual elimination of toxic chemicals.

(b) "Green Engineering" is "the development and commercialization of industrial processes that are economically feasible and reduce the risk to human health and the environment."[4]

(c) "Hazard" is the inherent property of an agent or situation having the potential to cause adverse effects when an organism, system or (sub) population is exposed to that agent."[5]

(d) "Continuous improvement" is defined as Successful implementation through continuous improvement and planning. Alternatives decisions are not final. They are steps along the path to sustainability.[6]

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[2] Ibid, p. 4.
[3] Anastas, Paul T., Warner, John C. *Green Chemistry:Theory and Practice*, Oxford University Press, New York, 1998, p. 8-9.
[4] Anastas, P.T., and Zimmerman, J.B., "Design through the Twelve Principles of Green Engineering", *Env. Sci. Tech.* 2003, *37(5)*, 94A-101A.
[5] Organisation for Economic Co-operation and Development (OECD), 2003, *Descriptions of selected key generic terms used in chemical hazard/risk assessment* (Paris: OECD).

Comment: This concept is not formally recognized in the current GLWQA. However, if Green Chemistry is to make significant progress towards the objectives of pollution prevention and zero discharge, the aspect requiring continual improvement is a critical element of the approach. The absence of such an element will not effectively achieve the elimination or pollution prevention of toxic chemicals.

(e) "Substitution" is defined as "the replacement or reduction of hazardous substances in products and processes by less hazardous or non-hazardous substances, or by achieving an equivalent functionality via technological or organizational measures."[7]

(f) "Life Cycle Perspective" is defined as "broad consideration (qualitative or quantitative) of environmental, social and/or economic issues across the life cycle of a chemical, material, or product."[8]

(g) "Prevention" is defined as "any change to a chemical, material, or product that reduces, avoids, or eliminates the use of hazardous substances or generation of hazardous byproducts across its life cycle, so as to reduce risks to the health of workers, consumers, or the environment, without shifting risks between workers, consumers, or parts of the environment.[9]

2. **The Principles of Green Chemistry and Green Engineering**

(a) The Twelve Principles of Green Chemistry are:

(1) It is better to prevent waste than to treat or clean up waste after it is formed.

(2) Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.

(3) Wherever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment.

(4) Chemical products should be designed to preserve efficacy of function while reducing toxicity.

(5) The use of auxiliary substances (e.g. solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.

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[6] Rossi, Mark, Tickner, Joel, Geiser, Ken, *Alternatives Assessment Framework of the Lowell Center for Sustainable Production,* Lowell Center for Sustainable Production, Version 1.0, July, 2006, p.9.

[7] J. Lohse, et al., 2003, *Substitution of hazardous chemicals in products and processes*, compiled by Ökopol GmbH and Kooperationsstelle Hamburg for the European Union Directorate General Environment, Nuclear Safety and Civil Protection of the Commission of the European Communities (Hamburg: Ökopol GmbH).

[8] Rossi, et al, p. 8.

[9] Rossi, et al., "Adapted from the definition of "toxics use reduction" as defined by the Massachusetts Toxics Use Reduction Act of 1987.", pp. 8, 21.

(6) Energy requirements should e recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure.
(7) A raw material of feedstock should be renewable rather than depleting wherever technically and economically feasible.
(8) Unnecessary derivatization (blocking group, protection/deprotection,temporary modification of physical/chemical processes) should be avoided whenever possible.
(9) Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
(10) Chemical products should be designed so that at the end of their function, they do not persist in the environment and break down into innocuous degradation products.
(11) Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.
(12) Substances and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions, and fires.[10]

(b) **The Twelve Principles of Green Engineering**

(1) Designers need to strive to ensure that all material and energy inputs and outputs are as inherently nonhazardous as possible.
(2) It is better to prevent waste than to treat or clean up waste after it is formed.
(3) Separation and purification operations should be designed to minimize energy consumption and materials use.
(4) Products, processes, and systems should be designed to maximize mass, energy, space, and time efficiency.
(5) Products, processes, and systems should be "output pulled" rather than "input pushed" through the use of energy and materials.
(6) Embedded entropy and complexity must be viewed as an investment when making design choices on recycle, reuse, or beneficial disposition.
(7) Targeted durability, not immortality, should be a design goal.
(8) Design for unnecessary capacity or capability (e.g., "one size fits all") solutions should be considered a design flaw.
(9) Material diversity in multicomponent products should be minimized to promote disassembly and value retention.
(10) Design of products, processes, and systems must include integration and interconnectivity with available energy and materials flows.

[10] Anastas, Paul T., Warner, John C. *Green Chemistry:Theory and Practice*, Oxford University Press, New York, 1998.

(11) Products, processes, and systems should be designed for performance in a commercial "afterlife".
(12) Material and energy inputs should be renewable rather than depleting.[11]

3. **Programs and Policies**

The Parties in cooperation with Municipal, State, Federal and Provincial Governments shall develop and adopt the following programs and measures to facilitate the application of Green Chemistry methodologies and principles to achieve zero discharge and the virtual elimination of inputs of toxic and hazardous substances into the Great Lakes System.

(a) Both Parties will establish parallel management-based regulations requiring all Great Lakes commercial and municipal enterprises at regular intervals to identify, evaluate, and report on viable, safer substitutions and/or alternative technologies and approaches in their use of hazardous and toxic substances. Management-based regulation will be used to incorporate pollution prevention into the decision-making processes of businesses.

(b) Both Parties will adopt a lifecycle perspective in the assessment of new chemicals, the re-evaluation of existing chemicals, and the remediation of legacy contamination, including all processes and products associated with the use of these substances. All chemicals in use or proposed for use in the Great Lakes Basin will be required to submit lifecycle analyses (LCA) of their impacts on the environment and human health, and will additionally include, but not be limited to, the extraction of raw materials, production processes, degradation products, waste creation and disposal, and recycling potential.

(c) Both Parties will establish regulatory mechanisms for the phase-out of hazardous processes and hazardous chemicals where viable, safer substitute technologies and approaches exist.

(d) The Parties will develop binational data repositories which will maintain up-to-date iterations and facilitate access to existing and future tools such as the Green Screen[12], i-Sustain[13], Pharos[14], and others by which users can assess and report their status in moving toward substitution, alternatives, and phase-outs.

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[11] Anastas, Paul T., and Julie B. Zimmerman. "Design Through the 12 Principles of Green Engineering." *Environmental Science & Technology 37,* no. 5 (2003): 94A-101A.
[12] http://www.cleanproduction.org/Greenscreen.php
[13] http://www.i-sustain.com/
[14] http://www.pharosproject.net/

(e) The Center for Green Chemistry and Green Engineering at Yale University has published a document called *Integrating Green Chemistry and Green Engineering into the Revitalization of the Toxics Substances Control Act*[15]. The following strategies have been adapted from that document:

(1) Data used to evaluate chemicals will make use of green chemistry concepts and metrics.

(2) Incentives will be created by the Parties to promote better performance on health, safety and environmental criteria, and/or switching to less hazardous alternatives for substances of concern in the Great Lakes.

(3) Information and data collected by the Parties will be made available through various mechanisms to help drive the adoption of the principles of GC&E forward under this Agreement.

(4) The Parties will implement coordinated research and development funding from diverse agencies to be overseen jointly by the Parties.

(5) Programs such as Design for the Environment (DfE) in the U.S. and comparable programs in Canada will be utilized to facilitate cooperative programs between stakeholders, including industry, governments, NGOs, academia, and labor in order to increase the impact of partnerships for the development of less hazardous products

(f) The Parties shall prioritize the use of the principles of green chemistry and green engineering to inform all reasonable and practicable measures to rehabilitate those portions of the Great Lakes adversely affected by hazardous and persistent toxic substances and shall promote treatment and remediation of contaminated sediments over warehousing in contained disposal facilities, landfills, and/or the use of incineration.

4. **Research** Research should be intensified to develop safer alternatives and viable substitutions for chemical threats to the Great Lakes System, including the application of the principles of green chemistry and green engineering to the remediation of legacy contamination.

(a) The Parties will collaborate to assure funding to create a binational network of government-academic-industry partnerships for the development, commercialization and diffusion of safer alternatives. Funding and support for technical outreach programs for GC&E implementation will advantage smaller and medium-sized Great Lakes enterprises and municipalities.

(b) The Parties will commit to funding partnerships and collaborations to disseminate information and to support capacity-building in the practice of green chemistry and green engineering among Great Lakes industries, academic institutions, and governments; the Parties will contribute funding in support of existing state and provincial green chemistry

[15] Matus, Kira MJ, Beach, Evan, Zimmerman, Julie B., *Integrating Green Chemistry and Green Engineering into the Revitalization of the Toxics Substances Control Act*, Center for Green Chemistry and Green Engineering, Yale University, New Haven, CT, June, 2010.

and green engineering information clearinghouses and will facilitate the growth and development of regional collaborations in this area.

(c) The Parties will fund and support the development of programs to encourage the adoption of green chemistry and green engineering curricula in Great Lakes educational institutions, K-12 and undergraduate through post-graduate levels.

5. **Reporting.**

The Parties will require reporting on the progress in developing alternatives, substitutions, and sunsetting/phasing out chemicals through development and implementation of a continuous improvement reporting regime.

(a) The Parties will jointly develop metrics to assess continuous improvement in reporting progress under this Annex.

(b) Industry and facility-specific baselines of current emissions and discharges of all chemicals identified as having inherent hazardous properties will be reported by the end of year two following adoption of this Agreement to serve as the basis for assessing continuous improvement under the articles of this Agreement..

(c) Reporting on the programmatic activities undertaken under Section 3. (a) to identify, evaluate, and consider for adoption viable, safer alternative technologies and approaches will be required from all identifiable point sources in the Great Lakes Basin every five years.