

2012-2015 PRIORITY WORK



ASSESSING PROGRESS

DEVELOPING INDICATORS

EVALUATING SCIENTIFIC INFORMATION



Assessing Progress: Apex Indicators

How are the Great Lakes doing? Are they getting better or worse? These important questions are guiding the IJC as it continues its work in selecting three sets of science based indicators that will help assess how well the Governments of Canada and the United States are doing in living up to their commitments under the Great Lakes Water Quality Agreement.

For twenty-five years, under the 1987 Great Lakes Water Quality Agreement (the Agreement), the IJC was responsible for producing biennial reports that assessed progress made towards achieving the objectives of the Agreement. The IJC published its 16th Biennial Report on Great Lakes Water Quality in May 2013, its final report under the 1987 Agreement. Using indicators with readily available data, the IJC reported their trends over time and produced an assessment of progress since 1987. The 16th Biennial Report also included over 40 recommendations regarding the revised 2012 Agreement and its implementation. In assessing trends of these indicators and making recommendations, the IJC worked with over 20 experts from both countries and incorporated the review comments of dozens of

experts from our Great Lakes Advisory Boards as well as government agencies, non-government agencies, environmental organizations, academia and tribal and First Nations representatives in both countries. This earlier work on indicators helps to form the basis for the IJC to fulfill its responsibilities under the revised Agreement of 2012.

Under the current Agreement the IJC's reports will be issued on a triennial schedule. In order to strengthen the science behind the indicators used for assessing how the Great Lakes are doing and to make them more useful to policy makers and the public, the IJC has been working with its Great Lakes Boards and a host of other experts. Three sets of indicators – ecosystem, human health and response – have been designed to complement one another and will be used together in the IJC's first triennial assessment of progress. The IJC recognizes the value of indicators aligned with objectives of the Agreement, as tools to assess progress of ecosystem protection and restoration; human health protection; and measure the Lakes' response to management activities.

Ecosystem Indicators - Progress to Date

IJC's Science Advisory Board and Water Quality Board held a binational workshop in September 2012 to identify the ecosystem indicators that will be used to help assess progress in protecting and restoring the Great Lakes. Sixteen apex indicators were identified by the workshop participants and subsequent efforts by a workgroup composed of IJC board members and regional experts. The indicators are divided into three subject areas to measure the physical, chemical, and biological integrity of the Great Lakes.

The IJC intends to use these 16 indicators to help assess the progress towards achieving the ecosystem related objectives of the Agreement.

CHEMICAL	Phosphorus	Phosphorus loadings and concentrations in each of the Great Lakes.
	Persistent Bio-accumulating Toxic Chemicals in Biota	The concentration of persistent, bio-accumulating and toxic substances in whole fish and fish-eating birds.
	Chemicals of Mutual Concern in Water	The concentration of select chemicals in water that can cause human health and ecosystem health impacts.
	Atmospheric Deposition of Chemicals of Mutual Concern	The presence of chemicals in the atmosphere and atmospheric deposition on the Great Lakes.
PHYSICAL	Land Cover	The rate and extent of change to, and fragmentation of, natural land cover.
	Tributary Physical Integrity	Changes in stream flow as a result of changes in land use and climate, and the connectivity of tributaries to the lakes.
	Coastal Wetlands	The extent, composition and quality of wetlands that have a direct surface water connection to the lakes.
	Shoreline Integrity	Length of protected shoreline that is physically and biologically unfavorable relative to the shoreline length that is favorable.
	Water Levels	The level of water above sea level for each of the Great Lakes.
BIOLOGICAL	Surface Water Temperature and Ice Cover	Surface temperature of the water and the extent, duration, and thickness of ice cover on the lakes.
	Groundwater Quality and Quantity	The quality and quantity of the groundwater and its interaction with the surface water in the Great Lakes basin.
	Lower Food Web Productivity and Health	Phytoplankton community structure and biomass, benthos abundance and diversity, and prey fish abundance and diversity.
	Fish Species of Interest	The populations of lake trout, walleye, whitefish, and sturgeon.
	Harmful and Nuisance Algae	Measure of harmful algae that can potentially produce toxins and nuisance algae that forms non-toxic blooms.
	Aquatic Invasive Species	The rate of new introductions and the status and impact of those aquatic invasive species having detrimental effects to the ecosystem.
	Abundance and Distribution of Fish-Eating and Colonial Nesting Birds	Measures of herring gulls and bald eagles, due to their position at the top of the Great Lakes aquatic food web, and the effects of chemical, physical, and ecological stressors.

Human Health Indicators - Progress to Date

The Health Professionals Advisory Board (HPAB) identified five indicators of human health exposure as the most useful candidates to better understand and convey exposure risks that result from recreational activities, consuming fish, or drinking water sourced within the Great Lakes basin.

This work was initiated in February 2013, when the HPAB convened a workshop to identify and prioritize apex human health indicators. Eighteen potential human health exposure indicators were identified by workshop participants in three subject areas: Drinking Water, Recreational Water Contact, and Fish Consumption. Subsequently, working groups of HPAB members and IJC staff have consolidated the workshop output into exposure indicator definitions. Workshop participants and experts from national, provincial and state agencies, and tribes/First Nations were invited to comment on indicator definitions. Comments are currently being carefully considered and the working groups are in the process of completing indicator definitions. The HPAB plans to submit a final report to the Commission in October 2013. These indicators are intended to assess progress towards achieving the Agreement's human health objectives.

Drinking Water	Chemical Integrity of Source Water
	Biological Hazards of Source Water
Recreational Water Contact	Identified Risks at Great Lakes Beaches
	Illness Risk at Great Lakes Beaches
Fish Consumption	Contaminant Levels in Great Lakes Edible Fish Species



Response Indicators - Progress to Date

Response indicators are designed to assess the progress made by management actions such as government programs and other measures undertaken in order to achieve the objectives of the Agreement. The response indicators are intended to complement the ecosystem and human health indicators, by providing qualitative and quantitative metrics to assess the degree to which promises are being achieved under the agreement. Examples of response indicators can include number of acres of protected habitat, number of best practices for the management of nutrients, and number of beneficial use impairments removed in areas of concern. A workshop will be convened to identify a small set of approximately 5-8 indicators, based on consensus input from both U.S. and Canadian experts. The response indicators are expected to be determined by summer 2015.



Indicator Framework for Assessing Progress

The indicator framework is being developed to provide an assessment of the extent to which programs and other measures are achieving the objectives of the Agreement.

The proposed framework consists of calculating a Great Lakes Environmental Effectiveness Metric (GLEEM) based on qualitative and quantitative information collected through interviews with experts. The process involves asking a pool of experts to assign scores to both environmental conditions related to the Agreement’s objectives and to the performance of the Government’s programs or other measures in supporting progress toward attainment of those objectives. The ecosystem, human health, and response indicators will be used to assist the experts in determining the extent to which the objectives of the Agreement are being achieved. The final GLEEM score may be developed for each general or specific objective of the Agreement for assessing the effectiveness of the Government’s programs.

Strengthening the Capacity to Deliver Science and Information

Understanding Monitoring Programs

Data collection and monitoring is essential to understanding how the Lakes are doing. This portion of the IJC’s work focuses on identifying data availability for calculating ecosystem, human health, and response indicators and identifying the programs which collect those data. Additional analysis will identify data gaps and requirements for the programs that collect such data. The findings will be used to provide recommendations to the governments regarding Great Lakes monitoring programs.

The IJC is in the process of better describing and refining indicators, inventorying programs that collect and synthesize such data, and analyzing monitoring program needs. The IJC is also gathering, integrating, and processing data to calculate those indicators that have data available. This will enable the IJC to provide a report on the “State of Great Lakes Monitoring and Data Collection” and decide which indicators to use for the first triennial assessment of progress.

Great Lakes Research Vessels



Capacity for Delivering Science and Information

Do Great Lakes science programs deliver the “biggest bang for the buck?” Do our researchers have the tools required to do the job and are there enough of them to go around? How much of the U.S. and Canada’s resources are obligated towards domestic program management and how much is available to satisfy the needs of the Great Lakes Water Quality Agreement? Do governments effectively communicate details about progress and results in a manner that managers can act on and the public can understand? How do monitoring programs transform raw data into actionable information? How can IJC best serve up information to the public and best report on the government’s progress under the agreement? These are the questions being addressed by the IJC under this priority.

The IJC is assessing current science capacity in the U.S. and Canada around the Great Lakes basin. Information is being entered into a Geographic Information System (GIS) database to better map and communicate the information so that further analysis and improvements can be made by scientists and policy makers in both countries. Based on the GIS database, the IJC will develop a report that identifies data gaps and resource requirements to effectively report on progress under the Agreement. The IJC is also using GIS methods to better communicate information about the apex ecosystem and human health indicators.



U.S. and Canadian Land Use/Cover Integrated U.S. 2001 NLCD & Ontario PLO 2000

What's Ahead: **Triennial Reporting**

The Great Lakes Water Quality Agreement charges the IJC with providing to the federal governments a triennial "Assessment of Progress Report". In addition to commenting on the government's Progress Report and summarizing public input, the IJC's triennial report will use the apex ecosystem, human health, and response indicators to independently assess progress made toward achieving the objectives of the Agreement. An analysis of data gaps for calculating those indicators and gaps in the programs that collect such data will be reported. Recommendations will be made to the Parties regarding areas where more progress needs to be made and how government programs can be improved to better protect, enhance, and restore the Great Lakes ecosystem.



Canadian Commissioners

Hon. Joseph Comuzzi, Chair
Gordon Walker
Hon. Benoît Bouchard

U.S. Commissioners

Lana Pollack, Chair
Dereth Glance
Rich Moy

International Joint Commission
Great Lakes Regional Office
(U.S. Mailing Address)
PO Box 32869
Detroit, MI 48232

International Joint Commission
Great Lakes Regional Office
100 Ouellette Ave., 8th Floor
Windsor, ON N9A 6T3

Public Affairs Adviser
John Nevin
519-257-6733
nevinj@windsor.ijc.org

www.ijc.org/en_/AOP | [@IJCsharedwaters](https://twitter.com/IJCsharedwaters)

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