

# INTERNATIONAL JOINT COMMISSION 2014 ACTIVITIES REPORT



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**On the cover, from top to bottom:** Commissioner Bouchard recognizes retiring board member Peter Yeomans, second from right, at the [Spring Semi-Annual](#); satellite image of the [Lake Erie algal bloom](#) blamed for the Toledo water crisis; the International Falls-Fort Frances Dam at [Rainy Lake](#); an IJC display during [World Wetlands Day](#).



## INTERNATIONAL JOINT COMMISSION

# 2014 Activities Report



Commissioners

Canadian Section



Gordon Walker  
Canadian Section Chair



Benoît Bouchard



Richard Morgan

United States Section



Lana Pollack  
United States Section Chair



Dereth Glance



Rich Moy

2014 in Review

One hundred and five years after the Boundary Waters Treaty of 1909 was signed, North America’s shared waters are feeling the repercussions of a changing climate. Despite the Polar Vortex phenomenon that produced significant ice coverage on the Great Lakes, Rainy River, and other shared waterways, globally 2014 was the warmest year on record, surpassing previous record-breaking years of 1998, 2005, and 2010. Fortunately, the drafters of the treaty had the foresight to create a framework for addressing issues that would arise over time in a cooperative, binational manner.

Following extremely heavy rainfall in early summer, residents across northern Minnesota, eastern Manitoba, and western Ontario faced significant flooding, including in the Rainy River basin. IJC commissioners and Rainy-Lake of the Woods board members were on the scene, working with dam operators, talking to the public and media, and keeping the public informed about the flooding situation.

A number of factors, including significant ice coverage, along with spring rain falls, drove a record two-year rise in Great Lakes water levels. Lake Michigan-Huron broke record low levels in January 2013 and rose three feet by the end of 2014. In July, the Commission approved a revised Order governing the flow of water from Lake Superior to Lake Michigan-Huron, which incorporates the latest science and enhances the robustness of the plan for climate variability into the future.

After 14 years of careful study, extensive public consultation, and thorough consideration of all uses and interests in both countries, the IJC recommended Plan 2014, a new regulation plan for Lake Ontario and the St. Lawrence River that continues to moderate extreme water levels, restores 64,000 acres of wetlands, and prepares for a changing climate. The IJC awaits the advice and concurrence of the federal governments of United States and Canada regarding Plan 2014 for influencing water levels and flows for the Lake Ontario-St. Lawrence River system.


In August, the greater Toledo area in Ohio and Point Pelee in Ontario experienced a disruptive toxic algal bloom, forcing a half million people to rely on bottled water for their daily needs. The water crisis ignited public consciousness that coordinated, binational action is needed to save Lake Erie once again. The crisis underscored the findings and recommendations of IJC’s report on “A Balanced Diet for Lake Erie: Reducing Phosphorous Loadings and Harmful Algal Blooms,” released in February. The report summarizes the latest science and calls for significant reductions to dissolved reactive phosphorous loadings from agriculture and other sources to reduce the size and duration of toxic harmful blooms and the oxygen-deprived dead zone in the central basin.

From algal blooms to flooding, more intense storms and extreme weather are ever present challenges for communities living in our shared watersheds. IJC activities along North America’s shared waters engaged local residents, academic experts, tribal representatives, and government leaders through a myriad of boards, public meetings, educational science-driven forums, and by developing tools to better understand binational watersheds through geospatial data harmonization.

The IJC ended 2014 with a full slate of commissioners, welcoming Commissioner Richard A. Morgan in December, as well as Patricia Morris who became director of the binational Great Lakes Regional Office just before the New Year.

U.S. Section

  
Lana Pollack, Chair

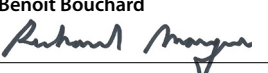
  
Dereth Glance

  
Rich Moy

Canadian Section

  
Gordon Walker, Chair

  
Benoît Bouchard

  
Richard Morgan

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# Chapter I: Rainy-Lake of the Woods

## Historic Rain and Flooding

The Rainy-Lake of the Woods basin saw historic rain and flooding in the early summer of 2014. During this time, members of the IJC's Rainy-Lake of the Woods Watershed Board and IJC officials met with mayors and emergency services managers in the Canadian and U.S. portions of the watershed to discuss flooding and response efforts. There were meetings with the Koochi-ching County Board of Commissioners in Minnesota, the towns of Fort Frances and Rainy River in Ontario, and in Baudette and Warroad, Minnesota.



A home surrounded by sandbags in the town of Rainy River.

Under the 1938 Rainy Lake Convention between the United States and Canada the IJC determines when emergency conditions exist, whether by reason of high or low water, and adopts measures of control with respect to dams in boundary waters of the Rainy Lake watershed in the event emergency condition exists.

The Board's Water Levels Committee continued to work with managers controlling the dams that regulate water levels and flows in the Rainy and Namakan basins. Management actions at the Fort Frances-International Falls and Kettle Falls dams were communicated to the public via news releases and radio spots on a local station, KGHS-AM in International Falls, Minnesota.

As 2014 ended, the Board conducted an online survey as part of ongoing efforts to review and evaluate the performance of water level management strategies for Rainy and Namakan lakes. The survey gathered input from shoreline property owners to ensure that an ongoing flood risk assessment adequately captures the types and magnitude of flooding damages. The survey was designed to help shoreline property owners on the Rainy and Namakan chain of lakes report on damages during the summer, and also allowed for damage reports from property owners on the Rainy River and Lake of the Woods shoreline to support water level management activities in those areas.

In 2014, Lake of the Woods rose above the level that triggers international management by the International Lake of the Woods Control Board. In most years, the outflow is managed by the Canadian Lake of the Woods Control Board.

## Water Quality Plan of Study for the Lake of the Woods Basin

In July, a draft Water Quality Plan of Study for the Lake of the Woods Basin including Rainy, Namakan and the upper chain lakes was released, detailing the additional investigation needed to improve water quality and the long-term ecosystem health of the area. Widespread algal blooms and other water quality issues have been a long-standing concern of basin residents on both sides of the border.

The Plan of Study was developed in response to a 2012 IJC recommendation that was endorsed by the Governments of Canada and the United States. The document was prepared by the IJC's Lake of the Woods Basin Water Quality Plan of Study Team following a workshop held in March at a Watershed Forum in International Falls, Minnesota.





A cluster of islands looking north over the west-central portion of Lake of the Woods in Canada. Credit: Lee Grim

Eight public meetings were held in Ontario and Minnesota as part of a public comment period on the draft. A final draft including the cost and prioritization of projects was circulated for public comment in preparation for submitting the report to governments.

The report provided the necessary background to the second edition of a *State of the Basin Report* published by the IJC and the Lake of the Woods Sustainability Foundation.

The Plan of Study identifies 32 projects to improve understanding of the basin ecosystem and support a balanced, binational approach to water quality. Topics of focus include nutrient

enrichment and harmful algal blooms, aquatic invasive species, and surface and groundwater contamination, including heavy metals and other contaminants.

In January 2015, the IJC recommended that the Governments of Canada and the United States make \$8.4 million available to fully fund the projects. The IJC also recommended that four projects in the plan be implemented immediately: an International Platform for Implementation, Rapid Evaluation and Implementation of Options to Manage Recent Zebra Mussel Infestation in Headwaters Areas in Minnesota, Long-term Funding of Wheeler's Point Gage and Designation as a Gage of Binational Significance, and Implementation of Best Management Practices and Removal of Solids from Effluents to reduce nutrient loads from agricultural lands and wastewater treatment facilities.

Once funded, the Plan of Study will provide the basis for developing coordinated efforts to effectively restore and protect the quality of these highly-valued binational waters.

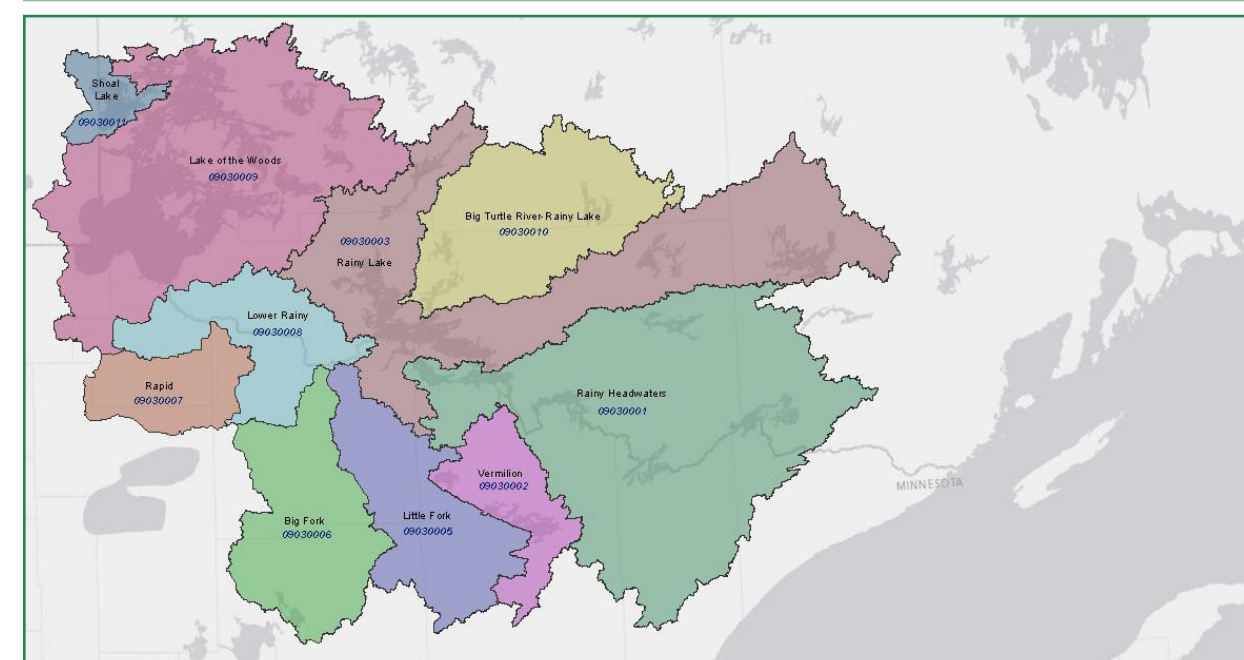
## Rule Curve Assessment

An assessment of rule curves for regulating the water levels of Rainy and Namakan lakes is scheduled to start in 2015. The rule curves were adopted by the IJC in 2000 to respond to concerns raised by Minnesota and Ontario, and better protect fish, birds and other natural resources. When the IJC adopted the rule curves, it committed to undertake a review within 15 years to examine how they affect all interests, including First Nations, shoreline property owners, boaters, environmental interests and hydropower producers in the binational watershed. The Commission has undertaken 22 studies over the last several years to develop the background information required for this review.

In March, the Rainy-Lake of the Woods Watershed Board held a workshop to help formulate a recommendation to the IJC for conducting the review. The IJC will appoint an expert panel in 2015 to lead the study that will include a shared vision model to evaluate the outcomes of various alternative rule curves.

A final report recommending any necessary changes to the rule curves is expected in 2017, which will be provided to governments and the public.

## Data Harmonization



Transboundary hydrologic units for the Lake of the Woods basin. Credit: USGS.

The Rainy River in the Lake of the Woods basin was home to the first-ever International StreamStats project in 2014.

StreamStats is a Web-based Geographic Information System (GIS) that provides users with access to an assortment of analytical tools useful for water-resources planning and management.

A core function of StreamStats is to gather information on flows. The types of flows being catalogued for the Rainy River are peak flows, due to flooding and other concerns.

StreamStats was developed by the U.S. Geological Survey, which helped extend the resource to the basin with assistance from IJC, the International Rainy-Lake of the Woods Watershed Board, Ontario Ministry of Natural Resources, and Environment Canada.

The application of StreamStats for the Rainy River grew out of a data harmonization project that began in 2008 when the IJC created a Transboundary Data Harmonization Task Force.

Data harmonization means that databases from Canadian and U.S. agencies have been integrated and replicated, and agencies are using the same standardized suite of hydrographic interpretations.





# Chapter II: St. Croix

## Science Meeting

To help chart a course for the future health and sustainable use of the watershed for the benefit of both countries, a *State of the St. Croix* science forum was held in November in New Brunswick.

The event was organized by the *International St. Croix Watershed Board*, in conjunction with the *St. Croix Waterway Commission* and support from the government of New Brunswick.

Four themes were explored over two days: Ecosystems-Based Management, Fisheries, Climate Change, and Resilient Communities.

The forum brought together researchers, government agencies, residents, and business owners. Those in attendance were able to discuss and collaborate, gain a more thorough understanding of the four themes, help identify knowledge gaps in research and other efforts, and identify ways to integrate individual work into beneficial and efficient action.

Information from the forum will provide the necessary background for the Board to determine its long-range work plan and will be helpful to state, provincial and federal government agencies in meeting their responsibilities



## Alewives

The IJC continues to fund *counts of spawning alewives in the St. Croix River*, as well as studies to better understand the watershed’s aquatic food web and impacts of water temperatures on bass spawning.

Final counts for 2014 logged 27,312 river herring (alewife/gaspereau and blueback herring) at the Milltown fishway, up from 16,677 in 2013.

The monitoring work grew out of a binational, interagency St. Croix Fisheries Steering Committee, which was convened in 2009 to develop an adaptive management plan for alewife restoration in the watershed.

Since the Maine Legislature passed a bill in 2013 to grant alewife unconstrained passage at Woodland and Grand Falls dams, it is important to count the numbers and movement of alewives.



Lee Sochasky counting alewives at the Milltown fishway during the 2014 alewife run. Credit: Atlantic Salmon Federation.

# Chapter III: Red River

## SPARROW Modeling

Across North America, lakes and river networks and their watersheds straddle major sections of the Canada-United States border. Many of these systems suffer from symptoms of eutrophication, primarily the result of excessive loading of the nutrients nitrogen and phosphorus. An improved understanding of where nutrients are coming from and the processes that may affect the delivery of nutrients to lakes and rivers would benefit the development of policies intended to reduce nutrient loads.

The IJC, in partnership with the U.S. Geological Survey (USGS), National Research Council of Canada (NRC) and several other federal, state and provincial agencies, is employing SPARROW to model water quality dynamics and nutrient loads in transboundary systems. *SPARROW*, developed by USGS, stands for SPATIally-Referenced Regressions On Watershed attributes.

Two binational SPARROW models are under development: one for the Red-Assiniboine basin, and one for the Great Lakes basin. These IJC-led efforts represent the first binational applications of the model.

Eutrophication symptoms include impaired water quality, harmful and nuisance algal blooms, and altered food web structure. A major challenge for water quality specialists in addressing eutrophication is the identification and quantification of nutrient sources.

The Red-Assiniboine model addresses water quality concerns in the Red and Souris rivers and at Lake Winnipeg, the terminus of the Red River. The model was completed in 2014. Watershed attributes were harmonized over Canadian and U.S. spatial extents, georeferenced to a harmonized stream network, and regressed against nutrient loads at almost 100 monitoring stations. A manuscript summarizing the results of the model is currently in preparation, which will be submitted for journal review and publication.

Building on the technical expertise generated during development of the Red-Assiniboine model, the IJC and its partners and collaborators made significant headway in 2014 on a SPARROW model that will cover both the Great Lakes basin and the Rainy-Lake of the Woods basin. It is anticipated that this model will be complete by the end of 2015.

Binational SPARROW models will be made available to IJC boards and the public through online mapping applications and visualization tools to assist in the resolution of water quality issues.



USGS researchers on the Red River in Fargo, North Dakota. Credit: USGS



# Chapter IV: Water Quantity

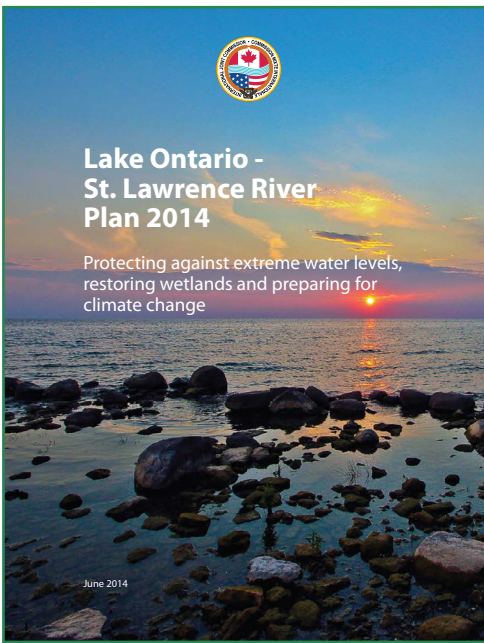
## Great Lakes Adaptive Management

In October 2014, the IJC followed up on its 2013 “Advice to Governments on the Recommendations of the International Upper Great Lakes Study” and established the Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee. Adaptive management is a structured, iterative process for continually improving management by learning from the outcomes of previous policies and practices. The GLAM committee will support the three Great Lakes boards of control in mid- to long-term monitoring, modeling and assessment related to the ongoing evaluation of the regulation plans for Lake Superior and Lake Ontario and other questions that may arise due to changing conditions.

The GLAM will help support a more comprehensive approach to managing the impacts of variable and changing lake levels due to a changing climate while also developing and maintaining needed data sets.



## Plan 2014 for Lake Ontario and St. Lawrence River



The cover of the Plan 2014 report

In June, the IJC advanced Plan 2014 after 14 years of scientific study and public engagement as the preferred option for regulating Lake Ontario-St. Lawrence River water and flows.

After exhaustive consideration of alternative plans, the IJC concluded that Plan 2014 offers the best opportunity to reverse some of the harm while balancing upstream and downstream uses and minimizing possible increased damage to shoreline protection structures.

Plan 2014 is designed to provide for more natural variations of water levels of Lake Ontario and the St. Lawrence River that are needed to restore ecosystem health. It will continue to moderate extreme high and low levels, better maintain system-wide levels for navigation, frequently extend the recreational boating season and slightly increase hydropower production. More year-to-year variation in water levels will improve coastal health.

The new plan is needed to address water levels management in the complex lake and river system, which includes many interests with differing needs, such as a large coastal popula-

tion, the St. Lawrence Seaway and commercial ports, a recreational boating and tourism industry, and significant environmental resources. The IJC submitted the report to the governments of Canada and United on the regulation of Lake Ontario and the St. Lawrence River and sought their views and concurrence on revising the IJC’s Order of Approval to consider ecosystem health with respect to all other interests and uses of the Lake Ontario-St. Lawrence River system.

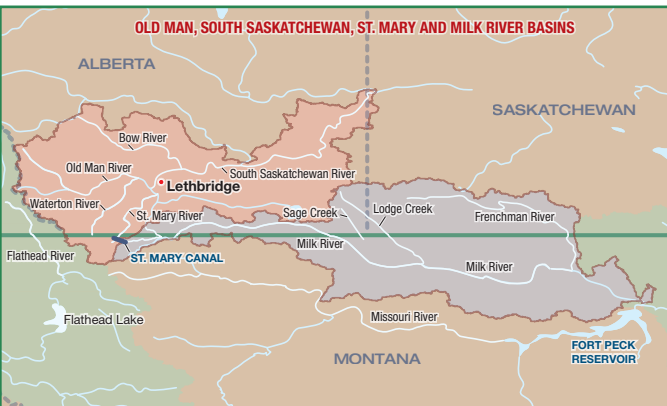
The IJC concluded that Plan 2014 should be implemented as soon as possible as it would continue to foster conditions contributing to the economic well-being of communities throughout the basin while improving the long-term ecological health of Lake Ontario and the upper St. Lawrence River in the face of climate change.

## Site Visits to Kootenay and St. Mary-Milk Rivers Region

Managing water on the prairies, where it is often scarce and always valuable, requires a high degree of international cooperation. The Milk and the St. Mary are two separate rivers that both flow across the international boundary. The two rivers, and their tributaries in Montana, Alberta, and Saskatchewan are specifically addressed in the 1909 Boundary Waters Treaty which states that for the purposes of irrigation and power, they shall be treated as one stream and apportioned equally between the U.S. and Canada. The St. Mary River is shorter and begins in Glacier National Park in Montana flowing through Alberta. The Milk River is much longer and more typical of a flashy prairie river system that torrents in the spring, then trickles, and even dries up, in the summer.

In July 2014, Commissioners visited the Milk and St. Mary watershed to meet with local experts and gain first-hand understanding of the challenges and opportunities of this unique glacial-fed, prairie river system. At the IJC Semi Annual meeting in October 2014, Commissioners received an interim-update from the co-chairs of the Alberta-Montana Joint Water Initiative, which was formed to explore issues related to the apportionment and use of these two rivers.

The 2014 water year for the watershed was just right; precipitation fell in the right abundance at just the right time. However the realities of a changing climate for the sensitive prairie river system do not escape the minds of managers. Glaciers feed about 5-6 percent of St. Mary’s flow and provide reliable flows necessary for the late summer growing season. Glacier National Park’s glaciers, which numbered more than 150 in 1825, now stand at about 25. The remaining glaciers are expected to melt in the next 10-15 years, according to research by the U.S. Geological Survey. Snow pack and ice fields will remain, but the slow, predictable flow of fresh glacial water from mountains, throughout the growing season, is expected to vanish.



Taken at Waterton Lakes National Park, during a site visit by IJC commissioners and staff.



Innovative and collaborative water management is a way of life on the prairies. There are 66 international gaging stations along the St. Mary and Milk rivers, which provide the data needed to divide the flow based on the principle in the 1921 order. Experts on both sides of the border, under the leadership of the Accredited Officers, have submitted International Watershed Initiative project proposals to build capacity to make better use of the available water in the Milk and St. Mary rivers. Such projects are steps toward meeting the needs of this sensitive watershed — to provide systematic and robust support for community water leaders so that they are informed and prepared for future challenges of intensifying cycles of drought and deluge.



An aerial view showing the St. Marys River control structures. Credit: U.S. Army Corps of Engineers

## Upper Great Lakes Study

Following recommendations from the International Upper Great Lakes Study, the IJC in July 2014 issued a new Supplementary Order of Approval for the regulation of outflows from Lake Superior.

The new Order enables the International Lake Superior Board of Control to adopt Regulation Plan 2012 as the means for regulating Lake Superior outflows. The Board began full implementation of the plan in January 2015.

Plan 2012 replaced regulation plan 1977-A, in place since 1990. The new plan was designed to deliver robust performance under a wide range of possible hydrological conditions, compared to the former plan.

Plan 2012 provides modest additional benefits for commercial navigation, hydroelectric generation, and coastal zone interests under a broad range of water supply conditions. It will avoid infrequent but serious adverse effects on the spawning habitat of the endangered lake sturgeon in the St. Marys River, and allow for more natural flows in the river overall.

## Lake Champlain-Richelieu River Reference



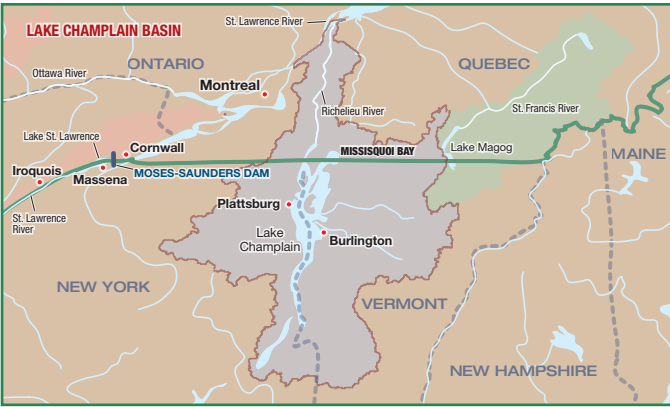
Flooding in 2011 on the Lamoille River. Credit: Lake Champlain Basin Program

In July 2013, the IJC delivered recommendations to Canada and the United States on a Plan of Study to address the problem of flooding in the Lake Champlain-Richelieu River basin that includes New York, Vermont, and Quebec. Water levels in the basin exceeded flood stage for 67 days in spring of 2011, damaging nearly 4,000 homes and resulting in tens of millions of dollars in damage.

The IJC-recommended Plan of Study, which envisioned investment in an enhanced suite of models to assess possible flood-control measures for the basin, as well as examination of management practices to prevent flooding, was projected to cost \$14 million over five years.

In 2014, the Canadian and U.S. governments directed the IJC to take initial steps to develop the data needed for improved flood plain maps and models.

The IJC appointed a Technical Working Group to evaluate existing data, identify data gaps, propose new data acquisition, and select flood modeling strategies in order to fulfill the objectives identified by governments. The Technical Working Group includes scientific specialists from the two governments, the province of Quebec, and the states of New York and Vermont.



The Lake Champlain Basin Program was contracted to provide secretariat duties, including workshop development and public outreach activities.

Completion of data development, static flood plain mapping and initial flood inundation models by the Technical Working Group is slated for September 2015.

# Chapter V: Water Quality

## Lake Erie Ecosystem Priority (LEEP)

Harmful algal blooms were in the headlines in 2014.

In February, 16 science-based recommendations were made to the Canadian and U.S. governments in the IJC's Lake Erie Ecosystem Priority (LEEP) report.

The recommendations are aimed at cutting excess phosphorus that runs off from farms and cities and contributes to harmful algal blooms, which can release toxins that affect drinking water.

The issue came to the forefront in August, when about 500,000 customers of the Toledo, Ohio, water system were told not to drink their tap water for three days after a harmful algal bloom in Lake Erie. The same warning was given later that month to hundreds of residents of Erie's Pelee Island, south of Leamington, Ontario.



Commissioners and panelists, at left, during one of the Harmful Algal Blooms Public Forums in Oregon, Ohio.

In November, hundreds of people came out to [Harmful Algal Blooms Public Forums](#) and panel discussions held by the IJC in Leamington, Ontario, and Oregon, Ohio, near Toledo. Those who attended expressed concern about the algae problem, and support for measures to reduce phosphorus inputs to the system from agricultural and urban sources.

A [new video](#) was developed to explain the LEEP recommendations, and [two other videos](#) were compiled after the meetings to help summarize what was discussed by panelists and participants. The IJC plans to update its LEEP report in 2015.

### Health Professionals Advisory Board

The Health Professionals Advisory Board explored the potential human health effects from harmful algal blooms with a report submitted for Commission consideration and [posted on the IJC website](#).

Many harmful algal blooms produce cyanotoxins which can affect the digestive, endocrine, and nervous systems in humans. The report covered the occurrence and distribution of health effects, risks, and regulations in place.

The board also identified [five indicators](#) which could be used in assessing the potential impact of the waters of the Great Lakes on levels of risk to human health. The indicators are useful in measuring progress toward meeting the human health objectives of the Agreement.

In [late 2014](#), the Commission transmitted a Board report, titled “Recommended Human Health Indicators for Assessment of Progress on the Great Lakes Water Quality Agreement” to the governments of Canada and the United States. The Commission and the Board believe that the indicators identified can contribute to the governments’ restoration efforts by helping the public understand the state of water quality in the lakes.

A Board report on “Health and Environmental Data in the Great Lakes Basin - Integrating Data Collection and Analysis” addressed the growing need for integrated environmental and health data. Through a series of consultations with health and environmental experts in Canada and the United States and a literature review, a comprehensive analysis was conducted to review existing environmental and human health data-sets in the Great Lakes region and to identify opportunities and challenges for data integration.

The Board made [eight recommendations](#) for improving the integration of both sets of data to make more informed decisions, and developed an environmental health assessment survey for distribution to Great Lakes public health units, departments and practitioners.

### New Great Lakes Boards

The IJC revamped its Water Quality and Science Advisory boards in 2014, as part of its efforts to provide advice to the governments under a renewed 2012 Great Lakes Water Quality Agreement between Canada and the United States.

The IJC held an open nomination process in 2013 and announced the new board membership in [March 2014](#). Both boards include an equal number of Canadians and Americans, who bring valuable knowledge and experience from areas including universities, government agencies, nongovernmental organizations and First Nations.

As part of outreach efforts, the Water Quality Board sponsored [a public forum](#) in September at the University of Windsor, which drew about 100 people. A panel of experts discussed topics ranging from harm-

ful algal blooms to microplastics and water diversions. Attendance was boosted by an introduction from singer-songwriter Sarah Harmer.

### Great Lakes Ecosystem Indicator Project

In June, [16 indicators](#) of Great Lakes health were recommended as tools to assess progress toward cleaning up and protecting the Great Lakes.

The [Great Lakes Ecosystem Indicator Project Report](#), prepared by top scientists and policymakers, recommends that the Canadian and U.S. governments consider using the indicators to monitor progress toward achieving ecosystem objectives under the Great Lakes Water Quality Agreement.

The Agreement commits the two nations to work toward restoring and maintaining the integrity of the waters of the Great Lakes.

The indicators are divided into three subject areas to measure the physical, chemical, and biological integrity of the Great Lakes. The measures were selected and developed by members of previous IJC Great Lakes Water Quality and Science boards as well as outside experts with input from the public and policy-makers.

The IJC intends to use this suite of indicators for its triennial assessment of progress report in 2017.

## Chapter VI: Additional IJC Highlights

### Ongoing Improvements to IJC.org

The IJC’s website at IJC.org underwent further improvements during the year, and conducted [a survey of users](#) to plan for future updates.

More than 84,000 users visited the site in 2014, viewing a total of more than 314,000 pages. The [most-visited pages](#) included the Rainy-Lake of the Wood Watershed Board and the Commission’s Lake Erie Ecosystem Priority (LEEP) report.

The site continued to feature official [news releases](#) and [publications](#), along with multimedia including [interactive maps](#).

To further engage with and inform the public, regular [newsletter articles](#) also were circulated via an email subscriber list and social media channels including [Facebook](#) and [Twitter](#).



From “Mending the Meander,” a newsletter post on reconnecting 35 miles of the Two Hearted River. Credit: TNC Archives



Microsites for some of the many [boards that advise IJC](#) were upgraded to be more user-friendly, and the IJC continued to partner with its boards and other organizations to feature content in its newsletter section.

Guest contributions during the year included newsletter articles from The Nature Conservancy, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Great Canadian Shoreline Cleanup, Alliance for the Great Lakes, Great Lakes Observing System, Red River Basin Commission, and Pennsylvania Department of Environmental Protection.

## Reports to Governments

Throughout the year, the IJC issued reports and letters to governments on various topics, many of which were covered in previous sections of this report. Below, find reports and letters issued in 2014.

- [Letter to Governments](#) on Great Lakes Adaptive Management, October 2014
- Rainy-Lake of the Woods State of the [Basin Report](#), Second Edition, July 2014
- Lake Ontario- St. Lawrence River [Plan 2014](#), June 2014
- Great Lakes Ecosystem Indicator [Project Report](#), June 2014
- IJC 2013 [Activities Report](#), May 2014
- A Balanced Diet for Lake Erie: Reducing Phosphorus Loadings and Harmful Algal Blooms ([LEEP Report](#)), February 2014

## Board and Staff Members Completing Service

Several board members [completed their service in 2014](#), leaving a legacy of volunteer service and expertise:

- **Dr. Peter Orris**, co-chair and member of the Health Professionals Task Force and the Health Professionals Advisory Board for more than 20 years;
- **Lee Grim**, Rainy Lake Board of Control since 2003 and Rainy-Lake of the Woods Watershed Board since 2013;
- **Deborah Lee**, co-chair of the Great Lakes-St. Lawrence River Adaptive Management Task Team, International Upper Great Lakes Study, Lake Ontario-St. Lawrence River Study;
- **Dr. John Lawrence**, Canadian co-chair of the IJC's Council of Great Lakes Research Managers since 2007;
- **Dr. Drew Brodtkin**, Health Professionals Advisory Board and Health Professionals Task force for 18 years;
- **Dr. William Bowerman**, U.S. co-chair and member of the Great Lakes Science Advisory Board for 16 years;
- **Peter Yeomans**, International St. Lawrence River Board of Control for 19 years and Citizens Advisory Council to the Great Lakes Levels Reference Study;
- **Dr. Theodore Hullar**, International St. Lawrence River Board of Control for 15 years; and
- **Colonel Charles Samaris**, co-chair of the International St. Croix River Watershed Board.

Commissioners wish to recognize with appreciation the staff members who completed their service in 2014:

- Doug M. Bondy, Regional Assistant, Great Lakes Regional Office;
- Susan Haynes Brown, Administrative Officer, U.S. Section;
- Jean-François Cantin, Senior Engineering Adviser, Canadian Section;
- Mae Carter, Reference Resource Specialist, Great Lakes Regional Office;
- Linda Gauthier, Administrative Assistant, Canadian Section;
- Jasmine Jarjour, Policy Adviser, Canadian Section;
- Stephen Locke, Director, Great Lakes Regional Office;
- Pierre Montreuil, Financial Officer, Canadian Section;
- John Nevin, Public Affairs Adviser, Great Lakes Regional Office;
- Russ Trowbridge, Political Adviser, U.S. Section;
- Isobel Wheatcroft, Administrative Assistant, Canadian Section; and
- Ted Yuzyk, Director, Sciences and Engineering, Canadian Section.

## In Memoriam, Herb Gray

The Rt. Hon. Herb Gray served eight years as Canadian chair of the IJC, from 2002-2010, following a career in the House of Commons that spanned four decades. Gray left a lasting legacy at the IJC and our shared waters are better off because of his service.

He helped steer the Commission through public consultations on the Order on the St. Mary and Milk Rivers, the Spills report on the St. Clair River and Connecting Channels, the Advice to the governments on a new Great Lakes Water Quality Agreement, and hearings on Lake Ontario Order.

His legacy at the Commission culminated with 2009 celebrations of the Boundary Waters Treaty Centennial. Gray died on April 21, 2014. [He was 82.](#)



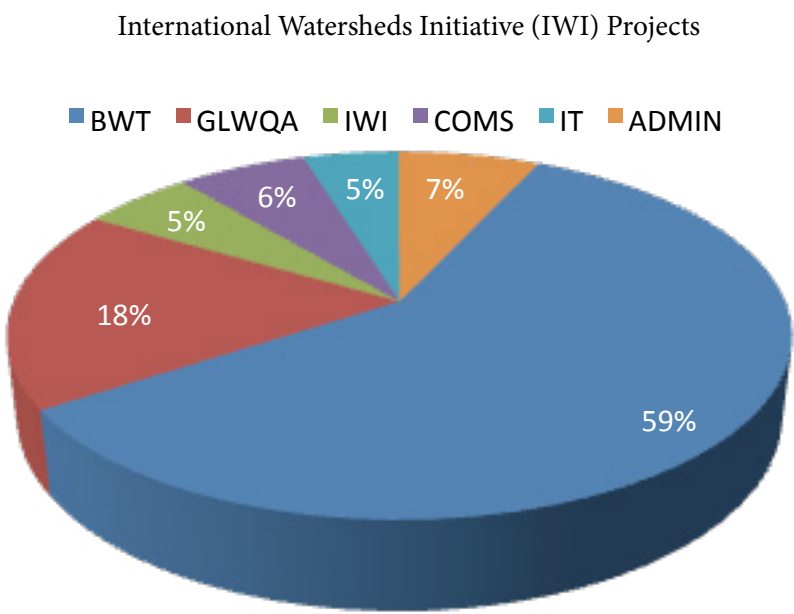
Herb Gray: 1931-2014

# Appendix

## International Joint Commission 2014 Budget

The IJC is funded by the United States and Canada directly through the U.S. and Canadian IJC section offices in Washington, D.C. and Ottawa, Ontario, as called for in the Boundary Waters Treaty. IJC expenditures in 2014 reflect U.S. Fiscal Year October 1, 2013-September 30, 2014 and the Canadian Fiscal Year April 1, 2013-March 31, 2014 and are reported in U.S. and Canadian dollars with no adjustment for exchange rate. IJC expenditures are made in six categories.

IJC Expense Area	Expenditure
Work under Boundary Waters Treaty references and applications (BWT)	\$8,291,000
Great Lakes Water Quality Agreement (GLWQA)	\$2,498,000
International Watersheds Initiative project funding (IWI)	\$768,000
Communication activities (COMS)	\$899,000
Information technology and support (IT)	\$662,000
Administrative costs (ADMIN)	\$986,000
<b>TOTAL U.S.-Canadian IJC Expenditures</b>	<b>\$14,104,000</b>



## International Watersheds Initiative (IWI) Projects

IWI projects funded in 2014 are listed below, by board and area, as appropriate.

## International Red River Board

### Red River Stressor-Response Modeling

The Board has tasked its Water Quality Committee with developing a nutrient management strategy for the Red River to improve understanding and support the development of nutrient-loading reduction policies in Canada and the United States. An important aspect of this strategy is the development of a method for evaluating water quality targets and/or load allocations for nutrients (nitrogen and phosphorus) in the Red River. The stressor-response model is investigating the relationships among nutrients, suspended sediment, and the biological response in the Red River.

The IJC-supported development of a SPARROW (spatially-referenced regressions on watershed attributes) model for the international Red River watershed will be useful for this project. The SPARROW model has integrated water quality and flow datasets from across the watershed. Additional work will be required to add biological data sets and address any other data gaps.

## Accredited Officers of the St. Mary and Milk Rivers

### St. Mary and Milk Rivers Natural Flow Data Warehouse

The purpose of this project is to scope, design, and establish a database (with a custom user interface) to house time-series natural flow data for the transboundary river basins that are administered by Accredited Officers of the St. Mary and Milk Rivers as defined by the 1921 Order of the IJC respecting the St. Mary and Milk Rivers. The project is just beginning and will improve calculation of water use in Canada and the United States to support the apportionment of water between the two countries.

A St. Mary and Milk Rivers Technical Working Group (SMRTWG) assists the Accredited Officers by identifying data, procedural or technological limitations and barriers that restrict the determination of the natural flow in the St. Mary and Milk Rivers and their tributaries in the state of Montana and the provinces of Alberta and Saskatchewan.

The U.S. Geological Survey and Environment Canada play an important role in these watersheds, jointly measuring streamflow and apportioning water between the two countries as prescribed by IJC orders. Access to the time-series data sets used in or derived by the flow apportionment process, as well as tools to assess and evaluate those results, should be made readily available to users in both countries. This will allow the SMRTWG to improve their understanding of the hydrologic conditions in the St. Mary and Milk rivers and their tributaries. It also will help the SMRTWG to assess and better understand the impact climate change may have on the basins.



# International St. Croix Watershed Board

## St Croix Watershed International Science Forum

The St. Croix International Waterway Commission, at the request of the International St. Croix River Watershed Board held a St. Croix Watershed Science Forum in November 2014. The purpose of this project was to bring together researchers, members of the public, and regional stakeholders to highlight scientific work within the research community, identify issues of concern and management challenges, and establish research and management priorities. The IWI provided funding to this forum to assist with the administration of the event.

## St. Croix River Aquatic Food Web Map and Nutrition Project

The work under this collaborative agreement is providing a critical assessment of the status of the ecosystem to assist managers in both countries by fulfilling two objectives: (1) providing a synthesis of species specific passage and habitat requirements, and system limitations, for all sea-run and riverine migratory fish species native to the St. Croix River, and (b) modeling the food web to document conditions in the watershed including the seasonal dynamics of water quality. Partners in this binational collaborative effort include the U.S. Geological Survey, University of New Brunswick, Maine Department of Marine Resources and Maine Department of Inland Fish and Wildlife.

## St. Croix Alewife Count

This project monitors the success of efforts to restore an ecologically-significant native species to the St. Croix River watershed.

The IWI provided funding toward this project to count the number of alewife that pass through the Canadian Department of Fisheries and Oceans trap at the Milltown dam. The enumeration will be undertaken by the Atlantic Salmon Federation. Providing this funding will help strengthen relationships with key stakeholders in the basin and demonstrate the Board's and the IJC's commitment to supporting this work.

# International Rainy-Lake of the Woods Watershed Board

## Effect of Water Management Regime of the Rainy-Namakan System on Wild Rice Production and Cattail invasion into Wild Rice Stands Project

This two-year project is quantifying how water level fluctuations in the Rainy-Namakan system affect wild rice productivity at critical stages of its development, and determining the effectiveness of cattail removal.

Water level management in the Rainy-Namakan may have detrimental effects on the existing and historical stands of wild rice within the Rainy Lake and Seine River sections of this system. This has been an ongoing concern of the Seine River First Nation (SRFN) as well as other First Nations in the basin. Elders of the SRFN report that rice stands have disappeared or declined in size in much of their traditional ricing areas. This project is assessing the effectiveness of efforts to restore native wild rice stands in the watershed.

In 2013, no wild rice was harvested from Rainy Lake or the Seine River. This compares to historical commercial sales of wild rice from Rainy Lake and the Seine River of up to 150,000 pounds and over 1,000,000 pounds on Lake of the Woods. These figures do not include personal use by community members in the

First Nations which was considerable and an important part of their diet. Lack of product has recently prompted the only wild rice processing facility in Ontario, located in Keewatin, to close and move to Manitoba. The loss of the wild rice harvest is primarily attributed by the wild rice industry to high water levels on Rainy Lake and Lake of the Woods. Furthermore, the existing stands harvested by Seine River seem to be decreasing in area at a rapid rate.

A particular recent concern in the Rainy-Namakan system has been the invasion of wild rice stands in Northwestern Ontario by the exotic perennial narrow leaf cattail. The problem with this species is that unlike the native cattail, it can tolerate depths normally occupied by wild rice. These exotic cattails are able to form dense monospecific stands and dominate a wetland, greatly reducing its diversity level. The competitive advantage of cattails over wild rice has not been quantified, but the outcome for wild rice seems to be detrimental. This has been evidenced by the nearly total eradication by invasive cattails of southern wild rice in the lower Great Lakes, where thousands of hectares of these macrophytes are now occupying former southern wild rice habitat.

## Lake of the Woods Water Quality Plan of Study Coordinator

An international watershed coordinator for the Lake of the Woods and Rainy River watershed assists the Rainy-Lake of the Woods Watershed Board in the coordination, development and project management of a Plan of Study for water quality in the Lake of Woods Basin. The coordinator facilitated and enhanced collaboration and integration of the efforts of groups working on watershed activities at the local, state/provincial and bi-national levels of organization including contacts with the international multi-agency working group, First Nations/Métis/Tribes, and local stakeholder groups and agencies. The IWI has contributed funding to this project over the past three years.

## Seine River Temperature Project

This project will improve the effectiveness of the efforts by the operators of the dams at the outlet of Rainy Lake to improve conditions for lake sturgeon during the spawning season.

Seine River is a tributary to Rainy Lake. In an effort to better understand the correlation between water levels and temperature and fish spawning in the Rainy Lake system, the International Rainy River Watershed Board needs water level, temperature, and fish data in the Seine River upstream of Rainy Lake. The data is used to develop a correlation between physical and environmental indicators and the dates of sturgeon spawning. Traditional First Nation ecological indicators, such as the size of poplar leaves, are also being analyzed as potential environmental indicators.

The IWI contributed funding to this project over the past three years and will be contributing again in 2015 to assess the impacts of regulation in the Seine River on adult and juvenile sturgeon populations, monitor the impact of the operations of the Sturgeon Falls generating station, known locally as Crilly Dam, on a provincially designated species at risk, lake sturgeon, and determine the effects of the operation and flow regime of the Sturgeon Falls generating station on lake sturgeon spawning requirements in the Lower Seine River system.

# Great Lakes-St. Lawrence River Adaptive Management

## Great Lakes Runoff Intercomparison Project for Lake Ontario (GRIP)

This binational collaboration is improving the understanding of runoff estimates for the Lake Ontario basin through a variety of modelling techniques. The knowledge will support the refining of existing basin runoff models, the technology transfer of new or developing basin runoff models,

and a review of operational challenges in improving runoff estimates in the Lake Ontario basin including both historical simulations and forecasts. Partners include Environment Canada, the National Oceanic and Atmospheric Administration, U.S. Geological Survey, and the U.S. Army Corps of Engineers.

GRIP is systematically and rigorously assessing a variety of models currently being used, or that could readily be adapted to simulate basin-scale runoff to the North American Laurentian Great Lakes. The Project builds on effort and momentum gained through the activities of the IJC's International Upper Great Lakes Study.

The IWI contributed funding for GRIP to improve the estimation of runoff into the Great Lakes basin, specifically in the Lake Ontario watershed, and from surrounding watersheds to support better understanding of the dynamics of changing Great Lakes water levels. Improved estimates of runoff in the Lake Ontario basin have been identified as a critical item in the Lake Ontario-St. Lawrence River Study Regulation Plan effort (as a forecasting support) and as a hydroclimate task within the Great Lakes-St. Lawrence River Adaptive Management Plan.

#### **Preliminary Development of a State-Space Model for Lake Ontario Water Balance Computations**

This project is assessing the utility of new water-supply calculation methods that could improve the regulation of water levels and flows in the Lake Ontario-St. Lawrence River system. Changes in water levels on the Great Lakes are determined by a dynamic interaction among primary water budget components including over-lake precipitation and evaporation, basin runoff and groundwater flows, inflows and outflows through the connecting channels, and flow augmentations and diversions. These components are used to derive a water budget for each of the five Great Lakes.

Water budgets for Great Lakes basins have traditionally been computed on a monthly basis using two methods that commonly produce discrepant estimates: the components method and the residuals method. Differences between these estimates are difficult to reconcile because there is no information on the uncertainties of either estimate. Even determining whether the two estimates are significantly different and need resolution is problematic. Furthermore, some components of the water budget are not adequately represented in the budget because they are difficult to measure or estimate. Neither traditional computation technique accounts for the dynamics of the water budget. This difficulty will exacerbate transitioning from water budgets computed on a monthly basis to budgets computed at shorter time intervals, such as weekly to daily estimates.

The Commission, through the IWI contributed funding to this project to provide a basis for assessing the potential utility of discrete-time state-space models to estimate the magnitude and uncertainty of weekly water budgets in the Great Lakes. The initial phase is formulating alternative state-space models, and selecting a form appropriate for application to Lake Ontario. A state-space model structure for estimating weekly water budgets for Lake Ontario is being developed and results documented.

#### **Adaptive Management Plan Support in the Great Lakes and St. Lawrence River**

This project supports the work of the Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee. Adaptive management is an important component of proposed new regulating approaches as a mechanism to measure and verify the expected benefits of the regulation plans and to help address future extreme conditions. It also is important for addressing extreme water level issues that go beyond lake regulation. The IWI provided funding to adopt adaptive management methods as part of the Great Lakes Control Boards' ongoing review and evaluation of regulation plans, to maintain and update evaluation tools and data already developed during past studies, and to establish IJC's Great Lakes-St. Lawrence River Adaptive Management Committee of technical experts to carry out these efforts.

## **Strategic IWI Projects Benefitting Multiple Boards**

#### **Transboundary Hydrographic Data Harmonization Support**

The products from this project, complete hydrographically correct drainage areas of the U.S.- Canadian border, are being used to update existing Watershed Boundary Database and National Hydro Network data sets to better reflect regional and local drainage patterns and watershed delineations. This database contains consistent and accurate attributes for harmonized drainage areas along the predetermined shared drainage area containers (US8- CAN4 swath) and provides a framework for the incorporation or other relevant data layers and a basis for regional assessments of our shared water resources.

A Task Force formed within the context of the IWI has agreed on protocols for margining drainage-area container information from each country and a process for reporting the harmonized containers back to each country for incorporation into the Canadian National Hydro Network and U.S. Water Boundary Database. The two groups in the Task Force also have conducted a preliminary review, identifying existing areas of congruence, areas where more work is required, and the level of effort and resources required for successful harmonization.

#### **Development of SPARROW Watershed Model - Great Lakes Basin**

In order to support the development of improved nutrient-runoff management approaches, this project is finalizing: (1) a harmonized streamflow network for the entire basin; (2) harmonized geospatial coverages of various environmental characteristics consistent with those developed for the U.S. part of the basin; (3) phosphorus and nitrogen loads/fluxes for monitoring sites throughout the Canadian part of the basin, consistent with that previously assembled for the U.S. part of the basin; and (4) development of bi-national SPARROW (spatially-referenced regressions on watershed attributes) models for total phosphorus and total nitrogen for the entire Great Lakes basin. This project follows on work the Commission has conducted in the Red and Souris rivers.

#### **U.S.-Canada StreamStats Development**

This project is improving basic capabilities for binational water management by further developing Web-based Geographic Information System (GIS) applications for the Souris, Qu'Appelle, Assiniboine, Red River, Rainy River and Lake of the Woods drainage basins. Development of a BETA binational StreamStats GIS application allows the IJC and its boards to easily obtain streamflow statistics, drainage-basin characteristics and other information for user selected sites on streams. The IJC boards have identified the USGS StreamStats tool as a logical application of the newly harmonized hydrographic datasets for the target project areas.

#### **IJC Mapping and Web Application Development, and Support System Maintenance**

This project enhances the IJC's capability to develop and deploy geospatial products. The Commission and its boards use geospatial products, specifically Web map applications, online mapping, and data visualization services to organize data gathered in different research projects on the boundary waters between the United States and Canada. The purpose of this project is to procure expert support in helping the Commission and its boards use and improve geospatial products in support of the Commission's mandates.



## IJC Boards and Task Forces



The IJC is assisted by numerous **boards and task forces** that work in transboundary basins along the Canadian-U.S. border.

1. Columbia River	2. St. Mary and Milk Rivers	3. Poplar River	4. Souris River
<ul style="list-style-type: none"> <li>• Osoyoos Lake Board of Control</li> <li>• Kootenay Lake Board of Control</li> <li>• Columbia River Board of Control</li> </ul>	<ul style="list-style-type: none"> <li>• Accredited Officers for the St. Mary-Milk Rivers</li> </ul>	<ul style="list-style-type: none"> <li>• Red River Board</li> </ul>	<ul style="list-style-type: none"> <li>• Souris River Board</li> </ul>
5. Red River	6. Lake of the Woods and Rainy River	7. Great Lakes	8. Lake Champlain and Richelieu River
<ul style="list-style-type: none"> <li>• Red River Board</li> </ul>	<ul style="list-style-type: none"> <li>• Lake of the Woods Board of Control</li> <li>• Rainy-Lake of the Woods Watershed Board</li> </ul>	<ul style="list-style-type: none"> <li>• Great Lakes Water Quality Board</li> <li>• Great Lakes Science Advisory Board</li> <li>• Great Lakes Research Council</li> <li>• Niagara Board of Control</li> <li>• St. Lawrence River Board of Control</li> <li>• Lake Superior Board of Control</li> <li>• Great Lakes-St. Lawrence River Task Team</li> </ul>	<ul style="list-style-type: none"> <li>• Lake Champlain-Richelieu River Plan of Study Workgroup</li> </ul>
9. St. John River	10. St. Croix River	Transboundary Region	
<ul style="list-style-type: none"> <li>• St. Croix River Watershed Board</li> </ul>	<ul style="list-style-type: none"> <li>• St. Croix River Watershed Board</li> </ul>	<ul style="list-style-type: none"> <li>• Health Professionals Advisory Board</li> </ul>	