2020-2021

INTERNATIONAL JOINT COMMISSION ACTIVITY REPORT

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ABOUT US

Canada and the United States created the International Joint Commission (IJC) because they recognized that each country is affected by the other's actions in lake and river systems along the border. Through independent science-based advice, the IJC helps the two countries manage these waters wisely and protect them for the benefit of today's citizens and future generations.

The IJC assists the two governments and is guided by the Boundary Waters Treaty between Canada and the United States signed in 1909. The Treaty provides general principles for preventing and resolving disputes over waters shared between the two countries and for settling other transboundary issues.

The IJC has two main responsibilities: setting conditions for projects that affect water levels and flows on the other side of the boundary and investigating and reporting on questions or matters of difference between the two countries along the common frontier. Such transboundary issues are often related to shared waters and seek recommendations for solutions. The IJC's decisions and recommendations on water levels and flows strive to consider impacts on, and the needs of, a wide range of water interests, including sanitation and drinking water, commercial shipping, hydroelectric power generation, agriculture, industry, fish and wildlife, recreational boating and shoreline property. The IJC also has responsibilities under the Great Lakes Water Quality Agreement. These IJC responsibilities include , assessing progress made by the governments towards protecting and restoring water quality, providing advice, and facilitating binational coordination.

The IJC is funded by the Governments of Canada and the United States.

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2020 - 2021 OVERVIEW

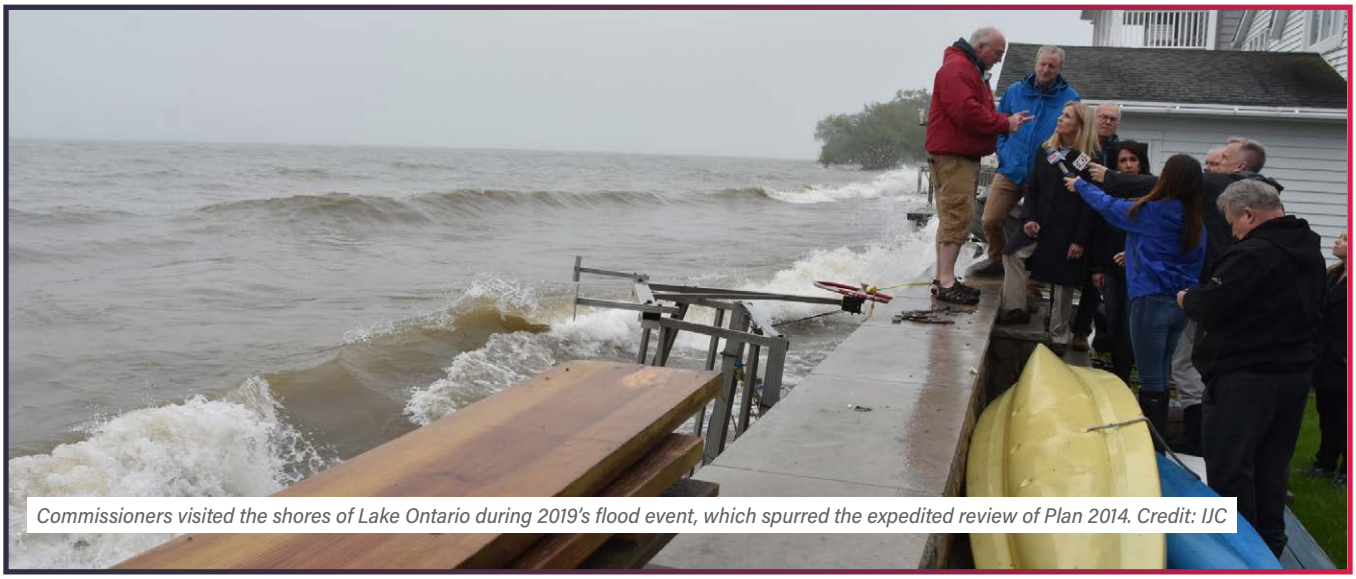
DRY CONDITIONS SETTLE IN ACROSS THE SHARED BORDER

Dry, drought-like conditions took hold across the transboundary over the summer of 2020 and did not let up in some areas through 2021. The Osoyoos Lake Board of Control, Rainy-Lake of the Woods Watershed Board and the St. Croix Watershed Board contended with dry weather following wet spring freshets. While the boards and the water managers were able to maintain water flows and levels within their regulatory guidelines, all three boards faced difficult conditions into the fall of 2020. Droughts only worsened the following year, as the bulk of the transboundary, from the Columbia River basin through the Upper Great Lakes, suffered from the hot, dry conditions across the continent.

EXTREME GREAT LAKES WATER LEVEL CONDITIONS AND WATER QUALITY ASSESSMENT

Water levels on the Great Lakes remained at or near record highs through 2020, as excess water continued to move through the lakes following several wet years. The IJC approved several requests from its boards to allow outflows from Lake Ontario at the Moses-Saunders Dam to continue at higher levels than normally prescribed by Regulation Plan 2014 to move as much of this water off the lake and out of the system as possible. Additionally, with government support the IJC initiated an expedited review of Plan 2014 to see if any improvements could be made to the management of outflows from Lake Ontario are managed. The first phase of that review was completed in late 2021 by the Great Lakes and St. Lawrence River Adaptive Management Committee and their report was submitted to the IJC for review. Since 2021 saw drier conditions in the Great Lakes, water levels started to fall across many areas of the basin.

In December 2020 the IJC published its second Triennial Assessment of Progress report on Great Lakes Water Quality and hosted a virtual press conference to release the report, fulfilling its public input and progress reporting responsibilities under the 2012 Great Lakes Water Quality Agreement. The IJC's expert advisory boards under the Great Lakes Water Quality Agreement—the Water Quality Board and Science Advisory Board—along with the transboundary Health Professionals Advisory Board, also published and publicized several final reports on studies years in the making, ranging from monitoring recommendations on connecting channels, human health risk of acute gastrointestinal illness from climate change, to assessing manure management practices. The Great Lakes Water Quality Board's 2021 Great Lakes Regional Poll results demonstrate the region's public nearly unanimously agree that the Great Lakes' water quality is important to protect.



Commissioners visited the shores of Lake Ontario during 2019's flood event, which spurred the expedited review of Plan 2014. Credit: IJC

OUTREACH AND COVID-19

Commissioners meet with IJC Board Members: Credit IJC

Like many organizations, the challenges brought by the COVID-19 pandemic in 2020 and 2021 affected IJC's work. Due to the pandemic, travel restrictions and border measures were implemented on both sides of the border that significantly limited international travel. Public health measures also limited domestic travel by IJC board members and staff. Through advances in technology and the hard work of the IJC's Information Technology team, staff and board members were able to stay connected and advance IJC's business working remotely from their homes.

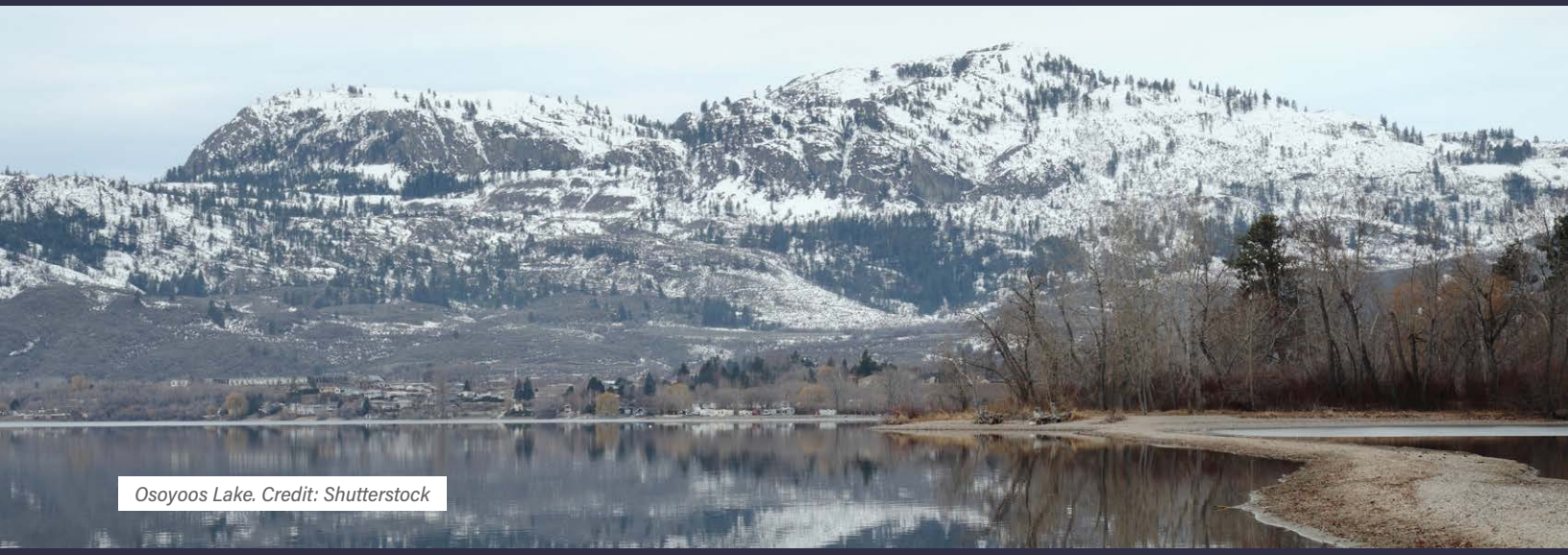
Despite these restrictions, IJC staff and board members were able to engage with the public and each other using video-conferencing software. While some in-person meetings had to be pushed back or redesigned, for the most part the IJC was able to fulfill its duty to hear from the public and communicate the work of the Commission and its boards.

STUDY BOARDS CONTINUE WORK

The Lake Champlain-Richelieu River Study Board continued its work through 2021, with some adjustments due to the pandemic. Like most other boards, its meetings – both public and among its study components – needed to move online due to the travel restrictions and the border measures in place. But the study board was able to make the most of this situation, holding virtual public meetings and a series of technical webinars that updated the public on specific aspects of its work.

Meanwhile, the Souris River Study Board continued its own work looking at potentially improving flood control and water supply in that basin. Due to the pandemic, the end date for the study was pushed back six months into late 2021. The board's report was submitted to the IJC in September 2021, followed by a highlights report in October and IJC public hearings in November. The final IJC submission was sent on to the governments the following January.

Additionally, a new study began in 2021 with the St. Mary-Milk Rivers Study Board forming at the end of the year. This study is looking at measures that could improve the efficiency of apportioning the waters of the two rivers between Canada and the United States.



Osoyoos Lake. Credit: Shutterstock

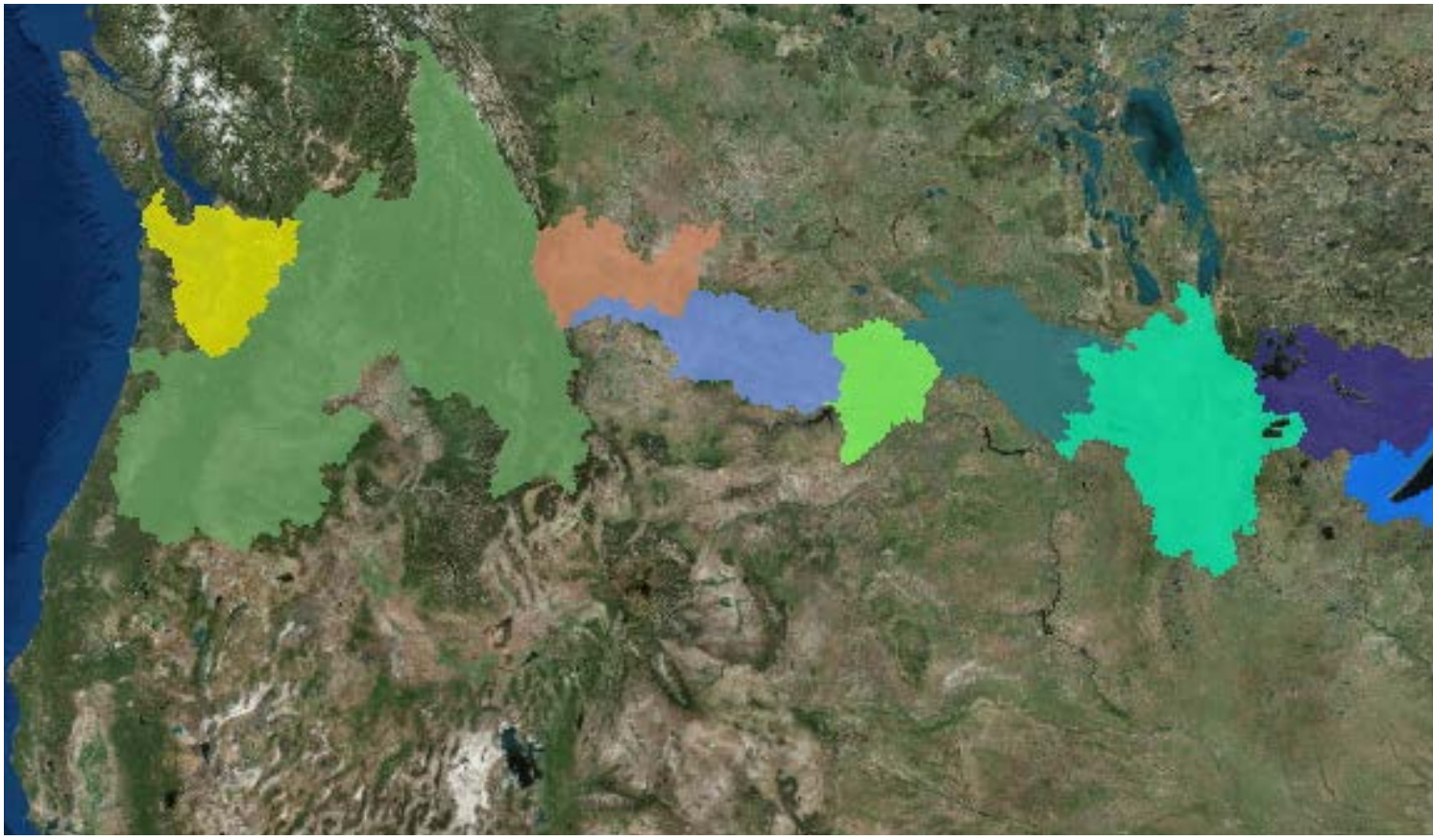
THE IJC, COAST-TO-COAST

The Columbia River basin covers 668,000 square kilometers (258,000 square miles), touching seven US states and the Canadian province of British Columbia. The IJC has three boards overseeing specific operations within this system: The International Columbia River Board of Control monitors backwater effects from the Grand Coulee Dam; the International Osoyoos Lake Board of Control oversees the operation of Zosel Dam to manage water levels in Osoyoos Lake, which crosses the British Columbia-Washington border; and the International Kootenay Lake Board of Control oversees the Corra Linn Dam at the outlet of Kootenay Lake in British Columbia, which gets its water from tributaries flowing through Idaho, Montana and British Columbia.

The St. Mary and Milk rivers each wind through the Canadian province of Alberta and the US state of Montana. Article VI of the Boundary Waters Treaty sets out how the water in the two rivers is to be shared between Canada and the United States. A 1921 IJC Order of Approval sets out a process for the apportionment of the waters. The process of apportionment is overseen by the Accredited Officers of the St. Mary and Milk Rivers, the two countries' water accounting officers. The two rivers, while having distinct basins and sources, are connected through the approximately century-old St. Mary Canal, which allows water from the St. Mary River to enter the Milk River. The International St. Mary-Milk Rivers Study Board is looking at ways to improve the efficiency of apportionment.

The Souris River originates in Saskatchewan before winding its way through North Dakota and Manitoba to join the Assiniboine River. The International Souris River Board monitors water quality, aquatic ecosystem health, and flow issues, and reports on the apportionment of water between the two countries. An International Souris River Study Board also developed flood mitigation recommendations, completing its work in 2021.

The Red River flows northward between North Dakota and Minnesota, continuing into Manitoba before emptying into Lake Winnipeg. The IJC's International Red River Watershed Board monitors and makes recommendations regarding water quality, flood preparedness and other water-related issues in the basin.

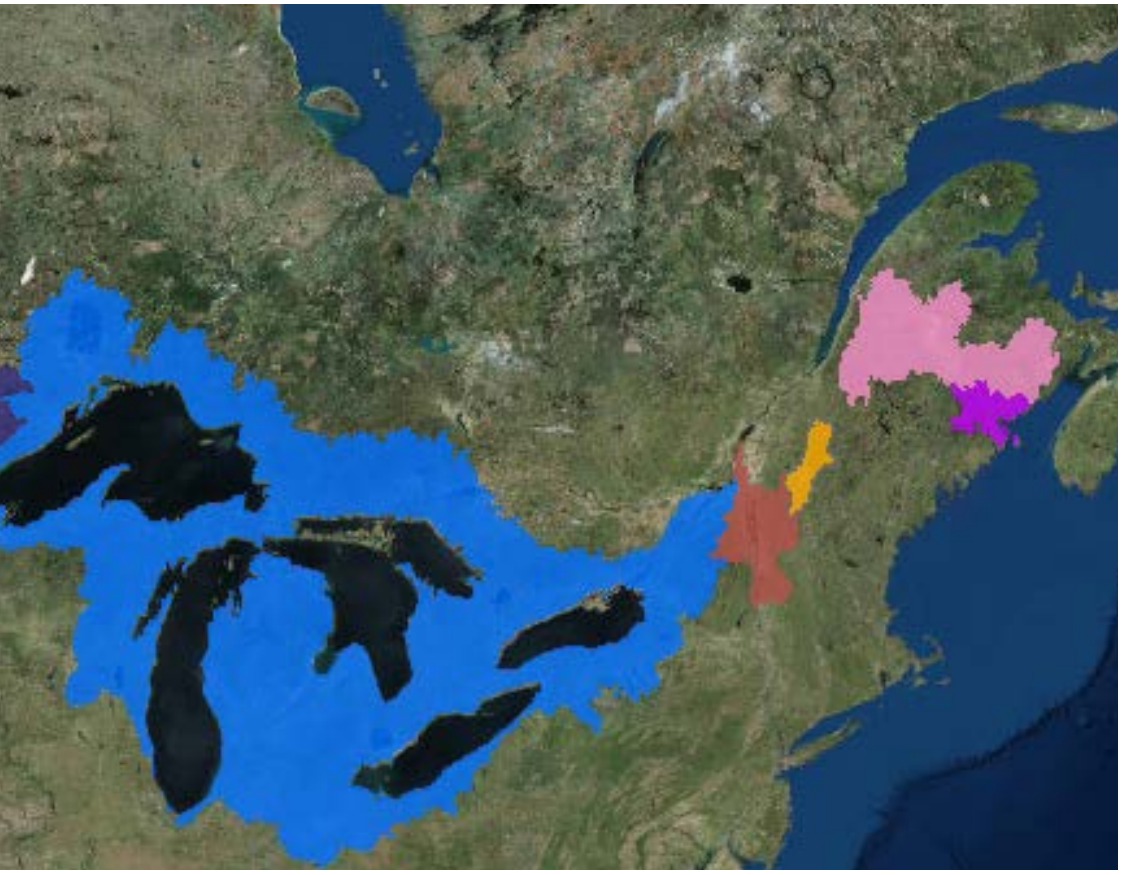


The Rainy-Lake of the Woods basin lies in northwestern Ontario, southeastern Manitoba, and northern Minnesota. The basin responds quickly to changes in water supply conditions, such as extreme rainfall events and can go above and below the prescribed levels in the rule curves established by the IJC. The International Rainy-Lake of the Woods Watershed Board supports Canada-U.S. coordination of water quality Initiatives throughout the entire Rainy-Lake of the Woods basin, and oversees the regulation of water levels on Rainy Lake and the Namakan Reservoir.

The Great Lakes and St. Lawrence River hold 20 percent of the earth's fresh surface water or 6 quadrillion gallons, cover a total area of 246,463 square kilometers or 95,160 square miles, and with the St. Lawrence River span 3,700 km (2,342 miles) or almost half of the North American continent. Within this basin, the IJC has three boards of control (Superior, Niagara, and Lake Ontario-St. Lawrence River) and the Great Lakes-St. Lawrence River Adaptive Management Committee. Additionally, the IJC has the Great Lakes Water Quality Board and Science Advisory Board that review, advise, and assess the progress of the Great Lakes Water Quality Agreement.

Lake Champlain sits between New York and Vermont, with its upper reaches entering Quebec. The lake flows into the Richelieu River, which in turn eventually meets with the St. Lawrence River. Due to the relatively flat topography in the region, the Richelieu River portions of the basin are susceptible to flooding. The IJC has been studying flooding risks since 2016 through its International Lake Champlain-Richelieu River Study Board and is working on recommendations to help mitigate future damages. A final report is due in 2022.

The St. Croix River forms the border between Maine and New Brunswick before emptying into Passamaquoddy Bay on the Atlantic Ocean. The International St. Croix River Watershed Board reports on water quality in the river and ecosystem health including reporting on the recovery of the alewife fishery. The St. Croix Board also monitors the compliance with requirements of four Orders of Approval issued by the IJC for dams on the St. Croix River at Forest City, Vanceboro, Grand Falls and Milltown. A dam on the St. John River at Grand Falls is also monitored by the St. Croix Watershed Board.



The Health Professionals Advisory Board works on both Great Lakes and transboundary watershed issues that intersect with water quality and human health. The board identifies and alerts the Commission to emerging human health issues associated with air or water quality in Great Lakes basin and other basins where the Commission has specific water quality responsibilities.

Osoyoos Lake. Credit: Shutterstock

OSOYOOS LAKE, KOOTENAY LAKE AND COLUMBIA RIVER BASIN

The Osoyoos Lake Board of Control reported heavy snowpack in the early part of 2020, but while this kept the Okanagan River basin to its north in good shape into the summer months, Osoyoos Lake saw drier conditions at those times. While water levels and flows remained within the regulatory rule curve through the summer, the board operated according to drought rules at that time. 2021 featured extremely hot, dry conditions through the summer months, but the board was able to once again maintain lake water levels within its rule curve.

Conditions in Kootenay Lake largely followed the rule curves laid out in its Order, with an exceedance in August 2020 attributed to the Grohmann Narrows – a natural restriction in the river downstream of the lake. Water levels on Kootenay Lake were kept stable in the fall to help promote kokanee spawning, as the fish prefer to reproduce in the shoals. The Kootenay Lake Board of Control is developing a report on with recommendations to the IJC on if a review of its its 1938 Orders of Approval is needed; the board expects to finish this report in 2022.

ST. MARY AND MILK RIVER BASINS

2020 was an extraordinarily difficult year for the apportionment of water within the basin, as a part of the St. Mary Canal known as Drop 5 collapsed in May. This reduced the Milk River to natural flows through the irrigation season. The federal governments, Montana and Alberta worked together alongside the Accredited Officers and local stakeholders to quickly replace Drop 5, along with another portion called Drop 2, which was in danger of collapsing as well. Despite the COVID-19 pandemic, travel restrictions and border measures in place, the necessary equipment reached the canal and workers were able to reconstruct the damaged section and restore water flow by October. In the meantime, irrigation along the Milk River largely ceased in late July to balance out apportionment between the two countries; the natural flow was reduced to a trickle not long after.

The Drop 5 stilling basin in the St. Mary Canal, used to reduce the velocity of the water, is being excavated and dewatered. Credit: John Kilpatrick

In November 2021, the IJC struck a St. Mary-Milk Rivers Study Board to research and provide recommendations on structural and non-structural measures that could improve access to apportioned waters by each country, in recognition of climate change and challenges to apportionment since the original 1921 Order was issued. This study board is scheduled to release its final results in 2025 and includes several advisory groups with representatives from stakeholder groups, government agencies and Indigenous Nations.

SOURIS RIVER BASIN

The International Souris River Board held its 2020 annual public meeting in February, shortly before the COVID-19 pandemic halted international travel and large gatherings. The June 2020 and 2021 meetings were done virtually.

The International Souris River Study Board completed its final report to the IJC in September 2021. Leading up to the finalization of its report, the study board hosted virtual public meetings on its draft final report in August 2021 and held a public comment period to gather feedback on the recommendations to the IJC. The Board also continued to receive guidance and advice from its Public Advisory Group, Resource and Agency Advisory Group and Indigenous partners throughout 2020 and 2021. Two virtual workshops with First Nations, the Metis Nation and Tribes interested in the study were held in 2020 and 2021, contributing to the recommendation by the Study Board for the creation of a permanent Indigenous Advisory Committee for the existing International Souris River Board. Since September 2021, a transition team met several times to help shift relevant operations from the study board over to the permanent river board and to discuss the river board's next steps.

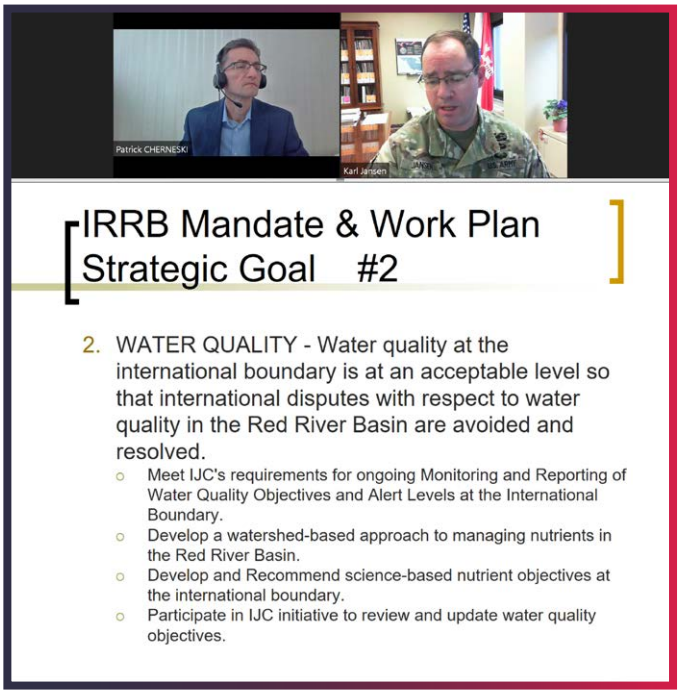
Following a public comment period and a November public hearing, the IJC transmitted a Souris Letter Report to the governments January 5, 2022. This Letter Report provided IJC input on the study board recommendations and some additional recommendations beyond the Study Board's final report that involve revising the 1989 Operating Plan to clarify some murky language, revisiting existing flow plans to reduce flood risks, improve operational flexibility, and benefit the environment, close knowledge gaps with additional research on the basin, and continue improved engagement and working relationships with Indigenous communities.

The Souris River at the Sherwood crossing. Credit: Dave Malkoff

RED RIVER BASIN

In December 2019, the International Red River Board submitted its recommendations to the IJC for nutrient concentration objectives at the international border. Specifically targeting phosphorus and nitrogen, these recommendations aim to reduce nutrients flowing through the Red River into Lake Winnipeg. The IJC held two in-person public hearings—one in Fargo, North Dakota in January, and another in Winnipeg, Manitoba in February—and had an open comment period on IJC.org through March 28 2020. After receiving public input, the IJC made its formal recommendations to the Canadian and US governments in May.

The Red River Board added four new members in 2021 in an effort to make the board more inclusive. The new members are all experts on water issues and come from Indigenous communities in both Canada and the United States. After consulting with governments, in June the IJC designated the board as the International Red River Watershed Board, and board members are currently researching updates to its directive and responsibilities to reflect this. These recommendations are expected to come to the IJC in 2022. These recommendations are expected to come to the IJC in 2022.



International Red River Watershed Board Co-Chairs Patrick Cherneski and Col. Karl Jansen talk about the board's water quality mandate during a January 2021 public meeting. Credit: IJC

The Red River flowing through Manitoba on its way to Lake Winnipeg. Credit: Manitoba Agriculture and Resource Development

RAINY-LAKE OF THE WOODS BASIN

The Lake of the Woods, which straddles Minnesota, Manitoba and Ontario. Credit: J. Stephen Conn

Following several years of study and consultation by Canada and the United States, the International Rainy-Lake of the Woods Watershed Board believes that there is now sufficient knowledge and consensus to establish a 20 percent reduction objective for phosphorus in the basin. This is considered critical in reducing the frequency and intensity of harmful algal blooms. The board communicated this recommendation to the IJC in October 2021, with a request for the IJC to re-engage governments in setting a shared phosphorus objective and load reduction target in the basin.

Through 2021, the basin experienced extreme to exceptional drought conditions, and was the driest on record. The board's Water Levels Committee met weekly to discuss conditions and maintain contact with water users and fisheries managers. Rainy Lake fell below the drought line by September 2021, necessitating reduced flows at the International Falls-Fort Frances dam on the Rainy River.

The board's Adaptive Management Committee is leading efforts to create and consult with the public on the implementation of the IJC climate change guidance framework for the basin; to enhance bathymetry data available for the nearshore areas of Rainy Lake and the Namakan Reservoir; and to enhance and potentially expand the performance indicators that guide the management of lake levels.

LAKE CHAMPLAIN AND THE RICHELIEU RIVER

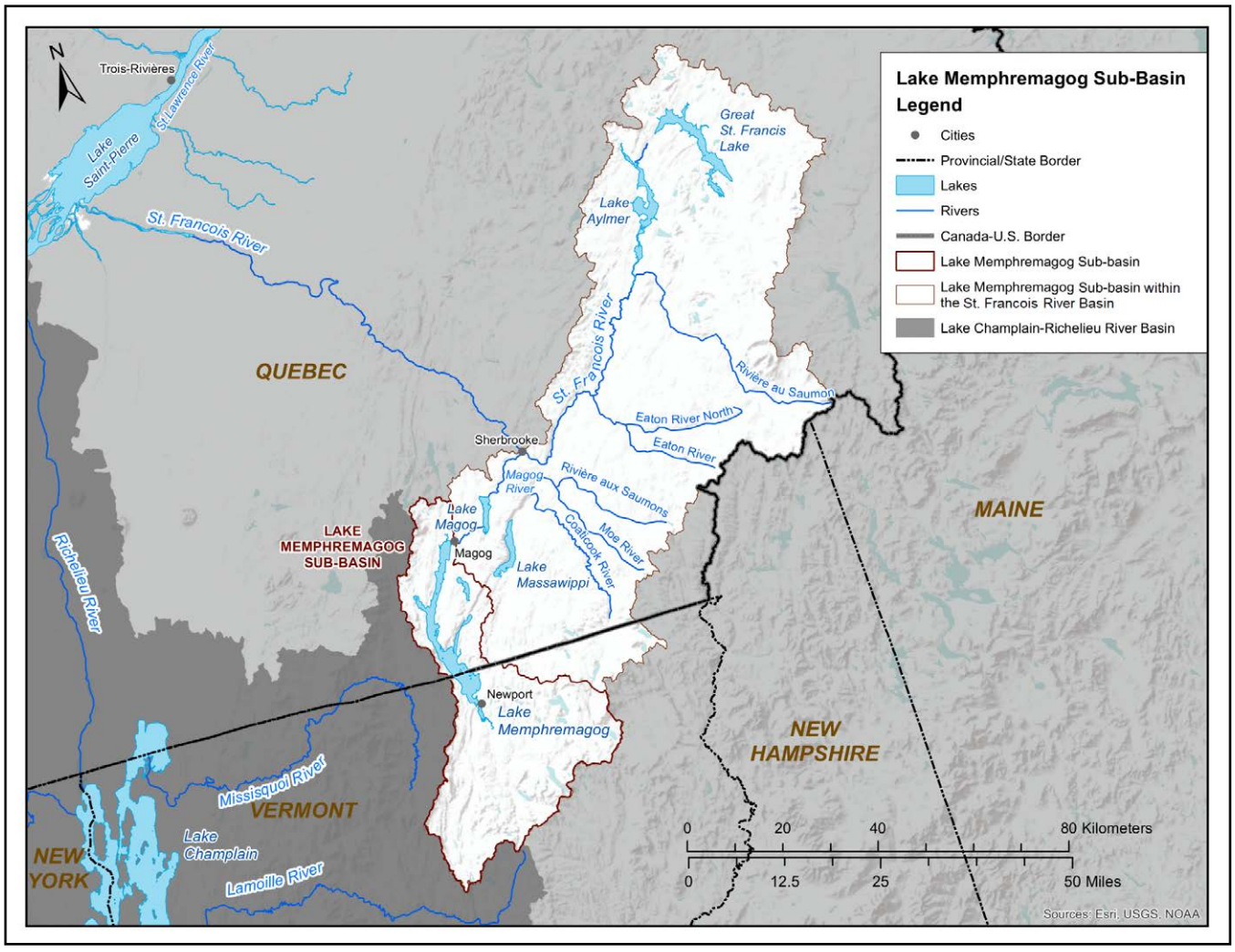
Aquatic plants along a Lake Champlain-Richelieu River wetland. Credit: Madeleine Papineau

The work of the International Lake Champlain-Richelieu River Study Board continued in 2020 and 2021 to investigate the causes, impacts, risks and potential solutions to flooding in the basin. As the board prepares to submit its final report to the Commission in 2022, it is working to share the key findings of its work with the public. The board released its Causes and Impacts report in March 2020, which focused in on the record flooding that took place in 2011 but largely looked at what has led to flooding in the basin and how it affected communities and property owners in the region. In May 2021, the Board released its Potential Structural Solutions to Mitigate Flooding, detailing the benefits that structural solutions being considered by the study would have on flooding. In December, the Board also released a report that looked at the potential use of wetlands and agriculture land as flood water storage options in the basin, in its report Flood Water Storage using Active and Passive Approaches.

LAKE MEMPHREMAGOG AND LAKE CHAMPLAIN

In 2017, the IJC received a reference from the governments of Canada and the United States to examine nutrient loading and harmful algal bloom issues in Lake Memphremagog, as well as Missisquoi Bay and the Lake Champlain-Richelieu River system to the west. A final report on this issue detailing recommendations on how to reduce these problems was delivered to the governments in March 2020.

That report includes recommendations that governments can take over the next 30 years to help resolve these problems. These include improving existing collaboration and mechanisms between the federal, state and provincial governments to reduce nutrient loads, supporting additional studies into the sources of nutrients entering the waters in the basin, and creating/implementing basin-specific action plans with the assistance of state, provincial, local and Indigenous governments.



ST. CROIX RIVER BASIN

Milltown Dam sits at the mouth of the St. Croix River. Credit: IJC

Activities from the International St. Croix River Watershed Board included monitoring the status of proposed changes at Forest City Dam and Milltown Dam.

The region saw below-average snowpack in the spring of 2020, but water levels and flows on the river itself were still healthy until a "flash drought" hit in May and June, where below-average precipitation combined with higher than normal temperatures. These dry, hot conditions continued through the summer until heavy rains hit in October. Flows were still relatively healthy in the upper reaches of the basin, but shrunk as the water got closer to the St. Croix River mouth. Due to the drought showing no indications of occurring ahead of time, water managers were not able to prepare by reducing outflows over the dams ahead of time.

The board worked with stakeholders including Woodland Pulp, the owners of the Woodland Dam and Grand Falls Dam—which predate the Boundary Waters Treaty —and Indigenous communities to analyze opportunities and constraints at the two dams for potential improvements to fish passage for a variety of local species on the St. Crox River. After the Milltown Dam, the Woodland Dam is the next dam up from the mouth of the river and is a barrier for fish returning to the St. Croix to spawn. The board released the report in 2021 with evaluations of different fish passage options at each site, which is being used as a starting point for future project discussions between Indigenous communities, the governments and Woodland Pulp.

THE HEALTH PROFESSIONALS ADVISORY BOARD

A map showing the "zones of pollution" from the IJC's 1913 nearshore contamination study. The Health Professionals Advisory Board is designing a follow-up centennial study. Credit: IJC

In 2020, the Health Professional Advisory Board published a review of the human health impacts of selenium and created infographics for both the general public and for health practitioners. The report delves into the safe consumption limits for selenium and how human activities can increase the amounts in the environment to a degree that it begins to affect human health if individuals consume food high with high selenium content, such as fish.

In 2021, the board published a phase 1 report for its Great Lakes Water Quality Centennial Study. More than a century ago the IJC conducted a study of nearshore contamination that linked fecal contamination to water quality and health issues. This 2021 report established the feasibility and need for a binational, Great Lakes basin-wide nearshore fecal bacterial/microbial water quality survey using modern technology. In the next phase, the board will develop an implementation plan for the proposed study.

A portion of the Health Professionals Advisory Board's public infographic on Selenium in aquatic ecosystems.

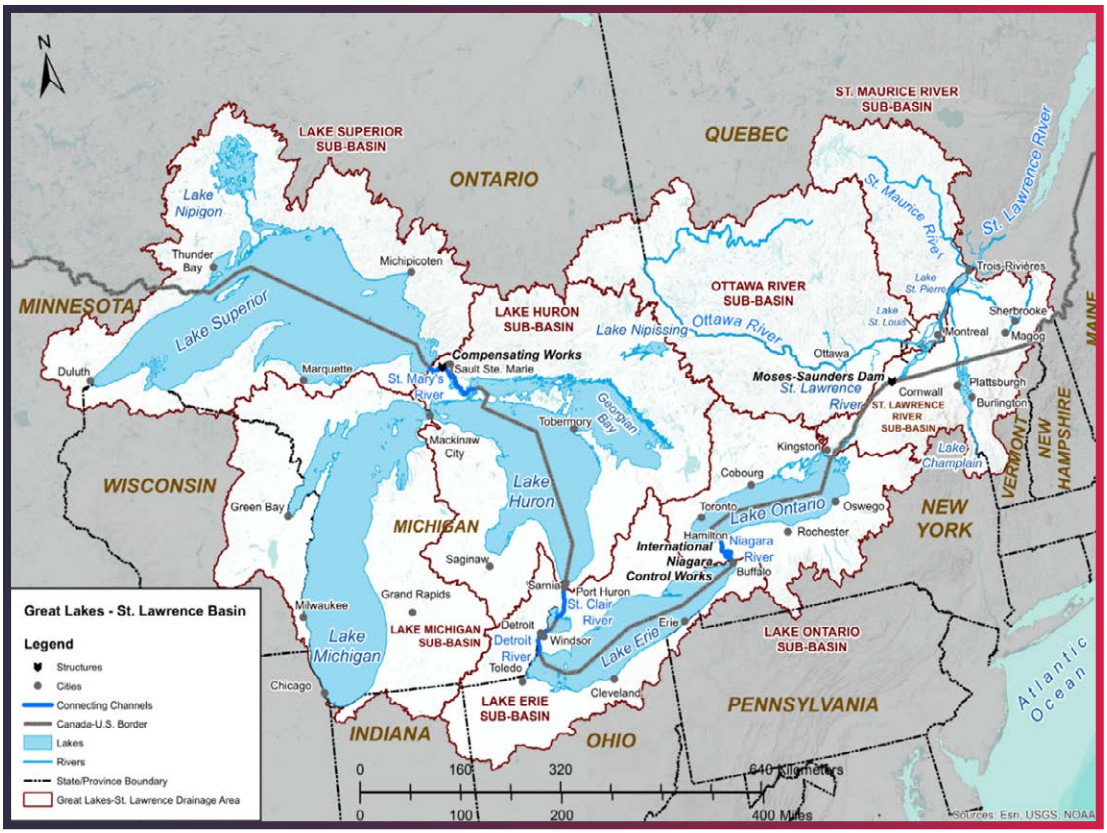
In 2021, the IJC approved two Phase 1 and Phase 2 reports for the board's project A Proof-of-Concept Pilot Study of Acute Gastrointestinal Illness (AGI) in the Great Lakes. The board's report combined water quality monitoring data with public health disease counts and climate data for four Great Lakes cities. Project Phase 1 sought to answer whether it was feasible to collect comparable, binational water quality and population health data for locations around the Great Lakes. Phase 1 report demonstrates that considerable data exist and is available, and that modest effort could improve the comparability and granularity of data. The board's Phase 2 research conducted statistical analyses of two sets of data (1. spatial and temporal records of GI illness and 2. storm intensity, frequency and timing.). The study found that heavy precipitation events following periods of dry weather were associated with a subsequent increase in laboratory confirmed cases of one of two waterborne illnesses (Giardia and Cryptosporidium) within one to seven weeks after the heavy storm.

Driftwood on the shores of Lake Michigan. Credit: Shutterstock

THE GREAT LAKES AND ST. LAWRENCE RIVER

The Great Lakes are a massive watershed, containing 20 percent of the planet's fresh surface water and covering 246,463 square kilometers (95,160 square miles). The St. Lawrence River, which drains this system into the Atlantic Ocean, is 3,700 kilometers (2,342 miles) long. Four of the five Great Lakes, as well as a portion of the St. Lawrence River, are shared between Canada and the United States, and the Great Lakes Water Quality Agreement between the two countries promotes a binational approach to restoring and protecting this shared treasure.

GREAT LAKES BOARDS



THE INTERNATIONAL LAKE SUPERIOR BOARD OF CONTROL

The International Lake Superior Board of Control oversees outflows from the power structures on the St. Marys River, where water from the lake flows into Lake Huron. To do this, the board follows Plan 2012, a regulation plan designed to try and balance outflows between the lakes and the river.

Water levels on the Upper Great Lakes remained high in 2020, including for Lake Superior where lake levels exceeded previous record high levels early in the year. Total basin water supplies returned to more normal levels in 2021 resulting in Lake Superior levels returning to near average by the end of the year.

THE INTERNATIONAL NIAGARA RIVER BOARD OF CONTROL

The Niagara River Board of Control monitors operations at the Chippewa Grass Island Pool control structure above the Niagara Falls and oversees the annual installation and removal of an ice boom at the outlet of Lake Erie to prevent ice jams on the river.

The work to install the ice boom for the 2020 winter season started in mid-December. This was done earlier than usual to account for the additional time needed to account for COVID-19 pandemic safety measures.

THE INTERNATIONAL LAKE ONTARIO-ST. LAWRENCE RIVER BOARD

The Lake Ontario-St. Lawrence River Board oversees flows through the Moses-Saunders Dam on the St. Lawrence River according to Regulation Plan 2014.

Water levels on Lake Ontario fell over the course of 2020 from the record highs of 2019. Due to continued high inflows from Lake Erie and above-average water levels on Lake Ontario itself, the dam operators continued to pass large amounts of water, above what is normally prescribed by the regulation plan. Alongside favorable weather conditions, this helped reduce water levels on the lake while not significantly impacting shipping along the St. Lawrence.

Based on its experience over the past several years, the IJC restructured the Lake Ontario-St. Lawrence River Board in 2020, reducing its membership while adding advisory groups. This ensures that community members and stakeholders along the lake and river can still have their voices and concerns heard and recognized, while allowing the board the flexibility it needs to make quicker decisions in emergencies. Alongside the Lake Superior and Niagara River control boards, the Lake Ontario-St. Lawrence River Board participated in a strongly attended tri-board webinar to explain conditions and regulation regimens—and limitations—across the Great Lakes.

THE GREAT LAKES-ST. LAWRENCE RIVER ADAPTIVE MANAGEMENT COMMITTEE

The Great Lakes-St. Lawrence River Adaptive Management (GLAM) Committee finished the first phase of its expedited review of Plan 2014 in 2021. The GLAM is looking at how the regulation plan has performed and what, if any, improvements could be made to it to make it more effective—while still retaining as many of the ecological, recreational and economic benefits that the plan brings as possible. The first phase of the review involved collecting data during this period of high inflows for short-term adjustments to outflows, and the IJC plans on releasing the Phase 1 report early in 2022.

The IJC is planning a second phase looking at potential improvements to the regulation plan for low-water impacts and long-term trends to begin once Phase 1 is finished. Phase 2 would see what, if any, changes to the regulation plan may be needed to account for climate change while still ensuring the plan retains its ecological, recreational and economic benefits. Any recommended changes would need to be approved by both governments before they could be implemented.

THE SECOND TRIENNIAL ASSESSMENT OF PROGRESS REPORT

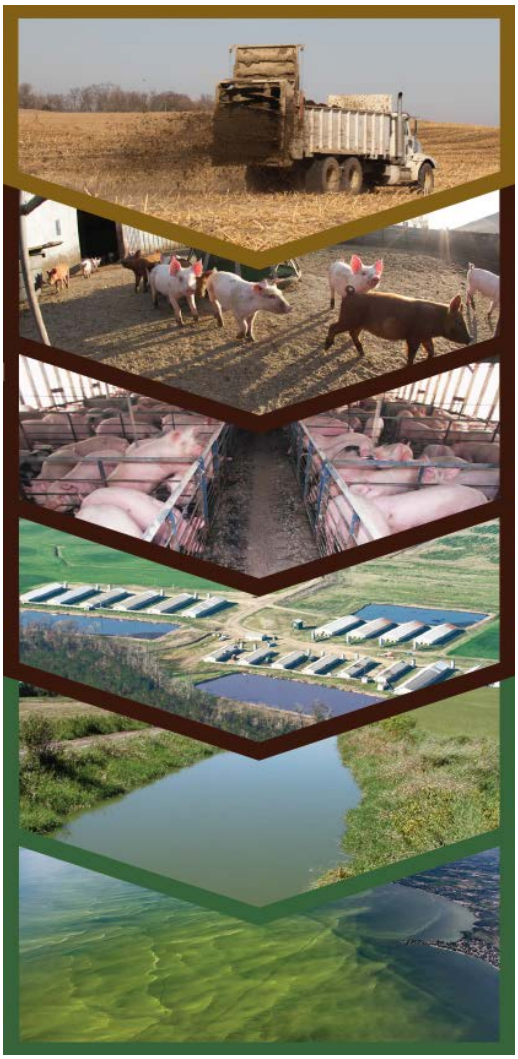
In December 2020, the IJC published its second Triennial Assessment of Progress (TAP) Report on Great Lakes Water Quality, releasing the report via virtual press conference. This report summarizes public input on the 2019 Progress Report of the Parties gathered throughout the summer and autumn of 2019 via in-person meetings and listening sessions, and an online survey. It analyzes and offers commentary on the effectiveness of select government program activities related to climate change, nutrients and public engagement, giving consideration to the Parties' State of the Great Lakes Highlights Report. A visual StoryMap also describes the IJC's public engagement efforts for the report and summarizes its recommendations.

The IJC offered three recommendations to governments in its TAP report. The IJC recommended that governments characterize Lake Superior nutrient loads into the lake that are forming cyanobacterial algal blooms to determine the best path forward on eliminating the blooms. The IJC also recommended that governments link their analysis and reporting on programs and the state of the Great Lakes to demonstrate how actions are tied to progress in Great Lakes health and vitality. Finally, the IJC recommended the Parties renew their Lakewide Action and Management Plan public engagement model in all lake basins and offered its assistance to governments to identify factors that previously contributed to effective public engagement in the Lake Superior basin.

Round Island Lighthouse at Mackinac, Michigan. Credit: Dan Denardo, 2020.

Summary of IJC recommendations in the 2020 Second Triennial Assessment of Progress Report on Great Lakes Water Quality. Credit: IJC

Lake Erie harmful algal bloom, August 2017. Credit: Aerial Associates Photography, Inc. by Zachary Haslick, via NOAA

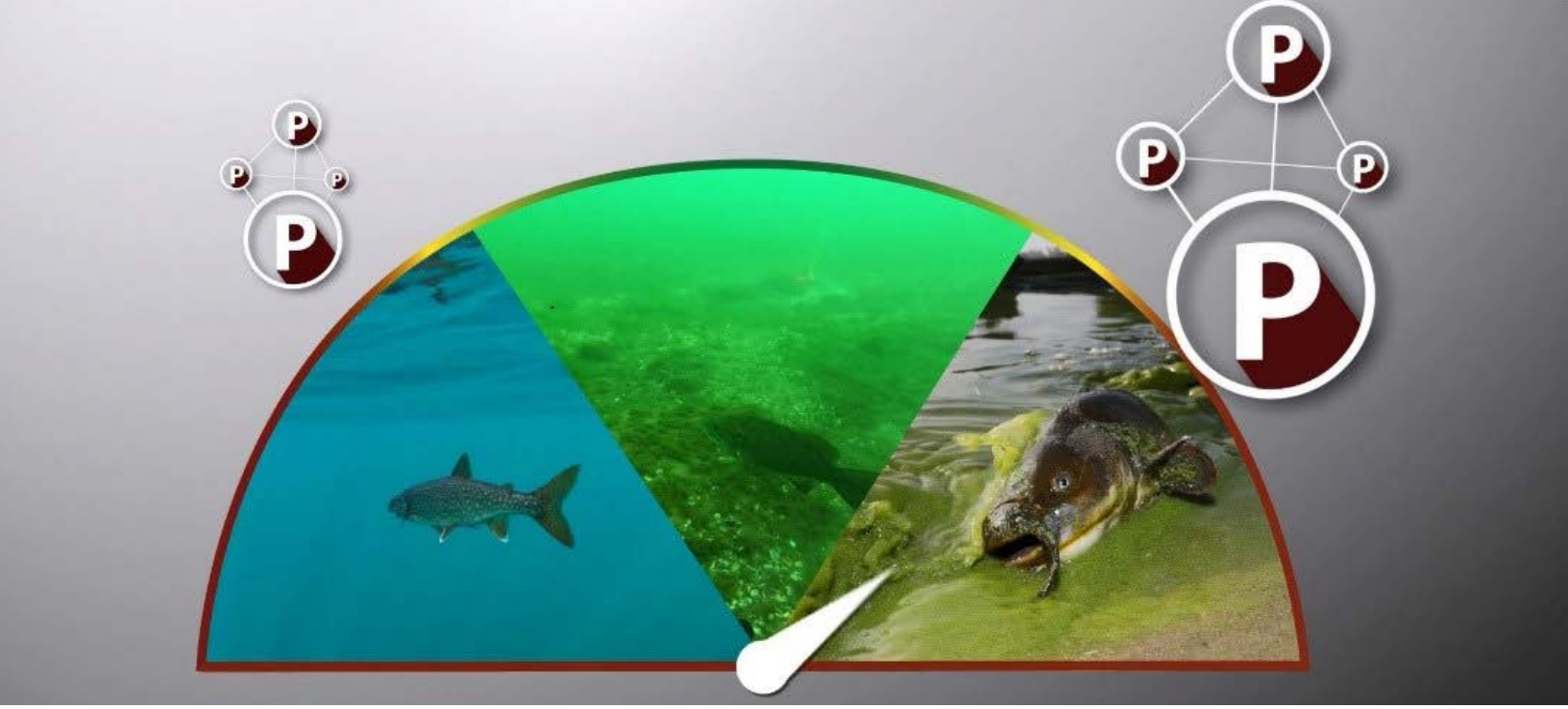


Portion of the Great Lakes Water Quality Board infographic about manure management practices that impact nutrient runoff into the Great Lakes. Credit: IJC

GREAT LAKES WATER QUALITY BOARD

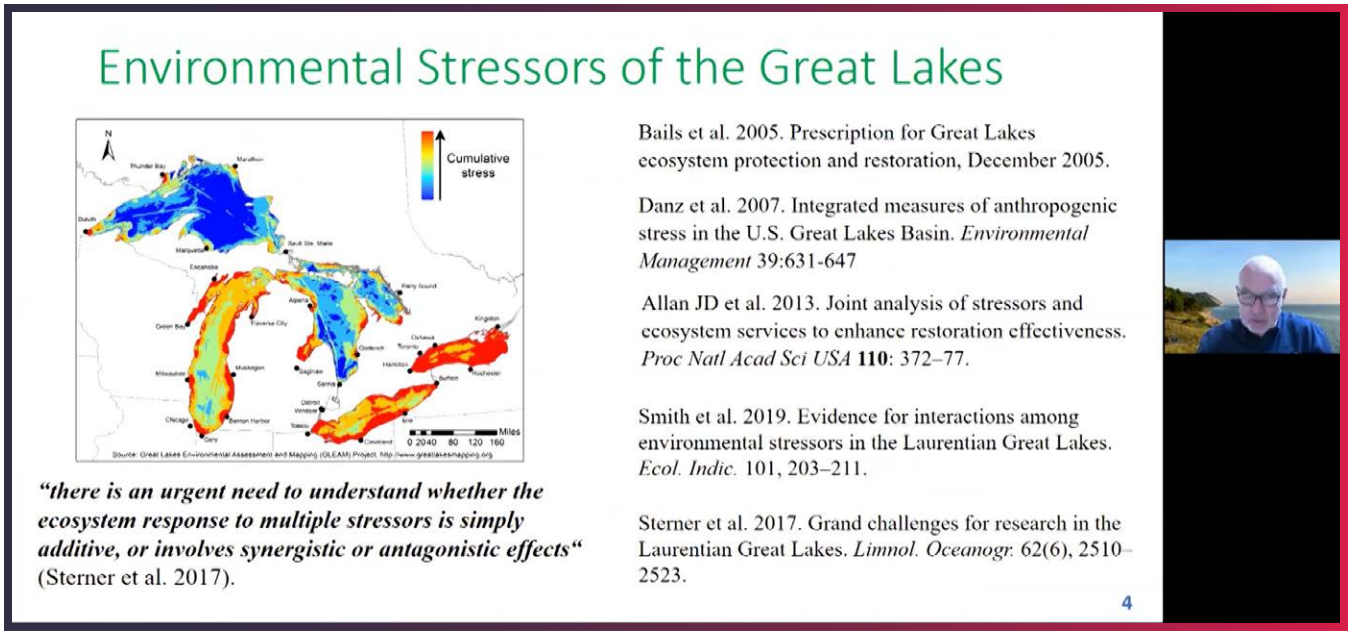
In early 2020 the Great Lakes Water Quality Board published a report on manure management practices governing large and medium-sized animal feeding operations in the Great Lakes basin. The report included recommendations specifying actions that could be taken through regulation and policy to reduce nutrient runoff into the watershed. The board also produced an infographic summarizing the problem and its recommendations. The board held a series of webinars to gather input on the recommendations and summarized the collective feedback in a report. The board is moving into a second phase of this project by establishing a diverse group of stakeholders involved in nutrient and manure management to create a framework for Great Lakes manure management, using the board's recommendations as a basis.

In 2021, the Water Quality Board published the results of its latest Great Lakes Regional Poll, reflecting the opinions of people across the Great Lakes on Great Lakes environmental issues. In addition to repeating the board's previous random sample phone poll methods, the board expanded its efforts to reach new respondents through an open online poll. In addition to developing a media toolkit to share key findings, the board held a public webinar to summarize its findings in December, emphasizing the striking findings that an overwhelming majority of residents feel the Great Lakes are important to protect.



An animation from the Great Lakes Science Advisory Board's video summarizing their report on the declining productivity of the offshore regions of the Great Lakes Credit: IJC

GREAT LAKES SCIENCE ADVISORY BOARD



A slide from the Great Lakes Science Advisory Board-Science Priority Committee's webinar summarizing their report in interacting stressors in the Great Lakes. Credit: IJC

The Science Advisory Board published three reports in 2020. The first report of the first of a two-phase study outlined the key components and organizational approach of a Great Lakes environmental Early Warning System that would allow jurisdictions to move quickly to address any new stressors or threats to ecosystems or water quality in the Great Lakes before they become established. A second report, accompanied by an explanatory video, delves into the decline of fish productivity in the offshore regions of the Great Lakes and links the problem to nutrients getting trapped in the nearshore regions. Finally, the Board released a report examining how different stressors in the Great Lakes interact with each

other, finding that climate change is a threat multiplier for several other water quality stressors. Over 500 individuals attended the public webinar about the report findings.

In 2021, the Science Advisory Board published a report on gaps in monitoring and researching the Great Lakes' connecting waters. Connecting waters are the rivers and channels that connect between the Great Lakes. For instance, the Niagara River connects Lake Erie with Lake Ontario. These connecting waters are hotspots of both ecological importance and human activity, but despite their vulnerability they are less frequently monitored or studied. The board held a public webinar to summarize their recommendations to improve coordination funding and infrastructure for monitoring connecting waters.

INTERNATIONAL WATERSHEDS INITIATIVE

The International Watersheds Initiative (IWI) is an approach to resolving transboundary water issues grounded on the belief that local communities, given appropriate assistance, are best placed to achieve solutions. This approach operates on an ecosystem focus, recognizing that ecosystems function as whole entities and should be managed as such, rather than being bound by traditional political boundaries. In order to make this approach into a reality, IJC boards in watersheds along the Canada-US border carry out IWI projects to help manage resources, promote communication, and conduct scientific studies, consistent with board responsibilities.

One boundary-wide project was the production of a video detailing the history of the IWI program, how it started, and how it works. This video was completed in early 2021.

The IWI history video explains how and where the program operates along the transboundary. Credit: IJC

Woodland Dam on the St. Croix River. Credit: IJC

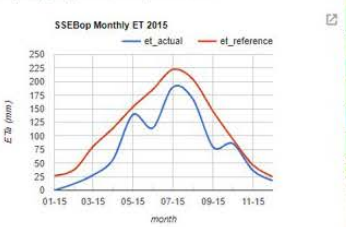
Landsat ET for Crop Water Use

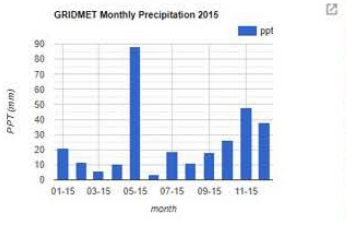
Landscape and crop Evapotranspiration (ET) estimates are important for monitoring and assessing vital surface and groundwater resources. The U.S. Geological Survey (USGS) is using the Operational Simplified Surface Energy Balance (SSEBop) model with Landsat satellites to estimate and quantify ET as part of the National Water Census through the Water Availability and Use Science Program.

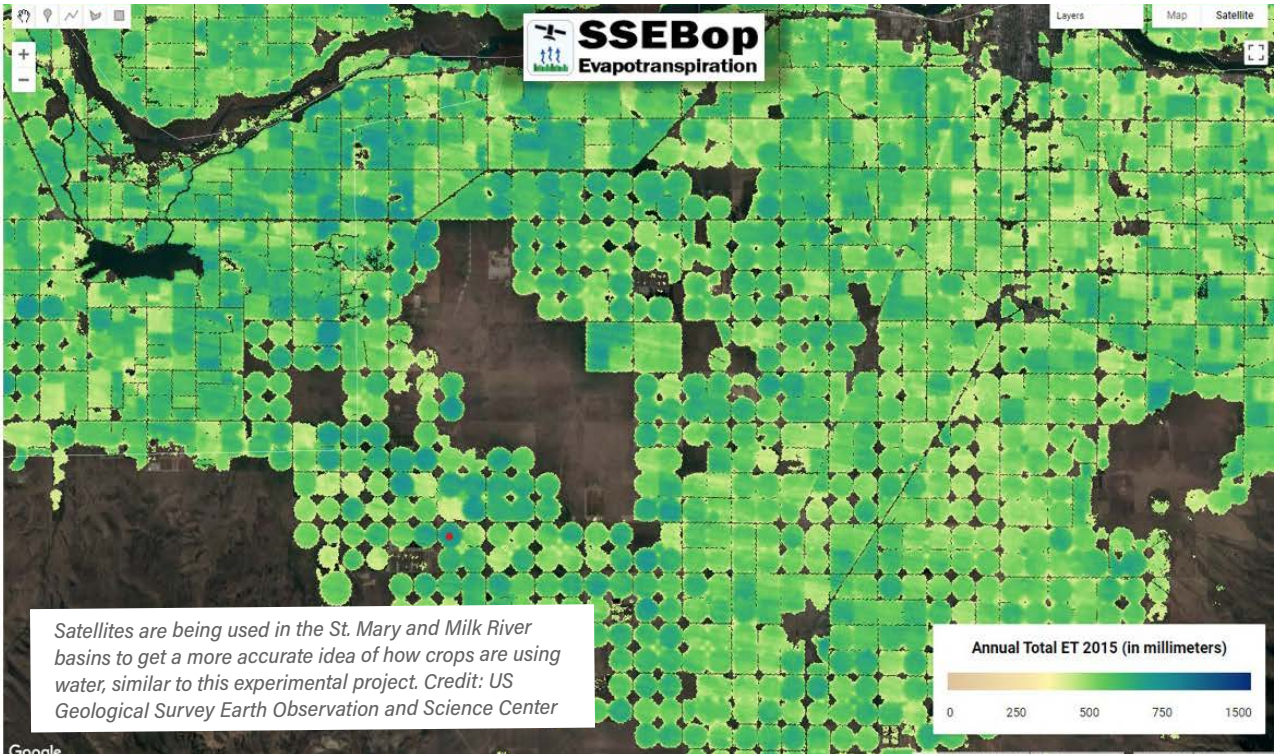
Click a point on the map to explore ET over time

Contributors: Mac Friedrichs, Gabriel Senay (USGS EROS), Charles Morton, Justin Huntington (Desert Research Institute)

Crop Type (CDL 2015): Alfalfa







Satellites are being used in the St. Mary and Milk River basins to get a more accurate idea of how crops are using water, similar to this experimental project. Credit: US Geological Survey Earth Observation and Science Center

St. Croix: IWI funds supported the annual alewife fish count at Milltown Dam in 2020 and 2021, which included a youth engagement program. Supported a study on water quality stressors and trends in the river system, and another study on fish passage in the river, which was completed in 2021.

Great Lakes: A study looking at the potential ecological impacts of drawing down water levels in the winter on Lake St. Lawrence was completed in April 2020, which looked at a variety of species under six different drawdown scenarios. Another study was completed in February 2020 that monitored coastal wetlands along Lake Ontario to see how they are being impacted by water regulation; monitoring is continuing outside of IWI funding. IWI funds were also allocated to support developing informational videos on water regulation in the Lake Ontario-St. Lawrence River system.

Rainy-Lake of the Woods: IWI supported an assessment of aquatic invasive species in the Rainy-Lake of the Woods region to determine what is already there, where those species are, and what are the biggest regional threats. This is designed to assist in developing consistent binational prevention efforts.

Red River: Work continued in 2020 on a drought risk analysis of the Red River basin to statistically characterize the potential for extreme low flow conditions over the next 50 years. This will help improve water quantity management for apportionment and environmental needs. New projects include funding training for local water managers to reduce nutrients entering the water system and a study to identify where salts are reaching the Red River basin.

Souris River: A pair of studies are ongoing through IWI to monitor water quality objectives at the two international crossings the Souris River makes, which will help with updating these objectives and identifying risks to the system. The first is studying dissolved oxygen, while the other is an overall water quality trends analysis.

St. Mary-Milk Rivers: Work continued on a consumptive use study in the region, which will assist in more accurately apportioning the waters between the two countries. This includes combining satellite imagery with existing weather and apportionment records to establish a historical database going back to 1982.

Kootenay Lake: Planning got underway for creating a visualization tool to communicate to the public and stakeholders what drives Kootenay Lake levels, the constraints of flow management, and the demands of the system.

Osoyoos Lake: As part of the four-year Osoyoos Lake Board of Control climate change vulnerability study, IWI supported combining the climate models for the Similkameen River and the Okanagan/Okanogan River basins. IWI funds also went towards mapping the near-shore bathymetry of Osoyoos Lake and developing a regional Osoyoos Lake Watershed Forum set to take place in 2022.

Additionally, IJC staff completed the International Watersheds Initiative Fifth Report to Governments in 2020, describing activities and successes since 2015 and plans for the overarching program into 2025. The Fifth Report to Governments is part of the ingoing reporting cycle to governments; the IJC provides reports to governments on the program every 5 years. In 2021, IJC staff produced the Climate Change Guidance Framework Highlights Report, which covers new developments and activities conducted by IJC boards in that IWI effort.

ENHANCING COLLABORATION WITH INDIGENOUS PEOPLES

In 2020 and 2021, overall Indigenous membership across IJC's boards committees increased:

- Four new seats were created for First Nations, Métis, and Tribal members on the International Red River Watershed Board. Melissa Hotain of the Sioux Valley Dakota Nation, Dr. Annette Trimbee of the Métis Nation, April Poitra-Walker of the Turtle Mountain Band of Chippewa Indians, and Benjamin Yawakie, a citizen of the Pueblo of Zuni and descended from the Turtle Mountain Band of Chippewa Indians, the Fort Peck Assiniboine and Sioux tribes and White Bear First Nations were all appointed in March 2021
- Ogimaa Kwe (Chief) Linda Debassige of M'Chigeeng First Nation was appointed in March 2021to the Great Lakes and St. Lawrence River Adaptive Management Committee.
- Following a recommendation of the International Souris River Study Board in 2021, the IJC is working to establish an Indigenous Advisory Committee for the permanent Souris River Board including potential board membership.
- Chief Hugh Agaki of the Peskotomuhkati Nation was appointed to the International St. Croix River Board in 2020.
- Dr. Margo Greenwood was appointed to the Health Professionals Advisory Board in 2020..
- Dr. Dwayne Jarman was appointed to the Health Professionals Advisory Board in 2020.
- Aniela-Jane Hannaford of the Métis Nation of Ontario was appointed to the Rainy Lake of the Woods Watershed Board's Adaptive Management Committee
- Joshua Jones of the Red Lake Nation was appointed to the Rainy Lake of the Woods Watershed Board's Adaptive Management Committee

In 2020 and 2021, IJC staff and commissioners participated in two Indigenous Awareness workshops, the first in 2020 focused on US Native American Tribes and the second in 2021 focused on First Nations and the Métis Nation in Canada.

In April 2021, the IJC hosted a two-day private virtual gathering that brought together Indigenous knowledge holders, academics, scientists, water resources practitioners, students, IJC staff and other experts passionate about protecting shared waters. Over the course of two days, presenters and participants shared their insights and advice on how the IJC and Indigenous peoples can collaborate more effectively in the custodianship of transboundary waters, and how the IJC can respectfully welcome and invite Indigenous knowledge into its work.

Through case studies, stories and reflections, participants learned of the benefits and challenges of working together, the fundamental importance of respectful partnerships, and how to share knowledge and ways of knowing in the protection of "One Water." The IJC is grateful for the dedication of a group of external advisors who invested their time and expertise to guide the planning of this gathering.

Also in 2021, the IJC formalized the roles and responsibilities for its staff Indigenous Collaboration Team to give focus and momentum to engagement efforts going forward.

The Great Lakes Science Advisory Board launched a project in May 2021 to better understand how Traditional Ecological Knowledge held by Indigenous nations can have a meaningful role within the IJC's scientific work. While this is focused on the Great Lakes, its recommendations are expected to be important for the entire organization and its work going forward.

IN MEMORIAM

REMEMBERING US COMMISSIONER SUSAN BAYH 1959-2021

Susan Bayh, who served as a US Commissioner from 1994 until 2001, passed away from brain cancer February 5, 2021 at the age of 61.

During her tenure with the IJC, Bayh was particularly interested in toxic chemical pollution in shared waterways and was remembered by current Canadian Co-Chair Pierre Béland (who served with her during a previous stint as a Commissioner) as a "peacemaker" who could always get members to find consensus on an issue.

Beyond the IJC, Bayh was the former First Lady of Indiana, and worked as an attorney and a professor over the course of her career; she also founded a nonprofit to help adult literacy.

REMEMBERING FORMER CANADIAN CO-CHAIR JOSEPH COMUZZI 1933-2021

Joseph Comuzzi, who served as Canadian Co-Chair on the Commission from January 2010 until January 2014, passed away December 31, 2021 at the age of 88.

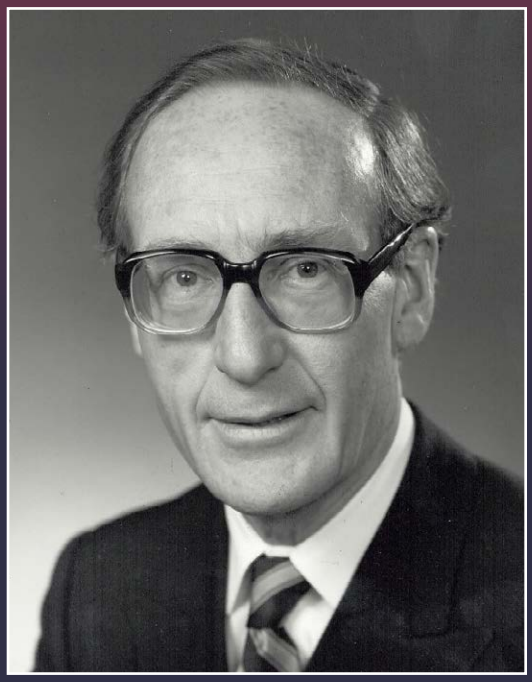
During his time with the IJC, Comuzzi advocated for greater Indigenous engagement and involvement with the IJC's work. He pushed for the inclusion of Indigenous communities on the Great Lakes Water Quality Board and the Rainy-Lake of the Woods Watershed Board. His tenure also saw the IJC publish studies regarding governance in the Lake of the Woods-Rainy River basin, water quality on Lake of the Woods, and the Lake Erie Nutrient Management Report.

Comuzzi along with his fellow five Commissioners, also signed the Advice to Governments on the Recommendations of the International Upper Great Lakes Study, as well as Lake Superior's Regulation Plan 2012.

REMEMBERING CANADIAN CO-CHAIR JAMES BLAIR SEABORN 1924-2019

James Blair Seaborn, Canadian Co-Chair of the Commission from 1982-1985, passed away November 11, 2019 at the age of 95.

Seaborn had a long and distinguished career in Canadian public service, taking a variety of duties with diplomatic posts following World War II before being recruited into Environment Canada in 1975. As the IJC's Canadian Co-Chair, Seaborn oversaw the release of report on Diversions and Consumptive Uses in the Great Lakes, which was published shortly before his tenure ended. Even after leaving the IJC, Seaborn continued to provide advice and input to successive Commission Co-Chairs.



ACKNOWLEDGEMENTS

A special thanks to former Public Affairs Officer Frank Bevacqua, who served with the IJC from 1978 until his retirement in 2021. The de facto IJC historian, his expertise and wisdom is missed by all!

The IJC would like to acknowledge the following staff members who completed their service in 2020 and 2021:

Frank Bevacqua	Public Affairs Officer	US Section
Pierre-Yves Caux	Director, Sciences & Engineering	Canadian Section
Sally Cole-Misch	Public Affairs Officer	Great Lakes Regional Office
Michele D'Amours	Communications Advisor	Canadian Section
Sheila Dugmore	Administrative Officer	Great Lakes Regional Office
Caron De Mars	Senior Advisor	US Section
Anthony Friio	Policy Analyst	Canadian Section
Ryan C. Graydon	Ohio Sea Grant Fellow	Great Lakes Regional Office
Wayne Jenkinson	Senior Engineering Advisor	Canadian Section
Tristan Lecompte	Environmental Officer	Canadian Section
Chuck Lawson	Secretary	US Section
Camille Mageau	Secretary	Canadian Section
Mackenzie Vaughn-Salt	Contractor	Canadian Section

The following board members completed their service in 2020:

Ralph Abele	St. Croix River Watershed Board	Member since 2012
Dr. J. David Allan	Great Lakes Science Advisory Board	Member since 2014
Jean Aubry-Morin	Lake Ontario-St. Lawrence River Board	Member since 2014
Michael Bart	Souris River Study Board	Member since 2017, Co-chair
Robert Company	Lake Ontario-St. Lawrence River Board	Member since 2014
Dr. Patricia Chambers	Great Lakes Science Advisory Board	Member since 2014
Col. William Conde	St. Croix River Watershed Board	Member since 2017, Co-chair
Sandra Cooper	Great Lakes Water Quality Board	Member since 2017
Frank Durbian	Souris River Board	Member since 2016
Jane Elder	Great Lakes Water Quality Board	Member since 2014
Garland Erbele	Souris River Board	Member since 2016, Co-chair
Maureen Gallagher	Red River Board	Member since 2016
Col. Mark Geraldi	Kootenay Lake Board of Control, Osoyoos Lake Board of Control	Member since 2017, Kootenay Co-chair
Dr. Andrew Gronewald	Great Lakes-St. Lawrence Adaptive Management Committee	Member since 2015
Dr. Bob Hecky	Great Lakes Science Advisory Board	Member since 2014
Christopher Hilkene	Great Lakes Water Quality Board	Member since 2014
Marc Hudon	Lake Ontario-St. Lawrence River Board	Member since 2016
Dr. Diane Kuehn	Lake Ontario-St. Lawrence River Board	Member since 2018
Deborah Lee	Great Lakes-St. Lawrence Adaptive Management Committee	Member since 2015
Ling Mark	Great Lakes Water Quality Board	Member since 2017
Dr. Yves Michaud	Great Lakes Science Advisory Board	Member since 2019
Suzie Miron	Lake Ontario-St. Lawrence River Board	Member since 2019
Teika Newton	Rainy-Lake of the Woods Watershed Board	Member since 2017, Co-chair
Kevin O'Donnell	Great Lakes-St. Lawrence Adaptive Management Committee	Member since 2018
Bill Reilich	Great Lakes-St. Lawrence River Board	Member since 2019
Mike Renouf	Red River Board	Member since 2008, Co-chair
Dr. Christine Semeniuk	Great Lakes Science Advisory Board	Member since 2014
Dr. Scott Sowa	Great Lakes Science Advisory Board	Member since 2014
Dr. Thomas Speth	Great Lakes Science Advisory Board	Member since 2015
Dr. Tim Takaro	Health Professionals Advisory Board	Member since 2012, Co-chair

The following board members completed their service in 2021:

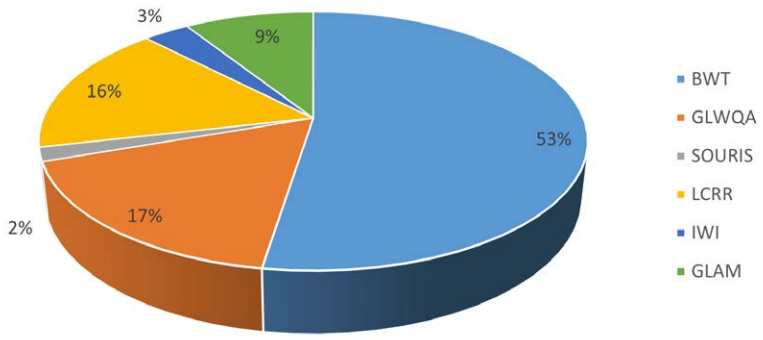
Bill Appleby	St. Croix River Watershed Board	Member since 2000
Nicole Armstrong	Red River Watershed Board	Member since 2012
Dr. Geneviève Bèchard	Lake Ontario-St. Lawrence River Board	Member since 2016, Co-chair
Marty Blake	Great Lakes Science Advisory Board	Member since 2020
Dr. Kyle Blasch	Kootenay Lake Board of Control	Member since 2015
Nicole Blasing	Rainy-Lake of the Woods Watershed Board	Member since 2020
Dr. David Buckeridge	Health Professionals Advisory Board	Member since 2014
Rob Caldwell	Great Lakes-St. Lawrence River Adaptive Management Committee, Lake Superior & Lake Ontario-St. Lawrence Boards of Control	Member since 2015, secretary, Lake Superior (since 2008) and Lake Ontario (since 2018)
Brian Caruso	Souris River Study Board	Member since 2019
Eric Day	Lake Champlain-Richelieu River Study Board	Member since 2016
Erich Emery	Great Lakes Science Advisory Board	Member since 2018
John Fahlman	Souris River Study Board	Member since 2017
James T. Fay	Souris River Study Board	Member since 2017
Randy Gjestvang	Red River Watershed Board	Member since 2015
Michel Jean	Lake Champlain-Richelieu River Study Board	Member since 2016
Daniel Leblanc	Lake Champlain-Richelieu River Study Board	Member since 2016
Mark Lee	Souris River Study Board	Member since 2017
Dr. Robert Lent	St. Croix River Watershed Board	Member since 2016
Suanne Miller	St. Croix River Watershed Board	Member since 2013
John Paczikowski	Souris River Board	Member since 2020
Madeleine Papineau	Lake Champlain-Richelieu River Study Board	Member since 2016
Dr. Al Pietroniro	Souris River Study Board	Member since 2017, Co-chair
Dr. Jeff Ridal	Great Lakes Science Advisory Board	Member since 2008, co-chair
Ayn Schmitt	Red River Watershed Board	Member since 2020
Dr. Rebecca Seal-Soileau	Souris River Study Board	Member since 2017, co-chair
Kevin Shaffer	Kootenay Lake Board of Control	Member since 2018, secretary
Dr. Christopher Stamler	Health Professionals Advisory Board	Member since 2020
Dr. Kristine Stepenuk	Lake Champlain-Richelieu River Study Board	Member since 2018
Richard Turcotte	Lake Champlain-Richelieu River Study Board	Member since 2016
Shanon Waters	Health Professionals advisory Board	Member since 2019
James Ziegler	Red River Watershed Board	Member since 2012

FINANCIAL SUMMARY

The Commission is funded by the United States and Canada as provided for in the Boundary Waters Treaty of 1909. The Commission's collective funding for major projects is reflected below regarding US Fiscal Year Oct. 1, 2019-Sept. 30, 2020, and Canadian Fiscal Year April 1, 2020-March 31, 2021. Funds are reported in cumulative U.S. and Canadian dollars with no adjustment for the exchange rate. Totals include $280,000 in 2020 and $515,000 in 2021 for litigation fees.

Category	2020	2021
Lake Champlain-Richelieu River Study (LCRR)	$2,869,000	$2,490,000
Lake Ontario Plan 2014 and Lake Superior Plan 2012 Reviews Great Lakes Adaptive Management Committee (GLAM)	$1,589,000	$3,405,000
Souris River Study (SOURIS)	$304,000	$375,000
St. Mary-Milk Rivers Study (SMM)	N/A	$862,000
International Watersheds Initiative (IWI)	$570,000	$1,320,000
Great Lakes Water Quality Agreement (GLWQA)	$3,024,000	$3,200,000
Boundary Waters Treaty (BWT)	$9,237,000	$8,098,000
Total	**$17,593,000**	**$19,750,000**

Summary of 2020 Expenses



Summary of 2021 Expenses