



International Rainy-Lake of the Woods Watershed Board

THIRD ANNUAL REPORT

**TO THE
International Joint Commission**

**COVERING THE PERIOD
April 2015 to March 2016**

TABLE OF CONTENTS

BASIN DESCRIPTION	3
OVERVIEW OF KEY WATERSHED ISSUES	3
HIGHLIGHTS OF BOARD ACTIVITIES	4
1. INTERNATIONAL RAINY-LAKE OF THE WOODS WATERSHED BOARD	5
2. BOARD ACTIVITIES	7
2.1 Water Levels	7
2.2. Water Quality.....	7
2.3. Engagement	8
2.4. Meetings	8
3. COMMUNITY ADVISORY GROUP (CAG)	9
4. INDUSTRY ADVISORY GROUP (IAG).....	10
5. WATER LEVEL CONDITIONS.....	10
6. WATER QUALITY CONDITIONS	11
6.1. 2012-2014 Water Quality Report	11
6.2. International Rainy-Lake of the Woods Watershed Forum	12
7. BASIN-WIDE DEVELOPMENT ACTIVITIES	13
8. INTERNATIONAL WATERSHED INITIATIVE PROJECTS COORDINATION.....	14
8.1. Seine River Temperature Project.....	14
8.2. 2015 Update of Upper Rainy River Numerical Model	15
8.3. Effect of Water Management Regime on Wild Rice Production.....	15
8.4. Effect of Water Management Regime on Cattail Invasion into Wild Rice Stands.....	16
8.5. Development of an international, web-based Stream Stats model for the Lake of the Woods – Rainy River Basin	16
8.6. Pilot Study Investigating Use of Stressor Indices Using a Risk-Based Basin Assessment Approach in the Rainy-Lake of the Woods Basin	16
9. RELATED ACTIVITIES: INTERNATIONAL WATERSHED COORDINATION PROGRAM	17
10.WORK PLAN STATUS	18
11.APPENDICES	19
APPENDIX 1 - RAINY RIVER BASIN	20
APPENDIX 2 - IRLWWB WORK PLAN 2015-16.....	21
APPENDIX 3 - STATUS OF STUDIES FOR THE RAINY AND NAMAKAN LAKES RULE CURVES EVALUATION	31

BASIN DESCRIPTION

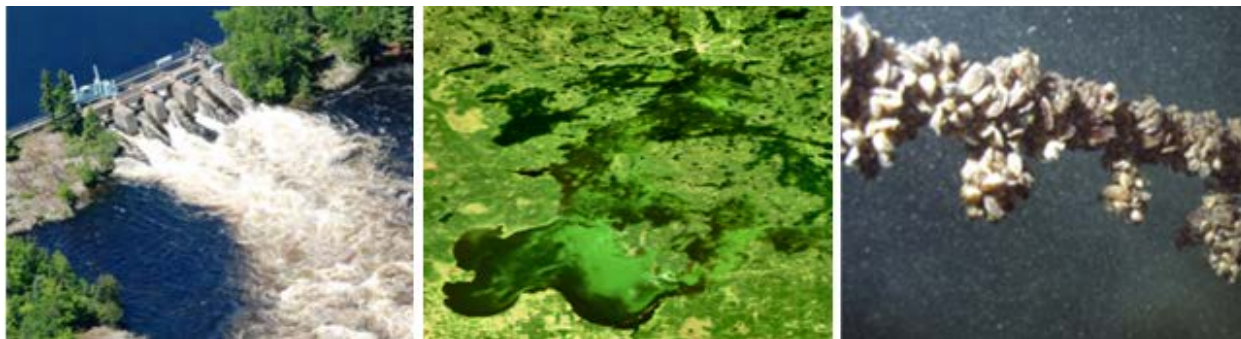
The Rainy-Lake of the Woods watershed covers an area of 70,000km². This boundary watershed is situated within the Canadian provinces of Ontario and Manitoba and the U.S State of Minnesota. A map of the Rainy-Lake of the Woods watershed is provided in Appendix 1 of this report.

OVERVIEW OF KEY WATERSHED ISSUES

The 2015 spring melt did not result in significant flooding conditions. A wet November led base flows to remain high throughout the freeze-up period and early winter snow totals were below normal for early 2016. In spring 2016, warmer than usual weather and above-normal rainfall resulted in an early start to the freshet and rising tributary flows. This led to the issuance of a Supplementary Order to allow for an earlier rise in the water levels of Rainy and Namakan Lakes than provided for by the current rule curves until mid-April.

Water quality continues to be a concern in the basin with the extent and severity of blue green algal blooms in 2015 on Lake of the Woods being the worst on record. Blooms approached full coverage of the lake during the late summer and early fall, presenting threats to the ecosystem and to human health due to the production of toxins by cyanobacteria. Continued research and monitoring is required to better understand the causes of blooms and to develop solutions to address this issue. The Board keenly awaits a response from governments on the status of the proposed Water Quality Plan of Study, which the IJC submitted to Governments in early 2015.

Aquatic invasive species (AIS) pose an emerging threat to the integrity of the basin's aquatic ecosystem. The arrival of zebra mussels (*Dreissena polymorpha*) to the headwaters of the Rainy River in Minnesota is of concern. Continued monitoring, research and education of the public will diminish spread throughout the basin. Species with established populations such as spiny water flea (*Bythotrephes longimanus*), rusty crayfish (*Orconectes rusticus*), and hybrid and non-native cattail (*Typha x glauca* and *Typha angustifolia*) continue to affect native wildlife and habitat, and current work is helping to better understand their impacts.



Water Levels (Left; photo: Lee Grim), algae blooms (Middle; MODIS imagery of Lake of the Woods for September 1st, 2015; image: NASA) and aquatic invasive species (Right; zebra mussels; photo: Environment and Climate Change Canada) are all of concern to the environment of the basin.

HIGHLIGHTS OF BOARD ACTIVITIES

The Board continues to place high priority on outreach. The Board held annual public meetings in both Ontario and Minnesota in August 2015. Meetings focused on the review of events during the high water situation of 2014, board activities, and stakeholder and public consultation. Continuing its emphasis on First Nations/Métis/Tribal engagement, Board members met with a representative of the Métis Nation of Ontario to introduce the IJC and its watershed boards, and to hear the concerns of the Métis community with regards to binational water resource management issues.

The Board worked to ensure active and effective stakeholder engagement through its Community Advisory Group and Industry Advisory Group. After hearing from members of the public and Community Advisory Group of their concern over the transportation of energy products within the Lake of the Woods drainage basin and the potential contamination of boundary waters which could result from an accident, the Board has included a review of transboundary coordination of environmental emergency planning and response measures in the basin in its work plan for the upcoming year.

The Aquatic Ecosystem Health Committee produced the First Annual Water Quality Report to highlight conditions in the Basin from 2012-2014 and the Engagement Committee developed a strategic communications plan for the Board.

The Water Levels Committee continued to provide oversight in the management of water levels in the boundary waters of the basin. The Committee continues to consult with the public and industry partners to provide timely and effective communication in the event that action is required to deviate from the mid-points of the rule curves for Rainy and Namakan Lakes. This was the case in the spring and summer of 2015 when the dam operators were directed to target the lower rule curves during the gate refurbishment project. In early spring 2016, the Committee allowed an early onset of the freshet to refill both Rainy and Namakan lakes above the current rule curves for that time of the year by requesting a Supplementary Order from the IJC, which was granted 18 March 2016.

The Board continued to work with the Voyageurs National Park project management team to provide oversight of the projects recommended in the 2009 Plan of Study for the Evaluation of the 2000 Order for Rainy and Namakan Lakes and Rainy River and supplementary studies added by the Commission. At this time, out of the 21 IJC-funded studies, 12 are complete and of the 9 remaining, 4 are in final approval, having undergone peer review.

The Board decided to manage its responsibilities using three standing committees. In addition to the Board's Water Levels Committee, the Aquatic Ecosystem Health Committee and the Engagement Committee were formed to address issues related to the basin's aquatic ecosystem and strategic communication with local and regional communities and groups.

1. INTERNATIONAL RAINY-LAKE OF THE WOODS WATERSHED BOARD

The International Rainy-Lake of the Woods Watershed Board (IRLWWB; herein the Board) has a mandate to monitor and report on the ecological health of the Lake of the Woods and Rainy Lake boundary waters aquatic ecosystem, including water quality, and to assist the IJC in preventing and resolving disputes regarding the boundary waters of the Rainy-Lake of the Woods watershed. The Board's water regulation mandate is to coordinate the management of water levels and flows on Rainy and Namakan Lakes. The Water Levels Committee retains authority to act independently of the Board in matters of emergency regulation of boundary waters in the watershed.

The Board receives local insight and advice to accomplish its mandate through a diverse membership including representation for First Nations, Métis and Tribal communities, and an equal number of non-government and government members. The Board aims to encourage the development of local and regional capacity and promotes public consultation through public meetings and through regular consultation with both a Community Advisory Group and Industry Advisory Group.

1.1. Board Membership

The Board is comprised of ten members from Canada and ten members from the United States. Board membership underwent some changes this past year. In the summer of 2015, the IJC recognized departing member Jenny Moorman. Jenny served as a local Board member and on the Community Advisory Group. In January 2016, Shawn Mason, of International Falls, joined the Board for a three-year term as a local member and Community Advisory Group member. In February 2016 Chief Earl Klyne announced his intention to resign from the Board; the position remains vacant at the time of writing. Also in January 2016, there was a change in the Board Canadian secretariat with Daniel Rokitnicki-Wojcik from Environment and Climate Change Canada taking over the role from Diane deBeaumont for an indeterminate period. Diane has been an integral part of the Board since 2013.

UNITED STATES

Col. Daniel Koprowski (Board Co-Chair/Water Levels Committee Co-Chair)

St. Paul District
U.S. Army Corps of Engineers

Lori Dowling-Hanson (Board Member)

Minnesota Department of Natural Resources

Suzanne Hanson (Board Member)

Minnesota Pollution Control Agency

James Stark (Board Member)

U.S. Geological Survey

Mike Hirst (Board Member/IAG Co-Chair)

Lake of the Woods Soil and Water Conservation District

Nolan Baratono (Local Board Member/Aquatic Ecosystem Health Committee Co-Chair/Water Levels Committee Member)

International Falls, MN

Charlene Mason (Local Board Member/Engagement Committee Co-chair/CAG Co-Chair)

Ely, MN

Shawn Mason (Local Board Member/CAG Member)

International Falls, MN

Al Pemberton (Local Board Member/CAG Member)

Red Lake, MN

Matt Gouin (Local Board Member/CAG Member)

Rainy Lake, MN

CANADA

Michael Goffin (Board Co-Chair)

Environment and Climate Change Canada

Gail Faveri (Board Member/Water Levels Committee Co-Chair/Engagement Committee Co-Chair)

Environment and Climate Change Canada

Trina Rawn (Board Member)

Ontario Ministry of the Environment and Climate Change

Greg Chapman (Board Member)

Ontario Ministry of Natural Resources and Forestry

Mark Lee (Board Member)

Manitoba Conservation and Water Stewardship

Kiley Hanson (Local Board Member/CAG Co-Chair)

Nestor Falls, ON

Dennis Brown (Local Board Member/IAG Co-Chair/CAG Member)

Atikokan, ON

Todd Sellers (Local Board Member/ Aquatic Ecosystem Health Committee Co-Chair/CAG Member)

Minaki, ON

Karen Cederwall (Local Board Member/CAG Member)

Kenora, ON

One Vacancy

ENGINEERING ADVISOR/SECRETARY

Scott Jutila (Secretary/Engineering Advisor)

St. Paul District
U.S. Army Corps of Engineers

Matt DeWolfe (Engineering Advisor)

Environment and Climate Change Canada

Daniel Rokitnicki-Wojcik (Secretary)

Environment and Climate Change Canada

2. BOARD ACTIVITIES

In 2015-16 the Board organized itself into three committees. In addition to the previously existing Water Levels Committee, the Board has formed an Aquatic Ecosystem Health Committee and an Engagement Committee. Committees report back to the full Board to seek final decisions and approvals, except as allowed for in the mandate of the Water Levels Committee as established by the International Joint Commission.

2.1 Water Levels

The role of the Water Levels Committee is to monitor the water levels of Rainy Lake and the Namakan chain of lakes. The Committee also acts as a technical adviser to the Commission on the matter of water levels regulation in the Rainy Lake watershed.

During the 2015 spring freshet, Mr. Nolan Baratono spoke twice a week on the radio to provide updates on water level conditions to the general public, a jointly managed initiative with the Board's Engagement Committee. The Water Levels Committee communicated regularly with the dam operators in the basin to keep apprised of flow and level changes, maintenance issues and other water level and flow matters of concern.

The Committee conferred on five occasions via conference call and communicated frequently through e-mail to address the dam refurbishment project, ongoing activities and to prepare the March 2016 Supplementary Order for approval by the IJC.

The Water Levels Committee also input to International Watersheds Initiative projects related to water management issues, Rule Curve studies, and the International Rainy and Namakan Lakes Rule Curve Review Study Board.

2.2. Water Quality

The role of the Aquatic Ecosystem Health Committee is to provide advice and make recommendations to the Board with respect to water quality and ecosystem health monitoring, reporting, objectives and alerts, and other activities assigned by the Board. The Board appointed Nolan Baratono (US) and Todd Sellers (Canada) as the Committee co-chairs and approved the appointment of the following individuals to the Committee:

- Goffin, Mike (ECCC)
- Hanson, Suzanne (MPCA)
- Hirst, Mike (Lake of the Woods SWCD)
- Page, Elaine (Manitoba Water Stewardship)
- Rawn, Trina (MOECC)
- Rokitnicki-Wojcik, Daniel (Alternate for Mike Goffin) (ECCC)
- Stark, Jim (USGS)

The Committee met via conference call on four occasions to develop a Terms of Reference and finalize the First Annual Water Quality Report. The Board's First Annual Water Quality Report was submitted to the IJC on April 1st 2016.

The committee is also participating in the larger IJC lead review of the application of Water Quality Objectives and Alert Levels in boundary waters.

2.3. Engagement

The role of the Engagement Committee is meet the communication needs of the Board including preparing products, working with the IJC Publicity and Communications staff, the Community Advisory Group and Industry Advisory Group, and the International Watershed Coordinator. The Committee coordinates outreach activities, prepares web-based documents and material to assist Board members engaging individuals and organizations within the basin. At its February 2016 conference call, the Board appointed Charlene Mason (U.S.) and Gail Faveri (Canada) as Committee Co-Chairs, finalized the Terms of Reference for the Committee and approved the communications strategic plan.

During the 2015 spring freshet, Mr. Nolan Baratono served as the Board's U.S. spokesperson providing updates on water level conditions to the general public. Mr. Matthew Gouin has now accepted the role of U.S. spokesperson. Matt DeWolfe serves as the Board's Canadian spokesperson on water level issues.

Between August 10 and August 13, 2015 the Board held public meetings in Kenora, Ontario; Fort Frances, Ontario; and Crane Lake, Minnesota. Topics of principle interest were the status of the proposed *Water Quality Plan of Study for the Lake of the Woods Basin* and the process for the Rainy and Namakan Lakes Rule Curve evaluation. During this period the Board also met with members of the Community Advisory Group and the Industry Advisory Group who raised environmental emergency planning and coordination as a topic of concern.

In March 2016, the Water Levels Committee presented the spring water levels management plan to the public as part of a public meeting held by the Rule Curves Study Board.

The Engagement Committee appreciates the communication efforts of the International Watershed Coordinator, including production of Newsletters and the [Virtual Tour of the Basin](#), which also support the work of the Engagement Committee.

2.4. Meetings

Board Meetings were held on: July 7, 2015; August 11/12, 2015; October 2, 2015; February 11, 2016; and March 15, 2016. The purpose of these meetings was to share information of relevance to the Board and to plan and deliver the Board's 2015/16 work plan.

Board members also participated in a meeting of the lake associations in the watershed which was facilitated by the Community Advisory Group to discuss issues, priorities, programs and initiatives of mutual interest. The Water Levels Committee also met with Dam operators H2O Power LP and Boise Inc. in August 2015 to discuss water levels management and communications.

List of Board Meetings

For a detailed summary of Board meetings, please consult the Board website at:

<http://ijc.org/en /RLWWB>

3. COMMUNITY ADVISORY GROUP (CAG)

Board members Charlene Mason (U.S.) and Kiley Hanson (Canada) are the Co-Chairs of the CAG. The CAG now consists of the public members of the Board (6 persons), the designated members of the Board (3 persons) and 11 local members (6 from the United States and 5 from Canada). These members come from all parts of the watershed, from Kenora to Mine Centre; from Gunflint Lake to International Falls. All come with perspectives which provide wide-ranging input into meeting discussions and e-mail exchanges between meetings.

During the 2015/2016 year, the Community Advisory Group (CAG) held five meetings: the first meeting was a teleconference held in June 2015, followed by a face-to-face CAG meeting and a meeting between the CAG, IAG and the Board in August 2015 during Basin Week. The CAG met again via teleconference in November 2015 and February 2016. An additional face to face was held in March 2016 during the Lake of the Woods Watershed Forum in International Falls.

In August 2014, the International Watershed Coordinator, Kelli Saunders, members of the CAG, and other interested parties formed a sub-committee to develop a networking event for lake and cottage associations from across the basin. Planning for the event ramped up in early 2015, and saw it come to fruition on August 13, 2015, during the Basin Week. The event was well attended - it showcased 2 guest speakers and provided an excellent opportunity for lake and cottages associations to network and figure out how to share or pool resources.

The CAG was tasked with reviewing with Board's annual work plan, and provided suggestions to the Board at their face-to-face meeting with them in August 2015. Individual members of the CAG also participated in public review of the 2014 Flood Management Final report. The CAG continues to raise and press on-going public concerns to the Board, including investigating the cumulative effects of mining projects within the basin, source water pollution (specifically the risks and need for bi-national emergency coordination and response from train derailments and the potential impacts of the proposed Energy East pipeline project), nutrient flow and dispersal, and aquatic invasive species.

Over the course of the year, the CAG received regular updates from Kelli Saunders on the International Watershed Coordination Program, as well as from the Board Engagement Committee and from IJC Staff. The CAG also received an update from Jim Stark, US Geological Survey, about the mining research on which the USGS and Minnesota agencies are collaborating.

Looking ahead, the CAG will be involved, as appropriate, in the review and input for the Rule Curves Review; continuing its quarterly meetings, either in person or via teleconference; providing opportunities for agencies to educate the CAG members about relevant activities; and inter-acting with the Board on areas of concern or planning. In addition, there has been a request to bring in some outside expertise to educate members of the CAG and the public on issues of nutrient flow and dispersal in the basin.

4. INDUSTRY ADVISORY GROUP (IAG)

Board members Mike Hirst (U.S.) and Dennis Brown (Canada) are co-chairs of the IAG. The purpose of the IAG is to make the Board aware of industry perspectives on both sides of the U.S.-Canadian border. The IAG also allows for industrial leaders to learn of the Board's activities related to water management and water quality. Current membership reflects the wide-range of industrial interests in the watershed, including hydroelectric power generation, paper production, agriculture, forestry, fisheries, the bait industry, mining, recreation and tourism. Membership is open to any industry operating in the Rainy-Lake of the Woods basin.

The IAG met throughout the day during its August 2016 meeting in International Falls and held joint discussions with the Community Advisory Group (CAG) and the Board. Presentations were provided by Ryan Maki of Voyageurs National Park, and Kelli Saunders, the International Watershed Coordinator (IWC). The presentations consisted of the Rainy and Namakan Rule Curves Plan of Studies and how this information will be utilized in the Rule Curves Evaluation process, and an update on activities of the IWC. The February 2, 2016 meeting included an update from Kelli Saunders and an update from the Rule Curve Reviews Canadian Co-Chair, Matt DeWolfe, on the process and timelines of the Rule Curves Review. On March 9, 2016, the IAG met and discussed the roles and activities of the Aquatic Ecosystem Health Committee and Engagement Committee of the Board. They also received updated on International Watershed Initiative projects managed by the Board, the Lake of the Woods Total Maximum Daily Load Study, and mining project updates.

5. WATER LEVEL CONDITIONS

The 2015 spring melt did not result in significant flooding conditions. The dam operator on the Canadian side, H2O Power, started its three year gate refurbishment project to renovate 100-year old gates which had extensive leaking. The refurbishment closed off two gates at a time behind a coffer dam, reducing the maximum outlet capacity of the dam. To reduce the risk of high water on Rainy Lake, the water levels Committee directed the dam operators to target the

lower rule curve in June and July to provide more storage capacity in the lake for high inflows. Four gates were refurbished in 2015 without high water incidents.

A wet November led base flows to remain high across the basin throughout the freeze-up period and some areas that experienced local high waters (with a return period between 1-in-4 years and 1-in-20 years). Early winter snow totals were below normal for early 2016.

In spring 2016, warmer than usual weather and above-normal rainfall resulted in an early start to the spring melt which resulted in high tributary flows. These conditions were likely caused or exacerbated by the strong El Nino experienced over the winter of 2016. Inflows during the spring rose sharply in several tributaries to Rainy Lake and the Namakan chain of lakes and water levels approached the top of the rule curve band. A Supplementary Order from the IJC was issued on March 18th permitted water levels to deviate from the rule curves by exceeding the upper limit to store water from the early spring conditions instead of discharging it downstream. Water levels were allowed to rise above the upper rule curve as authorized by the terms of the supplemental order. By April 15, 2016, the Board and Companies will resume compliance with the terms of the Commission's Consolidated Order dated January 18, 2001.

6. WATER QUALITY CONDITIONS

6.1. 2012-2014 Water Quality Report

To meet its mandated requirement for reporting to the IJC on water quality issues, the Board contacted relevant agencies in Canada and the United States to formally request water quality data related to the Rainy-Lake of the Woods watershed for the period of 2012-2014. A tremendous amount of information was received and in order to present a focused report to the commission, it was decided to request that agencies provide data summaries where available to be used as the basis of the Board's report.

In general, the data received illustrate that substantial spatial variation exists with respect to nutrients in the Rainy-Lake of the Woods basin. Nutrient levels, mainly phosphorus, in both waters and surficial sediments have exceeded IJC alert levels and other jurisdictional standards, in portions of the Rainy River, Lake of the Woods, and their tributaries, during the reporting period.

Monitoring in the Rainy River illustrates that phosphorus levels peak in the spring during the freshet and also that levels in general, have remained relatively stable over the period of 2009 to 2014. Spatially, within the Rainy River, Total Phosphorus (TP) levels are highest furthest downstream, and lowest furthest upstream. During the spring freshet, TP peaked at the mid-stream transects suggesting that elevated inputs could be entering the system from upstream tributaries (Big Fork, La Vallee, and Little Fork Rivers) in addition to point sources. Levels exceeded the phosphorus IJC alert level of 30µg/L frequently during the growing season at the

river outflow. The highest phosphorus loads recorded during the 2010 to 2014 period occurred in 2014 during the flood of record event.

Similarly, tributary monitoring illustrates that phosphorus levels were frequently in excess of the IJC alert level in streams entering the Rainy River. Maximum phosphorus concentrations tended to occur with the spring freshet and a second smaller peak occurs in mid-summer. Phosphorus levels in tributaries have remained relatively constant during the period 2009 to 2014 and it is suggested that variability in precipitation events is likely responsible for seasonal differences.

The major Canadian tributaries entering Lake of the Woods illustrate that there is a range in phosphorus levels entering the system. Little Grassy River exhibited the highest TP concentrations and loadings and has been identified as a potentially important source of phosphorus entering the lake.

Phosphorus concentrations in surface waters of the Lake of the Woods exhibited a south to north gradient. This is consistent with the elevated phosphorus concentrations entering the southern basin from the Rainy River and Little Grassy River. Surface water concentrations in the southern basins were near or exceeding the IJC phosphorus alert level.

Data for bottom waters exhibited elevated nutrient levels and is consistent with internal loadings of nutrients from sediments. High levels of nutrients in the bottom waters become available for algal growth at the surface during the fall turnover of the lake; this would support the persistence of algal blooms into the fall in the northern basins which has been observed in Lake of the Woods.

6.2. International Rainy-Lake of the Woods Watershed Forum

Over 160 researchers and resource managers packed the auditorium at the 13th annual International Rainy-Lake of the Woods Watershed Forum, held March 9-10, 2016 in International Falls, MN. Thirty-four oral and poster presentations were featured during the day and a half event. One third of the presentations were from IJC supported studies. Wayne Jenkinson, IJC Canadian Section, opened the session with an update on the IJC and its International Watersheds Initiative. Gail Faveri presented an update on Board activities.

Highlights of research presented during the Forum included results from studies:

- Assessing past and future changes in lakes from climate change, including climate effects on thermal stability, dissolved oxygen and nutrient availability in Lake of the Woods.
- Aiming to understand cyanobacteria blooms and toxins and predicting toxicity of harmful algal blooms.
- Investigating the role of habitat and water levels on wild rice production.
- Providing insight into assessment of water level regulation, its impacts and best strategies through the Rainy and Namakan Lakes Rule Curve Review.

- Updating progress of Minnesota’s phosphorus Total Maximum Daily Load Study for Lake of the Woods.

In addition, the Lake of the Woods Sustainability Foundation (LWSSF) presented its Kallemeyn Award outstanding professional achievement in scientific research or resource management in the Lake of the Woods and Rainy River watershed to Ryan Maki of Voyageurs National Park and its Wilson Stewardship Award honoring individuals, groups, or projects that have made a significant contribution to environmental stewardship in the Lake of the Woods and Rainy River watershed to Todd Sellers, Executive Director, LWSSF, and Board member.

In addition to the research presentations, the Forum was the venue for meetings of many groups working in the basin, including:

- The Board’s Citizen Advisory Group (CAG) and Industry Advisory Group (IAG).
- The Lake of the Woods TMDL Technical Advisory Committee.
- IJC International Watersheds Initiative Stressor Index Project.
- The International Rainy and Namakan Lakes Rule Curves Study Board

The Forum is organized annually by a partnership, led by the Lake of the Woods Water Sustainability Foundation, of researchers and resource managers working in the Rainy-Lake of the Woods Basin, including from the Minnesota Pollution Control Agency, Ontario Ministry of Environment and Climate Change, Environment and Climate Change Canada, Voyageurs National Park, St. Cloud State University, and Rainy River Community College. The Forum is supported by many sponsor agencies including the International Joint Commission.

7. BASIN-WIDE DEVELOPMENT ACTIVITIES

The Board is charged with monitoring and reporting on the ecological health of the Lake of the Woods and Rainy Lake boundary waters aquatic ecosystem, including water quality.

Construction and development of the New Gold Rainy River Mine continues in the Rainy District of Ontario. The mine is located in the basin northwest of Fort Frances and is expected to begin production in 2017. The project will process materials from a combination of open pit, underground and stockpiled ore. The project is expected to have a 20-year lifespan and aims to build local capacity through the hiring of local employees.

Planning for the replacement of the Baudette-Rainy River International Bridge continues and the project is currently in a preliminary design and consultation stage. Independent U.S. and Canadian Environmental Assessments are being developed, along with studies that will identify the alignment, bridge type, and project delivery method for the replacement of the bridge.

8. INTERNATIONAL WATERSHED INITIATIVE PROJECTS COORDINATION

During 2015/16, the Board oversaw the implementation of six International Watershed Initiative (IWI) projects. Of the six projects, 4 were completed and 2 are ongoing.

8.1. Seine River Temperature Project

This 5-year project started in 2011 and was completed in the spring of 2016. Partners include: Seine River First Nations, Shooneyaa Wa Biitong, Department of Fisheries and Oceans, Ontario Ministry of Natural Resources, H2O Power, and North-South Consultants.

The purpose of the Seine River Temperature Project was to help define the spring spawn for Seine River sturgeon through surrogate environmental indicators and note any effects of peaking on spawning.

Activities in 2015-16 included the deployment and monitoring of temperature and water level probes at three locations in the Seine River. These data will be included in a summary report and a peer-reviewed article will be prepared for publication to disseminate the findings of the project to the wider scientific community.

With the listing by the province of Ontario of the northwestern Ontario lake sturgeon population as a threatened species, protection of the habitat for this species has become a priority for resource managers, power corporations, water management boards, and First Nations. One of the major threats to lake sturgeon is the impact of peaking hydroelectric facilities on water levels during the spring spawning season. If the water downstream of the dam fluctuates dramatically at any time during the gestation period and results in stranded eggs or the drying out of the spawning area, the success of the spawn will be dramatically reduced. Using environmental indicators to define the spawning season as opposed to preset calendar periods is felt to be important to ensure that the efforts made to protect this species provide the maximum benefit while not adversely impacting upon the electricity needs in the area during periods when lake sturgeon spawning habitat is not being utilized.

Previous results from this multiyear project indicate that the traditional ecological indicators appear to have a consistent relationship with the spawning timing of lake sturgeon in Seine River. Both the size of the poplar leaves and presence of tiger swallowtails could have proved historically valuable for the people of Seine River who would have depended on being present at the timing of the sturgeon spawn for survival.

This project has produced important information and has developed capacity in the Seine River First Nation; the monitoring of traditional ecological indicator surveys; and the documentation of both the lake sturgeon spawning activities and larval drift timing. The success of this project has built an excellent knowledge base for which to build on in future years.

The extreme high water levels in 2012, 2013, and 2014 have provided an opportunity to learn how the lake sturgeon respond to high flows in Seine River. The data collected in the final year of study in 2015 provided information on lake sturgeon spawning activities during average and low flow conditions.

8.2. 2015 Update of Upper Rainy River Numerical Model

The objective of the project was to update the existing 2-D hydrodynamic model of the Upper Rainy River to analyze conveyance capacities during the on-going gate refurbishment project at the Fort Frances dam on the Rainy River. The other deliverables of this project included updated interactive visualization tools.

The Board is concerned that the temporary cofferdams installed during the gate refurbishment project will have an adverse effect on the water levels and flows of the Rainy River and Rainy Lake. This project simulated the resulting changes in levels and flows resulting from refurbishment work and has also produced simulation results of the 2014 high water levels and the overtopping of the dam spillway. The project's final report and updated interactive visualization tool were completed in the spring of 2016.

8.3. Effect of Water Management Regime on Wild Rice Production

This project quantified the effect of water level fluctuations on wild rice productivity at critical stages of phenological development. The research involved the wild rice harvest areas utilized by the Seine River First Nation. This is a two year project that was completed in spring 2016.

Water level management in the Rainy-Namakan System has detrimental effects on 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. 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. Furthermore, the existing stands harvested by Seine River seem to be decreasing in area at a rapid rate.

The project was conducted by the Seine River First Nation (SRFN) with assistance from Lakehead University (Dr. P.F. Lee) and the University of California (Dr. D. Marcum). Both scientists are specialists in wild rice. These scientists worked in co-operation with Dr. Jean Morin, Chief Scientist, Hydrology and Ecohydraulic Section, Environment and Climate Change Canada, to integrate the results into Dr. Morin's Integrated Habitat Model. Both controlled and field studies were conducted within the traditional wild rice harvesting areas of the SRFN on Wild Potato Lake and Rainy Lake and were designed to reflect the depth gradients in the wild rice stands as

well as the normal changes experienced by the stands as the water levels are increased within the water system.

8.4. Effect of Water Management Regime on Cattail Invasion into Wild Rice Stands

This project determined the effectiveness of cattail removal based on rule curve regulations in the Rainy-Namakan system and the corresponding survival of wild rice stands. This two year project was completed in spring 2016.

A particular recent concern in the Rainy-Namakan system has been the invasion of the exotic perennial narrow leaf cattail (*Typha angustifolia* or the hybrid, *Typha glauca* = *T. latifolia* x *T. angustifolia*) into wild rice stands in Northwestern Ontario. The problem with this exotic species is that, unlike the native *T. latifolia*, it can tolerate depths normally occupied by wild rice. These exotic cattails are able to form dense monospecific stands and thus essentially dominate a wetland, greatly reducing the diversity of native vegetation. The competitive advantage of cattails over wild rice has not been quantified, but the outcome for wild rice certainly seems to be detrimental, which is recognized on Rainy Lake itself.

Now in the second year of the study, the effectiveness of the cuttings on wild rice regeneration was quantified. The project was conducted by the SRFN with assistance from Lakehead University (Dr. P.F. Lee). The cattail study was conducted within the traditional wild rice harvesting areas of the SRFN on Wild Potato Lake and Rat River Bay, Rainy Lake.

8.5. Development of an international, web-based Stream Stats model for the Lake of the Woods – Rainy River Basin

The StreamStats project will provide a (USGS supported) web-based model that incorporates a Geographic Information System (GIS) to provide users access to an assortment of analytical tools that are useful for a variety of water-resources planning and management purposes. This is a three-year project that is currently in its second year. This project has implications for the IJC's Transboundary Data Harmonization Project and other Board work activities.

The product of this project could aid in invasive species management by determining watershed boundaries and hydrologic connections and providing data that will help with monitoring site selection, and assist in understanding the distribution of characteristics that relate water-quality concerns to streamflow. For the Rainy-Lake of the Woods Basin, StreamStats will be able to provide estimates of peak-flow statistics, floodplain mapping, and a variety of other water-resource planning and management applications.

8.6. Pilot Study Investigating Use of Stressor Indices Using a Risk-Based Basin Assessment Approach in the Rainy-Lake of the Woods Basin

This project aims to evaluate a novel watershed-scale risk assessment approach to modelling disturbance in the transboundary watershed. The project will leverage an existing methodology that is currently being applied to a large portion of Canadian sub-basin areas and test it for a

watershed with transboundary harmonized data at a finer resolution. This approach will use datasets of potential impacts such as rail or road crossings, land use, and agricultural and mining activity. The main outcome of the project would be to develop watershed-based stressor indices which would in effect identify areas at higher-risk of impaired water quality.

Activities to be conducted in Phase I (fiscal year 2015/16) of the project are to assess the feasibility of the project by bringing together a diverse team from a variety of appropriate agencies to screen potential datasets for use in the modelling component of the project.

9. RELATED ACTIVITIES: INTERNATIONAL WATERSHED COORDINATION PROGRAM

The International Watershed Coordination Program (IWCP) provided binational coordination and communication of research, management and citizen engagement for the basin throughout 2015. The IWCP was established in 2012 by the Lake of the Woods Water Sustainability Foundation (LOWWSF) as a multi-agency partnership in the basin. During 2015, along with LOWWSF, supporting partners included the IJC and the Minnesota Pollution Control Agency, through the Koochiching Soil and Water Conservation District.

The International Watershed Coordinator, Kelli Saunders, has served as the Study Manager for the Rainy-Namakan Lakes Rule Curves Study Board starting in August 2015, assisting in the logistical planning of meetings and report development in the first phase of the study – developing the Study Strategy. In this first phase, the IWCP Coordinator organized five public meetings and one webinar in September, initiated contact with all First Nation communities, Métis and Tribes in the study area, coordinated the Study Board response to peer review comments on two drafts of the Study Strategy and assisted with the establishment and organization of the Public Advisory Group and the Resources Advisory Group.

The IWCP Coordinator continued to provide secretariat support to the International Multi-Agency Arrangement (IMA) and its technical advisory committees, including startup of the AIS Committee with representatives from Manitoba, Ontario and Minnesota. The IWCP also provides an ongoing linkage between the IMA and the Board.

The IWCP Coordinator has been working with the Koochiching Soil and Water Conservation District, Minnesota Pollution Control Agency and members of the Board's CAG to develop a variety of tools and opportunities that promote civic engagement in water stewardship throughout the basin. In August 2015, the first Binational Lake Association Network Event was held in International Falls, MN, bringing together lake association members from both sides of the border to discuss priorities and common goals. Together with the IJC, an interactive lake association mapping tool is now being developed. The feasibility of a Crowd Sourced Hydrology pilot project has begun to be explored with the Ontario Ministry of the Environment and Climate Change, Environment and Climate Change Canada, MPCA and other partners, and the release of a [Virtual Tour of the Basin](#) by way of a Story Map was produced and shown to the

Board at their August meeting. The quarterly Rainy-Lake of the Woods Watershed News continues to be circulated regularly as a way to highlight the watershed stewardship initiatives at the international, regional and local level.

10. WORK PLAN STATUS

The Board annually develops a work plan aligned to the Board mandate as provide by the IJC as a means of planning and coordinating Board activities. The work plan is then regularly reviewed throughout the year to monitor progress of Board actions in relation to assigned roles and responsibilities. A copy of the Board's 2015/16 work plan including year-end status of work plan activities is appended as Appendix 2.

11. APPENDICES

Appendix 1	Rainy River Basin
Appendix 2	IRLWWB Work Plan 2015-16
Appendix 3	Status of Studies for the Rainy and Namakan Lakes Rule Curves Evaluation

APPENDIX 1 - RAINY RIVER BASIN



APPENDIX 2 - IRLWWB WORK PLAN 2015-16

IRLWWB WORK PLAN – for period April 2015 to March 2016 BASED ON April 1, 2013 “Directive to International Rainy-Lake of the Woods Watershed Board”			
<p>MANDATE OVERVIEW: The Board’s mandate is to ensure compliance with the Commission’s Order pursuant to the Rainy Lake Convention, to monitor and report on the ecological health of the Lake of the Woods and Rainy Lake boundary waters aquatic ecosystem, including water quality, and to assist the Commission in preventing and resolving disputes regarding the boundary waters of the Lake of the Woods and Rainy River watershed. The Board shall accomplish its mandate by exploring and encouraging the development of local and regional capacity to prevent and solve problems locally, applying the best available science and knowledge, and maintaining an awareness of the needs, expectations and capabilities of residents of the Lake of the Woods and Rainy River watershed.</p>			
WHAT WE HAVE BEEN DIRECTED TO DO:	WHAT WE ARE GOING TO DO TO CARRY OUT THIS DIRECTION:	ACTIONS TO DATE:	STATUS:
Water Quality / Aquatic Ecosystem Health Objectives			
<p>1. (Directive 4.a) Recommend, as appropriate, water quality and/or aquatic ecosystem health objectives for the boundary waters of the Lake of the Woods and Rainy River watershed.</p> <p>1a. (Directive 4.a) Maintain continuous surveillance over the quality of water and health of the Lake of the Woods and Rainy River boundary waters aquatic ecosystem (with particular focus on priority issues within the basin such as water quality, alien aquatic invasive species, climate change indicator and adaptation, and ground and surface water contamination, as identified by the International Lake of the Woods and Rainy River Watershed Task Force’s Study).</p>	<p>1. Complete review of data received in 2014/15 from relevant jurisdictions</p> <p>2. Request relevant agencies to conduct review of most recent data in relation to their jurisdiction’s objectives and provide data and analysis</p> <ul style="list-style-type: none"> • Assemble recent water quality and ecosystem health monitoring information <ul style="list-style-type: none"> ○ analyze in relation to water quality objectives and trends ○ focus on priority issues ○ determine approach to assessing and reporting to the IJC <p>3. Development/improvement of monitoring infrastructure, equipment, tools and software needed to meet 1a (also relevant to: 2, 3, 4, 4a & 5)</p> <ul style="list-style-type: none"> • IWI StreamStats Project – Expand existing USGS StreamStats Model to include all Canadian watersheds within the international watershed. <p>4. No action planned in 2015/16 pending</p>	<p>1. Reviewed data from relevant agencies.</p> <p>2. Developed approach to water quality reporting</p> <p>3. Requested data summaries from agencies.</p> <p>4. Developed and submitted First Annual Water Quality Report to IJC</p> <p>5. Formed Aquatic Ecosystem Health Committee (AEHC) to oversee reporting in future years.</p> <p>6. Co-Chairs met with IMA-TAC to initiate cooperation in the development of a future reporting template</p>	<p>Water Quality Report completed</p>

	completion of IJC's Water Quality Objectives Review Project and/or implementation of the Water Quality Plan of Study		
<p>2. (Directive 4.a.i) Continue to carry out evaluations and assessments from time to time as the Board considers necessary or desirable to ascertain the extent to which existing water quality objectives, such as approved by the Governments for the Rainy River in 1965, are being met.</p> <p>2a. (Directive 4.a.ii) Notify the Commission of instances where existing water quality objectives are not being met and of actions being taken by those responsible for sources of pollution and by the regulatory agencies to meet these water quality objectives.</p>	<p>1. Where exceedences of relevant objectives identified request relevant jurisdictions to indicate action taken</p> <ul style="list-style-type: none"> • Assess adequacy of actions taken <p>2. Report to the IJC on items 1, 1a, 2</p>	To be considered in the development of the approach to water quality reporting in future years	Continuing ongoing elevated loading of phosphorus noted resulting in significant algae development in 2015
<p>3. (Directive 4.a.iii) Review boundary waters water quality and aquatic ecosystem health from time to time and recommend to the Commission such amendments and additions to water quality or aquatic ecosystem health objectives as might be appropriate.</p> <p>3a. (Directive 4.a.iii) At a minimum, within one year after completion of, or updates to, major water studies and plans, review existing objectives and present a report to the Commission recommending whether or not to establish new or adjusted objectives, and any such objectives and their levels, so the Commission can consider bringing them</p>	No action planned in 2015/16 pending completion of IJC's Water Quality Objectives Review Project and/or implementation of the Water Quality Plan of Study	n/a	n/a

<p>forward to Governments for approval. (One example of a major water study or plan is a binational comprehensive basin water management plan for Lake of the Woods and Rainy River watershed, which could have subsequent major updates, anticipated each decade.)</p>			
<p>4. (Directive 4.b) Select, determine, establish, and report on water quality and/or aquatic ecosystem health alert levels within the waters of the Lake of the Woods and Rainy River watershed in order to identify potential problems for boundary waters for which water quality objectives have not been established (with particular focus on priority issues within the basin such as water quality, alien aquatic invasive species, climate change indicators and adaptation, and ground and surface water contamination).</p> <p>4a. (Directive 4.b.i) Continue to identify water quality problems on the Rainy River through a process based on comparisons of monitoring data with alert levels selected by the Board as the most stringent water quality guidelines being used by local, state, provincial or federal agencies for such pollutants.</p> <p>4b. (Directive 4.b.ii) Establish alert levels for biological, physical and chemical constituents the Board deems important within the Lake of</p>	<p>Determine alert levels or other appropriate means of assessing water quality information</p>	<p>To be considered in the development of the approach to water quality reporting in future years</p>	<p>Water Quality Report compared data to relevant jurisdictions' objectives and IJC 1965 alert levels</p>

<p>the Woods and Rainy River watershed.</p> <p>4c. (Directive 4.b.iii) Thereafter, report annually to the Commission on alert levels, exceedences and implications, actions being taken by those responsible for drivers of exceedences, if any, and actions being taken by regulatory agencies, if appropriate.</p> <p>4d. (Directive 4.b.iv) Review alert levels from time to time and make such amendments and additions as might be appropriate.</p>			
<p>5. (Directive 4.d) Keep the Commission informed of boundary waters aquatic conditions and plans, policies, and developments, actual or anticipated, which have the potential to affect the quantity and quality of the water and the health of the Lake of the Woods and Rainy River watershed boundary waters aquatic ecosystem.</p> <p>5a. (Directive 4.e) Maintain awareness of basin-wide developments and conditions which might affect water quantity and quality and ecosystem health, and the people living within the Lake of the Woods and Rainy River watershed, and recommend appropriate strategies to the Commission, if appropriate.</p>	<ol style="list-style-type: none"> 1. Board, IAG and CAG to bring forward relevant information <ul style="list-style-type: none"> • standing item on all agenda • International Watershed Coordinator to assist with advising the Board of developments in the watershed • Board to identify items which require further investigation • Board to develop recommendations as appropriate for communication to the IJC 2. Review and assess status, plans and policies and recommend appropriate strategies to the Commission as appropriate <ul style="list-style-type: none"> • Review of transboundary coordination of environmental emergency planning and response measures in basin 	<ol style="list-style-type: none"> 1. Opportunities provided to Board members, CAG/IAG and International Watershed Coordinator to bring forward such information at all meetings. 2. Board agreed to investigate binational emergency response to disasters, including derailment, and, if deemed appropriate, provide notification/ recommendation to the IJC 	Completed
<p>6. (Directive 4.f) Coordinate activities with appropriate agencies and institutions as may</p>	<ol style="list-style-type: none"> 1. Meet with resources agencies and institutions at least once a year 	<ol style="list-style-type: none"> 1. Held meeting with resource agencies on August 12, 2015. Exchanged information on a wide range of 	Completed

<p>be needed or desirable, including inter-agency working groups and other research groups conducting sound science within the watershed, and consider designating specific Board members to liaise with specific groups where useful.</p>	<p>2. With the assistance of the International Watershed Coordinator, Board Secretariat to liaise with agencies and institutions, and provide regular updates to Board</p>	<p>topics such as Minnesota’s TMDL project on Lake of the Woods and OMNRF’s fisheries and aquatic monitoring activities, and IMA and International Watershed Coordination activities</p>	
<p>7. (Directive 4.g) Establish and maintain a Community Advisory Group (CAG) for the purpose of keeping the Board aware of any water resource management issues that may arise in the basin and providing feedback and input to the Board’s products and processes, such as the Board’s work plan.</p>	<p>1. Seek CAG assistance in identifying resource management issues 2. Consult CAG on Board products and processes 3. CAG to meet as appropriate</p>	<p>1. CAG met in June, August and November 2015, and February and March 2016 2. CAG raised the issue of cross-border coordinated emergency response to disasters to the attention of the Board 3. CAG provided feedback on 2014 High Water Report for the Rainy and Namakan Lakes and Board work plan 4. Working with the International Watershed Program Coordinator, the CAG sponsored a lake and cottage association networking event in August 2015</p>	<p>Completed</p>
<p>8. (Directive 4.h) Establish and maintain an Industry Advisory Group (IAG) for the purpose of making the Board aware of industries’ perspectives.</p>	<p>1. Seek IAG input on industries’ perspectives 2. IAG to meet as appropriate</p>	<p>1. IAG met in August 2015 and February and March 2016 2. IAG raised the issue of cross border coordinated emergency response to disasters to the attention of the Board 3. IAG provided feedback on the Rainy-Namakan Rule Curve Review Process</p>	<p>Completed</p>
<p>9. (Directive 4.j) The Board shall organize a joint meeting of the Board with the CAG and IAG once a year.</p>	<p>1. Board to meet with CAG and IAG at least once a year</p>	<p>Board met jointly with the CAG and IAG on August 12, 2015</p>	<p>Completed</p>
<p>10. (Directive 4.k) Involve the public in the work of the Board; facilitate provision of timely and pertinent information on Board</p>	<p>1. Post meeting summaries, reports, newsletters, notices, and any other pertinent information, to Board website</p>	<p>1. Posted pertinent information to Board website and SharePoint site 2. Developed two presentations (lead: Public</p>	<p>Completed</p>

<p>activities within the watershed in the most appropriate manner [...]. Meet publically at least once a year with invitations to First Nations, Métis, and Native Americans and all water users groups and stakeholders to seek advice and hear concerns, such as on a binational comprehensive basin water management plan or other issues. (Locations of such meetings shall be moved around the basin, generally alternating between locations in Canada and the United States.)</p>	<ol style="list-style-type: none"> 2. Develop and implement engagement plan 3. Meet with the public, associations and interest groups on various issues, as required 4. Hold public meetings 5. Respond to public, agency, and IJC information requests or letters of complaint 6. Periodically conduct basin tours 	<p>Engagement Sub-Committee)</p> <ol style="list-style-type: none"> 3. Board held public meetings in March at the Rainy-Lake of the Woods Watershed Forum and in August in Kenora, Fort Frances, Ontario, and Crane Lake, MN 4. Met with a representative of Métis Nation of Ontario on August 12 (leads: Canadian Co-Chair, Secretary and Board member Karen Cederwall) 5. Helped organize first Lake Associations Network Event in International Falls on August 13 (leads: CAG co-chairs, International Watershed Coordinator) 6. Created the Engagement Committee, to address three issues: 1) informing the public about the Watershed Board and its work; 2) creating knowledge about how to reach the Board and associated Committee and Advisory Group members; 3) engaging the public with the Board, and its Committees and Advisory Groups 7. Strategic Communications Plan in place 	
<p>11. (Directive 4.m) Submit a report covering Board activities annually to the Commission, at least three weeks in advance of the Commission's spring semi-annual meetings, and submit such other reports as the Commission may request or the Board may desire.</p>	<ol style="list-style-type: none"> 1. Prepare annual report 	<p>The Board submitted its third annual report in April 2016</p>	<p>Completed</p>

WATER LEVELS COMMITTEE WORK PLAN 2015-2016

BASED ON "Directive to International Rainy-Lake of the Woods Watershed Board; April 1, 2013"

MANDATE OVERVIEW: The Water Level Committee is a committee of the IRLWWB. The Water Levels Committee is delegated by the Board with the task of ensuring compliance with the terms of the 2001 Consolidated Order in the matter of regulation of Rainy Lake and other boundary waters in the Rainy Lake watershed. The Board, through the Water Levels Committee, acts as a technical adviser to the Commission on the matter of water levels regulation in the Rainy Lake watershed.

WHAT WE HAVE BEEN DIRECTED TO DO:	WHAT WE ARE GOING TO DO TO CARRY OUT THIS DIRECTION:	ACTIONS TO DATE/LEAD:	STATUS
2001 Consolidated Order Requirements – Core Activities			
<p>1. (Directive 4.c) Ensure compliance with the terms of the Order in the matter of emergency regulation of Rainy Lake and other boundary waters in the Rainy Lake watershed and act as technical adviser to the Commission on this matter.</p>	<ol style="list-style-type: none"> 1. The Water Levels Committee’s Engineering Advisors will regularly monitor water levels and flows in the basin and evaluate compliance with the terms of the Order for the levels of Rainy Lake and Namakan Lake. The Committee and its advisers will provide technical advice to the Commission as requested, and as needed to keep the Commission apprised of any current or potential non-compliance with the terms of the Order 2. Obtain hydrologic/hydraulic data as necessary to monitor water levels and flows 3. Support the proper functioning of the gauge network. 4. Support the identification/resolution of equipment and data errors 5. Analyze data, maintain communications with the dam owners, and provide advice/direction to dam owners as required 6. Support studies to inform the assessment of the impact of the 2000 rule curve change on Rainy/Namakan Lakes 	<p>All required actions carried out</p> <p>See Appendix 3 for list of rule curve studies and status (as of March 31 2016)</p>	<p>Completed</p>

<p>2. (Directive 4.c.i) Whenever, in the opinion of the Water Levels Committee, the terms of the Order are not being complied with, the Water Levels Committee shall so inform dam owners and operators and make such recommendations as it considers appropriate.</p>	<ol style="list-style-type: none"> 1. The Water Levels Committee’s Engineering Advisors will notify the Committee and dam owners and operators of any potential or existing non-compliance with the 2001 Consolidated Order 2. In keeping with the directive, “At the earliest opportunity, the Water Levels Committee shall report to the Commission directly such apparent lack of compliance with the Order, the circumstances under which it occurred, the action taken by the Board, and the action, if any, taken by or on behalf of the dam owners and operators and inform the Board through the Board Co-chairs” 	<p>All required actions carried out</p>	<p>Completed</p>
<p>3. (Directive 4.c.ii) The Water Levels Committee may, on behalf of the Commission:</p> <ol style="list-style-type: none"> 1. authorize the reduction of the outflow from Rainy Lake for periods of up to ten days if necessary to raise the headpond level at International Falls-Fort Frances to ensure an adequate water supply for plant fire protection purposes or to permit the passage of watercraft from the headpond to Rainy Lake, provided the outflow shall not be less than the flows prescribed in paragraph numbered 2(c) of the Order, and 2. authorize the reduction of the outflow from Rainy Lake and/or Namakan Lake for periods of up to ten days if necessary to meet emergency conditions such as machinery 	<ol style="list-style-type: none"> 1. The Water Levels Committee’s Engineering Advisors will monitor basin conditions on a regular basis, and advise the Water Levels Committee on recommendations to reduce outflows consistent with this directive 2. The Water Levels Committee will evaluate conditions and direct the Companies as appropriate, advising the Board of any actions it takes. The Committee Co-chairs shall inform the Commission forthwith and as soon as practicable thereafter shall forward a written report to the Commission, describing the circumstances in which such action was taken. The report shall be posted on the IJC website following Commission approval 3. Update the Upper Rainy River hydrodynamic model to investigate the conveyance capacity of 	<ol style="list-style-type: none"> 1. Directed the Companies to target the lower range of the Rainy Lake rule curve during the June and July high inflow season in 2015, due to Rainy River Dam gate refurbishment work 2. Update of Rainy River hydrodynamic model IWI project complete 	<p>Completed</p>

<p>breakdowns at the Kettle Falls or International Falls-Fort Frances dams, fires or other accidents, provided the outflow shall not be less than the flows prescribed respectively in paragraphs numbered 1(c) and 2(c) of the Order.</p>	<p>two gates closed at a time with an IWI funded proposal</p>		
<p>4. (Directive 4.c.iv) When, in the opinion of the Water Levels Committee, conditions either exist or are likely to occur which make it advisable to deviate temporarily from the strict application of the Order, the Board Co-chairs shall refer the matter to the Commission by the fastest practicable means, together with the Water Levels Committee's recommendation; the Commission will inform the Water Levels Committee of its decision as expeditiously as possible</p>	<ol style="list-style-type: none"> 1. The Water Levels Committee's Engineering Advisors will monitor basin conditions on a regular basis, and advise the Water Levels Committee on recommendations to deviate from the strict application of the Order 2. If, based on a review of basin conditions, the Water Levels Committee determines that a deviation from the strict application of the Order is advisable; it will notify the Commission by the fastest practicable means. 3. Lead the coordination of participants in the Rainy River sturgeon spawning assessment protocol each spring as conditions warrant. 4. Submit the final year IWI proposal for the correlation of sturgeon spawning on the Seine River, a tributary of Rainy Lake, with environmental and traditional indicators 5. Submit the second year IWI proposal for the study of Rainy Lake Regulation on wild rice production 6. Submit the final year IWI proposal for the study of cattail mitigation measures on 	<ol style="list-style-type: none"> 1. Recommended the IJC issue a Supplementary Order for the emergency regulation of Rainy and Namakan Lakes to better regulate flows due to early spring melt conditions in the March 2016. The changes to regulation allowed for an early, partial refill of Rainy Lake and Namakan Reservoir to begin before April 1st 2. Seine River Temperature IWI project complete 3. Impacts of water level regulation on wild rice production IWI project complete 4. Cattail mitigation measures on tributary waters of Rainy Lake IWI project complete 	<p>Completed</p>

	tributary waters to Rainy Lake		
5. (Directive 4.c.vi) The Water Levels Committee shall meet face-to-face with the operators of the dam at International Falls-Fort Frances annually to discuss water level issues that have occurred during the previous year and keep the Board informed of important issues discussed at the meeting.	1. The Water Levels Committee will carry out the annual meeting as described in the Directive	Water Levels Committee met with dam operators on August 11, 2015	Completed
Meetings, Reports and Information Exchange			
1. The Board shall conduct its public outreach activities in accordance with the Commission's public information policies.	<ol style="list-style-type: none"> 1. Maintain communications as appropriate with the media and public, especially regarding water level and flow regulation. Issue public news releases and web site advisories, as needed, in keeping with the Commission's public information policies 2. Meet with the public, associations and interest groups on various issues, as required 3. Maintain the Board's web-based data on lake levels and basin flows for use by the public 4. Respond to public, agency, and IJC information requests or letters of complaint 5. Periodically conduct basin tours 6. Appear before the IJC at its semi-annual meetings, as requested 7. Annually update the Water Levels Committee Work Plan 	All required actions carried out	Completed
Monitor Developments/Conditions and Inform IJC			
	1. Track proposed hydropower developments in the Rainy basin which may impact trans-boundary waters and report developments to the Board	All required actions carried out	Completed

APPENDIX 3 - STATUS OF STUDIES FOR THE RAINY AND NAMAKAN LAKES RULE CURVES EVALUATION

RAINY AND NAMAKAN LAKES RULE CURVES EVALUATION STUDIES				
PROJECT INDEX	FUNDER	AGENCY	TITLE	STATUS (as of March 31, 2016)
1	IJC	Northland College & Northern Bioscience	Wetland Vegetation Monitoring- Voyageurs National Park	Complete; posted on Study Board website.
2	IJC	Environment and Climate Change Canada	Rainy and Namakan Hydrologic Response Model	Complete; descriptive text posted on Study Board website, Excel based model available from IJC on request.
3	IJC	Ontario Ministry of Natural Resources and Forestry	An Investigation of the Effects of the 2000 Rule Curve Change on the Rainy River Hydrologic and Hydraulic Regime	Complete; posted on Study Board website.
4	US Geologic Survey - analysis; IJC - analysis; Minnesota DNR - data collection; US National Park Service - data collection	US Geologic Survey, US National Park Service	Assess effects of water level fluctuation on bio-indicators using analytical models	Complete; posted on Study Board website.
5	IJC	US National Park Service	Detailed bathymetric mapping of the littoral zone of selected reservoir locations. Data only.	Complete; will not be posted on Study Board website as product is raw data only. Used in DEM of Rainy Lake / Namakan Reservoir.
6	IJC	Environment and Climate Change Canada	Habitat mapping for marsh nesting birds and herpetiles in the Rainy Lake area: Using GIS to assess the effects of the 2000 rule curve changes	Complete; posted on Study Board website.
7	IJC	University of Minnesota; Minnesota State University - Moorhead	Sustained Changes in Rainy Lake and Namakan Reservoir: Benthic Macroinvertebrate Communities in Relation to the 2000 Rule Curve Changes	Complete; posted on Study Board website.
8	IJC	USDA Forest Service; Minnesota DNR	Water level change effects on northern pike spawning and nursery habitat and reproductive success in Rainy	Complete; posted on Study Board website.

			Lake and Namakan Reservoir, Minnesota	
9	IJC	Department of Fisheries and Oceans Canada; University of Waterloo	Rainy River critical spawning and nursery habitat	Split into two components: Biological portion complete and posted on Study Board website; hydraulic portion in IJC peer review.
10	IJC	Bemidji State University	Economic survey of impact of rule curves on tourist resorts on Rainy Lake and Namakan Reservoir	Complete; will be posted on Study Board website as soon as IJC removes sensitive information from two appendices.
11	IJC	Environment and Climate Change Canada	Rainy Lake / Namakan Reservoir flooding and ice damage	In IJC peer review.
12	IJC	US National Park Service	Assess effects on cultural resources at a small number of sites on Rainy Lake and Namakan Reservoir	In IJC peer review.
13	IJC	Golder, Inc.	Assess effects on cultural resources at benchmark sites on the Rainy River	In IJC peer review.
14	IJC	Minnesota DNR	Relationship of Rainy River Hydrology to distribution and abundance of freshwater mussels	In IJC peer review.
15	IJC - analysis; Minnesota DNR - 2002 data collection	DFO	Rainy River fish community health (Index of Biotic Integrity)	Complete; posted on Study Board website.
16	IJC	University of Minnesota; Minnesota DNR	Study to measure critical spawning habitat for walleye (<i>Sander vitreus</i>) on selected lakes in the Namakan Reservoir and assess how this habitat has been affected by the International Joint Commission 2000 rule curve	Complete; posted on Study Board website.
17	IJC	Kenora Resource Consultants, Inc.	Examine municipal water treatment and hatchery data for Rainy River	In IJC peer review.
18	IJC	US Geologic Survey; Environment and Climate Change Canada; Natural Resources Canada	Revising Water-Surface Elevation Data for Gages in Rainy Lake, the Namakan Reservoir System, and Selected Rivers in Minnesota, United States and Ontario, Canada	In IJC peer review.
19	IJC	Environment and Climate Change Canada	Development of a 2-D habitat model required to support Study No 7 "Rainy River – critical spawning and nursery habitats	In IJC peer review.

20	IJC	US Geologic Survey	Collect bathymetric data for selected shallow areas to assist in the development of a digital elevation model for Rainy Lake and Namakan Reservoir	Complete; will not be posted on Study Board website as product is raw data only. Used in DEM of Rainy Lake / Namakan Reservoir.
21	IJC	Environment and Climate Change Canada	Modelling the Rainy Lake and Namakan Reservoir ecosystem response to water level regulation.	In IJC peer review.
22	US Geologic Survey - analysis; US National Park Service and US Geologic Survey - data collection	US Geologic Survey; US National Park Service	Trophic state in Voyageurs National Park lakes before and after implementation of a revised water-level management plan	Complete; published in the <i>Journal of the American Water Resources Association</i> , 2015.
23	US Geologic Survey	US Geologic Survey	Effects of changes in reservoir operations on water quality and trophic-state indicators in Voyageurs National Park, northern Minnesota	Complete; USGS Scientific Investigation Report, 2004.
24	US Geologic Survey - analysis; US National Park Service and US Geologic Survey - data collection	US Geologic Survey; US National Park Service	Evaluation of internal loading and water level changes: implications for phosphorus, algal production, and nuisance blooms in Kabetogama Lake, Voyageurs National Park, Minnesota, USA	Complete; USGS Scientific Investigation Report, 2011. Paper published in <i>Lake and Reservoir Management</i> , 2013.
25	US Geologic Survey	Science Museum of Minnesota; University of Minnesota; US Geologic Survey	Determining the historical impact of water-level management on lakes in Voyageurs National Park	Complete; U.S. National Park Service Natural Resources Technical Report, 2014.
26	US Geologic Survey - analysis; University of Minnesota-Duluth; US National Park Service, and US Geologic Survey - data collection	US Geologic Survey; US National Park Service	Can mercury in fish be reduced by water level management? Evaluating the effects of water level fluctuation on mercury accumulation in yellow perch (<i>Perca flavescens</i>)	Complete; Published in <i>Ecotoxicology</i> , 2014.
27	U.S. National Park	North Dakota State University	The effects of water-level manipulation on the benthic	Complete; U.S. National Park Service

	Service		invertebrates of a managed reservoir.	Natural Resources Technical Report, 2008. Paper published in <i>Freshwater Biology</i> , 2010.
28	U.S. National Park Service	Northland College & Northern Bioscience	Wetland vegetation monitoring: Voyageurs National Park	Complete; posted on Study Board website. U.S. National Park Service Natural Resources Technical Report, 2009.
29	US Geologic Survey	University of Minnesota; Science Museum of Minnesota; US Geologic Survey	Impacts of settlement, damming, and hydromanagement in two boreal lakes: a comparative paleolimnological study	Complete; published in the <i>Journal of Paleolimnology</i> , 2009.
30	University of Minnesota-Duluth; US Geologic Survey	University of Minnesota-Duluth; US Geologic Survey	Relationship between Mercury Accumulation in Young-of-the-Year Yellow Perch and Water-Level Fluctuations	Complete; published in <i>Environmental Science and Technology</i> , 2005.
31	US National Park Service	US National Park Service; Biodiversity Research Institute	Effects of water-level management on nesting success of common loons	Complete; published in <i>Journal of Wildlife Management</i> , 2013.
32	US Geologic Survey - analysis; Minnesota DNR and US Geologic Survey - data collection	US Geologic Survey; Minnesota DNR; US National Park Service	Does water level fluctuation influence production of Walleye and Yellow Perch young-of-year in large northern lakes?	In peer review (journal)
33	US Geologic Survey - analysis; Minnesota DNR and US Geologic Survey - data collection	US Geologic Survey; Minnesota DNR; US National Park Service	Are Walleye, Northern Pike and Yellow Perch increasing in abundance since the implementation of a new water level management regime in large lakes of the Rainy-Namakan system (MN, USA and ON, CA)?	In progress.
34	US National Park Service	US National Park Service	Work in progress (beavers)	In progress.
35	US Geologic Survey - data analysis; US National Park Service and US Geologic Survey - data collection;	US Geologic Survey; US National Park Service; University of Wisconsin - La Crosse	Work in progress (mercury methylation)	In progress; data collection complete

	University of Wisconsin - La Crosse - analysis			
36	IJC	Seine River First Nation; Kenora Resource Consultants Inc.	Seine River temperature variation with dam operation - effect on sturgeon spawning	In IJC review.
37	IJC	Seine River First Nation; Lakehead University	Cattails and Wild Rice Study - Cattail removal and influence of water fluctuation on wild rice growth and development	In IJC review.
38	IJC	MNRF; Northern Bioscience Inc.	Multi-year Rainy River Temperature Study	In IJC review.
39	IJC	Environment and Climate Change Canada	Namakan Pinch-Point Hydraulic Study	In IJC review.