

INTERNATIONAL RAINY RIVER WATER POLLUTION BOARD
INTERNATIONAL RAINY LAKE BOARD OF CONTROL

FALL 2009 REPORT

Submitted to
The International Joint Commission
October 9, 2009

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BOARD MEMBERS AND STAFF

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1.0 INTRODUCTION

The International Rainy River Water Pollution Board (IRRWPB) and the International Rainy Lake Board of Control (IRLBC) report jointly to the International Joint Commission (IJC) in the spring and the fall of each year. Both reports address activities and basin issues of interest occurring since the previous report and may include sections on specific topics under review by the Boards. The fall reports address environmental quality and related issues, while the spring reports address regulation of Rainy and Namakan lakes over the past calendar year.

The two Boards continued to work closely together, holding joint conference calls throughout the year and hosting a joint public meeting in the basin. The public meeting was held August 25, 2009 in International Falls, Minnesota. The Boards also met that week with the resource agencies and with representatives from the dam operators, ACH LP/AbitibiBowater and Boise Cascade. Commissioners Pierre Trépanier and Allen Olson, with IJC staff members Paul Pilon and Mark Colosimo, attended the meetings along with Board members and staff.

In 2009, as in recent years, the basin again experienced greater variability and more extreme precipitation than was typical in the 1980s-90s. Spring and early summer inflows were high due to the combination of record-setting winter precipitation and above normal spring rains. As a result, Namakan and Rainy lakes both rose above their Upper Rule Curves (URCs), Namakan for 10 days in May and Rainy for 52 days in May-June. However, the peak level on Namakan was 9 cm (3.5 in) below its maximum summer URC level, while the peak level on Rainy was only 12 cm (4.7 in) above its maximum summer URC level, well below the historic peak. Lake levels rose again in August due to heavy rains from late July well into August. Namakan Lake rose very close to its URC, while Rainy Lake exceeded its URC for 8 days, although the maximum deviation was only 3 cm (1.2 in). A full report on basin conditions in 2009, complete with graphs, will be provided in the spring 2010 joint report of the Boards.

2.0 AMBIENT ENVIRONMENTAL MONITORING

2.1 Water Quality Monitoring - MPCA

The Minnesota Pollution Control Agency (MPCA) monitors water quality on the main stem of the Rainy River at two long term sampling stations and on four tributaries to the Rainy River (Figure 1). All of these monitoring stations are part of the Minnesota Milestone sampling program, a program that includes fixed station stream monitoring sites throughout the state of Minnesota.

In keeping with the sampling schedule for the Minnesota Milestone program, these sites were last monitored in 2008 and will be reported here. The MPCA Milestone sites are sampled monthly for ten months of two non-consecutive years in a five-year period. Exceedances to ambient water quality standards are listed in Table 2 as a ratio to the total samples collected at each site. Complete data are available on the MPCA website at www.pca.state.mn.us. The next scheduled sampling year is 2010.

Water samples collected from main stem Rainy River stations and tributaries are analyzed for temperature, dissolved oxygen (DO), turbidity, pH, conductivity, total phosphorus, biological oxygen demand (BOD), nitrate + nitrite, ammonia, chlorophyll a, total suspended solids, volatile solids,

E. coli, and fecal coliform. The following sites in Table 1 are the current long-term water quality sampling stations on the main stem of the Rainy River and its tributaries. Data results from the monitoring program can be seen on the MPCA website at <http://www.pca.state.mn.us/data/eda/index.cfm#monitoring>.

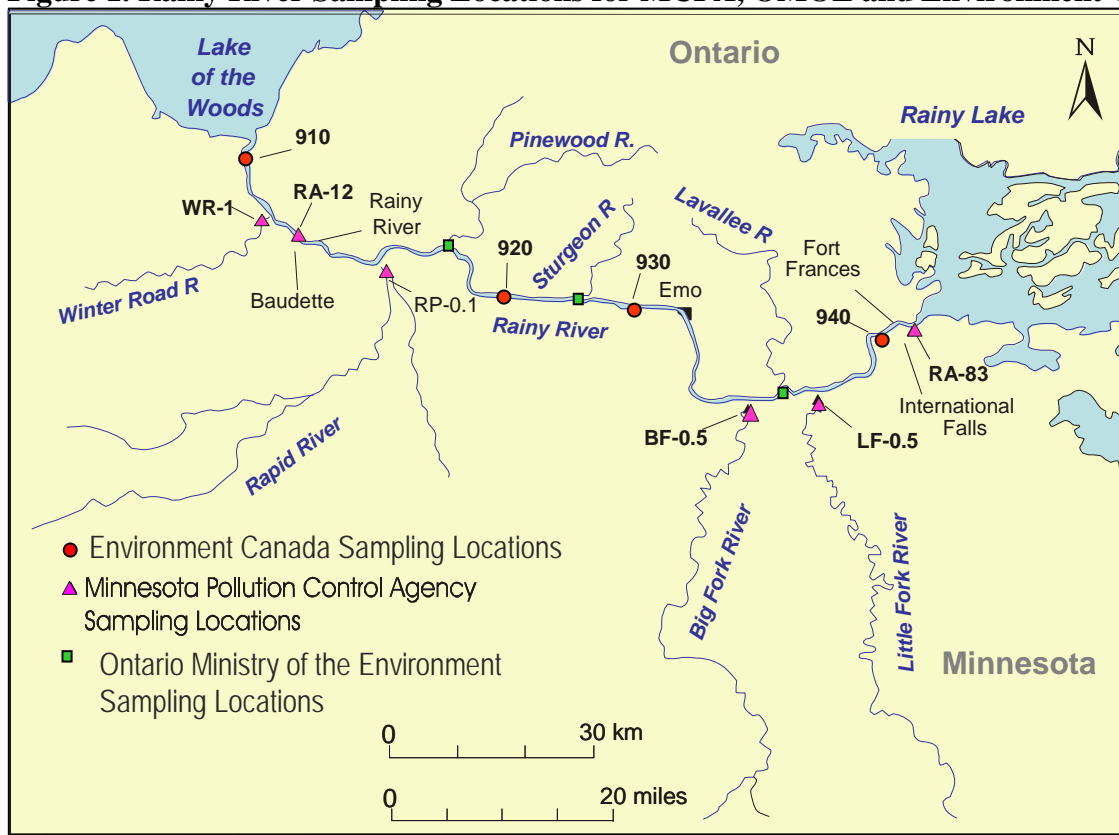
Table 1. MPCA Sampling Locations

Stations	Location	Parameters
RA - 12	Rainy River @ Baudette, MN	Turbidity, volatile solids, total suspended solids, pH, DO, BOD, chlorophyll a, total phosphorus, <i>E. coli</i> , fecal coliforms
RA - 83	Rainy River @ Int'l Falls, above dam	Turbidity, volatile solids, total suspended solids, pH, DO, BOD, chlorophyll a, total phosphorus, <i>E. coli</i> , fecal coliforms
BF - 0.5	Big Fork River @ bridge on MN 11 (4 mi. E of Loman, MN)	Turbidity, volatile solids, total suspended solids, pH, DO, BOD, chlorophyll a, total phosphorus, <i>E. coli</i> , fecal coliforms
LF - 0.5	Little Fork River @ bridge on MN 11 (0.5 mi. W of Pelland, MN)	Turbidity, volatile solids, total suspended solids, pH, DO, BOD, chlorophyll a, total phosphorus, <i>E. coli</i> , fecal coliforms
RP - 0.1	Rapid River @ Clementson, MN	Turbidity, volatile solids, total suspended solids, pH, DO, BOD, chlorophyll a, total phosphorus, <i>E. coli</i> , fecal coliforms
WR - 1	Winter Road River @ bridge on MN 11 (4 mi. W of Baudette, MN)	Turbidity, volatile solids, total suspended solids, pH, DO, BOD, chlorophyll a, total phosphorus, <i>E. coli</i> , fecal coliforms

Table 2. MPCA 2008 Ambient Water Quality Exceedances by Station

Station	Parameter	Exceedence Ratio	Notes
RA-83	-	none	
LF-0.5	Turbidity	9/12	The Little Fork River is on the U.S Impaired Waters List for Turbidity; a Total Maximum Daily Load process to address the impairment is scheduled to begin in 2011.
BF-0.5	Dissolved Oxygen	2/8	Exceedances occurred during low flow events in the summer.
BF-0.5	Turbidity	3/8	Exceedances occurred during spring peak flows (one) and during summer low flow events (two)
RP-0.1	-	None	
RA-12	Turbidity	1/31	Exceedance occurred during spring peak flow.

Figure 1. Rainy River Sampling Locations for MCPA, OMOE and Environment Canada



2.2 Water Quality Monitoring - Environment Canada

In 2008, Environment Canada (EC) initiated a program to monitor water quality on Lake of the Woods and, in 2009, added four sampling sites on the Rainy River in order to improve estimates of nutrient loadings to Lake of the Woods, and to measure mercury levels in the River for comparison to water quality guidelines. Results will be included in the 2010 Fall report. In cooperation with Rainy River First Nation, water samples are being collected from these stations (Table 3) on a bi-weekly basis to monitor nutrient and mercury concentrations. This sampling was initiated in June of 2009 at stations 920, 930 and 940 (Table 3), and will continue through to October. Further, winter sampling on a bi-weekly schedule will continue until March of 2010 at a single location (910) at the mouth of the Rainy River. Sampling at all four locations will continue in 2010.

Table 3. EC Sampling Locations in the Rainy River

Station	Location	Parameters Measured
910	Rainy River outlet	Mercury, nitrate/nitrite, ammonia, phosphorus, major ions
920	Rainy River below Long Sault Rapids	Mercury, nitrate/nitrite, ammonia, phosphorus, major ions
930	Rainy River below Manitou Rapids	Mercury, nitrate/nitrite, ammonia, phosphorus, major ions
940	Rainy River below Fort Frances	Mercury, nitrate/nitrite, ammonia, phosphorus, major ions

2.3 Water Quality Monitoring - USGS

In water year 2008 (October 2007 through September 2008), the United States Geological Survey (USGS) sampled for suspended sediment at the stream flow gage near the mouth of the Little Fork River, a primary Minnesota tributary to Rainy River. The purpose of this sampling, conducted in cooperation with the Minnesota Pollution Control Agency, was to begin to establish a statewide monitoring program for one of the most common problems for river impairment in the state, suspended sediment. This monitoring also will provide information about the comparison of sampling methods (such as cross-sectional integrated sampling compared to single-point depth integrated sampling) and analytical methods, such as for suspended sediment concentrations, total and volatile suspended solids concentrations, turbidity, and transparency tube measurements for various stream environments. Ten samples were collected across flows ranging from 137 to 9,590 cubic feet per second (3.9 to 271 cubic meters per second). Concentrations of sediment ranged from 13 to 269 mg/L (milligrams per liter). The highest concentration was measured during April high flow and the lower concentrations were measured during late summer and fall. More details about this monitoring site may be reviewed at [\[http://wdr.water.usgs.gov/wy2008/pdfs/05131500.2008.pdf\]](http://wdr.water.usgs.gov/wy2008/pdfs/05131500.2008.pdf)

Water-quality sampling also was conducted to better understand the effects of water-level management on nutrient cycling and algal production at selected sites. The importance of these data should become more valuable in the context of time trends as potentially related to water-level management. Water quality in Daley Brook at County Road 129 near Kabetogama, MN

[\[http://wdr.water.usgs.gov/wy2008/pdfs/05131500.2008.pdf\]](http://wdr.water.usgs.gov/wy2008/pdfs/05131500.2008.pdf) was sampled in May and again in August 2008. Total nitrogen (unfiltered) was less than 1.0 mg/l at both times and total phosphorus was 0.016 and 0.023 mg/L, respectively. Chlorophyll *a* was 2.01 ug/L (micrograms per liter) in August. Water quality in Kabetogama Lake at Sullivan Bay near Ash River

[\[http://wdr.water.usgs.gov/wy2008/pdfs/482554092500301.2008.pdf\]](http://wdr.water.usgs.gov/wy2008/pdfs/482554092500301.2008.pdf) was sampled monthly from May through September 2008. Chlorophyll *a* concentration ranged from 1.15 to 16.4 ug/L with the highest concentration from the July sample. Total nitrogen (unfiltered) was less than 1.0 mg/l at for all sample times and total phosphorus (unfiltered) ranged from 0.025 to 0.048 mg/L.

2.4 Tributary Monitoring Program - OMOE

In spring, 2009, the Ontario Ministry of the Environment, with a number of partners (Rainy River First Nation, Ontario Stewardship Council, Confederation College) began a tributary monitoring program. The main objective of this work was to fill the previously identified data gap in the current nutrient budgeting exercise for Lake of the Woods being undertaken by Trent University.. This work will also help to identify those tributaries with the highest nutrient loadings, and help focus possible reduction strategies in the future. Sampling is occurring on three tributaries of the Rainy River: the Lavallee River, the Sturgeon River and the Pinewood River in addition to seven other tributaries of Lake of the Woods.

As of September, 15 sampling events have been completed on all of the tributaries and an additional five events completed on the Rainy River tributaries. Samples have been analyzed for nutrients (phosphorus, nitrogen) and general chemistry parameters (pH, alkalinity, specific conductance, total & dissolved solids, dissolved organic & inorganic carbon, plus reactive silicate). Selected samples have also been analyzed for metals to provide Regional Staff reference data. Data are being compiled into a

data base. The tributary sampling program is expected to continue in 2010 in order that the nutrient loadings into Lake of the Woods can be further understood, and ultimately any management decisions made on the best information available.

2.5 Rainy Basin Condition Monitoring

Little Fork River Watershed

The lower reach of the Little Fork mainstem was added to the United States Federal Impaired Waters List [303(d) Report to Congress] for turbidity in 2006. The Total Maximum Daily Load study and report development is scheduled to begin in 2011.

In 2006, the MPCA began the Little Fork/Big Fork Paired Watershed Study designed to provide resource managers with information that will explain why the Little Fork has high sediment concentrations causing the turbidity. 2006 field work included a sediment-loading study during spring runoff and gathering additional morphologic data from both watersheds. 2007 field work included a continuation of the spring runoff sediment loading study, as well as an on-the-ground reconnaissance and characterization of a 12-mile section of the river (with assistance from the MDNR).

In 2008 The MPCA also conducted the first phase of intensive watershed monitoring of the Little Fork River and tributaries. Sites were be sampled to assess fish community structure, physical habitat, and water chemistry during the months of June - August. Invertebrate sampling at these sites was conducted in the month of September. Sampling will continue in 2009. A detailed assessment report is expected in 2010 or 2011. For more information on the MPCA's biological monitoring go to:

<http://www.pca.state.mn.us/water/biomonitoring/bio-about.html>

For a PDF map of monitoring locations on the Little Fork go to:

<http://www.pca.state.mn.us/publications/maps/biomonitoring-littleforkphase1.pdf>

Rainy River Headwaters Watershed

The White Iron Chain of Lakes Association (WICOLA), in cooperation with stakeholders and numerous state and federal agencies, is leading a volunteer-based, long term, condition monitoring project for the Kawishiwi River Watershed. The Kawishiwi is a sub-watershed of the Rainy River Headwaters Watershed. This effort was continued in 2008.

In 2008 WICOLA initiated a protection project for the Kawishiwi Watershed. The project is still under development, but it is expected to expand the ongoing monitoring effort and result in development of a watershed management plan.

2.6 Fish Consumption Advisories

Fish consumption advisories are issued based on fish tissue monitoring carried out by provincial and state agencies in Ontario and Minnesota. In Minnesota, it is a shared program between the Minnesota Department of Natural Resources (MDNR) and the Minnesota Department of Health (MDH), while in Ontario it is a shared program with the Ontario Ministry of Natural Resources (OMNR) and the Ontario Ministry of Environment (MOE).

Minnesota

Each year, the MDNR collects fish from lakes and rivers for testing. Fish fillets are tested for mercury and in some cases polychlorinated biphenyls (PCBs). The MDNR, the MPCA, and the MDH collaborate to select sites where fish are tested. The MPCA also screens fish for other chemical contaminants that may be of concern. The MDH issues fish consumption advice based on the concentrations of chemicals measured in fish fillets. The concentrations that trigger fish consumption advice are listed in Tables 4 and 5. Rainy River Basin specific fish consumption guidelines are listed in Tables A1 and A2 in Appendix A.

Table 4. Consumption Advice – Mercury 2009

Meal Advice	Women not planning to become pregnant and men (ppm mercury)	Pregnant women, women who may become pregnant, and children under age 15 (ppm mercury)
Unlimited consumption	≤ 0.16	≤ 0.05
1 meal / week	$> 0.16 - 0.65$	$> 0.05 - 0.2$
1 meal / month	$> 0.65 - 2.8$	$> 0.2 - 0.95$
Do not eat	> 2.8	> 0.95

Table 5. Consumption Advice – PCBs 2009

Meal Advice	(ppm PCB)
Unlimited consumption	≤ 0.05
1 meal / week	$> 0.05 - 0.22$
1 meal / month	$> 0.22 - 0.95$
1 meal / two months	$> 0.95 - 1.89$
Do not eat	> 1.89

Currently MDH issues consumption advisories based on mercury for Rainy Lake, Rainy River, Little Fork River, Big Fork River, Vermilion River and Lake of the Woods. There have been minor changes to consumption guidelines included in the Fall 2009 report. Detailed information can be found at <http://www.health.state.mn.us/divs/eh/fish/index.html>.

Ontario

The *Guide to Eating Ontario Sport Fish* is published every other year by the OMOE in cooperation with the OMNR. Skinless boneless dorsal fillets are analyzed for a variety of contaminants that may include mercury and other metals, DDT, PCBs, PCB congeners, mirex/photomirex, pesticides, chlorinated phenols, chlorinated benzenes, polycyclic aromatic hydrocarbons (PAHs), dioxins/furans and dioxin-like PCBs. Results are used to develop tables in the *Guide*, which give size-specific consumption advice for each species tested at each location. For Rainy River and Lake of the Woods where contaminant burdens vary within the water body, consumption advice is given for each area. The number of recommended meals per month ranges from 8, for fish with low contaminant concentrations, to zero, for fish with high contaminant concentrations. Consumption advice is based on health protection guidelines developed by Health Canada. The 2009-2010 *Guide* contains important

information on consumption of sport fish for both the general population and the sensitive population of women of child-bearing age and children under 15. The concentrations that trigger fish consumption advice are listed in Table 6. Rainy River Basin specific fish consumption guidelines are listed in Tables A3 and A4 in Appendix A.

Table 6. Examples of Ontario Consumption Advice Restrictions 2009/2010

Contaminant	Restrictions Begin	Total Restriction
Mercury (ug/g)	0.61	1.84
Mercury (ug/g) ¹	0.26	0.52
Total PCBs (ug/g)	0.105	0.844
Total PCBs (ug/g) ¹	0.105	0.211
Dioxins, Furans, Dioxin like PCBs (ng/g) TEQ ²	0.0027	0.0216
Dioxins, Furans, Dioxin like PCBs (ng/g) TEQ ¹	0.0027	0.0054

¹ Concentrations for women of child-bearing age and children under 15 years of age

² TEQ is the toxic equivalent of 2,3,7,8-TCDD

Advisories restricting fish consumption remain in effect for Rainy Lake, Rainy River, and Lake of the Woods. Consumption guidelines also vary within these water bodies with consumption of northern pike and walleye being more restricted in Rainy Lake in fish from Redgut Bay compared to fish from the North and South arm of the lake. These advisories are mainly a result of mercury concentrations in fish tissue, but depending on location they may also be based on concentrations of PCBs. Fish consumers should consult the “2009-2010 Guide to Eating Ontario Sport Fish” for more detailed information. The Guide can be accessed at <http://www.ontario.ca/fishguide>

2.7 Environmental Effects Monitoring (EEM)

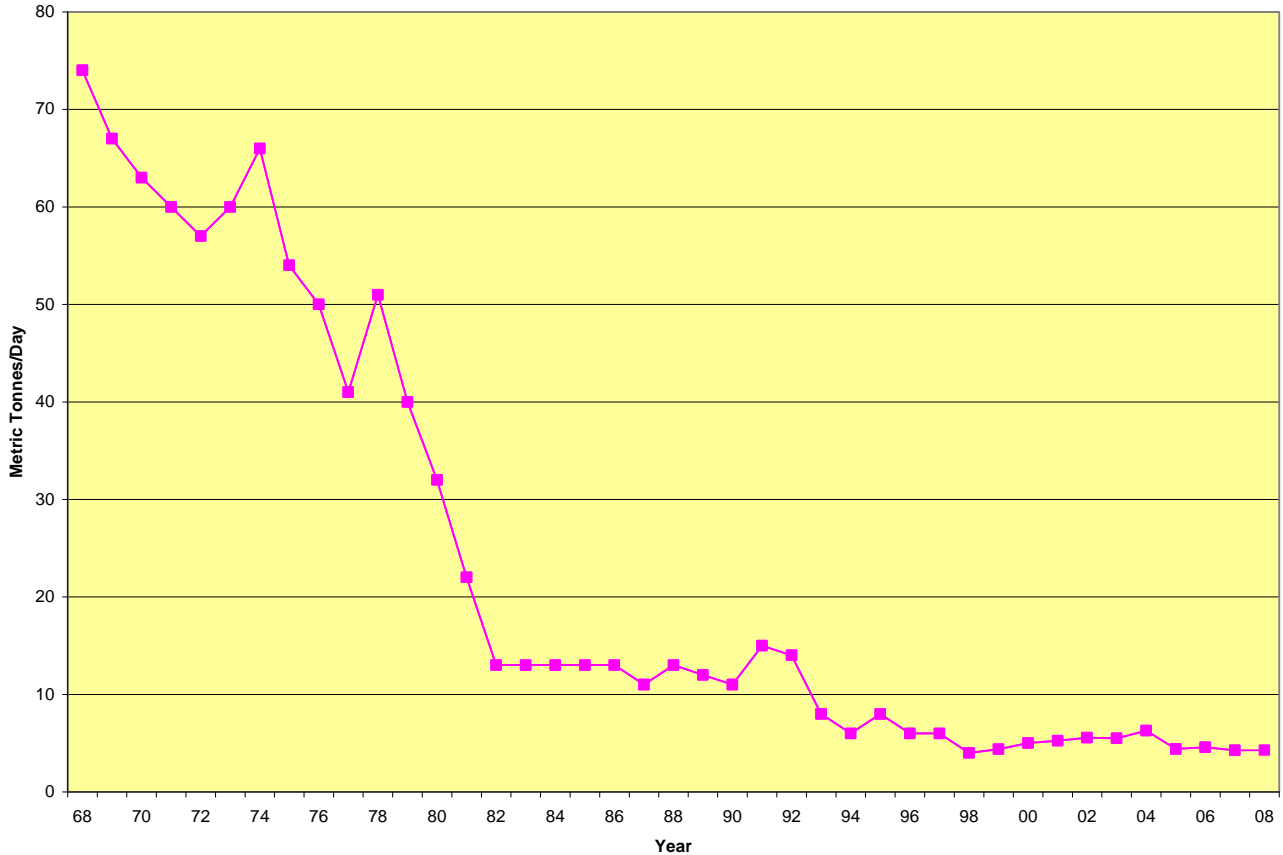
Through federal legislation, the Environmental Effects Monitoring program requires pulp and paper mills in Canada to monitor the effects of pulp and paper mill discharges in receiving waters. Study components include an adult fish survey, a benthic invertebrate survey, and toxicological testing of final effluent. The EEM program consists of a 3-year cycle of monitoring and interpretation that build on the findings from previous cycles. The latest report from the Fort Frances mill (April 2007) was based on Cycle 4 results, which are the most recent results. Cycle 5 will be reported on in 2010.

3.0 POINT SOURCE DISCHARGES

As indicated in the recent Board reports, point source discharges to the Rainy River from municipal and industrial sources have remained relatively constant from a loadings perspective and will probably remain fairly steady at current levels in the foreseeable future. The dramatic decreases in loading for conventional parameters, such as biological oxygen demand (BOD) and total suspended solids (TSS), from the 1960’s to the early 1980’s are the direct result of remedial measures undertaken by industry and municipalities. Figure 2 documents this historical downtrend of BOD from municipal and industrial sources. With no other significant remedial measures planned, BOD loads to the Rainy River will likely continue at or around the current levels. Given the nuisance algal bloom and elevated nutrient issues faced in water bodies downstream of Rainy River (Lake of the Woods, Lake Winnipeg),

the Boards have decided to include information on point sources loadings of total phosphorus (where available) in this report.

Figure 2. Total BOD Load from Continuous Discharges (mt/d) 1968-2008



3.1 Minnesota Municipal Sources

North Koochiching Sanitary Sewer District

The District, which includes International Falls, discharges to the Rainy River downstream of International Falls. The current NPDES Permit for the District expires in 2012. The District reported no violations to its discharge permit for the calendar year 2008. Discharge data from this facility are shown in Table 7 for the years 1996 through 2008. The National Pollutant Discharge Elimination System (NPDES) Permit for the District does not have a limit for total phosphorus.

Table 7. North Koochiching Sanitary Sewer Average Annual Discharge Summary

Year	Flow (m3/d)	BOD (kg/d)	TSS (kg/d)	TP (kg/d)
1996	6813	89.7	50.4	-
1997	4921	77.4	38.6	-
1998	5349	77.1	32.4	-
1999	5149	70.0	35.0	-
2000	4245	54.6	26.7	-
2001	4920	64.3	35.4	-
2002	4538	71.0	35.2	11.4
2003	3191	47.1	20.2	10.2
2004	4397	43.4	19.0	10.6
2005	4781	51.6	24.6	12.0
2006	3794	46.2	18.6	12.5
2007	3780	41.1	24.6	11.7
2008	4391	39.1	35.7	10.8

“-” = Data unavailable at the time this report was generated

Baudette

The Baudette wastewater treatment facility has a lagoon system that discharges seasonally to the Rainy River. The facility discharged during May, October, and November of 2008. The total discharge during that period was 230,759 m³. Monthly discharge volumes are shown below in Table 8. During discharge periods, BOD levels were well within the NPDES Permit limits of 25 mg/L and TSS levels were below 45 mg/L. Average BOD and TSS concentrations during discharge were 9.3 mg/L (90.6 kg/d – 24 days) and 33.9 mg/L. The NPDES Permit for the Baudette facility does not have a limit for total phosphorus. Average total phosphorus concentration during discharge was 1.9 mg/L. There were four TSS violations for average and maximum TSS concentrations during May, 2008. The NPDES Permit for the Baudette facility expired in May 2009, with permit reissuance in process.

Table 8. Baudette Waste Water Treatment Facility Monthly Discharge in m³

Year	April	May	June	July	Aug	Sept	Oct	Nov
2004	none	144,235	28,847	none	none	96,157	67,310	38,463
2005	57,690	none	96,150	none	none	38,460	57,690	67,305
2006	none	69,150	67,305	none	none	none	48,075	none
2007	none	76,920	none	none	none	none	96,149	38,460
2008	none	96,149	none	none	none	none	67,305	67,305

3.2 Ontario Municipal Sources

Fort Frances

A rebuild and upgrade of the Fort Frances wastewater treatment plant was completed in January 1998 to include secondary treatment and phosphorus removal. The result of improved treatment is indicated

in the 1998 discharge data in Table 9 which includes two years of pre-secondary treatment and ten years of secondary treatment. The plant operated throughout 2008 within the Ministry of Environment guidelines of 25 mg/L for both BOD and TSS. Average concentrations in 2008 were 3.6 mg/L BOD and 9.8 mg/L TSS, both well within the 25 mg/L limit. There were no bypass events in 2008. The average total phosphorus concentration in the discharge was 0.27 mg/L, resulting in an average loading of 2.0 kg/day. Average ammonia concentrations in the discharge were 3.0 mg/L, resulting in an average loading of 22.08 kg/day.

Table 9. Fort Frances Wastewater Treatment Plant Average Annual Discharge Summary

Year	Flow (m ³ /d)	BOD (kg/d)	TSS (kg/d)	TP (kg/d)
1996	8940	211	449	-
1997	7240	323	447	-
1998	6500	52	76	-
1999	8280	48	56	-
2000	6973	48	55	-
2001	8144	46	90	-
2002	7549	52	88	-
2003	6281	44	71	-
2004	7791	59	89	-
2005	8684	30	80	2.37
2006	7249	27	74	1.86
2007	6724	21	67	1.75
2008	7355	27	74	2.00

“-” = Data unavailable at the time this report was generated

Emo

The Town of Emo has a seasonal discharge from its sewage lagoon to the Rainy River. During 2008, a total of 163,432 m³ was discharged to the river over 35.5 discharge days in the spring and fall. BOD and TSS were within the provincial discharge guidelines of 40 mg/L and 30 mg/L, respectively, during discharge periods. Average BOD and TSS concentrations during discharge were 3.71 mg/L and 7.1 mg/L. Total phosphorus concentrations averaged 0.802 mg/L while total kjeldahl nitrogen was 2.06 mg/L.

Manitou Rapids

The sewage lagoon operated by Rainy River First Nations at Manitou Rapids is monitored by Health Canada. During the spring of 2008 the gate valve between the two cells of the lagoon was not closed and, thus, there was mixing between the two cells resulting in the presence of raw effluent in both cells. The decision was made to avoid releasing the cell to the river due to the potential negative environmental impacts. Sufficient capacity existed in the lagoon to hold the waste over to the fall period. At this time it was discovered that there was a leak in the gate valve between the two lagoons resulting in some degree of mixing between the two cells. The gate valve was subsequently repaired; however, because of the excess capacity available in the lagoon, the decision was again made to hold the effluent in the lagoon and not discharge to the river. Therefore, no discharges from the Manitou Rapids facility were made to the river in 2008.

Barwick

There were 11,772 m³ of effluent discharged from the lagoon to the Rainy River over a 48-hour period in 2008. During this discharge period, BOD averaged 4.1 mg/L and TSS averaged 3.6 mg/L.

Rainy River

The Town of Rainy River discharged a total of 323,287 m³ from its lagoon to the Rainy River during the spring and fall of 2008. During the discharge period, BOD averaged 3.88 mg/L and TSS averaged 3.1 mg/L, both below the provincial guidelines of 40 mg/L and 30 mg/L, respectively. Total phosphorus concentrations averaged 0.27 mg/L in the discharge while average ammonia (as nitrogen) was 2.63 mg/L.

3.3 Minnesota Industrial Sources MPCA

Boise Cascade - International Falls

Discharge data from 1996 to 2008, including effluent flow, BOD, TSS, absorbable organic halogens (AOX), and total phosphorus (TP) for the Boise Cascade mill in International Falls, is provided below in Table 10. There were no National Pollutant Discharge Elimination System permit violations in calendar year 2008. Dioxins and furans in bleach plant effluent samples were below the regulatory threshold (pursuant to 40 CFR Sec. 430.01) of 10 parts per quadrillion (ppq) in 2008. The current NPDES Permit for the Boise Cascade facility expired in August 2009, with reissuance of the Permit in process.

Table 10. Boise Cascade Annual Average Discharge Data

	Flow (m3/d)	BOD (kg/d)	TSS (kg/d)	AOX (kg/d)	TP (kg/d)
Permit Limit	N/A	4,720	7,935	567	N/A
1996	120,363	1,500	3,750	762	-
1997	114,686	1,150	2,230	615	-
1998	158,242	1,129	2,156	611	-
1999	149,368	1,537	2,105	506	-
2000	158,837	789	1,183	805	125.5
2001	135,768	645	1,079	N/A	72.0
2002	160,484	747	1,584	N/A	133.2
2003	143,164	956	2,094	N/A	153.2
2004	150,496	1,884	3,978	N/A	102.3
2005	150,325	1,134	1,810	267	78.2
2006	151,358	561	1,161	232	221.0
2007	148,076	695	1,191	225	131.8
2008	147,536	526	785	224	124.4

“-” = Data unavailable at the time this report was generated

“N/A” = Not analyzed

3.4 Ontario Industrial Sources

AbitibiBowater -Fort Frances

Data on flow, BOD, TSS, AOX and TP are provided in Table 11 for the years 1996 through 2008. The average annual daily loads for BOD, TSS and AOX in 2008 continue to be well below compliance levels. Average toluene was 0.0039 kg/day, average phenol was 0.0157 kg/day and average chloroform was 0.0187 kg/day. The mill had three acute toxicity exceedances in 2008. AbitibiBowater had no reported spills or uncontrolled discharges at the Abitibi lagoons throughout the year.

There was a spill in October of 2008 from the force main going to the Aeration Stabilization Basin (lagoon). Effluent from the mill travelled to storm drain which ran through Abitibi's property via an open ditch and eventually into Rain River below the dam. The ditch was blocked off and the effluent pumped with vacuum pumps back into the primary clarifier.

Table 11. AbitibiBowater Average Annual Discharge Data

Year	Flow (m3/d)	BOD (kg/d)	TSS (kg/d)	AOX (kg/d)	TP (kg/d)
Compliance Limit	N/A	5990	9420	956	
1996	84800	3330	4790	271	-
1997	84900	3350	5320	284	-
1998	59700	2290	3150	140	-
1999	86469	2700	5300	272	-
2000	91129	4139	6563	274	-
2001	88184	4484	6216	234	-
2002	87954	4701	6635	233	-
2003	88899	4429	5362	212	-
2004	80068	4279	5152	221	-
2005	79966	3199	4204	187	116.3
2006	78470	3936	4435	179	136.4
2007	78098	3492	4311	164	140.9
2008	67063	3107	4686	152	123.4

“-” = Data unavailable at the time this report was generated

4.0 BASIN ACTIVITY UPDATE

Background information on other activities occurring in the basin is summarized below. Some of the activities involve members of the IRRWPB and IRLBC in their agency roles, while others are summarized to provide an overview of the types of initiatives that are currently taking place by other agencies and/or interest groups.

4.1 Proposed Namakan River Hydropower Developments

As noted in the spring report, three sites on the Namakan River (High Falls, Hay Rapids and Myrtle Falls) had originally been proposed for hydroelectric development by the Ojibway Power and Energy Group (OPEG), a partnership between the Lac La Croix First Nation and Chant Construction.

Subsequent evaluation by the site proponent has resulted in modifications to the original plan: OPEG has decided that it is not feasible to develop the Hay Rapids site as originally planned, and the Myrtle

Falls development has been put on hold. Hence, at this time, OPEG is proceeding with plans for only a single generating station at High Falls and the capacity at this site will be increased to 6.9 MW (formerly 6.4 MW).

Public concern regarding the proposed development continued to be expressed at the August meeting in the Basin. In response, it was explained that the Namakan Hydropower project is currently progressing through the proponent-led Environmental Assessment (EA) process as outlined by the Ontario Waterpower Association. There are two remaining mandatory public consultation periods: the first is a Notice of Inspection of the draft EA document, and the second is a Notice of Completion of the final EA document. Board members will not be formally reviewing the documents, but will be relying on Canadian federal and provincial Environmental Assessment experts to review and comment on the contents of the draft EA document when it becomes available.

Concerns have also been raised regarding impacts to fisheries in transboundary waters, particularly to the lake sturgeon population. The Ontario Ministry of Natural Resources (OMNR) is continuing a study on the sturgeon population of the Namakan River and Namakan Reservoir in conjunction with biologists from Voyageurs National Park (VPN). The Boards are continuing to monitor the issue and will keep the Commission advised.

4.2 Environmental Monitoring for Future Rule Curve Evaluation

When new rule curves were adopted for Rainy and Namakan lakes in 2000, they were to be subject to review in 15 years. The IJC requested the basin natural resource agencies to collect the data needed to support such a review. The Boards' most recent reports in 2008 and 2009 have discussed in some detail the concerns of the Boards and resource agencies regarding gaps in needed monitoring and funding. These concerns were raised by the resource agencies at their meetings with the Boards in 2006 and 2007 and in turn were relayed to the IJC. In response, the IJC established the 2000 Rule Curve Assessment Workgroup, to develop and cost a plan of study (POS) to address the information gaps, as a basis for seeking required funds from governments and to recommend an approach for conducting the 2015 review.

The Boards' fall 2008 and spring 2009 reports provided status reports on the work of the Workgroup and some details of the work currently underway by the resource agencies. Although the Workgroup had hoped to submit its final POS to the Commission in April 2009, it was not submitted until June 29, 2009. The Commission is currently considering the Workgroup's findings and recommendations.

Regarding some of the current resource agency monitoring, Voyageurs National Park is conducting research and monitoring projects, including a project that uses five "best bet" ecological indicators to determine effects of implementation of the 2000 Rule Curves. Final reports have been generated for two of the five best bet indicators, benthic macro-invertebrates and wetland vegetation, and have been submitted to the Boards. Reports for the remaining three indicators (fish, common loons and furbearers) are nearing completion. Significant changes were seen in the benthic macro-invertebrate community in Namakan Reservoir, particularly in near shore areas, likely due to changes in winter draw down levels for the 2000 rule curves. Changes in near shore vegetation were also seen in Namakan Reservoir, under the 2000 rule curve conditions. However changes were also seen in the near

shore vegetation community in Rainy Lake and Lac La Croix suggesting that some of changes may be due to factors other than the 2000 rule curves, such as climate variability.

4.3 Hydropower Peaking

As discussed in previous reports, there is concern that hydropower peaking, the process of varying flow to coincide with peak times in electricity demand, has the potential for negative environmental impacts in the Rainy River, particularly in regards to the spring spawning period for sturgeon and walleye. The Peaking Work Group was formed in 2006 to deal with these issues.

The Peaking Work Group met in January 2009, February and March to review and revise and extend the informal peaking agreement. The Group adopted the following language, which was appended to the Informal Peaking Process:

1. The Informal Peaking Process will be continued with annual review and amendments as determined by consensus of the Work Group.
2. The Work Group agreed to consider a future proposal by the companies (AbitibiBowater, ACHLP and Boise Paper Solutions) requesting a trial to determine if potential impacts from limited peaking operations during the spring spawn window are close enough to natural flow variability to be acceptable to the resource agencies. The proposals metrics should include detailed information on natural variability, economics and biota (spring spawning fish species).

At its March 27, 2009 meeting the Peaking Work Group set the 2009 spring spawning window to commence April 15th with a tentative end date of June 30th. The Work Group scheduled a mid-window review for June 12th.

At the June 12th meeting the Work Group determined that cold weather had delayed the start of the sturgeon spawn and extended the spawning window to July 6th. The Work Group scheduled another meeting for June 30th to review conditions and determine if the window end date needed further modification.

At the June 30th meeting the Work Group extended the spawning window to July 15th due to delays caused by cold weather to the sturgeon spawn.

4.4 IJC International Watersheds Initiative

The International Watersheds Initiative (IWI) promotes an integrated, ecosystem approach to issues arising in trans-boundary waters through enhanced local participation and strengthened local capacity. Since the Rainy basin was identified by the IJC as a potential IWI watershed, the Boards have been involved in a number of IWI-related activities.

Lower Rainy River Modeling

Under the IWI, the U.S. Section of the IJC has been funding the work of the U.S. Army Corps of Engineers since 2006 to develop a computer-based steady and unsteady hydraulic model of the lower

Rainy River (from the International Falls – Fort Frances dam to Lake of the Woods). This was first addressed in the Boards' fall 2006 report, with updates in the spring and fall reports of 2007 and 2008 and spring 2009 report. While work on the model was essentially completed in late 2007, completion of an independent technical review (ITR) and completion of a final report remain to be done. The ITR work was expected to be completed before the end of the 2008 calendar year, but was delayed until recently. Presently, the ITR was initiated at the end of September 2009 and is being conducted by the Boundary Water Issues Unit of MSC Operations, Environment Canada in Burlington, Ontario. Following completion of the ITR and the addressing of any review comments, the final modeling technical work and reports will be packaged and submitted to the Commission.

Water and Health in Lake of the Woods and Rainy River Basins

In 2009, with the support of the IRRWPB and the IRLBC, the IWI funded the IJC's Health Professionals Task Force (HPTF) to create a detailed inventory of public health information related to water quality issues (e.g. drinking water, recreational water use, fish consumption advisories) at the local watershed level. The resulting report summarized available information regarding the programs and agency contact information (federal, provincial, state, First Nations, tribal, local municipalities and organizations) in the Lake of the Woods and Rainy River basins. The Boards commented on the draft report and, in October, were given a brief overview of the final document by the Co-Chair of the HPTF (Jim Houston) and the consultant hired to collate the report. With communication channels between the Boards and the HPTF now open, there is the opportunity for future collaboration in addressing new issues or expanded Board mandate.

Temperature Gauges in Rainy River

This year, IWI funding was approved to support the installation, operation and maintenance of temperature gauges at three locations in the Rainy River. These gauges will provide useful information for the Peaking Workgroup to help define the spring spawning period for walleye and sturgeon to guide the prohibition period for peaking. The first water temperature probe was installed at Manitou Rapids on the Rainy River by the USGS in mid-June; data is reported at near-real time at <http://waterdata.usgs.gov/nwis/uv?05133500>. Quality assurance included detailed measurements of temperatures through a cross section of the Rainy River to verify that the single point measurement for the continuous monitor was representative of the river temperature at that site. Plans are to install a second temperature probe immediately below the dam at Fort Frances/International Falls with a third probe at the town of Rainy River (installation, operation and maintenance of these latter two sites provided by Water Survey of Canada).

Upper Rainy River Modeling

This year, IWI funding was also approved to support a bank and bathymetric survey of the upper River by echo sounder, with concurrent Acoustic Doppler Current Profiler (ADCP) flow measurements. Environment Canada's Meteorological Service of Canada (MSC) ON staff will survey the river and flood plain in order to provide the bathymetry and hydraulic information necessary to construct a hydraulic model of the Rainy River from the mouth of Rainy Lake to the dam at Fort Frances-International Falls. The National Research Council will build a hydrodynamic numerical model, which will enable demonstrations of the effects of gate closures and openings on Rainy Lake water levels to the public. This modelling effort is also funded through the Canadian IWI.

2000 Rule Curve Indicator: Changes in Submerged Aquatic Vegetation

Conditional approval was received for an IWI proposal submitted by the Boards to fund additional monitoring to assess changes in near shore submerged aquatic vegetation communities in Rainy Lake and Namakan Reservoir (using Lac la Croix as the reference), and how these changes relate to effects of the 2000 Rule Curves. The conditional approval is pending resolution of issues related mostly to the form this contracted effort will take to engage a bi-national work team, while complying with all Canadian and U.S. procurement rules and procedures.

Board Merger and Mandate Expansion

No formal response has been received to date from the IJC re the Boards' letter of October 20, 2008 wherein the Boards recommended their merger and expansion of mandate to include water quality issues in Lake of the Woods, subject to prior consultations. The Boards have been made aware, however, that consultations have occurred between the IJC and the federal governments on this topic. Further discussions of this subject also occurred at the Boards' meeting with IJC Commissioners Trepanier and Olson, as well as IJC staff Paul Pilon and Mark Colosimo, during the August meetings in the Basin. One outcome of those discussions was preparation of a draft *Option Paper for Expanded Lake of the Woods IJC Water Quality Mandate* by IJC staff and their legal advisors, which was discussed with the Boards during a teleconference on October 5, 2009.

4.5 Rainy Dam Gate Operations

The Spring 2009 report, in discussing regulation operations in 2008, noted that some members of the public felt that the dam gates were not opened soon enough during high inflow events. The report explained that earlier opening of all the gates was not effective due to the flow restriction at Ranier Rapids, and simply resulted in significant drawdown of the upper river until such time as the level of Rainy Lake had reached typical summer levels. Further, this drawdown resulted in risk to the firewater system for the AbitibiBowater mill. Nevertheless, it was reported that a letter had been written to AbitibiBowater, encouraging them to re-locate the water intake for the firewater pump, so that more gates could be opened sooner, without risk to the mill, in order to verify that such action would not increase total outflow (in other words, to confirm that Ranier Rapids was limiting the total outflow, not the dam). In September, the Boards received a response from AbitibiBowater, stating their intent to install a second firewater pump in the second quarter of 2010 so that the current intake location would no longer pose a constraint to gate operations.

4.6 Meetings

This section contains brief summaries of key meetings and tours attended by the Boards and their staff during the reporting period.

IJC Spring Semi-Annual Meeting – March 31 - April 1, 2009

Several Board Members and staff attended an IJC International Watersheds Initiative (IWI) workshop in Washington on March 31. On April 1 the Boards appeared before the IJC at their semi-annual

hearing in Washington to present the Boards' spring report. The Boards met in two sessions before and after their presentation to the IJC. Items on the agenda included finalizing the presentation to the IJC, public concern over possible high water levels on Rainy Lake during the coming season and an appropriate Board response, planning for the Board meetings in International Falls / Fort Frances in August, a review of the IWI workshop, IWI project submissions and a joint Board work plan.

IRLBC/IRRWPB Joint Annual Basin Meetings – August 25-27, 2009

The Boards held their ninth joint annual meetings in the Rainy-Namakan basin to discuss water issues in the Rainy-Namakan and Rainy River basins. The meetings consisted of an afternoon meeting with the dam operators (Boise Cascade and ACH LP/AbitibiBowater) followed by an evening public meeting on the 25th in International Falls, Minnesota. A boat tour to learn more about the hydrology, biology and geology of the lower reach of the Rainy River was led by representatives of local resource agencies and Nolan Baratono of the IRRWPB on August 26th. A meeting with resource agencies in the basin occurred the following morning, on August 27th. The meetings were held International Falls, Minnesota at the Holiday Inn (meetings with dam operators and resource agencies) and at Rainy River Community College Theatre, Minnesota (public meeting). IJC Commissioners Pierre Trépanier (Canada) and Allen Olson (United States) and IJC staff Paul Pilon and Mark Colosimo were in attendance at the aforementioned meetings.

Dam Operators Meeting

At the meeting with the dam operators on the afternoon of August 25th, Boise Paper Solutions and ACH/AbitibiBowater representatives presented a summary of their regulation activities and dam operations during the preceding twelve months as well as an update on dam maintenance and safety activities, data collection and public information efforts. It was noted that due to wet spring conditions and record winter precipitation it was a challenge to stay within the rule curves and that water levels exceeded the URCs for a period of approximately 10 weeks. Boise Paper Solutions and ACH/AbitibiBowater reported that a number of complaints were made by the public due to high water levels. The Boards reported a number of public comments on water levels on either Rainy Lake or the Namakan Chain of lakes.

Communicating information to the public on water levels remained a priority. In order to address misperceptions amongst the public in regards to water levels Boise Paper Solutions has launched an updated and improved version of its website (Lakes.bc.com). There was also a discussion on the toll free public information line (1-800-Lakes), on gates and water levels, maintained by ACH/AbitibiBowater. The company and boards discussed the possibility of measuring the efficacy and amount of use the line receives. It was ascertained that the number was available only to local area codes, and there was some discussion on the potential costs and benefits in extending this service.

The boards expressed their gratitude and appreciation to Boise paper Solutions and ACH/AbitibiBowater for their cooperation and flexibility in regards to extending the no hydro peaking window to accommodate a delayed spring spawning period.

Public Meeting

The public meeting began at approximately 7:00 PM on August 26 at the Rainy River Community College Theatre, Minnesota. Attendance included many residents from the US and Canada, First Nations, the Rainy Lakes Conservancy group, paper companies and some media representatives. Following introductions, the Boards gave a brief presentation that included an update on some of the water quantity and quality issues discussed earlier in this report, and a review of basin conditions.

Following the presentation, the Boards opened the meeting to hear comments and to answer questions from the public; many comments, concerns, and questions centered on the issue of high water levels in Rainy and Namakan Lakes. IRLBC engineers attempted to explain the complex hydrology related to those conditions and that Mother Nature is difficult to control at all times. A few residents expressed their satisfaction with the control of water levels and commended the Boards, the IJC and the dam operators on the job they were doing. A few participants suggested that the current rule curves should be lower in the winter. IRLBC engineers explained that the 2000 rule curves were designed to serve multiple interests including landowners, fisheries, power generation and environmental concerns. Concern was expressed by a member of the Rainy Lakes Conservancy regarding the proposed hydropower development on the Namakan River. The Boards explained that this project was outside of the jurisdiction of the IJC since it was not assessed to have an impact on flow in trans-boundary waters. However, the IJC did send a letter to governments alerting them of the public's concern regarding the project. The IRWPB gave a brief explanation of the provincial environmental assessment process that the proposed project is currently undergoing, and when opportunities for public consultation would occur. A question was asked about daily changes in water levels from October to April resulting in ice build up along the shore. The Boards explained that this was likely the result of hydro peaking, which is deemed to have minimal environmental impact outside of fish spawning periods. Earl Kline, chief of the Seine River First Nation, raised a number of concerns about water quality and quantity in the watershed north of Rainy River, including proposed mining and nuclear waste disposal applications. The Boards thanked him for bringing these concerns to their attention and a suggestion was made that the Boards may meet with the Chiefs of Treaty 3 in the future to discuss their concerns.

Resource Agencies Meeting

At the invitation of the Boards, a meeting was held on the morning of August 27 with representatives of local resource agencies and other governmental organizations that have responsibility for water resources information and management within the Rainy River basin. In attendance were representatives from the U.S. Voyageurs National Park VNP, Lake of the Woods Soil and Water Conservation District, OMNR, Red Lake Band of Chippewa Indians, USGS, OMOE, Minnesota Department of Natural Resources MDNR, MPCA, Lake of the Woods Soil Water Conservation District, and Rainy River First Nation. For abstracts of presentations made at the resources meeting see appendix B.

Kelli Saunders, OMOE, gave an overview of their action plan for the Lake of the Woods watershed. The four pronged approach incorporates increased compliance monitoring. OMOE is taking a proactive approach to sewage inputs from residences on Lake of the Woods by increasing their sewage system inspections and enforcing compliance with sewage management practices. They are

participating in a number of scientific studies in response to data gaps identified in the Lake of the Woods State of the Basin Report, which they co-authored. Several monitoring programs are underway including water quality monitoring in LOW in support of nutrient budgets and sediment core collections. In addition OMOE is developing a tributary monitoring program for LOW and the Rainy River to model nutrient inputs to the watershed. In 2009, ten tributaries were sampled for metals and nutrients. Kelli also highlighted the establishment of the Multi Agency Working Group for Lake of the Woods, which includes participants from government agencies and stake holder groups, to address issues in the Lake of the Woods watershed.

Ryan Maki and Steve Windels, VNP, briefed the Boards on the Park's research and monitoring projects discussed earlier in Section 4.2. Other VNP current/upcoming projects include characterization of lake sturgeon movements and habitat use, a paleolimnological study on the historical impacts of water level management on the lakes of VNP, a nutrient cycling study on Kabetogama Lake in relation to water levels and modeling the effects of water level fluctuations on biological indicator species.

Darryl McLeod, OMNR, provided an overview of OMNR's fisheries monitoring activities on the waters from Lac La Croix to Rainy River. Fishery studies and assessments have continued despite budget and staffing constraints, although one fish community index netting survey scheduled for Lac La Croix was dropped. Commercial catch sampling for white fish was completed for all three Rainy Lake basins. Several studies and assessments on sturgeon are underway including a movement and habitat use study in conjunction with VNP, SDSU, MDNR and SNF, an assessment of sturgeon in Rainy Lake. A walleye index netting project is planned for the south arm of Rainy Lake this fall.

John Vandebroek, OMNR, was unable to attend the resources meeting, but he updated the Boards by email of legislative changes pertaining to the Ontario Species at Risk (SAR) act and pending amendments to the Ontario Species at Risk List. In June the Committee on the Status of Species at Risk in Ontario (COSSARO) identified the North western Ontario lake sturgeon population as threatened. The Species at Risk in Ontario list will be amended to reflect this. The implications for dam operations and water level controls in the Rainy basin should be clarified in coming months.

Kevin Peterson, MDNR, provided information on fisheries monitoring for the reservoirs. Due to staffing and budget constraints there was no annual angler creel survey of the Minnesota waters of Rainy Lake this year. Angler creel surveys for Rainy Lake and Namakan Reservoir will resume in 2010. MDNR has participated in studies to evaluate the impact of the 2000 rule curves on fisheries including a light trapping survey for larval northern pike and a fish community index netting for whitefish and cisco. Young of year northern pike numbers on Rainy and Kabetogama lakes have increased since the 2000 rule curves were put into practice. Northern pike are expected to be a good indicator species for water level changes; however, it is difficult to assign changes in abundance with changes to the rule curves.

Don Carlson outlined MPCAs intensive watershed program in the Rainy River basin. The goal of the program is to identify impaired watersheds and waters in need of additional protection through condition monitoring. Condition monitoring uses biological and non biological indicators to identify impaired water sheds. More intensive follow up monitoring is done in sub watersheds defined as impaired, in order to elucidate the major stressors causing impairment and identify pollution sources.

Overall, the meeting with the resource agencies and others was deemed successful. In keeping with the IJC's International Watersheds Initiative objective of facilitating and improving transboundary information awareness and sharing, the Boards will continue holding this type of meeting as a regular part of their annual basin meetings.

Additionally, the Boards held a joint teleconference on October 5, 2009 to discuss the Fall report and presentation to the IJC; the status of IWI proposals and projects underway; and development of a joint workplan. During the call, the Boards were joined by IJC staff Paul Pilon, Frank Bevacqua and Mark Colosimo; as well as US legal advisor, Susan Daniel, to discuss the draft *Option Paper for Expanded Lake of the Woods IJC Water Quality Mandate*. Finally, Jim Houston, co-chair of the IJC's Health Professionals Task Force, and their consultant, Jacqueline Oblak, joined the call to present an overview and discuss their IWI-funded report *Water and Health in Lake of the Woods and Rainy River Basins*.

Finally, since April 1 there have been numerous teleconferences and exchange of emails among Board members and IWI coordinators to discuss and refine proposals.

4.7 Lake of the Woods Multi-Agency Working Arrangement

On May 22, 2009, the Lake of the Woods Multi-Agency Working Arrangement was finalized and signed off by senior representatives of the following organizations: Environment Canada, Lake of the Woods Water Sustainability Foundation, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Ontario Ministry of the Environment, Ontario Ministry of Natural Resources, Manitoba Water Stewardship, Red Lake Band of Chippewa Indians and United States Environmental Protection Agency (the Group). Note that the Group will not be limited to those signatories (and, in fact, during our August meetings in the Basin, the Rainy River First Nations expressed a desire to participate). A Technical Advisory Committee (TAC) of working-level scientists from each participating agency has also been established to better coordinate science activities and data sharing. The TAC held their first teleconference on June 25th to discuss development of an integrated workplan to reflect all agencies' activities; status of the nutrient budget study; First Nations engagement; and data management. Members of the IRRWPB also participate on the Working Group and TAC and will keep the Boards apprised of developments.

5 BOARD MEMBERSHIP

Dr. William Darby, of the Ontario Ministry of Natural Resources stepped down from the International Rainy River Water Pollution Board, effective 31 July 2009. A dinner honouring Dr. Darby was held on the 28th of August, 2009 where he was presented with a plaque and a certificate of appreciation by the Boards and the IJC Commissioners. The IRRWPB is awaiting the appointment of his replacement.

Tana McDaniel, Environment Canada, was confirmed as the joint Secretary of the International Rainy River Water Pollution Board and the International Rainy Lake Board of Control during the August 2009 joint board meeting.

Appendix A. Fish Consumption Advisories for Rainy Lake, Rainy River and Lake of the Woods for Minnesota and Ontario

Table A1. Minnesota Fish Consumption Guidelines for the General Population

Rainy Lake					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Burbot		all sizes			mercury
Crappie		all sizes			mercury
Lake Whitefish	all sizes				
Northern Pike		all sizes			mercury
Sauger			all sizes		mercury
Smallmouth Bass		all sizes			mercury
Walleye		shorter than 20"	20" or longer		mercury
White Sucker	all sizes				
Yellow Perch		all sizes			mercury
Rainy River					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Crappie		all sizes			mercury
Lake Sturgeon	all sizes				
Northern Pike		all sizes			mercury
Quillback		all sizes			mercury
Redhorse Sucker		all sizes			mercury
Sauger		all sizes			mercury
Smallmouth Bass		all sizes			mercury
Walleye		shorter than 20"	20" or longer		mercury
White Sucker		all sizes			mercury
Yellow Perch		all sizes			mercury
Lake of the Woods					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Cisco	all sizes				
Northern Pike		all sizes			mercury
Sauger		all sizes			mercury
Smallmouth Bass		all sizes			mercury
Walleye		all sizes			mercury
White Sucker	all sizes				
Yellow Perch	all sizes				

Table A2. Minnesota Fish Consumption Guidelines for Women Who Are or May Become Pregnant

Rainy Lake					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Burbot			all sizes		mercury
Crappie			all sizes		mercury
Lake Whitefish		all sizes			mercury
Northern Pike			all sizes		mercury
Sauger			all sizes		mercury
Smallmouth Bass			all sizes		mercury
Walleye		shorter than 13"	13" or longer		mercury
White Sucker		all sizes			mercury
Yellow Perch			all sizes		mercury

Rainy Lake					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Burbot			all sizes		mercury
Crappie			all sizes		mercury
Lake Whitefish		all sizes			mercury
Northern Pike			all sizes		mercury
Sauger			all sizes		mercury
Smallmouth Bass			all sizes		mercury
Walleye		shorter than 13"	13" or longer		mercury
White Sucker		all sizes			mercury
Yellow Perch			all sizes		mercury

Rainy River					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Crappie		all sizes			mercury
Lake Sturgeon		all sizes			mercury
Northern Pike		shorter than 17"	17" or longer		mercury
Quillback			all sizes		mercury
Redhorse Sucker			all sizes		mercury
Sauger			all sizes		mercury
Smallmouth Bass			all sizes		mercury
Walleye			shorter than 25"	25" or longer	mercury
White Sucker		all sizes			mercury
Yellow Perch		all sizes			mercury

Lake of the Woods					
Species	Unrestricted	1 meal/week	1 meal/month	Do Not Eat	Contaminants
Cisco		all sizes			mercury
Northern Pike			all sizes		mercury
Sauger		all sizes			mercury
Smallmouth Bass			all sizes		mercury
Walleye		shorter than 16"	16" or longer		mercury
White Sucker		all sizes			mercury
Yellow Perch		all sizes			mercury

Table A3. Ontario Fish Consumption Guidelines for the General Population from the 2009 – 2010 Guide to Eating Ontario Sport Fish

Rainy Lake				
Species	8 meals/month	4 meals/month	2 meals/month	Do Not Eat
Redgut Bay				
Northern Pike ¹	10" – 16"	16" – 30"	30" - >30"	
Walleye ¹	8" – 14"	14" – 20"	20" – 26"	>26"
Smallmouth Bass ²	6" – 12"	12" – 18"	18" – 20"	
South Arm				
Northern Pike ^{2,8}	12" – 24"	24" – 30"	>30"	
Walleye ^{2,8}	8" – 20"	20" – 24"	24" – 28"	
Whitefish ²	12" – 20"			
Ling ²	22" – 26"			
White Sucker ^{2,8}	10" – 24"			
Stanjikoming Bay/ North Arm				
Northern Pike ^{2,8}	12" – 30"			
Walleye ^{2,8}	8" – 26"	26" – 30"		
Smallmouth Bass	8" – 18"	18" – 24"		
Whitefish	8" – 18"			
White Sucker	8" – 22"			
Rainy River				
Species	8 meals/month	4 meals/month	2 meals/month	Do Not Eat
Upstream of Fort Frances Dam				
Northern Pike ²	12" – 28"	28" - >30"		
Walleye ²	10" – 20"			
Smallmouth Bass ²	10" – 14"	14" – 16"		
White Sucker ²	10" – 24"	24" – 26"		
Downstream of Fort Frances to upstream of Long Sault Rapids				
Northern Pike ^{2,8}	12" – 30"	30" - >30"		
Walleye ^{2,8}	8" – 24"	24" – 26"		
Smallmouth Bass ²	8" - 18"	18" – 20"		
White Sucker ^{2,8}	12" – 18"	18" – 22"		
Sturgeon ^{2,8,9}	22" – 30"	30" - > 30"		
Town of Rainy River to downstream to Lake of the Woods				
Northern Pike ²	12" – 28"	28" - >30"		
Walleye ²	10" – 20"	20" – 24"		
Smallmouth Bass ²	14" – 16"			
White Sucker ²	12" – 20"			
Sturgeon ²	28" – 51"	51" – 67"		
Lake of the Woods				
Species	8 meals/month	4 meals/month	2 meals/month	Do Not Eat
Lake Trout ²	14" – 30"		30" - >30"	
Northern Pike ²	14" - >30"			
Walleye ²	6" – 26"	26"-30"		
Sauger ²	6" – 18"	18" – 20"		
Smallmouth Bass ²	6" – 18"			
Yellow Perch ¹	8" – 12"	12" – 14"		
Whitefish ²	6" – 26"			
Cisco ²	6" – 16"			
White Sucker ²	10" – 20"			

¹Mercury, ²mercury, PCBs, mirex/photomirex, pesticides ⁸chlorinated phenols and chlorinated benzenes ⁹polycyclic aromatic hydrocarbons

Table A4. Ontario Fish Consumption Guidelines for Women Who Are or May Become Pregnant and Children Under the Age of Fifteen

Rainy Lake				
Species	8 meals/month	4 meals/month	2 meals/month	Do Not Eat
Redgut Bay				
Northern Pike ¹		10" – 14"		> 14"
Walleye ¹	8" – 10"	10" – 14"		>14"
Smallmouth Bass ²	6" – 8"	8" – 10"		>10"
South Arm				
Northern Pike ^{2,8}	12" – 14"	14" – 22"		>22"
Walleye ^{2,8}	8" – 14"	14" – 18"		>18"
Whitefish ²	12" – 20"			
Ling ²		22" – 26"		
White Sucker ^{2,8}	10" – 20"	20" – 24"		
Stanjikoming Bay/ North Arm				
Northern Pike ^{2,8}	12" – 22"	22" - >30"		
Walleye ^{2,8}	8" – 20"	20" – 24"		>24"
Smallmouth Bass	8" - 12"	12" – 18"		>18"
Whitefish	8" – 18"			
White Sucker	8" – 22"			
Rainy River				
Species	8 meals/month	4 meals/month	2 meals/month	Do Not Eat
Upstream of Fort Frances Dam				
Northern Pike ²	12" – 18"	18" – 26"		>26"
Walleye ²		10" – 20"		
Smallmouth Bass ²		10" – 12"		>12"
White Sucker ²	10" – 24"	24' – 26"		
Downstream of Fort Frances to upstream of Long Sault Rapids				
Northern Pike ^{2,8}	12" – 20"	20" – 28"		>28"
Walleye ^{2,8}		8" – 20"		>20"
Smallmouth Bass ²		8" – 16'		>16"
White Sucker ^{2,8}	12" – 18"	18" – 22"		
Sturgeon ^{2,8,9}	22" – 30"	>30"		
Town of Rainy River to downstream to Lake of the Woods				
Northern Pike ²	12" – 18"	18" - 26"		>26"
Walleye ²	10" – 12"	12" – 18"		>18"
Smallmouth Bass ²		14" – 16"		
White Sucker ²	12" – 20"			
Sturgeon ²	28" – 51"	51" – 67"		
Lake of the Woods				
Species	8 meals/month	4 meals/month	2 meals/month	Do Not Eat
Lake Trout ²	14" – 28"	28" – 30"		>30"
Northern Pike ²	14" – 22"	22" - >30"		
Walleye ²	6" – 16"	16" – 24"		>24"
Sauger ²	6" – 14"	14" - 16"		>16"
Smallmouth Bass ²	6" – 14"	14" – 18"		
Yellow Perch ¹	8" – 10"	10" – 12"		>12"
Whitefish ²	6" – 26"			
Cisco ²	6" – 16"			
White Sucker ²	10" – 20"			

¹Mercury, ²mercury, PCBs, mirex/photomirex, pesticides ⁸chlorinated phenols and chlorinated benzenes ⁹polycyclic aromatic hydrocarbons

Appendix B. Resource Agency Activity in the Rainy River Basin

Voyageurs National Park Lake Levels Research and Monitoring Update to the International Rainy Lake Board of Control and International Rainy River Water Pollution Board

In an ongoing effort to assess the ecological effects of the 2000 Rainy Lake and Namakan Reservoir Rule Curves, Voyageurs National Park (VNP) staff have carried out or coordinated multiple lake levels focused research and monitoring projects. Additionally, VNP staff have several research and monitoring projects underway and have proposed additional projects to fill data gaps prior to the 2015 IJC review of the 2000 Rule Curves. A five part, National Park Service (NPS) funded study of “best bet” indicators was carried out from 2004 – 2006. Final reports summarizing the results of the benthic macroinvertebrate and wetland vegetation portions of this project have been published in the NPS Technical Report Series and distributed to the International Rainy Lake Board of Control and the International Rainy River Water Pollution Board. Reports for the remaining three portions of the project are in draft and in review. The results of these projects show that many of the predicted ecosystem responses have occurred in the Namakan Reservoir; however, unanticipated change has also occurred in control lakes which may increase the difficulty of assessing the effects of the 2000 Rule Curves. A paleolimnological study has been completed during which diatoms communities were assessed in cores from the Namakan Reservoir, Rainy Lake, and a control lake, Lac la Croix. The investigators have published one peer-reviewed paper based on this work, and the USGS final report and a second manuscript are in review. Data collection has been completed for investigations of sturgeon population, movements, and habitat use in the Namakan Reservoir and of nutrient cycling in Kabetogama Lake. Reports and manuscripts summarizing the results of these projects will be written in 2010. The USGS and Voyageurs National Park are currently carrying out a lake levels synthesis and analytical modeling project. The investigators are summarizing and synthesizing historic information on the potential effects of water level fluctuation on the biota of the Rainy Lake - Namakan Reservoir ecosystem and will develop and evaluate models to aid in the exploration of likely effects of the 2000 Rule Curves and alternative water level management strategies on important components of the Rainy Lake – Namakan Reservoir ecosystem. Finally, additional wetland vegetation monitoring on Rainy Lake, Namakan Reservoir, and Lac la Croix has been proposed for completion prior to the 2015 review to fill a known data gap.

Ontario Ministry of the Environment: Lake of the Woods Action Plan

The Ontario Ministry of the Environment has been conducting limnological and water quality research on Lake of the Woods for many years, but just recently has launched its enhanced Action Plan for Lake of the Woods in response to ongoing concerns regarding algae and, in some cases, toxic blue green algae. The main components of this Action Plan are compliance, science, out-reach and cross-border cooperation. In terms of compliance, OMOE conducted inspections of communal sewage facilities at many lodges on LOW during the summer of 2009 that have either never been inspected or were inspected several years ago. In partnership with several other resource agencies and academics in the basin, OMOE is contributing to the scientific research ongoing in the basin including the nutrient budget study for Lake of the Woods, conducting a tributary monitoring study and doing sediment research to determine impacts of climate change on algae production. The Ministry has also begun to implement a communications strategy that targets a variety of audiences (cottagers, municipalities, First Nations, agricultural community and the general public) and informs them of what they can do to make a difference regarding water quality on LOW and what the resource agencies are doing regarding

research and management planning. Finally, the Ministry is participating in a multi-agency working Arrangement that was signed in June 2009 by a variety of agencies around the basin in both Canada and the United States which indicates a commitment to work collaboratively on water quality research and future strategies for Lake of the Woods. Within this Working Group, there are discussions around the lack of governance in the basin, the need to share and map data, the desire to jointly communicate with the public and the interest in working towards a joint management strategy for the watershed.

OMNR/ MDNR Fish Monitoring in the Rainy River Basin

The Minnesota Department of Natural Resources (MNDNR) Fisheries office in International Falls has managed to continue most of our key sampling and monitoring activities on Rainy Lake and Namakan Reservoir in spite of shrinking budgets and staff reductions. In addition, much of the sampling that was done previously by Larry Kallemeyn (Aquatic Biologist with the USGS, now retired) has continued through collaboration with Voyageurs National Park and Ontario Ministry of Natural Resources. The annual angler creel survey of the Minnesota waters of Rainy Lake was an exception. However, angling effort and fish harvest has been relatively stable in recent years and harvests for all species have been within target levels. We plan to resume the angler creel survey on Rainy Lake and Namakan Reservoir in 2010 and 2010. Much of the monitoring listed above began in 1983 as part of Minnesota's Large Lake Sampling program and will provide useful information for evaluating the rule curve changes made in 2000.

Sampling efforts added specifically for evaluating fisheries response to the changes include Light Trapping for larval northern pike and Fish Community Index Netting (FCIN) for whitefish and cisco. A simple comparison of mean catches of young-of-year northern pike sampled in beach seines on Rainy and Kabetogama lakes indicates increased abundance has since 2000. This is encouraging since northern pike were identified as a key indicator species for evaluating water level changes. However, these results may not be significant and could be related to a climate or hydrological effect, rather than rule curve changes. This example illustrates the difficult task that lies ahead: sorting out rule curve effects from the inherent variability in natural systems due to weather, climate and various other factors. No monitoring was done on the upper Rainy River (above Long Sault Rapids) in 2009.

Please feel free to contact Kevin Peterson (Kevin.peterson@state.mn.us 218-286-5220) with any questions about MDNR's sampling efforts on Rainy River, Rainy Lake and Namakan Reservoir)

Fisheries monitoring activities on the boundary waters from Rainy River upstream to Lac La Croix have continued over the rule curve monitoring period since 2000. OMNR (Fort Frances District) continues to face many of the same fiscal and staffing challenges that were mentioned by MDNR. The table provided outlines the activities completed and/or planned in Ontario waters up to 2011.

Highlighted is Year 2009, where commercial catch sampling for whitefish has been completed for all three basins of Rainy Lake (four active licenses). In addition, sturgeon assessment projects have continued this past spring on the Rainy River (34 fish tagged in Sturgeon Creek) and on Namakan Reservoir as part of joint study with VNP, SDSU, MDNR and SNF. A similar sturgeon study continues on the Namakan River related to the proposed waterpower developments by OPEG. Four technical reports have been produced and have been distributed to resource agencies and other interested groups. A telemetry study is still on-going to coincide with a similar VNP/SDSU research study on the reservoir. Year two of a preliminary lake sturgeon assessment is still scheduled for Redgut Bay of Rainy Lake. A Fall Walleye Index Netting (FWIN) project will also be completed on

the South Arm, however OMNR was unable to complete a Fish Community Index Netting (FCIN) survey of Lac La Croix due to staffing constraints. Looking ahead, creel surveys are planned on Rainy Lake in 2010/11 to align with similar efforts in MN waters, as discussed at the Ontario-Minnesota Fisheries Committee.

FISHERIES MONITORING ON RAINY LAKE, RAINY RIVER AND NAMAKAN RESERVOIR, ONTARIO 2000-2011

Ontario Ministry of Natural Resources, Fort Frances District

= completed

= planned

* Specially Designated Waters (SDW)

Lake/Basin	Program	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Rainy Lake (North Arm)*	Fall Walleye Index Netting												
	Creel Survey												
	Commercial Catch Sampling												
Rainy Lake (Redgut Bay)*	Fall Walleye Index Netting												
	Creel Survey												
	Lake Sturgeon Assessment												
	Commercial Catch Sampling												
Rainy Lake (South Arm)*	Fall Walleye Index Netting												
	Creel Survey												
	Lake Sturgeon Assessment												
	Commercial Catch Sampling												
Namakan Lake	Fall Walleye Index Netting												
	Lake Sturgeon Assessment												
Sand Point Lake	Fall Walleye Index Netting												
	Lake Sturgeon Assessment												
Lac La Croix	Fall Walleye Index Netting												
	Fish Community Index Netting												
Rainy River*	Lake Sturgeon Assessment												
Namakan River	Lake Sturgeon Assessment												