

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

SPRING 2004 REPORT
(OCTOBER 2002 TO DECEMBER 2003)

Submitted to

The International Joint Commission

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1 INTRODUCTION

This report presents a summary of Board activities for the International Rainy Lake Board of Control (IRLBC) and the International Rainy River Water Pollution Board (IRRWPB) for October 2002 through December 2003.

After two years of high water conditions in the Rainy-Namakan basin, conditions turned very dry in the second half of 2002 and continued well into 2003, resulting in a poor refill for Rainy and Namakan lakes in 2003. Consequently, the level of Rainy Lake was below its lower IJC rule curve throughout much of the remainder of the year and below its IJC drought line from June through mid-October. Although not as severely affected, the level of Namakan Lake was also below its lower rule curve for several months during the early summer. Basin conditions and lake regulation are discussed in Section 2.

Section 3 of this report documents environmental monitoring activities in the basin, while Section 4 provides municipal and industrial point source discharge information. Information on basin activities and issues, including a status report on the Boards' examination of peaking and other issues on the Rainy River, as requested by the Commission, are in Section 5. The remaining sections cover Board coordination and public relations efforts (6) and other business and informational items (7).

A schematic and map of the basin are presented as Figures A-1 and A-2 in Appendix A. Appendix B contains quarter-monthly precipitation data in Figure B-1. Graphics of lake levels and net inflows and outflows for 2002 and 2003 are shown in Figures B-2 and B-3.

2 REGULATION SUMMARY

2.1 Basin Conditions

On the heels of the high water conditions in the Rainy-Namakan basin in early 2002, conditions turned very dry in July of 2002 and remained so through most of 2003. Precipitation over the Rainy-Namakan basin from November 1, 2002 through March 31, 2003 was the lowest since Board records start in 1901. Even so, both lakes remained within their respective IJC operating bands through the fall of 2002 and into April of 2003. However, the 2003 spring refill for Rainy and Namakan lakes was very poor. Inflows to both lakes remained near lower decile levels from the fall of 2002 into September 2003 for Rainy Lake and into July 2003 for Namakan Lake. As a result, the level of Rainy Lake was below its lower IJC rule curve for 187 days (May 2nd through November 4th) and below its IJC "drought line" for 138 days (June 3rd through October 18th). Although not as severely impacted, the level of Namakan Lake was below its lower IJC rule curve for 68 days (May 7th through July 11th). Once back within their respective IJC rule curves, both lakes remained there through the end of the year. The 2002 and 2003 quarter-monthly precipitation for the Lac la Croix and Rainy-Namakan basins is shown in Figure B-1. Namakan Lake levels, net inflow and outflow for 2002 and 2003 are displayed in Figure B-2. The same information is provided for Rainy Lake in Figure B-3. Figure B-4 provides a legend for Figures B-1 through B-3.

2.2 Regulation

In an effort to alleviate the impacts of low lake levels, the IRLBC took several actions under the terms of the IJC's 2001 "Consolidated Order for regulation of the level of Rainy Lake and of other Boundary Waters in the Rainy Lake Watershed". These actions were taken in consultation with resource agencies, affected municipalities, and others.

The IRLBC issued a public advisory concerning the very dry conditions in the Rainy-Namakan basin on May 30th, 2003. On June 19th, to slow Rainy Lake's rate of decline, the Board authorized a reduction in the outflow of Rainy Lake from 100 cubic meters per second (m³/s) or 3,530 cubic feet per second (ft³/s) down to 75 m³/s (2,650 ft³/s). On July 10th the Board directed that once the Namakan Lake level rose above its lower IJC rule curve, the lake should be maintained within the lower 10 percent of its IJC operating band. This action allowed more water to pass downstream, easing the low water situation on Rainy Lake.

The action taken by the Board on June 19th, to reduce Rainy Lake outflow to 75 m³/s (2,650 ft³/s), was terminated in mid-October as the level of Rainy Lake rose above its IJC drought line. The prescribed IJC minimum outflow of 100 m³/s (3,530 ft³/s) was reinstated.

On November 5th, the Board issued revised guidance on Namakan Lake levels due to a modest improvement in basin conditions and the expectation that Rainy Lake would rise into its IJC band. Under the revised guidance, the Board directed that Namakan Lake levels be maintained in accordance with the general provisions of the IJC's January 2001 Consolidated Order, subject to the level of Rainy Lake returning to its IJC operating band. This action terminated the Board's July 10th directive.

For 2003, the level of Rainy Lake reached its lowest point on June 23rd at 336.58 m (1104.3 ft), 87 cm (34 in) below its lower IJC rule curve and 12 cm (5 in) below its IJC drought line. This was the lowest summertime level since the rule curves were implemented in 1949. However, the lowest level recorded in recent years was 336.48 m (1103.9 ft) on October 14, 1998, which was 10 cm (4 in) below the minimum in 2003. Although below its lower IJC rule curve from early May through mid-July of 2003, the level of Namakan Lake rose slowly through the entire period and never fell below its IJC drought line. On Rainy Lake the maximum deviation below its lower IJC rule curve was 89 cm (35 in) on July 5th and the maximum deviation below its IJC drought line was 59 cm (23 in), also on July 5th. On Namakan Lake the maximum deviation below its lower IJC rule curve was 68 cm (27 in) on June 7th, but the lake remained above its IJC drought line throughout the entire year.

3 AMBIENT ENVIRONMENTAL MONITORING

3.1 Water Quality Monitoring

The Minnesota Pollution Control Agency (MPCA) monitors water quality on the main stem of the Rainy River at three long-term sampling stations (Figure 3-1, Table 3-1) and on four tributaries to the Rainy River (Table 3-2). 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.

Table 3-1 MPCA Rainy River Sampling Locations on the Main Stem of the Rainy River.

Sampling Agency	STORET Station #	STORET Description
MPCA	RA - 12	Rainy River @ Baudette, MN
MPCA	RA - 81	Rainy River @ Int'l Falls, below dam
MPCA	RA - 83	Rainy River @ Int'l Falls, above dam

In keeping with the sampling schedule for the Minnesota Milestone program, these sites were last monitored in the 2002-2003 water year (October 2002 to September 2003). The MPCA Milestone sites are sampled monthly for ten months of two non-consecutive years in a five-year period.

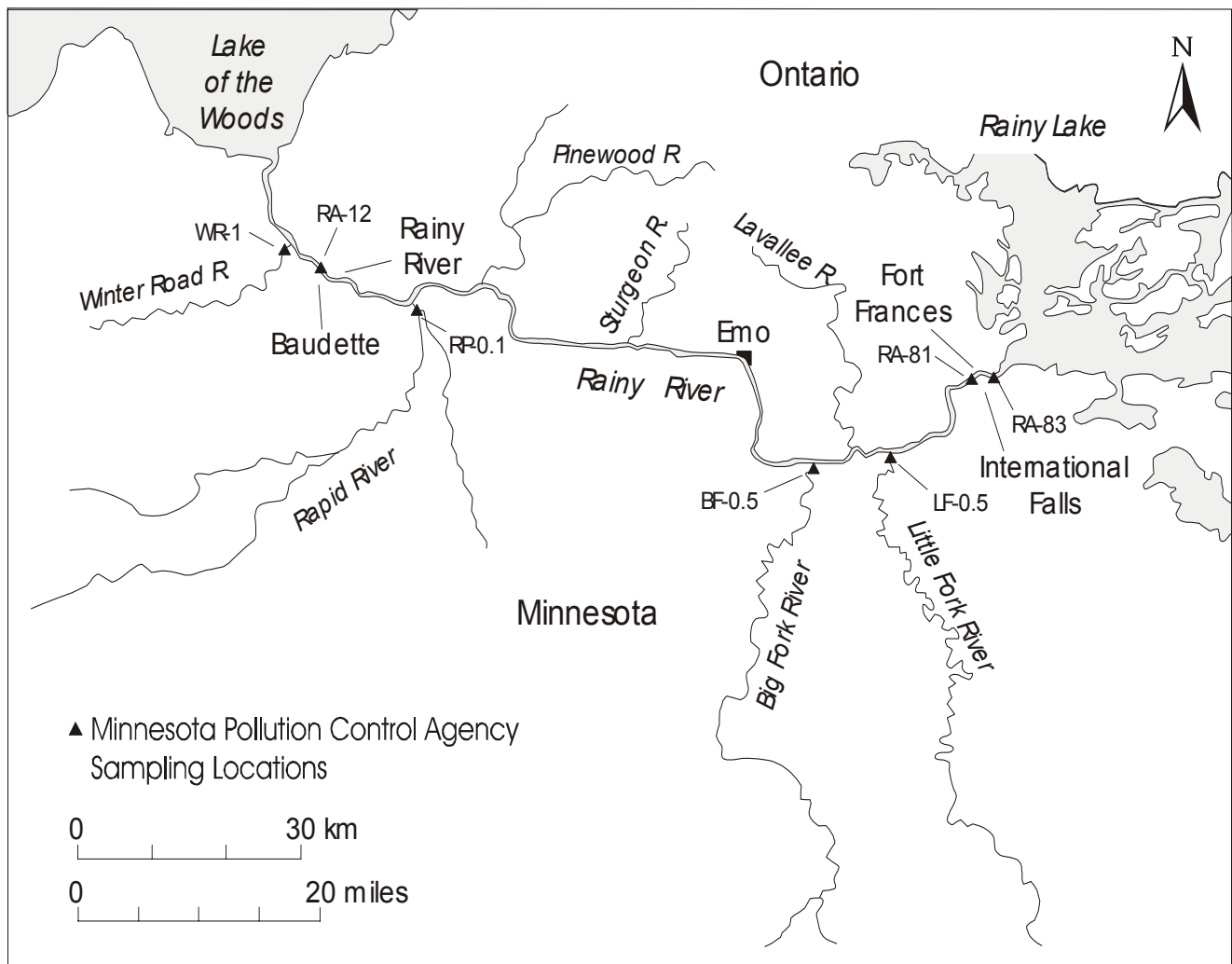


Figure 3-1 Rainy River Sampling Locations

Water samples collected from main stem Rainy River stations and tributaries (Table 3-2) are analyzed for temperature (field), dissolved oxygen (field), turbidity, pH, conductivity, total phosphorus, BOD, nitrate + nitrite, NH₃+NH₄, and chloride.

In addition to the Rainy River main stem stations, four tributary stations of the Rainy River are monitored. They are listed in Table 3-2.

Table 3-2 MPCA Rainy River Tributary Water Sampling Locations.

Sampling Agency	STORET Station #	STORET Description
MPCA	BF - 0.5	Big Fork River @ bridge on MN 11 (4 mi. E of Loman, MN)
MPCA	LF - 0.5	Little Fork River @ bridge on MN 11 (0.5 mi. W of Pelland, MN)
MPCA	RP - 0.1	Rapid River @ Clementson, MN
MPCA	WR - 1	Winter Road River @ bridge on MN 11 (4 mi. W of Baudette, MN)

Results from the MPCA's 2002-2003 sampling program will be presented in the Boards' Fall 2004 report.

3.2 Fish consumption Advisories

Fish tissue monitoring, carried out by provincial and state agencies in Ontario and Minnesota, results in the issuance of fish consumption advisories. In Minnesota, it is a shared program between the Minnesota Department of Natural Resources (MDNR) and the Minnesota Department of Health (MDH). In Ontario it is a shared program with the Ministry of Natural Resources (MNR) and the 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, MPCA, and MDH collaborate to select sites where fish are tested. The MPCA also screens fish for other chemical contaminants that may be a concern. The MDH issues fish consumption advice based on the concentrations of chemicals measured in fish fillets. Mercury and PCB concentrations that trigger fish consumption advice are listed in Tables 3-3 and 3-4.

Table 3-3 MDH Mercury Fish Consumption Advisory.

Meal Advice	General Population (ug/g mercury)	Women of Child-bearing Age and children under 15 years (ug/g mercury)
Unlimited consumption	< 0.16	< 0.05
1 meal / week	0.16 - 0.65	0.06 - 0.2
1 meal / month	0.66 - 2.8	0.21 - 1.0
Do not eat	> 2.8	> 1.0

Table 3-4 MDH PCBs Fish Consumption Advisory.

Meal Advice	(ug/g PCB)
Unlimited consumption	< 0.05
1 meal / week	0.06 - 0.2
1 meal / month	0.21 - 1.0
1 meal / two months	1.1 - 1.9
Do not eat	> 1.9

During this reporting period, the MDH issued consumption advisories based on mercury for Rainy Lake, Rainy River, Little Fork River, Big Fork River, and Lake of the Woods. Consumption advice for the Vermillion River is based on levels of PCBs and mercury. There have been no changes to consumption guidelines that were reported in last year's report. More detailed information on Minnesota fish consumption guidelines is available online at www.health.state.mn.us/divs/eh/fish/index.html.

Ontario

The Ministry of Natural Resources and Ministry of Environment are responsible for the collection of fish while the Ministry of Environment carries out the contaminant analysis on fish tissue and issues the "Guide to Eating Sport Fish". Skin-off fillets are analyzed for a variety of contaminants that can include mercury, PCBs, and dioxins/furans. Consumption advisories are based on health protection guidelines developed by Health Canada. Chemical concentrations that trigger consumption restrictions are listed in Table 3-5.

Table 3-5 Chemical Concentrations in Ontario Fish that Trigger Advisories.

Contaminant	Restrictions Begin	Total Restriction
Mercury (ug/g)	0.45	1.57
PCBs (ug/g)	0.5	4.0
Dioxins/Furans (pg/g) TEQ ¹	10	81

1. 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. These advisories are based on mercury concentrations in fish tissue. There are more restrictive advisories for women of childbearing age and children under 15 years of age. No consumption advisories are in effect for PCBs or Dioxins/Furans. For more detail, fish consumers should consult the “2003-2004 Guide to Eating Ontario Sport Fish” available at any office of the Ontario Ministry of Natural Resources or online at www.ene.gov.on.ca/cons/590b11_intro.pdf.

3.3 Environmental Effects Monitoring (EEM)

The Environmental Effects Monitoring program requires pulp and paper mills in Canada, through federal legislation, to monitor the effects of pulp and paper mill discharges in receiving waters. The study design for the Fort Frances mill, as approved by Environment Canada, includes an adult fish survey, a benthic invertebrate survey, and toxicological testing of final effluent. The EEM program consists of a series of monitoring and interpretation cycles that build on the findings from previous cycles.

Since the regulations came into effect, the Fort Frances mill has completed 2 cycles of the program. They carried out their Cycle 3 EEM sampling in September 2002. A final report on Cycle 3 results is required to be submitted to Environment Canada on or before April 1, 2004. A detailed summary of Cycle 3 findings will be included in Fall 2004 report.

4 POINT SOURCE DISCHARGES

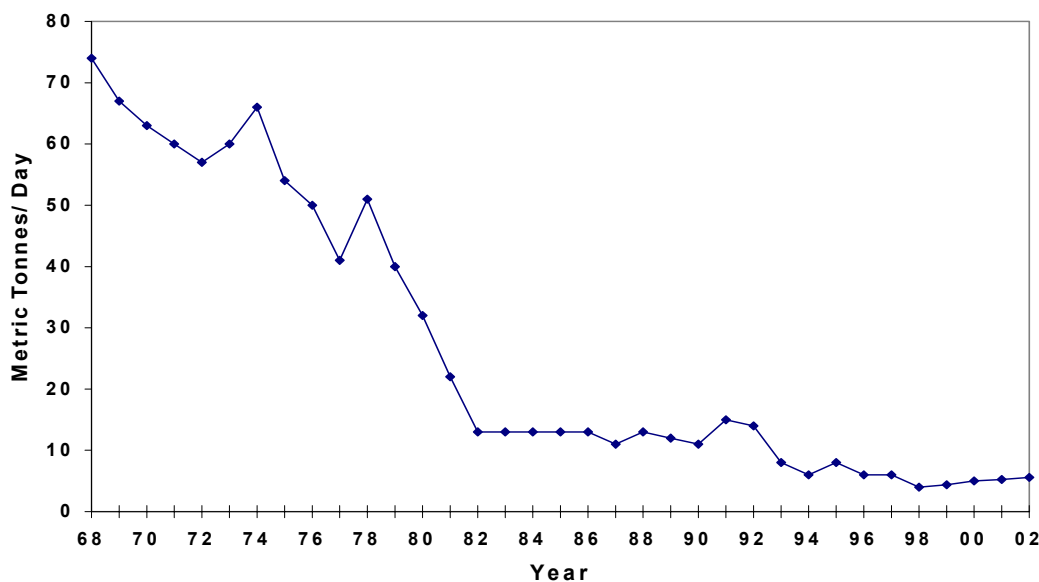


Figure 4.1 Total BOD Load from Continuous Discharges (mt/d) on Rainy River 1968-2002.

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 the conventional parameters such as BOD and TSS from the 1960's to the early 1980's is a direct result of remedial measures undertaken by industry and municipalities. Figure 4-1 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.

4.1 Minnesota Municipal Sources

North Koochiching Sanitary Sewer District:

The District, which includes International Falls, discharges to the Rainy River downstream of International Falls. The District reported no violations for the year 2002. Discharge data from this facility for the years 1996 through 2002 are listed in Table 4-1.

Table 4-1 North Koochiching Sanitary Sewer Discharge Summary 1996-2002.

Year	Flow (m ³ /d)	BOD (kg/d)	TSS (kg/d)
1996	6813	89.7	50.4
1997	4921	77.4	38.6
1998	5349	77.1	32.4
1999	5149	89.5	51.7
2000	NA	54.6	26.6
2001	4920	64.3	35.4
2002	4538	70.9	35.2

Baudette

There were no exceedances of the permit limits of 128 kg/d for BOD and 230.3 kg/d for TSS for this facility in 2002. The facility discharged during May, June, July, and September. The total discharge during that period was 192,467 m³ with a daily average of 6,435 m³/d.

4.2 Ontario Municipal Sources

Fort Frances

The Fort Frances wastewater treatment plant was rebuilt and upgraded to include secondary treatment and phosphorus removal in January 1998. The result of improved treatment is indicated in the discharge data presented in Table 4-2, which includes two years of pre-secondary treatment and five years of post secondary treatment. The plant operated throughout 2002 within the Ministry of Environment guidelines of 25 mg/L for both BOD and TSS. Average concentrations in 2002 were 6.7 mg/L BOD and 11.8 mg/L TSS, both well within the 25 mg/L limit.

Table 4-2 Fort Frances Wastewater Treatment Plant Loading Data for 1996-2002.

Year	Flow (m ³ /d)	BOD (kg/d)	TSS (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

Emo

The Town of Emo has a seasonal discharge from its sewage lagoon to the Rainy River. During 2002, a total of 163,443 m³ was discharged to the river over 46 discharge days. BOD and TSS loads were within the provincial discharge guidelines during the June, July, and October discharge periods. There were exceedances of the TSS guideline during the May discharge period due to sediment being washed in from the sides of the lagoon by excessive wave action. BOD was in compliance during the May discharge period.

Manitou Rapids

The sewage lagoon operated by Rainy River First Nations at Manitou Rapids was discharged over two periods, August 19 through September 23 and September 27 through October 29, 2002. Prior to discharge, Health Canada collected samples on July 23, 2002 to confirm that all effluent parameters were within the allowable federal discharge limits (Table 4-3).

Table 4-3 Manitou Rapids Effluent Parameters and Concentrations in 2002.

Parameter	Concentration	Federal Guideline
Total Phosphorus	0.449 mg/L	1.0 mg/L
BOD	3 mg/L	20 mg/L
Phenols	< 0.001 mg/L	20 mg/L
TKN	3.26 mg/L	None
TSS	4 mg/L	25 mg/L

Barwick

There were no discharges from the sewage lagoon located in Barwick during 2002.

Rainy River

The Town of Rainy River discharged a total of 210,692 m³ from its lagoon to the Rainy River during 2002. During the discharge period, BOD and TSS were below their regulated limits of 40 mg/L and 30 mg/L respectively.

4.3 Minnesota Industrial Sources

Boise Cascade Corporation - International Falls

Discharge data from 1996 to 2002 including effluent flow, BOD, TSS, and AOX for the Boise Cascade Mill in International Falls is provided in Table 4-4. There were no permit violations during the 2002 calendar year. Dioxins and furans in mill effluent samples were below the detection limit of 10 parts per quadrillion (ppq) in 2002.

The discharge permit for this facility expired in 1996. As indicated in previous reports, the company has submitted an application for a new permit, and the MPCA continues to work on issuing the permit. The expired permit limits remain in effect until a new permit is issued.

Table 4-4 Boise Cascade Discharge Data for 1996 through 2002.

	Flow (m3/d)	BOD (kg/d)	TSS (kg/d)	AOX (kg/d)
<i>Compliance Limit</i>	<i>N/A</i>	4,720	7,940	<i>N/A</i>
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	1183	805
2001	135,768	645	1079	NA
2002	160,484	747	1584	NA

4.4 Ontario Industrial Sources

Abitibi-Consolidated Inc. -Fort Frances

Data on flow, BOD, TSS, and AOX are provided in Table 4-5 for the years 1996 through 2002. The decreased levels indicated for 1998 are the result of a labour dispute that shut down mill operations for approximately 5 months. The average annual daily loads for BOD, TSS and AOX in 2002 continue to be below compliance levels, however, the mill did have a daily BOD loading limit exceedance on June 2, 2002.

There were no spills reported to the river during 2002. Environment Canada continued investigating the May 2001 spill.

Table 4-5 Abitibi-Consolidated Discharge Data for 1996 through 2002.

	Flow (m3/d)	BOD (kg/d)	TSS (kg/d)	AOX (kg/d)
<i>Compliance Limit</i>	<i>N/A</i>	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

5 BASIN ACTIVITIES UPDATE

This section of the report is intended to provide background information on other activities occurring in the basin. 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.

5.1 Basin Planning and Management (MPCA)

The complete Rainy River Basin Water Plan consists of two volumes. The first, the Rainy River Basin Information Document (BID) contains summary water management information for the Rainy River Basin. The BID was published in December 2001. The BID focuses on water quality, quantity and the aquatic and riparian environment. Whenever possible, the information is presented by major watershed.

Volume 2 of the Rainy River Basin Water Plan deals with water management. The Rainy River Basin Water Management Plan, published in December 2003, includes goals, objectives, strategies and indicators designed to maintain or improve the waters of the Rainy River Basin. Residents, stakeholders, local elected officials and representatives from local, state and federal agencies developed the water management plan which consists of seven sections: five watershed plans, a combined basin-wide section and a basin project list.

Copies of the BID and Volume 2 may be accessed at libraries throughout the Rainy River Basin or on the internet at <http://www.pca.state.mn.us/water/basins/rainy/index.html>.

The Basin-wide Section (Section I) was developed by the Basin Committee. The Rainy River Basin Committee, composed of representatives of each of the five local committees, basin residents, stakeholders, local elected officials and representatives from local, state and federal agencies, was established as an ad hoc committee with the following three tasks:

1. Merge goals, objectives and strategies from local committees into a basin-wide section for the basin plan.
2. Identify conflicts between local committees and ask the local committees to resolve the conflicts.
3. Identify any basin-wide water management issues not addressed by local committees and develop appropriate goals, objectives and strategies to address the issues.

The local sections (Sections II through VI) were developed by local committees focusing on distinct geographic areas. The East Local Committee concentrated on the eastern portion of the Rainy Headwaters Watershed. The East-Central Local Committee focused on the western portion of the Headwaters Watershed along with the Vermilion, and eastern portions of the Rainy Lake and Little Fork Watersheds. The North Local Committee was concerned with the western portion of the Rainy Lake Watershed and the Rainy River/Manitou Watershed along with the northern portion of the Little Fork and Big Fork Watersheds. The South Local Committee had the southern portions of the Little Fork and Big Fork Watersheds. The West Local Committee concentrated on the Rapid, Baudette and Lake of the Woods Watersheds.

The local committees began their work of development of goals, objectives and strategies for water management activities in April 2002. In November 2002, with the local committees having completed most of their work, the Basin Committee began meeting to address their tasks. The Committee grouped

similar goals into frameworks and established subcommittees to develop goals, objectives and strategies suitable for the basin section of the plan. For stand-alone or relatively straightforward goals, the Committee reviewed and revised those that members felt appropriate for the basin section. In general, the Committee required that a goal have basin-wide significance or be very important locally in order to be included in the basin section. The Committee's approach was that the local sections are just as valid as the basin section and that issues primarily of local concern were adequately covered in the local sections.

The Basin Committee found minimal conflicts between local committees. These differences were generally so minor that members saw no need to request that the local committees revise their goals. The basin section reflects areas of agreement among local committees. The Basin Committee did not identify any basin-wide issues of significance not already identified by the local committees.

The Rainy River Basin Water Management Plan calls for a significant water monitoring effort. This effort includes expansion of existing programs and creation of new programs. The Basin Plan does not call for monitoring simply for the accumulation of data. Rather, the Plan calls for monitoring to meet basin-wide needs identified by the plan developers. The emerging theme of the Plan is to maintain high quality waters and improve waters in need of restoration. Participants in the planning process do not want to wait until rivers and lakes degrade to state standards (MN Rules 7050). Development and implementation of the comprehensive basin-wide monitoring effort will provide decision-makers with the information necessary to make informed decisions about future development. Plan developers have voiced concerns that if comprehensive condition monitoring does not begin soon, water quality degradation may go unnoticed, resulting in significant impacts to the environment. Identifying and recording existing conditions are necessary to the development of appropriate strategies.

The Basin Committee recognizes that some of the goals, objectives and strategies will need further development during implementation before appropriate lead and supporting organizations can be determined. The Committee also noted that some of the goals and objectives were intended as policy statements to help guide water management activities throughout the Rainy River Basin, thus not requiring an identified lead.

5.2 Peaking Work Group

Hydropower facilities often vary their day-time and night-time outflows, in response to the fluctuating demand for electricity or in response to differing electrical costs for peak and off-peak time periods. This diurnal fluctuation in flow is called 'peaking'.

Concerns about water levels and flow rates on the Rainy River were raised at public meetings held by the IJC on November 28, 2001 in International Falls, MN. The concerns included the effects of peaking on navigation, ice conditions and aquatic ecosystem health. In a December 10, 2001 letter to the Chairs of both Boards, the IJC directed its Rainy Boards to "jointly examine the other issues raised during the public hearing related to the use of water in Rainy River and Rainy Lake, including peaking operations, and report to the Commission by September 2002".

In response, the Boards chose to piggyback onto the efforts of an independently formed work group established in the spring of 2002 to look into the environmental effects of peaking on the Rainy River. This Group, officially known as the 'Committee on the Environmental Effects of Peaking on the Rainy River' is comprised of representatives from: Boise Cascade Corporation, Abitibi-Consolidated Incorporated of Canada, Canadian Department of Fisheries and Oceans, Ontario Ministry of Natural

Resources, Rainy River First Nations, Minnesota Pollution Control Agency, Koochiching County Environmental Services and the Minnesota Department of Natural Resources.

Terms of Reference developed by the Work Group describe the Group's purpose as being "to examine the environmental effects of peaking on the aquatic resources and habitat of Rainy River". If harmful effects are found, the Group will explore strategies and make recommendations to minimize environmental impacts. If favorable effects are found, the Group will promote these findings in their final report. The Boards intend to incorporate the findings of the Group in their joint report to the Commission on the examination of issues raised by the public in 2001 related to the use of water in the Rainy River and Rainy Lake, including the effects of peaking operations. Given the present resource limitations for both Boards, this approach was felt to be more cost-effective than Board duplication of the Work Group's efforts.

A progress report on activities of the Peaking Work Group was provided to the IJC by the IRLBC in October 2002.

Subsequently, the IRLBC requested the Work Group to also look at the non-environmental impacts of peaking on Rainy River, but the Group declined, stating it did not have the expertise to undertake a broader mandate. The IRLBC then developed a draft scope of work for a "full assessment" of the effects of peaking on Rainy River, which the Work Group commented on in January 2003. In their comments the Group encouraged the development of a hydraulic model to assist in evaluating the effects of peaking.

At the January 2003 meeting of the Work Group, Boise Cascade announced it had not been peaking for a year and had no plans to resume. Abitibi-Consolidated stated it had not been peaking much and might consider discontinuing the practice. The IRLBC subsequently asked the Companies to provide written statements detailing their peaking operations. The Board received responses from the Companies in late March 2003. Boise's response stated that the Company had not used peaking since October 10, 2001 at their International Falls hydropower facilities and that they had no short or intermediate-term intentions to do so, but reserved the option should it become necessary. The response further noted that peaking has occurred on every river in North America with hydropower generation and nothing precludes this mode of operation. The Abitibi Consolidated response stated that, while peaking at the Fort Frances hydropower facility has been dramatically reduced over the past two years, peaking is a very important tool available to offset high power costs. The Abitibi Consolidated response further stated that the Company will reconsider the opportunity to effectively utilize peaking to offset increased power costs, if the cost structure of power in the region changes negatively in the future.

The letters from the Companies were discussed at the April 29, 2003 meeting of the Work Group. The consensus of those present was for the Group to continue exploring strategies and recommendations to minimize environmental impacts of peaking. Work of the Group is ongoing.

Overall, the Boards' examination of peaking operations and other water use-related issues, as requested by the IJC, has been delayed well beyond the Commission's original September 2002 milestone for completion of a report on the matter. This has been in part due to the Boards' decision to piggyback onto the efforts of the Work Group and subsequent delays in their work, and in part due to resourcing constraints. The Boards anticipate completion of the Work Group's final report this summer. The Boards will review the Work Group's findings and report to the Commission at its fall semi-annual meeting.

5.3 Rainy River First Nations/Environment Canada/Environmental Arrangement

In 2002-2003, the Rainy River First Nations (RRFN) Rainy River Watershed Program collaborated with Environment Canada to develop a strategic Environmental Management Plan for the community. This plan was completed in May of 2003. Environment Canada, Indian and Northern Affairs Canada (INAC), Federal Economic Development Initiative for Northern Ontario (FedNor), and the RRFN Watershed Program will work collaboratively with other programs at Rainy River First Nations to develop a broader, community-driven, multi-year Sustainable Management Plan (SMP) for the community of Manitou Rapids.

To develop this SMP, the Melbourne Principles for Sustainable Cities developed jointly by the United Nations Environment Program (UNEP), the International Council on Local Environmental Initiatives (ICLEI) and the Australian Environmental Protection Agency will be used as a guide. The Melbourne Principles are a set of statements intended to guide thinking and provide a strategic framework for action. Environment Canada contributed to the development of these principles, which were presented by UNEP and ICLEI at the World Summit on Sustainable Development in Johannesburg, South Africa in August 2002. The vision of the Melbourne Principles is to create an environmentally healthy, vibrant and sustainable community where people respect one another and nature, to the benefit of all (see <http://www.unep.or.jp/ietc/Focus/MelbournePrinciples/English.pdf> for details on the Melbourne Principles).

RRFN will exercise discretion as to how it implements or adapts these principles to its specific situation and to the work it has already conducted. However, the SMP will cover not only the environmental challenges outlined in the Environmental Management Plan, but any other issues that the community wants to address.

The project will consist of two deliverables:

1. The Sustainable Management Plan for Rainy River First Nations.
2. A critique of the SMP development process and the usefulness of the Melbourne Principles, for Environment Canada.

5.4 Rainy Lake and Namakan Reservoir Environmental Monitoring Work Group

An IJC Supplementary Order of January 6, 2000, implemented new "rule curves" for regulating water levels on Rainy Lake and Namakan Reservoir. In response to recommendations of the IRLBC, resource management agencies on both sides of the border began a cooperative monitoring program in 2002 to identify impacts of the new rule curves on the biological and aquatic communities, and to provide an adequate source of information for future reviews. The monitoring program is intended to span a 10-year period, so that a range of events and adaptations of the biological community can be identified.

In 2002, a Monitoring Working Group was established to coordinate these efforts. The Working Group consists of representatives from the U.S. National Park Service (NPS), U. S. Geological Survey (USGS), Ontario Ministry of Natural Resources (OMNR), Canada Department of Fisheries and Oceans (DFO), Minnesota Department of Natural Resources (MDNR), Minnesota Pollution Control Agency (MPCA), and First Nations.

To date the Working Group has:

- held two workshops and several meetings to identify the "best bets" for further investigation;
- coordinated agency inventories and assessments to ensure they are relevant to the monitoring objectives;
- initiated and supported research on the effects of lake level regulation on the aquatic ecosystem.

Current studies include:

- evaluation of the effects of water level fluctuations on aquatic vegetation, trophic-state indicators and mercury uptake in prey fish. These studies are being supported by the NPS and USGS.
- an NPS-funded study from 2004 to 2006 to assess effects of the 2000 rule curves on fish, loons, muskrats, wetlands, and benthos. Teams for each of these subjects have been developed, with members coming from academia, government agencies, and non-government organizations. The teams have all met and are in the process of developing study plans.
- OMNR has acquired Ikonos satellite imagery of wetlands on the reservoirs.
- the USGS, NPS, MDNR and OMNR, in conjunction with Michigan State University, have initiated a three-year radio-tracking project in Rainy Lake to assess the population characteristics and movements of lake sturgeon.

Provincial, state and federal agencies will continue their attempts to apply financial and personnel resources to the need for monitoring. However, it is clear from discussions with representatives of the resource management agencies that, over the long term, competing priorities may interfere with fulfillment of the IRLBC recommendations.

5.5 Lake of the Woods Erosion Work Group

In 2002 the Minnesota Pollution Control Agency formed a work group to investigate the causes of erosion occurring along the south shore of Lake of the Woods and to Pine, Curry and Garden Islands and recommend erosion control measures. The work group consists of technical staff from Lake of the Woods County, Lake of the Woods SWCD, US agencies: Geological Survey and Natural Resources Conservation Service, and Minnesota Agencies: Board of Soil and Water Resources, Department of Natural Resources and the Pollution Control Agency.

The work group is still gathering and analyzing data. The work group is trying to find funding to develop a numeric model of the sand cycle within the lake and to complete shoreline regression analysis based on satellite imagery. Dependant on funding, the work group could complete its task by December 2005.

6 COORDINATION AND PUBLIC RELATIONS

6.1 Overall Perspective

Over the past year, the IRLBC and IRRWPB have endeavored to maintain a high level of coordination and communication with each other, the Commission, the Companies and stakeholders in the Rainy-Namakan basin regarding critical lake regulation activities.

The Boards communicated with the public during the 2003 low water event by a number of means. The Boards received some inquiries in 2003 from individual property owners in the Rainy-Namakan basin, requesting information on hydrologic conditions in the basin and on dam operations or asking that action be taken to relieve falling lake levels. By way of contrast with the high water conditions of 2001 and 2002, fewer calls were received concerning the low water conditions in 2003. Additionally, most basin residents that contacted the Boards seemed to understand that the low water conditions were the result of natural circumstances beyond human control.

The Boards feel they have done a credible job of ensuring a high level of effective communication. The Companies continue to demonstrate a willingness to work on improving public and Board communication. Communications between the Companies and the Board concerning the 2003 low water event was very good in the view of the Boards.

6.2 Boise Cascade and Abitibi-Consolidated Initiatives

The Companies continue to be actively responsive to public information needs. Flow changes and gate openings at Rainy and Namakan lakes are announced on radio stations CFOB in Fort Frances and KGHS in International Falls. Large flow changes on the Seine River are announced on radio station CKDR in Dryden, ON. A toll-free telephone information line is maintained from May 01 to October 31 to provide the public with information on water levels for Rainy and Namakan Lakes. This lake level information line includes daily-recorded messages with information on lake elevations and outflows for Rainy and Namakan Lakes, precipitation levels and spillway gate operations for the dams at International Falls/Fort Frances and Kettle Falls. This information can be accessed by calling 1-800-274-LAKE (1-800-274-5253). In addition to the toll-free number, lake level graphs for Rainy and Namakan Lakes are published weekly in the *Fort Frances Times* and *International Falls Daily Journal* from early spring to late fall. Lake level information is also printed in the *Atikokan Progress*. In addition, Boise Cascade provides this information on its website (<http://lakes.bc.com>).

6.3 Board News Releases and Paid Ads

The IRLBC made use of news releases, during the 2003 low water event in the Rainy-Namakan basin, to inform the public of hydrologic conditions and actions being taken with regard to lake regulation. The Board issued the following news releases concerning the low water conditions in the basin.

- May 30th – A public advisory concerning the dry conditions in the Rainy-Namakan basin.
- June 19th – Authorization for reduction in the outflow of Rainy Lake to slow the lake's rate of decline.
- July 10th – Directive to the companies (Boise and ACI) that once the Namakan Lake level rose above its lower IJC rule curve, the lake level should be maintained within the lower 10 percent of its IJC operating band.
- November 5th – Revised guidance on Namakan Lake levels and directive returning the regulation of Rainy and Namakan lakes to the general provisions of the IJC's January 2001 Consolidated Order.

These news releases were disseminated broadly within the Rainy-Namakan basin to the local media and affected government entities and agencies. This information was also posted on the IRLBC web site. In addition to news releases, the Boards utilized paid ads to advertise notices of Board and IJC meetings in the basin.

6.4 Meetings

This section contains brief summaries of key meetings and functions attended by the Boards and their staff.

IJC Fall Semi-Annual Meeting – October 9, 2002

The Boards met jointly with the Commission at the Fall Semi-Annual meetings held at the Ottawa, Ontario office of the IJC on October 9, 2002. The primary purpose of the appearance was the presentation of the IRLBC's report on 2002 high water levels in the Rainy-Namakan basin. The final report, dated November 27, 2002, was transmitted to the Commission on the same day.

IJC Meeting with the Koochiching County Commissioners – October 28, 2002

At the invitation of the Koochiching County Board of Commissioners, IRLBC board members and IJC staff attended a meeting hosted by the County Commissioners in International Falls, MN to provide an opportunity for members of the public to voice their concerns regarding the 2002 high water event in the Rainy-Namakan basin. Improving local input to the regulation of Rainy and Namakan Lakes was also discussed during the meeting. The County Commissioners expressed their support for a local advisory committee that would provide advice to the IRLBC.

IJC Spring Semi-Annual Meeting – April 8, 2003

The Boards met jointly with the Commission at the Spring Semi-Annual meeting held at the Washington, D.C. office of the IJC on April 8th. The primary purpose of the joint appearance of the Boards was to provide the Commission with a brief overview of each board and for further discussions concerning the improvement of local involvement. The Commission reiterated their desire to improving local involvement and committed to a May 12th meeting in the basin to discuss the best approach.

IJC Roundtable - Improving Local Involvement – May 12, 2003

On May 12, 2003 IJC Canadian Chairman Herb Gray and IJC United States Commissioner Allen Olson, along with Commission staff, Board Members and Board staff, met with representatives of affected interest groups in Fort Frances and Baudette to seek their views on improving local involvement.

Meeting With Boise Cascade/Abitibi-Consolidated – July 24, 2003

In connection with the annual basin trip, the Boards met with Boise Cascade and Abitibi-Consolidated representatives at Boise Cascade's training facility in International Falls on the morning of July 24th. Items discussed included regulation of the lakes during the period of low water, Board/Companies and Board/IJC communications, hydrologic data collection and transfer issues, periodic dam maintenance activities, water level related public relations activities of the Companies, improvements to the Boise powerhouse, and peaking operations by the Companies.

Public Meetings of the IRLBC/IRRWPB – July 24 and 25, 2003

The Boards held joint annual public meetings in International Falls on the evening of July 24th and the Town of Rainy River on the morning of July 25th.

International Falls - In light of low water conditions throughout the basin, public interest was high. Approximately 60 persons attended this meeting, including local basin residents, individuals representing downstream Lake of the Woods interests, Company representatives and local media representatives.

Rainy River – Nine (9) people attended this meeting. All of the participants were local basin residents.

U.S. Commissioner Allen Olson, Canadian Commissioner Robert Gourd, and IJC staff were also present at both meetings.

The Boards began the meetings with a short presentation outlining the hydrologic conditions that led to the low water event in 2003 and the actions taken by the IRLBC to minimize the impacts of the low water. After the presentation the meeting was opened to public questions.

Residents of Rainy Lake voiced their concerns over the low lake levels, feeling their interests had not been well balanced with the upstream and downstream concerns. Several residents expressed their willingness to manage lake levels with a “share the pain” approach, but ultimately felt the residents around Rainy Lake suffered the most. During the high water event of 2002, water was held in Rainy Lake to protect the Town of Rainy River. During the drought experienced in 2003, water was held in Namakan Lake while Rainy Lake outflows were held steady to protect spring spawning.

Board members addressed these concerns by explaining the process and conditions required to deviate from the general provisions provided under the 2001 IJC Consolidated Order for Rainy and Namakan Lakes.

Basin Tour – July 24 and 25, 2003

In connection with the annual public meeting, Board Members, Commissioners, and staff toured the control dams at International Falls and at Kettle and Squirrel Falls. Boise Cascade provided a tour of their powerhouse in International Falls, highlighting the improvements made in the generator room in response to the 2001/2002 high water events.

Board Meetings and Conference Calls

The IRLBC and IRRWPB met jointly on four occasions and held a number of conference calls during this reporting period. Subject matter discussed on the joint conference calls included: increasing local involvement, low water conditions in the basin, hydropower peaking, gauging, development of a joint work plan, and Board appearances before the Commission. Individually, the IRLBC and IRRWPB met separately on several occasions and held a number of conference calls regarding the individual board matters.

6.5 Website

In coordination with the launch of the new IJC website, the IRLBC and IRRWPB web sites supported by the U.S. Army Corps of Engineers, St. Paul District (www.mvp-wc.usace.army.mil) were deactivated in December 2003. The Corps of Engineers website now provides links redirecting users to the official IRLBC and IRRWPB web pages. In addition to the information currently available on the websites, the Boards are planning to post a quarterly newsletter summarizing their activities.

7 OTHER BUSINESS

7.1 Board Membership

Effective October 1, 2003, Dr. Syed Moin, a Senior Hydrologic Engineer for the Water Issues Division of the Meteorological Service of Canada, replaced Doug Brown as the Canadian Member of the International Rainy Lake Board of Control.

In December 2003, the IJC expanded the IRLBC by appointing two new members local to the Rainy/Namakan basin. Mr. Steve Richardson of Devlin, Ontario and Mr. Leland Grim of International Falls, Minnesota joined the current members, Dr. Syed Moin of Burlington, Ontario and Colonel Robert Ball of St. Paul, Minnesota.

The IRRWPB membership has not changed during this reporting period.

7.2 IRLBC and IRRWPB Work Plans

Early in 2003, the IRLBC and IRRWPB prepared work plans for their respective boards that were closely coordinated to meet the IJC's 2001 directive for the boards to work in a more closely integrated manner. Work plan goals and board activities are shown in the work plan outlines that follow. It should be noted that a number of expanded IRLBC activities are, as of yet, not resourced. The work plans will be updated on an annual basis near the beginning of each calendar year.

International Rainy Lake Board of Control (IRLBC)

Goals

- Monitor, and at times direct, the regulation of water levels on Rainy and Namakan Lakes in accordance with the 2001 IJC Order.
- Co-ordinate activities with the IRRWPB as directed by the IJC to better address water quantity and quality issues in the basin.

Core Activities

- Water Level Regulation
 - monitor water levels and flows
 - collect hydrologic/hydraulic data
 - support proper functioning of gauge network
 - support correction of known gauge equipment and data issues
 - analyze data
 - provide advice and direction to dam owners as required
 - communicate with dam operators, IRRWPB, IJC, media and public as required, directly related to on-going regulation
- Meetings and Reports
 - conduct one annual public meeting in the basin
 - meet with dam owners annually
 - attend one IJC semi-annual meeting if required
 - produce annual report to the IJC
 - periodically, conduct basin tours and meet with interest groups

Expanded Activities (Not Resourced)

- Meetings and Reports
 - participate in extra conference calls and meetings with IRRWPB, IJC, dam owners, interest groups
 - participate in stakeholder, other agency and IJC sponsored workshops/conferences
 - produce special reports, such as flood reports
- Studies and Special Assignments
 - participate in IJC's "local involvement" initiative (add board members, create Public Advisory Committee, etc.).
 - develop and publicize hazard land and shoreline development guidelines
 - facilitate improved public communication and education of water management issues in the basin
 - conduct peaking review/study
 - support IJC's "model review" initiative
 - produce public brochure
 - resolve difference in Boise and Abitibi tailwater readings. Investigate datum issues for Rainy and Namakan gauges.
 - assess basin data collection network and recommend improvements. Facilitate implementation of additional gauging in the Namakan Chain of Lakes to support hydrologic/hydraulic modeling
 - when sufficient data exists, develop hydrologic/hydraulic models as appropriate and assess relative differences in lake levels (backwater effects) in Namakan Chain under varying conditions of inflow, to answer questions arising out of 2001 flood (especially for Crane Lake).
 - develop/adapt unsteady flow model of Rainy River from International Falls to Lake of the Woods and use it to assess impacts of various water management strategies on the Rainy River
 - develop SOW for assessing the environmental impacts on the Rainy River of various water management strategies and facilitate implementation
 - review and comment on reports by others affecting basin water management
- New Administrative Activities
 - prepare meeting minutes
 - produce public newsletter
 - enhance/expand/maintain web site. Post new content on hazard lands. Post news releases, reports, minutes or newsletter
 - support advocacy activities for public information/education
 - review and technical support for others
 - respond to growing public, agency, IJC information requests
 - plan and prepare for additional Board meetings, conference calls, public meetings and Board/IJC sponsored workshops and basin inspection tours
 - develop and maintain work plan

International Rainy River Water Pollution Board (IRRWPB)

Goals

- oversee the quality of the water in the Rainy River.
- coordinate activities with the International Rainy Lake Board of Control (IRLBC) as directed by the IJC to better address water quantity and quality issues in the basin.

Reporting

- coordinate the preparation of the annual IRRWPB report.
- submit an annual written joint report (IRRWPB and IRLBC) to the IJC.
- present a summary of the IRRWPB annual report at the IJC semi-annual meeting as required.

Meetings

- attend IJC semi annual meetings in Ottawa and Washington as required.
- conduct a joint public meeting annually in the basin.
- participate in joint board phone conference calls on a monthly basis.
- meet with public in the basin on various issues as required.

Basin Activities

- participate in local basin planning and watershed evaluation efforts.
- provide technical support for the Minnesota Pollution Control Agency's Rainy Basin watershed planning.
- provide in kind support for the multi-agency monitoring workgroup assessing the impact of the International Rainy Lake Board of Control rule curve change on Rainy/Namakan Lakes.
- provide in kind technical support for the workgroup looking at effects of peaking in the Rainy River.
- work in conjunction with the IRLBC to develop framework for establishing a Public Advisory Committee.

7.3 Local Public Involvement

The IJC has a long-standing interest in having more local involvement in the water management activities of its various boards. Interest groups and residents in the Rainy-Namakan basin have echoed these sentiments and requested stronger local input, particularly following the high water years of 2001 and 2002.

On May 12, 2003, IJC Canadian Chairman Herb Gray and IJC United States Commissioner Allen Olson met with representatives of affected interest groups in Fort Frances and Baudette to seek their views on improving local involvement. Members and staff of the IRLBC and IRRWPB also attended and gave technical support to the Commissioners. Two potential approaches were proposed for discussion:

Decision-making - To expand membership on the IRLBC from two to four, by adding two members who live within the watershed of Rainy Lake, Namakan Lake and Rainy River, one from the United States and one from Canada.

Advice to the IRLBC - To establish an Advisory Committee that would advise the IRLBC on matters of local concern regarding the Board's mandate, and to improve communication between the Board and the public within the watershed. The Advisory Committee would be comprised of members of the public who reside within the watersheds of Rainy Lake, Namakan Lake and Rainy River.

After assessing the public input, the IJC viewed expansion of the IRLBC as the best means for incorporating local involvement into the IRLBC decision-making process. On December 9, 2003 the IJC appointed Mr. Leland Grim and Mr. Steven Richardson to the Board. Mr. Grim, of International Falls, Minnesota, taught science at Rainy River Community College for 33 years and has worked as a seasonal employee in Voyageurs National Park for 31 summers. He was appointed by the Governor to serve on the Minnesota Environmental Education Board for four years. Mr. Richardson, of Devlin, Ontario, has served as a firefighter for 21 years, including 10 years in management positions. In 2000, the Ontario Government appointed him Fire Coordinator for the District of Rainy River. Mr. Grim and Mr. Richardson joined current members, Dr. Syed Moin of Burlington, Ontario and Colonel Robert Ball of St. Paul, Minnesota.

With this goal achieved, the Commission has directed the IRLBC to continue with the investigation of the establishment of a local advisory committee.

7.4 Rainy River Gauge

On June 30th a new real-time water level gauge at the Town of Rainy River, Ontario became operational. The gauge, installed by the Water Survey of Canada, was jointly funded through a partnership of the IJC, the Fort Frances District Office of the Ontario Ministry of Natural Resources (OMNR) and the Lake of the Woods Control Board (LWCB). The Town of Rainy River supported the project by providing construction crews to install the necessary sensing line from the gauge site to the Rainy River. The Town has also provided space and power for the gauging equipment in their water treatment plant. The new gauge provides improved monitoring on the lower Rainy River.

7.5 Maintenance Activities and Dam Safety

Maintenance Activities

Since the last report by the Boards, the Companies have taken a number of actions related to the ongoing maintenance of the outlet facilities throughout the basin. These actions are listed below.

- International Falls Powerhouse:
 - Repaired the West Dike.
 - Installed a new tailwater level transmitter.
 - Raised the elevation of the river road access to the powerhouse.
 - Repaired the ash sluice wall.
- Calm Lake Dam and Sturgeon Falls Dam:
 - Upgraded supervisory control.
 - Repaired the access road.
 - Repaired the safety boom upstream of Calm Lake Dam.
- Raft Lake Dam:
 - Replaced 7 stop logs c/w metal ends.
- Kettle Falls Dam and Squirrel Falls Dam:
 - Removed jammed logs and debris from gate 10 at Squirrel Falls.

Maintenance scheduled for 2004 includes the following:

- Minimize stop log leakage at Calm Lake and Sturgeon Falls,
- Overhaul of GS1 head gate lifting machine in the Abitibi powerhouse,
- Fabricate cofferdam for use during repair of GS1 trash rack support structure.

Phase #10 of the Calm Lake Dam pier/decking refurbishment, originally scheduled for 2003, has been moved to the 10-year maintenance plan for Hydro facilities.

Implementation of June 2002 Acres Report Recommendations – Option 2

As a follow-up to last year's report on this subject, Boise notified the IRLBC in an April 24, 2003 letter that they had completed implementation of Option 2 recommended in the June 2002 Acres report with one modification. The modification was noted in the Company's December 13, 2002 letter to the board's engineering advisors and consisted of using concrete ring retaining walls around each generator instead of a strip wall downstream of the units to protect them from flooding. This modification was required to allow crane access to the major pieces of equipment for maintenance. The ring walls were built similarly to the originally proposed wall and to the same top elevation of 1091.0 feet.

The following list outlines the work completed to implement Option 2.

- Modified the concrete arch floor upstream of generator units 1 to 5.
 - Removed and replaced (to include dowelling into the original concrete) existing concrete floor topping.
 - Patched and sealed exposed concrete arch floor to minimize leakage.
 - Extended existing hole drains to top of new floor topping and fitted with threaded steel sleeves with flat top nut plug.
 - Inspected and assessed the need for existing floor steel cover plates and made watertight.
- Constructed concrete ring walls around generator units 1 to 5.
- Upgraded generator pit sump pumps.
- Installed electrical feeds for the generator pit sump pumps.
- Repaired the North wall and floor.

Boise notified the IRLBC engineering advisors in an April 24, 2003 letter that the modifications had been completed. In their response to the company, the board's advisors thanked the company for its timely completion of the modifications, noting IJC and Board concurrences with implementation of Option 2 of the June 2002 Acres Report (as stated in the Commission's October 15, 2002 letter to the Vice-President of the company's Minnesota Operations). The advisors also noted the Commission's concurrence with the Board's recommendation that Boise develop a contingency plan defining the course of action that will be taken by the company to prevent a structural failure of its powerhouse for tailwater elevations above 1091.0 with its powerhouse completely shut down.

The company's response was provided in an August 5, 2003 letter to the IRLBC's U.S. engineering advisor. The company's contingency plan contains two key points. First, the company will not allow the water differential between the inside and outside of the powerhouse to exceed 32 inches. This is the maximum allowable differential (including safety factor) determined by the company's structural engineering consultant. Second, if conditions warrant, the company will shut off the hydro flow to prevent damage to the powerhouse. In each case the company would work closely with the Board to

assure well-coordinated and considered actions. The Board is presently considering the adequacy of the plan provided by the company.

ACKNOWLEDGEMENTS

The IRLBC and IRRWPB Board Members would like to thank Ed Eaton, Rick Walden, Rick Cousins, and Kari Layman for their assistance in preparing this report.

APPENDIX A

MAP AND SCHEMATIC OF BASIN

- Figure A-1 Winnipeg River Drainage Schematic
- Figure A-2 Winnipeg River Drainage Basin Map

WINNIPEG RIVER DRAINAGE SCHEMATIC

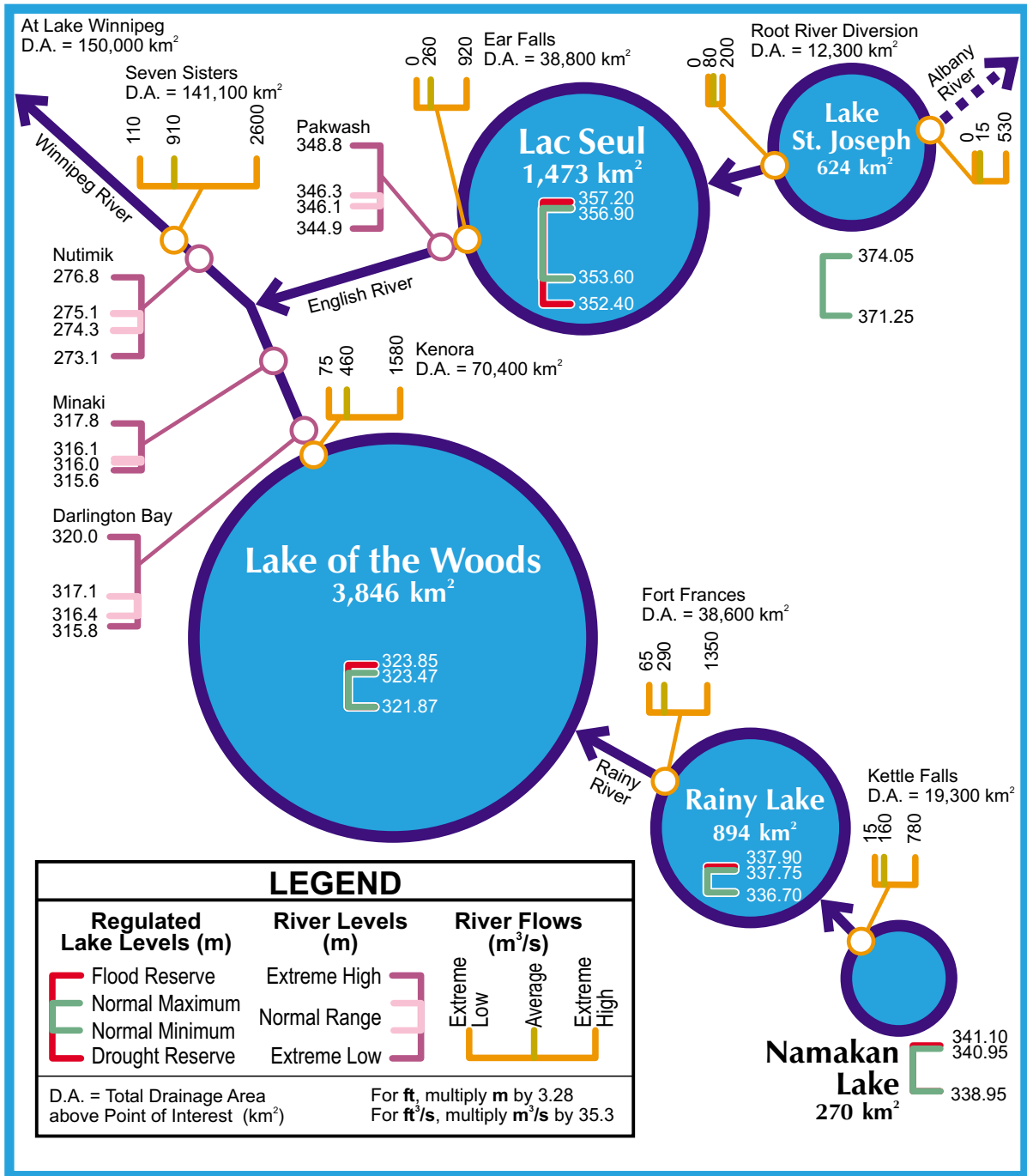


Figure A-1

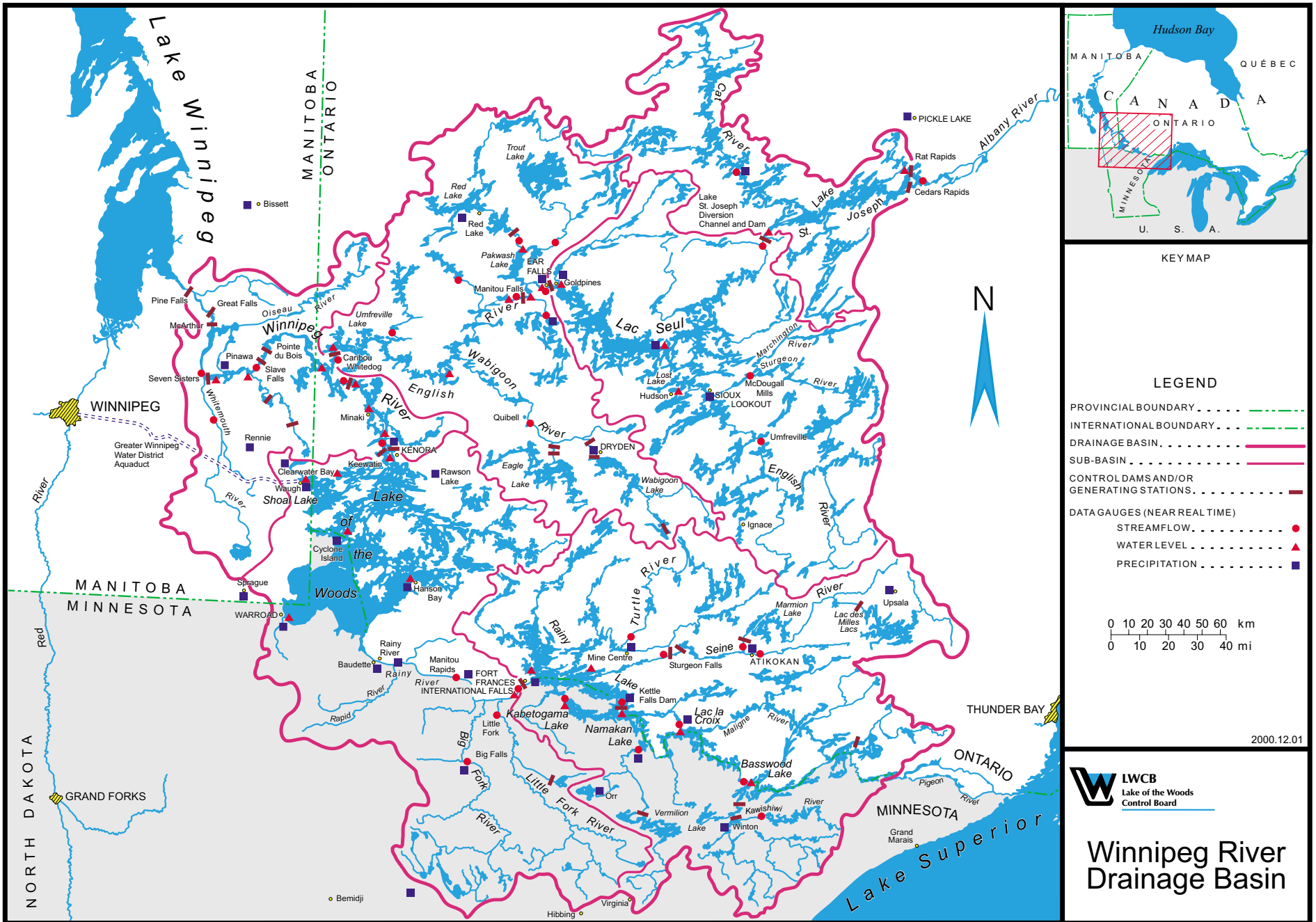


Figure A-2

2000.12.01

LWCB
Lake of the Woods
Control Board

Winnipeg River
Drainage Basin

APPENDIX B

FIGURES

- Figure B-1 Rainy Basin Precipitation
- Figure B-2 Namakan Lake Elevation, Net Inflow and Outflow
- Figure B-3 Rainy Lake Elevation, Net Inflow and Outflow
- Figure B-4 Legend for Lakes and River Graphs

NOTE

All precipitation, water level and flow data used in the text and figures of this report were taken from the database of the Secretariat of the Lake of the Woods Control Board. At the time of preparation of this report, this data was still provisional and subject to revision.

RAINY BASIN PRECIPITATION

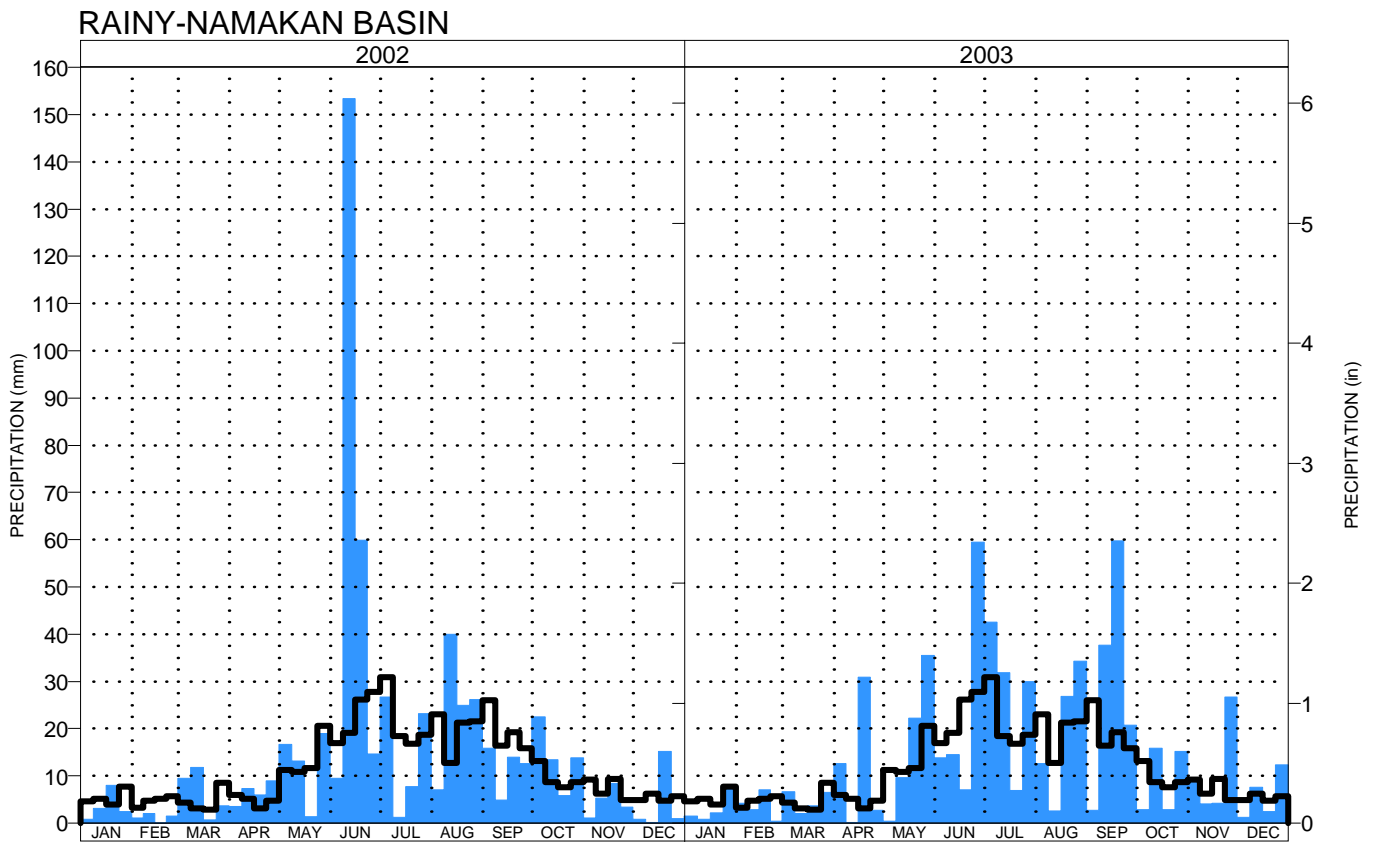
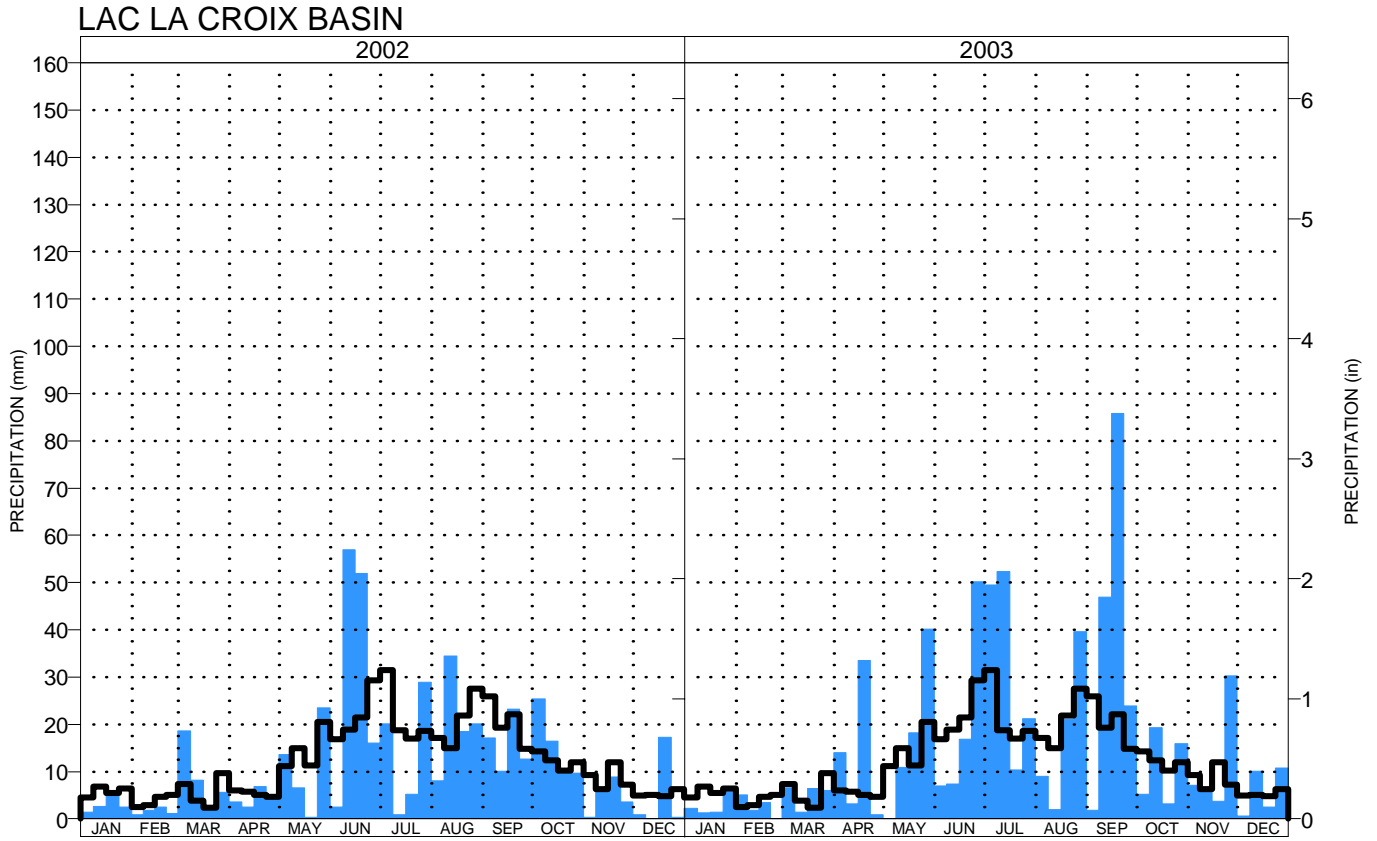


Figure B-1

RAINY LAKE

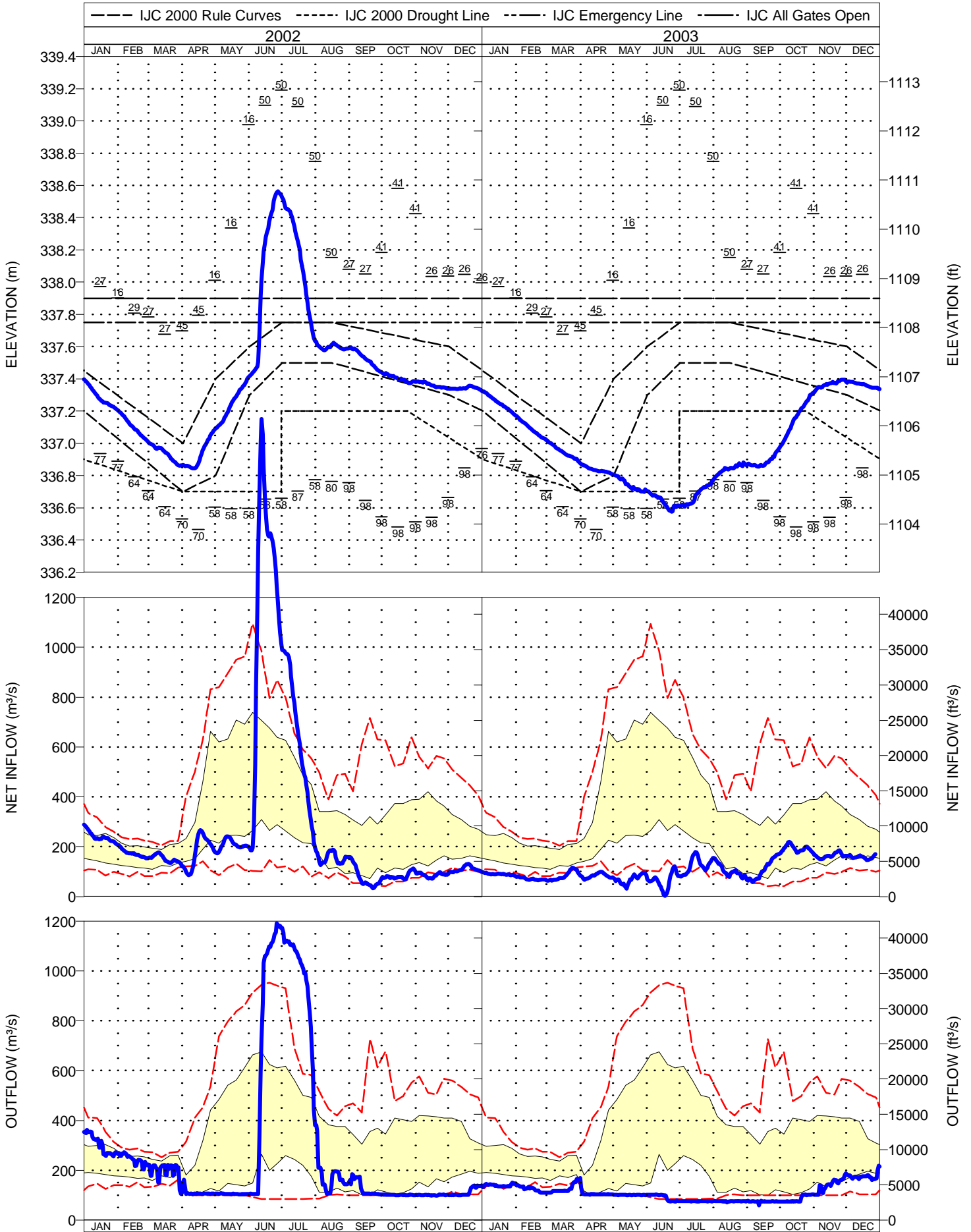


Figure B-3

LEGEND - LAKE AND RIVER GRAPHS

PRECIPITATION



Actual data for year shown, plotted as quarter-month totals
(last quarter-month is usually incomplete)



Statistical Median - precipitation has been below this line 50% of the time

WATER LEVELS & FLOWS

Actual Data



Actual data for year shown
- levels are 1-day main lake means plotted daily
- inflows are 7-day means
- outflows are daily values

Rule Curves (Namakan & Rainy Lakes)



IJC 2000 Upper & Lower Rule Curves



IJC 2000 Drought Line



IJC Upper Emergency Level



IJC "All Gates Open" Level

Statistical Data

50

Maximum level recorded and its year of occurrence



Level/flow has been above this line 10% of time.



Normal level/flow range
- level/flow has been above this range 25% of time
- level/flow has been within this range 50% of time
- level/flow has been below this range 25% of time



Level/flow has been below this line 10% of time

77

Minimum level recorded and its year of occurrence

All statistical levels are based on 3-day means at month quarter points.

All statistical flows are based on quarter-monthly means.

Percent data is based on the period 1970-1999.

Datums for water levels are:

- Namakan Lake - USC&GS (1912) datum
- Rainy Lake - USC&GS (1912) datum