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

SPRING 2008 REPORT

Submitted to

The International Joint Commission

March 31, 2008

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BOARD MEMBERS AND STAFF

	Canada	**USA**
IRLBC Members	Rick Walden[1] PEng	Jon Christenson COL
	Peter Williams PEng	Leland Grim
IRRWPB Members	Melanie Neilson	Jeffrey Stoner PG
	William Darby PhD	Nolan Baratono
IRLBC Engineering Advisors	Rick Cousins[1] PEng	Edward Eaton PE
Joint Board Secretary		Kari Layman PE

[1] *Interim appointment*

1 INTRODUCTION

The International Rainy Lake Board of Control (IRLBC) and the International Rainy River Water Pollution Board (IRRWPB) 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. In addition, the spring reports address regulation of Rainy and Namakan lakes over the past calendar year, while the fall reports address environmental quality and related issues.

Section 2 of this report summarizes the regulation of Rainy and Namakan lakes during 2007. Section 3 of the report addresses other activities of the Boards and items of interest in the basin. A map of the basin (Figure 1) can be found in the Appendix.

2 LAKE LEVEL REGULATION

As in a number of recent years, inflows to the Rainy-Namakan basin were again quite variable in 2007. The first five months were essentially a continuation of the drought which began in June 2006. An improvement in rainfall in late May and early June seemed to signal the end of the drought, and brought inflows, while not large, at least back into the normal range. However, July-August rainfall was below normal and inflows were again below normal by mid to late July and declining. This situation was finally turned around strongly by well above normal rainfall through September and into October. While inflows started the year at 10 percentile or less and only rose to about 25 percentile on Namakan (50 percentile on Rainy) in early summer before declining again to 10 percentile or less in September, they peaked above 95 percentile in October and were still 80 percentile at year-end. Due to these variable inflows, both lakes fell below their respective lower rule curves from mid-May to early June, Rainy Lake fell just slightly below its IJC band again in mid-September, and Namakan rose above its band for a good part of October and November. The 2007 quarter-monthly precipitation for the Lac la Croix and Rainy-Namakan subbasins is shown in Figure 2. Water levels, net inflows and outflows are shown on Figures 3 and 4, respectively, for Namakan and Rainy lakes. Figure 5 provides a legend for these figures.

Namakan Lake

Namakan Lake started the year with its level at 36 percent of its IJC rule curve band, its inflow at 10 percentile and its outflow at 10 percentile. With inflows and outflows continuing in the 10 percentile range, the lake level was down to 23 percent of band by mid-March. However, a weak but early snowmelt runoff, combined with precipitation a little above normal over the last half of March, led to the lake level beginning to rise, reaching 42 percent of band by end-March. The IRLBC had directed the Companies (Boise and Abitibi, owners and operators of the dams) to target the lower portion of the operating band (rather than the middle portion) in December 2006 due to the low level of Rainy Lake; this directive was rescinded in late-March.

The increase in inflow was short-lived, falling below 10 percentile in early April and mostly remaining there through late May. In contrast, the operating band rises quite steeply through April and May. Although the lake level continued to rise strongly, aided by a reduction in outflow from 50 m^3/s to the IJC-specified minimum of 30 m^3/s, the meager inflow was insufficient to keep the level within the band. While the lake level continued to rise, it crossed the IJC Lower Rule Curve (LRC) on May 17. With rainfall improving after the first week of May, inflows gradually increased, allowing the lake level to

continue rising parallel with the LRC. At most, the lake level was 15 cm (6 in) below the LRC during this period. With the IJC operating band starting to decline in early June, the lake level crossed the LRC back into the band on June 10. The outflow was increased rapidly to about 160 m^3/s to stop the lake rising and briefly reached nearly 190 m^3/s before ending June at 160 m^3/s, at which time the lake level was 40% of band and inflow was 25 percentile.

Unfortunately, with rainfall again falling off and averaging less than half the normal amount from mid-July through to the end of August, inflow declined to 10 percentile by the end of July and remained near there through August. Namakan outflow was reduced in stages to about 40 m^3/s by the end of August, thereby keeping the lake level generally at 30-50 percent of band through this period. Rainfall picked up significantly in September, averaging about twice the normal amount over the month in the Rainy-Namakan basin and ever higher upstream. As a result, inflow increased significantly over the last half of September, ending the month at 70 percentile. At month-end, the lake level was 93 percent of band and the outflow was 170 m^3/s.

The above normal rainfall in September was followed by two more above normal periods of rain in October. As a result, the inflow to Namakan Lake continued to rise and became the maximum of record (for the time of year) for 20 days in late October and early November. Overall, Namakan inflow rose from a low of less than 30 m^3/s in mid-September to a peak of over 500 m^3/s in October before declining to 175 m^3/s at year-end, still an 80 percentile value for that date. To limit the rising lake level in response to these inflows, the Namakan Lake dam was fully open from October 20 through November 23. However, the outflow capacity was not sufficient to keep the lake level within the IJC band, especially given that the level band declines significantly after September. Although the lake level did not rise much above its end-September level, it did not start to decline significantly until November 7. It was above its Upper Rule Curve (URC) from October 5 through November 22, with a maximum deviation of 24 cm on November 6. At year-end, Namakan Lake was at 45 percent of its IJC band, with an outflow just over 180 m^3/s.

Rainy Lake

Rainy Lake started the year with an inflow of only 5 percentile (about 80 m^3/s) and with its level 40 cm (16 in) below its LRC and 10 cm (4 in) below its Drought Line (DL). Due to its low level, outflow had been reduced in December 2006 from 100 to 65 m^3/s (following consultations with resource agencies, municipalities and others) and was held at 65 m^3/s though March. With this reduced outflow, the lake level remained relatively constant from mid-December through mid-March. With the lake level steady but the operating curves continuing to decline, Rainy was back above its DL on February 27 and above its LRC on March 17. As with Namakan, due to March precipitation and a beginning snowmelt, the lake level then started to rise, ending March at 45% of band. If the outflow had remained at 100 m^3/s, the lake would have ended March 26 cm (10 in) below its LRC.

Under the IJC's 2001 Order, while the IRLBC has the authority to reduce outflow to as low as 65 m^3/s when the level of Rainy Lake is below its DL, the outflow must be 100 m^3/s between the DL and the LRC. With concerns that the dry conditions might persist into the spring, both Boards wanted to ensure that outflows could be maintained at 65 m^3/s well into 2007 to benefit lake level recovery, rather than having to increase the outflow if the level just rose above the DL. Thus, in February, the IRLBC sought a Supplementary Order from the IJC that would allow the Board to set the outflow as low as 65 m^3/s whenever the lake level was below the LRC or elevation 336.8 m, whichever was higher, through to June 30. This request was supported by the resource agencies, the Companies and affected

municipalities. The IJC issued the requested Supplementary Order on February 27; this Order and a related IJC news release were posted on both Board web sites.

Although inflow rose to 35 percentile in early April, it dropped to a new minimum of record by mid-April and generally remained below 10 percentile through to late May. Even so, with the outflow maintained at only 65 m^3/s, the lake level rose steadily through April and May, but was not able to keep up with the rising IJC operating band. The level crossed the LRC on May 15. As with Namakan, improved rainfall starting in May led to increasing inflows from late May into June. The lake rose more steeply and re-entered its operating band on June 11. At most, the lake level was 15 cm (6 in) below its band. Outflow was increased sharply starting on June 11, reached 420 m^3/s on June 20 and was 375 m^3/s at the end of June, at which time the lake level was 57% of band and inflow was 50 percentile. With the extended drought apparently over, Rainy Lake inflow from June 2006 through May 2007 was computed to be only 88 m^3/s, the lowest for this 12 month period since records began in 1912.

As with Namakan, inflow declined through July and August in response to below normal rainfall, and was minimum of record (for the time of year) by August 27. Rainy outflow was reduced to the normal IJC minimum of 100 m^3/s by August 6 and held there. In spite of this action, the lake level declined through its operating band and actually fell slightly below its LRC (less than 1 cm below) near mid-September. With the well above-normal September rainfall, inflow to Rainy Lake increased sharply through the latter half of the month, reaching 70 percentile by month-end. The outflow was first increased on September 26, reaching 182 m^3/s by month-end, at which time the lake level was at 47 percent of band.

The above normal rainfall in September was followed by two more above normal periods of rain in October. As a result, inflow to Rainy continued to rise and exceeded 95 percentile for 25 days in late October and early November. Overall, Rainy inflow rose from a low of 20 m^3/s in mid-September to a peak near 880 m^3/s in October before declining to 290 m^3/s at year-end, still an 80 percentile value. To hold the lake level within its operating band, Rainy Lake outflows were increased sharply in early October. The dam was fully open from October 22 through October 31, with a peak discharge of nearly 860 m^3/s, and the lake level reached 98 percent of its band on October 26. Rainy Lake ended the year with its level at 73 percent of its band, and with an outflow of 370 m^3/s.

3 BASIN ISSUES AND OTHER BUSINESS

3.1 Proposed Hydropower Developments on the Namakan River in Ontario

As noted in the 2007 spring and fall reports, three sites on the Namakan River (below Lac La Croix and above Namakan Lake) have been proposed for small hydroelectric developments. Field work and studies are currently underway by the proponent, the Ojibway Power and Energy Group (OPEG), a partnership between the Lac La Croix First Nation and Chant Construction. The projects are subject to both federal (Canadian) and provincial environmental assessments. A presentation on the proposals was held at the Lac La Croix First Nation on December 19, 2007 and was followed by two public information sessions on February 19 and 21, 2008 in Atikokan ON and Fort Frances ON respectively. Two periods of formal public review are anticipated; tentatively in the summer and fall of 2008.

Considerable public concern regarding these proposed developments was expressed prior to and at the Boards' public meeting in August 2007. Following the public meeting, the Boards wrote to the IJC to advise the Commission of the public concern, noting in particular the public expectation that the IJC

would be involved in spite of Commissioner Olson's statement that the IJC has no authority to act unless the issue is referred to the IJC by the governments of Canada and the USA. The IJC subsequently sent letters to both governments to alert them to the issue. The IJC letters, along with the Boards' letter, information on the proposals and a presentation prepared by the Rainy Lake Conservancy, were posted on the Boards' web sites in November 2007.

At the project presentation held in December 2007 and at the public open house information sessions held in February 2008, it is understood that the proposed developments were strongly supported by Lac La Croix First Nation. The public attending these sessions apparently expressed a mix of views. The Boards continue to monitor the issue and will keep the Commission advised.

3.2 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. While data is being collected and studies are on-going on the lakes, there is concern that current funding is insufficient to complete this work. In addition, the required work has not yet been defined and initiated on the Rainy River, and needed socio-economic data is missing in all areas, due to lack of funding and other resources. These concerns were raised by the resource agencies at their meetings with the Boards in the summers of 2006 and 2007 and in turn were relayed to the IJC. In response, the IJC proposed setting up a Work Group to develop and cost a plan of study to address the information gaps, as a basis for seeking required funds from governments. Work Group members were proposed by the Boards to the IJC in March 2007 and the IJC named members in late 2007.

The Work Group held its first meeting on January 31, 2008 and subsequently held a gap analysis workshop of agency and academic experts on March 10-11, 2008. The Group is scheduled to submit a draft Plan of Study to the Commission this spring, and a final report by late summer, 2008.

3.3 Hydropower Peaking

Concerns about the impacts of hydropower peaking operations (at Fort Frances – International Falls) on the Rainy River were raised at public meetings held by the IJC in 2001. Following much discussion and review, a "Peaking Work Group" was set up in the fall of 2006, leading to an agreement for a two year trial (2007 and 2008) during which there would be no peaking for 2½ months in the spring spawning period. Nominal dates of April 15 to June 30 were selected, with provision for adjustment based on monitoring. The background of this issue has been addressed in previous reports.

In the fall of 2007, the Peaking Work Group agreed that the arrangement had worked well in the spring of 2007 and confirmed that the same process would be followed in the spring of 2008. A review of the trial will be held in the fall of 2008.

3.4 IJC International Watersheds Initiative - Rainy River Modeling

Under the IJC's International Watersheds Initiative, the US Section of the IJC has been funding work since 2006 to develop a computer-based 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 2007 reports. Survey work to define the river bed geometry was conducted by the US Geological Survey, while the flood plain topography was developed by a private contractor working for the US Army Corps of Engineers. Set-up and calibration of a HEC-RAS

hydraulic model was carried out by the Corps, using a melding of the two channel geometry data sets. While work on the model was completed in late 2007, further review, testing and the completion of a report remain to be done.

3.5 Pine Island Peat Mining Project

As noted in previous reports, the IRRWPB has been monitoring plans for the Pine Island Peat Mining Project, which could potentially lead to the release of mercury into the Black River in Minnesota and thence into the Rainy River. The Spring 2007 report listed a number of recommendations for the monitoring of mercury that the IRRWPB sent by letter in January 2007 to the Minnesota Pollution Control Agency (MPCA). The MPCA responded on November 26, 2007, challenging the need for additional monitoring and asserting that compliance with the mercury effluent limits in the Pine Island facility permit would ensure that no significant impact to the environment would occur.

Given the size of the Black and Rainy Rivers, the many varied sources of mercury to the rivers, and the fact that mercury effluent limits for the facility were established in the context of Minnesota's 6.9 ng/L water quality standard, the IRRWPB re-evaluated the likelihood of being able to detect an increase in mercury concentration downstream that could be attributed to the Pine Island Facility. The IRRWPB concluded that it would be difficult, if not impossible, to detect an impact. Therefore, in the IRRWPB's subsequent response to the MPCA (dated March 28, 2008), the recommendations for additional monitoring were withdrawn. Instead, the Pollution Board outlined a step-wise approach that would include an annual review of the mercury discharge data from this facility (once operational) under its US National Pollutant Discharge Elimination System (NPDES) permit and a comparison of effluent loadings with in-stream concentrations of total mercury. If effluent concentrations are determined to have an impact on the receiving environment, or increase over time, the IRRWPB may recommend additional monitoring at that time.

3.6 Meetings

IJC Fall Semi-Annual Meeting

IRLBC and IRRWPB members and staff attended the fall semi-annual meeting of the IJC in Ottawa on October 17, 2007. The Boards' presentation to the IJC addressed water quality, basin activities, Board meetings and lake regulation. The water quality component reported on water sampling and environmental effects monitoring, existing fish consumption advisories, and municipal/industrial point source discharges. There were no violations reported and aquatic health was said to be good. The basin activities component provided an update on spring hydropower peaking operations, environmental monitoring for rule curve re-assessment, the proposed Namakan River hydropower developments, the emerging issue of spiny water fleas in the basin, and the data collection for, and development of, a Rainy River hydraulic model. Following the presentation, there was discussion of governance issues in the basin, including the proposed merger of the IRLBC and IRRWPB, the future creation of a watershed board, and whether emerging Lake of the Woods water quality issues should be addressed separately or by an expanded IRRWPB. The Boards were requested to consider these matters, discuss them with IJC staff and provide input to the IJC Commissioners.

Board Conference Calls and Meetings

In addition to meeting on October 16, 2007 in advance of the IJC Semi-Annual Meeting, the two Boards continued to maintain contact via email exchanges and conference calls during the reporting period.

Three joint conference calls were held; on October 31, 2007 and on February 1 and March 28 in 2008. These calls addressed basin conditions, the governance issues posed by the IJC, the proposed Namakan River hydropower developments, the March 2008 IJC International Watershed Initiatives Workshop, the environmental monitoring plan of study to prepare for rule curve review, nutrient loading to Lake of the Woods, newsletters, the spring report/presentation for the IJC, and the potential merger of the two Boards. In addition, the IRRWPB held a separate conference call, on March 14, 2008, to discuss its views on Board merger and potential changes to its geographic area of interest for pollution issues, and to discuss its response to the MPCA letter regarding the Pine Island Peat Mine (Item 3.5 above).

3.7 Workshops

International Lake of the Woods Water Quality Forum

The Rainy River Basin Water Resources Center hosted the 5th annual International Lake of the Woods Water Quality Forum on March 12-13, 2008. The Center is located at the Rainy River Community College in International Falls. The Forum, well-attended by over 100 scientists and resource managers, was also attended by some Members and staff from both the IRLBC and the IRRWPB. Three working groups (Nutrients and Algae, Monitoring Coordination and Aquatic Invasive Species) met on the morning of March 12. These were followed by a number of presentations on the afternoon of the 12th and on March 13.

The 2008 Forum theme was Aquatic Invasive Species, with presentations on high profile species such as the spiny water flea and rainbow smelt, on not so well known species like the diatom D. geminata, and on adaptive management options to prevent and control infestations. Other presentations addressed the role of phosphorus in eutrophication and the occurrence of blue-green algal (cyanobacteria) blooms. Another area of note was Environment Canada's increased focus on Lake of the Woods as a component of its Lake Winnipeg Initiative.

IJC's International Watershed Initiative Workshop

A number of Members and staff of the two Boards attended this workshop in Vancouver on March 18-19, 2008. While brief presentations were made by attendees representing each of the pilot watershed board areas, the workshop focused on sessions addressing the operating principles, framework and governance, action plan and funding priorities for the initiative.

While it is understood that an official summary of the workshop will be available by the end of April, Board members and staff who attended noted the following in particular:

- The workshop was successful in clarifying what the Initiative is and is not, in clarifying expectations, in clarifying the need for a simple statement of working principles, and in verifying that the overall intent is to work co-operatively with other jurisdictions.
- A "shared understanding" amongst users of a watershed is a more realistic objective than a "common vision".
- Common challenges are limited Member time and lack of stable/additional resources.
- The IJC needs a "champion" in both federal governments to successfully pursue its plans.
- A process is needed to determine and prioritize project funding.
- Similar workshops should be held frequently.

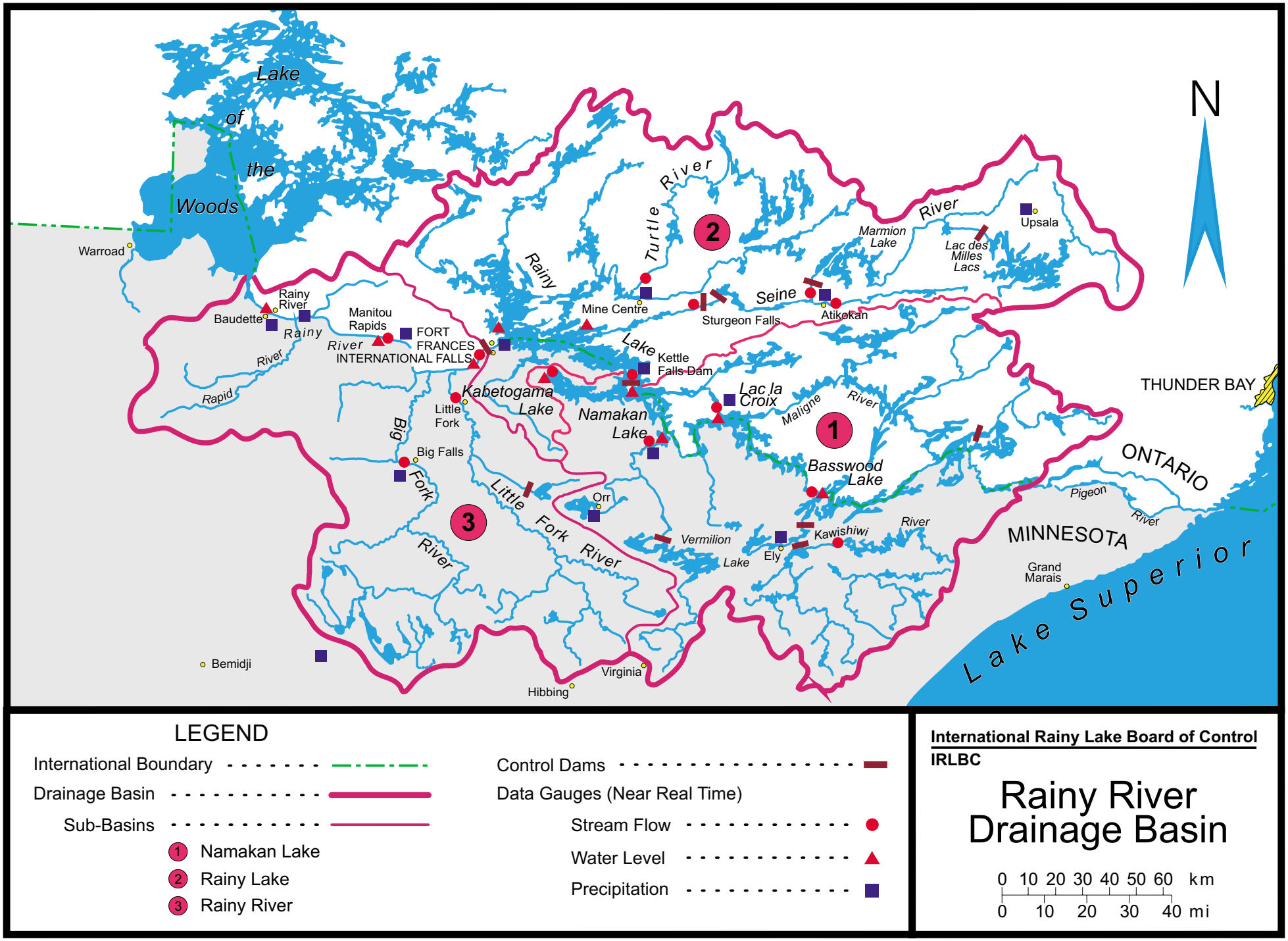
3.8 Board Membership

Effective October 15, 2007, Melanie Neilson (Environment Canada, Burlington ON) was named by the IJC as the Canadian Co-Chair of the IRRWPB, replacing John Merriman, who had retired in March 2007.

APPENDIX

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.



LEGEND

- International Boundary
- Drainage Basin
- Sub-Basins
  - 1 Namakan Lake
  - 2 Rainy Lake
  - 3 Rainy River
- Control Dams
- Data Gauges (Near Real Time)
  - Stream Flow
  - Water Level
  - Precipitation

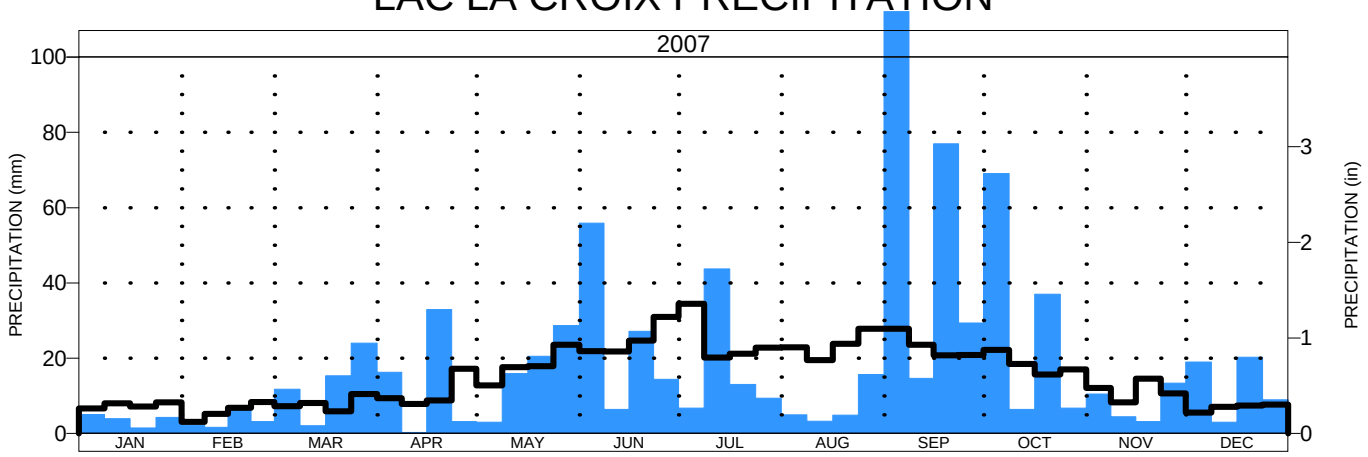
International Rainy Lake Board of Control
IRLBC

Rainy River Drainage Basin

0 10 20 30 40 50 60 km
0 10 20 30 40 mi

Figure 1

LAC LA CROIX PRECIPITATION



RAINY-NAMAKAN PRECIPITATION

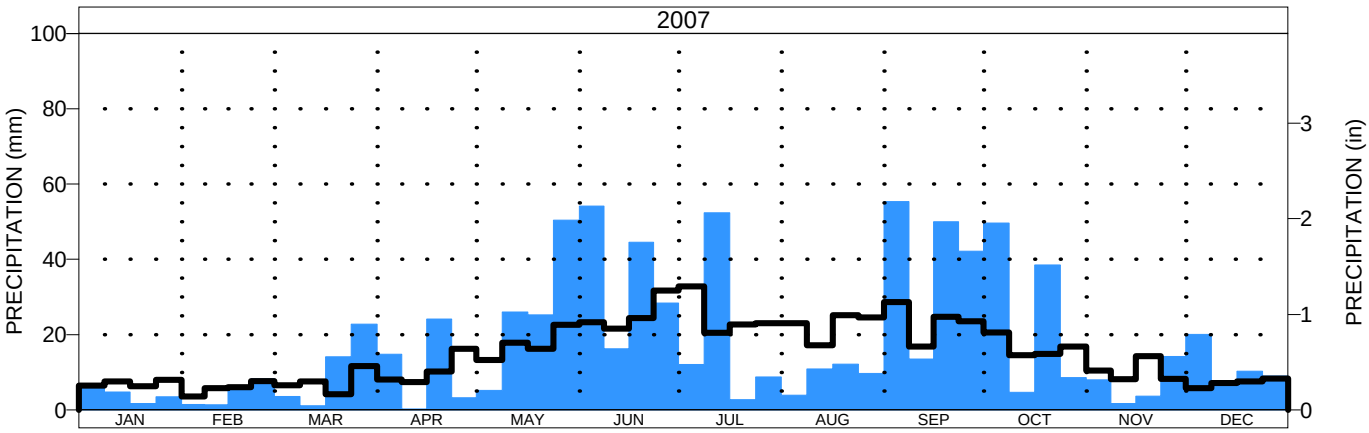


Figure 3

NAMAKAN LAKE

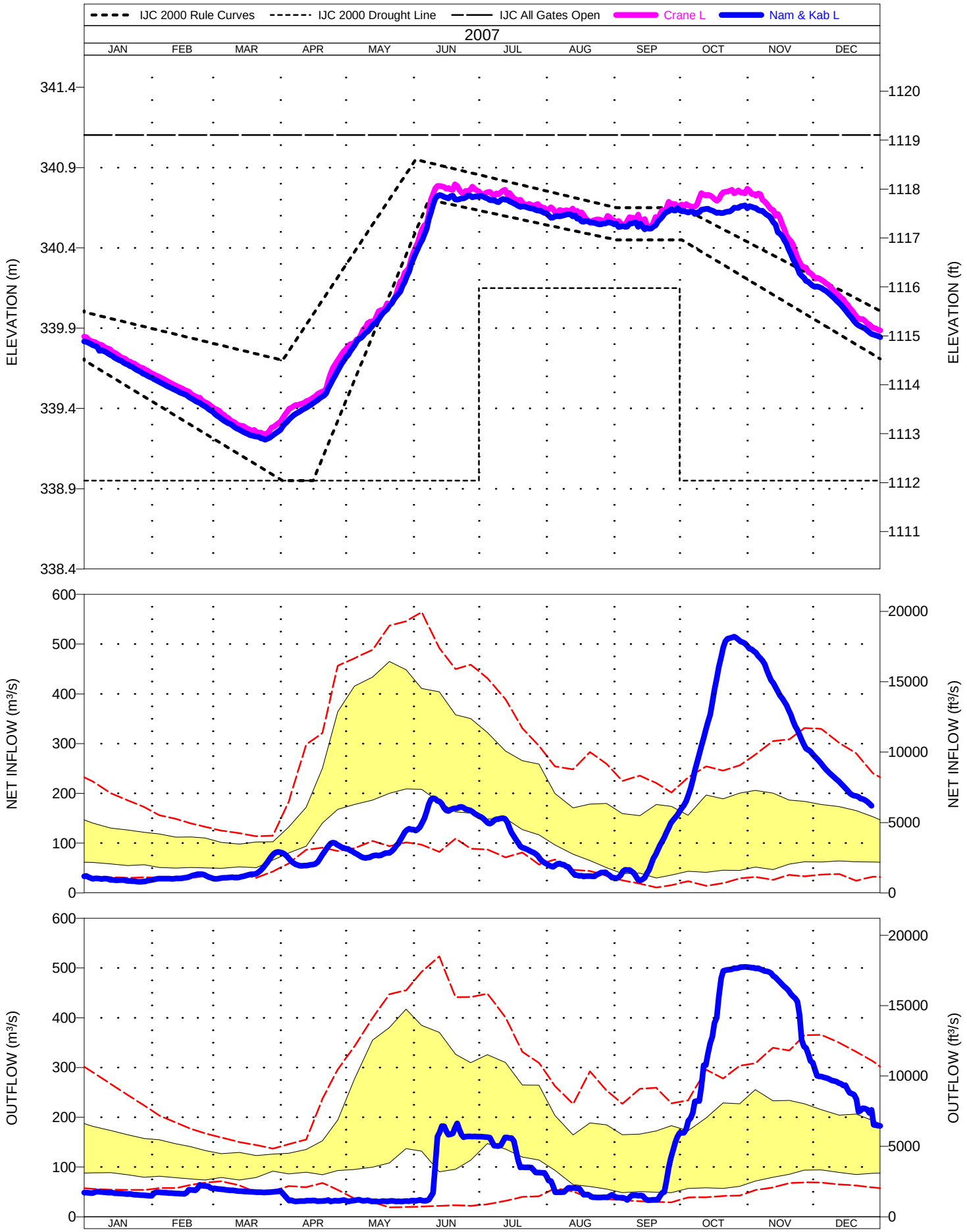
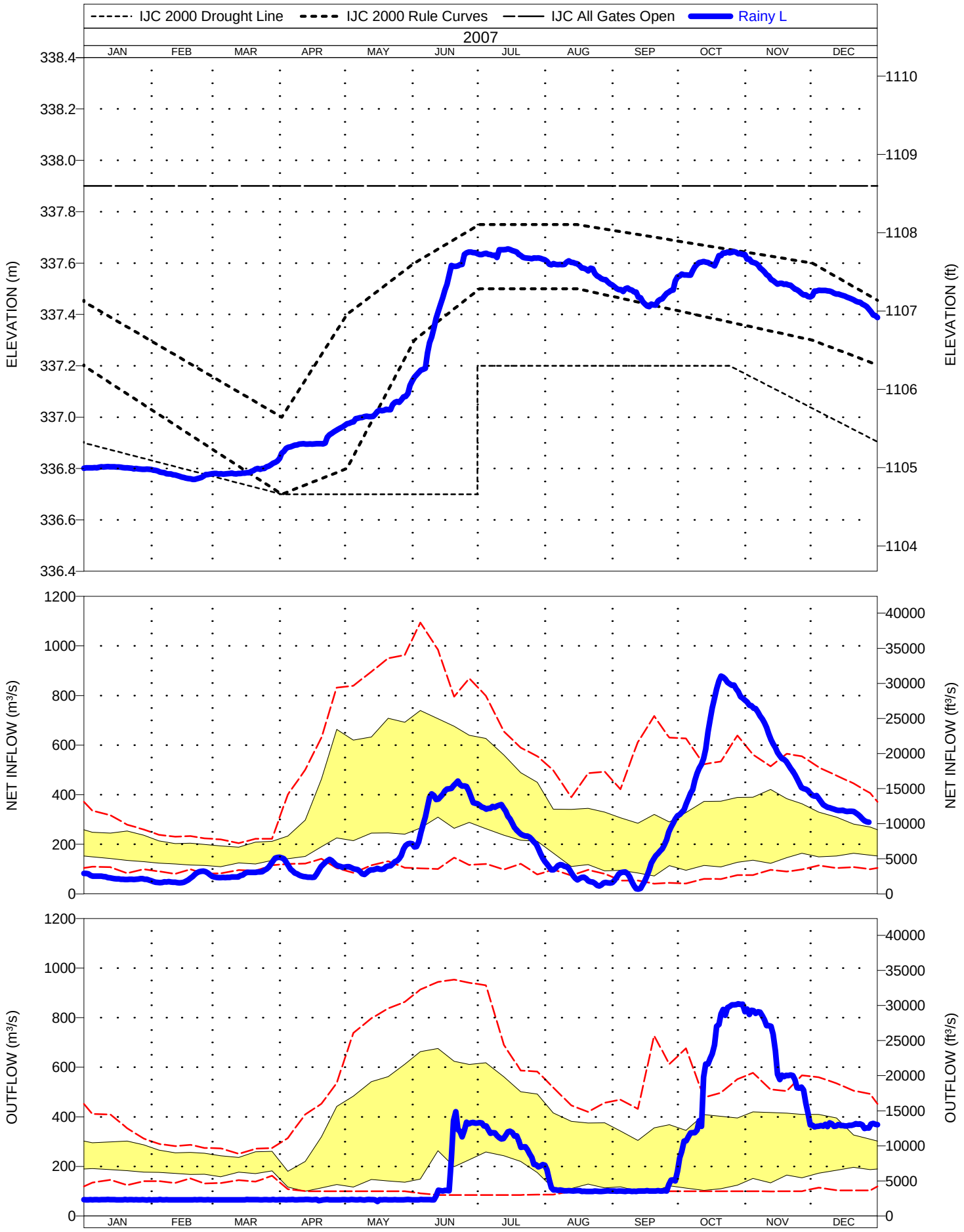


Figure 4

RAINY LAKE



LEGEND - LAKE AND RIVER GRAPHS

PRECIPITATION

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

Average - over the years 1970-1999

WATER LEVELS & FLOWS

Actual Data

Actual data for the dates shown
- levels are 1-day means plotted daily
- inflows are 7-day means plotted daily
- outflows are daily values

Rule Curves (Namakan & Rainy Lakes)

IJC 2000 Upper & Lower Rule Curves

IJC 2000 Drought Line

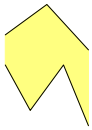
IJC Upper Emergency Level

IJC "All Gates Open" Level

Statistical Data

50 — Maximum level/flow 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/flow 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