INTERNATIONAL RAINY LAKE BOARD OF CONTROL
IRLBC

EXCERPTS FROM

REPORT ON YEAR 2002 HIGH WATER LEVELS IN THE RAINY/NAMAKAN BASIN

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NOTE
ONLY SECTIONS 1, 7 AND 8 ARE INCLUDED IN THIS "EXCERPTS" VERSION OF THE REPORT.

1. INTRODUCTION

In 2002 Rainy and Namakan Lakes experienced high water levels for the second year in a row. The peak level on Namakan Lake was not as high as in 2001, but the peak level on Rainy Lake was 32 cm (12.6 in) above the 2001 peak. Whereas the high levels in 2001 were the result of a series of heavy rainfall events over the whole Rainy-Namakan basin from early April through July, the high levels in 2002 were primarily the result of an extraordinary 2-3 day rainfall event in early June centred on the Rainy basin.

Property owners and visitors to the basin were very frustrated with having to deal with such an occurrence two years in a row, especially when it was understood that the 2001 event was a relatively rare one with a probability of occurrence of, on average, less than once in 50 years. As in 2001, the public questioned the handling of the event by the International Joint Commission (IJC), its International Rainy Lake Board of Control (IRLBC) and the owners of the dams, Boise Cascade Corporation in the United States of America and Abitibi-Consolidated Inc. in Canada. The public also questioned whether the new "rule curves" adopted by the IJC in January 2000 might be worsening the situation, since high levels had now occurred in 2 of the 3 years of their existence.

This report has been prepared for the IJC by the Board to document the event, to explain its cause and the actions taken by the Board and the Companies, to present the results of simulation modelling of the lakes conducted to assess the handling of the event and the impact of the new rule curves, and to draw conclusions and make recommendations as appropriate. The Board suggests that readers of this report also read the Board's report on the 2001 event, as it contains information (such as lake outflow constraints) relevant to both events that is not repeated herein.

7. SUMMARY AND CONCLUSIONS

The high water levels experienced in the Rainy-Namakan basin in 2002 were due to a very large amount of rainfall in June, which primarily resulted from an extraordinary rainfall event on June 9-10 but was augmented by another significant rainfall event on June 22-23. Total rainfall during this period was the highest since 1948 (55 years). As a result, inflows to Rainy Lake for the month of June were the 2nd highest since 1912. The resultant peak water level on Rainy Lake was 338.56 m (1110.8 ft) on June 27, the highest level reached since 1950 and 2nd highest since 1912. The June 27 peak was 66 cm (26 in) above the IJC "all gates open" level and 81 cm (32 in) above the upper emergency level. Although inflows to Namakan Lake were in the median range through most of June and July, efforts to provide some relief to high Rainy Lake levels by reducing Namakan Lake outflow in late June resulted in higher levels than would have otherwise occurred and some minor high water impacts on the Namakan Chain of Lakes. On the Rainy River the response to the June 9-10 rainfall event produced (based upon anecdotal evidence) the highest levels and flows ever experienced by anyone now living in the region on the smaller tributaries in the lower reaches of the Rainy River, creating a flood threat to the Town of Rainy River. Subsequently, the timing of tributary runoff from the June 22-23 rainfall event with peak outflows from Rainy Lake produced the highest tailwater levels at the Boise powerhouse since 1950, causing flooding of the powerhouse and creating concerns about the safety of its continued operation.

Simulation modelling was conducted by the Board to address some of the public concerns regarding lake management during this event. It was found that the delay in the full opening of the Rainy Lake dam, in order to protect the Town of Rainy River from flooding, caused the peak on Rainy Lake to be at most 5 cm (2 in) higher than it might otherwise have been. Similarly, it was found that the use of additional storage on Namakan Lake during the event had lowered the Rainy Lake peak level by 5 cm (2 in) at most, while causing the level of Namakan Lake to rise 24 cm (9.4 in) above its emergency level. Regarding the effects of rule curves, it was found that, had the 1970 rule curves still been in place in 2002 but operations within

them been to current day stated policy, the peak level on Rainy Lake might have been 9-20 cm (3.5-8 in) lower than it was, depending on assumptions made within that policy (policy variants). However, most of the difference (with each policy variant) was due to the drought period preceding the heavy rain period, which resulted in the lake level being below normal (by differing amounts, dependent on policy variant) when the rains came. In a more typical year, with lake levels remaining near mid-band through the spring, the June 2002 rains with the 1970 rule curves would likely have resulted in a peak level on Rainy Lake only 4-8 cm (1.5-3.0 in) lower than it was, depending on Namakan operations. Further, it was found that, if the 2002 June rains had occurred in the 1990s, when both the 1970 rule curves and all operating requirements and policies related to them were in place, then the peak level on Rainy Lake would likely have been only 2.5 cm (1 in) lower than the actual peak in 2002. Finally, it was found that, if the peak level on Rainy Lake was to be limited to, or kept close to, the IJC upper emergency level (highest point on either the 1970 or 2000 upper rule curve), the level of Rainy Lake would have had to be drawn down to about 335.4 m (1100.4 ft), or 1.3 m (4.3 ft) below the lowest point on both the 1970 and 2000 lower rule curves, prior to the June rainfall event. Such a drawdown, to provide flood protection, would prove devastating to most uses of the resource in most years.

Overall, the differences between the actual 2002 peak level and the modelled results with the 1970 rule curves generally fell within the range predicted during the rule curve study conducted by the IRLBC and reported upon in 1999. It was recognized in that study that somewhat higher levels were likely to occur with the revised rule curves under above-normal inflow conditions. This was recognized as the cost for attempting to achieve environmental benefits, and was deemed to be an acceptable tradeoff at that time. Where the difference is larger at the upper end of the range of results, it is clearly due to the 2002 event being a more extreme event than those tested during the study, and it appears to fall well within what would be expected. As with the 2001 event, the high water levels that occurred in 2002 were due to abnormally high rainfall and do not appear to be unduly worsened by the adoption of the new rule curves. In the Board's view it is simply fate that 2 of the 3 years since the adoption of the new rule curves have proven to be high water years.

The high water conditions and flooding resulting from the very heavy rainfall in June 2002 caused widespread damage over portions of southeastern Manitoba, northwestern Ontario and northern Minnesota, including the Rainy-Namakan basin. Within the Rainy-Namakan basin, severe flooding caused extensive washouts of roads, highways and rail lines and damage to homes near the Atikokan, Seine and Turtle Rivers and their tributaries to the northeast of Rainy Lake. Extensive damage to some homes and farms along with road washouts were also experienced near the Pinewood, Sturgeon and La Vallee River tributaries to the Rainy River in Canada, between Fort Frances and the Town of Rainy River. The Town of Rainy River experienced significant damage to roads, culverts and in particular its sewer infrastructure. In the United States, in Koochiching County away from Rainy Lake, major damages were concentrated in agricultural crop and livestock losses and damages to agriculture-related structures, primarily from tributary and overland flooding. On Rainy Lake, the high levels damaged a large number of fixed docks and shoreline facilities or rendered them difficult or impossible to use, with business at a number of local marinas and several resort and houseboat operations impacted to varying degrees. Other problems reported around Rainy Lake included flooding of home basements and crawl spaces, home furnaces and water heaters, yards and landscaping, septic systems and sewers. Abitibi-Consolidated in Canada reported losses in hydroelectric generation, paper production, flood fight and clean up costs, and extensive damage to its woodlands road network, with nearly every bridge and culvert in the storm area being washed out. In the United States, Boise Cascade incurred significant flood fight and clean up costs associated with the flooding of its International Falls powerhouse. Flood fight and clean up costs were incurred to one degree or another by most of the communities and individuals directly affected by the June 2002 rainfall. In contrast, high water damage on the Namakan Chain of Lakes was limited and relatively minor in nature.

Due to the high water events in the basin in 2001 and 2002, stakeholders have requested more explanation of regulation processes and trade-offs, more information during significant events and more public input to the regulation of Rainy and Namakan Lakes. In response, a number of preliminary ideas are being considered by the Board which would hopefully improve 2-way communications, addressing both input from the public to the Board and information from the Board to the public. The Board intends to explore these ideas further, with the hope of fostering greater public involvement and better understanding by basin residents of the regulation process.

In conclusion, the extraordinary June 2002 rainfall was bound to result in high lake and river levels. This was a relatively rare event, about which little can be done. The Companies and the Board responded to the rapidly increasing inflows in a timely and appropriate manner, increasing outflow over time as quickly as was prudent. The variability of inflows provided by nature is simply much greater than the Board's limited ability to regulate them. High levels such as those experienced in 2002 certainly won't occur every year, but even higher levels have occurred in the past and will occur again in the future. Property owners must be aware of this and take appropriate steps. These include: being aware of the range of water levels likely to occur, being aware of hazard land and floodplain zones, limiting incursion into the floodplain and hazard land zone to only docks and boathouses and recognizing that these structures are at risk, and preserving natural vegetation as much as possible to limit erosion.

8. RECOMMENDATIONS

Based on its assessment of the 2002 high water event, the Board recommends:

- that the IJC Year 2000 rule curves for Rainy and Namakan Lakes not be reviewed further at this time. The IJC should continue with its plans for review in 2015, with an earlier review only if warranted by new information in the future. The high water events in 2001 and 2002 were the result of unusually heavy rainfall and were not unduly worsened, beyond what was anticipated, by the new rule curves adopted in 2000. The peak level reached in 2002 on Rainy Lake, while 0.81 m (2.7 ft) above the IJC upper emergency level, was 0.67 m (2.2 ft) below the 1950 flood peak of record, and therefore was well within the shore zone area that should be considered hazard land around the lake.

- that more effort be made: to raise public awareness of the water levels that can occur, to educate the public about the shoreline hazard land area and how it should be used, and to encourage local governments to adopt and enforce hazard land zones around the lakes with appropriate development restrictions. After the events of 2001 and 2002, it is apparent that many people do not realize the risks associated with living and building near the water’s edge and do not realize the height to which the lakes have risen in the past and are likely to rise to again, and even higher, in the future. As a result, appropriate planning has not occurred, nor have safeguards and measures to minimize damage been put in place. In light of the events of 2001 and 2002, it would be irresponsible not to try to rectify this situation.

- that steps be taken to improve communications with the public, and to explore potential means of increased public involvement, regarding water level and flow regulation. Stakeholders in the basin have requested more explanation of regulation processes and trade-offs, more information during significant events and more public input to the regulation of Rainy and Namakan Lakes. In response, a number of preliminary ideas have been discussed by the IRLBC, the IRRWPB and the IJC, including information pamphlets, periodic informal stakeholder round-table discussions and establishment of a public advisory group to the IRLBC. These preliminary ideas should be investigated further and discussed by the Boards and the IJC with the dam operators and other stakeholders, seeking their views, comments and additional ideas.