

## Adopted Regulation Strategy – LWCB Regulation Meeting – March 11, 2004

### Overview

We are entering this spring following three very abnormal years in the Winnipeg River drainage basin. In 2001 and 2002 Lake of the Woods reached the highest levels in fifty years, while in 2003 Lake of the Woods saw the lowest summer levels since 1980. For Lac Seul, inflows were very low in 2003 until mid-summer, but improved dramatically for the latter part of the year.

Spring weather outlooks for the southern part of the basin from United States forecasters indicate no trend to either side of normal for either temperature or precipitation. Canadian outlooks, however, are for above normal temperature and precipitation for the spring period. (It should be noted that the reported skill level shown for these forecasts is “not significantly better than chance”.)

### Lac Seul

#### i) Scenarios

The attached graph for Lac Seul shows scenarios of lake levels that would result from 5 different combinations of assumed inflows and outflows. The April 1 starting level for the 5 scenario lines shown on the graph represents the Secretariat’s forecast as of March 11. The actual level on April 1 is very dependent on inflows and outflow changes up to that time. It should be noted that the scenarios show a range of possible future conditions and are not forecasts nor are they necessarily linked to the operating strategy.

For the Lac Seul scenarios, the Lake St. Joseph diversion is assumed to be fully open. Under high inflow scenarios, closing the diversion would allow Lac Seul outflows to be reduced by 80 to 190 m<sup>3</sup>/s.

#### ii) Overall Objectives

- supply water requested by Ontario Power Generation and Manitoba Hydro for hydroelectric energy generation; try to ensure that at least their minimum requirements are met
- provide optimal Lac Seul, Pakwash Lake and English River levels for the fishery and tourist outfitter interests
- optimize energy use to avoid spill in wet conditions and violation of low flow constraints in dry conditions
- regulate Lac Seul level and outflow to avert or minimize flood risk downstream
- use Lac Seul storage to offset Lake of the Woods high/low flows for the benefit of users of the Winnipeg River in Manitoba
- avoid closing the Lake St. Joseph diversion with resulting increased flows down the Albany River

#### iii) Seasonal Considerations

With Lac Seul levels having been the lowest in many years through last spring and summer, the primary concern of tourist outfitters and fishery managers is to see the lake begin to rise and to achieve higher levels during the fish spawn this spring and for navigation at the beginning of the walleye fishing season. While it may be difficult to achieve the preferred levels, the risk of declining levels after April 15 is quite low, if outflows are reduced below 200 m<sup>3</sup>/s. The minimum

inflow since 1958 (when the Lake St Joseph diversion came into operation) for the last half of April was in 1988 when inflows averaged 162 m<sup>3</sup>/s. Regarding the fishery and tourist outfitter spring target levels of 1164 ft (354.79 m) for April 15 and 1165 ft (355.09 m) by the opening of the fishing season in May, these levels have been met in 12 and 13 years of the past 20, respectively. For this year, the mid-April target may be missed by up to 25 cm (10 in) depending on inflows and the timing of outflow reductions. The mid-May target will be more easily met if inflows remain above median.

The power utilities will benefit from storing water during the freshet period so that river flows do not exceed their powerhouse capabilities.

#### iv) Strategy

##### ***To March 31 (Drawdown Period)***

The current (March 11) outflow is 470 m<sup>3</sup>/s. Without any changes in dam settings, the outflow will continue to decline naturally as the lake level falls. Further outflow reductions from Lac Seul will be timed to maintain flows on the Winnipeg River in Manitoba below 960 m<sup>3</sup>/s as the spring freshet flows increase and to ensure that Lac Seul begins to rise towards the fishery water level goals. The reductions will be coordinated with the provincial power utilities and fishery resource managers with the extent of the reductions dependent on inflows. Significant Lac Seul outflow reductions beginning about mid-March will provide lead time for reduced flows in Manitoba by early April and will also reduce the extent of drawdown below the April 15 fishery target level.

Due to the current (March 11) level of the lake, it is highly unlikely that it is possible to both continue to meet the hydro flows agreed to in the strategy set last fall and to satisfy the preferred April 15 fishery target level. To meet the fishery target, outflow would have to be cut by more than 50% immediately. Flows in the Winnipeg River in Manitoba will be maintained close to 900 m<sup>3</sup>/s but, through outflow reductions, every effort will be made to come as close to the fishery targets as inflows permit. To facilitate this, as noted in the Lake of the Woods drawdown strategy, an effort will be made to supply some of the water for Manitoba from Lake of the Woods, thereby reducing the outflow demands on Lac Seul.

##### ***After March 31 (Refill Period)***

###### a) Low Inflow Conditions

- Outflow should be managed to ensure Lac Seul level continues to rise, while ensuring that there is sufficient outflow to meet downstream hydropower generation and fishery requirements.
- Consultation with interests, including OMNR staff in Red Lake and the provincial hydro utilities, would be necessary to arrive at the appropriate balance between lake levels and outflows. In general, if inflow remains low throughout the refill period, outflow should be adjusted to maintain a balance between upstream and downstream interests. Note that a lower quartile outflow for May for the 1970-1999 period was approximately 50 m<sup>3</sup>/s while a lower decile outflow was approximately 40 m<sup>3</sup>/s.

###### b) Moderate Inflow Conditions

- As of March 11, this is considered the most likely scenario for Lac Seul, with inflows near median, to somewhat above median. This corresponds to the S3 to S2 scenarios on the attached graph.

- Constrain outflow to allow the lake level to begin to recover while supplying water for hydroelectric production and for English River fishery concerns. At median inflow, try to meet the Lac Seul outfitter target of 1165 ft (355.09 m) for the May holiday weekend. (This criterion would be met with inflows slightly above median and outflows of 200 m<sup>3</sup>/s.)

c) High Inflow Conditions

- Note from the scenario graph that, due to the anticipated drawdown of Lac Seul by March 31, the risk of high water levels on the lake are reduced.
- The recommended strategy for high inflow conditions is to balance Ear Falls outflow with the rise in Lac Seul level to reduce flood risk both on Lac Seul and on downstream areas. An effort should be made to maintain Lac Seul levels (or projected levels) below upper decile through May, with a transition to near upper quartile by the end of June. Outflows should remain below 450 m<sup>3</sup>/s for moderately wet conditions, below 500 m<sup>3</sup>/s for most conditions and below 600 m<sup>3</sup>/s in all but extreme conditions. Under extreme conditions, maintain Lac Seul level no higher than upper decile at the end of June with outflow no higher than 600 m<sup>3</sup>/s. Increase to as much as 800 m<sup>3</sup>/s to keep the level below 357.1 m (1171.6 ft). When Lac Seul is above the level at which the Lake St. Joseph diversion comes under Board jurisdiction (356.01 m /1168.0 ft until the end of May; 356.31 m /1169.0 ft for June), the diversion flow should be reduced before increasing Lac Seul outflow to more than 500 m<sup>3</sup>/s. The diversion would also be closed if flows on the Winnipeg River at Slave Falls were projected to exceed 2000 m<sup>3</sup>/s. This corresponds to an upper decile June-July level on Nutimik Lake of 276.0 m (905.6 ft).

## **Lake of the Woods**

i) Scenarios

The attached graph for Lake of the Woods shows scenarios of lake levels that would result from 5 different combinations of assumed inflows and outflows. The April 1 starting level for the 5 scenario lines shown on the graph represents the Secretariat's forecast as of March 11. The actual level on April 1 is very dependent on inflows and outflow changes up to that time. It should be noted that the scenarios show a range of possible future conditions and are not forecasts nor are they necessarily linked to the operating strategy.

ii) Overall Objectives

- Carry out lake regulation with due regard for the Canada-United States Treaty and Canadian legislation regarding Lake of the Woods levels and outflows.
- Adjust lake level and outflow to achieve a balance between upstream and downstream interests, as inflow dictates.
- Strive to keep the summer lake level 10-15 cm (4-6 in) lower in "average" years as per the Board commitment made following the 2001 high water year.

iii) Seasonal Considerations

Lake of the Woods water levels are currently (March 11) at 25 %ile but, for the second year in a row, they are the lowest since 1988. Lake of the Woods inflow had declined through February and local users expressed concerns that low lake levels might be repeated this summer if flow reductions are not made.

Although there is no evidence that the low inflows are any more likely to continue than a return to wetter conditions, regulation strategy will be defined to hedge against drier than normal conditions, at least for the near term.

If average lower quartile inflows are assumed for the spring period, outflow need only average 200 to 225 m<sup>3</sup>/s to achieve the Board's goal of having Lake of the Woods level 10 to 15 cm (4 to 6 in) below median. Note, however, that even with median inflow, an outflow of 400 m<sup>3</sup>/s or higher would be required to meet the lake level goals.

iv) Strategy

***To March 31 (Drawdown Period)***

The current (March 11) outflow is 275 m<sup>3</sup>/s. Conditions will be reviewed and a potential first flow adjustment made the week of March 15<sup>th</sup>. Due to current higher inflows (to March 11), the March 31 level may be higher than that targeted through the winter. Outflow increases will be made prior to March 31, as possible, without taking the lake below the March 31 target, in order to help meet the flow requirements downstream and therefore alleviate the outflow demands on Lac Seul. As a guide for making near-term outflow changes, the lake level will be targeted for an end of May level of 322.7 m (1058.7 ft). Outflow should not be reduced below 200 m<sup>3</sup>/s or increased above 700 m<sup>3</sup>/s to satisfy these constraints.

***After March 31 (Refill Period)***

a) Low Inflow Conditions

- If a lake level of 322.40 m (1057.7 ft) or lower is anticipated after April 30, reduce outflow to 150 m<sup>3</sup>/s, unless forecasts indicate a good probability of increasing inflows. Before April 30, reduce outflow to as low as 150 m<sup>3</sup>/s if the lake level is below 322.35 m (1057.6 m) and is declining.
- Satisfy minimum outflow requirements as recommended by the Ontario Ministry of the Environment.
- Assess conditions immediately before spawning begins in the Winnipeg River so that outflows can be set to prevent, as much as possible, the need for further flow reductions during the spawning season (late April to early June), while ensuring the lake level does not decline.
- Maintain the lake level above lower decile if possible.

b) Moderate Inflow Conditions

- As of March 11, this is the most likely scenario for Lake of the Woods; caution should be exercised on the side of avoiding excessively low lake levels.
- Assess conditions immediately before spawning begins in the Winnipeg River so that outflows can be set to prevent, as much as possible, the need for further flow reductions during the spawning season (late April to early June), while ensuring the lake level continues to rise.
- Outflow increases should be kept moderate during the spawning period.
- Attempt to keep the summer lake level 10-15 cm (4-6 in) below the summer peak median level of 323.14 m in accordance with the commitment made by the Board following the high water year of 2001. To achieve this, the lake level targets would be approximately 322.7 m (1058.7 ft) for the end of May and 322.9 m (1059.4 ft) at the end of June. Try to

balance this with avoiding outflows in excess of the generation capability at Kenora and optimizing hydroelectric generation downstream.

- Set outflow to as much as 800 m<sup>3</sup>/s to prevent the peak lake level from exceeding 323.09 m (1060 ft) for the benefit of Lake of the Woods cottagers and south shore residents, if inflow is no higher than median.
- Through late May and June, attempt to limit Lake of the Woods outflow changes which would adversely affect nesting loons on the Winnipeg River.
- Through June and early July, try to manage lake levels to limit the rate of rise for wild rice.

c) High Inflow Conditions

- Balance higher water levels on the lake with the impact of increased outflows downstream, both in Ontario and Manitoba.
- Do not increase outflow above 800 - 900 m<sup>3</sup>/s to keep the lake level (or projected level) below upper quartile in June. A flow of 900 m<sup>3</sup>/s on the Winnipeg River would cause the level below the Norman Dam to be about 1.4 m (4.6 ft) above normal; upper quartile level on the lake is 0.2 m (8 in) above median.
- For this year, in light of the recent high water years, increase outflow as necessary to prevent the lake level (or the projected level) from rising above 323.47 m (1061.25 ft), which is the legislated top of the normal operating range. Note however, that the Convention and Protocol states “during periods of excessive precipitation the total discharge from the lake shall, upon the level reaching 1061 sea-level datum, be so regulated as to ensure that the extreme high level of the lake shall at no time exceed elevation 1062.5 sea level datum”. In future years, the Board may wish to consider making use of this flood storage during periods of high inflow.
- An attempt should be made to keep outflow increases to a maximum of 100 m<sup>3</sup>/s per week, except during the spawning season when it would be desirable to not exceed 50 m<sup>3</sup>/s per week. Note on the scenarios, however, that persistent 90 %ile inflows would necessitate inflow increases of 200 m<sup>3</sup>/s per week.



