12 Operating Plans

The following section provides the detailed operating plans which identify flow and level compliance requirements for the individual control structures on the Muskoka River system. For each structure, the operating plan is provided in descriptive and graphic format. The manner in which each operating plan meets objectives and considerations is noted. Public comments are summarized and the manner in which the plan addresses those comments is noted. Additional detail pertaining to public consultation is contained in Appendix D. Operating plans for watershed lakes/reservoirs and waterpower facilities are presented sequentially, commencing at the upstream limit of each subwatershed and proceeding downstream, beginning at the North branch subwatershed, then the South Branch and finally the Lower sub-watershed.

Flood and Drought Definitions

Definition of a Flood Situation and Terminology – Within a lake or river system, a flood situation is typically defined by a specific elevation, beyond which, some level of damage (to persons, property or infrastructure) is known to occur. Within the Muskoka River system, historical information has been incorporated into the current operating plans for the various MNR controlled lakes, such that an elevation has been identified as the beginning of this zone. While similar information is not available for river reaches to define the specific 'water level' at which damage may start to occur, historical 'flow levels' which have resulted in damage and or complaints have been integrated into the current operating plans. The term used to describe either the 'lake level' or the river 'flow level', beyond which damage may start to occur, is the High Water Zone (HWZ).

Within the following section and this WMP, the term 'Flood Allowance' is used to define the distance within the MNR controlled lakes between the top of the NOZ and the beginning of the HWZ. For downstream river reaches (below those structures), the term also refers to the flow volume at the beginning of the HWZ (as identified in MNR's Muskoka River Dam Operations Manual).

For waterpower facilities, this WMP will establish fixed operating limits (in terms of head-pond levels) under normal operating conditions. However, these facilities are located on river sections, have no direct control over the operation of dams on upstream lakes, and have limited ability to control head pond elevations during

high flow situations. Additionally, if they are operated to discharge the maximum discharge possible downstream flooding with occur. Accordingly, a High Flow Trigger (HFT) has been established for each power generating facility, which represents the maximum discharge possible while minimizing downstream flood damages. Therefore as outlined in Section 13.3 at discharge flows above the HFT the High Water Indicator will be met and operators will not be considered to be out of compliance with the water level requirements of the WMP. Under those circumstances, waterpower facility operators will coordinate their operations with MNR facilities to address the situation. Flood messages, as defined by the Provincial Flood Forecasting and Warning Committee, would be issued by MNR as appropriate, depending on the severity of the event.

Flooding is not a concern within the watershed during an average spring with slow snowmelt spread out over a 2 to 3 week period. However, a sudden melt, alone or in combination with significant rainfall, can increase the potential for flooding. As such, the present operating plans for the MNR controlled lakes included provisions to lower the March drawdown level beyond the Target Operating Level should conditions within the watershed indicate that there is a higher than normal risk of spring flooding associated with above normal snow pack water content, high temperatures and/or spring rainfall. In order to maintain this capacity to respond to the risk of a spring flood under these circumstances, the following provisions are incorporated into the new operating plans:

1 - If snow pack water content is >25% above normal on March 15 on the North Branch of the Muskoka River, lakes controlled by MNR will be lowered to the bottom of the NOZ.

2 - If snow pack water content is >50% above normal on March 15 on the South Branch of the Muskoka River, lakes controlled by MNR will be lowered to the bottom of the NOZ.

3 - If snow pack water content is >100% above normal on April 1 on both branches of the Muskoka River, lakes controlled by MNR will be lowered to the bottom of the LOZ.

Should the above-noted conditions occur, MNR will take snow courses on a weekly basis after March 15 to monitor/evaluate the potential for the development

of abnormal hydrologic conditions and assist in the development of an appropriate course of action.

Similarly, frequent rain and/or high temperatures and/or frozen ground can contribute to abnormal runoff and/or flow events. The following additional provisions apply under those conditions:

1 - On unfrozen ground, with 25 mm of rain in 1 day or 50 mm rainfall over several days and/or >10^{o}C during the day for more than 2 days or above 0^{o}C overnight for more than 2 days, lakes controlled by MNR will be lowered to the bottom of the NOZ.

2 - On frozen ground, with 25 mm of rain in 1 day or 25 mm rainfall over several days and/or >10^{o}C during the day for more than 2 days or above 0^{o}C overnight for more than 2 days, lakes controlled by MNR will be lowered to the bottom of the NOZ.

Definition of a Drought Situation and Terminology – A provincial "Ontario Low Water Response" procedure has been developed to allow provincial agencies that have specific roles and responsibilities related to water management to undertake a coordinated response to a drought situation (MNR et al, 2003). Three levels of drought are identified within that document, each with specific characteristics and level of response, ranging from conservation, to conservation and restriction on non-essential use, to conservation, restriction and regulation of all uses. Those procedures will remain in effect and will apply to the Muskoka River system should the appropriate conditions develop.

Section 13.3 identifies low water conditions where operators will not be considered to be out of compliance with the plan if they operate outside of the NOZ. Low Flow Triggers (LFT) have been defined which represent flows below which facilities may have difficulty maintaining water levels due to leakage, infiltration and evaporation. Under those circumstances, waterpower facility operators will coordinate their operations with MNR facilities to address the situation.

Similarly, the provision of adequate flow for walleye spawning on the South Branch below OPG's South Falls facility has been based on historical flow data and the ability to manipulate upstream lakes during the walleye spawning/

incubation period (approximately April 15 to June 1, as determined by MNR based on actual site temperatures) to provide the required quantity of flow (5 m^3/s from Baysville dam, which provides 3 m^3/s below Matthias GS and 3 m^3/s in the South Falls bypass/walleye spawning channel on an hourly basis). Should those values not be attainable in the future (e.g., due to extreme low water conditions, perhaps as a result of climate change), MNR, OPGC and OPG will cooperate to develop a response to this situation.

12.1 North Branch Muskoka River

12.1.1 McCraney Lake

The operating plan for McCraney Lake is shown in Figure 12.1.1, and has the following characteristics:

Target Operating Level Range:	444.2 to 445.2 m
Normal Operating Zone Range:	444.0 to 445.5 m
Absolute Range:	443.5 to 445.6 m
Summer* Range (Typical):	445.3 to 443.45 m
Winter Drawdown:	None
Flood Allowance (lake/river):	445.5 to 445.6 m/none
Maximum Daily Flow:**	4.6 m^3/s
Minimum Daily Flow*:**	0.5 m^3/s target
Natural Environment Constraints:	Base flow in downstream reach for ecological improvement. Cold-water lake with naturally reproducing lake trout population. Shoal locations unknown.
Social Constraints:	Minimum lake level of 444.2 during summer recreation season for canoe access to upstream lakes
Other:	None

* Summer period defined as June 1 to September 15.
** 50-year average.
***7-day average.

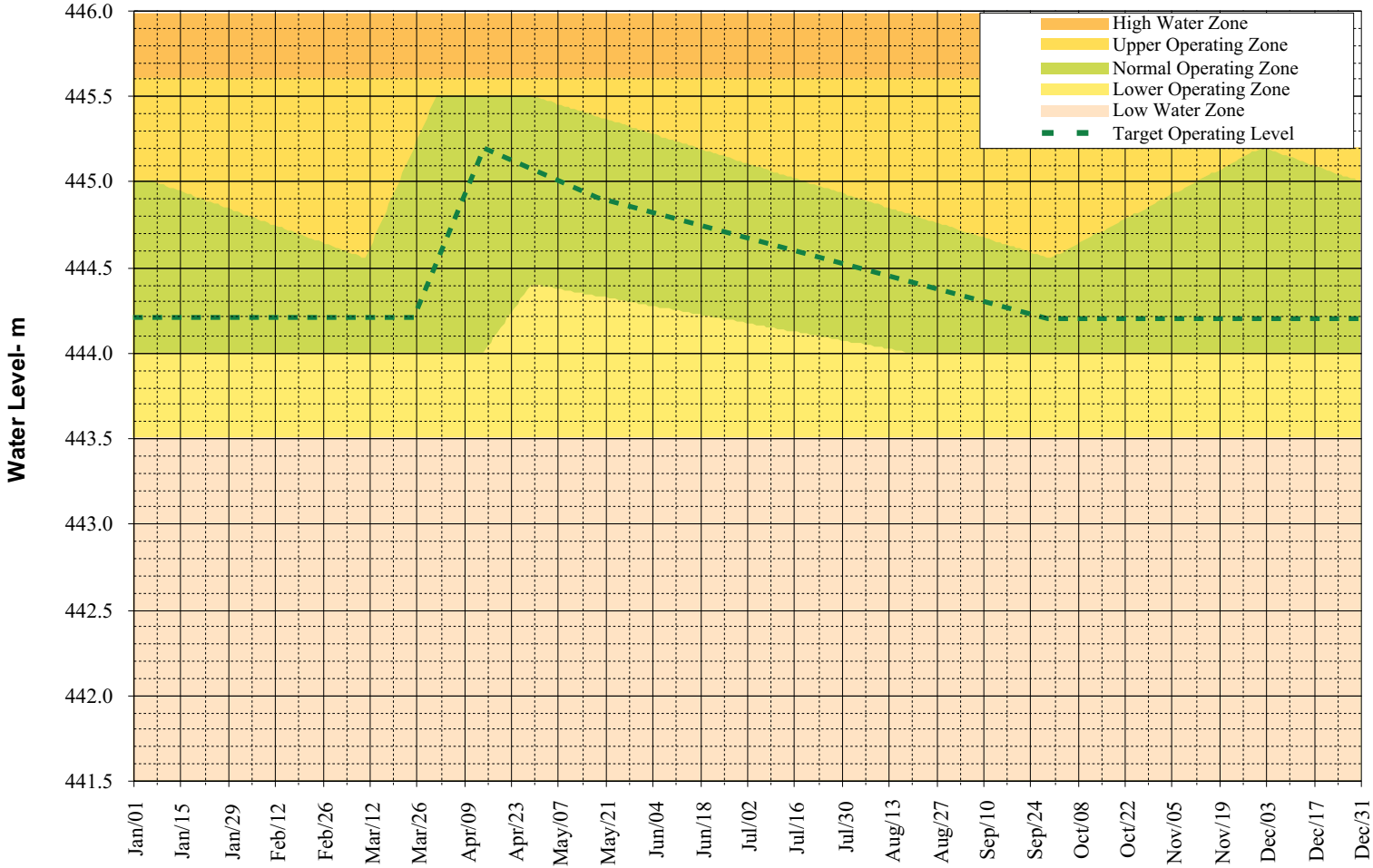


Figure 12.1.1
Muskoka River Water Management Plan
McCraney Lake Operating Plan

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Benefits and Resolution of Issues

- The elimination of the previous late summer draw down of 2 to 3 m is expected to provide a number of fisheries and ecological benefits within the lake ecosystem, including
  - improved littoral zone communities (not subjected to late summer dewatering and/or winter freezing/ice scour when the lake did not refill before the onset of winter)
  - improved upper riparian zone due to less annual variability in spring water levels
  - improved lake trout habitat due to higher and more stable fall water levels (stable late summer/early fall water levels will allow spawning areas to be subjected to cleansing wave action, and increase potential for egg survival/future recruitment)
- The operating plan closely simulates a natural flow regime, which meets the objectives of MNR's water management planning guidelines and Algonquin Parks management policies.
- The maintenance of a consistent outflow from the lake will improve habitat conditions in the reach immediately below the dam (by eliminating the cessation of flow in late October when the valve is closed after the drawdown is complete) including the maintenance of a base flow in the Big East River.
- Less variable water level will improve Algonquin Park canoe route access to Rain and Sawyer lakes, especially during late August and early September.
- The operating plan is expected to reduce operational visits (dam can be set to self-regulate) and expenditures in the long term.

Conflicts

- Eliminating the late summer/early fall drawdown eliminates this seasonal source of flow for the Big East River, and could affect late summer navigation (i.e., canoeing).
- Eliminating the late summer/early fall drawdown reduces the outflow from the lake and the water available in the North Branch for waterpower generation at this time of the year.

Public Comments

None

Information and Science Needs

- Baseline information is required on the ecology of the reach immediately below the dam (benthic and/or fish community to use as indicator of change)
- Baseline information on brook trout populations and associated habitat below the dam and in the upper portions of the Big East River.

12.1.2 Camp Lake – MNR

The operating plan for Camp Lake is shown in Figure 12.1.2, and has the following characteristics:

Target Operating Level Range:	412.15 to 412.75 m
Normal Operating Zone Range:	412.0 to 412.8 m
Absolute Range:	411.9 to 412.9 m
Summer* Range (Typical):	412.3 to 412.8 m
Winter Drawdown:	None
Flood Allowance (lake/river):	412.8 to 412.9 m/none
Maximum Daily Flow:**	2.0 m^3/s
Minimum Daily Flow*:**	0.25 m^3/s target
Natural Environment Constraints:	Cold-water lake with naturally reproducing lake trout population. Shoal locations known.
Social Constraints:	Infrastructure (fixed dock) heights range from 412.82 to 413.17 m.
Other:	None

Benefits and Resolution of Issues

- No change to NOZ during the summer and winter periods. Revised NOZ during the fall to accompany the higher fall TOL.
- The reduced fall drawdown is expected to improve lake trout habitat. Higher fall water levels will provide a larger area for spawning and improved habitat conditions in long term (spawning areas will be more susceptible to cleansing wave action, and increased potential for egg survival/future recruitment).
- The reduced fall drawdown also reduces the overall range of lake levels, and is anticipated to enhance recreational access to docks and structures, especially in the latter part of the fall season.
- The operating plan closely simulates a natural flow regime, which meets the objectives of MNR's water management planning guidelines.
- The maintenance of a consistent outflow from the lake throughout the year will improve habitat conditions in the reach immediately below the dam and into the Big East River. Reducing the magnitude of the fall drawdown

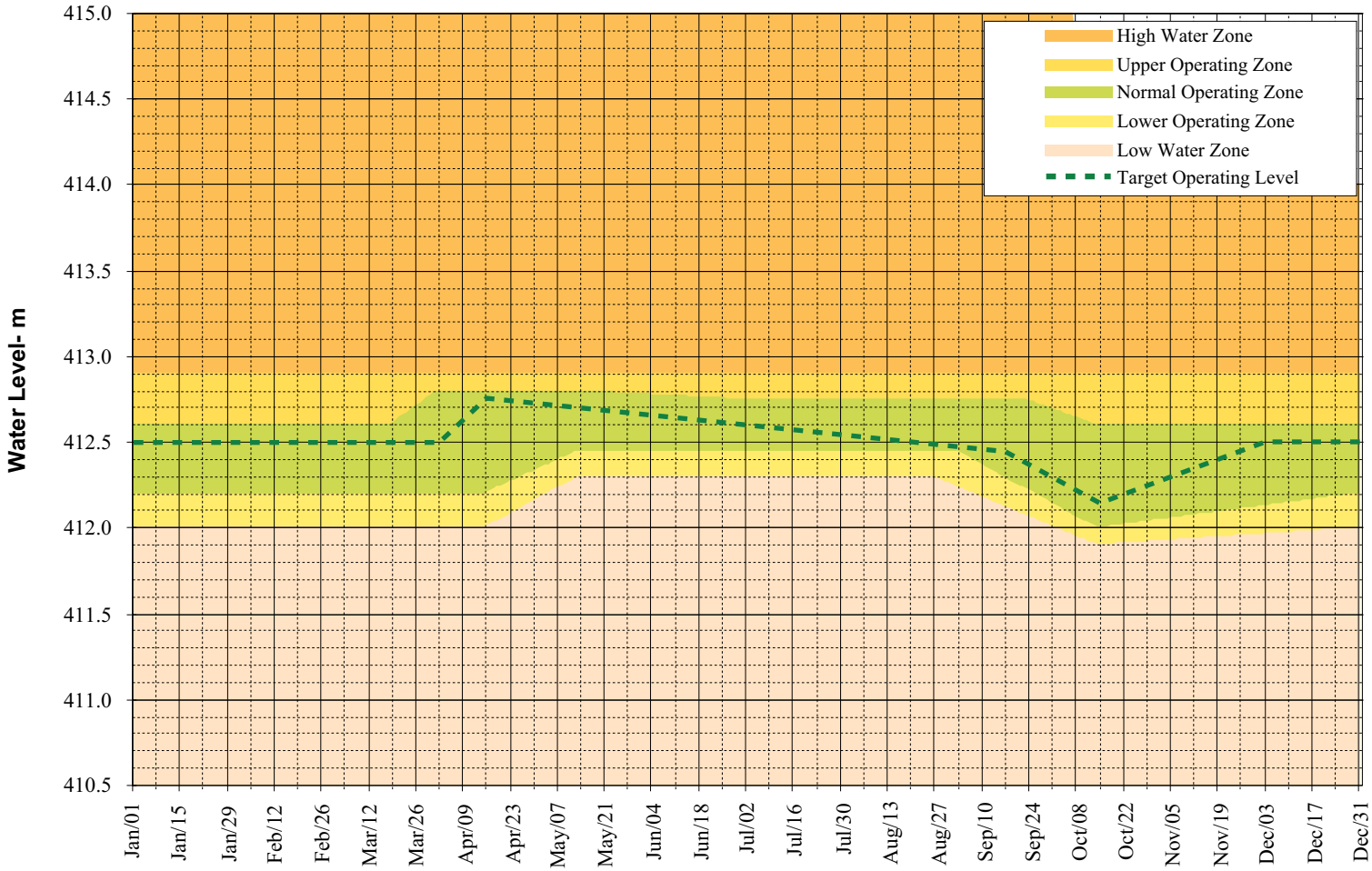


Figure 12.1.2
Muskoka River Water Management Plan
Camp Lake Operating Plan

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will reduce the impact of the late October-early December flow cessation as the lake refills to the winter elevation.
- The operating plan is expected to reduce operational visits and expenditures in the long term.

Conflicts
- Reducing the fall drawdown reduces this late season source of flow for the Big East River, and could affect late season navigation (i.e., canoeing).

Public Comments
None

Information and Science Needs
- Baseline information is required on the ecology of the reach immediately below the dam (benthic and/or fish community to use as indicator of change)
- Baseline information on brook trout populations and associated habitat below the dam, in Tasso Creek and in the upper portions of the Big East River.

12.1.3 Tasso Lake – MNR

The operating plan for Tasso Lake is shown in Figure 12.1.3, and has the following characteristics:

Target Operating Level Range:	398.8 to 399.6 m
Normal Operating Zone Range:	398.7 to 399.7 m
Absolute Range:	398.5 to 399.85 m
Summer* Range (Typical):	399.4 to 399.48 m
Winter Drawdown:	399.1 to 398.85 m
Flood Allowance (lake/river):	399.7 to 399.85 m/none
Maximum Daily Flow:**	5.1 m^3/s
Minimum Daily Flow*:**	0.5 m^3/s target
Natural Environment Constraints:	Base flow required in downstream reach to maintain healthy brook trout population. Cold-water lake with naturally reproducing lake trout population. Shoal locations known.
Social Constraints:	Boat access to/from South Tasso Lake through a culvert under Muskoka Road 8 to be maintained – no change in summer/early fall water levels. Infrastructure (fixed dock) heights ranged from 399.59 to 400.29 m, with many including a floating section. Overtopping of the dam would create concerns due its use as a public access road.
Other:	None.

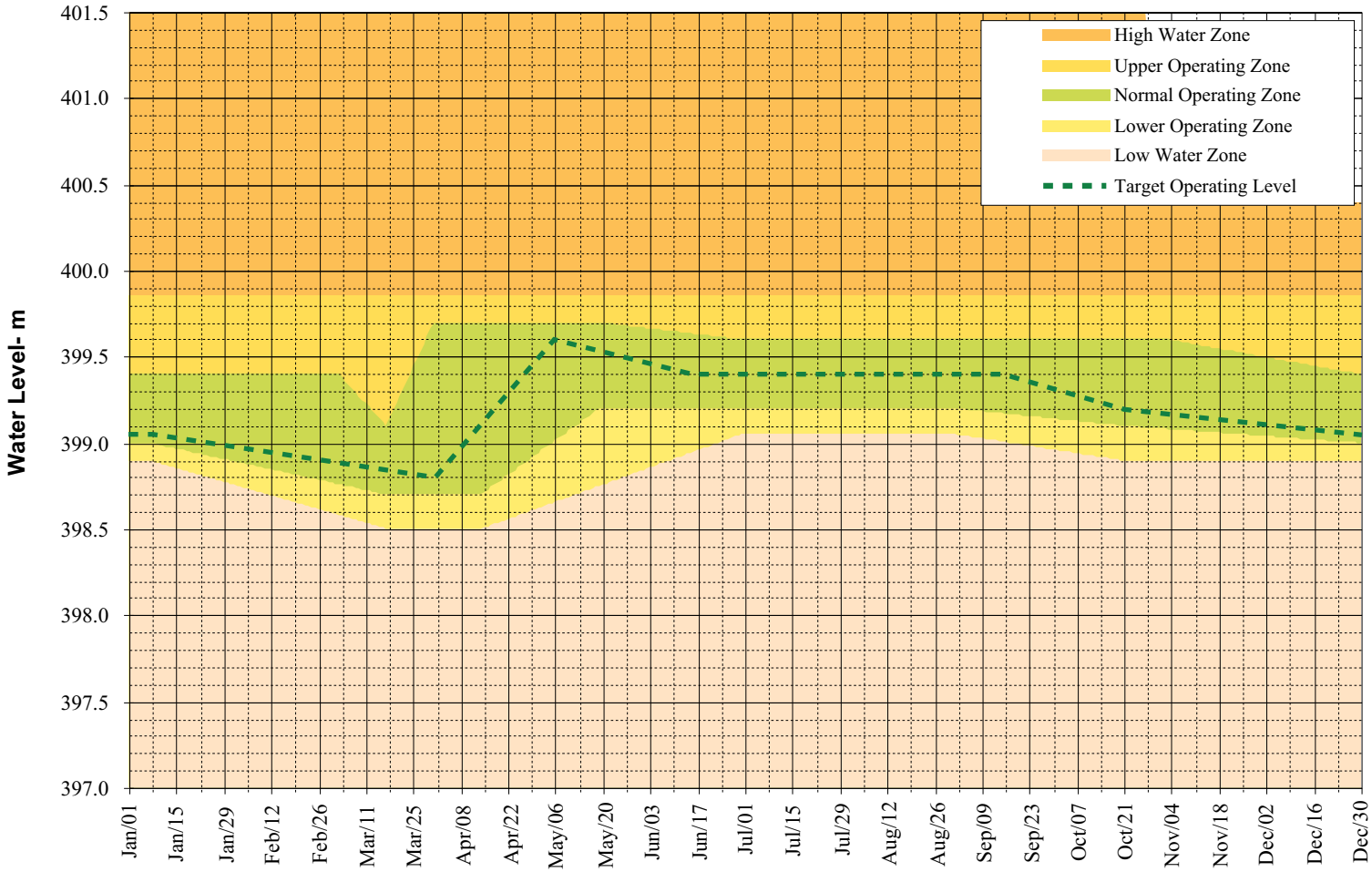


Figure 12.1.3
Muskoka River Water Management Plan
Tasso Lake Operating Plan

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Benefits and Resolution of Issues

- No change to NOZ.
- Slightly higher spring peak (0.2 m) and slow drawdown anticipated to improve habitat conditions for wetlands and spring spawning fish species
- Fall drawdown proceeds slowly into winter drawdown (elimination of a sharp drop) to maintain more consistent flow into downstream habitats.
- Consistent summer, fall and winter flows to maintain brook trout habitat value in Tasso Creek.

Conflicts

- Higher spring water levels enhance flooding/ice damage potential to infrastructure. However, not considered significant due to present use of floating sections combined with elevated shoreline portions.

Public Comments

None

Information and Science Needs

- Baseline information is required on the ecology of the reach immediately below the dam (benthic and/or fish community to use as indicator of change)
- Baseline information on brook trout populations and associated habitat below the dam, in Tasso Creek and in the upper portions of the Big East River.

12.1.4 Buck Lake – MNR

The operating plan for Buck Lake is shown in Figure 12.1.4, and has the following characteristics:

Target Operating Level Range:	300.3 to 301.0 m
Normal Operating Zone Range:	300.2 to 301.15 m
Absolute Range:	299.9 to 301.19 m
Summer* Range (Typical):	300.30 to 301.0 m
Winter Drawdown:	300.4 to 300.3 m
Flood Allowance (lake/river):	301.15 to 301.19 m/none
Maximum Daily Flow:**	25.6 m^3/s
Minimum Daily Flow*:**	1 m^3/s target
Natural Environment Constraints:	Shoreline erosion is a concern during high water events.
Social Constraints:	None.
Other:	None

Benefits and Resolution of Issues

- No change to NOZ. Spring water level peak approximately 2 weeks earlier to improve habitat conditions for wetlands and spring spawning fish species.
- No change to elevation of spring peak, and quicker reduction to summer TOL will address resident spring high water concerns.
- Consistent summer, fall and winter flows to maintain habitat values in Buck River downstream from the dam.

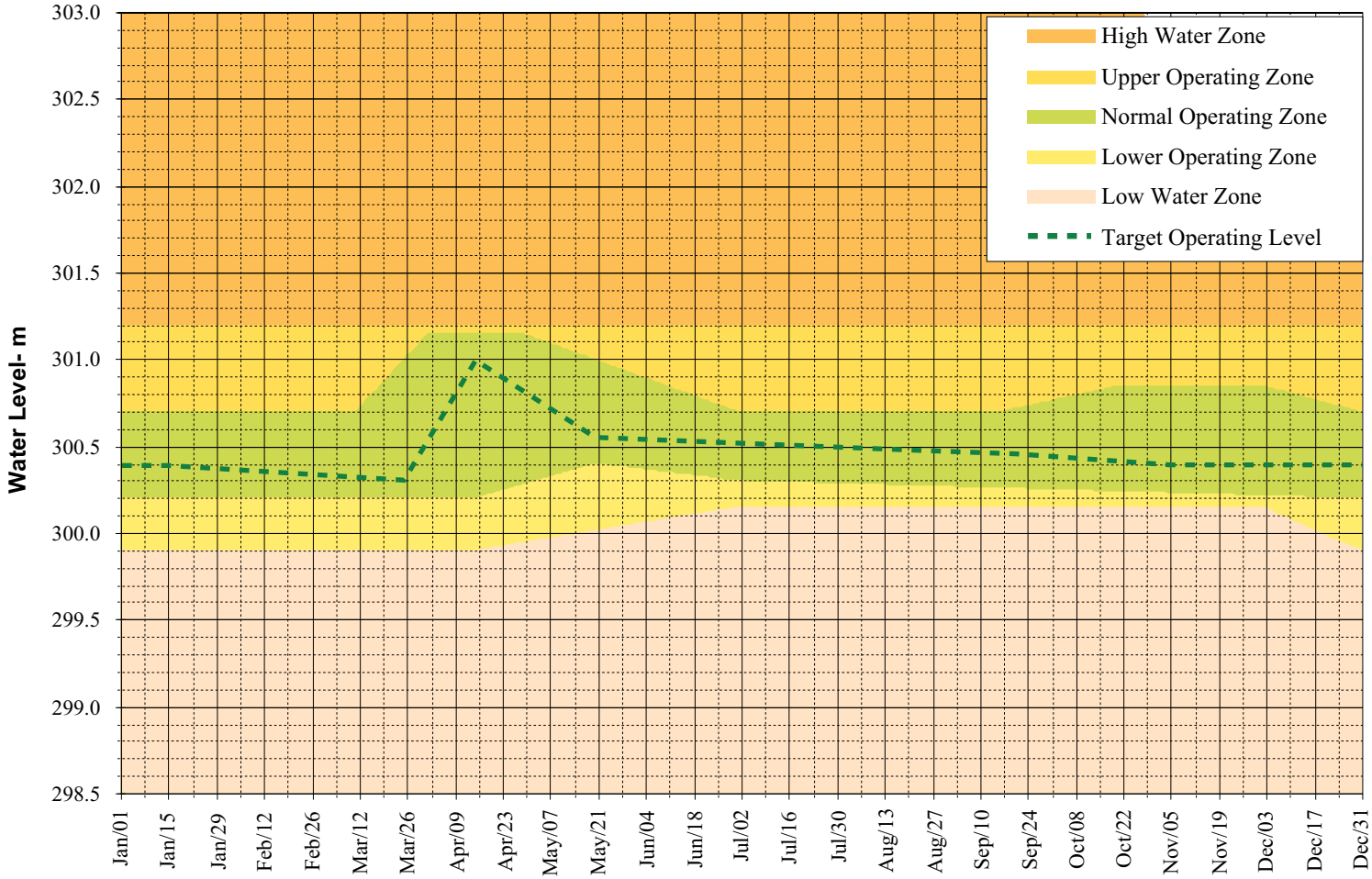


Figure 12.1.4
Muskoka River Water Management Plan
Buck Lake Operating Plan

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Conflicts

- Difficult to maintain the TOL in the spring as the lake is slow to drain (constricted outlet).

Public Comments

None

Information and Science Needs

None

12.1.5 Fox Lake – MNR

The operating plan for Fox Lake is shown in Figure 12.1.5, and has the following characteristics:

Target Operating Level Range:	294.3 to 294.6 m
Normal Operating Zone Range:	294.2 to 295.0 m
Absolute Range:	293.9 to 296.0 m
Summer* Range (Typical):	294.35 to 294.5 m
Winter Drawdown:	294.35 to 294.3 m
Flood Allowance (lake/river):	295.0 to 296.0 m/9.9 m^3/s
Maximum Daily Flow:**	26.7 m^3/s
Minimum Daily Flow*:**	1 m^3/s target
Natural Environment Constraints:	Potential disturbance to loon nesting due to water level management.
Social Constraints:	Concerns expressed by residents regarding high summer water levels and shoreline erosion – summer TOL of 294.37 m preferred to reflect a traditional level, and to reduce shoreline erosion and changing shoreline vegetation patterns
Other:	Difficult to mitigate high water events due to constriction at downstream bridge.

Benefits and Resolution of Issues

- No change to upper NOZ. Slightly higher (0.1 m) and earlier (11 days) spring water level peak will improve habitat conditions for wetlands and spring spawning fish species.
- Quicker reduction to summer TOL will address resident concerns over early summer high water concerns and shoreline erosion.
- Lower late summer NOZ and TOL to address resident concerns regarding high summer levels.
- Consistent summer, fall and winter flows to maintain habitat values in the river reach downstream from the dam.

Conflicts

None

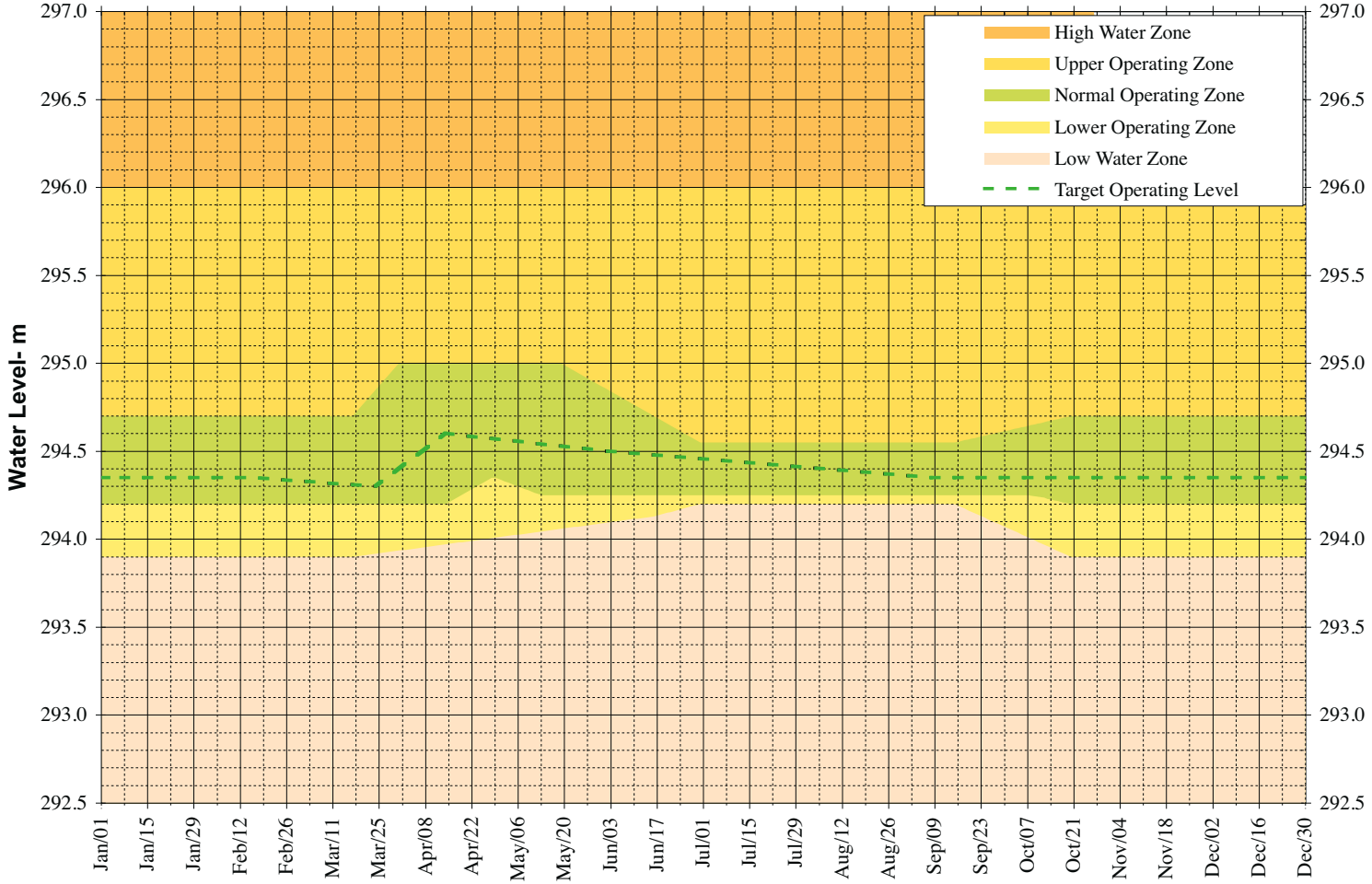


Figure 12.1.5
Muskoka River Water Management Plan
Fox Lake Operating Plan

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Public Comments

Environmental Component	Comment	Resolution
Shoreline erosion	"instead of leaving the water level high…over the fall/winter/spring period when we experience the harshest onshore winds and waves on the east side of the lake, the water is raised to the midpoint [of our]… beach…in the fall. This results in heavy erosion of the sandy beaches due to undercutting. Later in the fall, the logs are pulled and the water is left low over the winter. We have no erosion problems once it is dropped to this lower level….Once the spring freshet is over, you [MNR] lower the water level again to mid-point and we again get severe erosion (usually May/June). The water levels are then lowered very slowly over the May, June, July period, not reaching their optimum summer levels [294.35 to 294.40] usually until about the first of August. During this period of gradually lowering water levels, we experience the most major erosion of the year on our beaches." "If summer levels are maintained too high, significant shoreline erosion occurs…a summer level of 294.4…seems adequate." "…the target summer operating level for Fox Lake should be 294.37 m to reflect a traditional pattern and to reduce the continuing shoreline erosion and changing shoreline vegetation patterns caused by the current operational level of 294.45 m."	The spring peak water level will be achieved 11 days earlier and drawdown to the summer level will commence immediately. There will be a gradual decline over the summer period (June 1 to September 15) to a 10-cm lower level. No water level change through fall and early winter, with a more gradual decline to the same target winter level.
Loon nesting	"Almost every year…loons build a nest…in the north end of the lake. Usually nest building commences by early June and they, of course, build close to the water's edge. As you [MNR] have not dropped the water to its summer levels and you continue to drop the water slowly over the next 2 months, the loons often experience difficulty in reaching their nest prior to hatching of their eggs, usually in July. This can result in nest abandonment"	A study was undertaken to assess the effect of water level fluctuations on loon reproductive success in the Muskoka River watershed (Acres, 2003). The study recommended that any water management strategy should attempt to minimize the magnitude of fluctuation in water levels during loon nesting and incubation period. The proposed water management strategy in this lake will address this recommendation by having an earlier spring peak and a quicker reduction to the summer water level.

Information and Science Needs

None

12.1.6 Huntsville Lakes (Vernon, Fairy and Peninsula) – MNR

The operating plan for the Huntsville Lakes is shown in Figure 12.1.6, and has the following characteristics:

Target Operating Level Range:	283.3 to 284.0 m
Normal Operating Zone Range:	283.16 to 284.15 m
Absolute Range:	283.1 to 284.62 m
Summer* Range (Typical):	283.7 to 283.9 m
Winter Drawdown:	283.75 to 283.3 m
Flood Allowance (lake/river):	284.13 to 284.62 m/142 m^3/s
Maximum Daily Flow:**	126.8 m^3/s
Minimum Daily Flow*:**	3 m^3/s, year round target 11 m^3/s, winter target
Natural Environment Constraints:	Cold-water lake with known lake trout spawning shoals in all three of the lakes.
Social Constraints:	Lakes have extensively developed shoreline, with water-based recreation activities continuing well into fall. Infrastructure elevations ranged from 283.89 to 284.49 m.
Other:	Limited ability of the dam to respond to high water levels/flow events due to limited flow capacity in lake connecting channels. A target outflow of 11 m^3/s is provided during the winter months to provide storage for the spring freshet and meet waterpower needs.

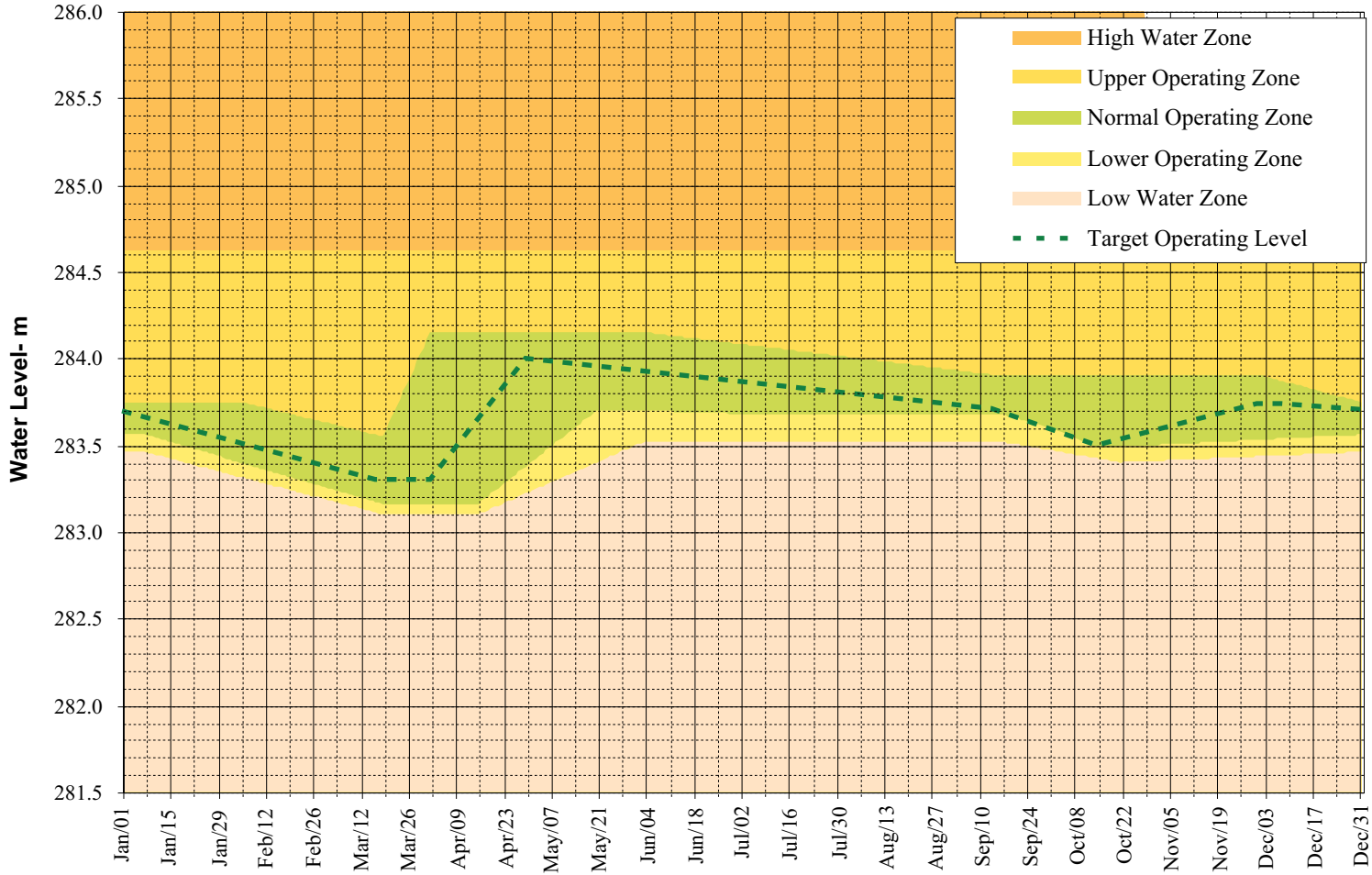


Figure 12.1.6
Muskoka River Water Management Plan
Huntville Lakes Operating Plan

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Benefits and Resolution of Issues

- No change to NOZ. Average maximum high water level essentially unchanged (4 cm higher) and no change to number of High Water Zone exceedances.
- Operating plan with a gradual, continual reduction in TOL throughout the spring and summer recreation season will eliminate the previous stepped operating levels approach. Fall/early winter TOL unchanged.
- Less differential between fall and winter water levels (0.2 m vs 0.3 m presently) to improve lake trout reproductive habitat.
- Consistent outflow from the lake to improve habitat conditions in the downstream river reach below the dam.
- Proposed water level and flow regime will more closely simulate a natural flow regime to enhance littoral zone conditions.

Conflicts

- No change to maximum spring outflow level, but a predicted increase in the number of years when downstream flood damage zone flows are exceeded (17 in 50 vs 11 in 50 presently).
- The summer range of water levels (at 80^{th} percentile level) is predicted to increase by up to 12 cm relative to present conditions.

Public Comments

Environmental Component	Comment	Resolution
Access and Navigation	"When the water is too low, boats can't access docks/slips and can hit underwater obstacles" "boat/motor damage during unusually low water levels"	Maintain existing NOZ and TOL during the fall season.
Infrastructure	"dock…damage due to high water" "water intake freeze in spring due to levels below normal" "In some years, if the water is high when the ice is going out, we sustain structural damage to our docks and boathouses"	No predicted change in spring high water levels or ice damage potential.
Shoreline Erosion	"Beach damage due to high water"	No predicted change in spring high water levels.
Flooding	"if water is too high our property becomes flooded…water level is often too high [in springtime]" "in spring, out boathouses and docks are flooded when the water is high"	No predicted change in spring high water levels.
Water Levels	"keep water levels similar from season to season"	Not possible – levels fluctuate in response to natural events (rainfall, drought). Lakes managed to balance needs of infrastructure, recreation, natural environmental and socioeconomic components.
Natural Environment	"the late winter drawdown of water from Peninsula Lake leaves the littoral zone and all the resting eggs and larvae exposed to long periods of intense cold" "Concern is lake life health for Peninsula; amphibian life seems to have been ignored. Compensate negative impact of trout spawning shoals by re-stocking. Extreme winter level drawdown affects aquatic and amphibian life in subtle ways. It should be limited to the extent possible, regardless of power generation needs. Can winter drawdown be delayed to second half of March with improved control method at Mary Lake locks?"	Reduced differential between late winter and fall drawdown levels (0.2 m) is anticipated to provide some benefit to eggs and larvae. Huntsville Lakes are managed to balance needs of infrastructure, recreation, natural environmental and socio-economic components. Lake trout stocking is no longer considered appropriate due to limited survival and adverse impact on remaining natural stocks (i.e. dilution of gene pool with fish that are not adapted to unique conditions within lake). Drawdown is undertaken gradually during the winter to ensure storage volume is

Environmental Component	Comment	Resolution
	"Aggressive winter/fall drawdown is causing a large amount of Pen Lake shore to be exposed to temperature extremes and desiccation during January, February and March. This is destroying many of the overwintering (eggs/larvae) species of the littoral zone" "Is there any room for input from those of us that live on the shores or Pen Lake? Can we contact someone when levels are too high or low"	available when needed for spring freshet, to limit adverse effects on lake ice cover and levels and downstream flow regime, and make most efficient use of outflow for waterpower generation. Less winter drawdown would increase spring levels and aggravate flooding concerns. Input and/or water level concerns can be forwarded to the Water Control Technologist at the Bracebridge MNR office.

Information and Science Needs

None

12.1.7 Mary Lake – MNR

The operating plan for Mary Lake is shown in Figure 12.1.7, and has the following characteristics:

Target Operating Level Range:	280.3 to 281.0 m
Normal Operating Zone Range:	280.03 to 281.1 m
Absolute Range:	279.95 to 281.15 m
Summer* Range (Typical):	280.9 to 280.65 m
Winter Drawdown:	280.67 to 280.3 m
Flood Allowance:	281.1 to 281.15 m/141.6 m^3/s
Maximum Daily Flow:**	140.6 m^3/s
Minimum Daily Flow*:**	3 m^3/s, year round target 11 m^3/s, winter target
Natural Environment Constraints:	Several lake trout spawning shoals located within the current late winter/early spring drawdown zone.
Social Constraints:	Lake has extensively developed shoreline, with water-based recreation activities continuing well into fall. Infrastructure elevations ranged from 280.95 to 281.63 m.
Other:	Dam is operated in conjunction with the Huntsville Dam to provide summer recreational opportunities, a minimum downstream flow, and a winter release for infrastructure protection and waterpower generation.

Benefits and Resolution of Issues

- No change to NOZ. Summer water levels will decline gradually over the summer season to simulate a natural flow regime and provide more natural ecological conditions.
- Slightly higher spring water level to improve ecological conditions for wetlands and spring spawning fish species.
- Fewer High Water Zone exceedances.
- Less differential between fall and winter drawdown levels to improve lake trout spawning habitat conditions. Decreased winter drawdown will increase the amount of available aquatic habitat.

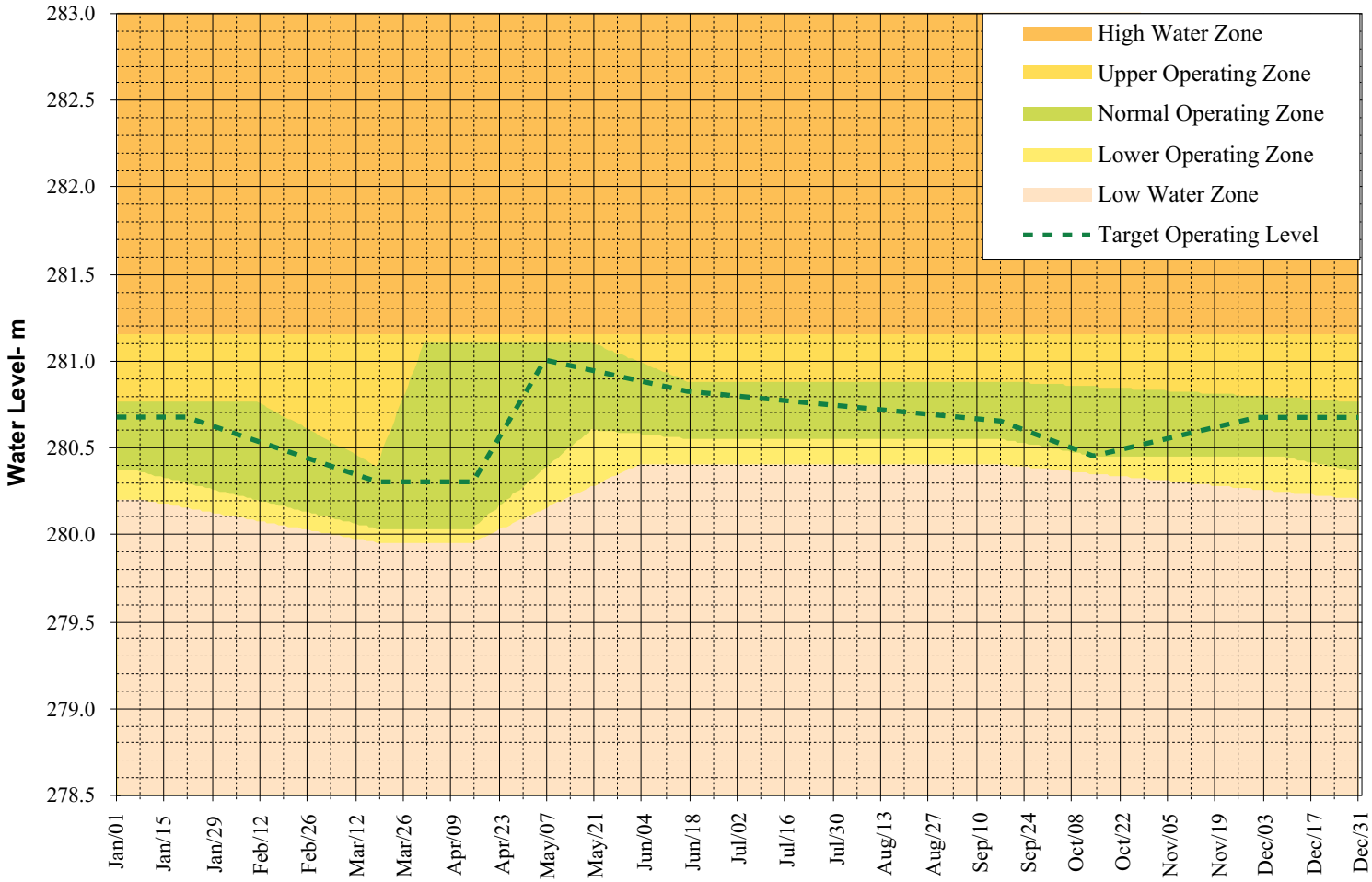


Figure 12.1.7
Muskoka River Water Management Plan
Mary Lake Operating Plan

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- The maintenance of a consistent outflow from the lake will improve habitat conditions in the reach below the dam.

Conflicts

None

Public Comments

Environmental Component	Comment	Resolution
Mary Lake		
Infrastructure	"if the flows are not controlled the water level will be too affected, making the docks too high or too low" "Consistent water levels are essential so that guests may use our dock to moor boats" "we maintain four major swimming/boating areas with docks…avoid major swings in water level June to September…keep summer level at design level" "When I was a child (1940's and 50's) there was usually 3 to 4 ft of water [at dock and boathouse] – now there is often less than 12"…maintain a greater depth of water in Mary Lake and the downstream section of river"	Limited ability to control extreme flow events. Operating plan maintains current NOZ, with a gradual decline in water level throughout the spring, summer and fall seasons. Plan will provide a more natural flow regime with higher levels in spring and early summer, gradually declining into the fall.
North Branch Downstream from Mary Lake		
Hydrology	"maintain more even flow in the system [downstream from Mary Lake]" "riverfront property [downstream from Mary Lake] is occasionally flooded in spring"	Limited ability to control flows and levels during extreme events. Average maximum daily flow unchanged. No increase in number of exceedances of reach flow limit.
Fish and Wildlife (downstream from Mary Lake"	"I am concerned about [fluctuations in water levels] effects on fisheries, water quality and shoreline erosion"	Goal of new operating plan is to provide more consistent river flows throughout the seasons.
General	"low water levels are greatest concern"	As above
Commercial Activities	Impacts of water level fluctuation on fur trapping along this stretch of river	As above
Infrastructure	"When river level grows (say 3' higher than normal) it floods our artesian well"	Limited ability to control flows and levels during extreme events.
Draft Plan Comments		
Water Levels	"Noted very little change in water levels from May to October and no change to the NOZ, therefore, no concerns with this proposal."	Accepted

Information and Science Needs

None

12.1.8 High Falls – Bracebridge Generation Limited

The operating plan for High Falls is shown in Figure 12.1.8, and has the following characteristics:

Normal Operating Zone:	268.85 to 269.62 m
Best Management Practice:	Remain above 269.0 m from June 15 to September 15
Summer* Range (Typical):	269.0 to 269.62 m (with BMP)
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time (see Section 13.3).
Maximum Daily Flow:**	155.5 m^3/s
High Flow Trigger:	80 m^3/s
Minimum Daily Flow*:**	None for facility; Flow Distribution Plan for High Falls
Low Flow Trigger:	3 m^3/s
Energy Emergency:	None
Scenic Flow Regime:	Scenic regime to be implemented as per EA agreement on completion of facility expansion. Agreed regime varies seasonally and weekly as follows: - 5 m^3/s on weekends and holidays from May 1 to June 15 and September 15 to October 31 - 3 m^3/s on weekends and holidays from June 15 to September 15 - 1.5 m^3/s during weekdays from May 1 to October 31
Natural Environment Constraints:	None
Social Constraints:	Previous commitments made during facility expansion EA are integrated into operating plan (to be implemented when expansion is complete), including implementation of the Flow Distribution Plan which specifies minimum flows between May 1 and October 31, and monitoring commitments.
Other:	A minimum flow of 3 m^3/s is to be released from Mary Lake (by MNR) to maintain baseflow in the river system during the summer period.

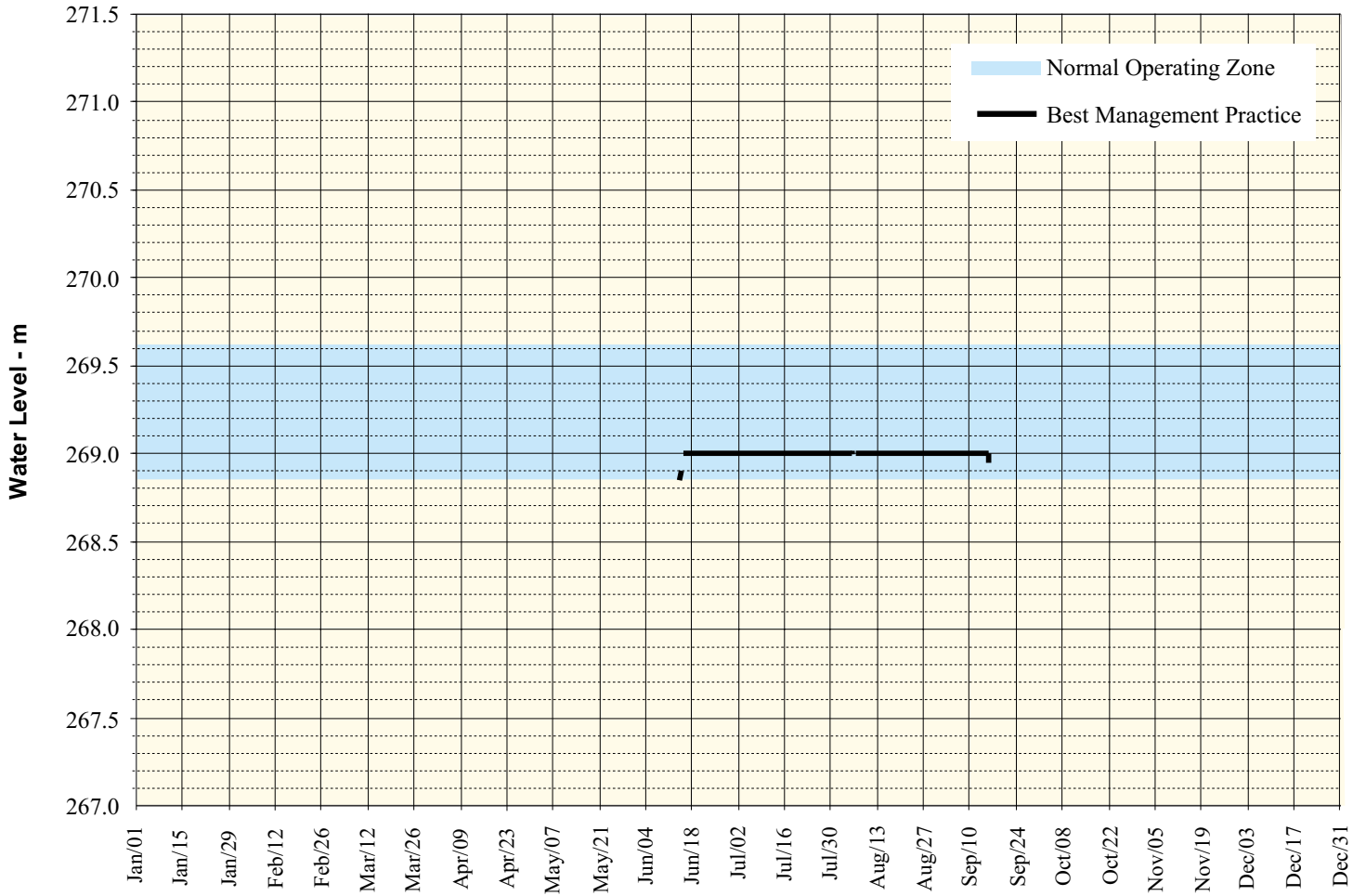


Figure 12.1.8
Muskoka River Water Management Plan
High Falls Reservoir Operating Plan

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Back of figure

Benefits and Resolution of Issues

- Reduced and defined absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- BMP established during the summer recreation period to promote maintenance of higher head-pond levels during that period.
- Consistent summer, fall and winter minimum flow to maintain social and ecological habitat values in North Branch leading into Lake Muskoka.

Conflicts

- The facility is considered run-of-river, and relies on flow provided from Mary Lake and associated upstream waterbodies. More coordination between MNR and BBG will be required to allow BBG to remain within the narrower operating range.
- The narrower absolute range within the plan reduces the flexibility of waterpower operator to alter head pond levels in response to energy demands.

Public Comments

- Head-pond water level fluctuations were identified as a concern during initial public consultation
- Poor water quality was noted for the reach below High Falls

Environmental Component	Comment	Resolution
High Falls		
Levels and Flows	"better flow in later summer period"	New operating plan is anticipated to provide more consistent river flows throughout the spring, summer and fall seasons.
Aesthetics	"None of what I have seen addresses the mess (fencing?) created at High Falls"	Site safety and compliance with regulatory requirements is outside scope of plan.
Power Generation	"there needs to be a major use of all the dam structures to generate hydro-electric power. The equipment is all available for run-of-river generation in low-head/no-head situations and should be used" "plan takes all aspects into consideration … good to have local generation available" A total of 3 similar comments received.	Objective of plan has been to maintain or improve existing waterpower generation potential.

Information and Science Needs

None

12.1.9 Wilson Falls – Bracebridge Generation Limited

The operating plan for Wilson Falls is shown in Figure 12.1.9, and has the following characteristics:

Normal Operating Zone:	254.14 to 255.4 m
Best Management Practice:	Remain above 254.29 m from June 15 to September 15
Summer* Range (Typical):	254.29 to 255.2 m (with BMP)
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	159.4 m^3/s
High Flow Trigger:	65 m^3/s
Minimum Daily Flow*:**	None
Low Flow Trigger:	3 m^3/s
Energy Emergency:	None
Scenic Flow Regime:	None
Natural Environment Constraints:	None
Social Constraints:	None
Other:	A minimum flow of 3 m^3/s is released from the upstream lakes to maintain baseflow in the river system during the summer period.

Benefits and Resolution of Issues

- Reduced and defined absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- BMP established during the summer recreation period to promote maintenance of higher head-pond levels during that period.

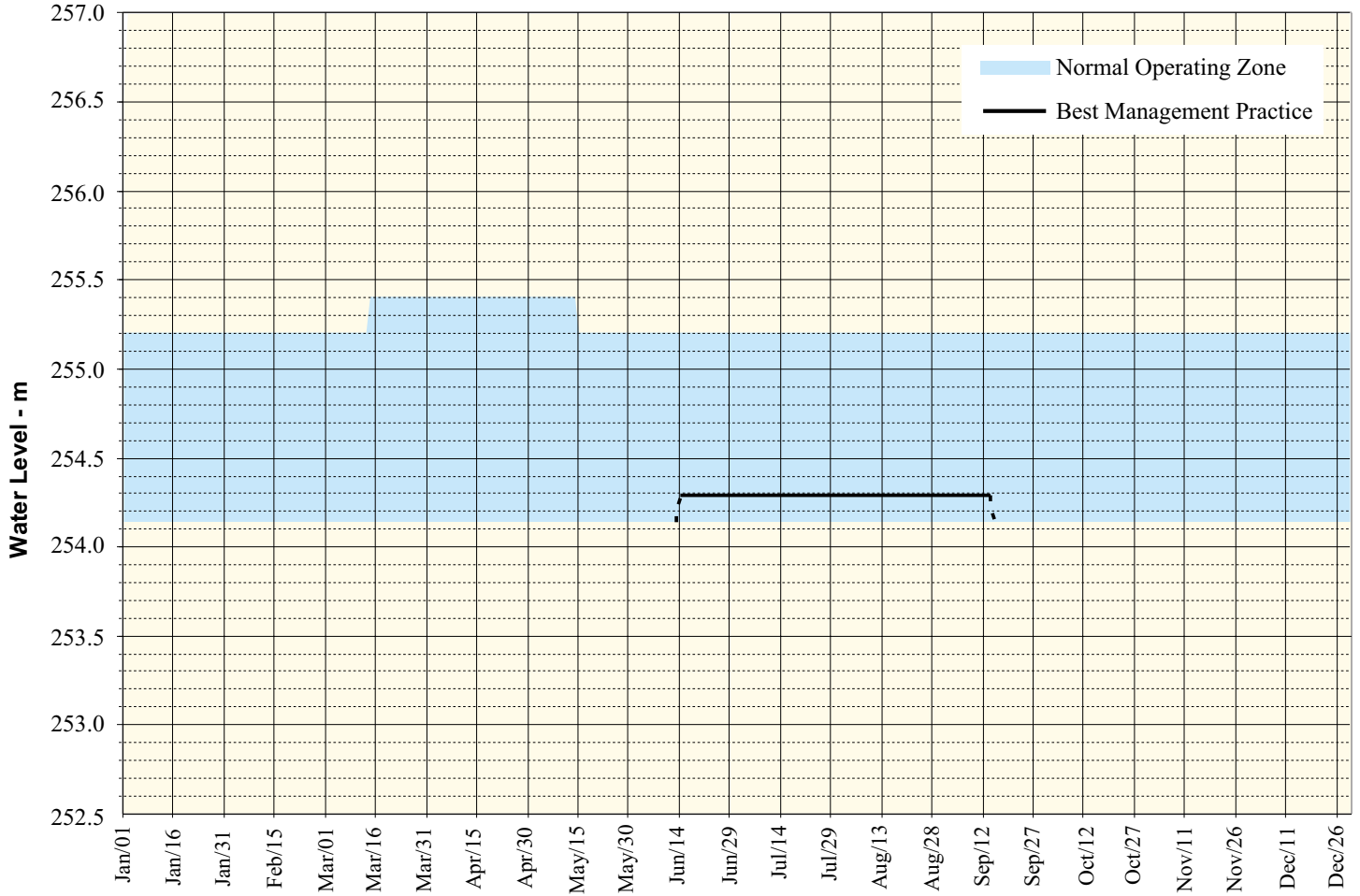


Figure 12.1.9
Muskoka River Water Management Plan
Wilson Falls Reservoir Operating Plan

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- back of figure

- Consistent summer, fall and winter minimum flow to maintain social and ecological habitat values in North Branch leading into Lake Muskoka.

Conflicts

- The facility is considered run-of-river, and relies on flow provided from Mary Lake and associated upstream waterbodies. More coordination between MNR and BBG will be required to allow BBG to remain within the narrower operating range.
- The narrower absolute range within the plan reduces the flexibility of waterpower operator to alter head pond levels in response to energy demands.

Public Comments

- Head-pond water level fluctuations were identified as a concern during initial public consultation.

Information and Science Needs

None

12.1.10 Bird's Mill Dam – District Municipality of Muskoka

The operating plan for Bird's Mill Dam is shown in Figure 12.1.10 and has the following characteristics:

Normal Operating Zone:	241.7 to 242.7 m
Summer* Range (Typical):	242.0 to 242.3 m
Winter Drawdown:	None
Flood Allowance:	None. The discharge capacity of the facility is unknown, and it may not be able to control river levels beyond certain flows. The specified High Flow Trigger is equivalent to the trigger applied to upstream and downstream facility (to maintain continuity). Water levels may exceed the upper extent of the NOZ above this flow value.
Maximum Daily Flow:**	~160 m^3/s
High Flow Trigger:	65 m^3/s
Minimum Daily Flow*:**	None (see Low Flow Trigger)
Low Flow Trigger:	3 m^3/s
Natural Environment Constraints:	Brown trout stocked into area between Bird's Mill dam and Wilson Falls.
Social Constraints:	Maintain recreational use potential of river reach above the dam. Avoid flooding of Bracebridge streets by maintaining approximately 0.3 m of freeboard between the upper NOZ and the water level that would result in flooding of River Road (approximately 243.1 m).
Other:	No historical water level data to confirm range of head-pond elevations. Water level data will be collected to allow future evaluation of the of facility water levels. Proposed water level range will be a guideline for facility operations, not legally binding limits (i.e., voluntary levels).

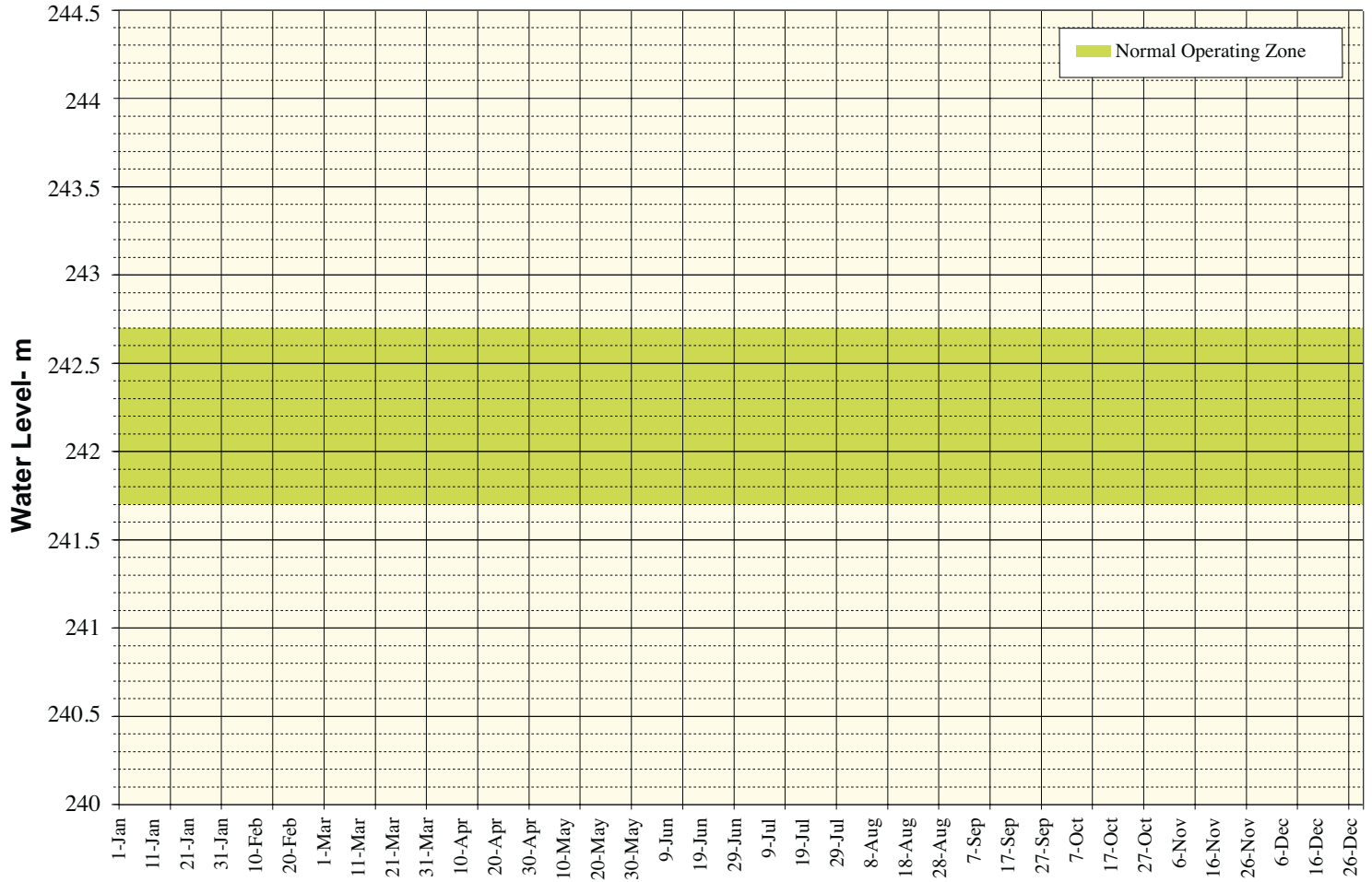


Figure 12.1.10
Muskoka River Water Management Plan
Bird's Mill Dam Operating Plan

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Benefits and Resolution of Issues

- Previous operating levels were not recorded. New operating plan strives to duplicate the range of water levels that have occurred historically. Operating levels will be recorded in future to assess validity of selected range.
- Plan will maintain recreational use of river reach and current environmental features and values.
- Plan will maintain provision to operate existing equipment (turbines, pumps, etc) in its capacity as a museum, historic landmark and tourist attraction.
- Operating plan responds to potential high water/flooding issues.
- Plan formalizes communication strategies between dam operators on the North Branch Muskoka River.

Conflicts

None

Public Comments

None

Information and Science Needs

- Monitor head-pond water levels to assess range of levels that occur under normal and extreme flow regimes.

12.1.11 Bracebridge Falls - Bracebridge Generation Limited

The operating plan for Bracebridge Falls is shown in Figure 12.1.11, and has the following characteristics:

Normal Operating Zone:	235.6 to 237.6 m
Best Management Practice:	None
Summer* Range (Typical):	235.6 to 237.6 m
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	161.0 m^3/s
High Flow Trigger:	65 m^3/s
Minimum Daily Flow*:**	None
Low Flow Trigger:	3 m^3/s
Natural Environment Constraints:	None
Social Constraints:	None
Other:	A minimum flow of 3 m^3/s is released from the upstream lakes to maintain baseflow in the river system during the summer period.

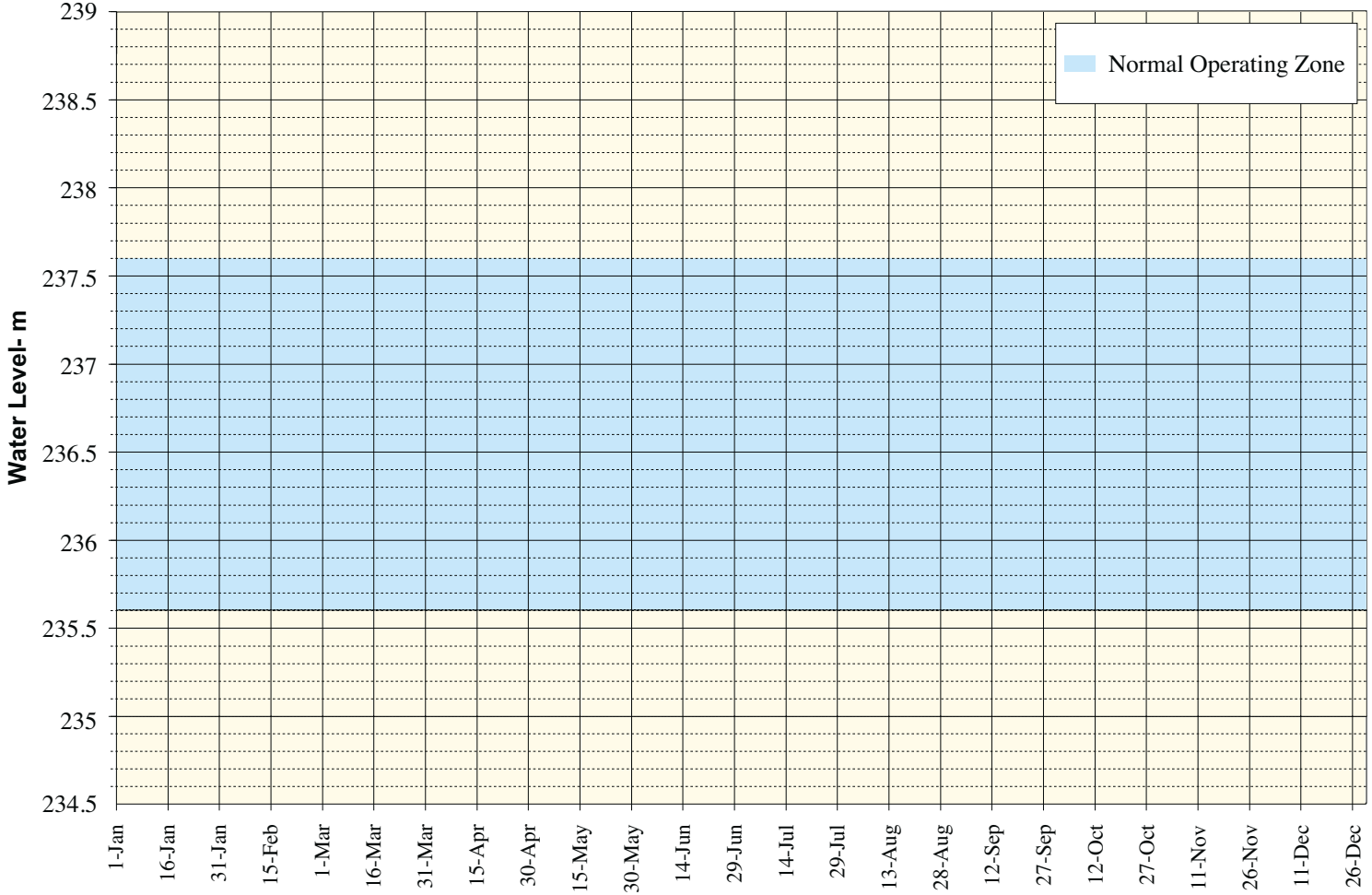


Figure 12.1.11
Muskoka River Water Management Plan
Bracebridge Falls Reservoir Operating Plan

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Back of figure

Benefits and Resolution of Issues

- Defined absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- Consistent summer, fall and winter minimum flow to maintain social and ecological habitat values in North Branch leading into Lake Muskoka.

Conflicts

- The facility is considered run-of-river, and relies on flow provided from Mary Lake and associated upstream waterbodies. More coordination between MNR and BBG will be required to allow BBG to remain within the narrower operating range.

Public Comments

None received.

Information and Science Needs

None

12.2 South Branch Muskoka River

12.2.1 Burnt Island Lake – MNR

The operating plan for Burnt Island Lake is shown in Figure 12.2.1, and has the following characteristics:

Target Operating Level Range:	427.9 to 428.65 m
Normal Operating Zone Range:	427.4 to 428.7 m
Absolute Range:	426.9 to 429.0 m
Summer* Range (Typical):	428.1 to 428.55 m
Winter Drawdown:	None
Flood Allowance (lake/river):	428.7 to 429.0 m/none
Maximum Daily Flow:**	7.8 m^3/s
Minimum Daily Flow*:**	0.5 m^3/s, annual average target
Natural Environment Constraints:	Cold-water lake with naturally reproducing lake trout population.
Social Constraints:	Lake forms part of an Algonquin Park canoe route with wilderness camp sites.
Other:	Dam is water access only and is operated by Algonquin Park staff.

Benefits and Resolution of Issues

- Maintain the current summer NOZ. Fall and winter NOZ adjusted to fit the new TOL during those periods.
- The reduced fall drawdown is expected to provide a number of fisheries and ecological benefits within the lake ecosystem including
  - improved littoral zone communities (not subjected to late summer/early fall dewatering and/or winter freezing/ice scour when the lake did not refill before the onset of winter)
  - improved upper riparian zone due to less annual variability in spring water levels, and
  - improved lake trout habitat due to higher and more stable fall water levels (stable late summer/early fall water levels will allow spawning areas to be subjected to cleansing wave action and increase potential for egg survival/future recruitment).

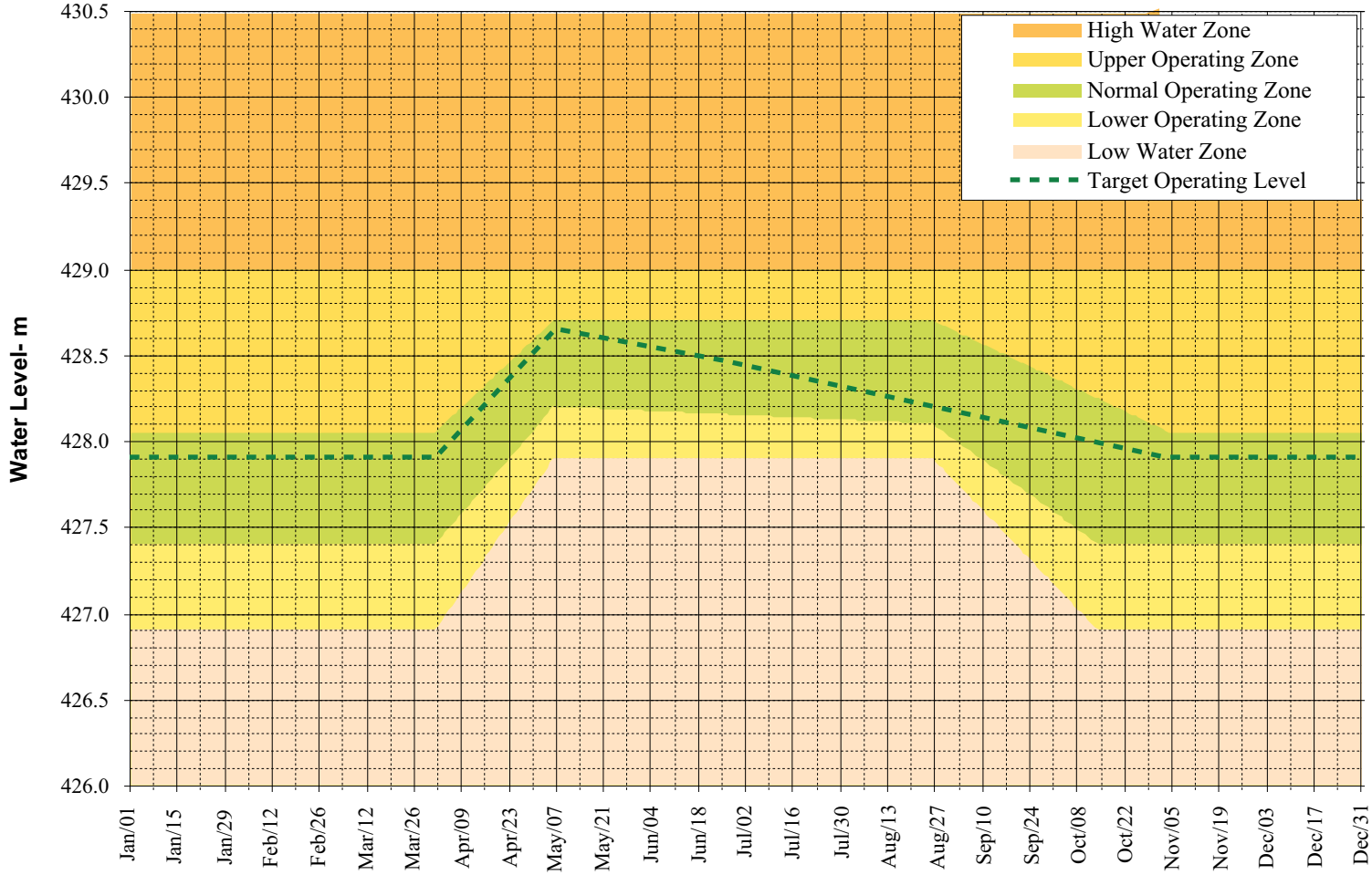


Figure 12.2.1
Muskoka River Water Management Plan
Burnt Island Lake Operating Plan

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Back of figure

- The operating plan closely simulates a natural flow regime, which meets the objectives of MNR's water management planning guidelines and Algonquin Park's management policies.
- The maintenance of a more consistent outflow from the lake will improve habitat conditions in the reach immediately below the dam (by eliminating the cessation of flow following completion of the fall drawdown)
- Reduced seasonal drawdown range that will eliminate the effect of the previous late summer/early fall drawdown on recreational uses.
- Potential to eventually eliminate dam operation (convert dam to an overflow structure with slot or valve to accommodate summer base flow release).

Conflicts

- Eliminating the late summer/early fall drawdown eliminates this seasonal source of flow for the Oxtongue River, and could affect late summer navigation (i.e., canoeing) in that reach.
- Eliminating the late summer/early fall drawdown reduces the outflow from the lake and the water available in the South Branch for waterpower generation at this time of the year.

Public Comments

None

Information and Science Needs

None

12.2.2 Joe Lake – MNR

The operating plan for Joe Lake is shown in Figure 12.2.2, and has the following characteristics:

Target Operating Level Range:	421.5 to 422.1 m
Normal Operating Zone Range:	421.4 to 422.1 m
Absolute Range:	421.2 to 422.2 m
Summer* Range (Typical):	421.63 to 422.0 m
Winter Drawdown:	421.5 to 421.7 m
Flood Allowance (lake/river):	422.1 to 422.2 m/none
Maximum Daily Flow:**	15.5 m^3/s
Minimum Daily Flow*:**	0.5 m^3/s, annual average target
Natural Environment Constraints:	Cold-water lake with naturally reproducing lake trout population.
Social Constraints:	The lake forms part of an Algonquin Park canoe route with several developments along the shoreline.
Other:	Dam has road access and is operated by Algonquin Park staff.

Benefits and Resolution of Issues

- Maintain the current NOZ throughout the year.
- Higher spring peak and gradual seasonal drawdown will improve ecological conditions for wetland species and spring spawning fish species
- Allowing the lake level to rise in the fall replicates the natural flow regime and is expected to result in improved habitat for lake trout.
- The maintenance of a more consistent outflow from the lake will improve habitat conditions in the reach below the dam.
- Reduced operational demands (potential to convert to non-operational structure).

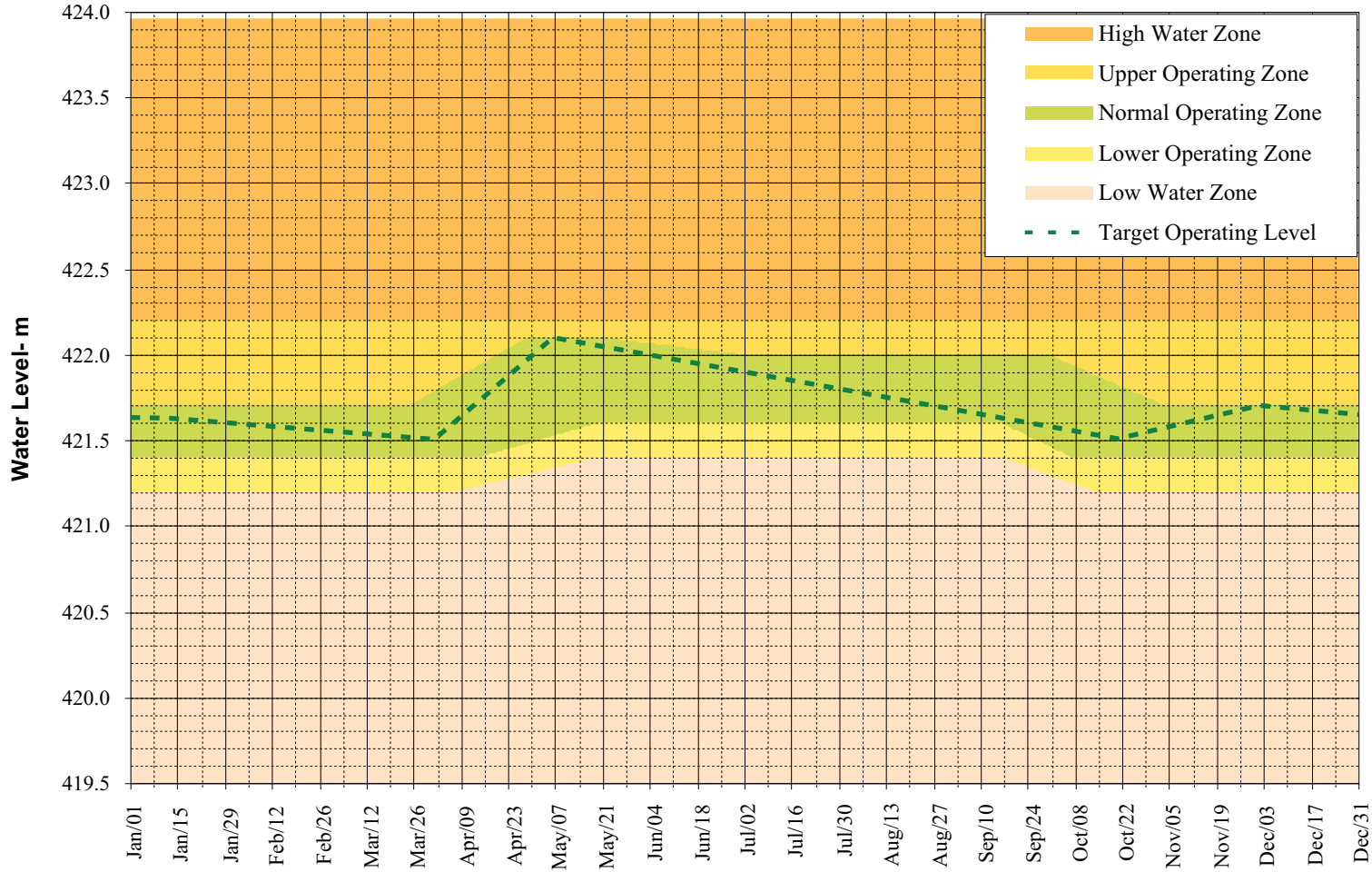


Figure 12.2.2
Muskoka River Water Management Plan
Joe Lake Operating Plan

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Conflicts

- Higher spring water level creates greater potential for ice damage to existing docks (1 lodge, 1 youth camp and 5 private cottages)
- Greater change in levels during summer recreational season, but limited effect anticipated as motorized vessels are not allowed on the lake.

Public Comments

None

Information and Science Needs

None

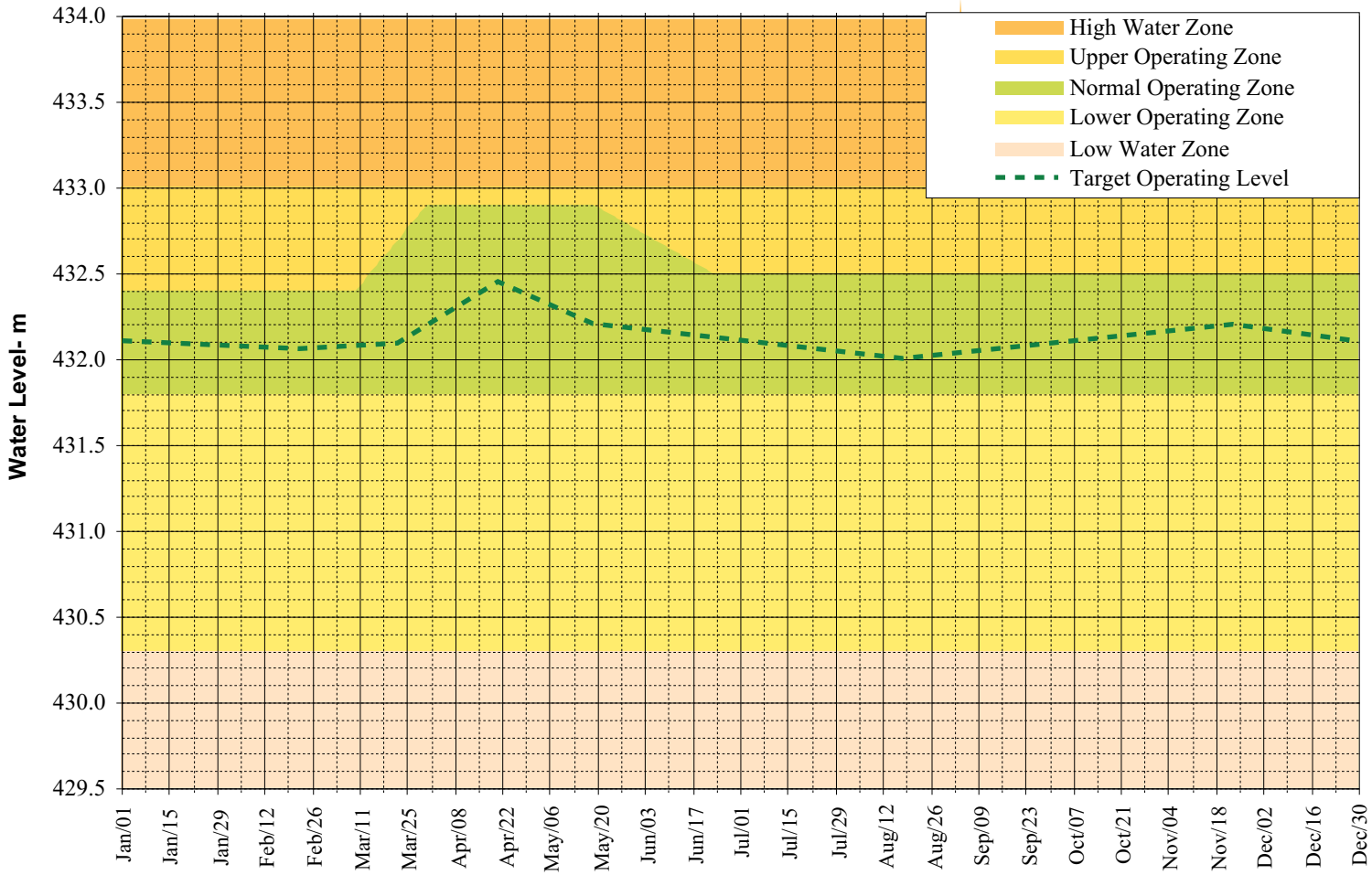
12.2.3 Ragged Lake – MNR

The operating plan for Ragged Lake is shown in Figure 12.2.3. The dam has partially failed (section of right abutment washed out), there are no plans to repair it, and no plans to operate the dam in the future. The operating plan noted below replicates the water levels that are predicted to naturally occur within the lake under those conditions.

Target Operating Level Range:	432.0 to 432.45 m
Normal Operating Zone Range:	431.8 to 432.9 m
Absolute Range:	430.3 to 433.0 m
Summer* Range (Typical):	432.0 to 432.15 m
Winter Drawdown:	432.2 to 432.05 m
Flood Allowance (lake/river):	432.9 to 433.0 m/none
Maximum Daily Flow:**	7.8 m^3/s
Minimum Daily Flow*:**	1.5 m^3/s, annual average target
Natural Environment Constraints:	Cold-water lake with naturally reproducing lake trout population.
Social Constraints:	Lake is located within Algonquin Park and used primarily for canoeing.
Other:	Dam has partially failed and is no longer operated by MNR.

Benefits and Resolution of Issues

- The operating plan closely replicates the water level and flow regime that will occur naturally, given the lake's hydrology and dam outflow characteristics. The plan meets the objectives of MNR's water management planning guidelines.
- Elimination of the fall drawdown and higher winter water levels will improve lake trout habitat in the long-term by providing more stable seasonal water levels.
- Reduced operating demands, as the structure will no longer be operated.
- Elimination of the fall drawdown will provide a more natural downstream flow regime.



* Dam not operated, plan reflects natural hydrologic conditions

Figure 12.2.3
Muskoka River Water Management Plan
Ragged Lake Operating Plan

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Conflicts

None

Public Comments

None

Information and Science Needs

None

12.2.4 Canoe/Tea/Smoke Lakes – MNR

The operating plan for Canoe/Tea/Smoke Lake is shown in Figure 12.2.4, and has the following characteristics:

Target Operating Level Range:	417.3 to 418.0 m
Normal Operating Zone Range:	417.02 to 418.05 m
Absolute Range:	416.89 to 418.2 m
Summer* Range (Typical):	417.6 to 417.9 m
Winter Drawdown:	417.5 to 417.3 m
Flood Allowance (lake/river):	418.05 to 418.2 m
Maximum Daily Flow:**	39.4 m^3/s
Minimum Daily Flow*:**	1.5 m^3/s, target
Natural Environment Constraints:	Cold-water lakes with naturally reproducing lake trout populations. Location of lake trout spawning shoals known on Smoke Lake.
Social Constraints:	Lakes are on one of the most heavily used canoe routes in Algonquin Park. Considerable shoreline infrastructure (i.e., docks).
Other:	Winter release of 1.4 m^3/s is currently provided for waterpower generation.

Benefits and Resolution of Issues

- Maintain upper limit of NOZ throughout year. Lower limit of NOZ adjusted late summer and early fall to accommodate a lower October 15 TOL.
- Higher spring peak and gradual seasonal drawdown to improve ecological conditions for wetland species, spring spawning fish species, and riparian and littoral zone habitats.
- Less differential between fall and winter TOLs to improve lake trout spawning habitat conditions.
- Less winter drawdown will provide more aquatic habitat.
- Gradual decline in lake levels throughout the ice-free season will improve minimum flows in the Oxtongue River.

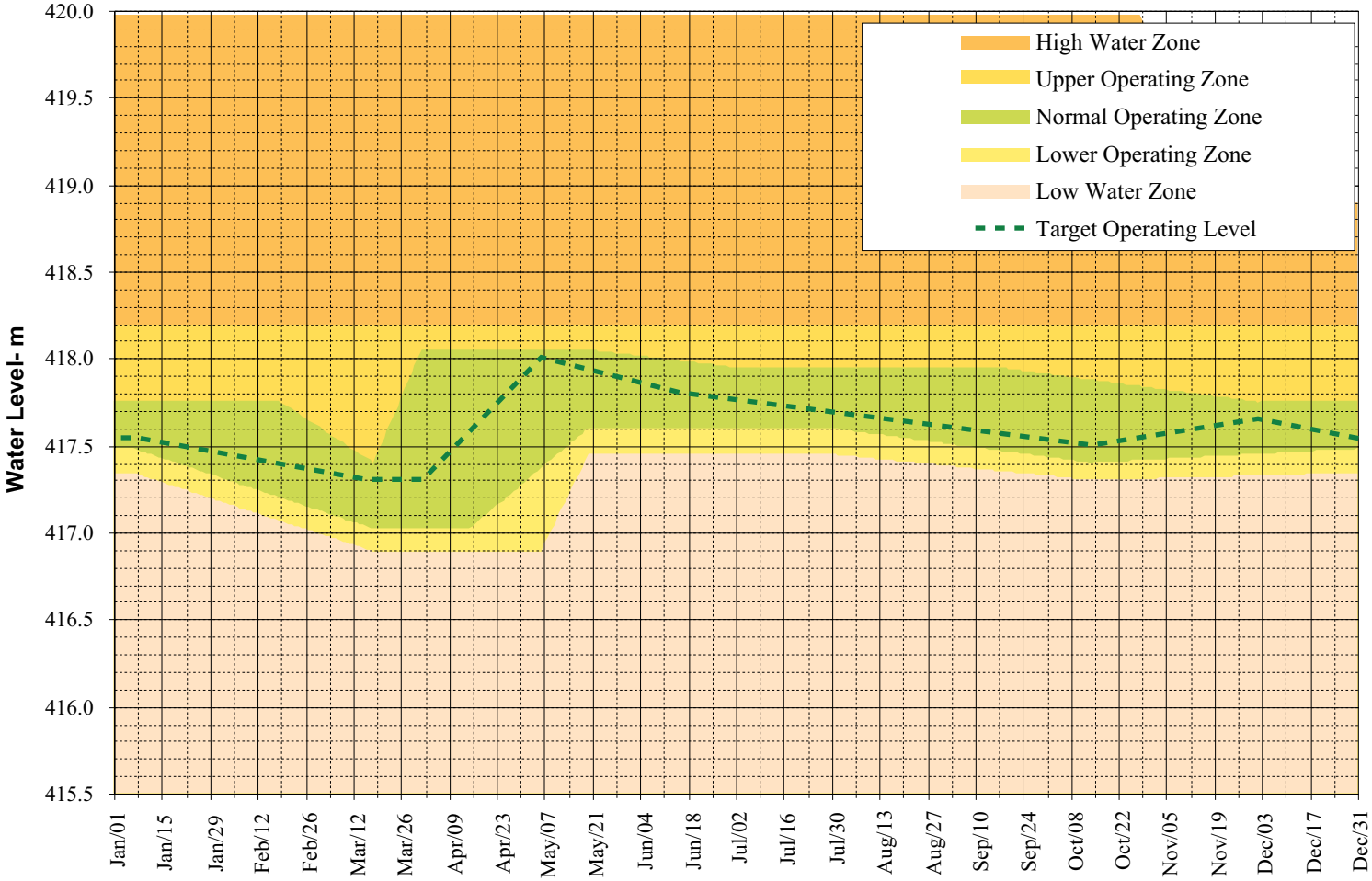


Figure 12.2.4
Muskoka River Water Management Plan
Canoe, Smoke and Tea Lakes Operating Plan

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- back of figure

- The maintenance of a more consistent outflow from the lake will improve habitat conditions in the reach below the dam.

Conflicts

- More change in recreation season lake level (up to 0.20 m more) may cause some access and infrastructure concerns. However, this amount of fluctuation is not uncommon on other watershed lakes.

Public Comments

None

Information and Science Needs

None

12.2.5 Kawagama Lake – MNR

The operating plan for Kawagama Lake is shown in Figure 12.2.5, and has the following characteristics:

Target Operating Level Range:	354.6 to 355.6 m
Normal Operating Zone Range:	354.5 to 355.7 m
Absolute Range:	354.2 to 356.07 m
Summer* Range (Typical):	355.15 to 355.55 m
Best Management Practice:	TOL of 355.6 from May 30 to July 1 TOL of 355.6 to 355.3 from July 1 to September 15, followed by fall drawdown to 354.8 by October 15
Winter Drawdown:	355.0 to 354.6 m
Flood Allowance (lake/river):	355.7 to 356.07
Maximum Daily Flow:**	22.9 m^3/s
Minimum Daily Flow*:**	1.5 m3/s summer, 0.4 m, January 1 to March 15
Natural Environment Constraints:	Significant portion of primary lake trout spawning shoal in lake dewatered by the present winter drawdown.
Social Constraints:	Shoreline infrastructure ranged from 355.83 to 355.98 m. High spring water levels may cause ice damage and shoreline erosion. Fall drawdown levels may impact navigation. Low winter water levels are a concern for dug well and water lines.
Other:	Lake is often hard to fill in the spring if snowmelt and rainfall is less than normal. Lake operated to provide winter flow that contributes to the hydropower potential of the South Branch

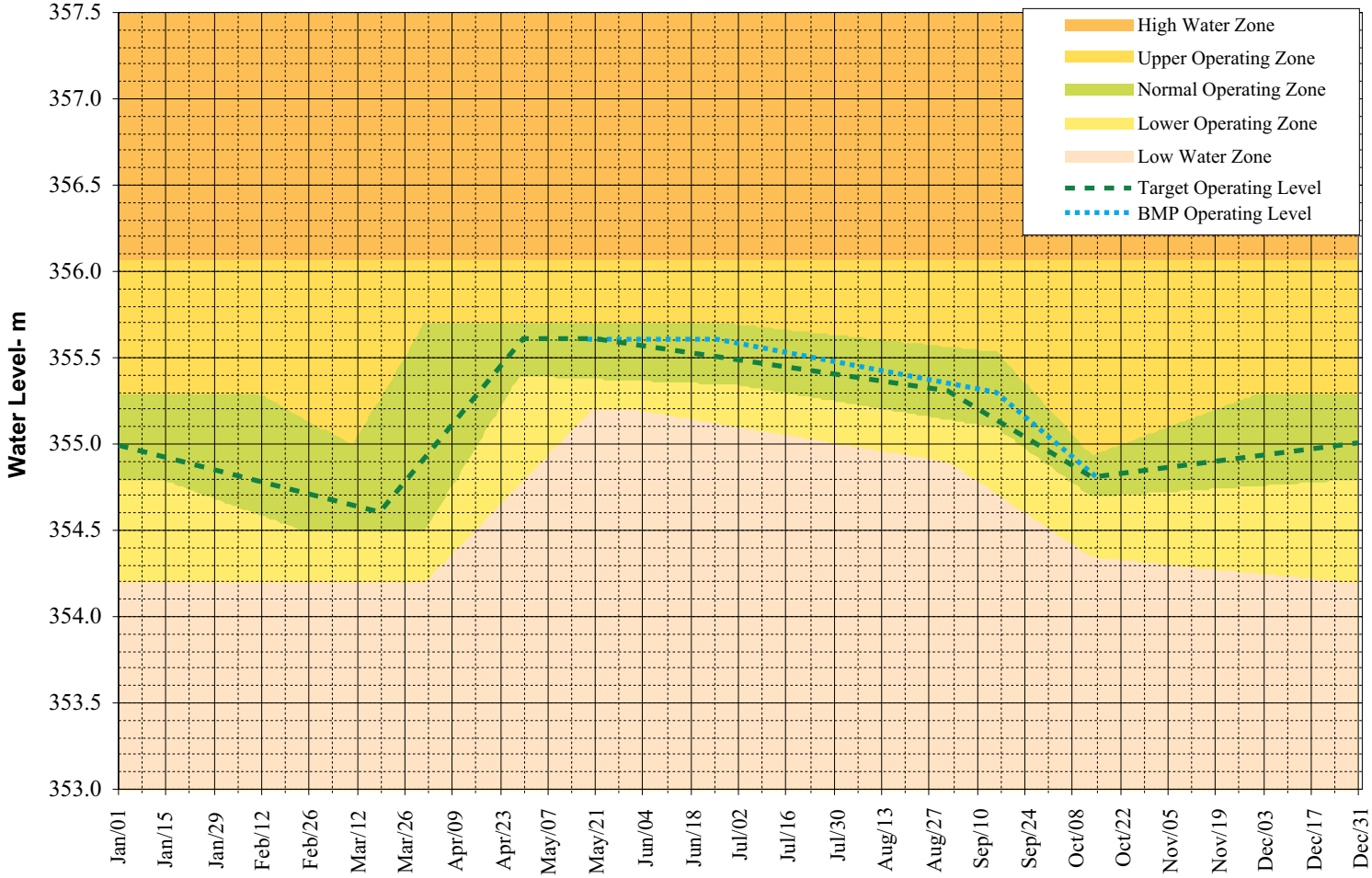


Figure 12.2.5
Muskoka River Water Management Plan
Kawagama Lake Operating Plan

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Benefits and Resolution of Issues

- Reduced NOZ and TOL with less difference between seasonal levels.
- Lower spring peak to address shoreline erosion concerns on east end of lake (windward side).
- BMP instituted to take advantage of those years with more rainfall/runoff in response to resident concerns about lower summer levels. BMP retains existing summer TOL and delays initiation of fall drawdown until September 15 (provided hydrologic conditions are adequate)
- Reduced winter drawdown will decrease the differential between the fall and winter drawdown levels to improve lake trout spawning habitat.
- Less winter drawdown will increase the amount of winter aquatic habitat
- Identified baseflow into the Hollow River matches the levels historically provided (lake was not providing 3 m^3/s during most summer seasons).

Conflicts

- Reduced winter flow regime may impact waterpower potential during that time of year. Compensated by increased flow during the summer season from other lakes within the watershed.

Public Comments

Environmental Component	Comment	Resolution
Infrastructure	"low water levels in March sometimes cause the water level in our dug well to be very low" "fluctuating flows or levels affect docks" Four other similar comments re: infrastructure	March 15 TOL is 42 cm (16.5") higher than with the previous operating plan. Overall differential between fall and winter levels reduced by the same amount.
Navigation/boat access/seasonal water level change	"These rapid drawdowns also put severe limitations on extended water access to shoreline properties in the fall season" "these early drawdowns increase navigation risks as hazards are now just below the surface during early fall" "the number one problem for our membership [Kawagama Lake Cottager's Association] is the rapid fall drawdown making it impossible for many cottagers to use their boats up to and including the Thanksgiving weekend." "I think it's safe to say that Kawagama property owners (the majority) are going to be seriously disappointed (with Case Two option as described in the Options Report). They were looking for more equity throughout the system – we still have almost twice the range that any other settled lake on the system has" Fifteen other similar comments re: navigation / boat access/seasonal water level change	Initiation of fall drawdown delayed to September 15 when hydrologic conditions permit (as per BMP). Large lake area and limited inflow make it difficult to maintain summer levels unless outflow from the lake was reduced to zero. Fall (October 15) elevation maintained to allow lake trout to utilize historic spawning areas. Enhancements to lake trout spawning habitat attained by elevating winter drawdown level as opposed to lowering fall drawdown level (so as to reduce water level differential between those two time periods).
Erosion	"we have lost at least 30' of beach and dunes, many hundred year old trees because of high water level" "the entire shoreline of the east end is being eroded when the water level is high in the spring" Six other similar comments re: erosion	Spring (May 1 to 15) TOL reduced by 0.16 m compared to present operating plan.

Environmental Component	Comment	Resolution
Fish and Wildlife	"Impacts [of water level drawdown and fluctuation] are believed to include a negative effect on lake trout propagation, loon nesting" "the marsh area has lost area where many ducks and birds spawn" Seven other similar comments re: fish and wildlife	Reduced winter drawdown will result in less mortality of lake trout eggs and maintain a greater wetted area and lake volume during the winter season.
Draft Plan Comments		
Water Levels and Lake Trout Habitat	"…accept the conclusion drawn from Kawagama Lake Spawning Study which indicated that raising the fall drawdown should destroy the primary spawning bed and virtually wipe out the lake trout population." "…Accept that the October 15 drawdown target could not be changed without breaking the law which states that it is illegal to knowingly destroy fish habitat." "…Pleased with the compromise postponing the start of the drawdown from September 1 to September 15 that was reached and that has been built into the new plan." "…Can count on your support and appropriate volunteer assistance as the monitoring proceeds. We are hopeful as you are that the changes will bring about a significant improvement in lake trout fishery in Kawagama.	MNR and industry partners in the WMP welcome the support and assistance of Kawagama Lake volunteers to assist with future monitoring and research projects.

Information and Science Needs

- Undertake lake trout spawning surveys on regular basis over term of plan to evaluate future use and hatching success at primary spawning shoal, as well as any expansion to new or presently unused spawning sites. Further investigate any spawning site expansion should it be noted.
- Undertake adult population studies over term of plan to evaluate whether improvements to egg survival translate into increased adult populations.
- Undertake creel/harvest surveys over the term of the plan so as to take harvest variability into account in the assessment of adult populations and the evaluation of the success of water management changes.

12.2.6 Lake of Bays – MNR

The operating plan for Lake of Bays is shown in Figure 12.2.6, and has the following characteristics:

Target Operating Level Range:	314.5 to 315.32 m
Normal Operating Zone Range:	314.34 to 315.38 m
Absolute Range:	314.28 to 315.5 m
Summer* Range (Typical):	315.05 to 315.35 m
Winter Drawdown:	315.22 to 314.5
Flood Allowance (lake/river):	315.38 to 315.5 m/99.1 m^3/s
Maximum Daily Flow:**	85.9 m^3/s
Minimum Daily Flow*:**	5 m^3/s from April 15 to June 1 (or dates as determined by MNR based on water temperature at South Falls).
Natural Environment Constraints:	Cold-water lake with a number of lake trout spawning shoals partially within or close to late winter/early spring drawdown zone
Social Constraints:	Extensive high value shoreline development. Infrastructure elevations range from 315.47 to 316.03 m. Potential for ice damage (in the spring) when high winds and high water levels occur simultaneously.
Other:	Target outflow of 17 m^3/s provided during winter for waterpower generation.

Benefits and Resolution of Issues

- No change to upper extent of NOZ; slight downward expansion of NOZ in the fall to accommodate a lower October 15 TOL.
- No change to summer recreation season attributes.
- Earlier and slightly higher spring peak with a gradual seasonal drawdown to improve ecological conditions for wetlands, spring spawning fish species and shoreline riparian areas.

- Insert Figure 12.2.6

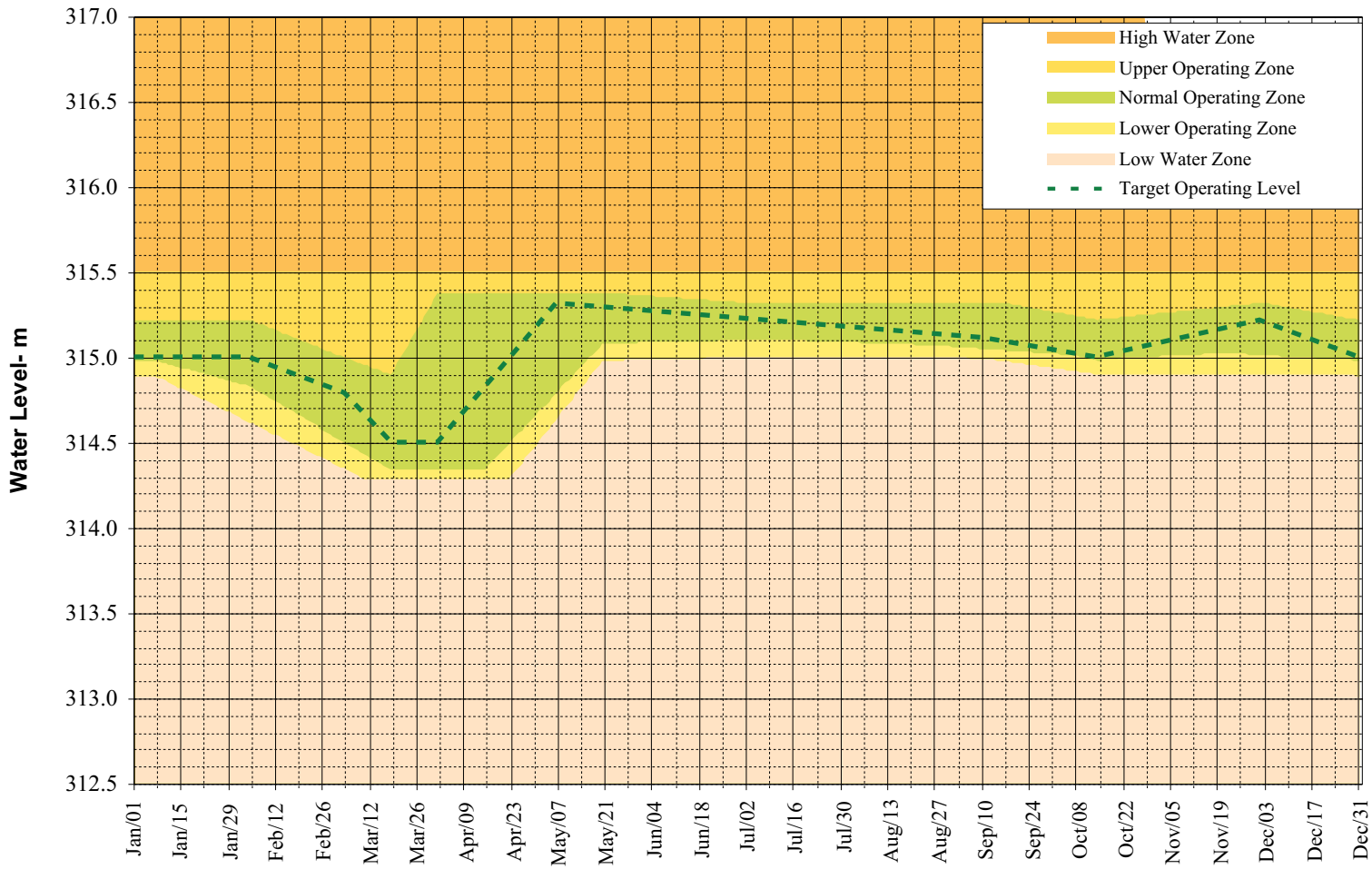


Figure 12.2.6
Muskoka River Water Management Plan
Lake of Bays Operating Plan

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- back of figure

- Less differential between fall and winter levels to improve lake trout spawning habitat conditions.
- Improved downstream minimum and base flows in summer (higher and more consistent flow).

Conflicts

- Similar overall summer water level range, but more change to median summer water level due to gradual seasonal drawdown. Potential for negative response by residents accustomed to static summer levels.
- Lower October 15 TOL to enhance lake trout spawning habitat may create negative response from some lake residents.
- Slightly higher maximum outflow (approx 11%) and more exceedances of downstream flow limit (but only by 1 m^3/s in 26 of the 27 simulated cases) during high flow periods.

Public Comments

Environmental Component	Comment	Resolution
Infrastructure	"any water level excursion significantly above normal causes….dock damage problems…no late fall floods" "low water – water lines freeze" "try to keep water levels lower during ice break up and shortly following it in order to minimize damage of docks and other structures" "levels in excess of 6" above normal summer cause…dock damage"	Lower late summer and early fall water levels should lessen potential impact of late fall floods. Winter TOL 10 cm higher No change to spring peak.
Recreation	"water too high – no beach for our guests" "high water levels virtually eliminate my beach"	Gradual spring/summer season reduction will provide a range of water levels during the recreation season.
Erosion	"any water level excursion significantly above normal causes serious erosion…no late fall floods" "water too high -…erosion due to high water" "high water – shorelines subject to erosion from wave action" "levels in excess of 6" above normal summer cause erosion of shoreline" "high water levels…contribute to shoreline erosion"	Lower late summer and fall levels should address fall shoreline erosion concerns.
Navigation	"low water - …water travel becomes hazardous, access for boats becomes difficult" "water too low – docking issues, this however would have to be extreme too be a problem"	Gradual spring/summer season reduction will provide a range of water levels during the recreation season.
Lake trout spawning	"try your best to keep spawning trout covered until they hatch…I'd try to lower levels in September prior to spawning then raise them till freeze up – hold that level till after spawn and then drop for spring runoff" "allow lowering water only after lake trout spawn has hatched" "winter drawdown affects the lake trout spawning beds"	Lower fall TOL and higher winter TOL to reduce differential between these two critical levels (to 0.5 m vs 0.76 m presently) as it relates to lake trout spawning, incubation, hatch and eventual emergence from the spawning gravel. Studies being undertaken in Kawagama Lake (as a test lake) to assess effectiveness of strategy.

Environmental Component	Comment	Resolution
	"trout spawning beds need cover until they hatch"	
Waterpower	"I would like to see more green power, such as water generation. I feel that what is being proposed is very adequate, and should be our main concerns where water generation is involved"	Objective of plan has been to maintain or improve existing waterpower generation potential.
Downstream River Flows and Water Levels - Fraserburg Area		
Water Quality	"My major concern is the very low levels in the summer. The water stagnates, and I'm sure is unhealthy for wildlife and humans alike" "during summer months, the river is so low and flow is non-existent, that it smells and it is stagnant, even the possibility of E. coli exists" "..low water levels (not moving) will cause high levels of bacteria…this is our main source of drinking water" "at low level river stinks" A total of 28 comments regarding this topic were received.	Lake operating regimes revised to provide more consistent downstream flow during summer low flow period. Commitment by MNR to maintain flow of 3 m^3/s at Baysville dam, and utilize the range within the NOZ rather than focusing on the TOL.
River Flows/ Flooding	"The release of water at Baysville into the South Branch should be more effectively controlled so as to minimize the possibility of flooding the lower-lying properties in Fraserburg" "2.5 cms water flow too low, and 48 cms water flow is flood zone" "…the most important part of water management is communicating of level adjustments between the parties. The MNR doesn't seem to consider that they have a responsibility to the other operators or the residents. But, of course, they must have adequate staff of responsible people to do this work" "water levels on South Muskoka River be properly coordinated between dams so that no sudden drawdown occurs between June and September"	Current operating strategy for the river system is to quickly pass high flow events through the system to return lakes to NOZ levels. Greater recognition of adverse effects of this practice was gained as a result of this planning process. MNR to obtain operational tools (i.e., flood forecast model) to improve operational capabilities. More emphasis on equitable distribution/sharing of high levels between lakes and river reaches during high flow events.

Environmental Component	Comment	Resolution
	A total of 10 comments regarding this topic were received.	
Erosion	"land is flooded in the spring and fall causing erosion along the shore" "in recent years we have seen chunks of land floating down the river due to this quick variations in water levels" A total of 7 comments regarding this topic were received.	Current operating strategy for the river system is to pass high flow events through the system to return lakes to NOZ levels. Greater recognition of adverse effects of this practice as a result of this planning process. MNR to obtain operational tools (i.e., flood forecast model) to improve operational capabilities. More emphasis on equitable distribution/sharing of high levels during high flow events.
Navigation / boat access / docks	"When the water level goes way down, the boat usually gets stuck in mud" "maintain a higher level, consistently avoiding damage to docks and boats" A total of 25 comments regarding this topic were received.	Lake operating regimes revised to provide more consistent downstream flow during summer low flow period. Commitment by MNR to maintain flow of 3 m^3/s at Baysville dam, and utilize the range within the NOZ rather than focusing on the TOL.
Infrastructure (water lines)	"if they keep on dropping water levels and flows it will affect our water line. This is our water source. If they drop it any lower it could start sucking mud…which could cost thousands of dollars to repair" "tenuous low levels expose foot valve in summer, in fall exposed line freezes" A total of 12 comments regarding this topic were received.	Lake operating regimes revised to provide more consistent downstream flow during summer low flow period. Commitment by MNR to maintain flow of 3 m^3/s at Baysville dam, and utilize the range within the NOZ rather than focusing on the TOL.
Fish and Wildlife	"water levels fluctuate too much in the summer and will affect fish spawning and other wildlife" "there are countless fish spawning sites, especially bass nests which become exposed when the water level drops too far. Also marsh nesting birds become vulnerable" A total of 24 comments regarding this topic were received.	Lake operating regimes revised to provide more consistent downstream flow during summer low flow period. Commitment by MNR to maintain flow of 3 m^3/s at Baysville dam, and utilize the range within the NOZ rather than focusing on the TOL.

Environmental Component	Comment	Resolution
Recreation (e.g., swimming)	"swimming precarious during high water" "poor swimming due to frequent low water level" A total of 6 comments regarding this topic were received.	Lake operating regimes revised to provide more consistent downstream flow during summer low flow period. Commitment by MNR to maintain flow of 3 m^3/s at Baysville dam, and utilize the range within the NOZ rather than focusing on the TOL.
Draft Plan Comments		
Water Levels and Flora and Fauna Investigations	"…resolved that the Council of the Corporation of the Township of Lake of Bays recommends to the Ministry of Natural Resources that they continue to study the impacts of fluctuating water levels on flora and fauna." "Resolution supports conclusions/ recommendations of Ms. Judi Brouse, Director of Waters Program for the District Municipality of Muskoka dated September 16, 2005 in that the data required to fully understand the implications of water fluctuations on flora and fauna is incomplete. It is recommended that the MNR continue to study the impact of fluctuating water levels on the flora and fauna of the watershed and that operating procedures be reviewed and updated from time to time to incorporate new findings and understandings.	MNR and partners will keep the Township of Lake of Bays apprised of progress and results from monitoring programs.

Information and Science Needs

- Develop procedures to assess potential improvements to summer riverine habitat as a result of higher summer base flows
- Compare results of Kawagama Lake investigations to existing studies from Lake of Bays. Decide upon need for similar investigations in Lake of Bays during next term of plan.

12.2.7 Wood Lake – MNR

The operating plan for Wood Lake is shown in Figure 12.2.7, and has the following characteristics:

Target Operating Level Range:	300.6 to 301.15 m
Normal Operating Zone Range:	300.45 to 301.35 m
Absolute Range:	300.25 to 301.67 m
Summer* Range (Typical):	300.95 to 301.1 m
Winter Drawdown:	300.8 to 300.6 m
Flood Allowance (lake/river):	301.35 to 301.67
Maximum Daily Flow:**	2.6 m^3/s
Minimum Daily Flow*:**	0.1 m^3/s target
Natural Environment Constraints:	Warm-water lake, no identified environmental constraints.
Social Constraints:	Extensive shoreline property development.
Other:	None

Benefits and Resolution of Issues

- No change to NOZ. Minor adjustment to TOL to provide more consistent spring, summer, and fall downstream flows to maintain habitat and social values in the South Branch.

Conflicts

None

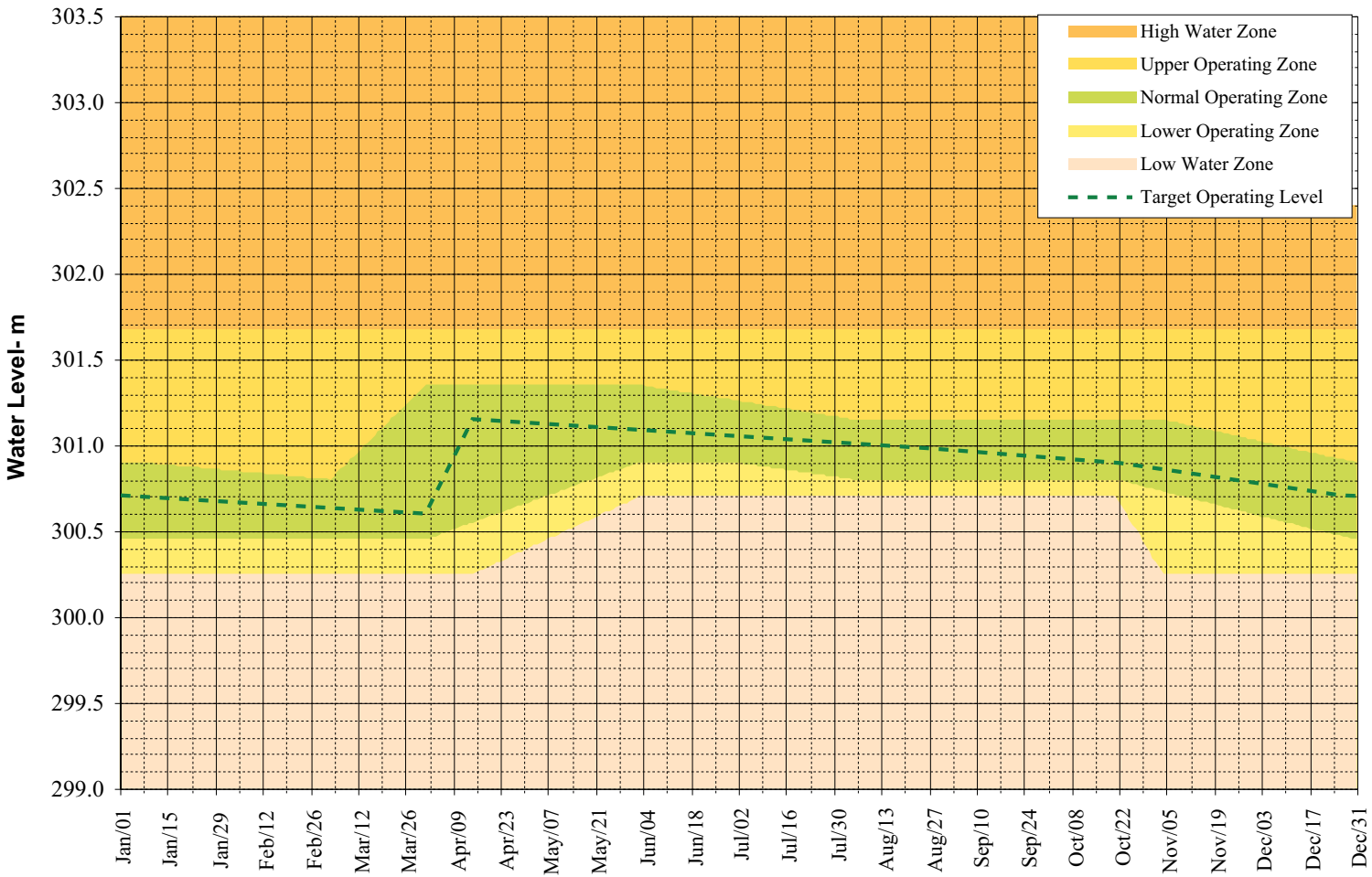


Figure 12.2.7
Muskoka River Water Management Plan
Wood Lake Operating Plan

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Public Comments

Environmental Component	Comment	Resolution
Shoreline erosion	"High water level on Wood Lake should be kept below 301.6 m – Experience over 53 years shows that levels above 301.6 m can cause significant shoreline erosion at the east end of Wood Lake"	NOZ unchanged (300.45 to 301.35 m), TOL is 10 cm higher in the spring, declining over the summer to 5 cm below the previous end of summer level.

Information and Science Needs

None

12.2.8 Matthias Generating Station - Orillia Power Corporation

The operating plan for Matthias Generating Station is shown in Figure 12.2.8, and has the following characteristics:

Normal Operating Zone:	292.0 to 293.2 m (spring) 292.0 to 293.0 m (rest of year)
Best Management Practice:	Follow March 15 – June 1 water level curve Remain above 292.5 m from June 1 to June 15 Remain above 292.3 m from June 15 to September 15
Summer* Range (Typical):	292.0 to 293.0 m
Winter Drawdown:	None
Flood Allowance:	None. The facility has adequate discharge capacity and will coordinate their operations with upstream and downstream facilities when river levels pass beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	100.32 m^3/s
High Flow Trigger:	109.8 m^3/s
Minimum Daily Flow*:**	3 m^3/s measured on an hourly basis, from April 15 to June 1 (or dates as determined by MNR based on water temperature at South Falls).
Low Flow Trigger	3 m^3/s
Energy Emergency:	None
Natural Environment Constraints:	Extensive wetlands at upper end of reservoir – positively affected by higher spring water levels, adversely affected by large scale mid-season fluctuations. Minimize water level fluctuation during centrarchid spawning/hatch period.

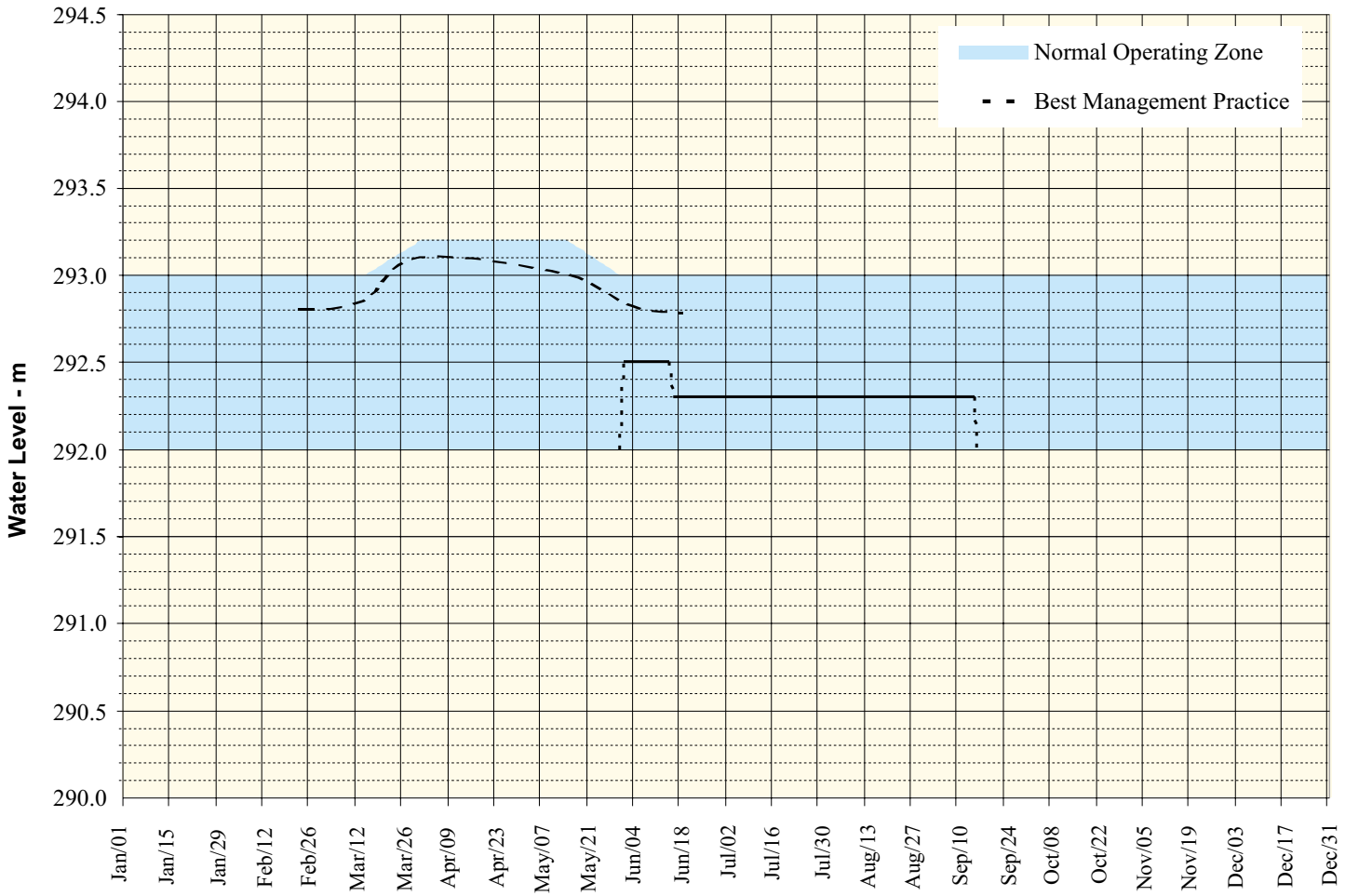


Figure 12.2.8
Muskoka River Water Management Plan
Matthias Reservoir Operating Plan

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Social Constraints:	Large water level fluctuations adversely affect access to docks and shoreline property.
Other:	A minimum flow of 3 m^3/s is released from the upstream lakes to maintain base flow during the summer season.

Benefits and Resolution of Issues

- Reduced absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- BMP established for spring period to provide ecological improvements for wetlands, amphibians, spring spawning fish species and shoreline riparian zone areas.
- BMP established during centrarchid spawning period to provide improvements
- BMP established during the summer recreation period for social enhancements (e.g., improved navigation, access to shoreline properties, maintaining water intakes) and environmental enhancements (benefits for fish and wildlife and wetland plants species).
- Minimum flow release during the walleye spawning period to ensure consistent flow at South Falls.
- Consistent summer, fall and winter minimum flow (3 m^3/s provided from Baysville dam) to maintain social and ecological habitat values in the South Branch.

Conflicts

- The facility is considered run-of-river, and relies on flow provided from Lake of Bays and associated upstream waterbodies. More coordination between MNR and OPGC will be required to allow OPGC to remain within the narrower operating range.
- The narrower absolute range within the plan reduces the flexibility of the waterpower operator to alter head-pond levels in response to energy demands.

Public Comments

Environmental Component	Comment	Resolution
Navigation/boat access/water levels	"if water levels are too low we have no access to the property. We have been stranded on several occasions due to low water levels, not being able to leave our property" "Orillia Hydro has done a much better job of water control for the last couple of years…" ""… water levels were much more stable this past year. Perhaps this study has already encouraged dam operators to be more contentious, coordinate actions up and downstream, etc" "Hydro users are entitled to the flow and that's all. With modern controls at their disposal, levels can be kept to within ½ m, and that should be their limit" "If you do not have control of water levels above Matthias GS to be kept in the normal "green" zone, you are wasting everyone's time" A total of 12 comments regarding this topic were received.	Reduced absolute operating range. BMP implemented by OPGC during the summer recreation period in recognition of shoreline resident's concerns regarding low water levels. Summer BMP provides a voluntary range of up to 0.7 m.
Erosion	"we have lost numerous trees and 2 ft of shoreline in the past 20 years" A total of 3 comments regarding this topic were received.	Current operating strategy for the river system is to pass high flow events through the system to return lakes to NOZ levels. Greater recognition of adverse effects of this practice as a result of this planning process. MNR to obtain operational tools (i.e., flood forecast model) to improve operational capabilities. More emphasis on equitable distribution/sharing of high levels between lakes and river reaches during high flow events.
Infrastructure	"when water level drops dramatically our… water supply valve is barely in water and sucking mud"	Reduced absolute operating range. BMP implemented by OPGC during the summer recreation period in recognition of shoreline resident's concerns regarding low water levels.

Environmental Component	Comment	Resolution
Fish and Wildlife	"pike and bass are prevalent – nests are in danger when water down, lots of geese and ducks – same problem with nesting" "Do not see the "proposals" as a concern at this time, but rather as a benefit, since historically, this section of the Muskoka River has received very little attention – re: the impacts of water level fluctuations. Pleased to see study of fish populations above Matthiasville Dam." "…we have a wetland area which serves fish, otters, herons, etc. When severe drawdowns occur, this habitat is left high and dry" A total of 13 comments regarding this topic were received.	Reduced absolute operating range. BMP implemented by OPGC during the spring and early summer in recognition of concerns regarding fish spawning, and riparian and littoral zone habitat.
Recreation (i.e., swimming)	A total of 5 comments were received regarding water management's affect on swimming, particularly low water levels.	Reduced absolute operating range. BMP implemented by OPGC during the summer recreation period in recognition of shoreline resident's concerns regarding low water levels.
"Green" power	"I would like to see more green power used" "Explore new technology to generate more power from the same flow rates" A total of 3 comments regarding this topic were received.	Goal of present operating strategy is to maintain or enhance existing waterpower potential throughout the river system.

Information and Science Needs

- Further investigations of fish spawning activity (northern pike, yellow perch, smallmouth bass, rock bass and pumpkinseed) during the spring and early summer to better define areas being utilized and extent of use relative to river and head pond water levels.

12.2.9 Trethewey Generating Station – OPG

The operating plan for Tretheway Generating Station is shown in Figure 12.2.9, and has the following characteristics:

Normal Operating Zone:	278.52 to 279.43 m
Summer* Range (Typical):	278.52 to 279.43 m
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	101.4 m^3/s
High Flow Trigger:	110.8 m^3/s
Minimum Daily Flow*:**	None
Low Flow Trigger	3 m^3/s
Energy Emergency:	None
Natural Environment Constraints:	Low water levels may impact fish habitat. Flow balancing required with upstream and downstream facilities during walleye spawning.
Social Constraints:	Low water levels may impact navigation.
Other:	A minimum flow target of 3 m^3/s is released from the upstream lakes to maintain base flow in the river system during the summer period.

Benefits and Resolution of Issues

- Reduced absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- Consistent summer, fall and winter minimum flow (3 m^3/s) to maintain social and ecological habitat values in the South Branch leading into Lake Muskoka.

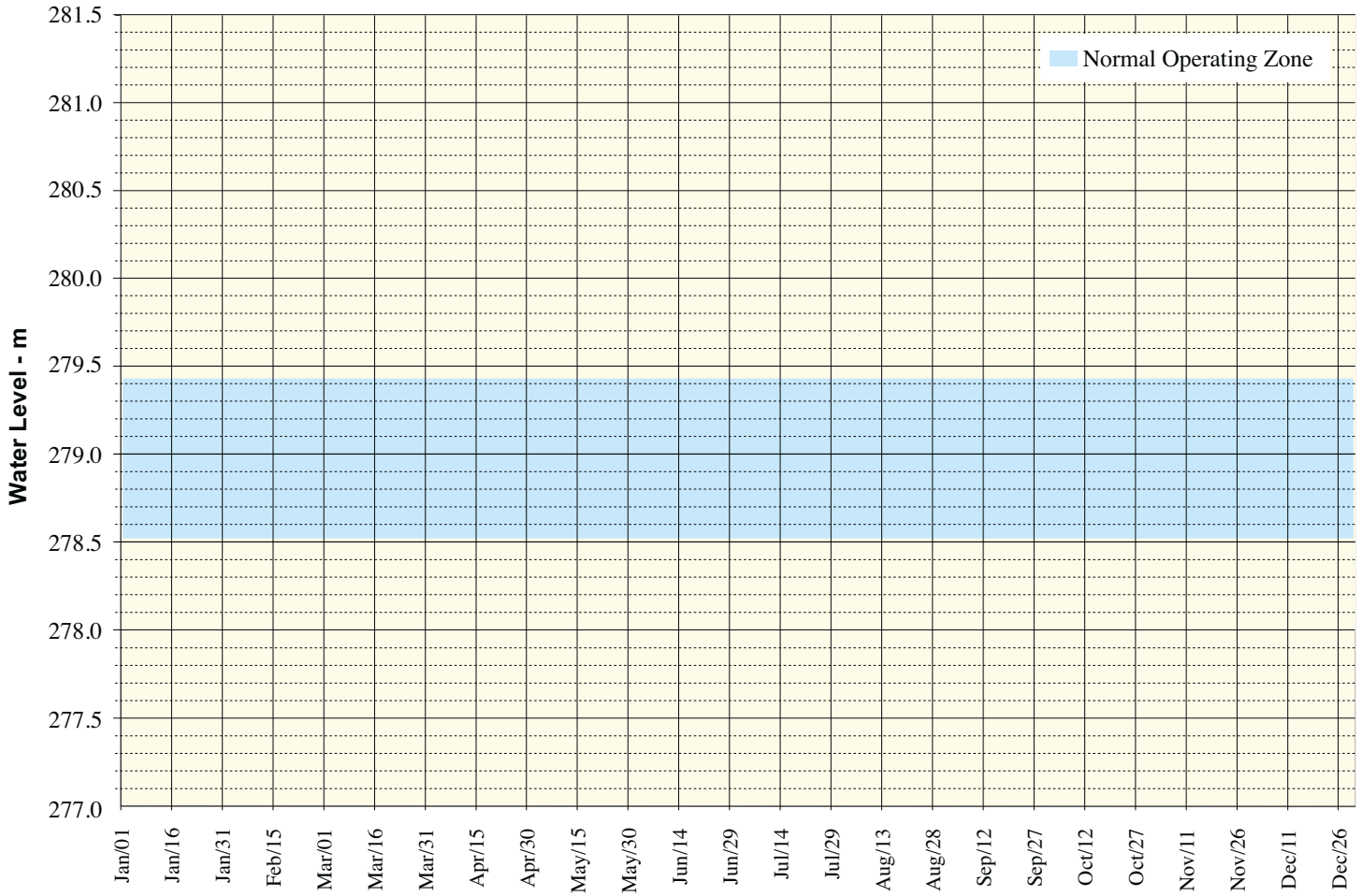


Figure 12.2.9
Muskoka River Water Management Plan
Trethewey Reservoir Operating Plan

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Conflicts

- The facility is considered run-of-river, and relies on flow provided from Lake of Bays and associated upstream waterbodies. More coordination between MNR and OPGC will be required to allow OPGC to remain within the narrower operating range.
- The narrower absolute range within the plan reduces the flexibility of the waterpower operator to alter head pond levels in response to energy demands.

Public Comments

Environmental Component	Comment	Resolution
Water Levels (Between Matthias GS and Trethewey GS)	"We wish there was a way to lessen the dramatic water level changes. Our water levels change often." "Power generation targets re liable to add to river level fluctuations. It is apparent that the extreme water level fluctuations will not be addressed by the proposed plan. River levels that swell and recede hourly will continue. It is obvious that the chief concern will be selling hydro-electric power. Only serious investment to homogenize turbine capacities can mitigate the problem. Anything less neglects harm done" "I would like to see the water level differentials to be closer" A total of 4 similar comments on this topic were received.	Reduced absolute operating range, but continued ability to fluctuate water levels within that narrower, legally enforceable zone. Lake operating regimes revised to provide more consistent downstream flow during summer low flow period. Commitment by MNR to maintain flow of 3 m^3/s at Baysville dam, and utilize the range within the NOZ rather than focusing on the TOL.
"Green" power	"I would like to see more green power used" "Explore new technology to generate more power from the same flow rates" A total of 4 similar comments on this topic were received.	Goal of present operating strategy is to maintain or enhance existing waterpower potential throughout the river system.

Information and Science Needs

None

12.2.10 Hanna Chute Generating Station – OPG

The operating plan for Hanna Chute GS is shown in Figure 12.2.10, and has the following characteristics:

Normal Operating Zone:	268.11 to 268.71 m
Summer* Range (Typical):	268.11 to 268.71 m
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	103.5 m^3/s
High Flow Trigger:	112.6 m^3/s
Minimum Daily Flow*:**	None
Low Flow Trigger	3 m^3/s
Energy Emergency:	None
Natural Environment Constraints:	Flow balancing required with upstream and downstream facilities during walleye spawning.
Social Constraints:	None
Other:	A minimum flow target of 3 m^3/s is released from the upstream lakes to maintain base flow in the river system during the summer period.

Benefits and Resolution of Issues

- Reduced absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- Consistent summer, fall and winter minimum flow (3 m^3/s) to maintain social and ecological habitat values in the South Branch leading into Lake Muskoka.

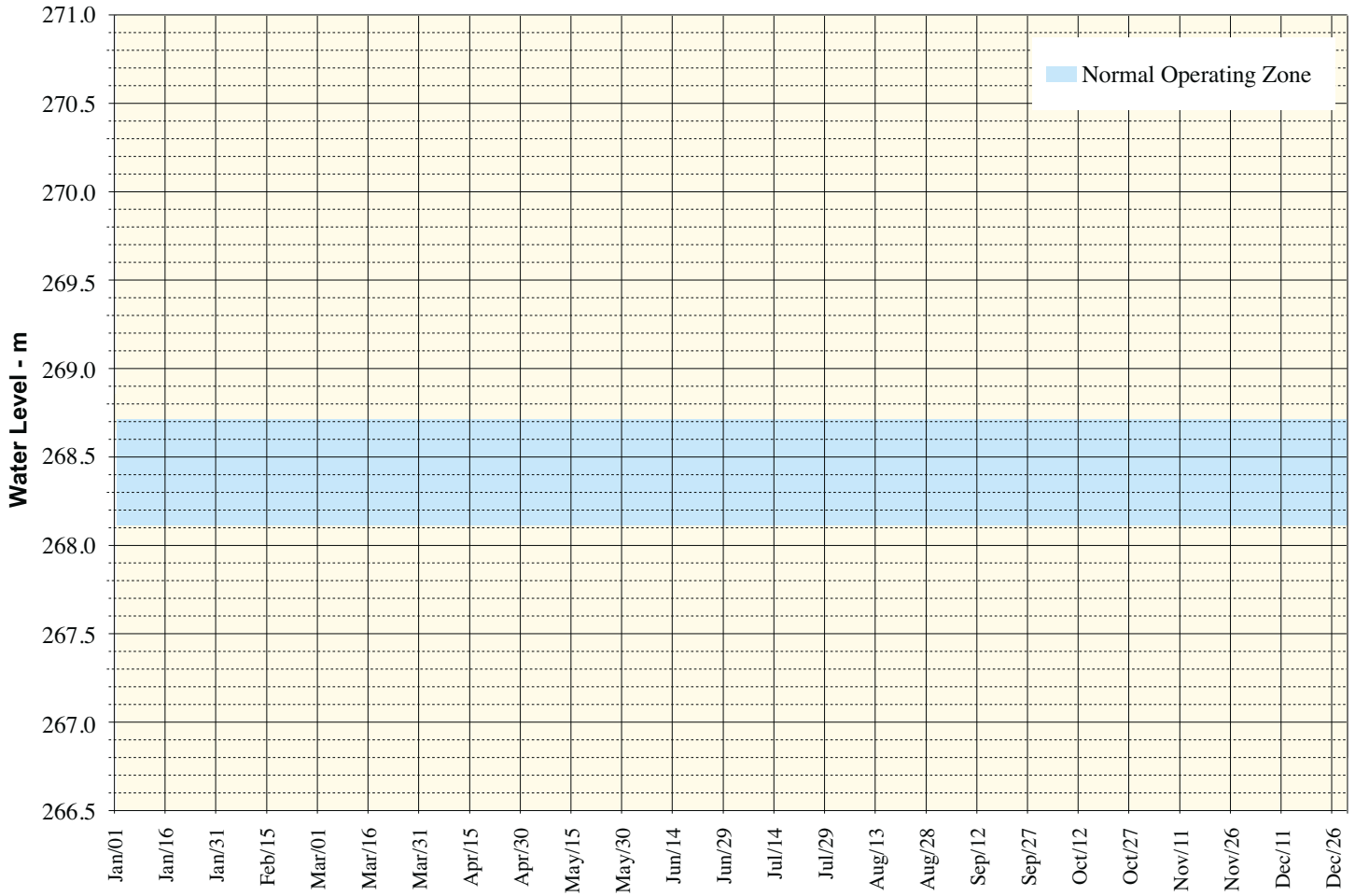


Figure 12.2.10
Muskoka River Water Management Plan
Hanna Chute Reservoir Operating Plan

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Conflicts

- The facility is considered run-of-river, and relies on flow provided from Lake of Bays and associated upstream waterbodies. More coordination between MNR and OPGC will be required to allow OPGC to remain within the narrower operating range.
- The narrower absolute range within the plan reduces the flexibility of the waterpower operator to alter head-pond levels in response to energy demands.

Public Comments

None

Information and Science Needs

None

12.2.11 South Falls Generating Station – OPG

The operating plan for South Falls GS is shown in Figure 12.2.11, and has the following characteristics:

Normal Operating Zone:	258.59 to 259.5 m
Summer* Range (Typical):	258.59 to 259.5 m
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	103.5 m^3/s
High Flow Trigger:	112.6 m^3/s
Minimum Daily Flow*:**	None
Low Flow Trigger	3 m^3/s
Energy Emergency:	None
Natural Environment Constraints:	Major walleye spawning area (for Lake Muskoka) below South Falls. OPG to provide a consistent minimum flow of 3 m^3/s through the spillway and over the spawning bed during the walleye spawning period (dates to be established by MNR based on temperature data collected at site).
Social Constraints:	None.
Other:	A minimum flow of 3 m^3/s is released from the upstream lakes to maintain base flow in the river system during the summer period.

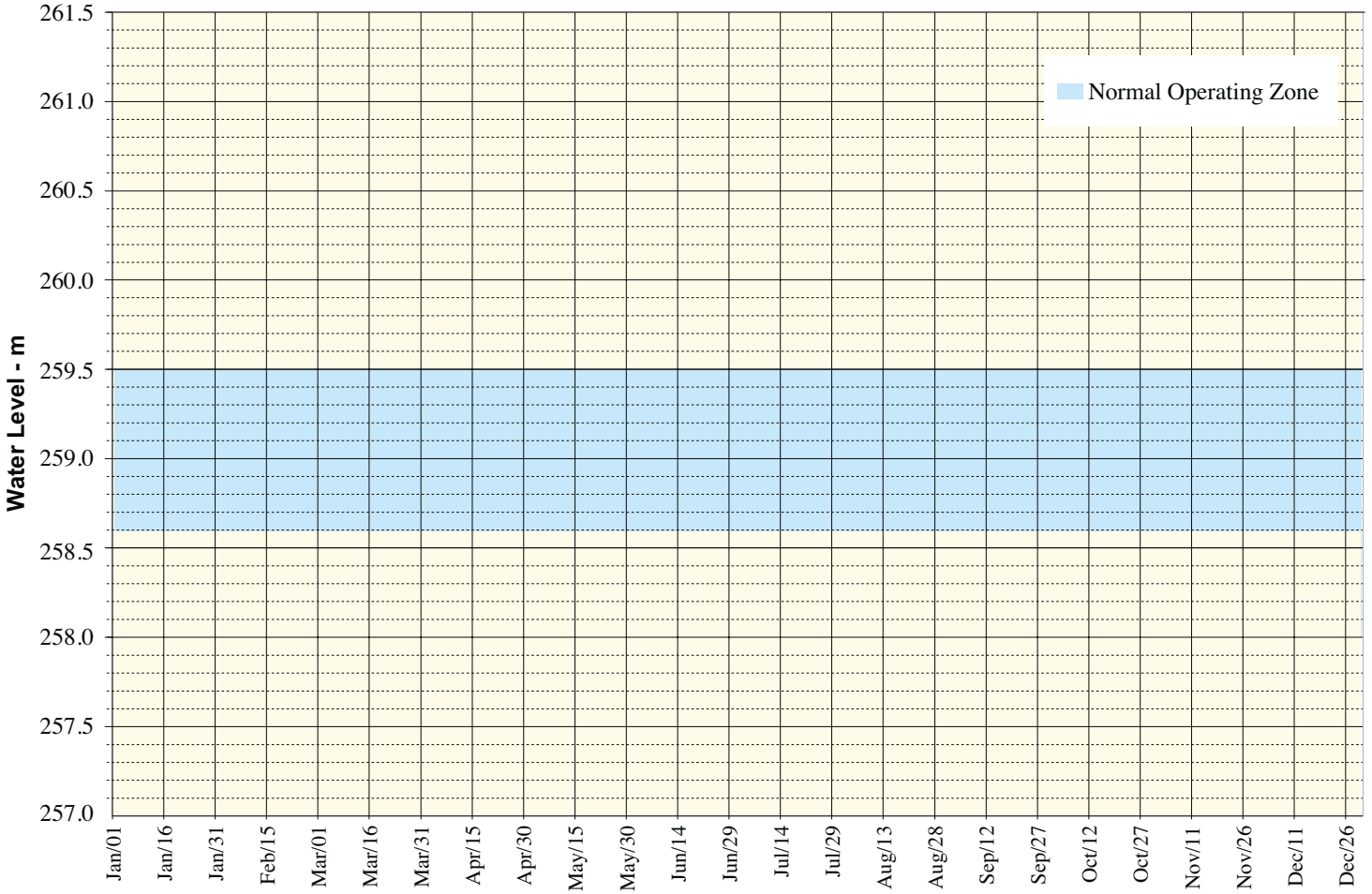


Figure 12.2.11
Muskoka River Water Management Plan
South Falls Reservoir Operating Plan

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Benefits and Resolution of Issues

- Reduced absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- Minimum flow of 3 m^3/s (measured on an hourly basis) provided through the spillway channel from approximately April 15 to June 1* to maintain walleye spawning site adjacent to the South Falls powerhouse.
- Consistent summer, fall and winter minimum flow (3 m^3/s) to maintain social and ecological habitat values in the South Branch.

Conflicts

- The facility is considered run-of-river, and relies on flow provided from Lake of Bays and associated upstream waterbodies. More coordination between MNR and OPG will be required to allow OPG to remain within the narrower operating range.

Public Comments

Environmental Component	Comment	Resolution
Recreation	"I do not understand why the beach at Muskoka Falls cannot enjoy a consistent, nice water level when OPG controls both South Falls and Hanna Chute. It is a small beautiful bay."	Reduced absolute operating range, but continued ability to fluctuate water levels within that narrower, legally enforceable zone.

Information and Science Needs

- Evaluate operational data (i.e., flows from Baysville, Matthias and South Falls) to determine whether management plan is providing the desired result of a consistent minimum flow of 3 m^3/s during the walleye spawning period.

* Dates to be established by MNR based on water temperature at site.

12.3 Lower Muskoka River

12.3.1 Lakes Rosseau and Joseph – MNR

The operating plan for Lakes Rosseau and Joseph is shown in Figure 12.3.1, and has the following characteristics:

Target Operating Level Range:	225.65 to 226.2 m
Normal Operating Zone Range:	225.4 to 226.25 m
Absolute Range:	225.3 to 226.37 m
Summer* Range (Typical):	226.0 to 226.15 m
Winter Drawdown:	226.0 to 225.65 m
Flood Allowance (lake/river):	226.25 to 226.37 m/42.0 m^3/s
Maximum Daily Flow:**	64.8 m^3/s
Minimum Daily Flow*:**	1 m^3/s, summer target
Natural Environment Constraints:	Lake trout spawning shoals on Lake Rosseau potentially within the winter drawdown zone.
Social Constraints:	Extensive high value shoreline development with infrastructure ranging from 226.25 to 226.97 m. Potential for spring ice damage to infrastructure due to high spring levels. Navigational constraints at Port Carling Locks from April 15 to October 15.
Other:	Lake difficult to fill in the spring if lower than normal snowmelt and rainfall. Lake level difficult to maintain during dry summers due to limited inflow and high evaporative losses.

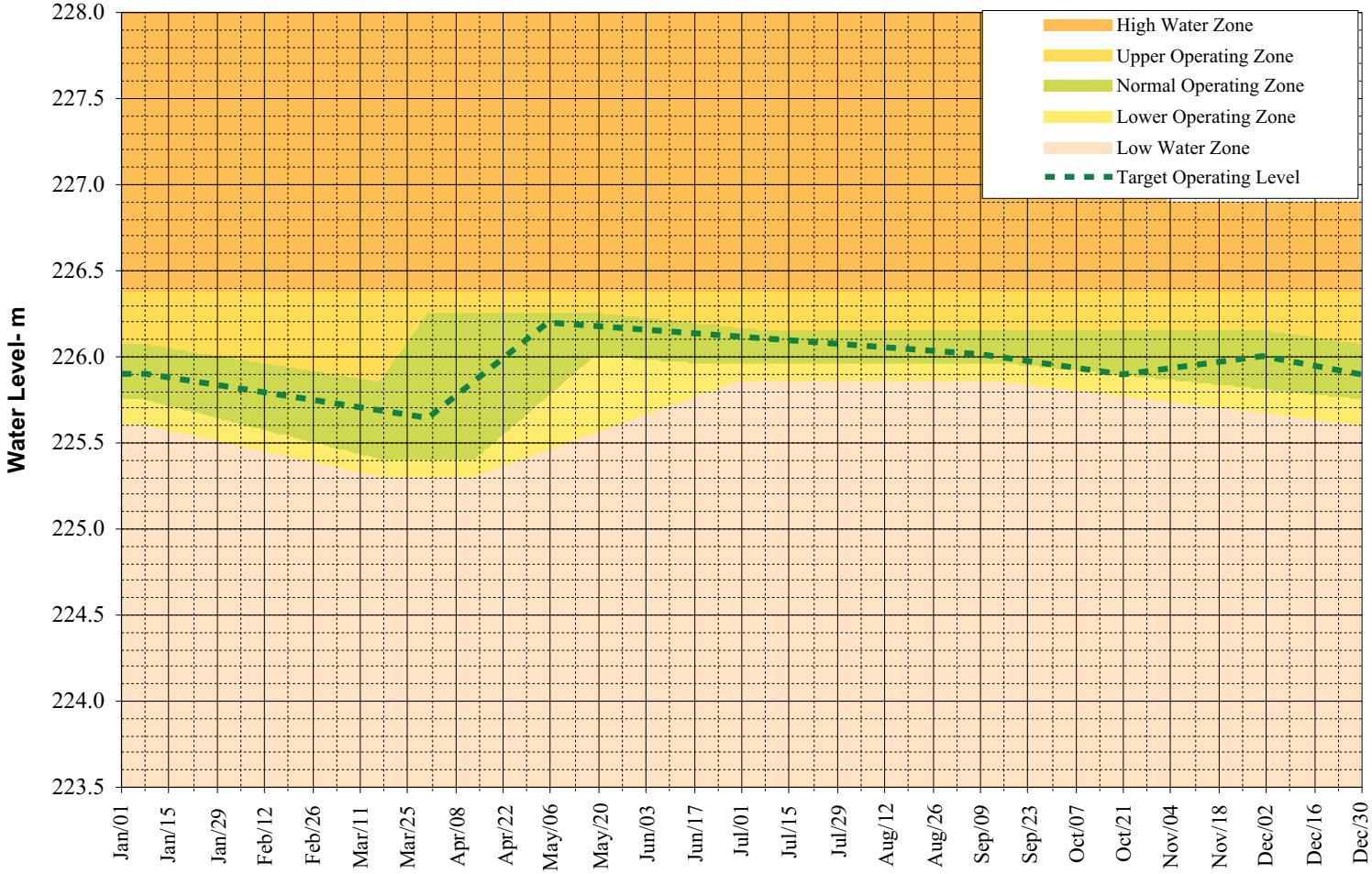


Figure 12.3.1
Muskoka River Water Management Plan
Lakes Rosseau & Joseph Operating Plan

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Benefits and Resolution of Issues

- A slightly higher spring peak with gradual seasonal drawdown to improve ecological conditions for wetland species, spring spawning fish species and shoreline riparian habitat.
- Less differential between fall and winter drawdown levels to improve lake trout spawning habitat conditions. Reduced winter drawdown will increase the amount of available aquatic habitat during this time period.
- Slightly higher summer target outflow and marginally more baseflow to improve downstream flow conditions for ecological health.

Conflicts

None

Public Comments

Environmental Component	Comment	Resolution
Infrastructure	"Indian River at Port Carling…low water levels any time from May to Oct/Nov result in our…boats (at the bow) bumping the sand bottom or resting on it, in their boathouse slips"	Difficult to maintain summer levels during those years when there is below normal rainfall, limited inflow and high evaporative losses.
Shoreline Erosion	"Serious shoreline erosion...during high water"	No change to NOZ or upper operating limit.

Information and Science Needs

None

12.3.2 Lake Muskoka, Bala North and South Dams, and North Bala Generating Station – Swift River Energy Ltd.

Lake Muskoka water level is controlled and managed by SREL utilizing the North Bala GS and the Bala North and South Dams. The operating plan for Lake Muskoka is shown in Figure 12.3.2, and has the following characteristics:

Target Operating Level Range:	224.9 to 225.6 m
Normal Operating Zone Range:	224.6 to 225.75 m
Absolute Range:	224.55 to 225.97 m
Summer* Range (Typical):	225.28 to 225.65 m
Winter Drawdown:	225.52 to 224.9 m
Flood Allowance (lake/river):	225.75 to 225.97 m/368.1 m^3/s (spring)/ 283.0 m^3/s (summer)
Maximum Daily Flow:**	309.6 m^3/s
Minimum Daily Flow*:**	6 m^3/s (inclusive of 4 m^3 from Burgess)
Natural Environment Constraints:	Lake trout spawning shoals Flows for walleye spawning at Moon Falls Lake Sturgeon spawning activity and reproduction habitat in Moon River
Social Constraints:	Extensive high value shoreline development with infrastructure ranging from 225.64 to 226.44 m Potential for spring ice damage to infrastructure. Low level can impede navigation access at Port Carling locks. High lake levels and high flows from Port Carling dam can cause flooding of Marinas on Indian River
Other:	Winter drawdown undertaken for downstream hydropower production

Benefits and Resolution of Issues

- Slightly higher spring peak with gradual seasonal drawdown to improve ecological conditions for wetland species, spring spawning fish species and shoreline riparian zone habitat.

- Less differential between fall and winter drawdown levels will improve lake trout spawning habitat conditions. Higher winter water levels will increase the available aquatic habitat during this time period.

In March 2005, MNRF released the Bala North site for potential waterpower development, with the intention that the successful developer would take over operation of both Bala dams. Swift River Energy Ltd. was awarded Applicant of Record Status through the province's Waterpower Site Release process, and proceeded with a proposal to develop the site, which followed the review and approval process noted below:

- Environmental Screening under Ontario Regulation 116/01 (Electricity Projects) administered by MECP
- Federal Screening under the Canadian Environmental Assessment Act (CEAA)
- Integration of the requirements of the Water Management Planning Guidelines for Waterpower, administered by MNRF, into the above-noted screenings
- Federal approvals (as required), including Navigable Waters Protection Act authorization
- Provincial approvals (as required), including Lakes and Rivers Improvement Act (MNRF), Public Lands Act (MNRF), Permit to Take Water (MECP), as well as various construction permits and approvals, etc.
- Other municipal or local approvals/permits as required.

Communication Plan Summary

SREL has consulted with MNRF, OPG and KRIS Renewable Power Ltd. (operator of Burgess GS) who have agreed to and will comply with the "North Bala Communication Procedure" (the Communication Procedure) which sets out the means by which communication will occur between MNRF, SREL, operator of the Burgess GS and OPG with respect to weekly operations, freshet, drawdown, bypass flow requirements, concession flows. The communication schedule will be agreed to by all parties with respect to observing and satisfying the established requirements of the MRWMP.

The Communication Procedure describes the respective communication relationships, timelines, contact names and the information each requires. Primary communication requirements are:

- MNRF will communicate with OPG/SREL on changes to upstream storage dams supplying flow to Muskoka Lake.
- As agreed, to in the Communication Procedure, the operator of the Burgess GS will communicate with SREL on planned and unplanned flow changes.
- SREL, as the operator of the Bala North and South Dams and North Bala GS (Lake Muskoka), will notify OPG and MNRF of all dam operations (planned or unplanned) that change flow within the downstream reach below Lake Muskoka in accordance with the protocol agreed under the established Communication Procedure
- SREL will be responsible for reporting to MNRF on events/incidents outside of the normal operating range, in accordance with the compliance monitoring and reporting requirements of the MRWMP (see Section 13).
- SREL Public Relations will be responsible for external communications by means of public notifications to other external stakeholders in respect to any scenarios where flows/levels are changing substantially or will deviate outside of their normal operating range as a result of planned or unplanned operations at Bala.

Conditions of approval imposed on SREL through Environmental Assessment

The Bala dams and the North Bala GS are operated by SREL in accordance with the existing approved operating strategy for Lake Muskoka. Detailed conditions of operation committed to by SREL through the Environmental Assessment Act process and with which SREL is required to comply are summarized as follows:

Water Levels

- Existing Normal Operating Zone (NOZ) provides the compliance range for Lake Muskoka water levels
- Lake Muskoka will not be used as storage with respect to the operating regime of North Bala GS
- Cycling operations during low flow periods may result in daily Lake Muskoka water level fluctuations of no more than 2 cm within a calendar day based on hourly average water levels recorded at the WSC Beaumaris level gauge 02EB018.
- Operations will, as much as possible, adhere to a narrow Best Management Zone (BMZ) band around the existing Lake Muskoka Target Operating Level

(TOL) – refer to Appendix I for a figure graphically depicting the BMZ (no BMZ applicable Jan 1st to Apr 30th)

- Water levels in Bala Reach are jointly managed by SREL and OPG (SREL operates Bala dams and North Bala GS which provide flow into Bala Reach, OPG operates Ragged Rapids GS and Moon Dam which releases flow from Bala Reach). Coordination and communication between MNRF, SREL and OPG, in accordance with the agreed upon Communication Procedure will be required to ensure all parties remain within the defined operating range in this MRWMP for Bala Reach.
- OPG can only manage the Bala Reach elevation and downstream flows and levels in accordance with legislative requirements and applicable plans and approvals (MRWMP compliance, Moon River Mitigation/Avoidance Plan for Lake Sturgeon, Endangered Species, and Fisheries Act obligations) so long as SREL provides OPG sufficient Lake Muskoka outflows.

Flows

- Ensure existing combined minimum flow of 6m³/s from Lake Muskoka is maintained, with a minimum of 1 m³/s through each of Bala North and South Dams
- Bala South Dam minimum flow to increase to 2 m³/s during summer tourist season (Jul 1st – Labour Day)
- Bala North Dam minimum flow to increase to 9.5 m³/s during walleye spawning (as determined each year through consultation with MNRF – approx. Apr 15th – 30th).
- Bala North Dam minimum flow to decrease to 2m³/s during walleye egg incubation (as determined each year through consultation with MNRF – approx. May 1st – 14th)
- Provide no less than a continuous, uninterrupted minimum Lake Muskoka total outflow of at least 22 m³/s every year between April 15th and June 1st for Walleye and Lake Sturgeon spawning activity and reproduction in accordance with the Moon River Mitigation/Avoidance Plan for Lake Sturgeon.
- Provide no less than a continuous, uninterrupted minimum Lake Muskoka total outflow of at least 18 m³/s every year between June 1st and June 10th for Lake Sturgeon spawning activity and reproduction in accordance with the Moon River Mitigation/Avoidance Plan for Lake Sturgeon.
- The uninterrupted flow can be passed through the Generating Station given that the restoration times match those identified in Tables 4 and 5 in the Dam Operating Plan.
- Under low flow conditions, when planned outflows from Lake Muskoka fall below 22 m3/s or 18 m3/s and lake water levels cannot be maintained during the corresponding time periods identified above, SREL will consult with MNRF to determine low flow water allocation priorities, in

accordance with the Moon River Mitigation/Avoidance Plan for Lake Sturgeon.

	Bala North Dam	Bala South Dam
Victoria Day weekend	4 m^3/s	4 m^3/s
Canada Day weekend	2 m^3/s	4 m^3/s
Simcoe Day weekend	2 m^3/s	4 m^3/s
Labour Day weekend	2 m^3/s	4 m^3/s
Thanksgiving weekend	4 m^3/s	4 m^3/s
Cranberry Festival weekend	4 m^3/s	4 m^3/s

- Flow in excess of the minimum bypass over Bala South and North Dams is sequentially allocated to Burgess GS (4 m^3/s) and then North Bala GS – under declining flows, the priority of flow sequence is reversed.
- Flows in excess of powerhouse capacity and minimum bypass will be spilled first over Bala South dam, and then Bala North dam when South dam's capacity reached.

Cycling Operations

- During low flow conditions, when the outflow from Lake Muskoka does not allow at least 20 m^3/s daily average flow to be passes through the Bala Generation Station, SREL will cycle operations such that the operating discharge will be 20cms (absolute range 20-22 m^3/s). Under normal circumstances this will provide approximately 26 m^3/s total discharge from Lake Muskoka (Bala GS 20 + Burgess 4+ leakage 2m^3/s).
- Facility will be cycled a maximum of once per day
- No cycling of operations will be conducted during Walleye and/or Lake Sturgeon spawning (Apr 15th – Jun 10th, or as season determined each year by MNRF)

Flow Restoration

In the event of a sudden and unplanned shutdown of flows through the North Bala GS powerhouse, SREL will prioritize the restoration of Lake Muskoka outflows to pre-event conditions based on established time limits outlined in the Bala Falls Dam Operating Plan (a.k.a the operating plan) and in coordination with OPG/MNRF to minimize downstream impacts. Under certain conditions i.e. winter ice conditions SREL will coordinate with OPG/MNRF to determine preferred post-event conditions.

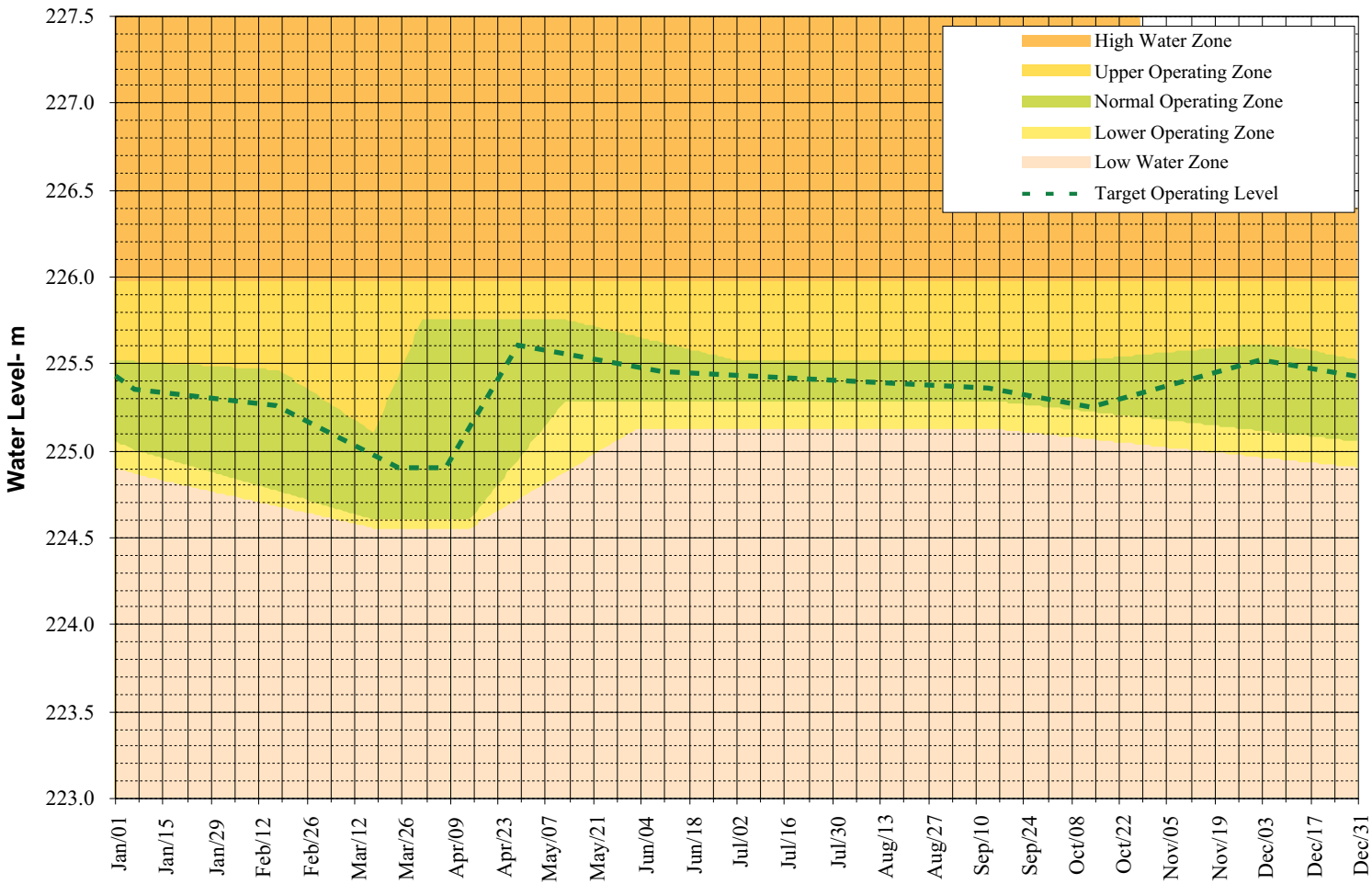


Figure 12.3.2
Muskoka River Water Management Plan
Lake Muskoka Operating Plan

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Public Comments

Environmental Component	Comment	Resolution
Flooding	"Spring runoff, levels at ice break-up [impact me]" "Flooding, dock damage"	No change to flood or ice damage potential
Navigation	"Navigation on waterways…mouth of [Muskoka] River is silting in" "Navigation [at the mouth of the Muskoka due to silt]" "Lake Muskoka Levels …fluctuate enough to make navigation challenging" "Planning for a new dock requires good information about projected spring levels and the timing and target level for October. I have to deal with shallow water at my dock"	No navigation changes. Silting of river mouth on Lake Muskoka is outside the scope of this WMP.
Power generation	"very necessary strategy for the entire watershed… we need more hydropower generation – efficient and clean"	Goal of present operating strategy is to maintain or enhance existing waterpower potential throughout the river system.
Infrastructure	"It seems to me that MNR should be interested in whether improvements could be made in any way if money were available to modify the control structures"	Plan takes operating constraints and operational limits into consideration. Reviews of the integrity and safety of MNR structures are undertaken on a regular basis.
Upstream Reach between Bracebridge and Lake Muskoka		
Navigation/ Infrastructure	"lower summer levels would have possible negative impact on river and lake navigation and docking" "delay fall drawdown to mid October to avoid interference with boating"	Summer levels to remain within the previous NOZ. Fall drawdown needs to be completed by mid October for lake trout spawning.
Draft Plan Comments		
Power Generation at Bala North Site	"…gravely concerned about the potential impact of the proposed power generation installation at the Bala North damsite on the management of Lake Muskoka and the upper lakes." "…object to the development of a hydro generation plant at the Bala North damsite which would result in unacceptable and damaging fluctuations of Lake Muskoka water levels as it would become a head-pond reservoir."	A development at the Bala north site would be subject to federal and provincial environmental assessment (EA) processes, as well as MNR's Water Management Planning Process. These processes provide numerous and varied opportunities for public and stakeholder input into the proposed operational regime of the facility. Stakeholder and public groups are urged to take advantage of the various consultation opportunities

Environmental Component	Comment	Resolution
	"too large a range above and below its (Lake Muskoka's) summer target operating level. This range appears to open up the opportunities for the new operator to build up and release a potential head of water of approximately 38 cm/15 in for production of hydro in the high need season of the summer."	to review operational strategies and express their views.

Information and Science Needs

- MNR will obtain new operational tools (i.e. flood forecast model) to assist with the management of flows and levels throughout the Muskoka River system. A review of operational capabilities vs model predictions will be undertaken to assess the effectiveness of the new operating strategy in meeting flow and level goals and objectives
- An assessment of the ability to provide higher, more consistent flow, with fewer high volume peaks, throughout the spring walleye spawning period.

12.3.3 Burgess Generating Station - Algonquin Power

The Burgess GS is located on Lake Muskoka adjacent to the SREL controlled Bala North and Bala South dams and North Bala GS and provides a flow of 0.5 to 4 m^3/s into Bala Reach. The facility is advised (by MNRF) when there is insufficient water to operate, and when it must shut down (typically when North Bala GS and both Bala North and Bala South dams are closed and water levels on Lake Muskoka are falling below the NOZ). The Burgess facility will cease operations within 24 hours of the notification by MNRF to shut down. As outflow from Lake Muskoka increases, flow in excess of the minimum flow rates for the Bala South and North Dams is sequentially allocated to Burgess GS, North Bala GS, then Bala South and lastly Bala North dam. Under declining flows, the priority of flow sequence is reversed. The operating range is the same as that of Lake Muskoka (see Figure 12.3.2 for Lake Muskoka operating ranges).

12.3.4 Bala Reach, Ragged Rapids and Moon Dam – OPG

The operating plan for Bala Reach, which is controlled by OPG's Ragged Rapids GS and Moon Dam, is shown in Figure 12.3.3 and has the following characteristics:

Normal Operating Zone:	219.0 to 219.3 m summer 219.2 to 219.5 m spring, fall & winter
Summer* Range (Typical):	219.0 to 219.3 m
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	88.9 m^3/s
High Flow Trigger:	85 m^3/s (at Bala Dams)
Minimum Daily Flow*:**	None
Low Flow Trigger	3 m^3/s
Energy Emergency:	None
Natural Environment Constraints:	Walleye spawning at Moon Falls in the spring (approximately April 15 to June 1 annually).

Adequate flow in the Moon River during the summer low flow period.

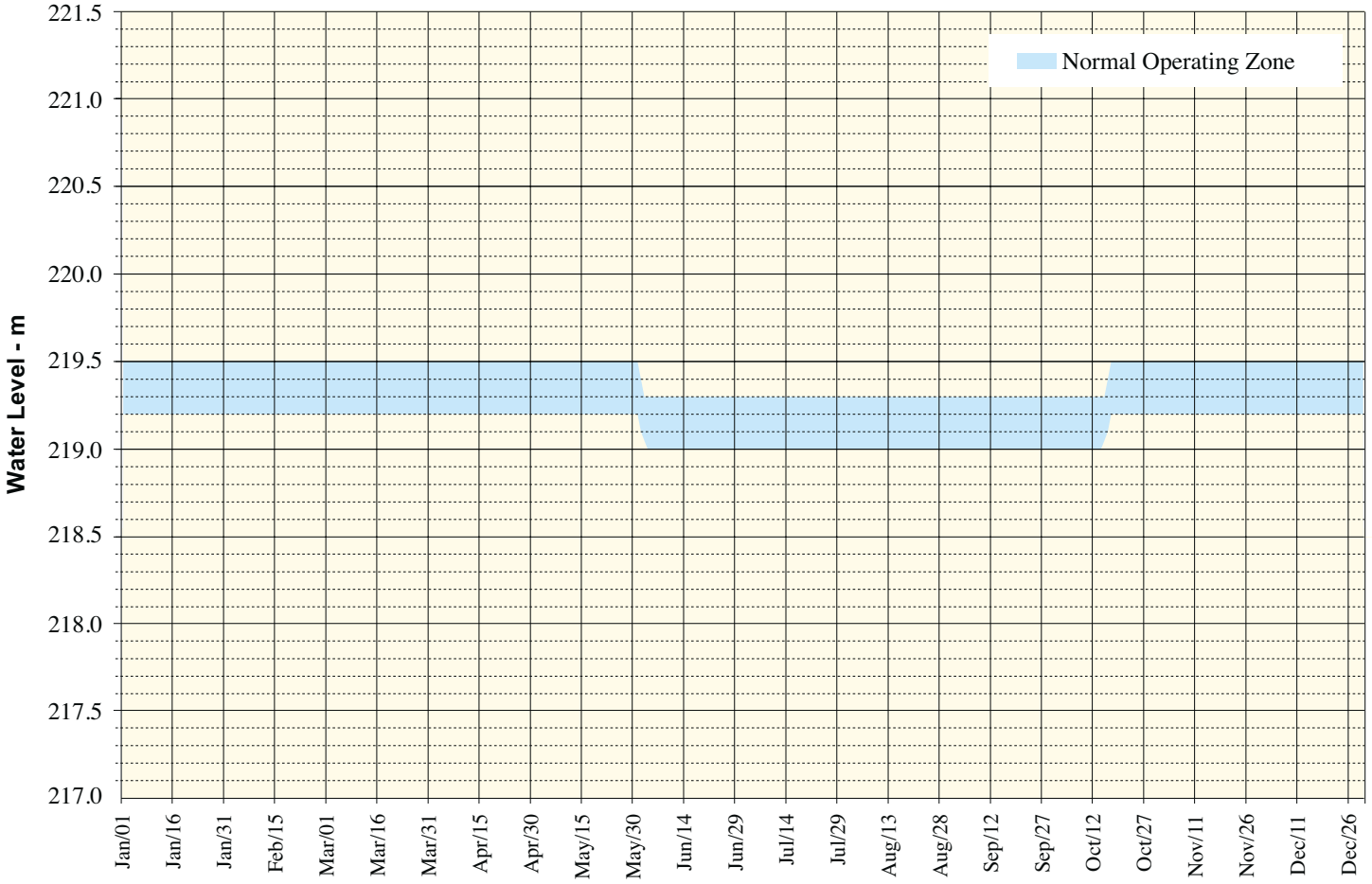


Figure 12.3.3
Muskoka River Water Management Plan
Bala Reach, Ragged Rapids and Moon Dam Operating Plan

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Social Constraints:	High water levels in Bala Reach may affect septic beds and inundate docks and cottage crawl spaces Low water levels in Bala Reach may restrict access to docks and properties.
Other:	Moon Chutes, located at the downstream end of Bala Reach, restricts outflow from Bala Reach at flows in excess of 85 m^3/s resulting in progressively higher levels as flows continue to increase. Flows and levels in Bala Reach are managed jointly by SREL and OPG. Optimum flow withdrawal for waterpower generation at Musquash stations (Ragged Rapids and Big Eddy) is 85 m^3/s.

Benefits and Resolution of Issues

- No change to the operational levels for the Bala Reach area. The TOLs, as recently agreed between OPG and area stakeholders, will become the legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers are provided to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- Ragged Rapids head pond and Moon Dam are utilized by OPG to provide flow into the Musquash River for waterpower generation and to respond to high flow events. No operational limits established for Ragged Rapids head pond given the need to vary its levels to maintain Bala Reach within its TOL.
- Flow of approximately 4 m^3/s provided into Bala Reach via the Burgess Generating Station. An additional 2 m^3/s provided via leakage at the Bala dams to achieve an overall flow target of 6 m^3/s in the reach (see Lake Muskoka minimum flow target) during the summer low flow period.
- Summer flow (approximately 1 m^3/s) in the Moon River provided via leakage through the Moon Dam to maintain social and ecological habitat values. Studies to be undertaken to assess environmental values in this river reach.

Conflicts

- Water levels in Bala Reach are jointly managed by SREL and OPG (SREL operates Bala dams and North Bala GS which provide flow into Bala Reach, OPG operates Ragged Rapids GS and Moon Dam which releases flow from Bala Reach). Coordination and communication between SREL and OPG, in accordance with the agreed upon Communication Procedure, will be required to ensure all parties remain within the legally defined operating range for Bala Reach.
- High water levels will still occur in Bala Reach during high flow events due to the limited storage available in upstream lakes. Utilization of management tools (i.e., operational model using flood forecast information) may enhance ability to reduce severity of short term, moderate flow events.
- The operating strategy for the Moon River will continue to target 14 m^3/s at the Moon Falls walleye spawning site during the walleye spawning and incubation period when flows at Bala are greater than 20 m^3/s as a best management practice. When overall watershed conditions indicate that 20 m^3/s cannot be sustained through the utilization of storage in the upper lakes, flows may be reduced to 8 to 10 m^3/s in the Moon River and 4 to 6 m^3/s in the Musquash River. Increased flow during the spring period has been suggested to enhance walleye spawning opportunities and survival at the Moon Falls spawning site. Amendments to flow management for the Moon River are expected as new information becomes available (see Section 15), through an adaptive management process.

Public Comments

Environmental Component	Comment	Resolution
Infrastructure	"Moon River properties…flood to extreme or are left with docks high and dry" "property damage/loss occurs regularly on our section of the river due to fluctuations of 3 to 4 feet. The damage/loss can be to shoreline structures (mainly docks) or to boats" "consistent water levels make it easier to keep our docks where we want them and means less loss of property if a sudden rise in water level occurs and floats things away"	Maintain seasonal operating zones agreed to between OPG and local stakeholders. District Municipality of Muskoka to establish flood levels. MNR to obtain and implement management tools to enhance ability to moderate short term, moderate flow events. MNR and OPG to enhance communication and information sharing pertaining to the management of flows and levels in Bala Reach.
Fluctuation	"Moon River levels are extremely inconsistent from hour to hour, day to day, season to season and year to year"	MNR and OPG to enhance communication and information sharing pertaining to the management of flows and levels in

Environmental Component	Comment	Resolution
	"…water levels on the Moon River at Bala fluctuate only within a 1 ft range in the summer" "…the perception has been that when the level in Lake Muskoka rises even a minimal amount, the excess gets dumped in the Moon River, causing it to sometimes rise to totally unacceptable levels…" "OPG understands the normal operating level required on the Bala Reach, and if maintained properly, I have no concerns about damage. Nice to see stakeholders working to get consensus on such a significant issue" A total of 6 comments on this topic were received.	Bala Reach.
Fish and Wildlife	"[fluctuating water levels] impact all shore life" "concern that enough water flows through the river to be sure that it is healthy for fish and frogs" "low flows on the Moon River and drastic fluctuations are having a major negative impact on walleye reproduction" "the fishery of the receiving waterbody (Georgian Bay) is being impacted [by water level and flow management]"	Studies to be undertaken to establish resource values in the Moon River and flow required to maintain viability of Moon River walleye population. An adaptive management approach to be undertaken by MNR and OPG.
Water Quality	"we need enough flow to be sure that the river, including the bays, flushes itself so that bacteria is not allowed to grow causing problems in more stagnant areas"	Studies to be undertaken to establish resource values in the Moon River. An adaptive management approach to be undertaken by MNR and OPG.
Draft Plan Comments		
Power Generation at Bala North Site	"…all of the values which we worked to have reviewed and considered in the development of this plan are respected by any power generation operation." "In the past, MNR and OPG have cooperated to address many issues in the management of this very complex riverine/lake-like body with its	A development at the Bala North site would be subject to federal and provincial environmental assessment (EA) processes, as well as regulation by MNR under the Water Management Planning Process. These processes provide numerous and varied opportunities for public and stakeholder input into the

Environmental Component	Comment	Resolution
	complicating natural restrictions at the Chutes. The potential dramatic negative impacts on the human and other life forms existing below the Bala dams as a result of a power plant must be addressed in this plan to protect the integrity of the intent of the plan – to provide a more 'natural' control system for the Muskoka River."	proposed operational regime of the facility. Stakeholder and public groups are urged to take advantage of the various consultation opportunities to review operational strategies and express their views.

Information and Science Needs

- Establish natural resource values in the Moon River relative to existing flows and levels.
- Define walleye spawning areas and habitat characteristics at Moon Falls
- Define the relationship between flow (in terms of wetted area) and walleye spawning habitat at Moon Falls
- MNR will obtain new operational tools (i.e., flood forecast model) to assist with the management of flows and levels throughout the Muskoka River system. Undertake an assessment of the ability to provide higher, more consistent flow, with fewer high volume peaks, throughout the spring walleye spawning period.

12.3.5 Big Eddy Generating Station – OPG

The operating plan for Big Eddy GS is shown in Figure 12.3.4, and has the following characteristics:

Normal Operating Zone:	206.35 to 207.3 m
Summer* Range (Typical):	206.35 to 207.3 m
Winter Drawdown:	None
Flood Allowance:	None. However, the facility has limited discharge capacity and cannot control river levels beyond the specified High Flow Trigger. Levels may exceed the upper extent of the NOZ at this time.
Maximum Daily Flow:**	90.3 m^3/s
High Flow Trigger:	85 m^3/s
Minimum Daily Flow*:**	None
Low Flow Trigger	3 m^3/s
Energy Emergency:	None
Natural Environment Constraints:	None
Social Constraints:	Flow releases from Big Eddy may result in water levels fluctuations on downstream reaches and lakes.
Other:	Automated sluice gate to be installed in one bay of Go Home Lake dam to address water level changes due to Musquash River flow changes.

Benefits and Resolution of Issues

- Reduced absolute operating range, with legally enforceable upper and lower limits under normal operating conditions. High and Low Flow Triggers to address flow extremes (whether naturally occurring or the result of upstream dam operation).
- Water level fluctuations in Go Home Lake resulting from Big Eddy flow releases to be addressed by installation of automated flap gate in Go Home Lake dam.

Conflicts

- The facility is run-of-river and relies on flow provided from upstream waterbodies and facilities. More coordination will be required to remain within the narrower operating range.
- The narrower absolute range within the plan reduces the flexibility of the waterpower operator to alter head pond levels in response to energy demands.

Public Comments

Environmental Component	Comment	Resolution
Navigation/boat access	"this river [Musquash and Gray Lake] can be considered quite dangerous due to the fluctuation of water levels and force of current when the dams are in operation"	Warning signs have been installed by OPG to advise of dangers associated with increased flow when plants are operational.
Infrastructure	"there have been many occasions where our boat has been marooned on land as the water has retreated drastically"	Lake operating regimes revised to provide more consistent downstream flow during the summer low flow period. Commitment by MNR to maintain minimum flows at Baysville and Port Sydney dams, and utilize the range within the NOZ rather than focusing on the TOL.
Erosion	"this constant extreme fluctuation is certainly taking its toll on the erosion of the surrounding land"	Lake operating regimes revised to provide more consistent downstream flow during the summer low flow period, which will reduce the frequency of stops/starts of the generating units.
Fish and wildlife	"this constant extreme fluctuation is certainly taking its toll on the…wildlife in the area and the fish in these waters"	Lake operating regimes revised to provide more consistent downstream flow during the summer low flow period, which will reduce the frequency of stops/starts of the generating units.

Information and Science Needs

None

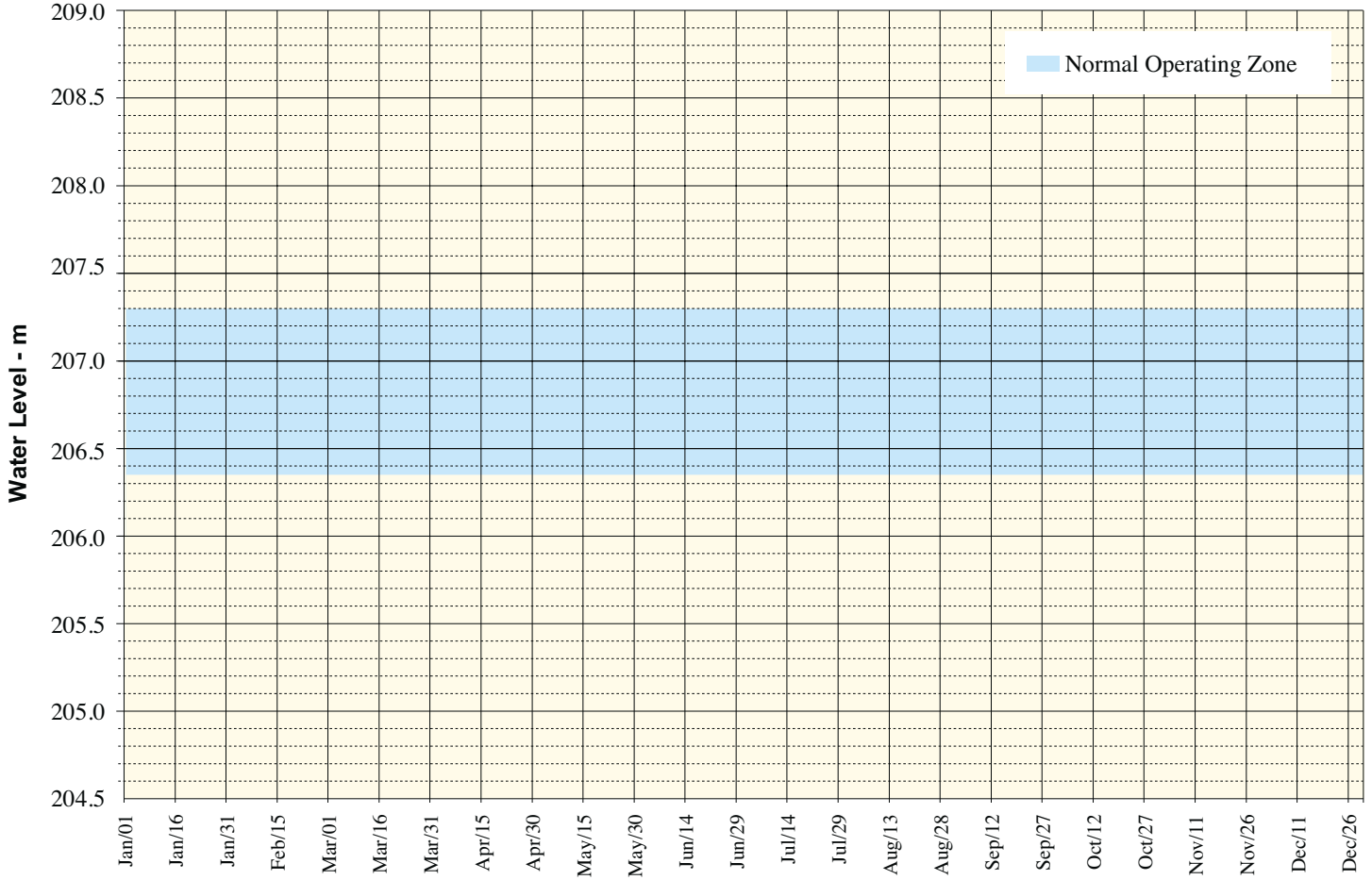


Figure 12.3.4
Muskoka River Water Management Plan
Big Eddy Reservoir Operating Plan

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