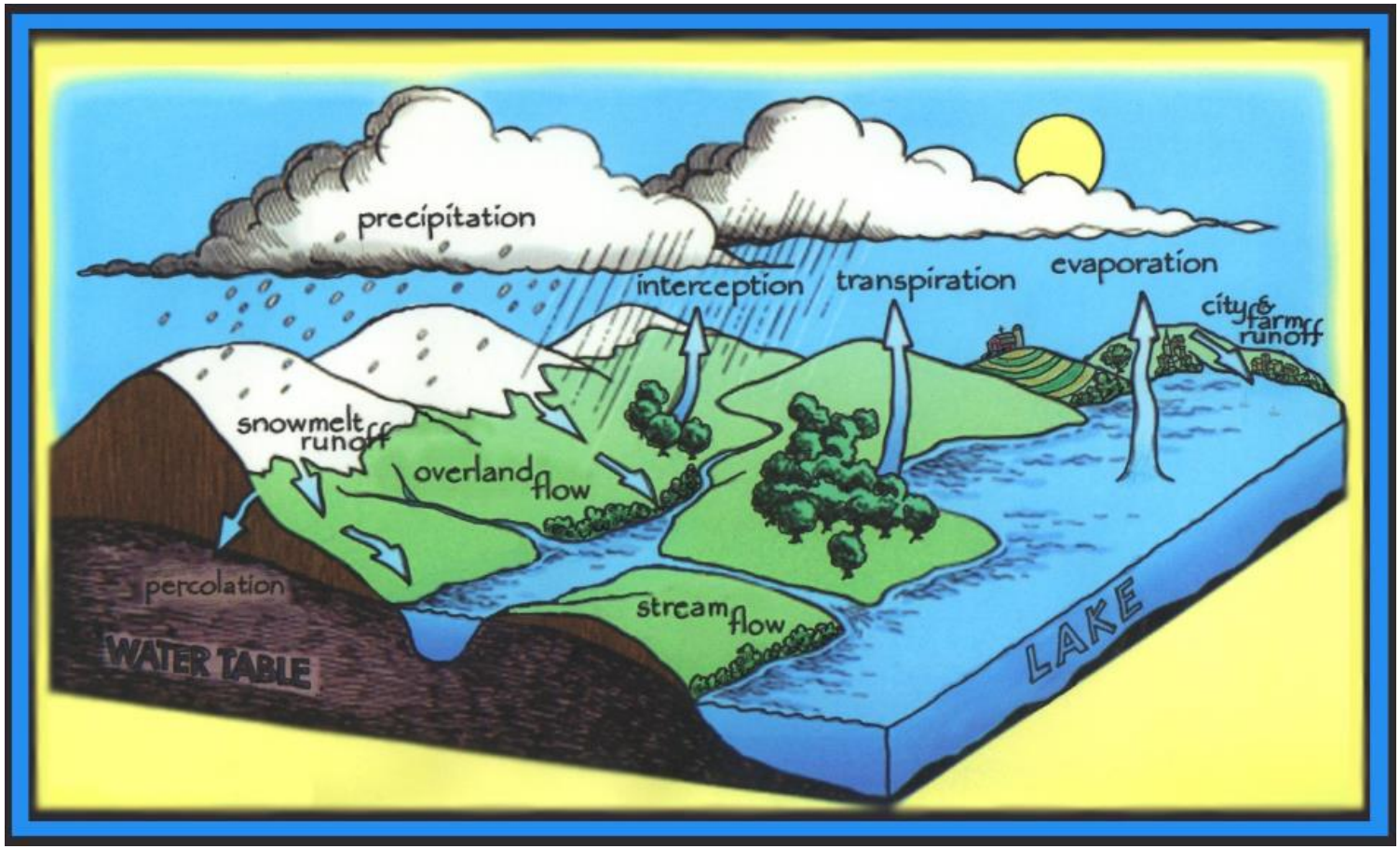
Peninsula Lake ECO Workshop

July 2, 2016

Mara Kerry
Partnership Specialist
Parry Sound District

Amanda Vincent
IRM Technical Specialist
Parry Sound District

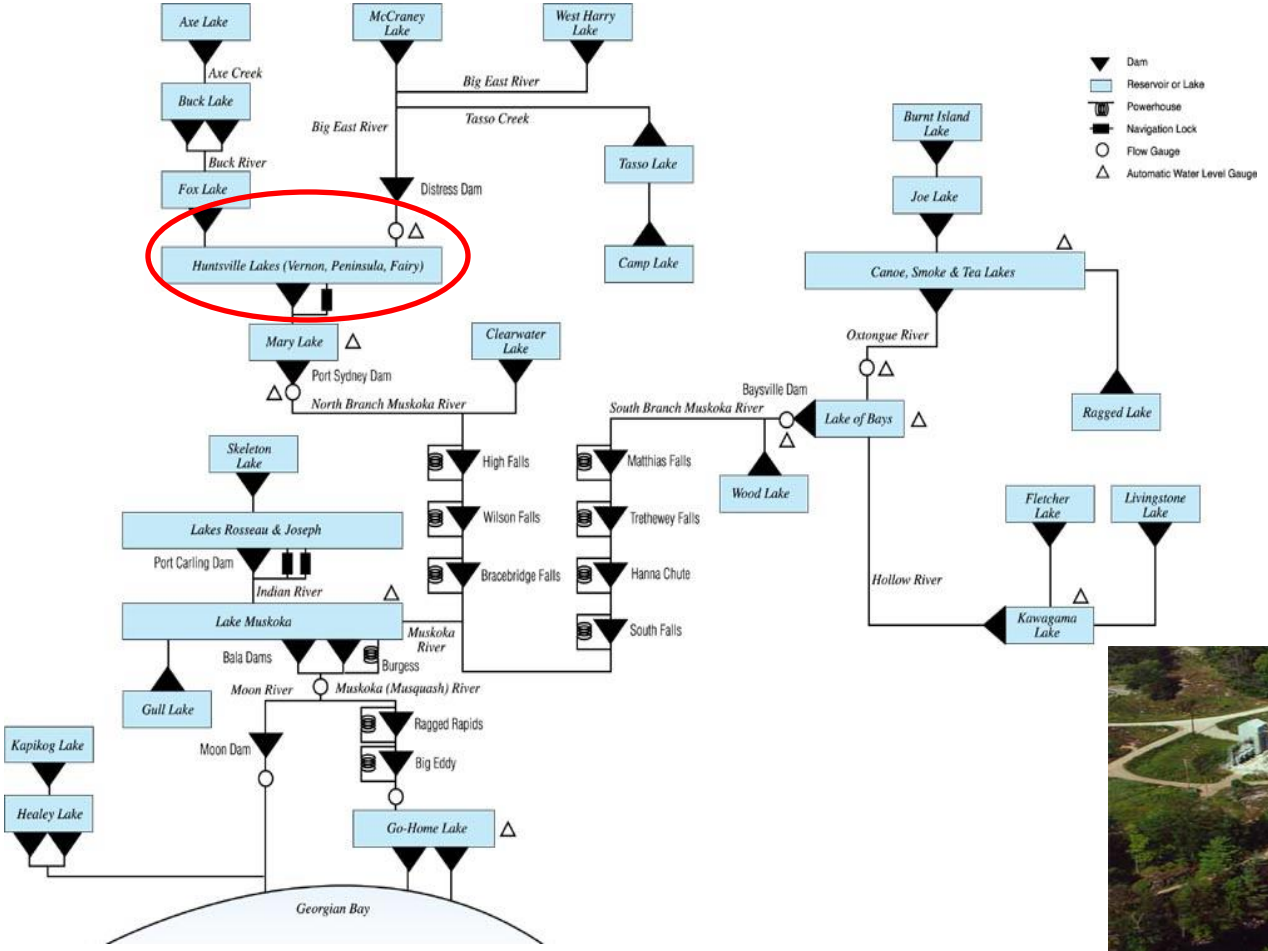
What is a Watershed?



Muskoka River Watershed

Muskoka River System

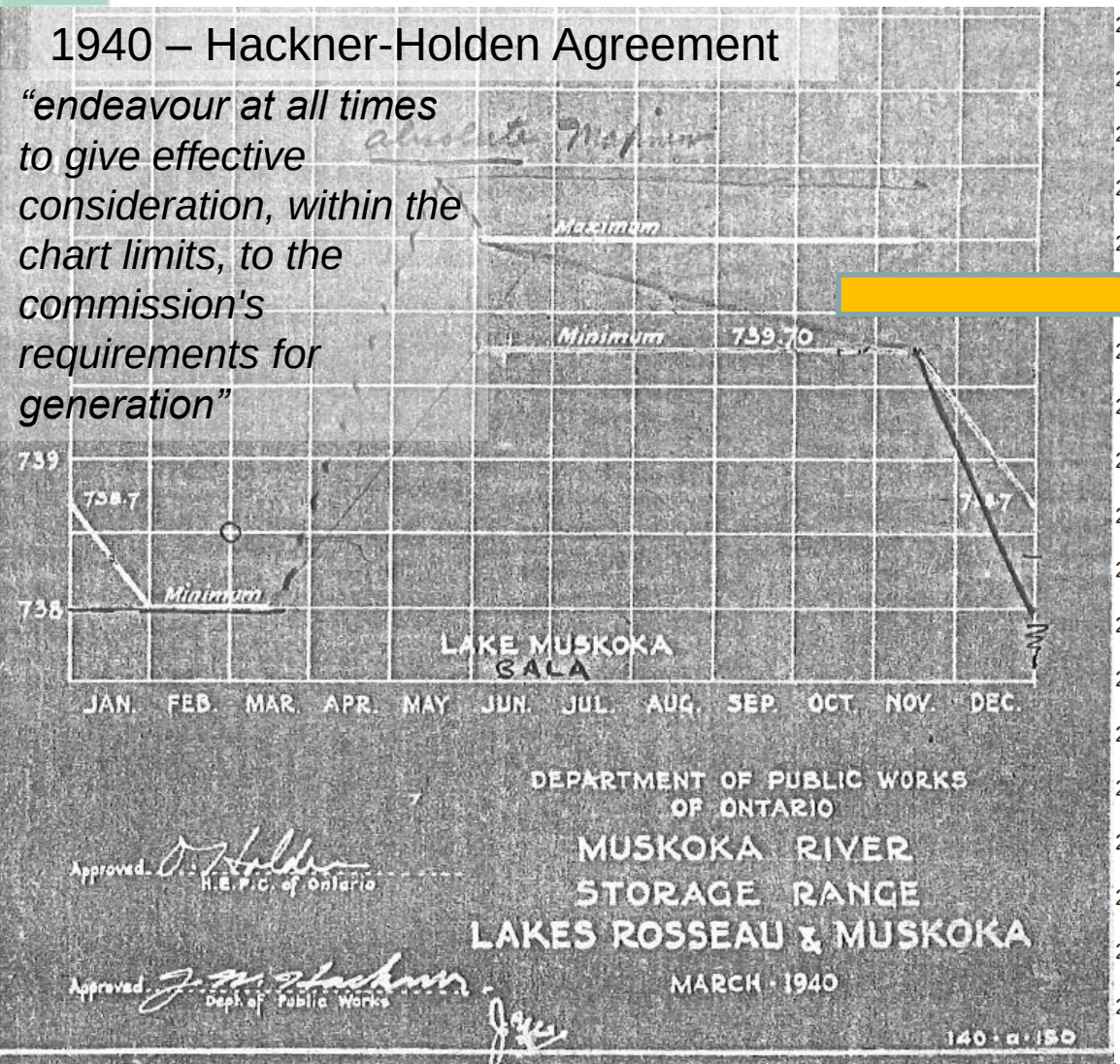
MNRF Control Dams and Waterpower Facilities

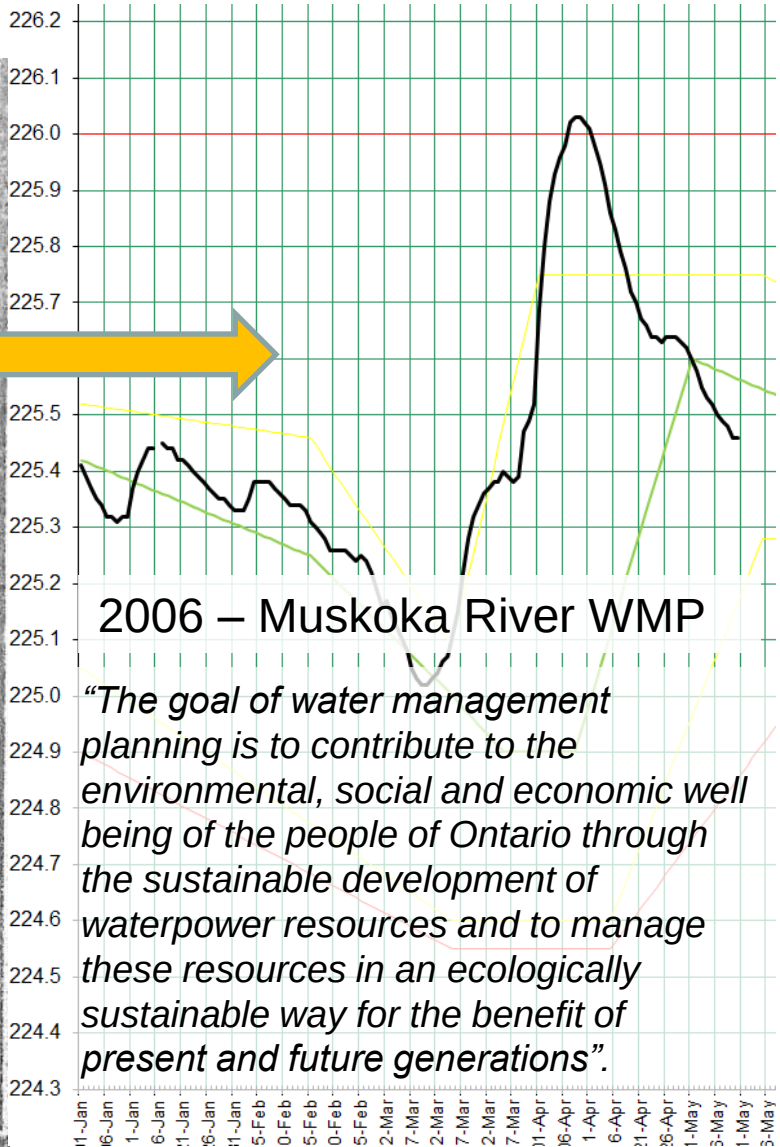


Conflicts Arise!!!

1940 – Hackner-Holden Agreement

"endeavour at all times to give effective consideration, within the chart limits, to the commission's requirements for generation"





2006 – Muskoka River WMP

"The goal of water management planning is to contribute to the environmental, social and economic well being of the people of Ontario through the sustainable development of waterpower resources and to manage these resources in an ecologically sustainable way for the benefit of present and future generations".

Water Management: Issues/Considerations

- Equability
- Recreational lake levels
- Water levels and river flow fluctuations
- River base (minimum) flows
- Lake trout spawning habitat - winter lake drawdown
- Walleye spawning habitat - spring flows
- Seasonal inundation of wetland areas- fish and wildlife habitat
- Flood mitigation - protection of property

(Photo: Walleye spawning area: below OPG South Falls)

Muskoka River Water Management Plan

- MRWMP came into affect June, 2006: available on *Muskoka WaterWeb*: www.muskokawaterweb.ca

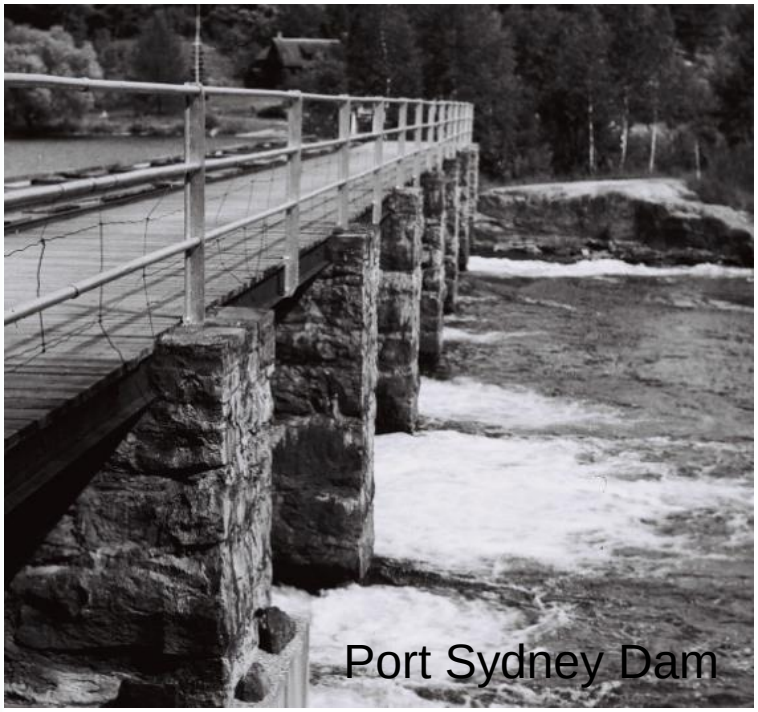
- *Goal:* contribute to the environmental, social and economic well being of people through the sustainable development of waterpower resources and to manage these resources in an ecologically sustainable way for present and future generations;

- Achieved through management of water levels and flows as they are affected or controlled by the operation of both waterpower facilities and MNR dams

- Waterpower facilities and dams each have an annual operating plan for flow and level requirements "*None of the dams regulating the 23 major lakes were built for flood control purposes"*

Dams and Water Levels

- Many of the original dams were constructed in the late 1800's to early 1900's:
  - Facilitate the transport of logs to sawmills
  - Hydroelectric generation
  - Aid commercial navigation
- Dams range from large structures with multiple openings requiring frequent visits to small structures that may not appear to be a water control structure



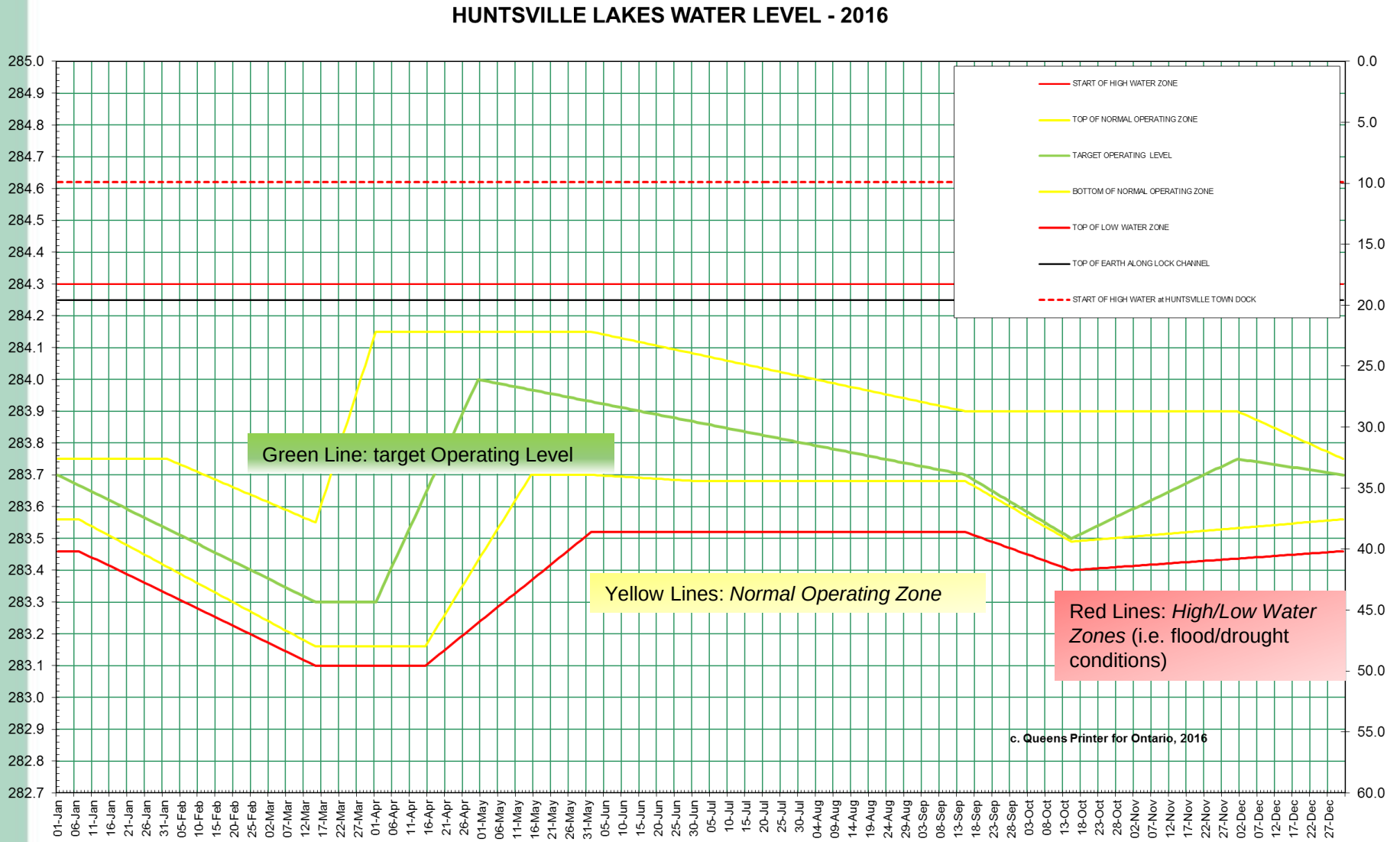
Port Sydney Dam

Ministry of Natural Resources

Ontario

Natural. Valued. Protected.

Rule Curve / Operating Plan



Rule Curve – WMP Objectives

HUNTSVILLE LAKES WATER LEVEL - 2016

Longer period of higher spring water levels maintains wetlands, seasonally inundated and littoral areas for fish and wildlife habitat; provided sustained discharge during the Walleye spawning and egg incubation period.

Declining summer water levels provides enhanced downstream flows during periods of dry weather

Increased fall drawdown reduces difference between fall and late-winter levels and promotes Lake Trout to spawn at lower elevations within shoals

Reduced winter drawdown under WMP objectives helps minimize mortality of Lake Trout eggs/fry that don't hatch/disperse until late April/early May

Drawdown *provides flows for electricity generation throughout winter and mitigates spring high water (non-flood) events; can be lowered further based on watershed conditions; e.g. snow pack water content and/or weather outlook/trends*

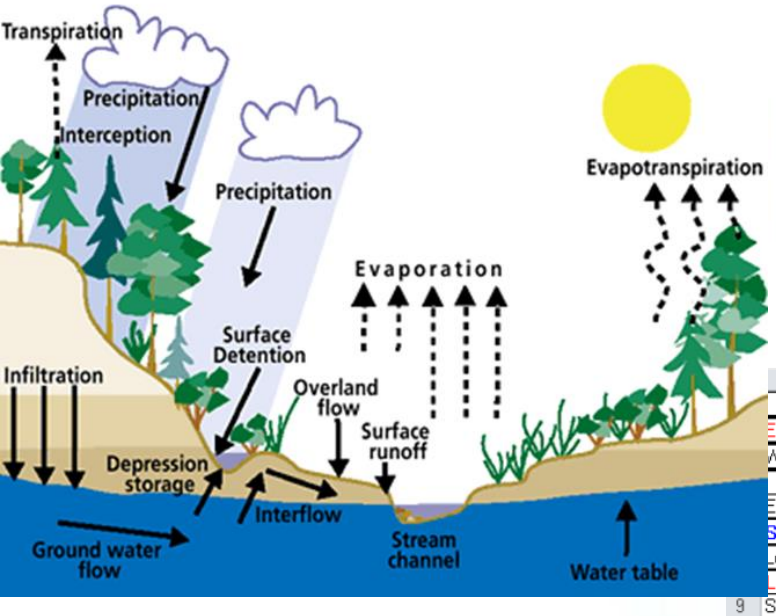
High Water *and* Flood Events

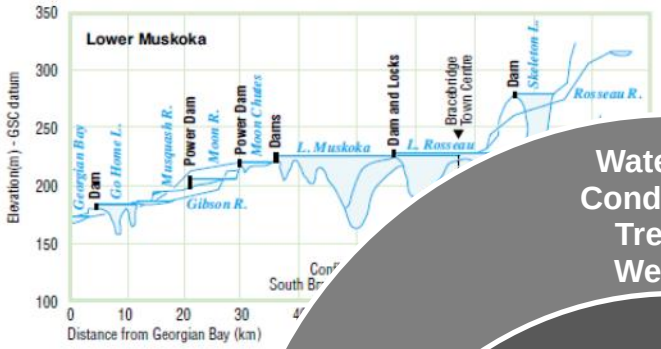
- The operation of MNR dams mitigate impacts of high water that occur at any time of the year but cannot prevent a *flood event*
- MNRF dams are not designed as flood control structures and have a finite discharge capacity within a lake's Normal Operating Zone;
- During spring freshet following winter drawdown, total inflow to a lake is greater than dam outflow. Lake level and dam outflow will continue to increase until such time dam outflow matches inflow; *then* lake levels crest
- Natural and manmade (e.g. bridge/infilling) constrictions to flows within rivers and lake outlets can compound high water conditions
- A flood is a natural event that occurs periodically and will continue to occur
- Frequency or severity of floods (and drought) will increase into the future due to climate change; *adaptation and mitigation important…*

Living by Water: Adaptation/Mitigation

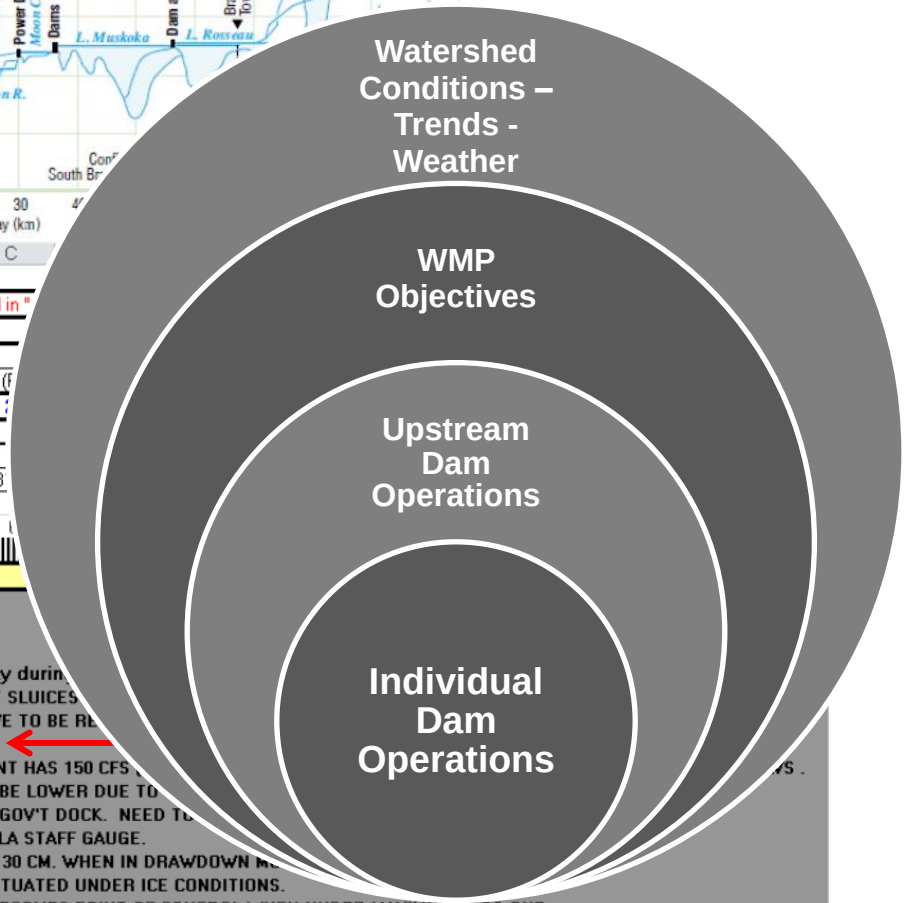
- MRWMP: *provides an adaptive management approach to operating dams which lessens impacts during periods of high water and drought; e.g. winter drawdowns, minimum flows within river sections downstream of regulated lakes*
- Avoid infilling or building within floodplains along rivers
- Protect wetlands
- Build boathouses/docks at an appropriate elevation above normal summer lake levels
- “Flood-proof” boathouses; consider portable or cantilevered docks
- Operate boats in a manner to reduce wake; boat wake significantly more damaging to shorelines/infrastructure than wind-driven waves
- Follow good shoreline use practices to minimize erosion and safeguard other values associated with our lakes and rivers!

Daily Planning Cycle: Monitoring and Dam Operations





	A	B	C
	BALA SOUTH		
	ENTER Bala Bay water level in "		
	Water level in "feet" >		
	Enter the number of logs "IN" (F		
	Sluice #	1	
	Logs Out	7	
	Logs In	1	
9	Sill Elevation	731.99	73
10	Head Feet	5.7	
11	Flow cfs	609.0	
12			
13	<< KEY NOTES >>		
14			
15	OPERATION NOTES		
16	General Information		
17	>> note levels in Bala Bay durin		
18	* NUMBER ONE AND EIGHT SLUICES		
19	* ANY CHANGES HERE HAVE TO BE RE		
20	705-472-5851		
21	* ALGONQUIN POWER PLANT HAS 150 CFS		
22	* ELEVATION AT DAM CAN BE LOWER DUE TO		
23	READ BALA BAY GAUGE ON GOV'T DOCK. NEED TO		
24	BEAUMARIS GAUGE AND BALA STAFF GAUGE.		
25	DIFFERENCE CAN BE UP TO 30 CM. WHEN IN DRAWDOWN M		
26	THIS DIFFERENCE IS ACCENTUATED UNDER ICE CONDITIONS.		



Water Level and Flow Gauge Network

HOBOlink powered by Onset®

Fox Lake

Latest Conditions

Relay State: Deactivated (Open)

Water Level (Water Level): 294.4153 metres

Temp (Temperature): 23.65 C

Battery: 4.36 V 100%

Activity Log

Connections | Alarms

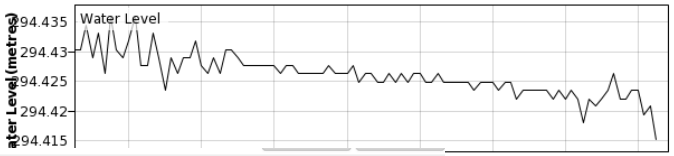
Next connection expected 42 minutes from now

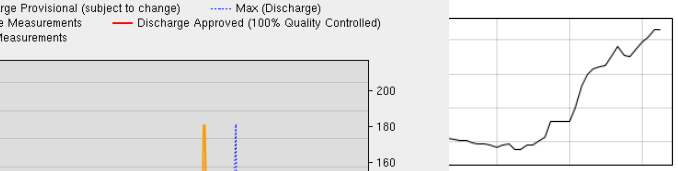
Graphs

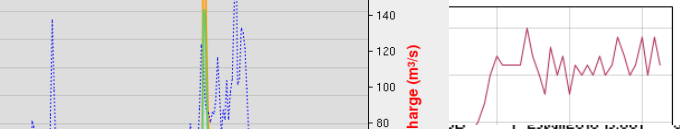
Past Day | Past Week | Past Month

07/19/2015 13:45:00 - 07/20/2015 13:45:00 (EDT)

16:00:00 19:00:00 22:00:00 01:00:00 04:00:00 07:00:00 10:00:00 13:00:00







Worksheet Report

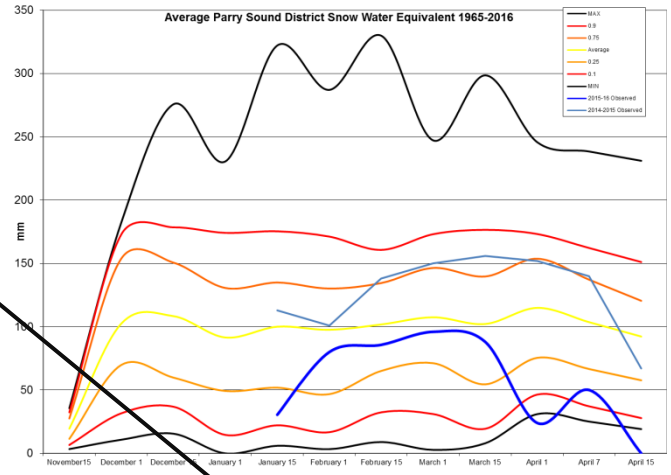
Surface Water Monitoring Centre

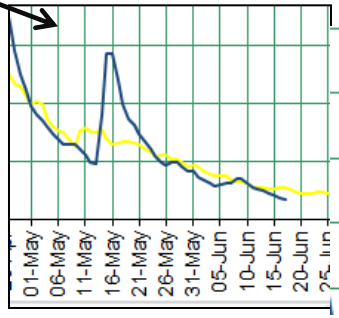
Level			(Q) DamTotal Flow cms			Precip	Water Temp	Air Temp (Today)	
ay	Yesterday	Change	Today	Yesterday	Change	24 Hours (mm)	Today - Average (°C)	Max (°C)	Min (°C)
9.53	279.54	-0.01	49.40	49.60	-0.20				
5.35	225.34	0.01	132.40	130.50	1.90		17.1		
3.46	329.47	-0.01	8.00	8.20	-0.20			18.5	7.6
2.72	282.73	-0.01	31.50	32.80	-1.30		18.6		
3.99	294.00	-0.01	42.20	43.00	-0.80		17.8		
5.52	205.54	-0.02	78.90	83.80	-4.90			20.2	8.2
3.90	283.89	0.01	40.00	39.70	0.30	0.0	18.6		
5.10	185.23	-0.13							
5.55	355.55	0.00							
9.44	225.44	0.00							
6.15	226.16	-0.01							
5.27	315.25	0.02							
0.78	280.78	0.00							
7.73	417.73	0.00							
5.23	335.23	0.00							
0.32	300.32	0.00							
2.39	412.39	0.00							
4.40	294.40	0.00							
0.35	0.35	0.00							
0.94	0.94	0.00							
0.50	280.50	0.00							
9.10	399.10	0.00							

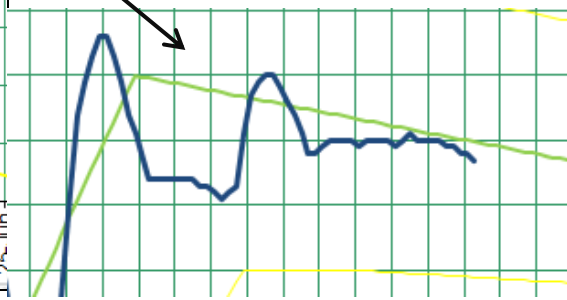
OD	25Jan2016 15:00			
013	01Jun2016 11:00	8.86	8.88	-0.02
013	01Jun2016 10:00	5.39	5.42	-0.03
011	01Jun2016 10:00	25.77	25.80	-0.03
018	01Jun2016 11:00	7.66	7.68	-0.02
011	01Jun2016 10:00	2.10	2.01	0.09
012	01Jun2016 10:00	3.62	3.86	-0.24
005	01Jun2016 10:00	8.68	8.70	-0.02
004	01Jun2016 11:00	0.78	0.88	-0.10
014	01Jun2016 11:00	3.45	3.57	-0.12
008	01Jun2016 11:00	7.85	8.07	-0.22

Predicting Runoff /Operating the Dams

- Operational decision based on:
  - Water level and trends in relation to the Operating Plan of the lakes
  - Short and long term weather forecasts
  - Snow water content if applicable
  - Overall watershed conditions







- Calculating Dam Ops…
- 1) Build Rate (3.6 m3/s to change HV 1cm/24h)
- 2) 24 hour rise in water level
- 3) Possible inflow from runoff

Build rate x desired trend = flow change at dam

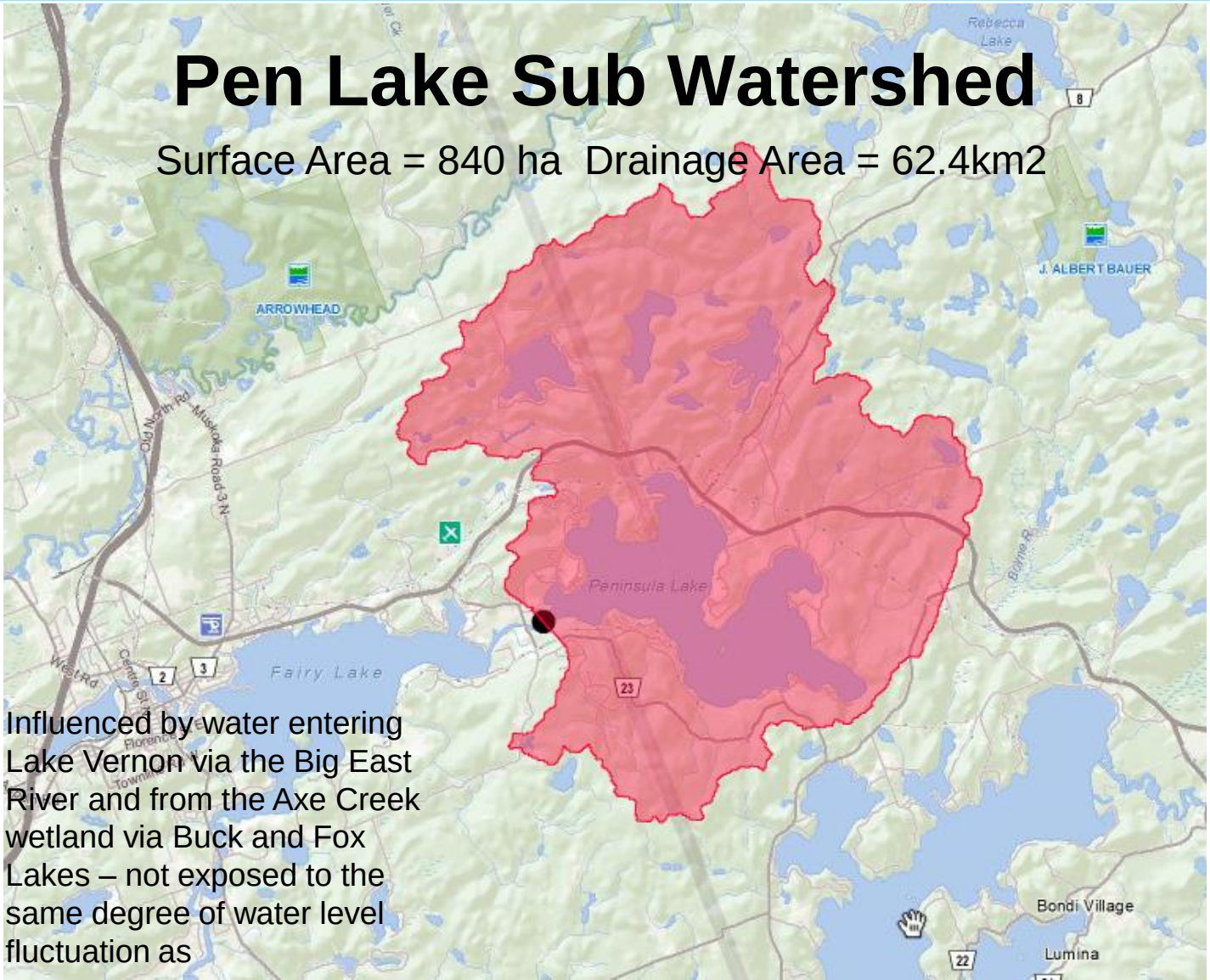
- Weir equation built into excel calculator to determine # stop logs to be removed

Stoplog calculator = weir equation **Q = C (L-0.1H) H3/2)**
Q=Discharge
C=Coefficient (1.5-1.8 varies based on crest width)
L=Length of Weir (length of stop log inside the gain)
H=Head (height of water over stop log)

Operating the Dams to Achieve WMP Objectives

Pen Lake Sub Watershed

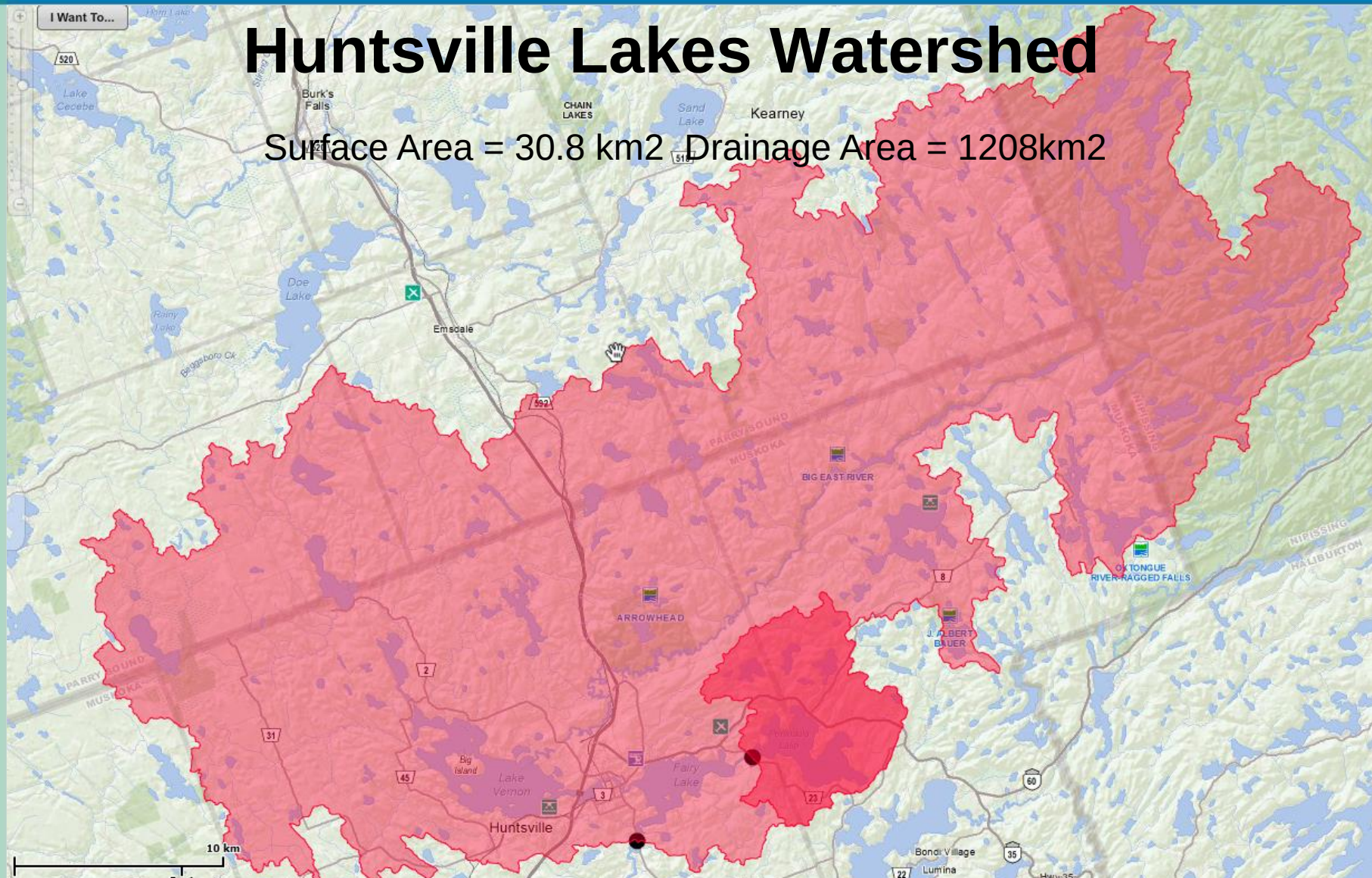
Surface Area = 840 ha Drainage Area = 62.4km2



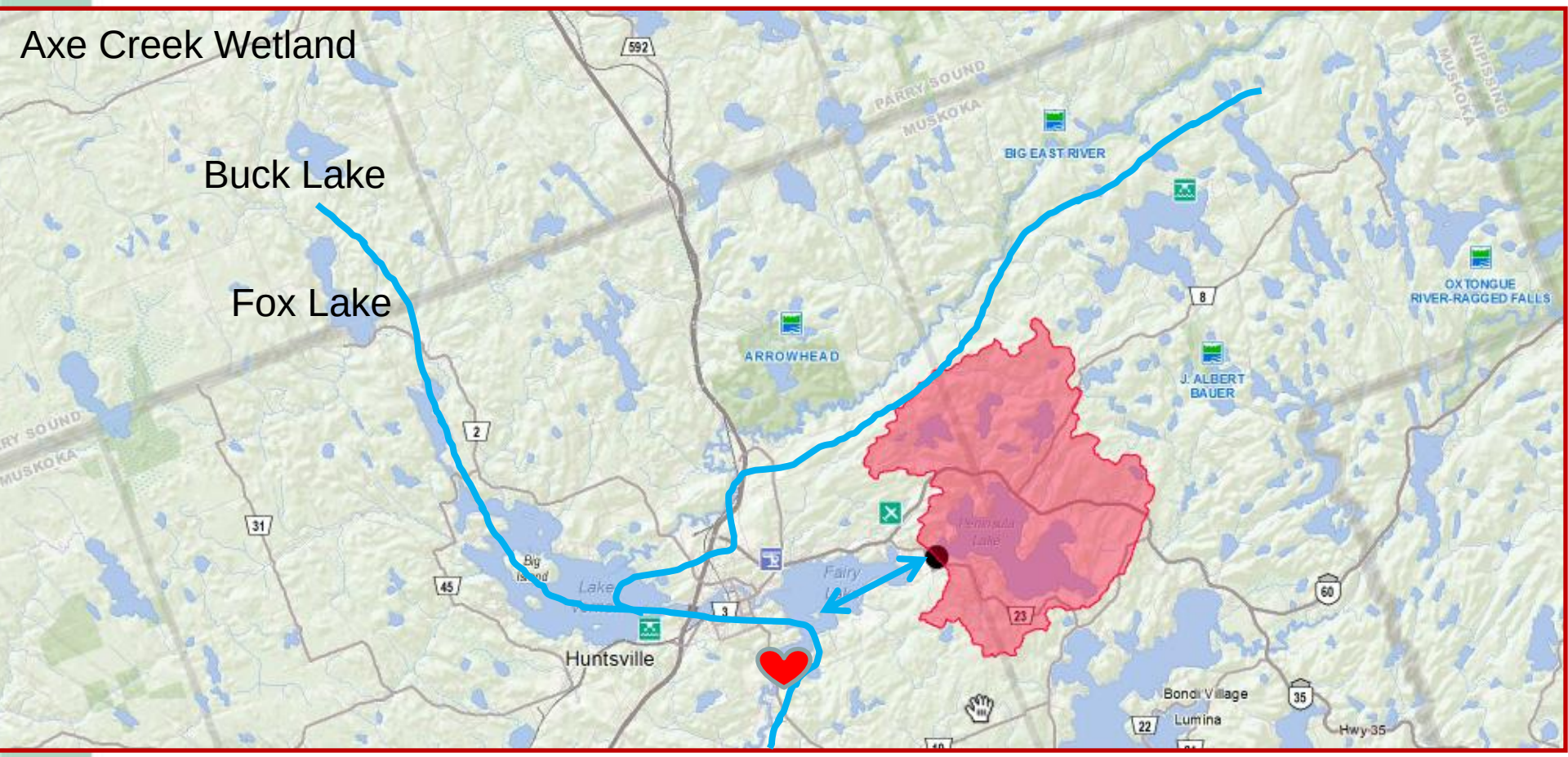
Influenced by water entering Lake Vernon via the Big East River and from the Axe Creek wetland via Buck and Fox Lakes – not exposed to the same degree of water level fluctuation as

Huntsville Lakes Watershed

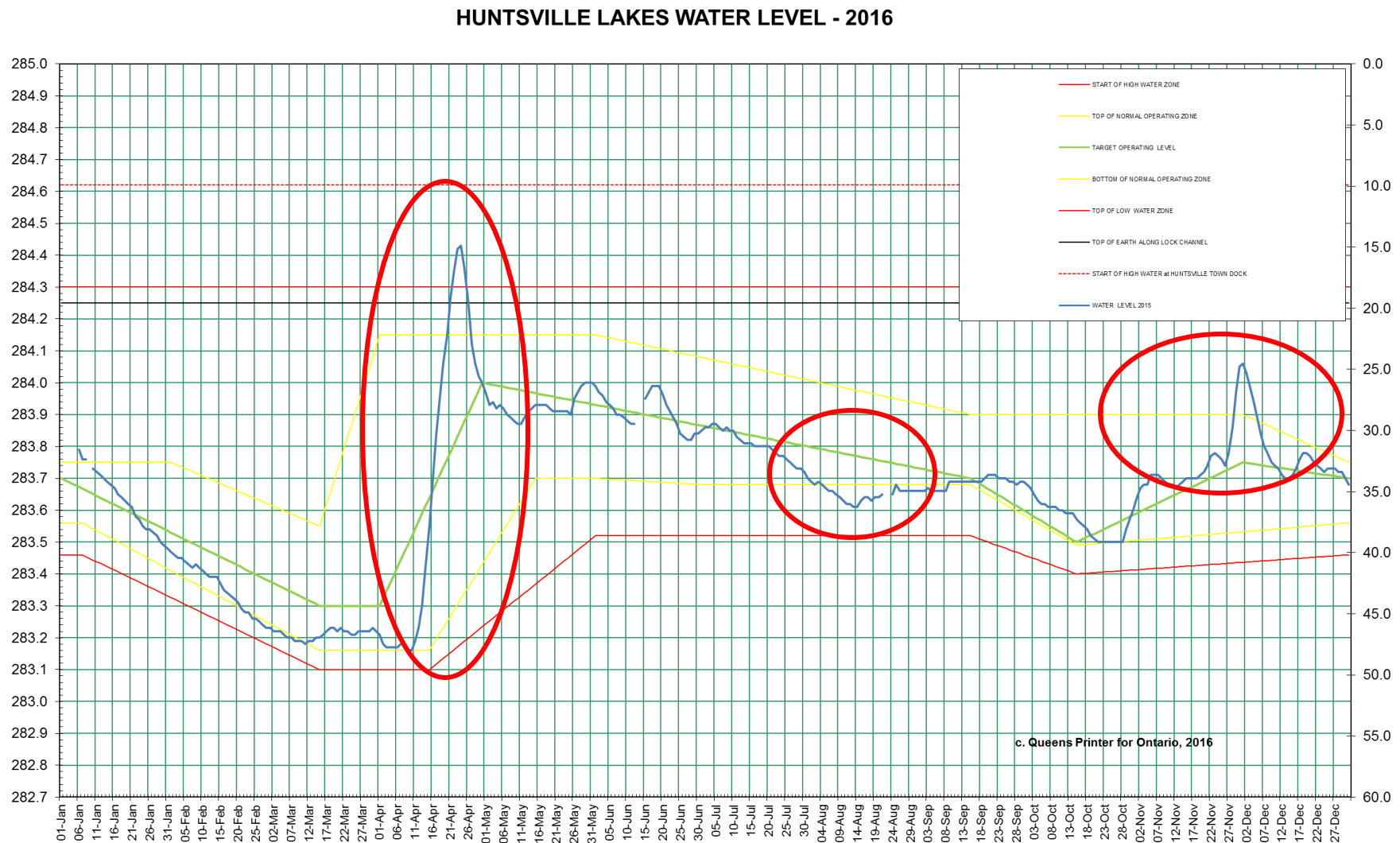
Surface Area = 30.8 km2 Drainage Area = 1208km2



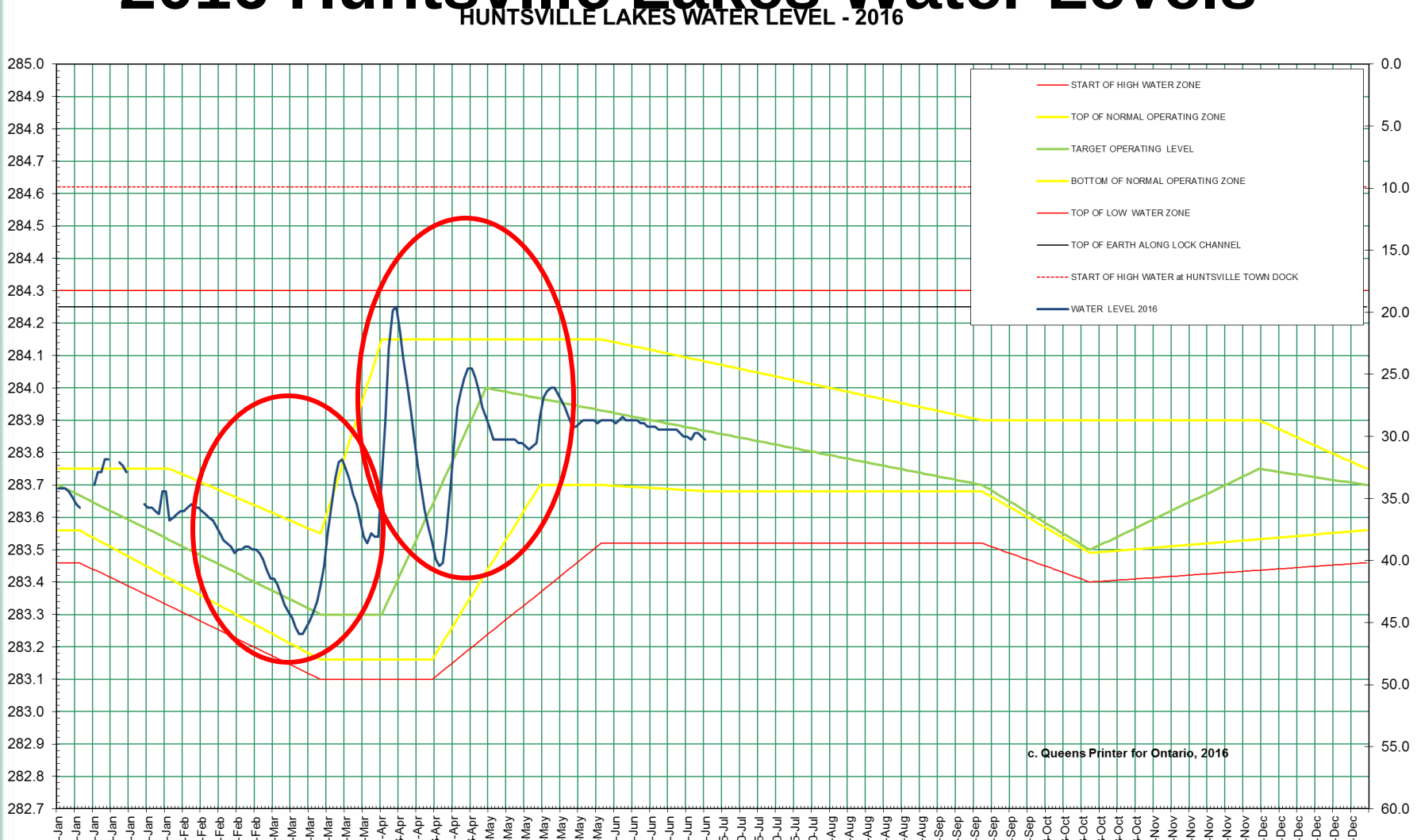
Huntsville Lakes – flow direction



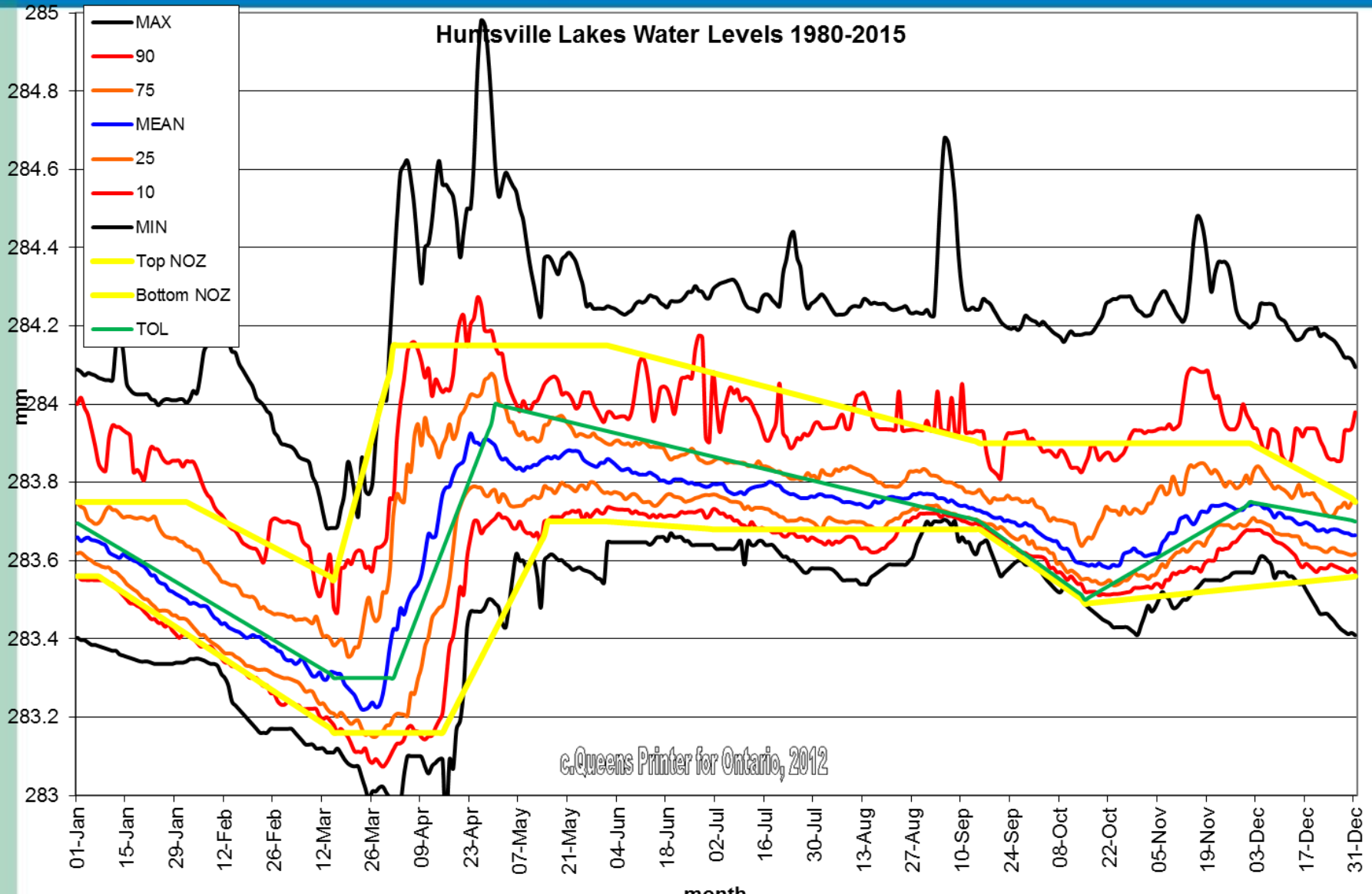
2015 Huntsville Lakes Water Levels



2016 Huntsville Lakes Water Levels



Historic Water Levels



Thank you!