



Ottawa River
Regulation
Planning Board

Commission de planification
de la régularisation
de la rivière des Outaouais

Limits to the Regulation of the Ottawa River 2019 Spring Flood Overview

Ottawa River Regulation Secretariat

Michael Sarich
Manon Lalonde

Ottawa River Watershed



SPRING FLOODS VARY

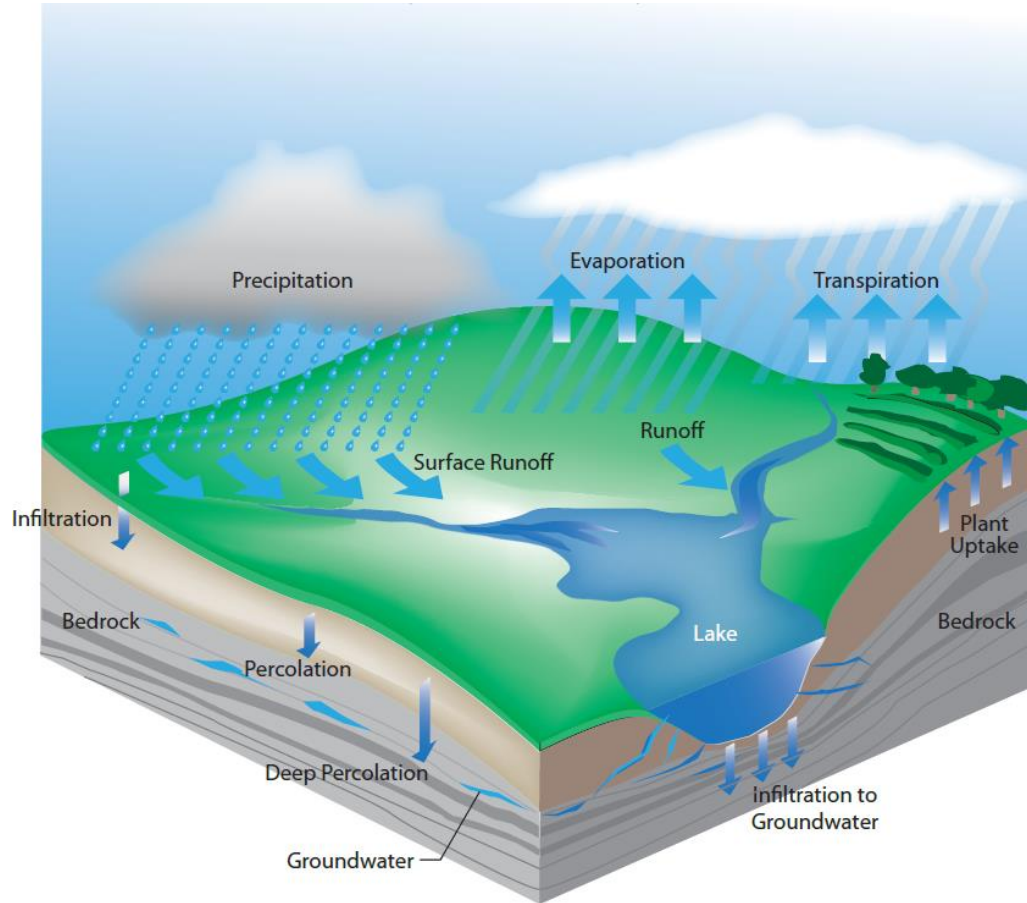
1950-2018:

Maximum daily flow
at Carillon dam
varied between
3,635 and 9,094 m³/s

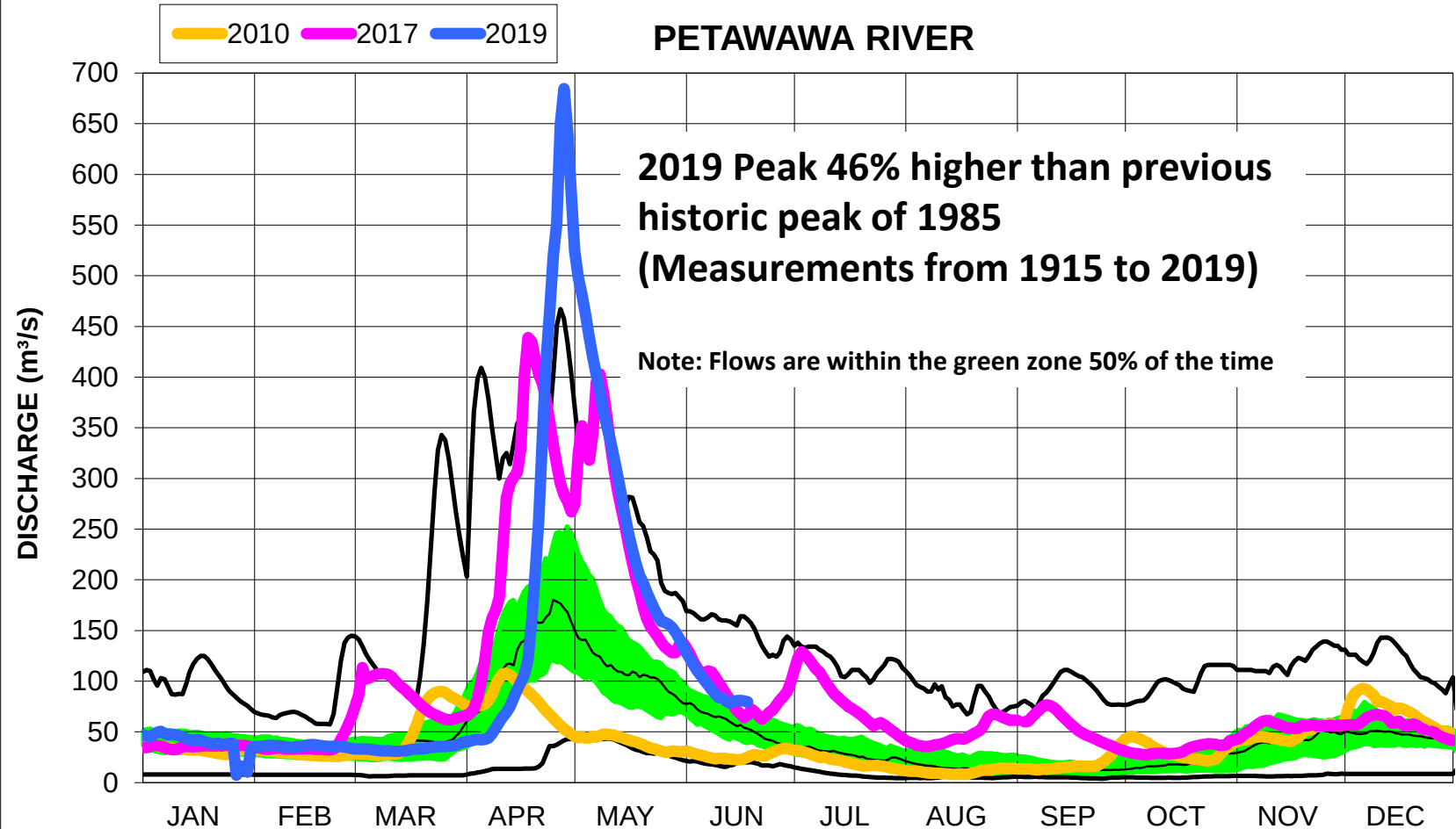
In 2019:

Maximum daily flow
on April 30th
9,217 m³/s

The Water Cycle



Natural Variability



What about Flow Regulation?

13 Large Reservoirs



- Reservoirs: large bodies of water that are used to:
 - Release water during winter
 - Retain water in the spring
- Flow regulation
 - Increase flows during winter
 - Reduce flows during spring
- 1983 Agreement
 - Integrated management

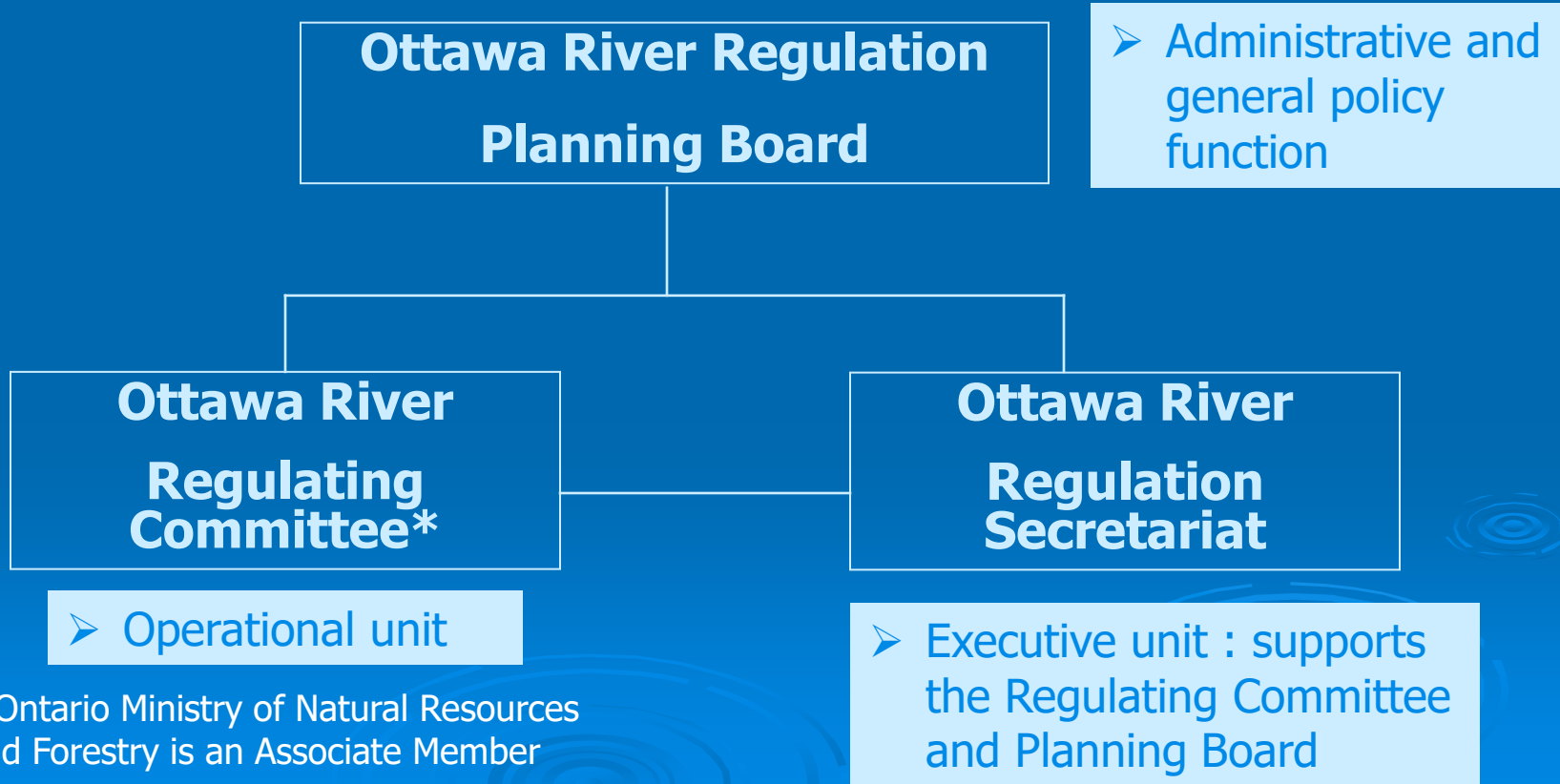
The 1983 Canada-Ontario Quebec Agreement established:

- Ottawa River Regulation Planning Board
- Ottawa River Regulating Committee
- Ottawa River Regulation Secretariat



- ***Main role*** : to ensure that the flow from the principal reservoirs of the Ottawa River Basin are managed on an integrated basis : minimize impacts – floods & droughts
- ***Secondary role*** : to ensure hydrological forecasts are made available to the public and government agencies for preparation of flood related messages

How is the Planning Board structured?



Planning Board Members

Quebec

Ministère de
l'Environnement, et de la
Lutte contre les
changements climatiques
(MELCC)

Hydro-Québec

Canada

Public Services
and Procurement
Canada

Canadian Coast Guard

Environment and Climate
Change Canada (ECCC)

Ontario

Ministry of Natural
Resources and
Forestry (MNR)

Ontario Power
Generation

-
- Planning Board reports to three parties that signed the 1983 Agreement
 - Ministers of MELCC, ECCC and MNR

Mandate include Liaison with the International Lake Ontario – St. Lawrence River Board (ILO-SLRB)



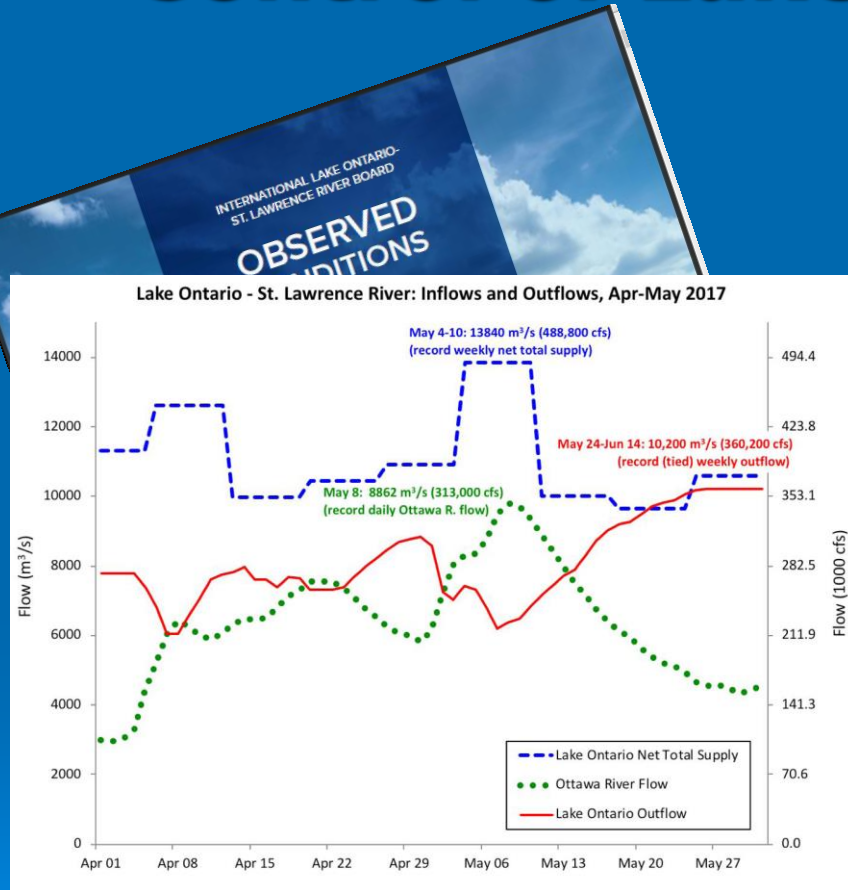
- During spring freshet:
 - Ottawa River has considerable effect on the flows of the St. Lawrence and Montreal archipelago
 - Ottawa River forecasts are used as input for the management of Lake Ontario outflow into the St. Lawrence (based on Plan 2014)

- ILO- SLRB reports to the IJC
 - 6 members (3 Canada, 3 USA)
- <https://ijc.org/en/loslrbs>

Control of Lake Ontario Outflows

Minimizing impacts of floods

- Lake Ontario outflow is reduced when Ottawa River flows are high – in accordance with ILO-SLRB operational rules
- Lake Ontario outflows have no impact on the Ottawa River
 - Integrated management of the Ottawa River basin reservoirs is solely focused on the Ottawa River for the spring freshet period
- Reducing Lake Ontario outflow when Ottawa River flows are high was done prior to Plan-2014



Operators of the Principal Reservoirs

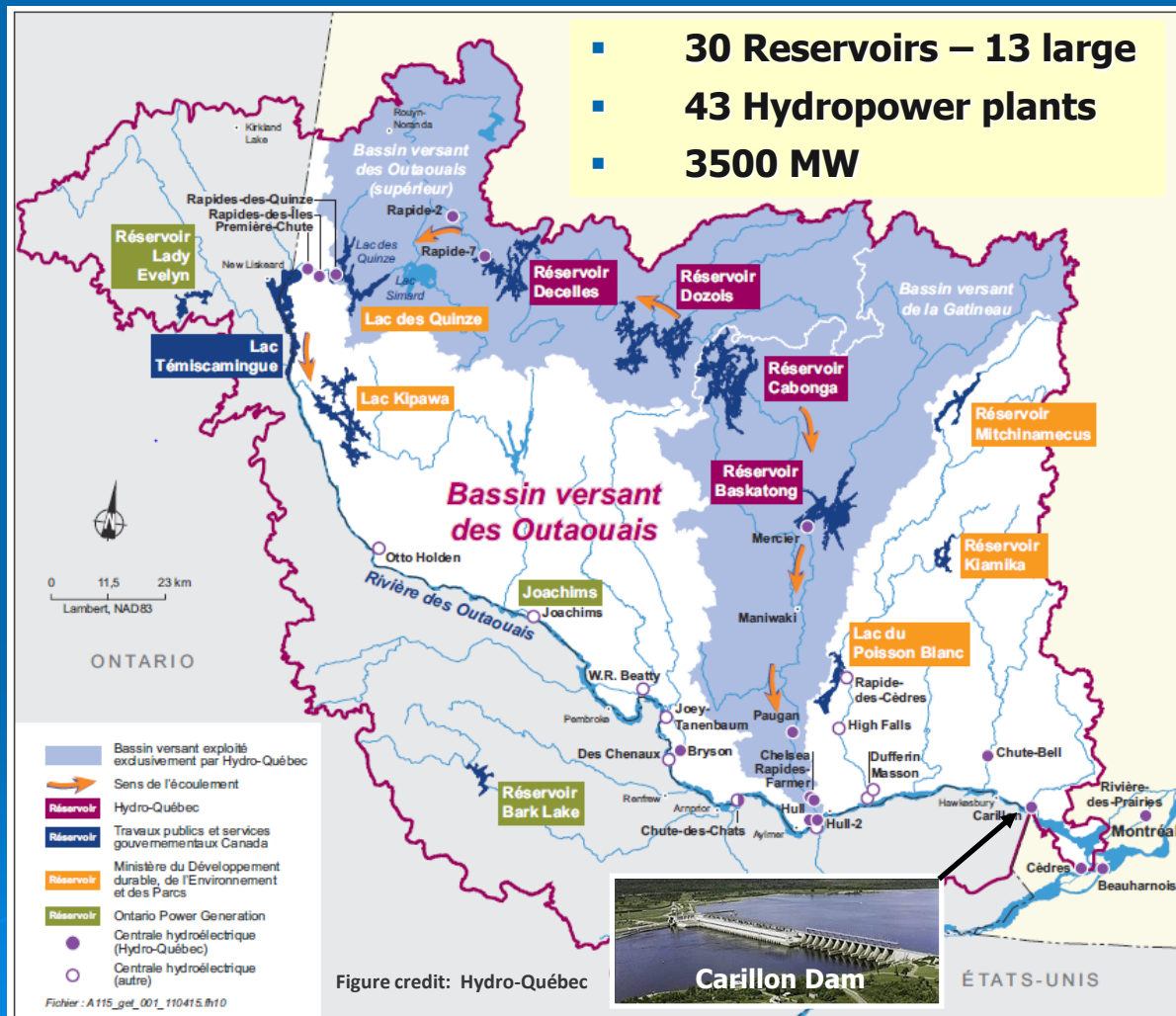
Operators of the 13 largest reservoirs under the 1983 agreement:



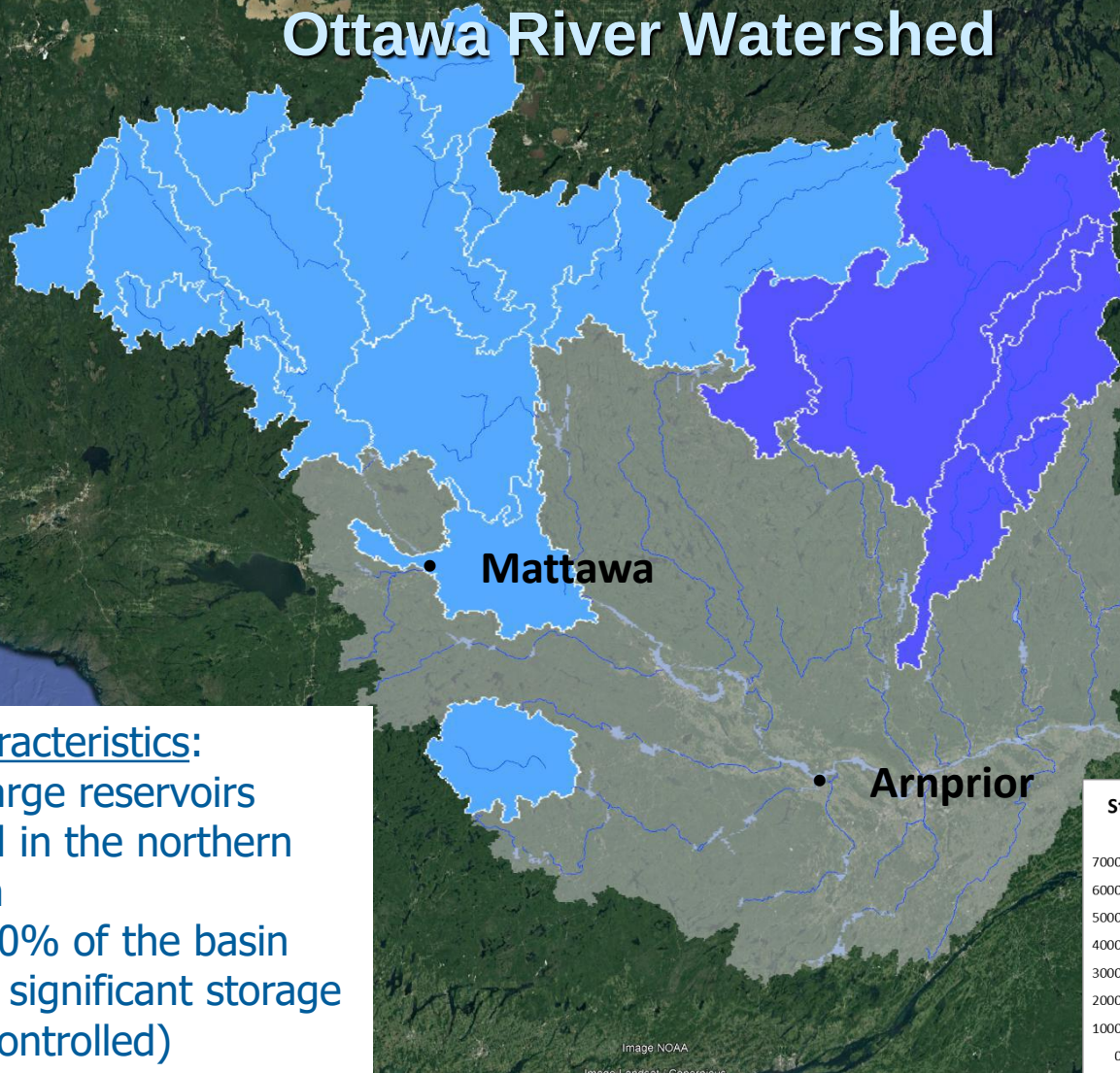
Gouvernement du Canada

Ontario Ministry of Natural Resources and Forestry is an Associate Member on the Regulating Committee

- Contributes hydrometeorological information
- Disseminates flood forecast information in Ontario



Ottawa River Watershed



Basin Characteristics:

- Most large reservoirs located in the northern portion
- Over 60% of the basin has no significant storage (is uncontrolled)

Storage Volume in Principal Reservoirs
(million cubic metres)

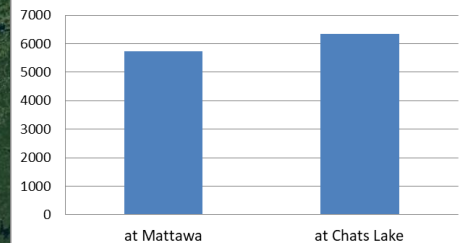


Image NOAA
Image Landsat / Copernicus

Ottawa River Watershed

Basin Characteristics:

- Abitibi-Timiskaming to Ottawa is 62% of Total Area
- Half the Significant storage (51%)

175 km

Image NOAA

Image Landsat / Copernicus

Google Earth

Types of Structures



Run-Of-River Dams

**Limited capacity to store
spring runoff
(Carillon, Chats Falls,
Chenau, Bryson, Des
Joachims, Otto Holden)**



Reservoir Dams

**Capacity to store a portion
of the spring runoff
(Baskatong, Dozois, Des
Quinze, Timiskaming, etc.)**

Major Run-Of-River Dams on the Ottawa River

Otto Holden Dam

Des Joachims Dam

Bryson Dam

Chenaux Dam

Chats Falls Dam

Carillon Dam

175 km

Image NOAA

Image Landsat / Copernicus

Google Earth

Reservoir Management Annual Cycle



Winter

Winter
drawdown
and
preparation
for the spring
freshet

Spring

Refill and
retention of
water to
reduce
downstream
flow

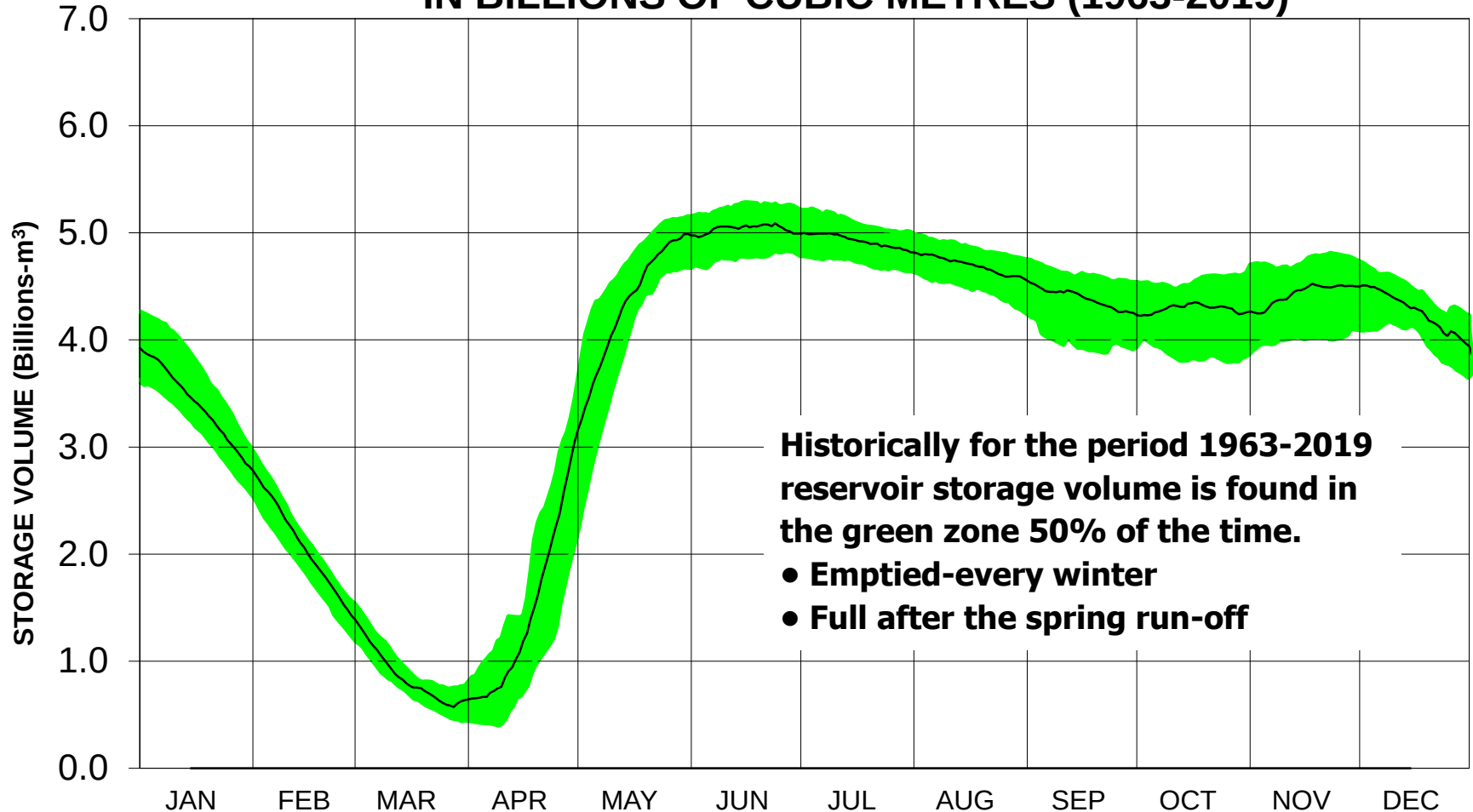
Summer

Summer level
management
and drought
mitigation

Fall

Operations for
fall flood
control and
reservoir refill

WATER STORED IN ABITIBI-TIMISKAMING RESERVOIRS IN BILLIONS OF CUBIC METRES (1963-2019)



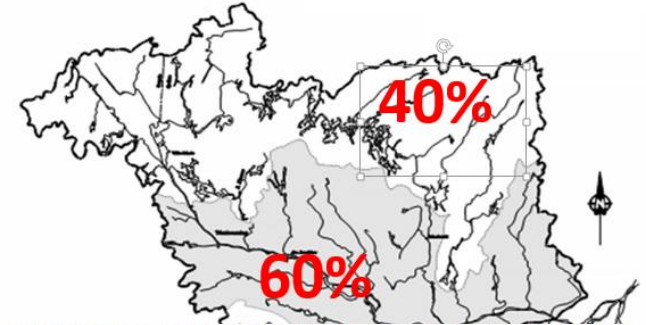
Limits of Flow Regulation

Flooding occurs when:

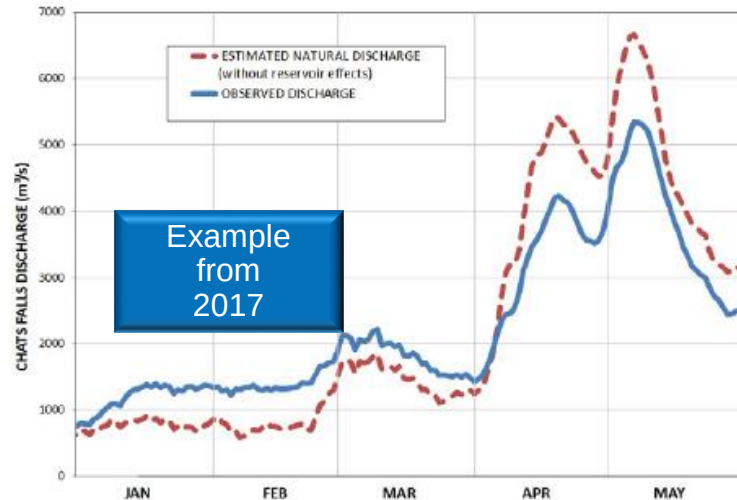
- Spring runoff greatly exceeds the size of reservoirs
- There is significant spring runoff in areas where there are no reservoirs

Flooding extent and duration :

- Is always reduced
- Eliminated in many years



5C : Effect of the 7 Upstream Principal Reservoirs on Flows of the Ottawa River at Chats Lake

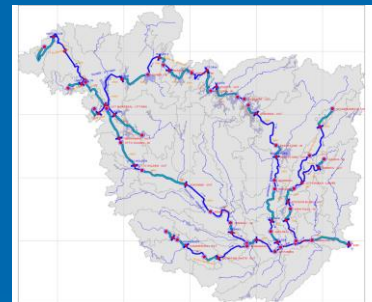
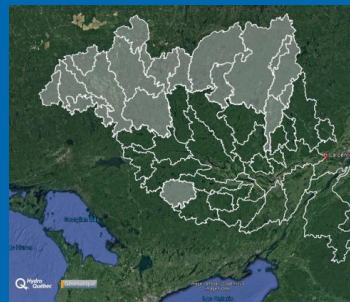


Daily work of the Regulating Committee

- Collect all information relevant to flow forecasting (Secretariat)

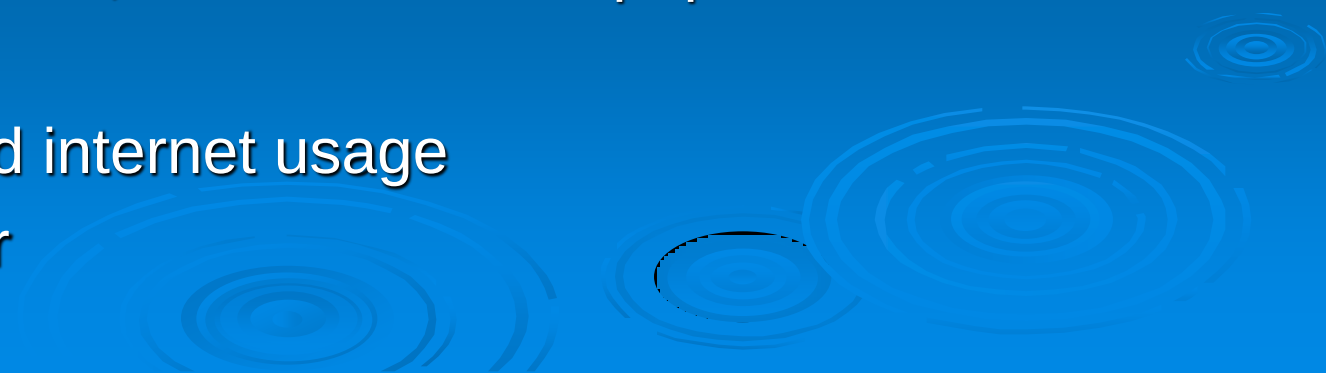


- Run flow models
(Hydro-Québec and Secretariat)



- Assess forecast conditions(weather, inflows and levels/flow rates) and optimize holding back to spring runoff in reservoirs to reduce flows downstream to maximize flood alleviation (Regulating Committee)
- Disseminate river conditions forecast to responsible authorities and the public (Secretariat and MNRF – Surface Water Monitoring Centre)

Communicating the Coming Flood Risk

1. Always to Responsible Government Agencies first
 - ON - MNRF, Surface Water Monitoring Centre
 - QC – Sécurité civile, COG
 - Municipalities (Courtesy Calls)
 2. Traditional Media
 - Television, Radio and Newspapers
 3. Website
 - Record internet usage
 - Twitter
- 
- The background of the slide is a solid blue color. In the bottom right corner, there are several concentric white circles of varying sizes, resembling ripples on water, which add a decorative element to the presentation.

1 - Flood-related Messages

- Look for local conservation authorities and MNRF district office flood-related messages

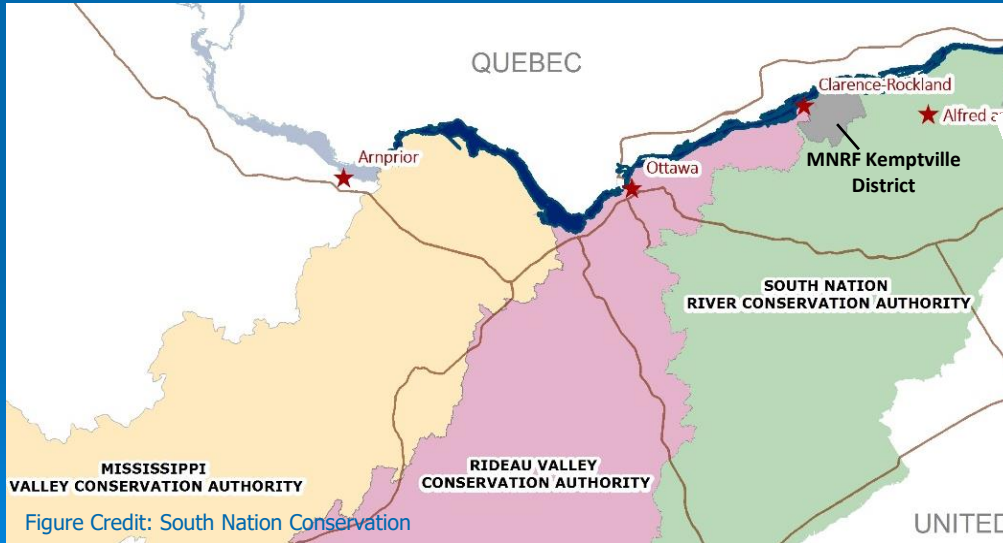


Figure Credit: South Nation Conservation

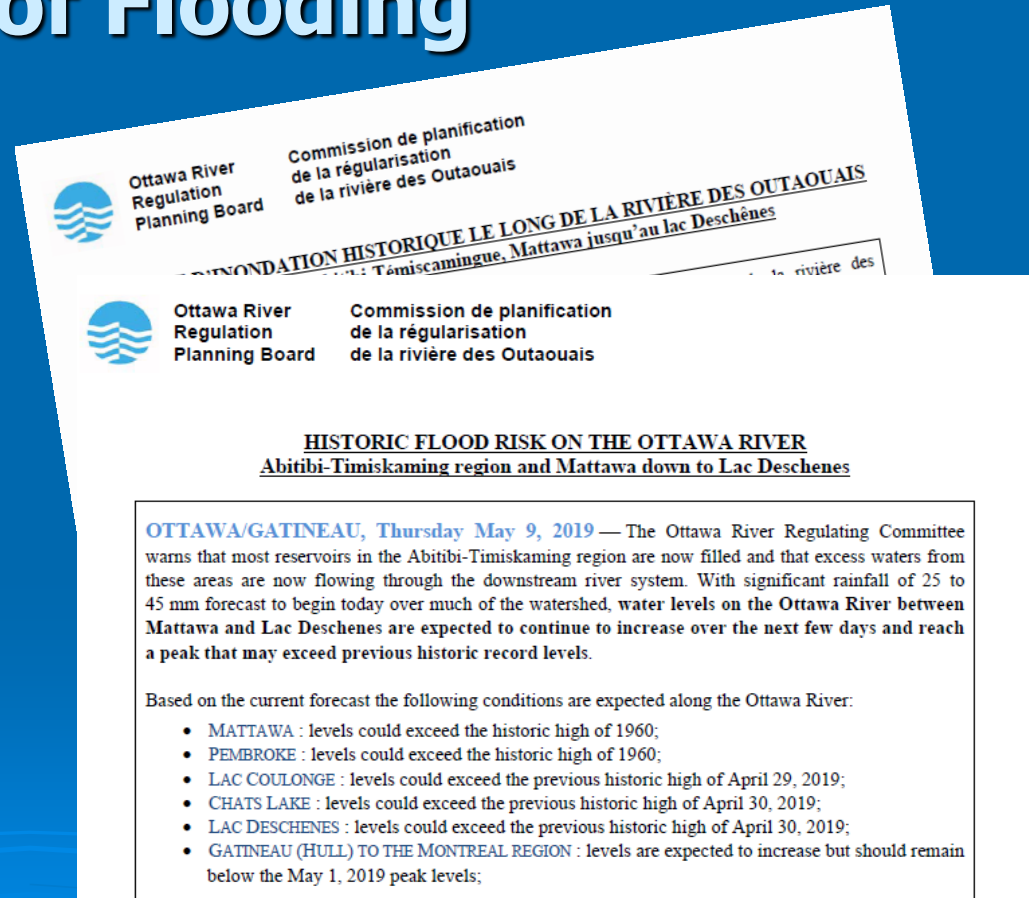
<https://www.ontario.ca/law-and-safety/flood-forecasting-and-warning-program>



2 – Keeping the Public Informed of the Risk of Flooding

➤ 6 Press Releases in 2019

- **11 April– Start of the spring freshet**
- **First peak – warning of the risk of flooding:**
 - **16 April– levels similar to the first peak of 2017**
 - **18 April– levels similar to the peak of 2017**
 - **25 April– level possibly exceeding those of 2017**
- **Second peak–two notices:**
 - **3 May– Levels are high with potential for further increases**
 - **9 May- Historic flooding from Mattawa down to Lac Deschenes**



3 – Follow us on Twitter – twitter.com/ORRPB



ORRPB @ORRPB · May 9

Historic flood risk on the Ottawa River between Mattawa and Lac Deschernes/Britannia and Abitibi-Timiskaming region. Read the full press release by the Ottawa River Regulating Committee at ottawariver.ca/current-press-... #ONFlood #OttawaRiverLevel



13



4



ORRPB @ORRPB · May 3

Levels could rise rapidly between Mattawa and Lac Coulong flood levels experienced earlier last month. Read the full Pres. Ottawa River Regulating Committee at ottawariver.ca/current-... #OttawaRiverLevel



10



6



ORRPB @ORRPB · May 3

Ongoing flood risk on the Ottawa River in all areas over the coming two weeks. Levels to remain high for the period. Read the full Press release by the Ottawa River Regulating Committee at ottawariver.ca/current-press-... #ONFlood #OttawaRiverLevel



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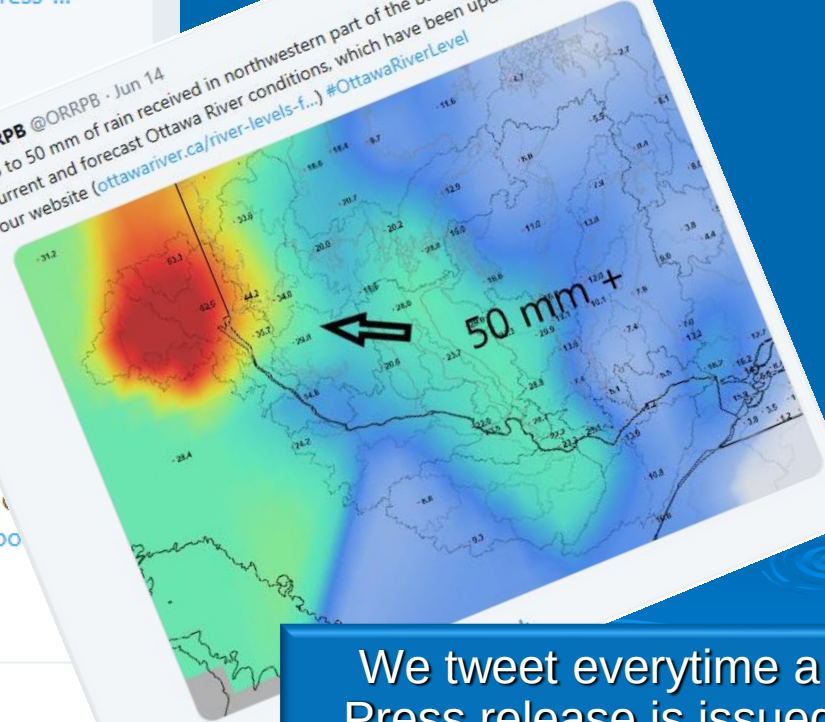
ORRPB @ORRPB · May 2

Questions about dams answered by Senior Water Resources Engineer Michael Sarich. Hear the interview by Robyn Bresnahan at cbc.ca/listen/live-ra... #ONFlood #OttawaRiverLevel



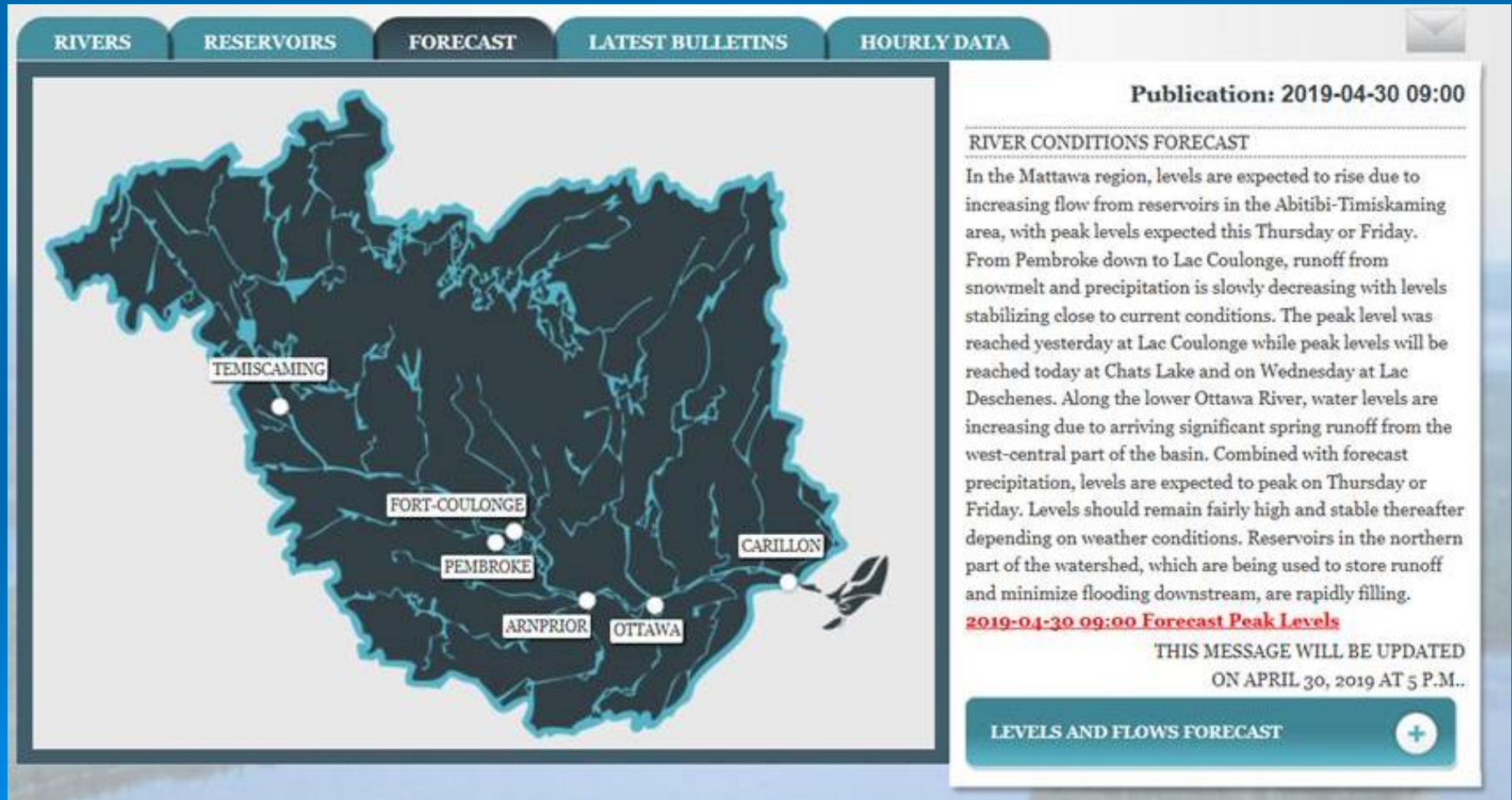
ORRPB @ORRPB · Jun 14

Up to 50 mm of rain received in northwestern part of the basin. Check out the current and forecast Ottawa River conditions, which have been updated today on our website (ottawariver.ca/river-levels-f...) #OttawaRiverLevel



We tweet everytime a Press release is issued ...and more

3 - Daily updating of Website



3 - Forecast Peak Flood Levels

Utilized in the case of exceptional flooding

- *Used for the first time in 2017*
- *Used once again in 2019*
- *Published over 50 times in 2019*

Look for 'Lac Deschenes / Britannia' for info relevant to Constance Bay

OTTAWA RIVER REGULATING COMMITTEE (ORRC)

OTTAWA RIVER

FORECAST PEAK FLOOD LEVELS

2019-04-23 09:00

(Next update 2019-04-23 17:00)



	2017 PEAK (m)***	CURRENT LEVEL		FORECAST PEAK LEVEL		CHANGE (cm) *
		DATE-TIME	LEVEL (m) **	DATE	LEVEL (m) **	
MATTAWA	153.96	2019-04-23 08:00	152.73	2019-05-01	154.00	127
PEMBROKE	113.03	2019-04-23 05:00	112.68	2019-04-27	113.20	52
LAC COULONGE	108.52	2019-04-23 06:45	107.60	2019-04-28	108.50	90
LAC CHATS	75.95	2019-04-23 08:00	75.33	2019-04-27	75.80	47
LAC DESCHENES/BRITANNIA	60.44	2019-04-23 08:00	59.83	2019-04-28	60.30	47
GATINEAU/HULL MARINA	45.20	2019-04-23 06:45	44.20	2019-04-29	44.60	40
THURSO	43.69	2019-04-23 06:45	43.02	2019-04-29	43.30	28
GRENVILLE/HAWKESBURY	42.81	2019-04-23 06:45	42.30	2019-04-29	42.50	20
MANIWAKI	166.10	2019-04-23 06:45	164.33	2019-04-28	165.00	67

3 - Increased Forecasting

2017 : 3-day forecast at 4 locations

SITES (PUBLICATION: 2017-04-27 15:31)		OBSERVATIONS		FORECAST		
		DATE/TIME	VALUE	2017-04-27	2017-04-28	2017-04-29
Ottawa River at Temiscaming	Flow (m ³ /s)			1400	1500	1500
Ottawa River at Pembroke	Level (m)	2017-04-27, 8 A.M.	112.44	112.44	112.45	112.60
Ottawa River at Britannia	Level (m)	2017-04-27, 8 A.M.	59.64	59.64	59.64	59.64
	Flow (m ³ /s)	2017-04-27, 8 A.M.	3650	3650	3650	3650
Ottawa River at Carillon	Flow (m ³ /s)	2017-04-27, 8 A.M.	5684	5600	5600	5650

2019 : 4-day forecast at 6 locations

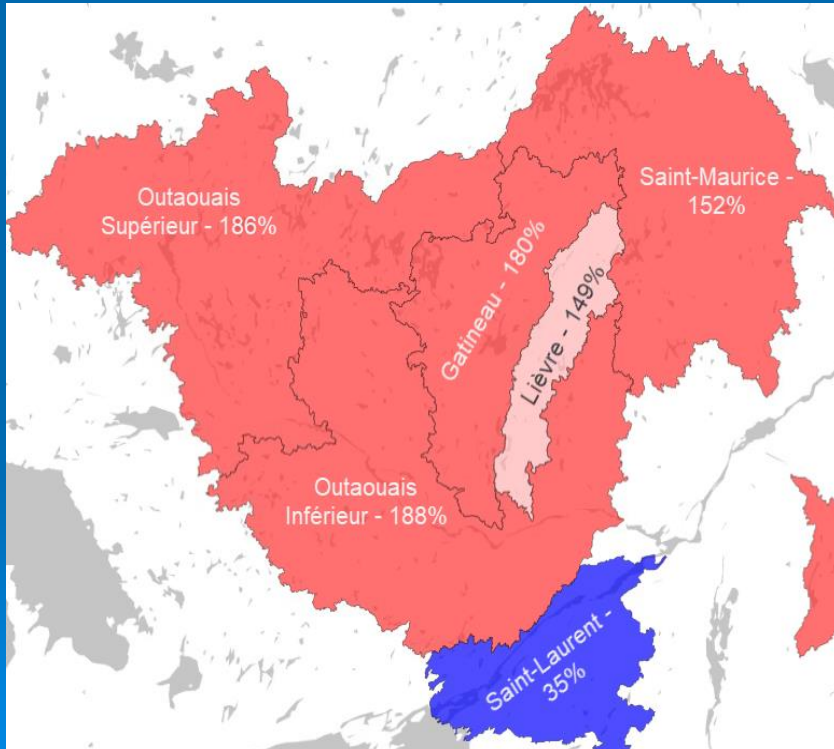
(PUBLICATION: 2019-05-06 18:22)		DATE/TIME	VALUE	2019-05-06	2019-05-07	2019-05-08	2019-05-09
Ottawa River at Temiscaming	Flow (m ³ /s)			2600	2800	2900	2900
Ottawa River at Pembroke	Level (m)	2019-05-06, 8 A.M.	113.33	113.35	113.50	113.55	113.60
Lake Coulonge at Fort-Coulonge	Level (m)	2019-05-06, 8 A.M.	108.74	108.78	108.85	108.95	109.05
Chats Lake at Arnprior	Level (m)	2019-05-06, 8 A.M.	75.99	76.00	76.00	76.03	76.05
Lake Deschenes at Britannia (Ottawa)	Level (m)	2019-05-06, 8 A.M.	60.45	60.40	60.38	60.40	60.45
	Flow (m ³ /s)	2019-05-06, 8 A.M.	5393	5350	5250	5300	5350
Ottawa River at Carillon	Flow (m ³ /s)	2019-05-06, 8 A.M.	8150	8100	7900	7850	7850

Events of 2019



Winter 2019 – Freshet Preparation

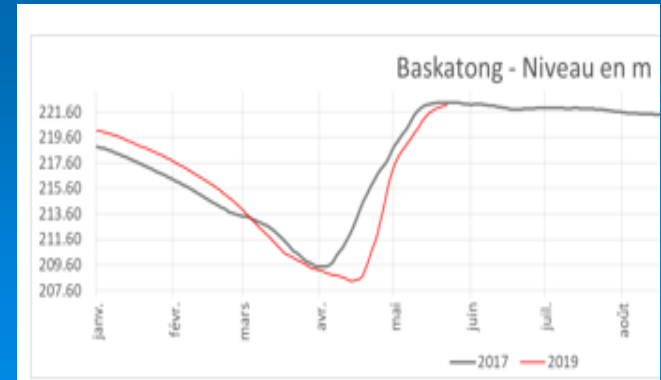
Snow on the Ground April 1st % of Average



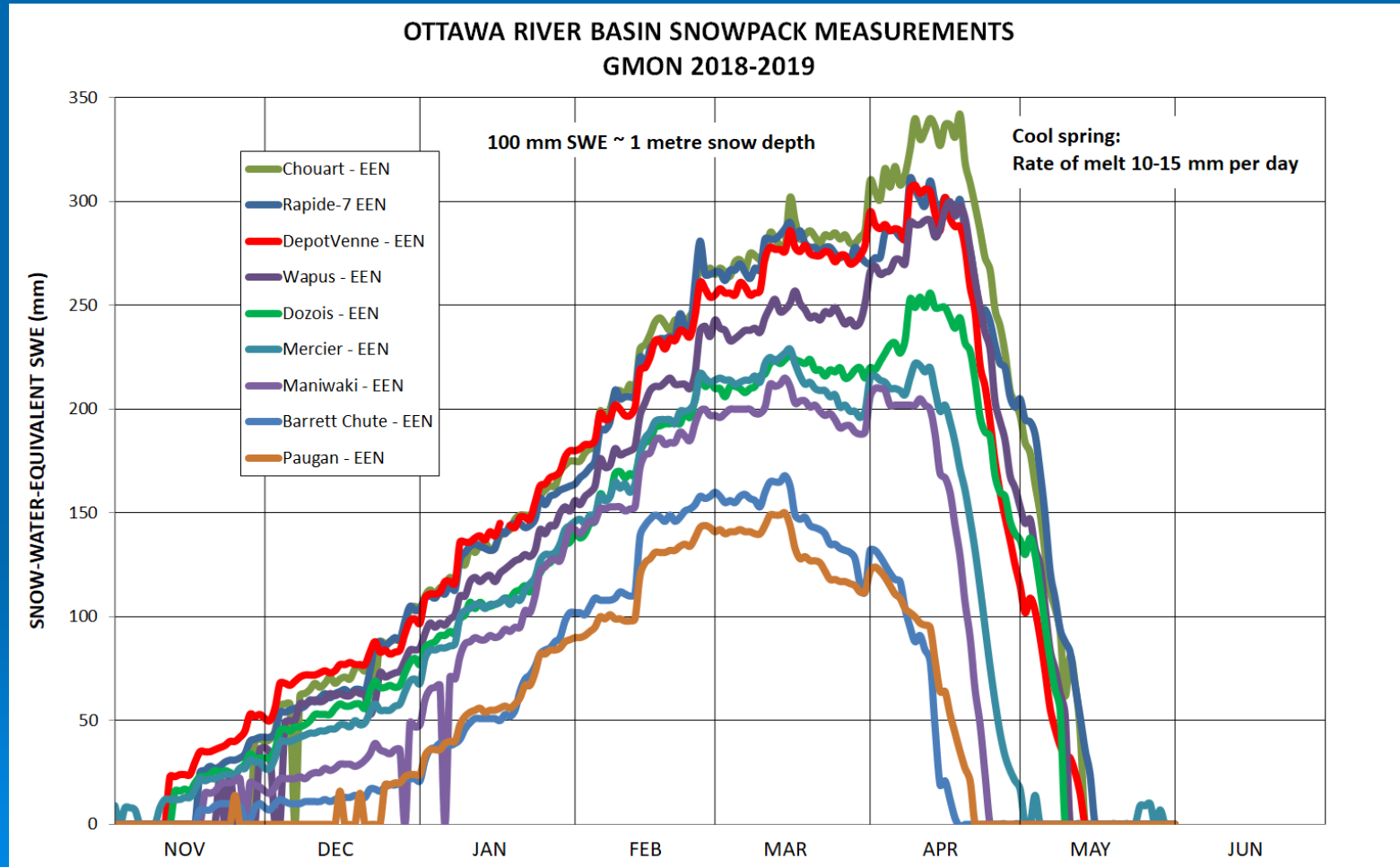
Snowpack measurements



Drawdown of reservoirs



Winter 2019 – Freshet Preparation

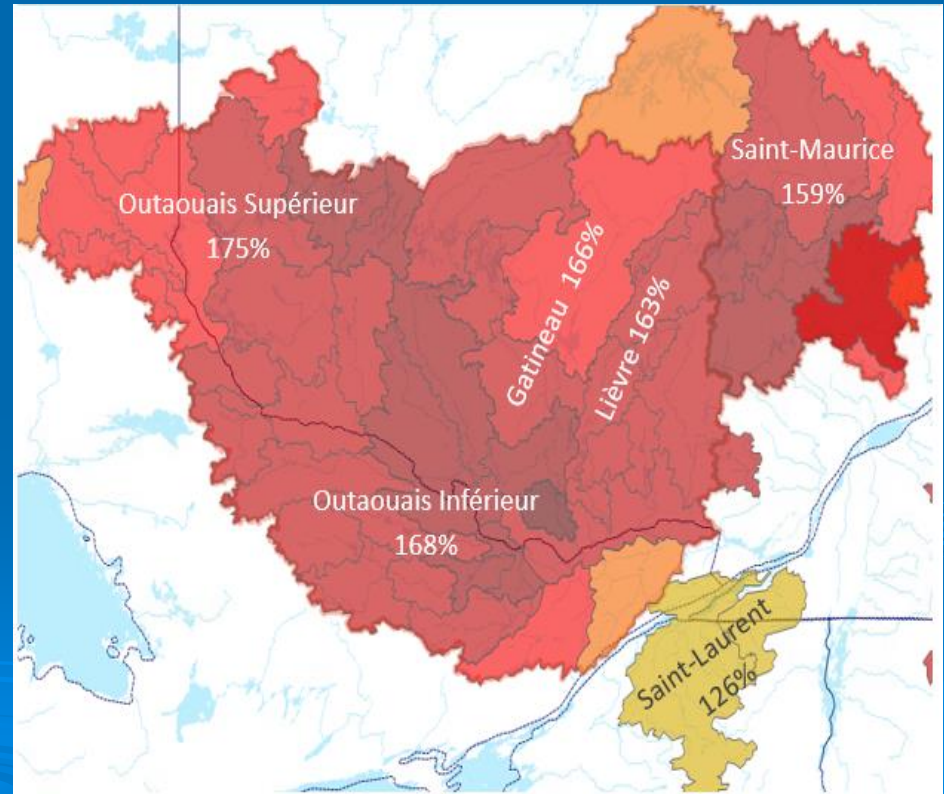


Spring Freshet 2019

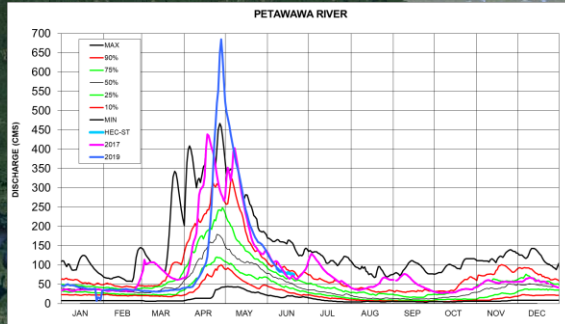
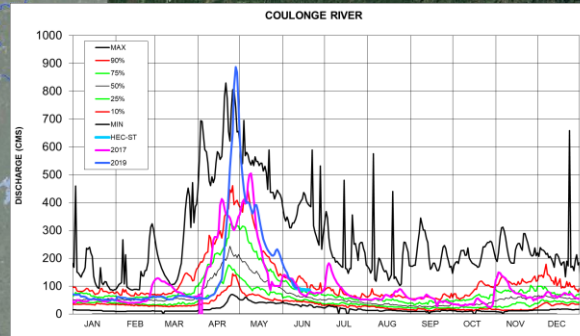
Excess precipitation over the whole basin

- Precipitation forecasts limited over 1 week in advance
- Historic tributary peaks!

Total Precipitation from April 1st to May 27th
% of Normal



Tributary Flooding 2019



New historic record peak flows from the uncontrolled mid-basin tributaries

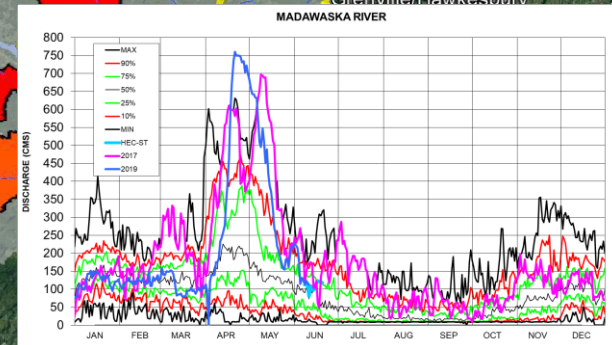
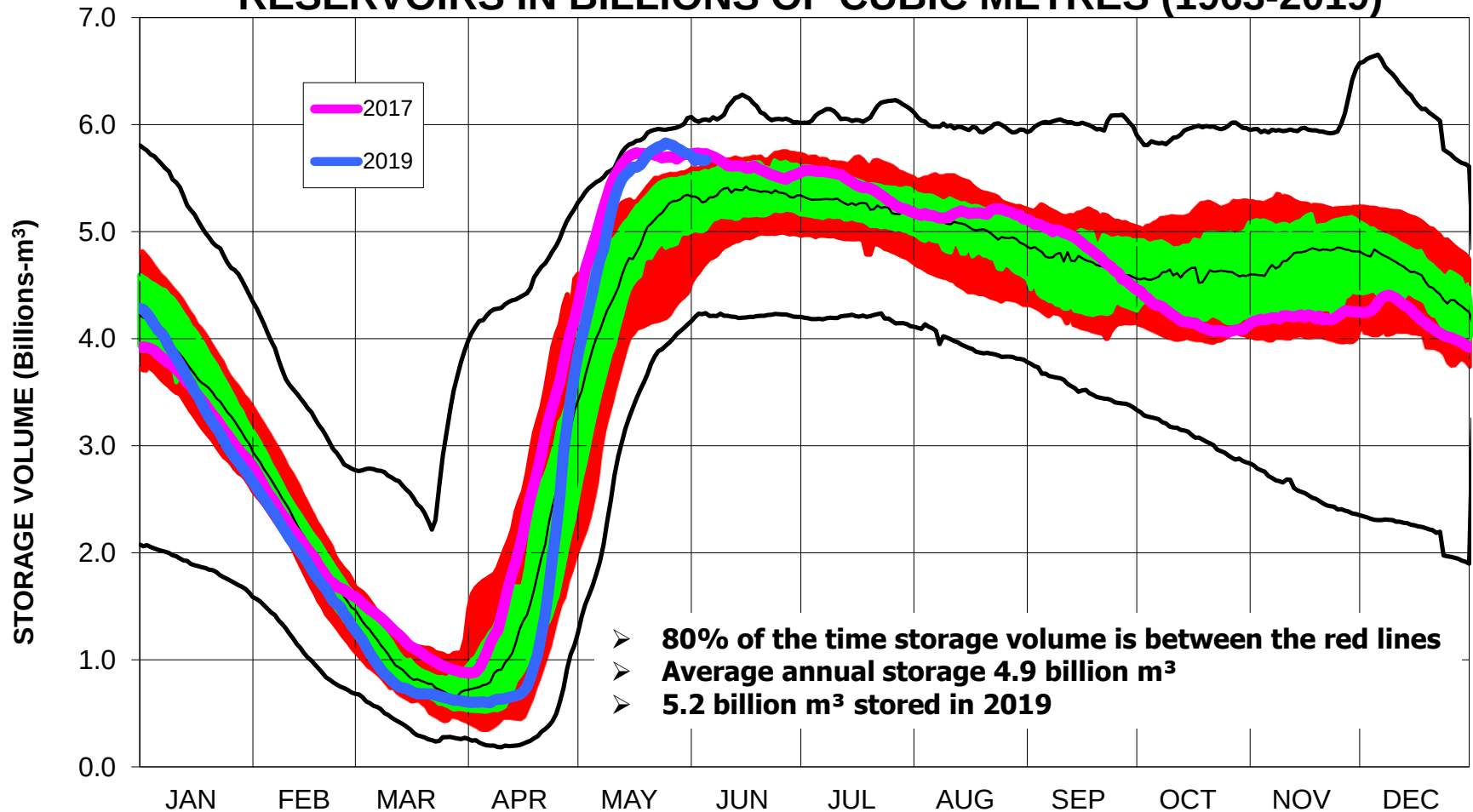


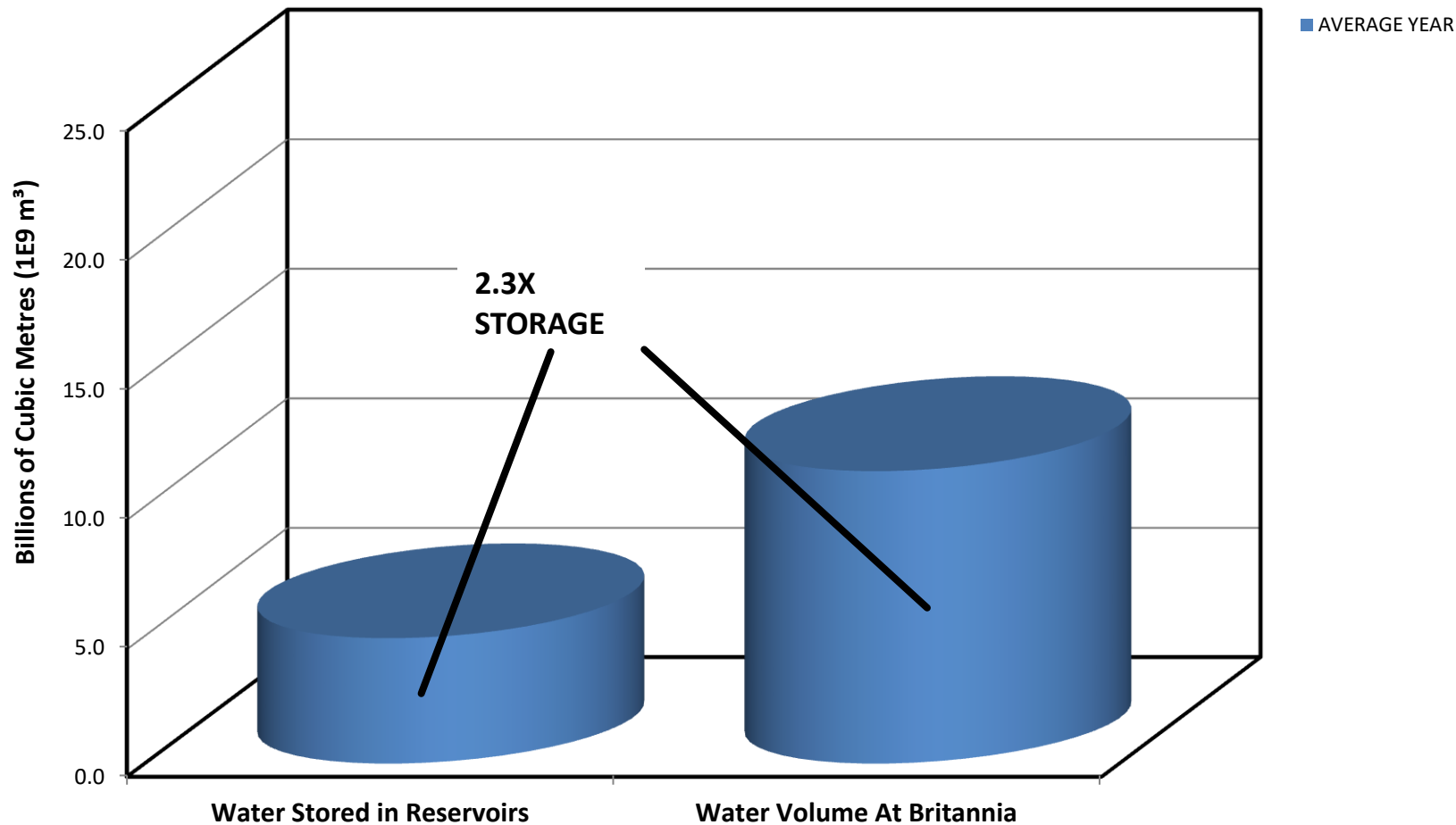
Image NOAA
Image Landsat / Copernicus

Earth

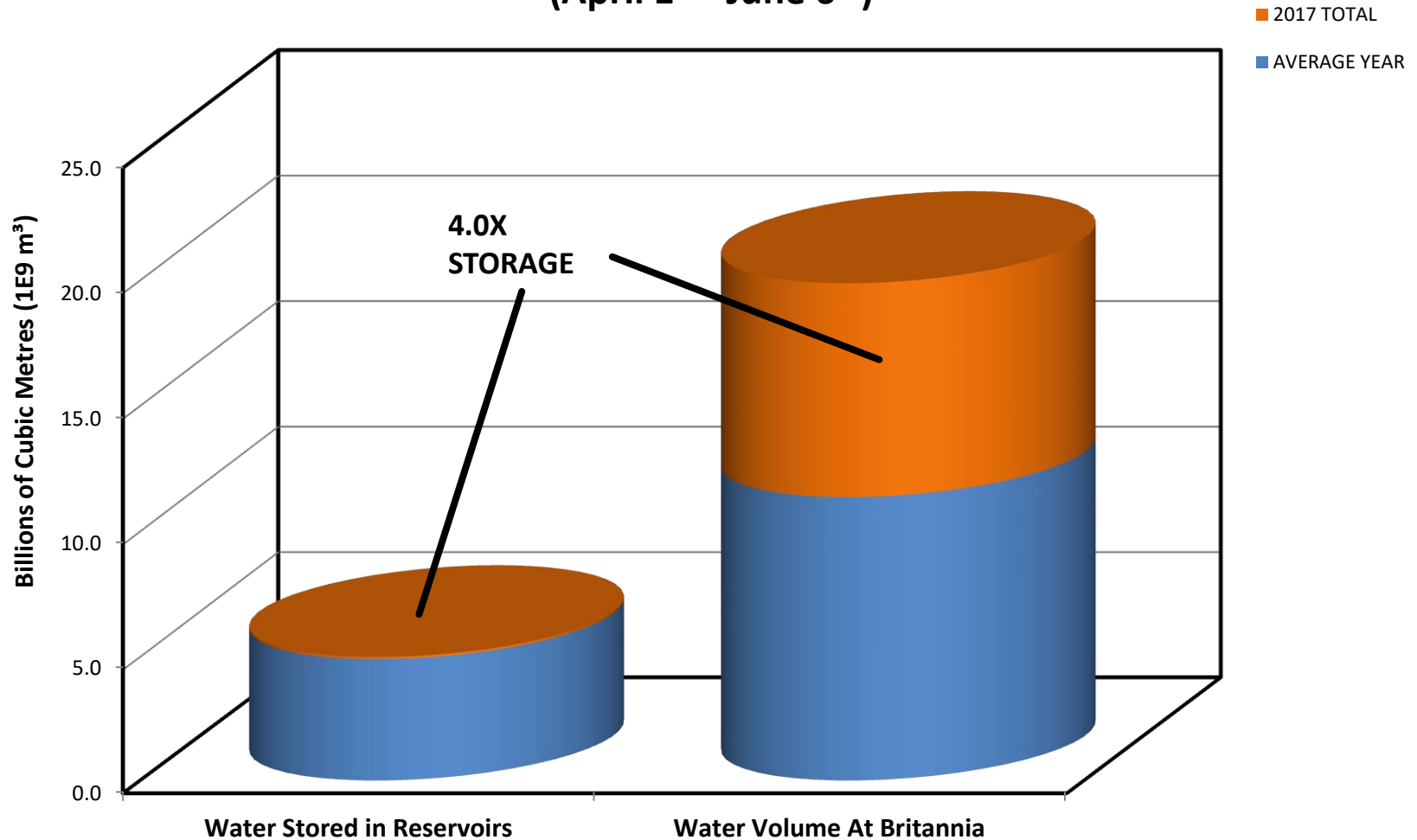
WATER STORED IN ABITIBI-TIMISKAMING-BARK LAKE RESERVOIRS IN BILLIONS OF CUBIC METRES (1963-2019)



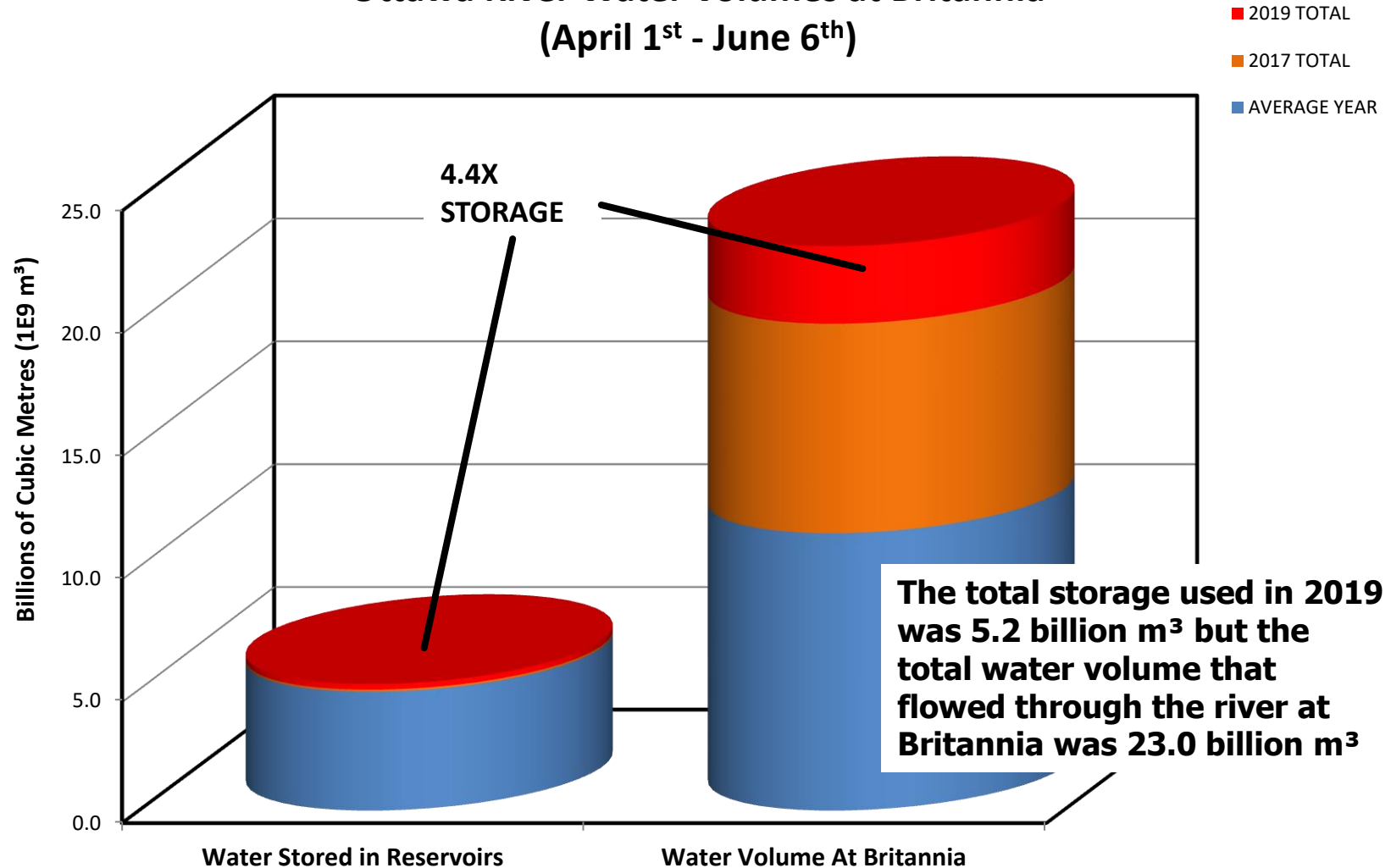
Ottawa River Water Volumes at Britannia (April 1st - June 6th)



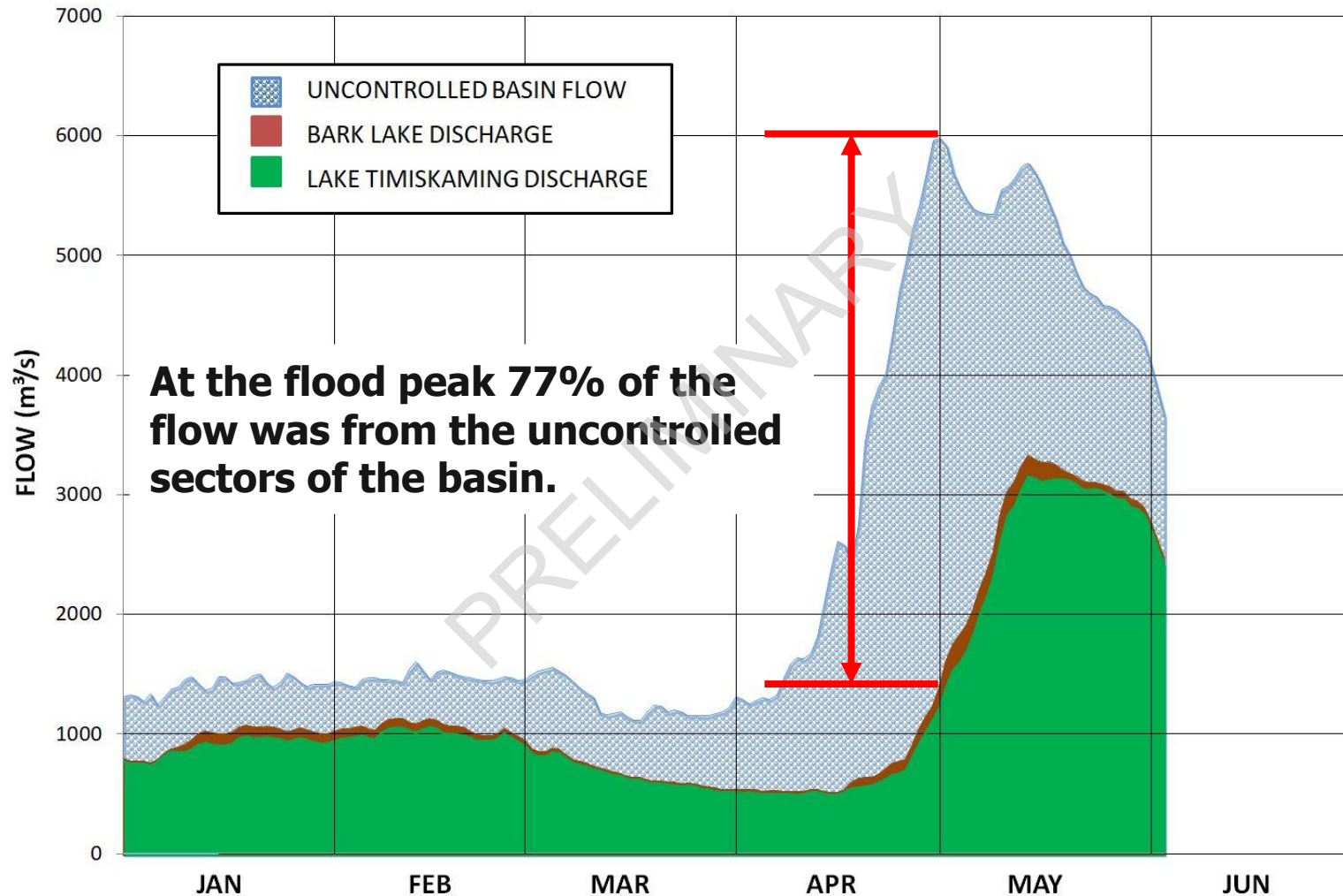
Ottawa River Water Volumes at Britannia (April 1st - June 6th)



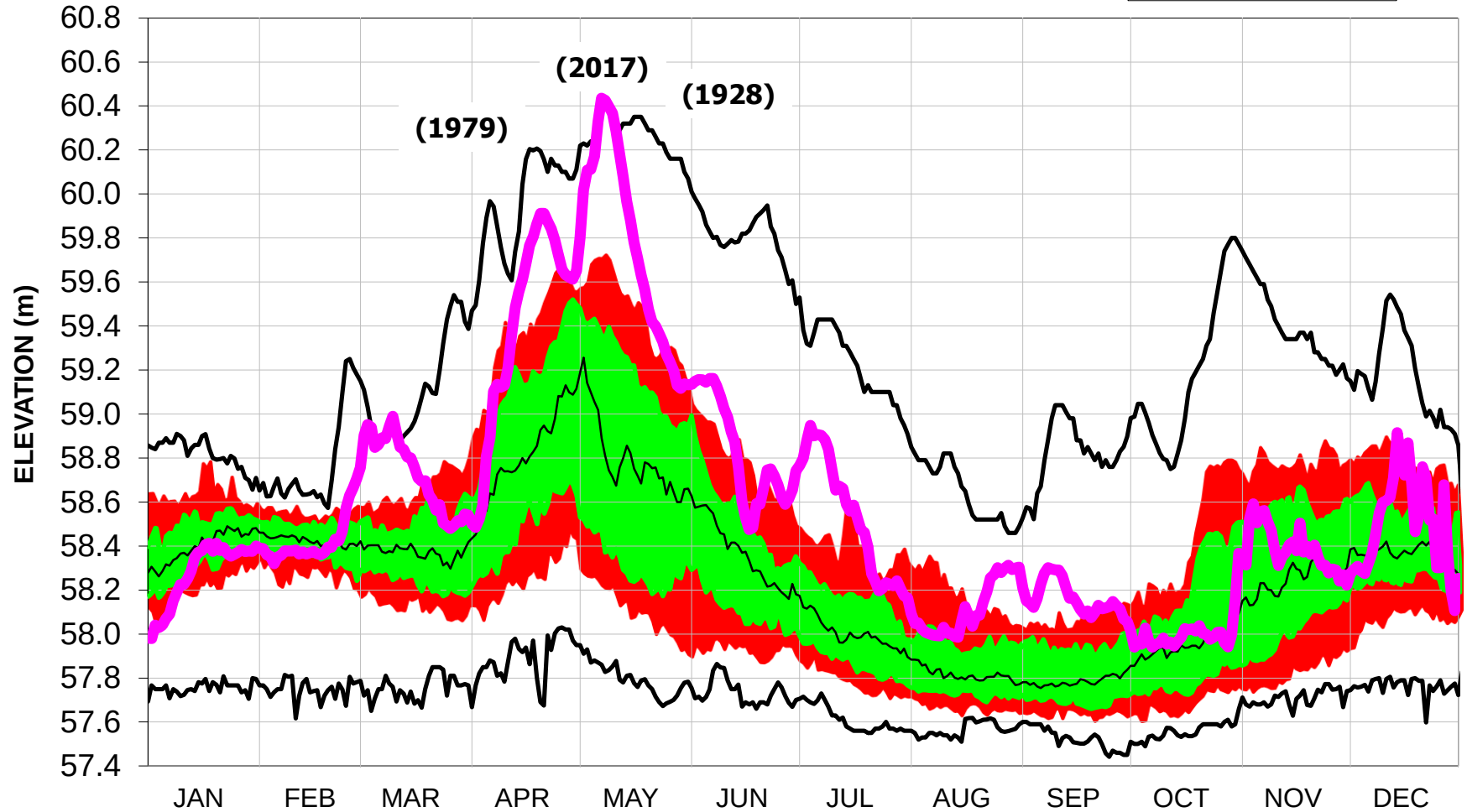
Ottawa River Water Volumes at Britannia (April 1st - June 6th)



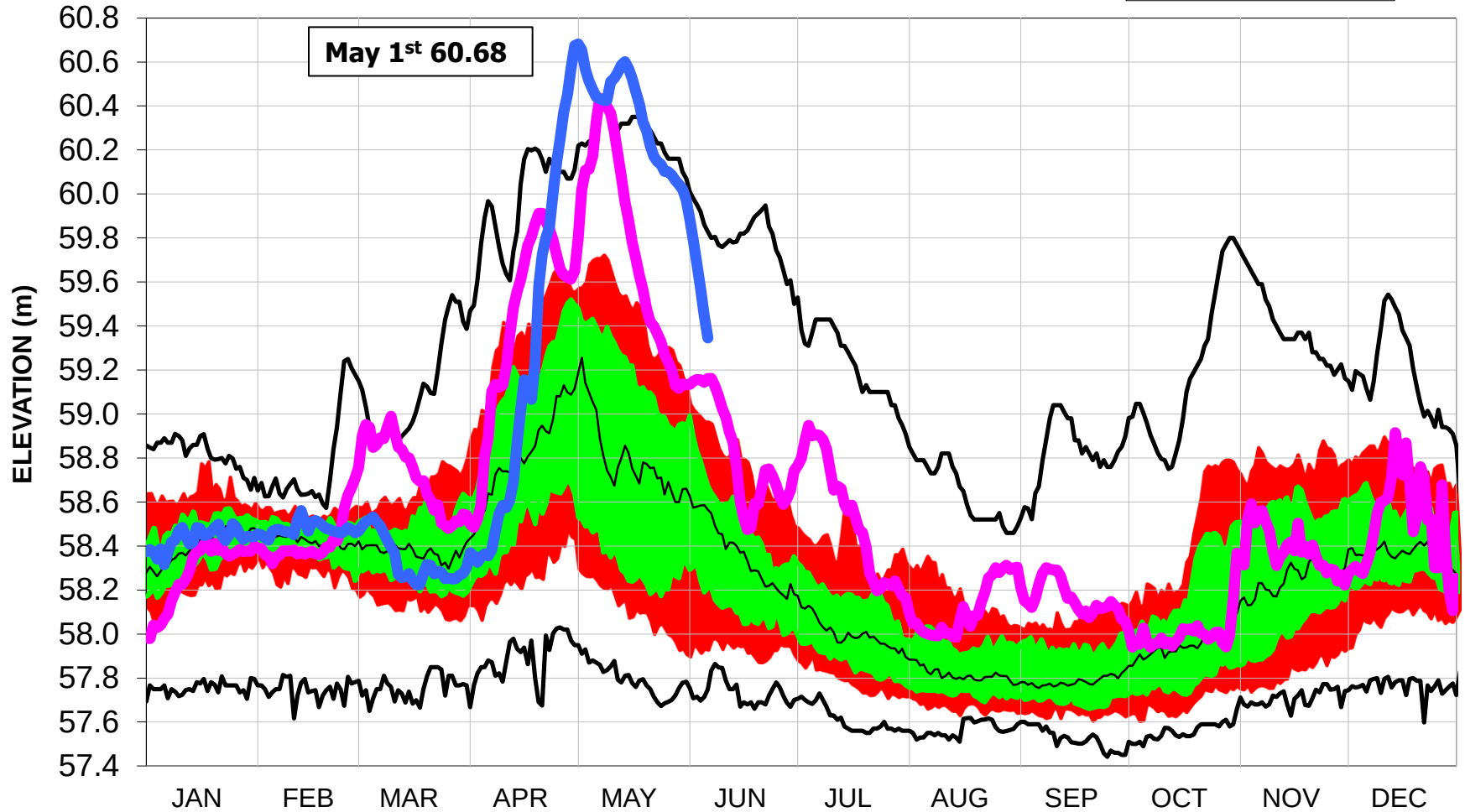
UNCONTROLLED PORTION OF BRITANNIA DISCHARGE



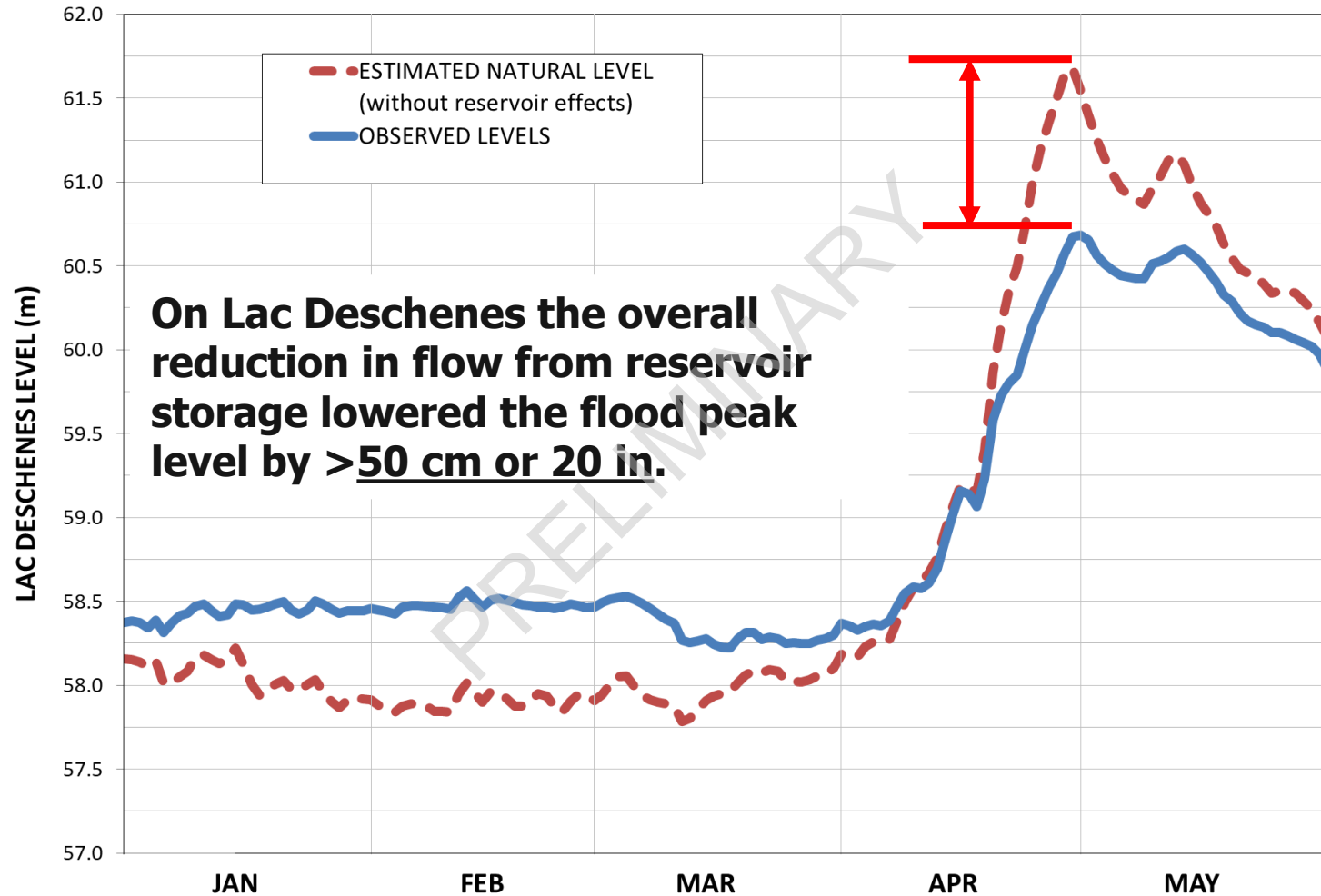
BRITANNIA LEVEL



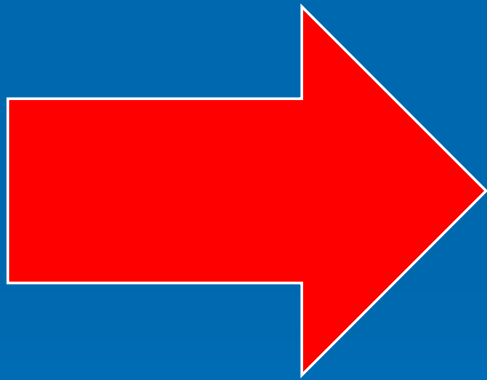
BRITANNIA LEVEL



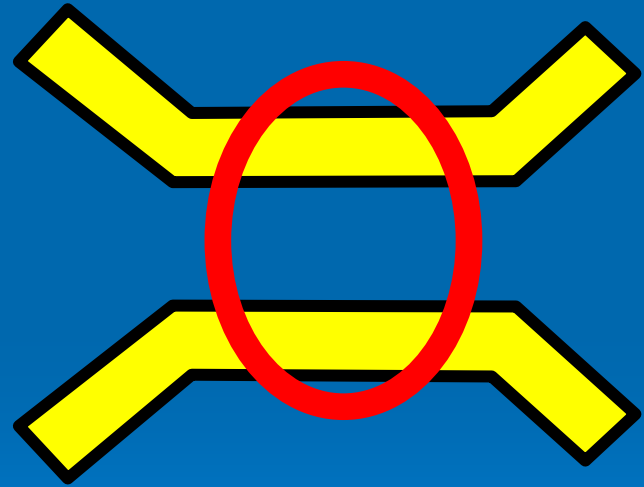
LAC DESCHENES - OBSERVED LEVELS AND RESERVOIR EFFECTS



What determines the level in my area?

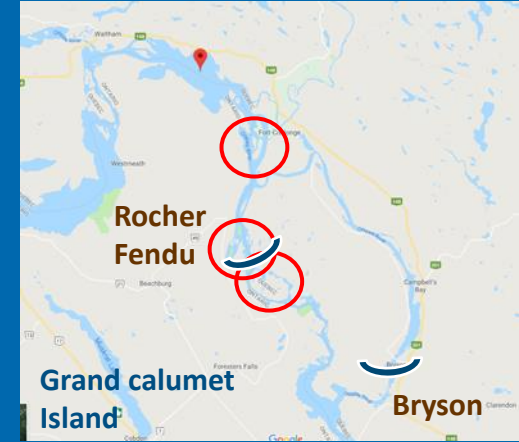


**Arriving Upstream
Flow**



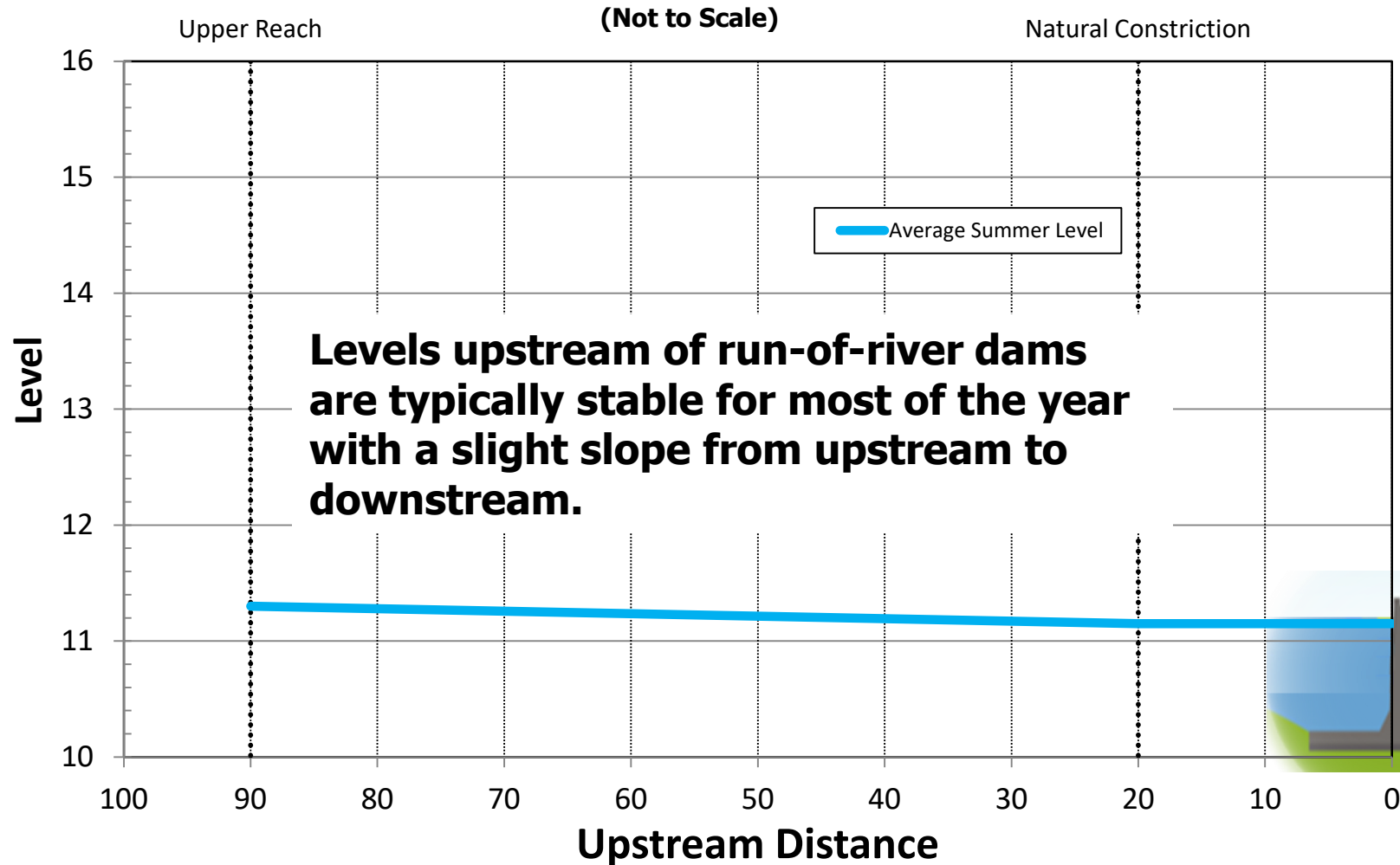
**Downstream Constrictions
(Control Point)**

Natural River Narrowing's Restrict the Passage of Water

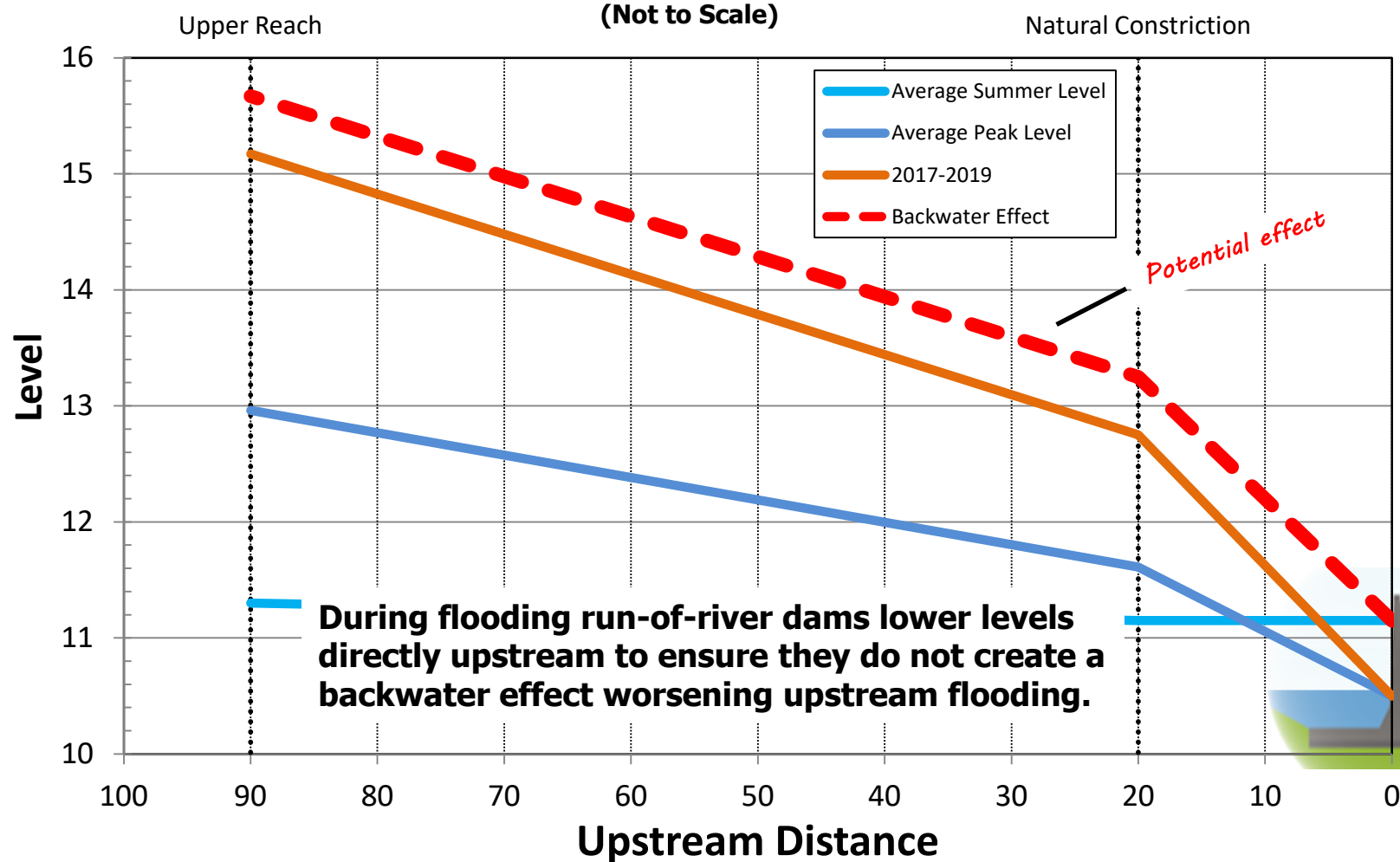


- Narrowing's cause water to back up (similar to a funnel)
- Before river flows become high, run-of-river dam's lower their level above the dam and conditions return to a near natural state

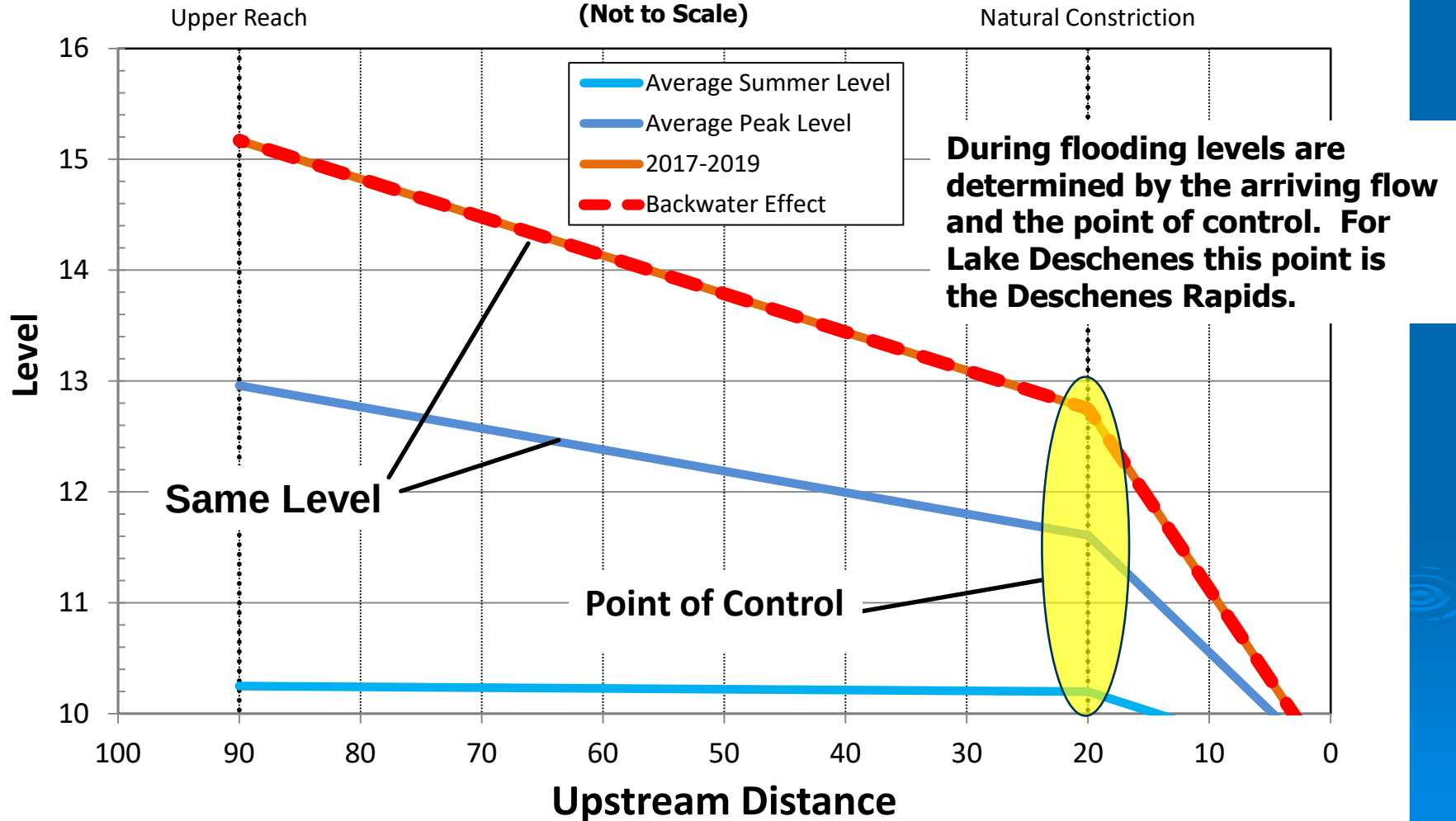
Upstream Water Level Profile



Upstream Water Level Profile



Upstream Water Level Profile



**REMOVAL OF ALL THE RUN OF RIVER DAMS
WOULD STILL RESULT IN THE SAME FLOOD LEVELS!**

Otto Holden Dam

Des Moines Dam

Bryson Dam

Chenault Dam

Chenault Falls Dam

Carroll Dam

175 km

Image NOAA

Image Landsat / Copernicus

Google Earth

Lake Deschenes – Natural Lake

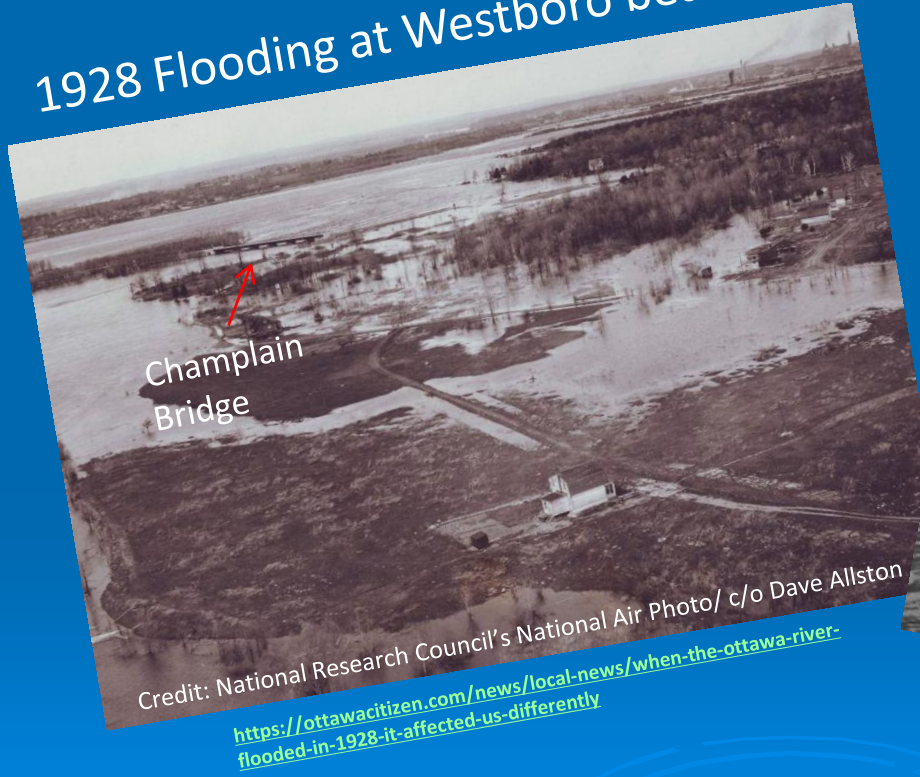
- Water levels are determined by
 - the upstream river flow rate
 - the natural river narrowing at Deschenes rapids
- Ring Dam at Chaudière Falls - Does not affect lake levels
 - during normal or flood conditions
- Carillon Dam - Affects water levels up to Hull
 - during normal conditions
 - but not during flood conditions (given operational levels are lowered)
- Conditions downstream (Hull, Carillon, Great Lakes) – *No effect on Lake Deschenes levels*

Exceptional Spring Flooding

- Historic flooding from Pembroke down to Montreal
 - Record levels recorded at Pembroke, Westmeath/Lac Coulonge, Chats Lake, Britannia beach, Mattawa highest since 1960
 - Level in Gatineau/Hull similar to 2017
 - Highest since start of recording in 1964
 - Flow rate at Carillon dam similar to 2017
 - Probably the highest flow in recorded history (1880's->)
- Exceptional floods occurred in 20's, 50's, 70's, 2017 and 2019
 - Other exceptional floods are to be expected in the future

Floods of the past

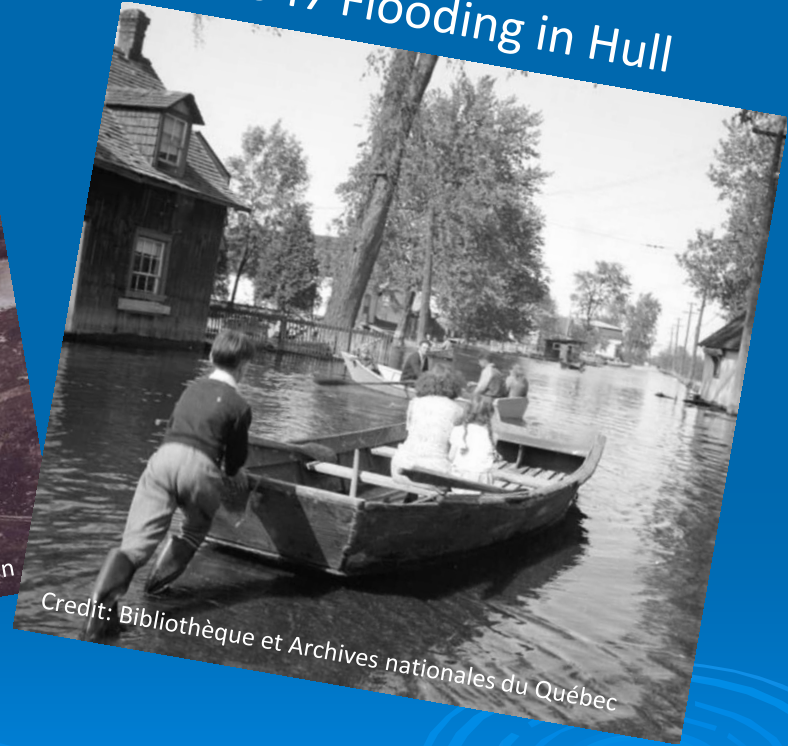
1928 Flooding at Westboro beach



Credit: National Research Council's National Air Photo/ c/o Dave Allston

<https://ottawacitizen.com/news/local-news/when-the-ottawa-river-flooded-in-1928-it-affected-us-differently>

1947 Flooding in Hull



Credit: Bibliothèque et Archives nationales du Québec

Flooding on the Ottawa River occurred before dams were built

Risks of Living in the Floodplain

Should be called the 1% flood!

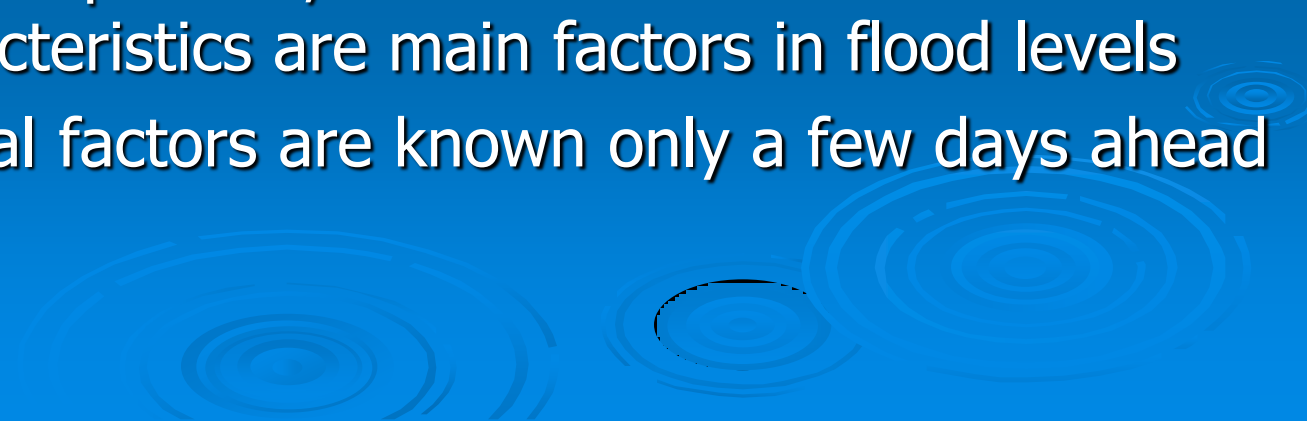
Risk over a 50-yr Period

Over a 50-year period, there's 40% chance of getting a 100-yr flood event at least once

100-yr Flood

Is actually a 1% flood, meaning that on any given year, there is a 1% chance of having a flood of this magnitude

Limitations of Regulation

- Size of reservoirs smaller than spring runoff, large portion of the watershed uncontrolled
 - Flooding cannot be prevented
 - Peak of the flood is substantially reduced
 - Amount of precipitation, rate of snowmelt and natural stream characteristics are main factors in flood levels
 - Meteorological factors are known only a few days ahead
- 
- The bottom of the slide features a decorative graphic of several concentric circles, resembling ripples on water, in a lighter shade of blue against the main background.

Dam Mismanagement?

<https://ottawacitizen.com/news/local-news/egan-high-and-dry-the-maddening-story-of-the-upper-ottawa-river>

Egan: High and dry – the maddening story of the upper Ottawa River



KELLY EGAN, OTTAWA CITIZEN
More from Kelly Egan, Ottawa Citizen (HTTP://OTTAWACITIZEN.COM/AUTHOR/KELLYJOSEPHEGAN)

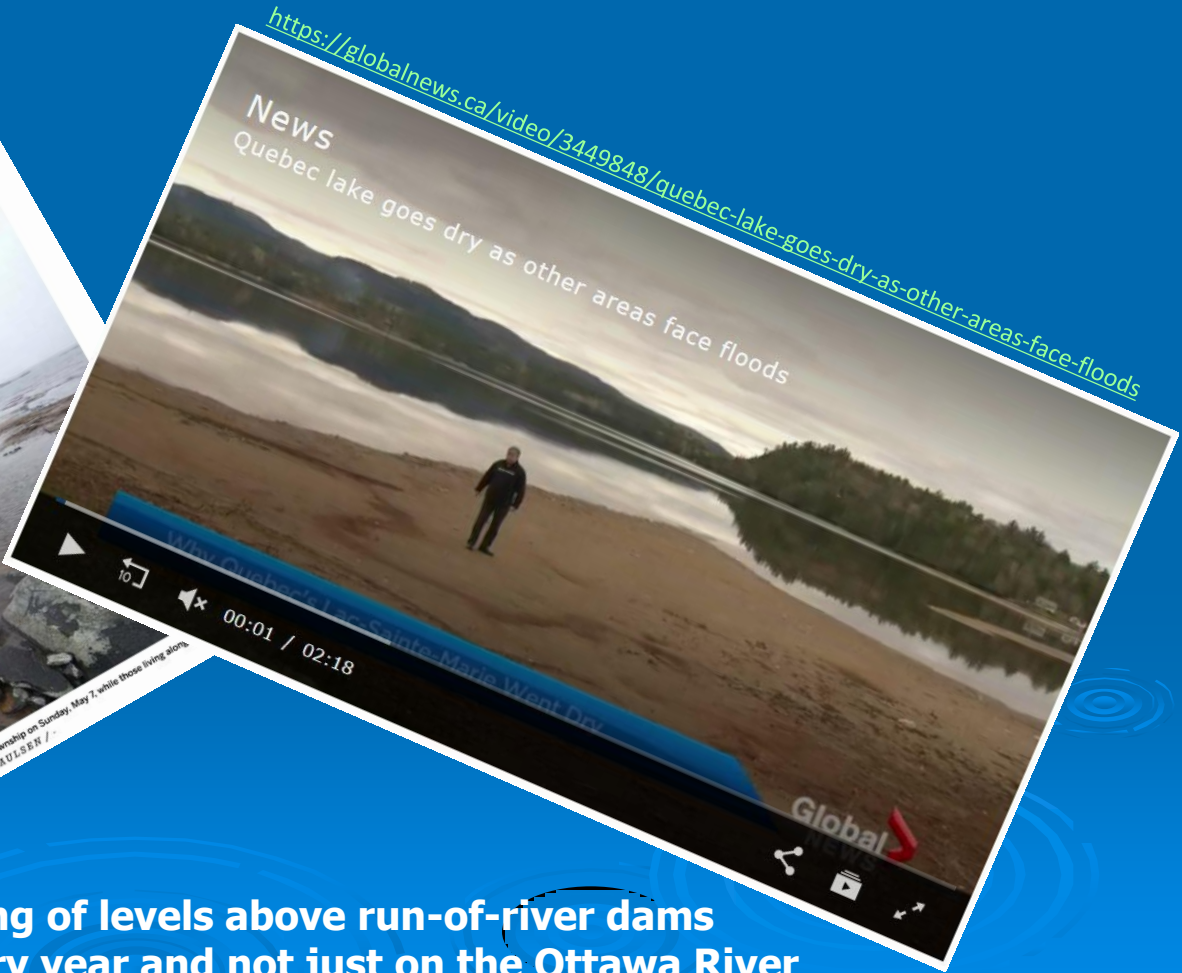
Published on: May 11, 2017 | Last Updated: May 11, 2017 4:00 PM EDT



The low water level is seen at the Stonecliffe boat launch in Head, Clara and Maria Township on Sunday, May 7, while those living along Ottawa River downstream and other waterways have been flooded out. RYAN PAULSEN /

News

Quebec lake goes dry as other areas face floods

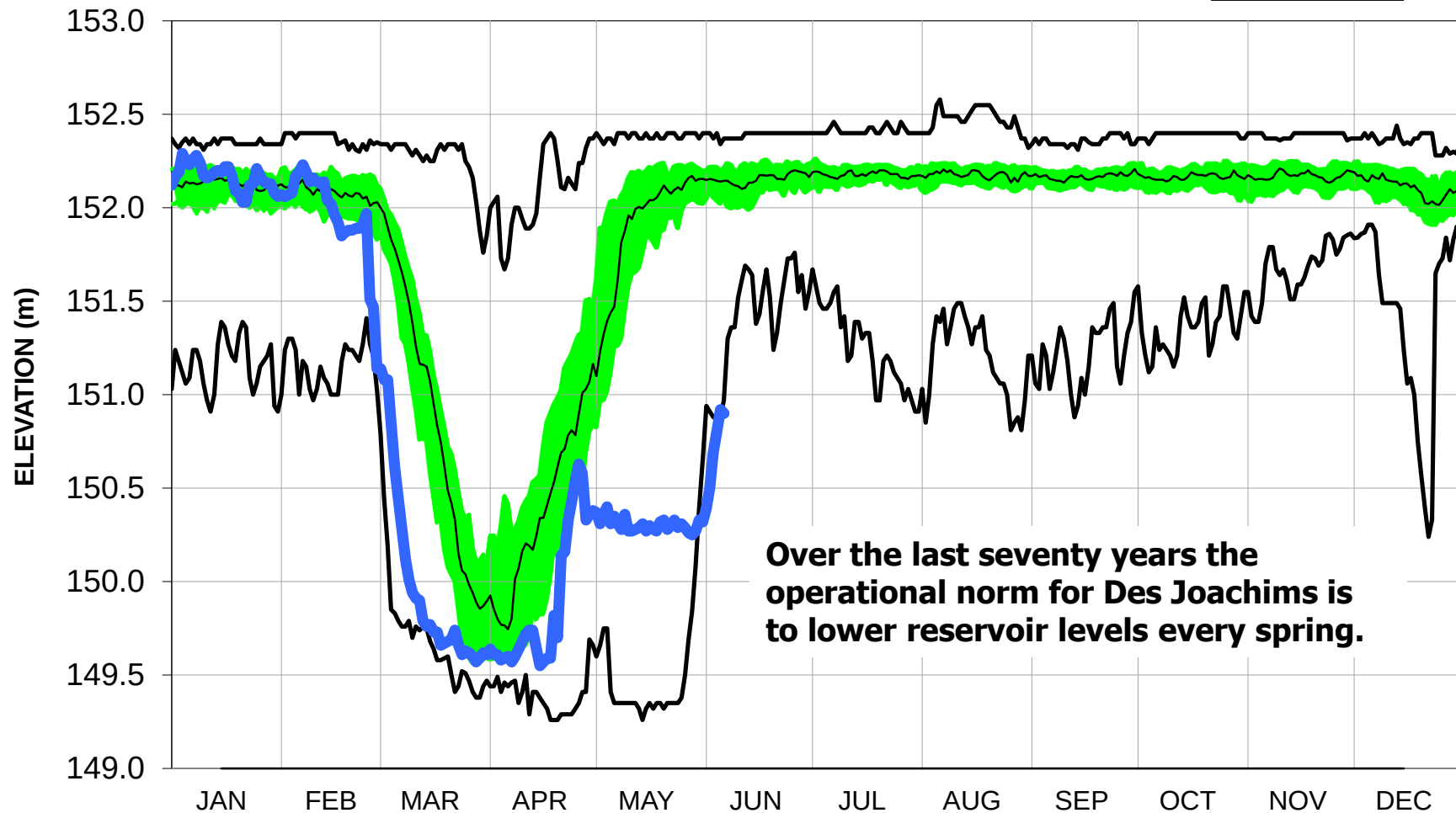


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Global

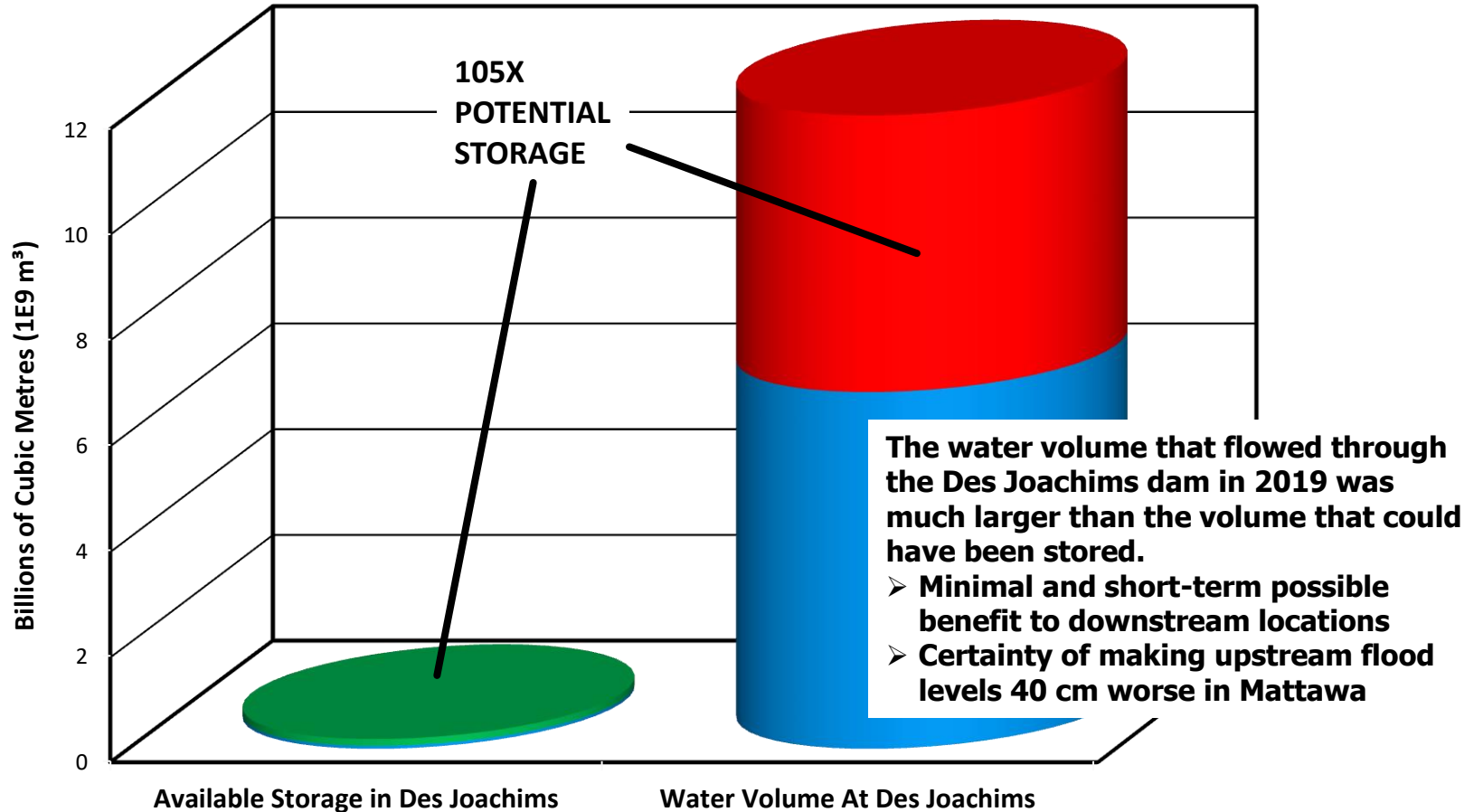
Lowering of levels above run-of-river dams is done every year and not just on the Ottawa River

DES JOACHIMS LEVEL



Ottawa River Water Flow Regulation During the Spring Freshet (April 1st-June 6th)

■ TOTAL 2019
■ AVERAGE YEAR





Information

Current Water levels
Toll free number 24 hours per day

Ottawa-Gatineau

613-995-3443

613-995-3455

English

French

Outside

1 800 778-1246

1 800 778-1243

Flow forecasts
during freshet

Web Site: **<http://www.ottawariver.ca>**

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