



Ottawa River
Regulation
Planning Board

Commission de planification
de la régularisation
de la rivière des Outaouais

Lake Deschenes and the Ottawa River Basin

Ottawa River Regulation Secretariat

The Ottawa River Basin and the ORRPB



The 1983 Canada-Ontario Quebec Agreement established:

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

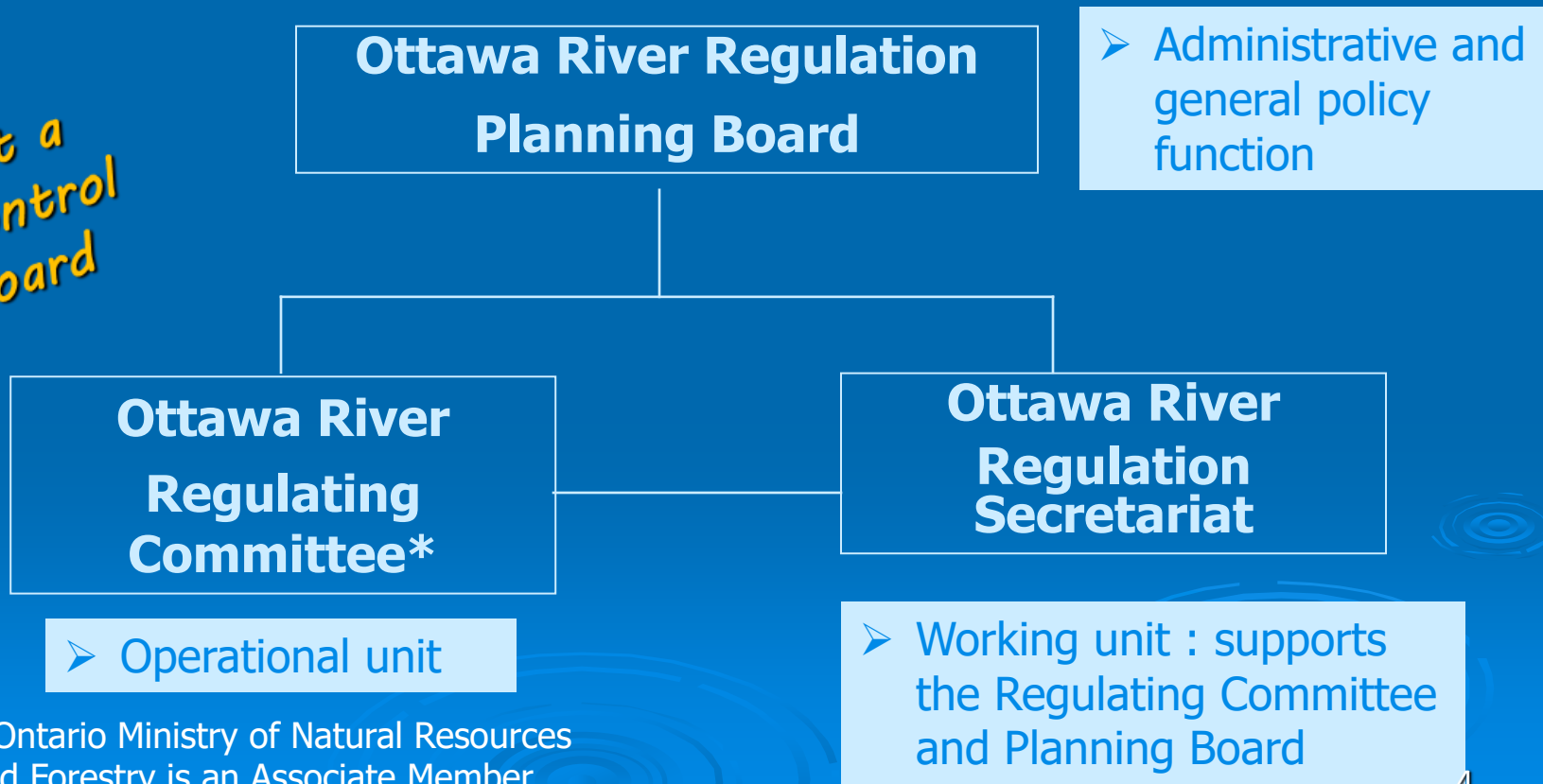


- *Main role* : to ensure that the flow from the principal reservoirs of the Ottawa River Basin are managed on an integrated basis : minimize impacts – floods & droughts
- *Secondary role* : to ensure hydrological forecasts are made available to the public and government agencies for preparation of flood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



How is the Planning Board structured?

Not a Control Board





What about Flow Regulation?



13 Principal Reservoirs



- Reservoirs are large bodies of water that are used to:
 - Store or release water from rainfall & snowmelt
- Flow regulation:
 - Retain water in the spring (... reduces flows downstream)
 - Release water during winter (...increases flows downstream)
- 1983 Agreement:
 - Integrated management



Ottawa River Watershed



SPRING FLOODS VARY

1916-2018:

Maximum daily flow
at the Deschenes Rapids
varied between
1,700 and 5,368 m³/s

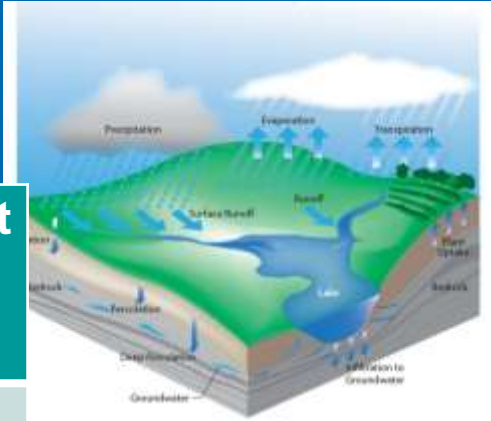
In 2019:

Maximum daily flow
on April 30th
5,977 m³/s

**All runoff in the western portion of the
basin passes through Lake Deschenes**



Weather Conditions and Risk of High Water Events

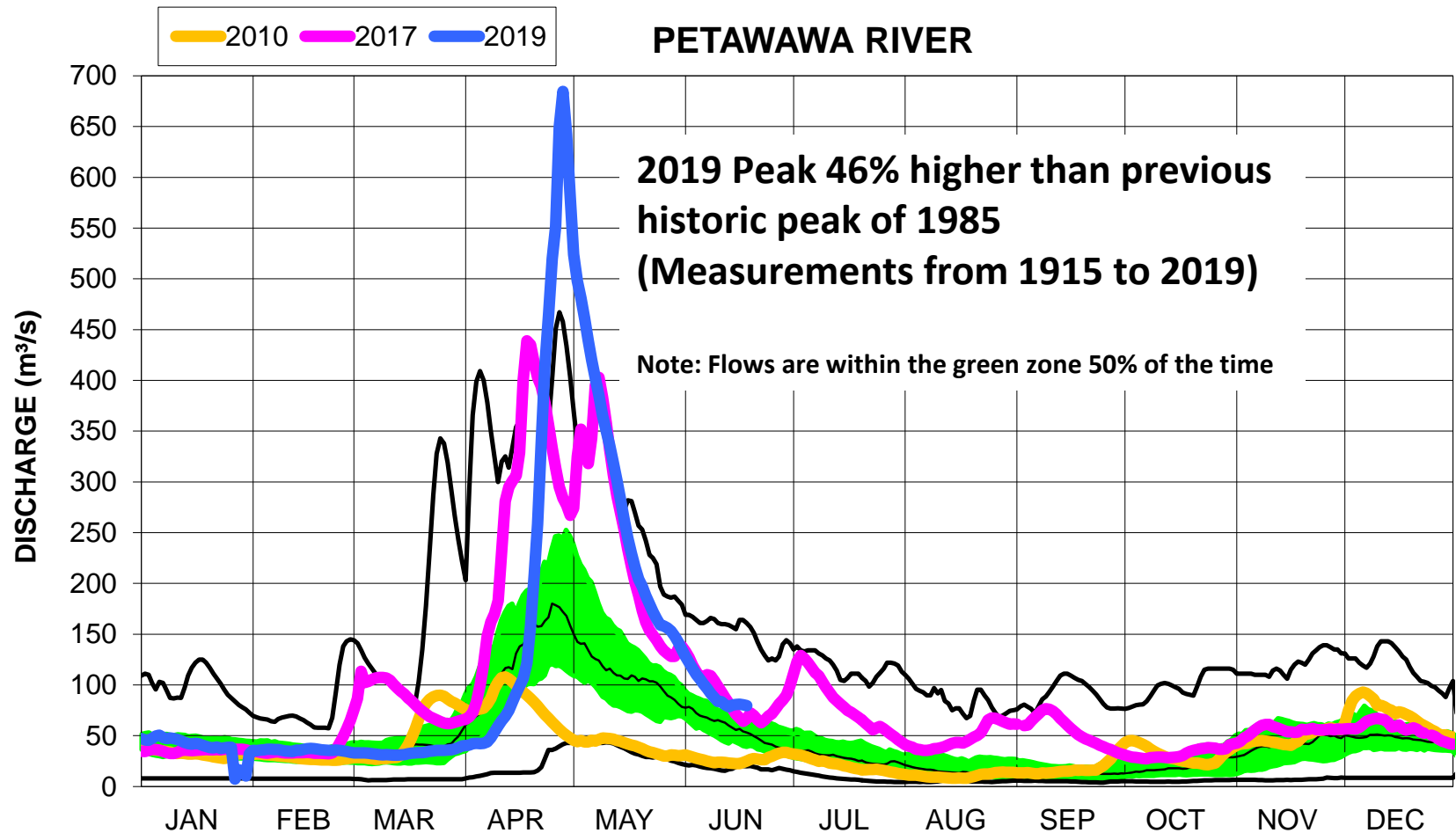


Weather/Water Conditions during Spring		Effect on Risk
Snowpack when freshet starts (SWE*)		↗
Rapid melt of a heavy snowpack		↗
Early spring (increases probability of a slow melt)		↘
Rainfall amounts > 25 mm/day		↗
March, April, or May monthly precipitation > average		↗
Tracking of storm	Regulated portion of basin	—
	Unregulated portion of basin	↗
Ground absorption capacity	Rain on snow	—
	Rain on partially frozen / saturated soil	↗

Weather patterns over different sectors of the basin affect the degree of flooding experienced in other locations.

* SWE = Snow Water Equivalent, which is measured in mm

Natural Variability





13 Principal Reservoirs

13 principaux réservoirs

ONTARIO POWER GENERATION

Gouvernement du Canada

Hydro Québec

Québec



Reservoirs are mainly used to store spring runoff



Les réservoirs servent principalement à emmagasiner le ruissellement au printemps

Carillon dam at outlet



Land Area Draining to Principal Reservoirs

40%
regulated

• Mattawa

60%
unregulated

• Arnprior

Basin Characteristics:

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



Reservoir Management Annual Cycle

Winter

- reservoir drawdown
- hydroelectric production (HQ/OPG)

Spring

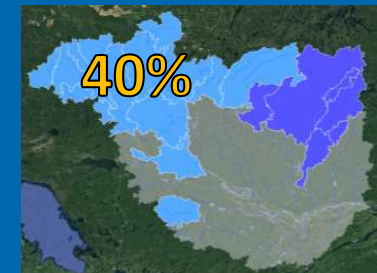
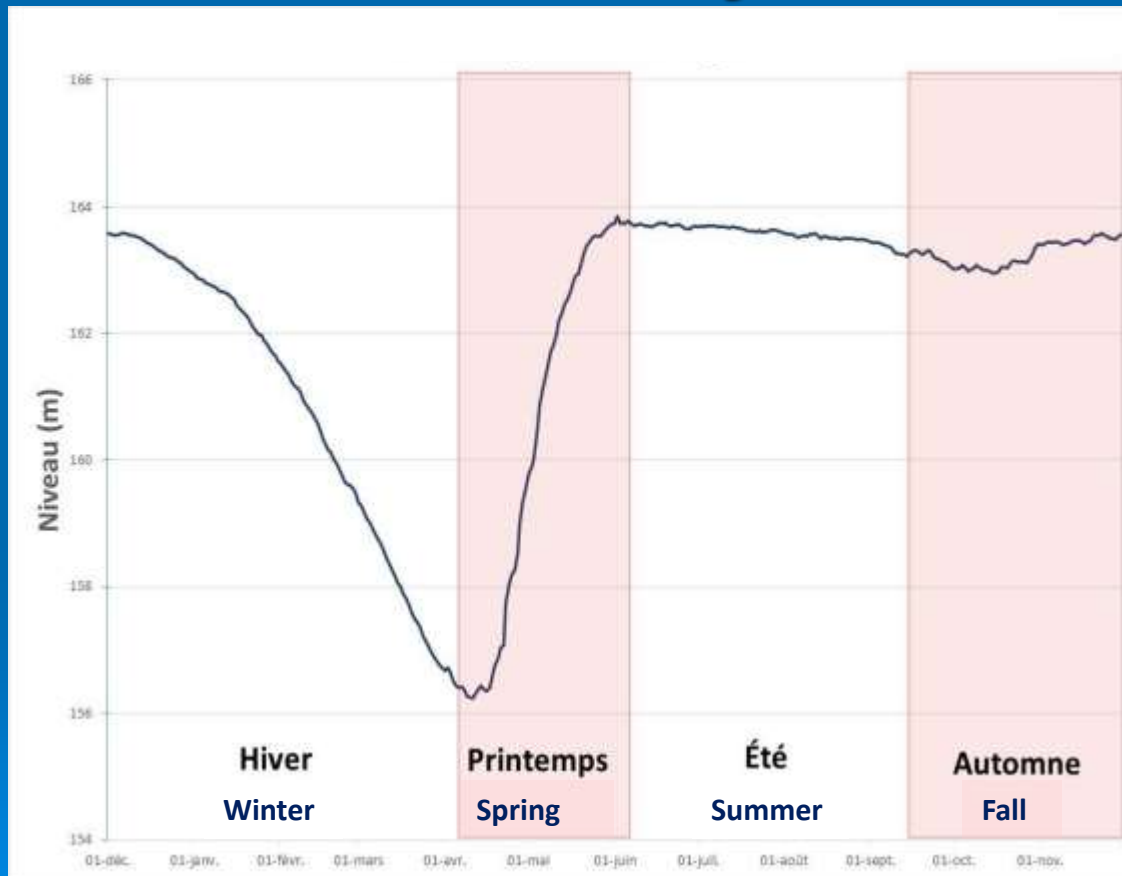
- refill
- flood mitigation

Summer

- water level stability
- drought mitigation

Fall

- flood / drought mitigation

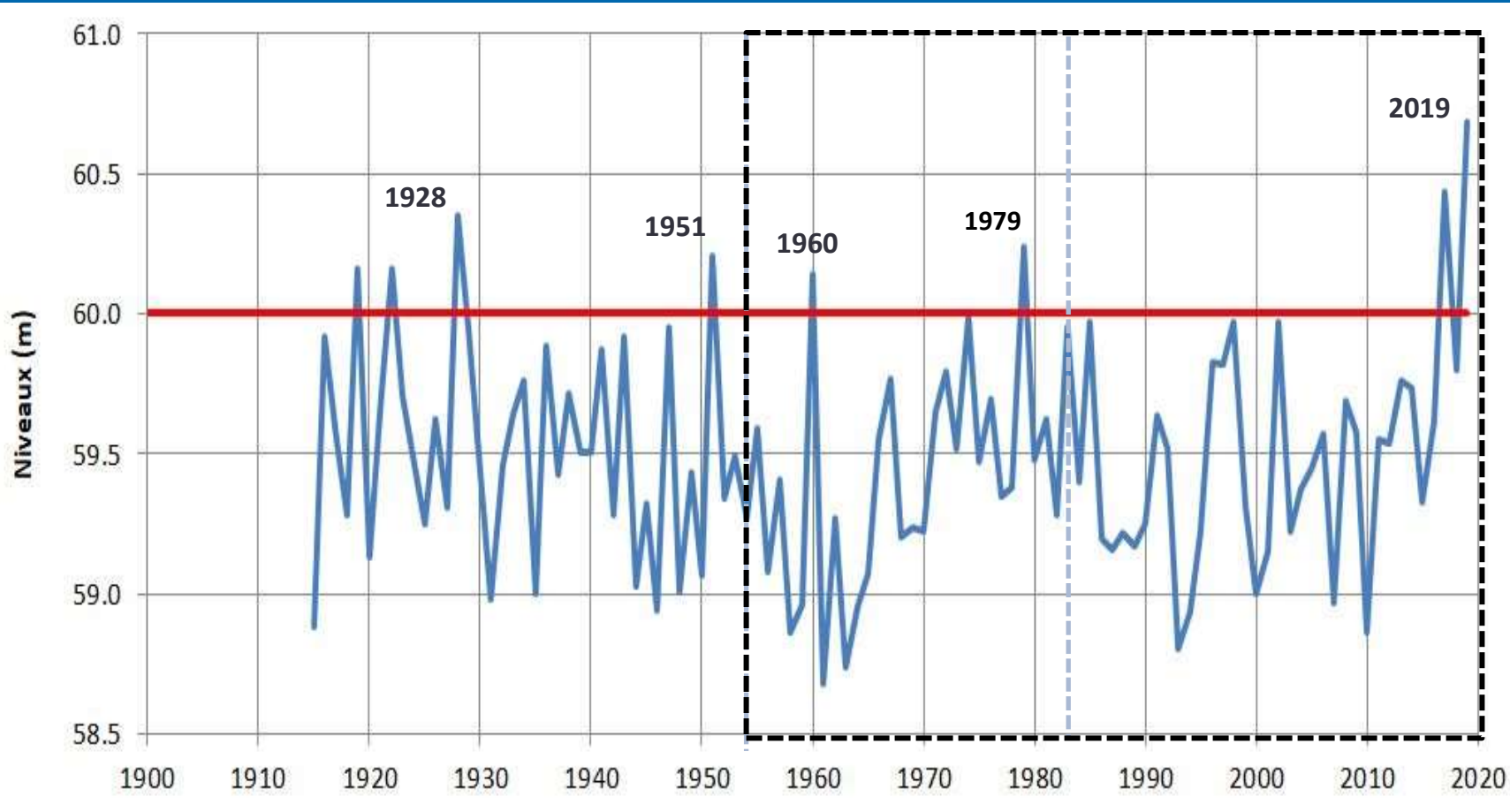


Limits to Flow Regulation



Limits to Flow Regulation

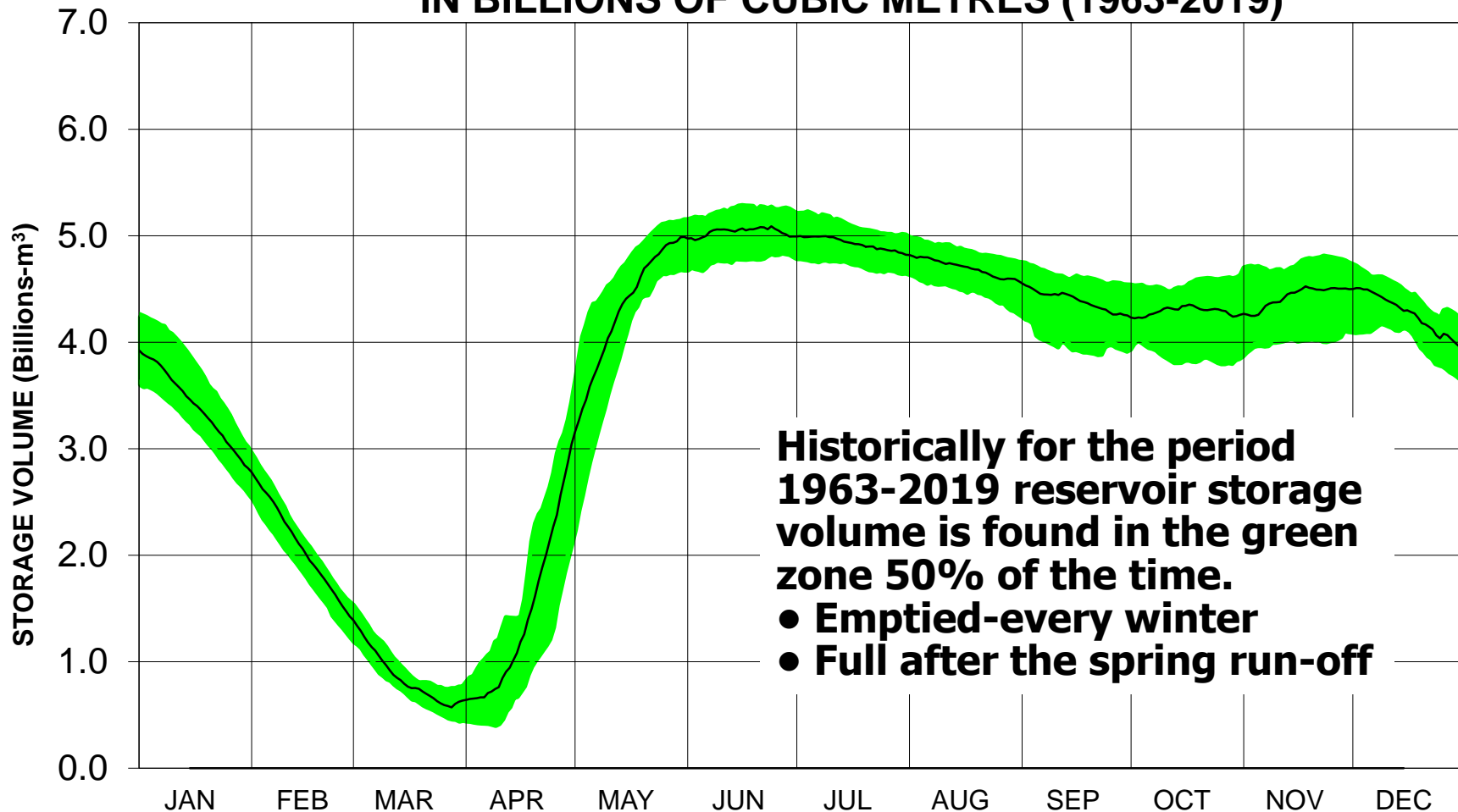
Peak Levels on Lake Deschenes



1954 – Filling of the last reservoir

1983 – ORRPB Creation

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



**Historically for the period
1963-2019 reservoir storage
volume is found in the green
zone 50% of the time.**

- Emptied-every winter
- Full after the spring run-off



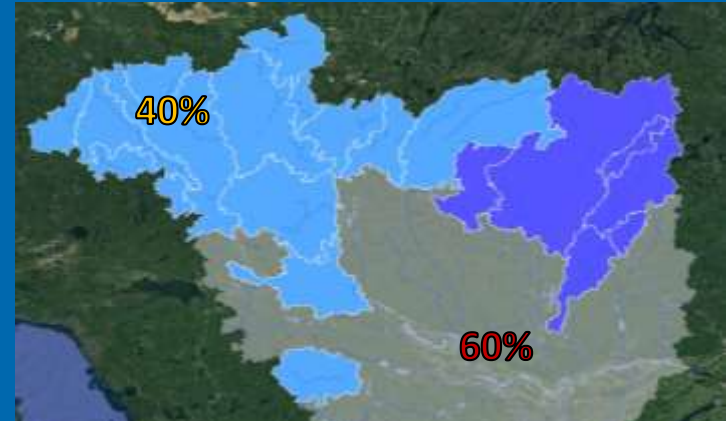
Limits of Flow Regulation

Flooding occurs when:

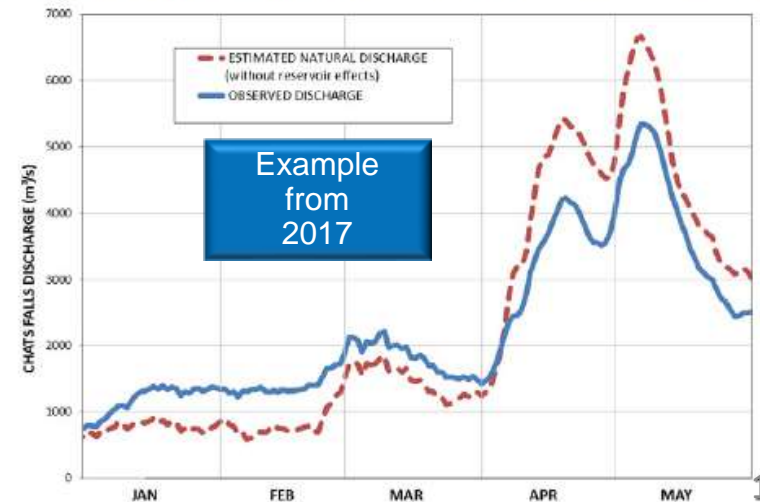
- Spring runoff greatly exceeds the size of reservoirs
- There is significant spring runoff in areas where there are no reservoirs

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





Types of Structures



Reservoir Dams

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



Run-Of-River Dams

**Limited capacity to store
spring runoff
(Des Joachims during
high flow events, Chats
Falls)**



Major Run-Of-River Dams on the Ottawa River

Otto Holden Dam

Des Joachims Dam

Bryson Dam

Chenaux Dam

Chats Falls Dam

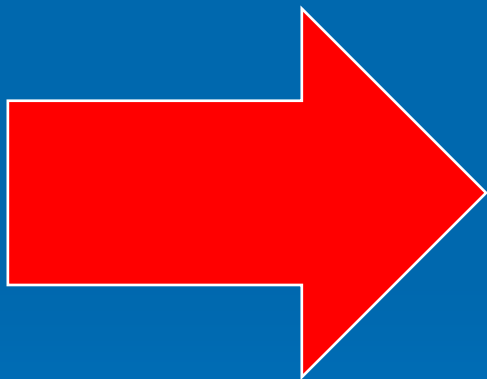
Carillon Dam

Normal or Spring Conditions?

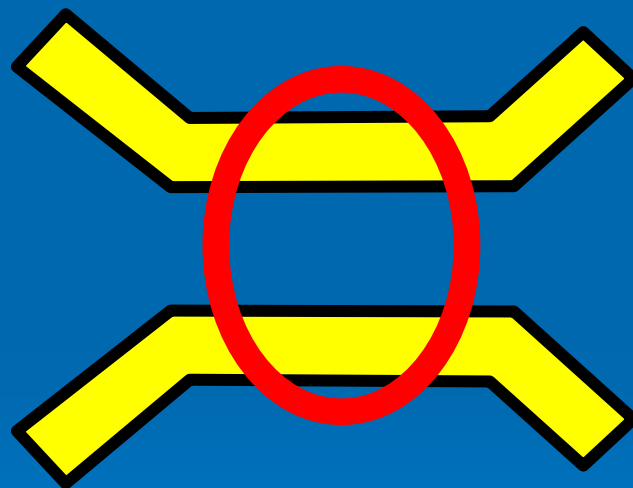
- normal – peaking or cycling facilities
- spring – *like* run-of-river facilities



What determines the level in my area?

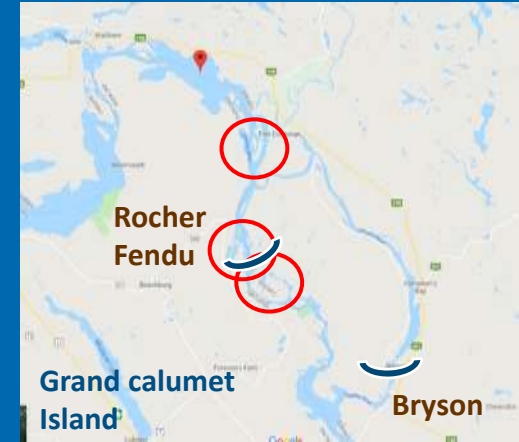


**Arriving Upstream
Flow**



**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



For Lake Deschenes

- Levels are determined by arriving upstream flows (Chats Lake)
- How much water can leave at the Deschenes Rapids constriction



Deschenes Rapids



Real-Time Hydrometric Data Graph for OTTAWA RIVER AT BRITANNIA (02KF005) [ON]

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

Graph Table

Station: 02KF005

Data Type: Real Time

Download?

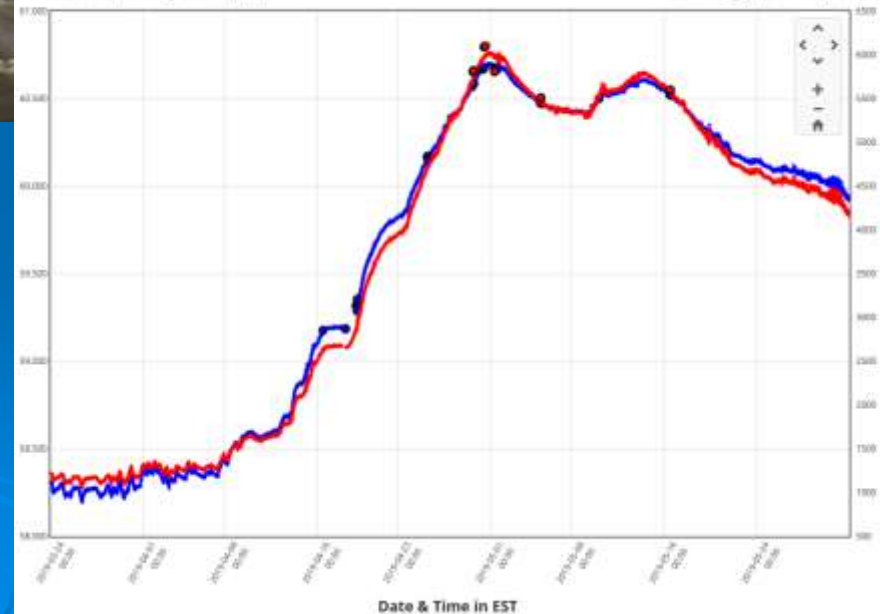
Apply

Legend



Water Level (Primary sensor) (m)

Discharge (Derived) (m³/s)



- Water levels and flows are related
- The higher the flow - the higher the level
- Hydrologic modeling predicts flows
- Forecasters use this stable flow vs level relationship to predict flood levels for Lake Deschenes

Do downstream dams influence water levels on Lake Deschenes?

- No influence on Lake Deschenes levels
- The river drops about 4 metres between the Deschenes rapids and above the ring dam and 20 metres to below parliament hill
- Downstream dams pass all arriving flow from Lake Deschenes



No downstream dam operator can 'lower the water level' on Lake Deschenes.

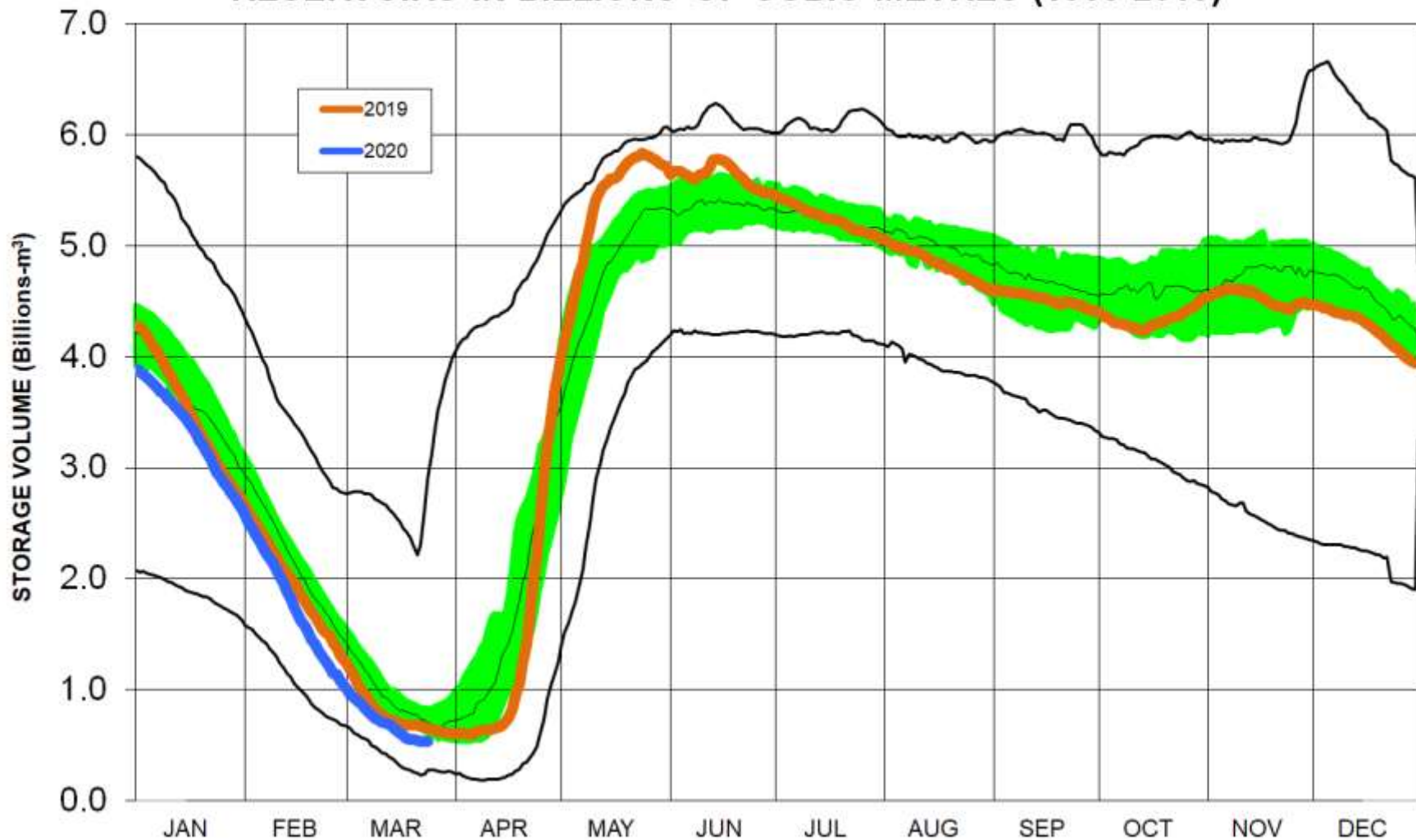
The only means of reducing levels on Lake Deschenes is to reduce upstream flows. This is helped by filling the principal reservoirs during freshet.

Questions to be asking about reservoir management (?)

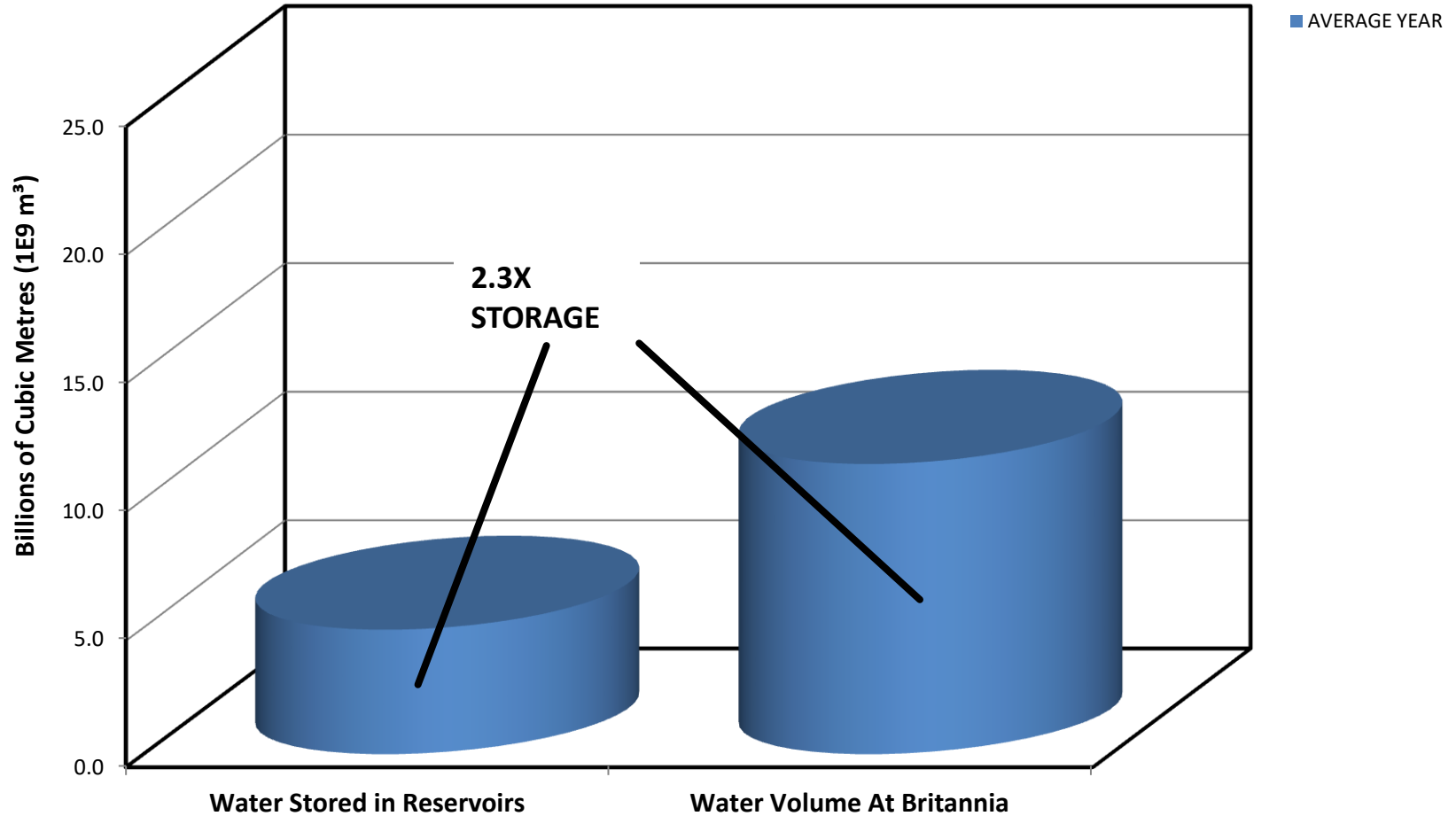
- **Is reservoir storage being effectively used**
- **Do other areas benefit while we are flooded**

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

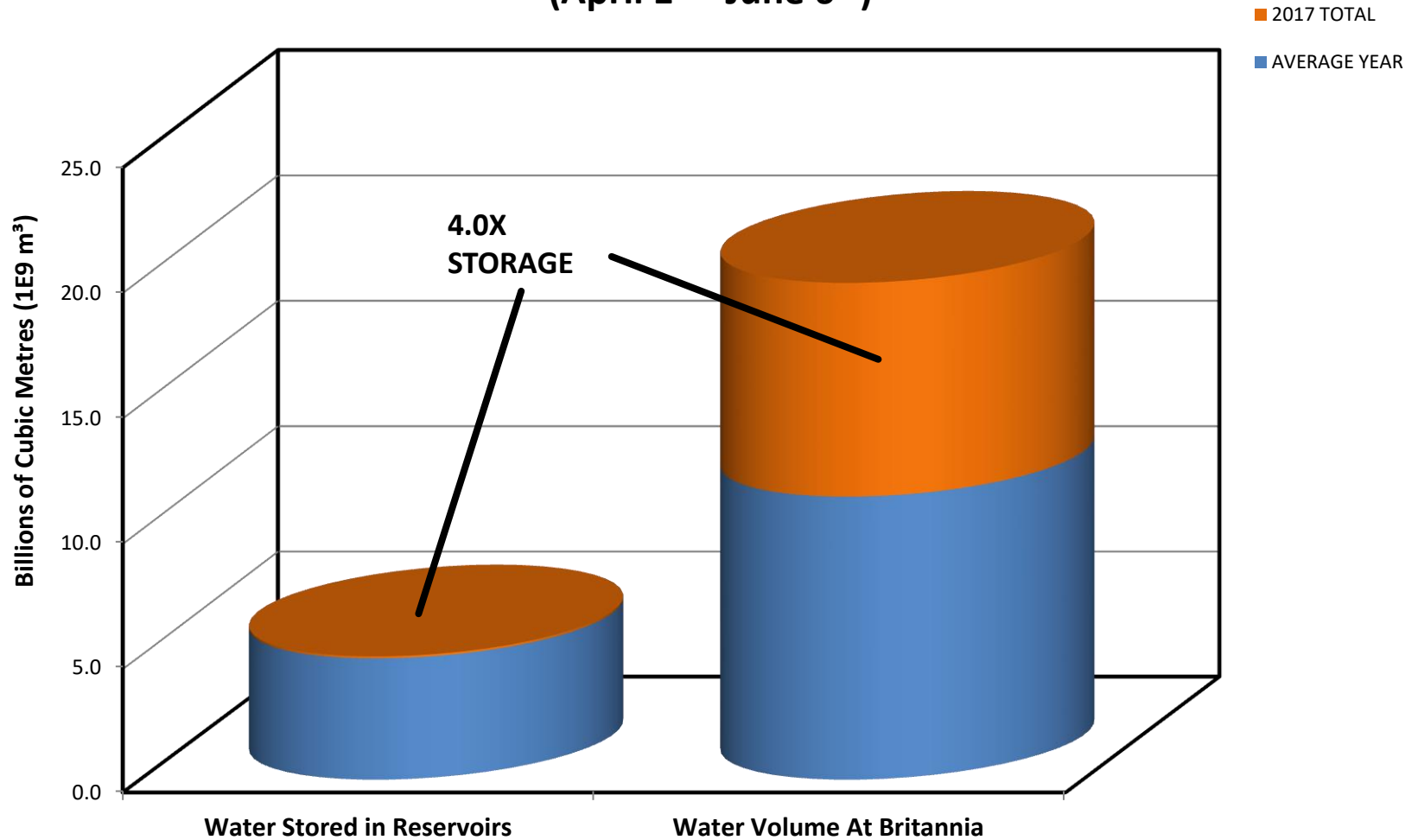
2020-03-31



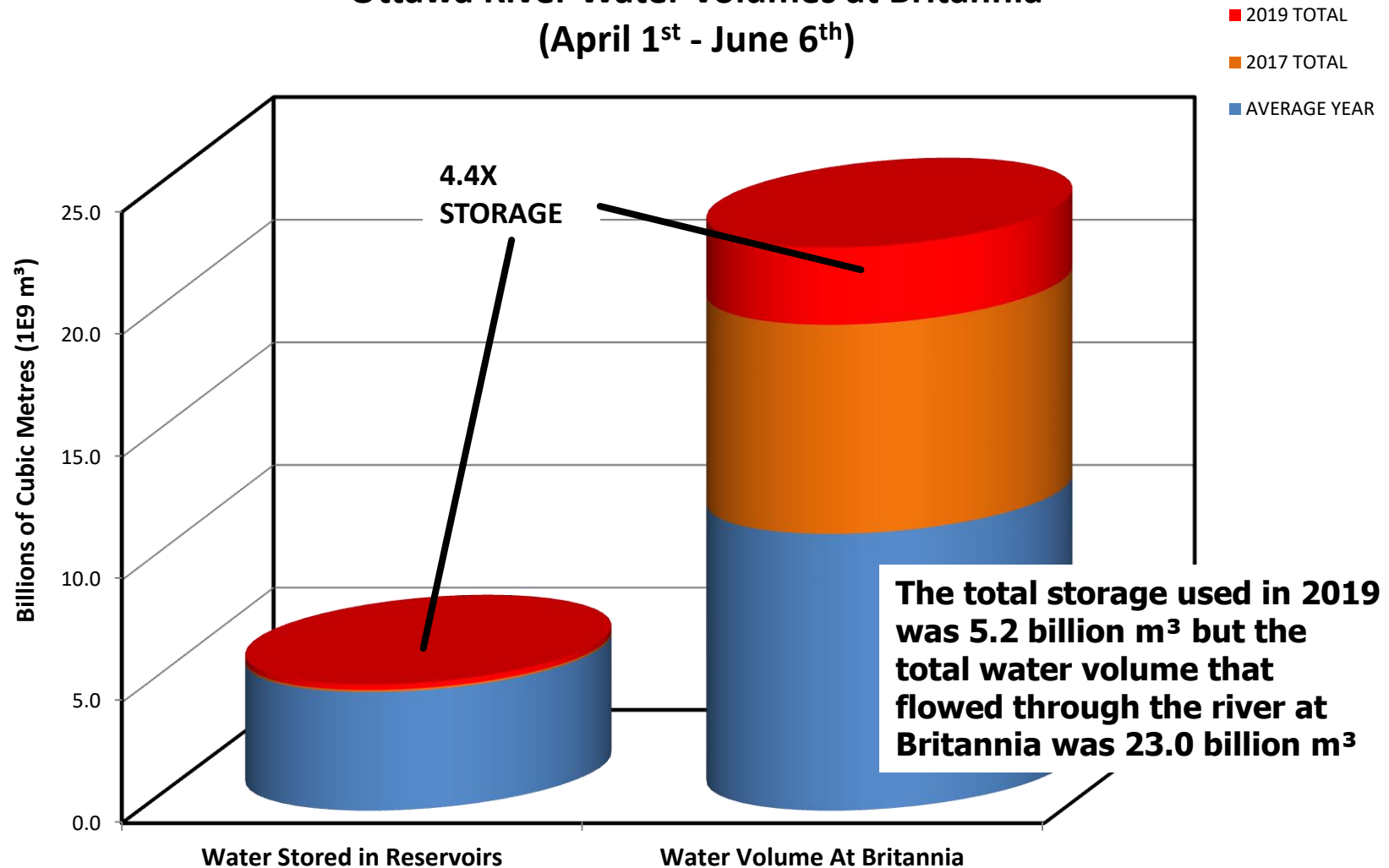
Ottawa River Water Volumes at Britannia (April 1st - June 6th)



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



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



OTTAWA RIVER REGULATING COMMITTEE (ORRC)

OTTAWA RIVER
 FORECAST PEAK FLOOD LEVELS
 2019-05-07 17:00
 (Next update 2019-05-08 17:00)



	CURRENT LEVEL		FORECAST PEAK LEVEL		CHANGE (cm) *	
	2017 PEAK (m)***	DATE-TIME	LEVEL (m) **	DATE		LEVEL (m) **
MATTAWA	153.96	2019-05-07 15:00	155.22	2019-05-09	155.60	38
PEMBROKE	113.03	2019-05-07 14:00	113.47	2019-05-09	113.60	13
LAC COULONGE	108.52	2019-05-07 13:45	108.80	2019-05-10	109.15	35
LAC CHATS	75.95	2019-05-07 13:00	75.98	2019-04-30	76.31	-33
LAC DESCHENES/BRITANNIA	60.44	2019-05-07 15:00	60.43	2019-04-30	60.70	-27
GATINEAU/HULL MARINA	45.20	2019-05-07 13:45	44.66	2019-05-01	45.18	-52
THURSO	43.69	2019-05-07 13:45	43.17	2019-05-01	43.67	-50
GRENVILLE/HAWKESBURY	42.81	2019-05-07 13:45	42.37	2019-05-01	42.76	-39
MANIWAKI	166.10	2019-05-07 13:45	165.40	2019-05-11	165.70	30

* CHANGE is the difference in centimeters between the FORECAST PEAK LEVEL and the CURRENT LEVEL.
 (negative values denote the amount that levels have decreased from the peak)

** All levels are in reference to mean sea level.

*** Peak water level

Location has

Warning:

- Water level

- The flow rate

bodies of water

- The FORECAST

River Condition

2019-05-07

Snow melt runoff

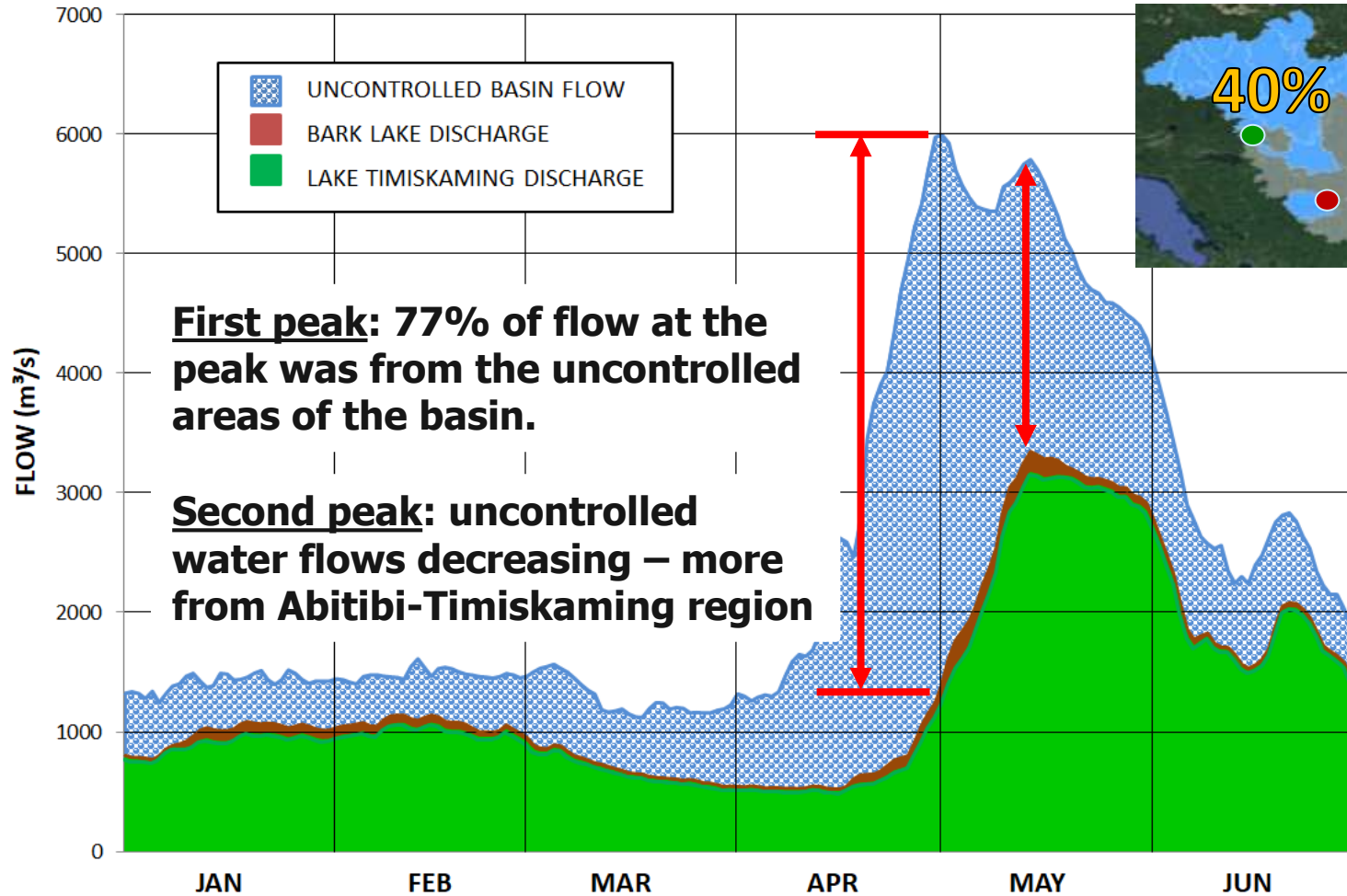
Timiskaming

Southern river location's water levels peak within days of one another as northern reservoir discharge is held to a minimum

levels to rapidly rise along the river between Mattawa and Lac Coulonge. With significant rainfall of 15 to 35 mm expected to begin on Thursday over much of the watershed, levels are expected to peak along this upper river section on Thursday through Saturday depending on location. Along the Ottawa River from Chats Lake down to Lac Deschenes, levels have stopped declining and are expected to rise again due to increased flow from the Abitibi-Timiskaming region combined with forecast precipitation. Water levels from Chats Lake down to Lac Deschenes are not expected to exceed the initial peaks observed last week. In downstream locations from Pointe Gatineau down to the Grenville/Hawkesbury area, levels are expected to remain stable until Thursday and may increase slightly thereafter depending on the amount of precipitation received.

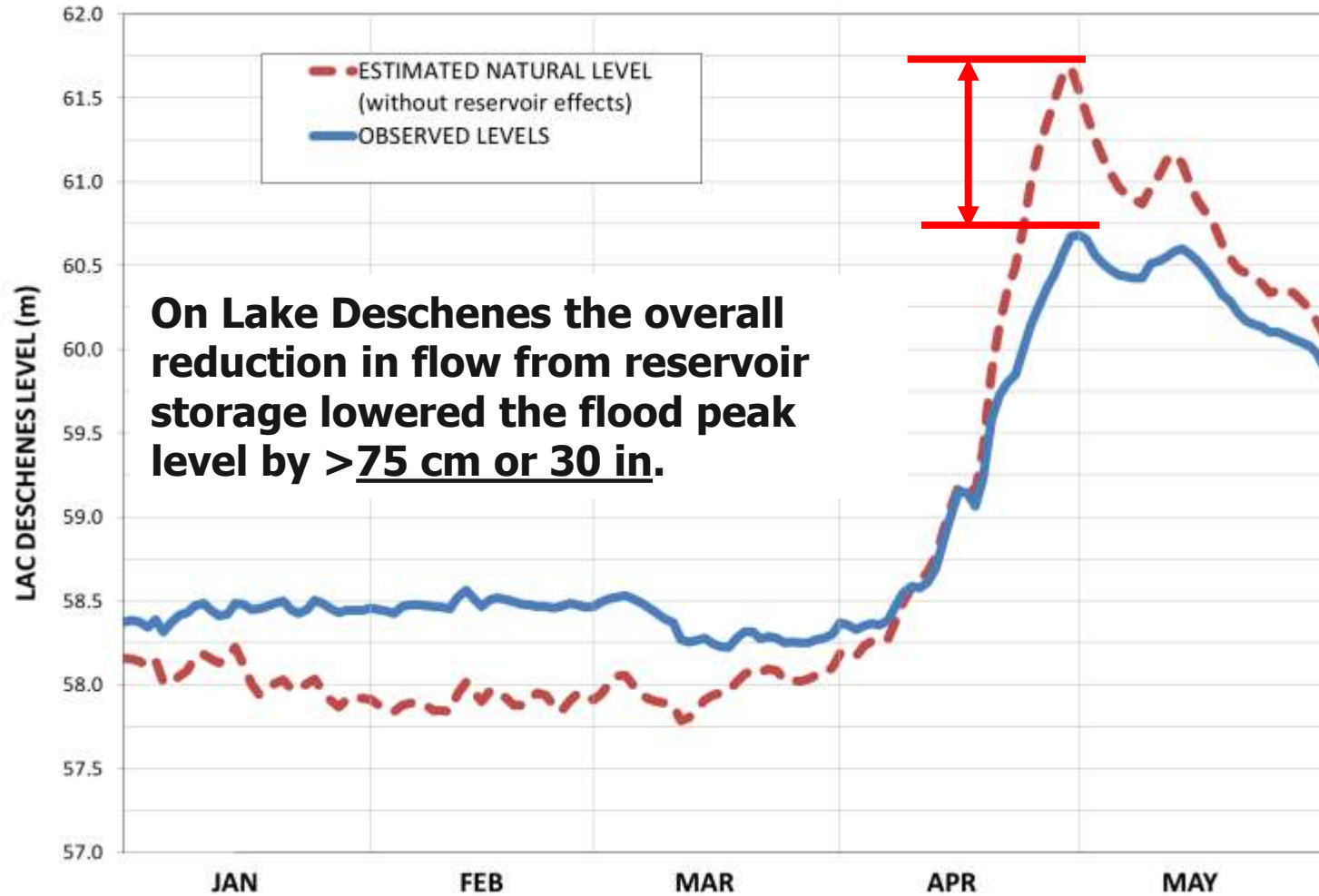


UNCONTROLLED PORTION OF BRITANNIA DISCHARGE



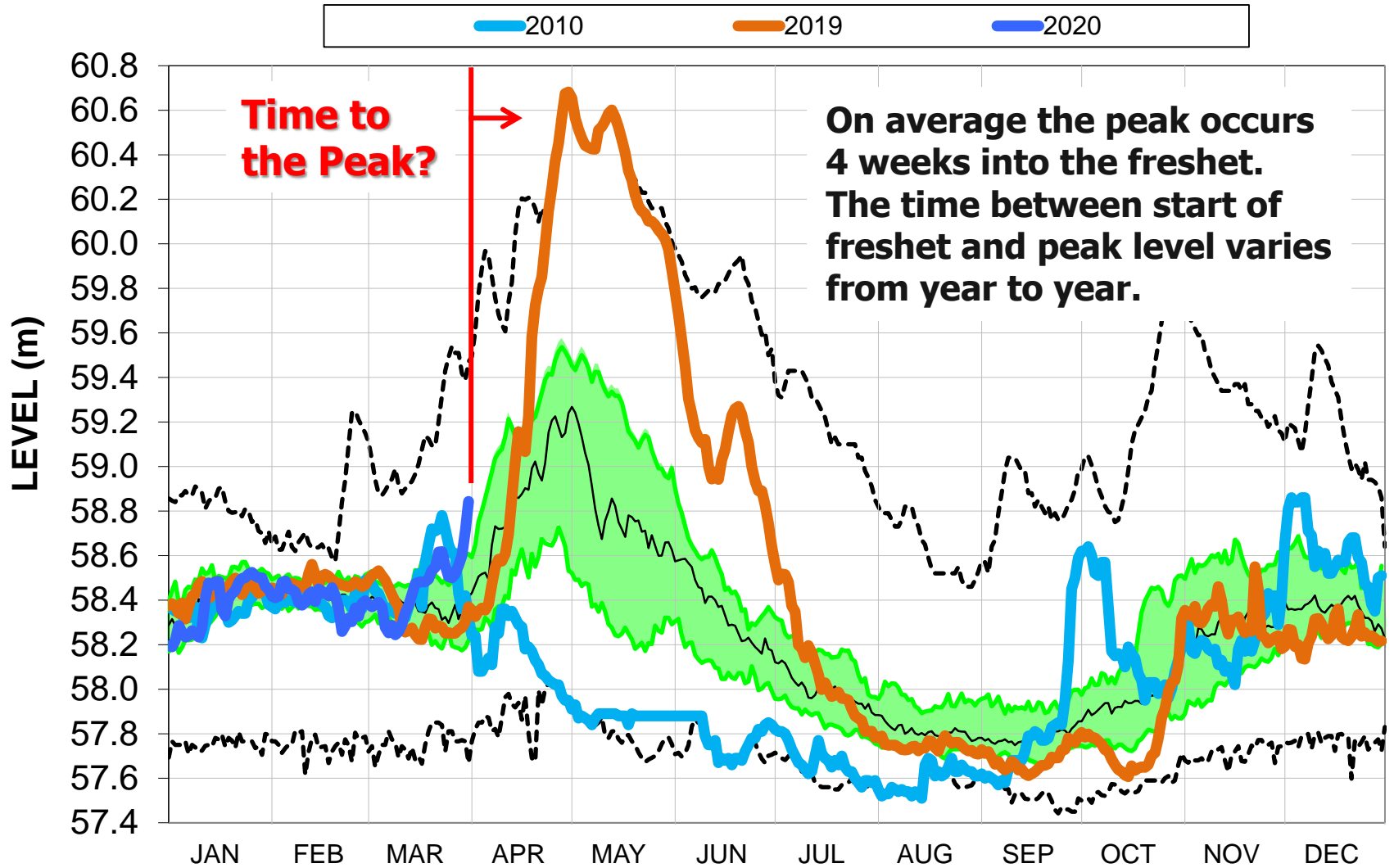


LAC DESCHENES - OBSERVED LEVELS AND RESERVOIR EFFECTS



On Lake Deschenes the overall reduction in flow from reservoir storage lowered the flood peak level by >75 cm or 30 in.

BRITANNIA LEVEL





Conclusions

- Flooding is the result of natural processes that vary from year to year and is a function of snowmelt, temperatures and precipitation
- Available reservoir storage is the same every year while flow volume from the basin can vary widely
- Peak level on Lake Deschenes is determined by the peak flow that arrives from up river locations
- Peak levels are reduced every year by the retention of water in the principal reservoirs



Information

Current and
forecast
conditions
during freshet

www.ottawariver.ca
www.rivieredesoutaouais.ca

*Conditions
actuelles et
prévues en
rivière pendant
la crue*

@ORRPB

TWITTER

@CPPRO

Recorded message

819-994-9049 Ottawa-Gatineau
1-800-778-1246 Outside

Message téléphonique

*819-994-8171 Ottawa-Gatineau
1-800-778-1243 À l'extérieur*

Ottawa River
Regulation Secretariat

Email : secretariat@ottawariver.ca

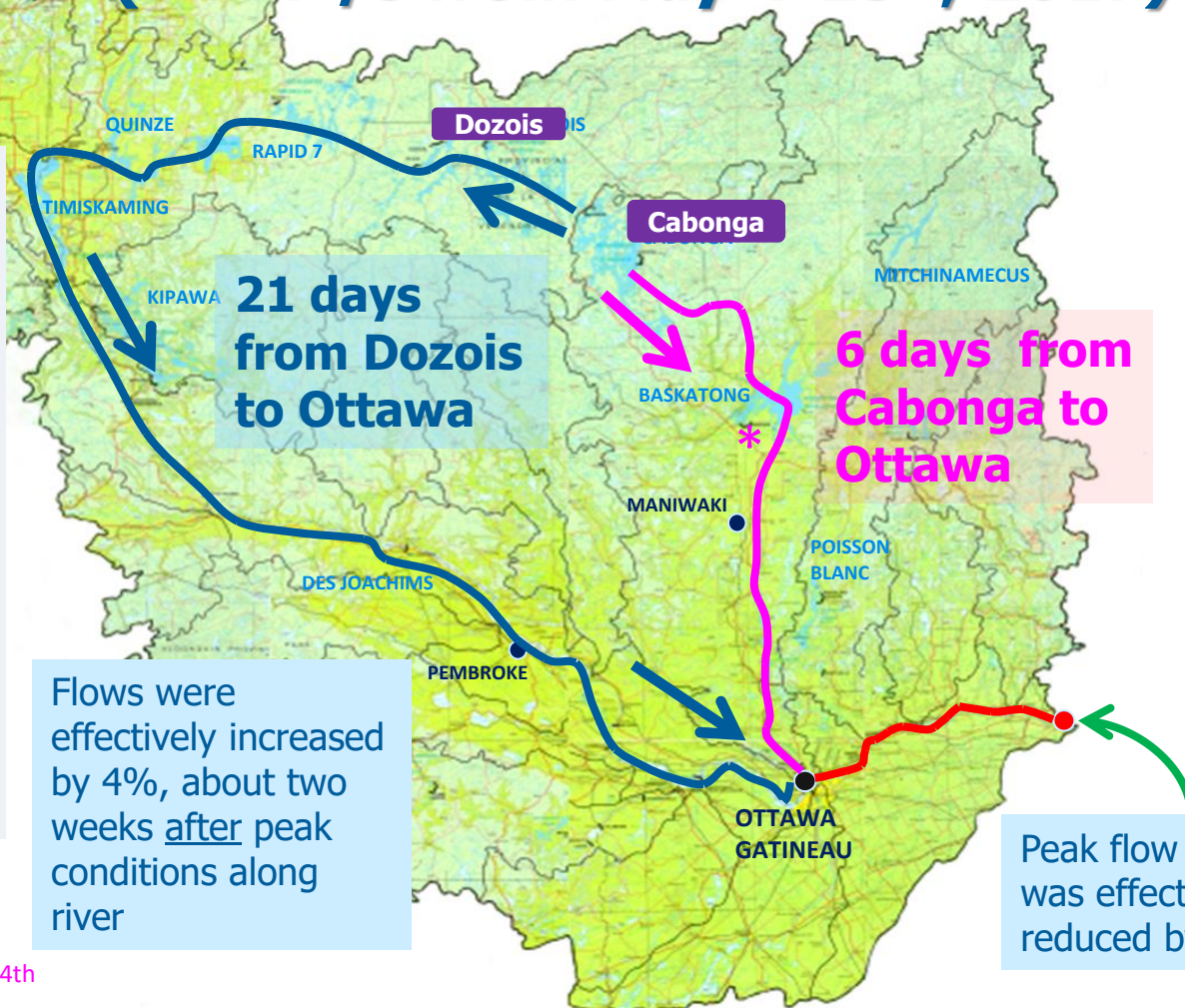
*Secrétariat pour la régularisation
de la rivière des Outaouais*

Email : bureau@ottawariver.ca



Diversion from Cabonga to Dozois (74 m³/s from May 4-15th, 2017)

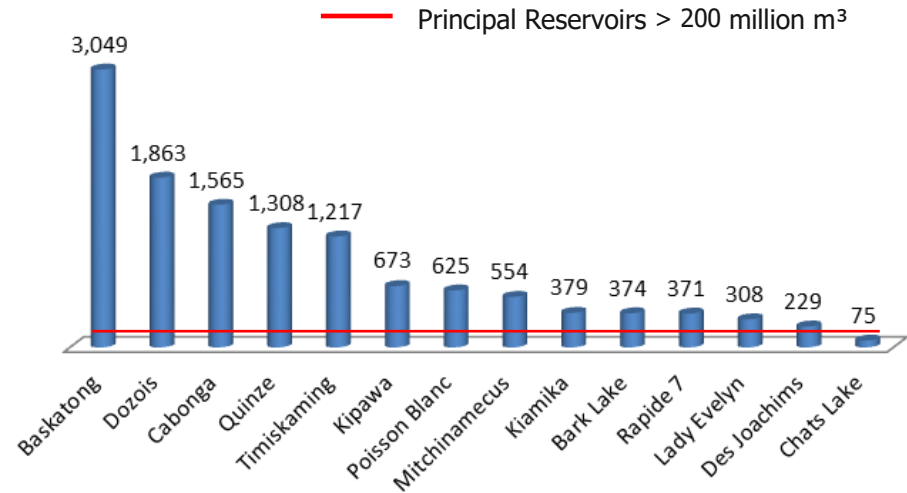
- Water is regularly diverted outside freshet (commercial agreement OPG & HQ)
- Diverting water during freshet required a unanimous decision by the ORRC and ORRPB (ORRPB includes MNRF & OPG members)





Couldn't we store more water by lowering the river levels upstream?

Reservoir Storage Capacity (million m³)

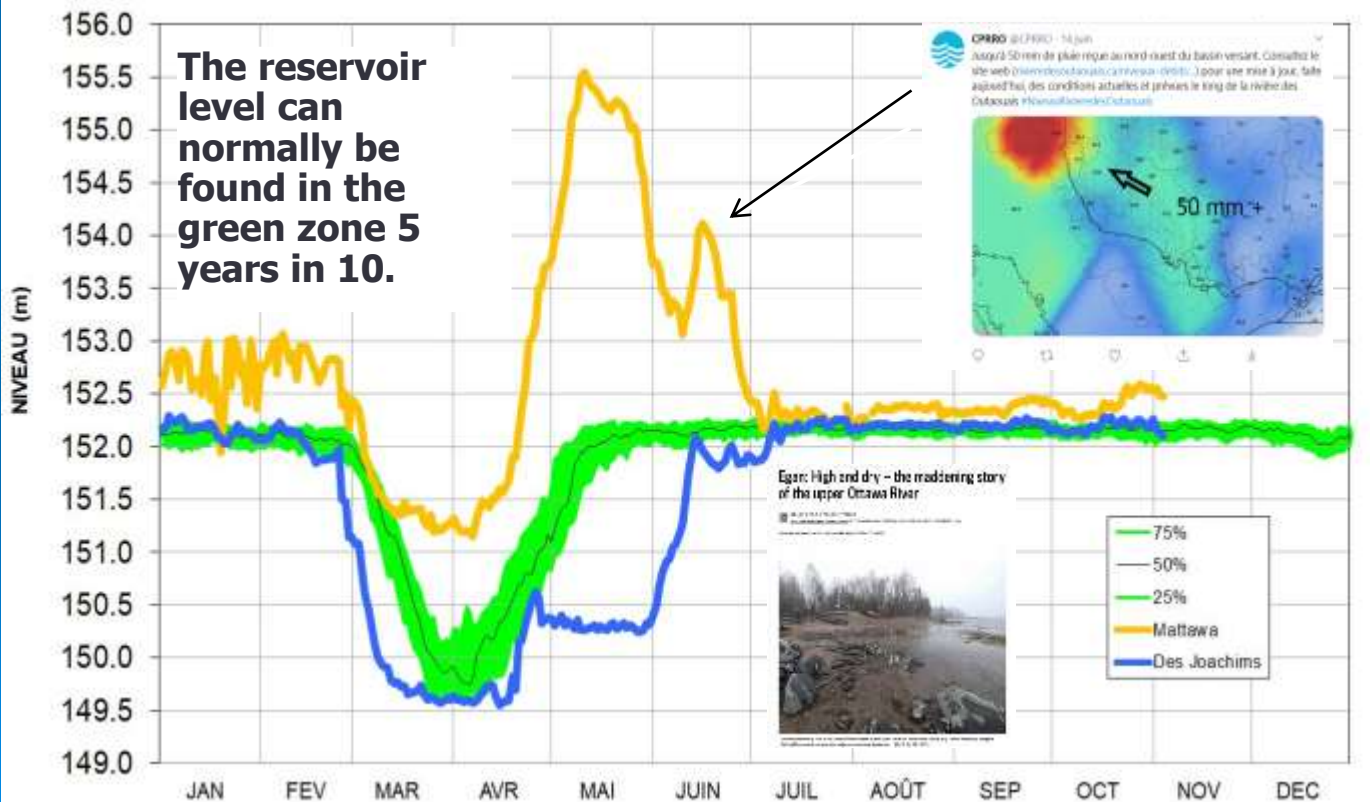


- Lowest April level recorded (before the dam was built): **72.88 m** (475 m³/s)
- Average April level since the dam was built: **74.10 m** (2000 m³/s)
- Lost storage of **1.22 m**(?)
- It takes **5 days** at **200 m³/s** to fill this volume
- As of April 2nd Chat Falls inflow has been above **2000 m³/s** for **3-days**
- 2019 peak flow was over 6000 m³/s



Minimizing impacts from flooding Des Joachims (2019)

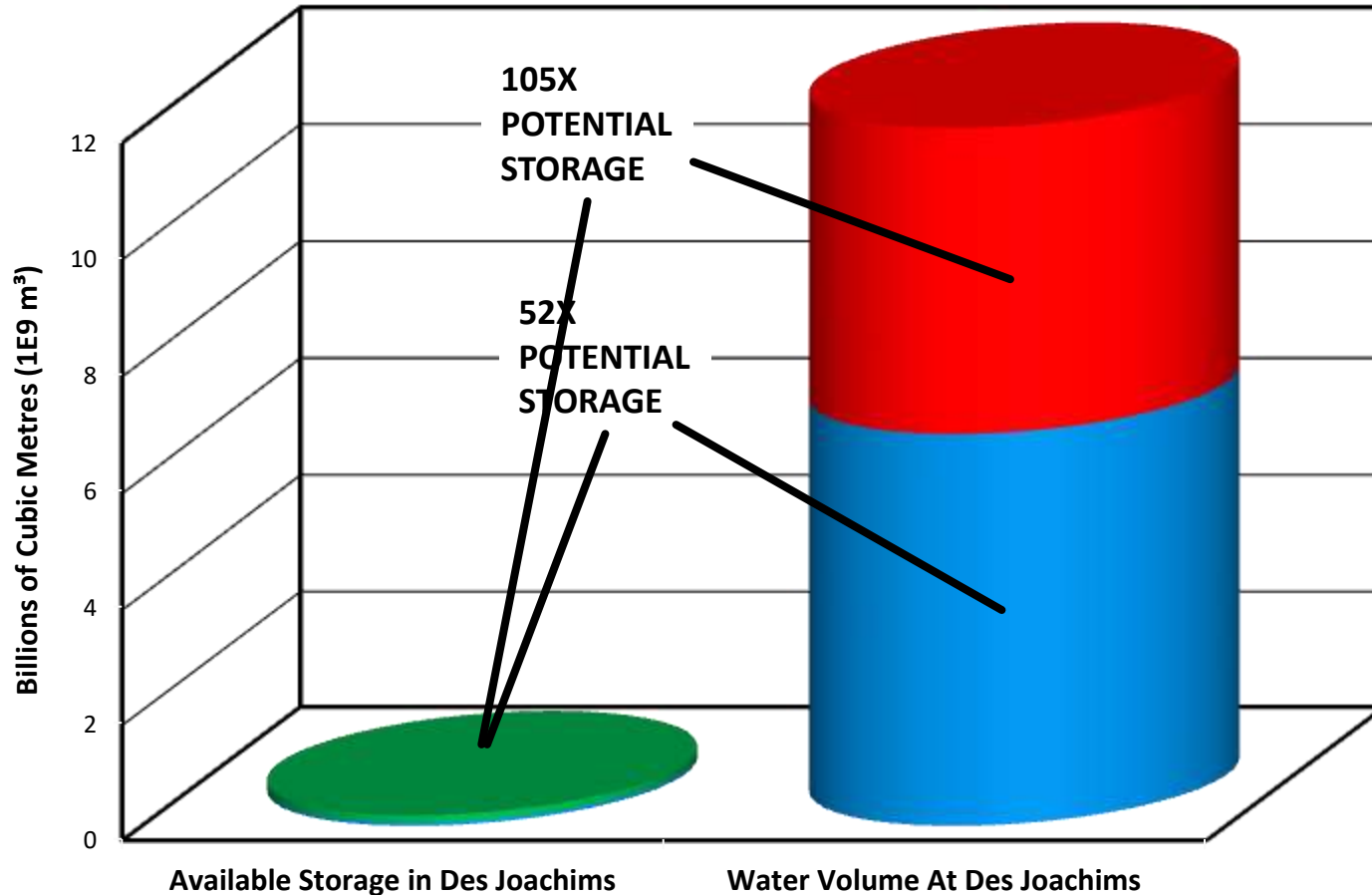
Water level (m) from Mattawa to Des Joachims GS



- At the peak of flooding levels at Des Joachims are kept low to prevent backwater effects at Mattawa
- In mid-June rainfall of 50 mm fell in the Abitibi-Timis-kaming region on already full reservoirs.

Water Management at Des Joachims (Swisha) During the Spring Freshet (April 1st-June 6th, 2019)

■ TOTAL 2019
■ AVERAGE YEAR



The incoming river flow is so much larger than the Swisha reservoir capacity that filling the reservoir would have provided only temporary relief downstream