



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

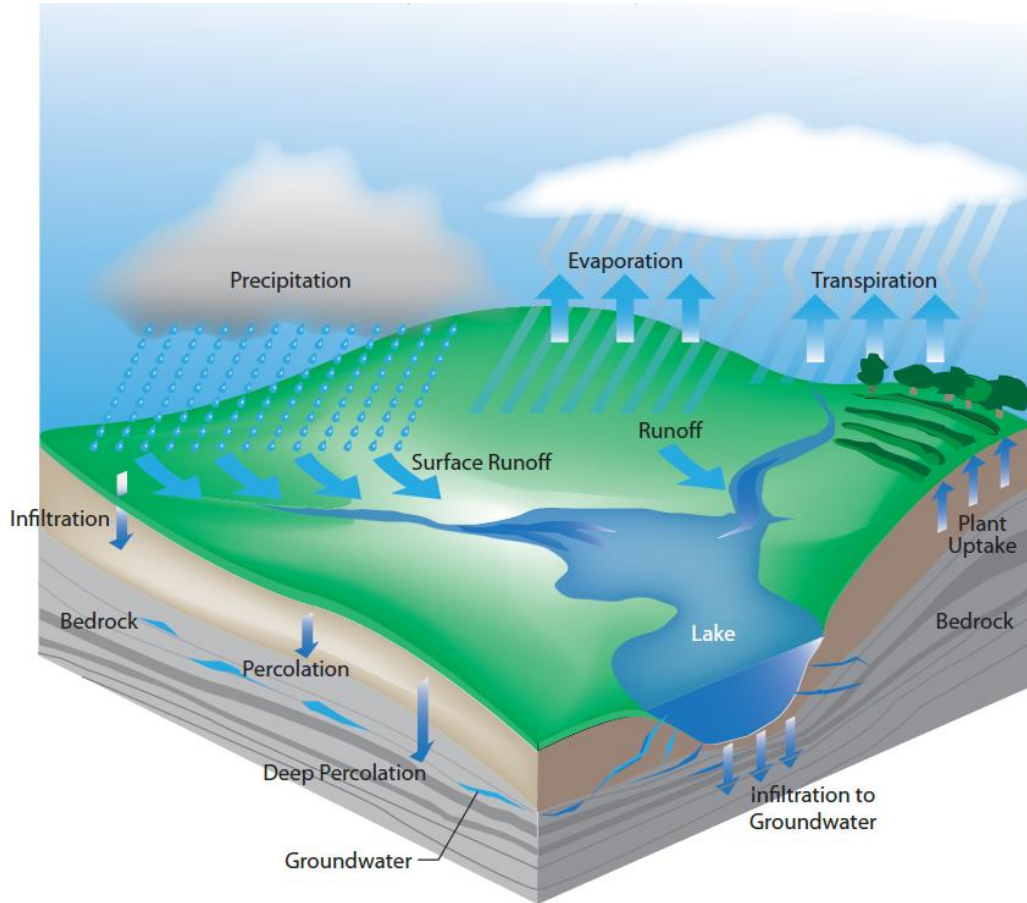
1950-2018:

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

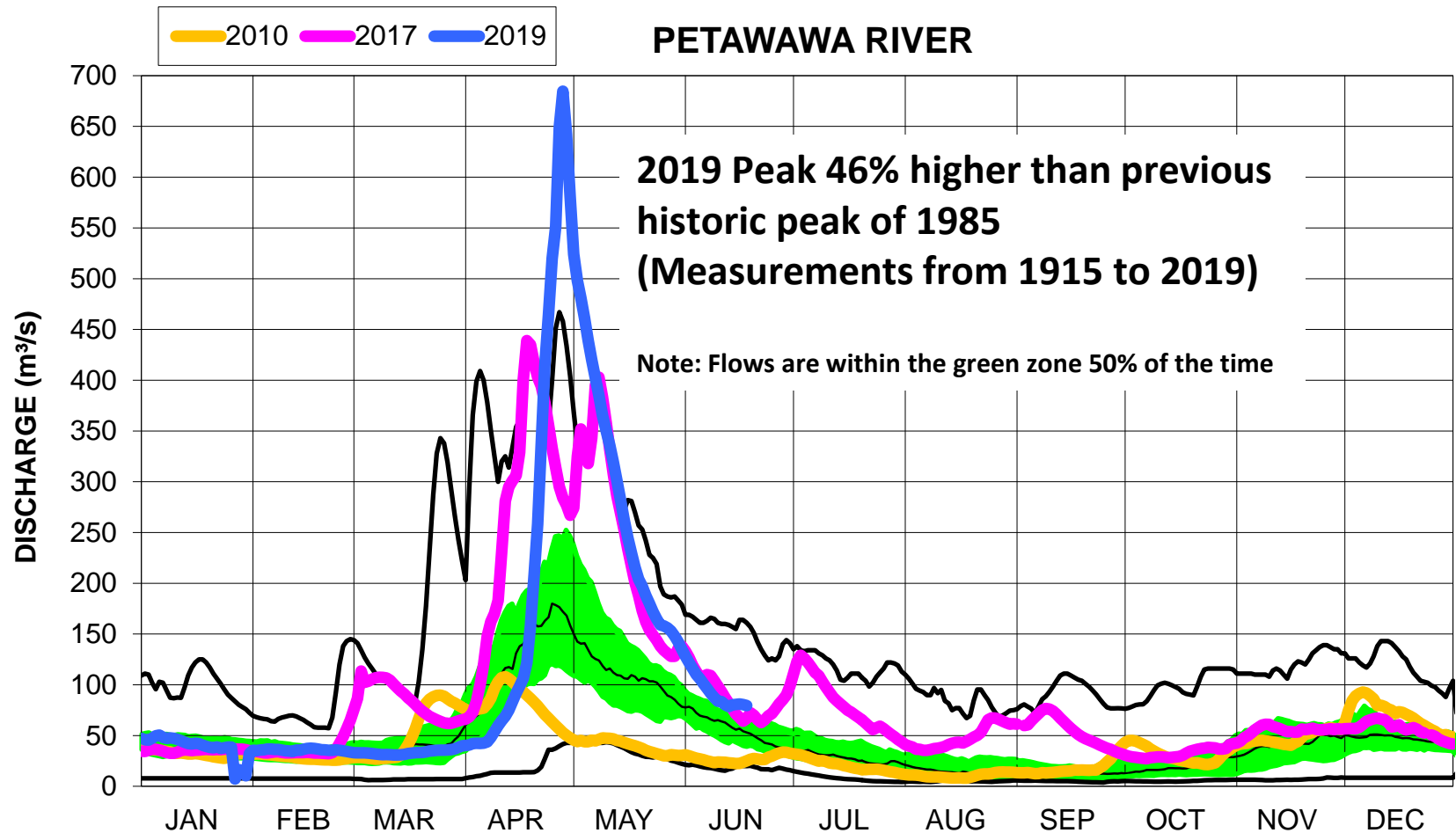
In 2019:

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

The Water Cycle

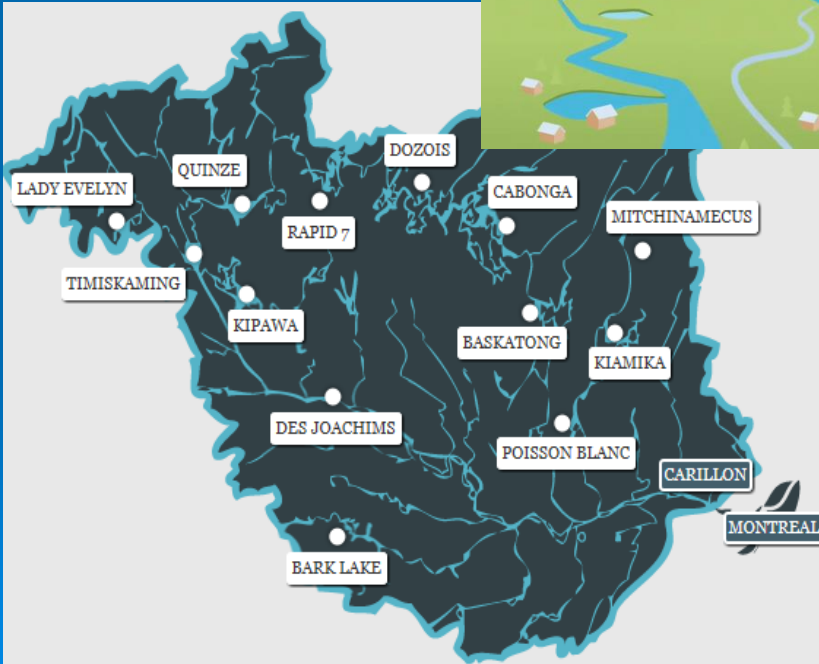


Natural Variability



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

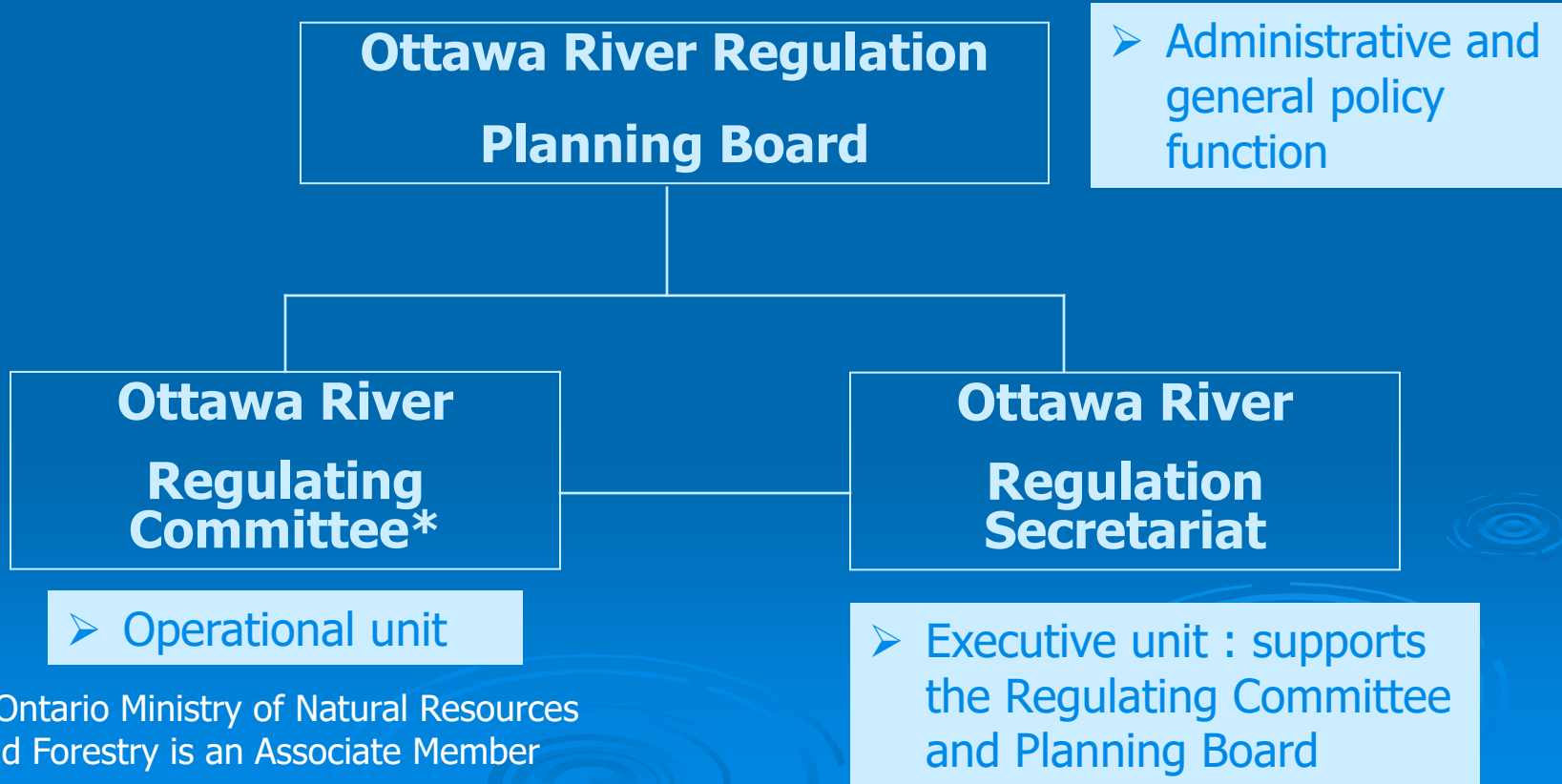
The 1983 Canada-Ontario Quebec Agreement established:

- 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

Hydro-Québec

Canada

Public Services
and Procurement
Canada

Canadian Coast
Guard

Environment and
Climate Change
Canada

Ontario

Ministry of Natural
Resources and
Forestry

Ontario Power
Generation

Operators of the Principal Reservoirs

Operators of the 13 largest reservoirs under the 1983 agreement:

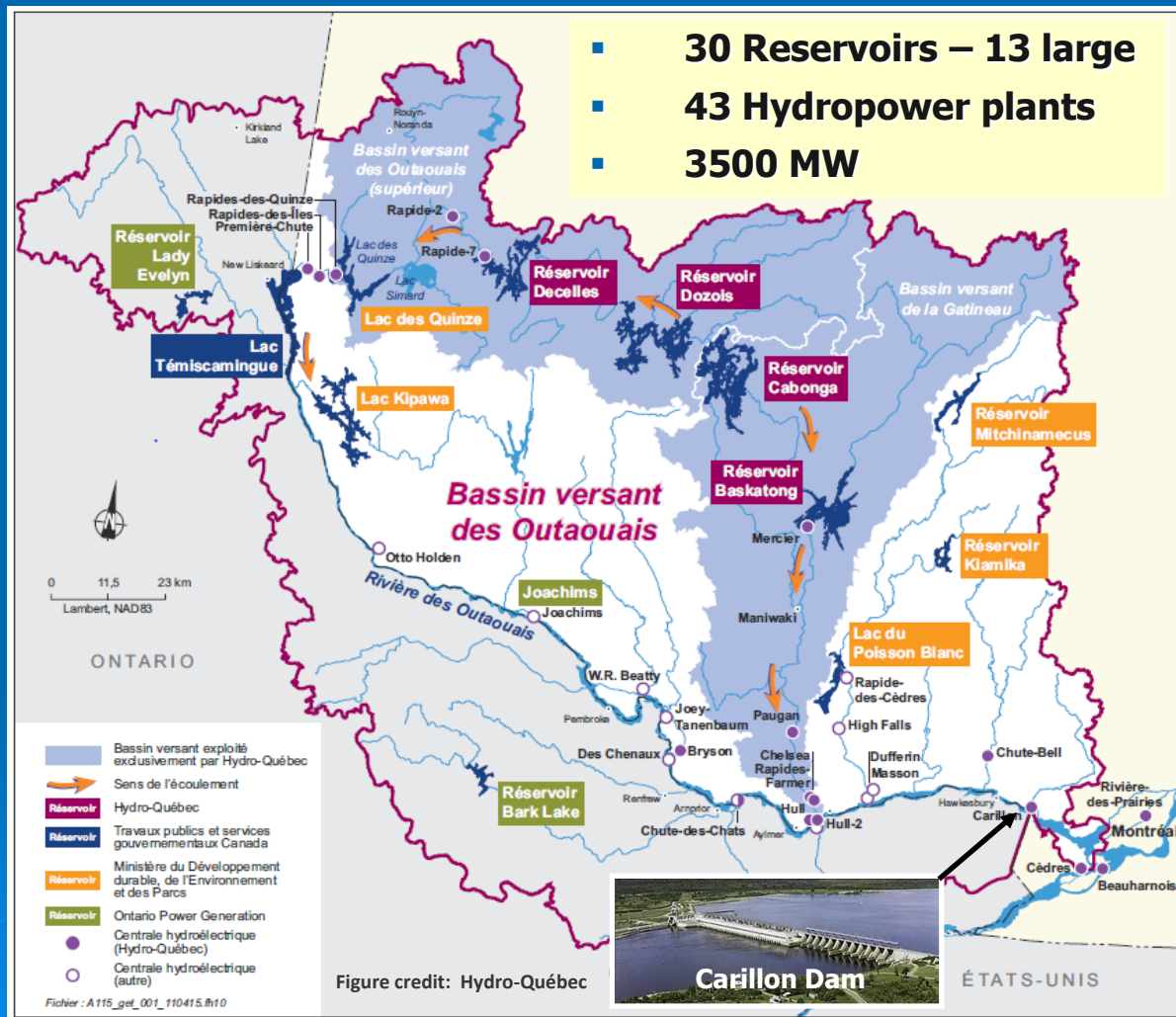


Gouvernement du Canada

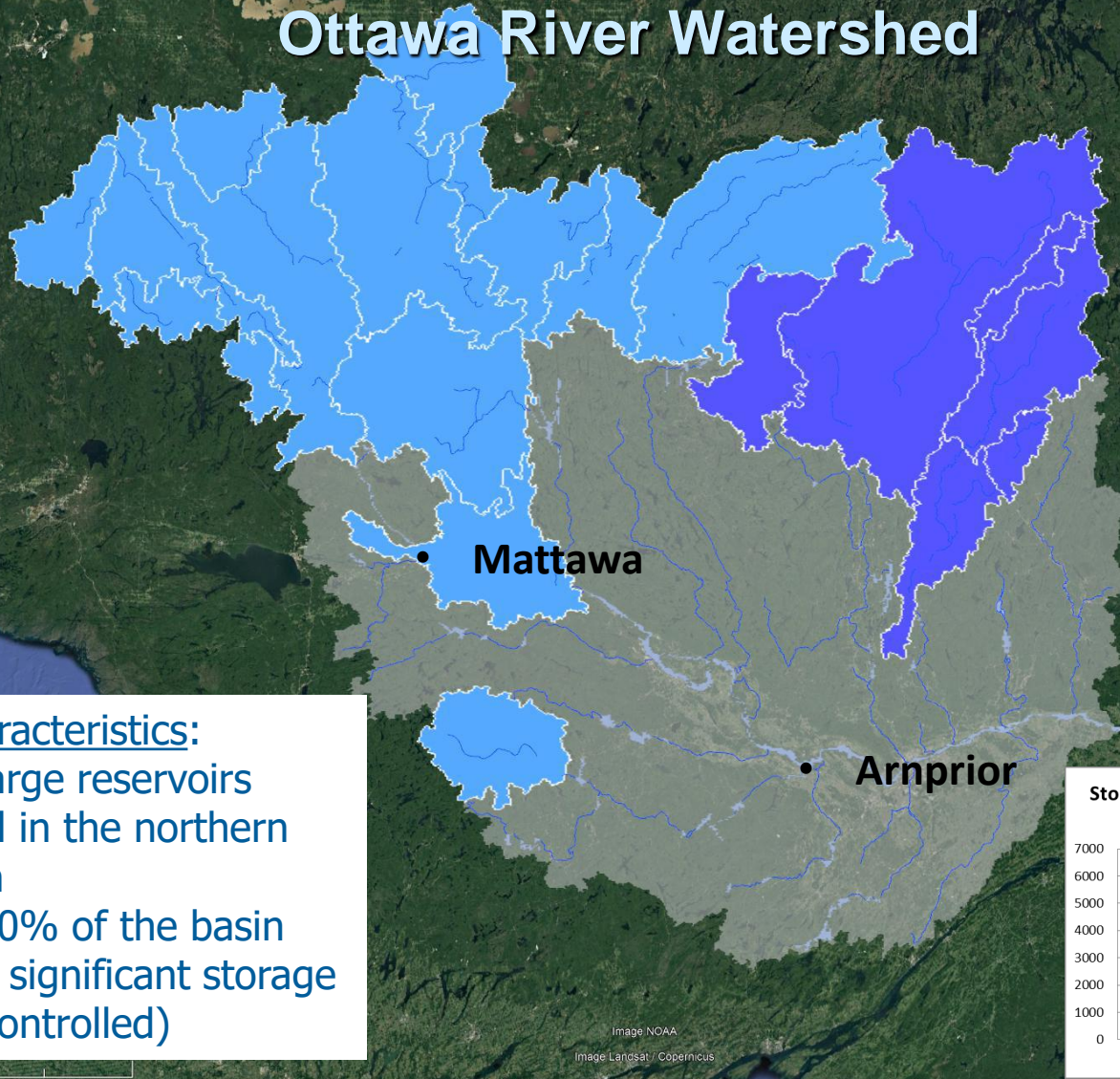
Ontario Ministry of Natural Resources and Forestry is an Associate Member on the Regulating Committee

- Contributes hydrometeorological information
- Disseminates flood forecast information in Ontario

- 30 Reservoirs – 13 large
- 43 Hydropower plants
- 3500 MW



Ottawa River Watershed



Basin Characteristics:

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

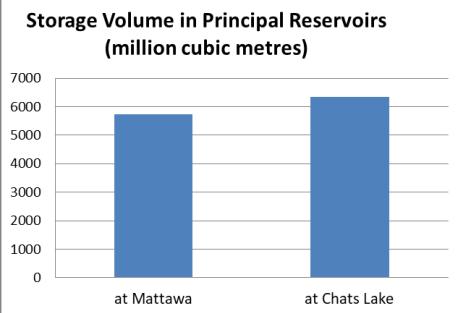


Image NOAA
Image Landsat / Copernicus

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,
Chenault, 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

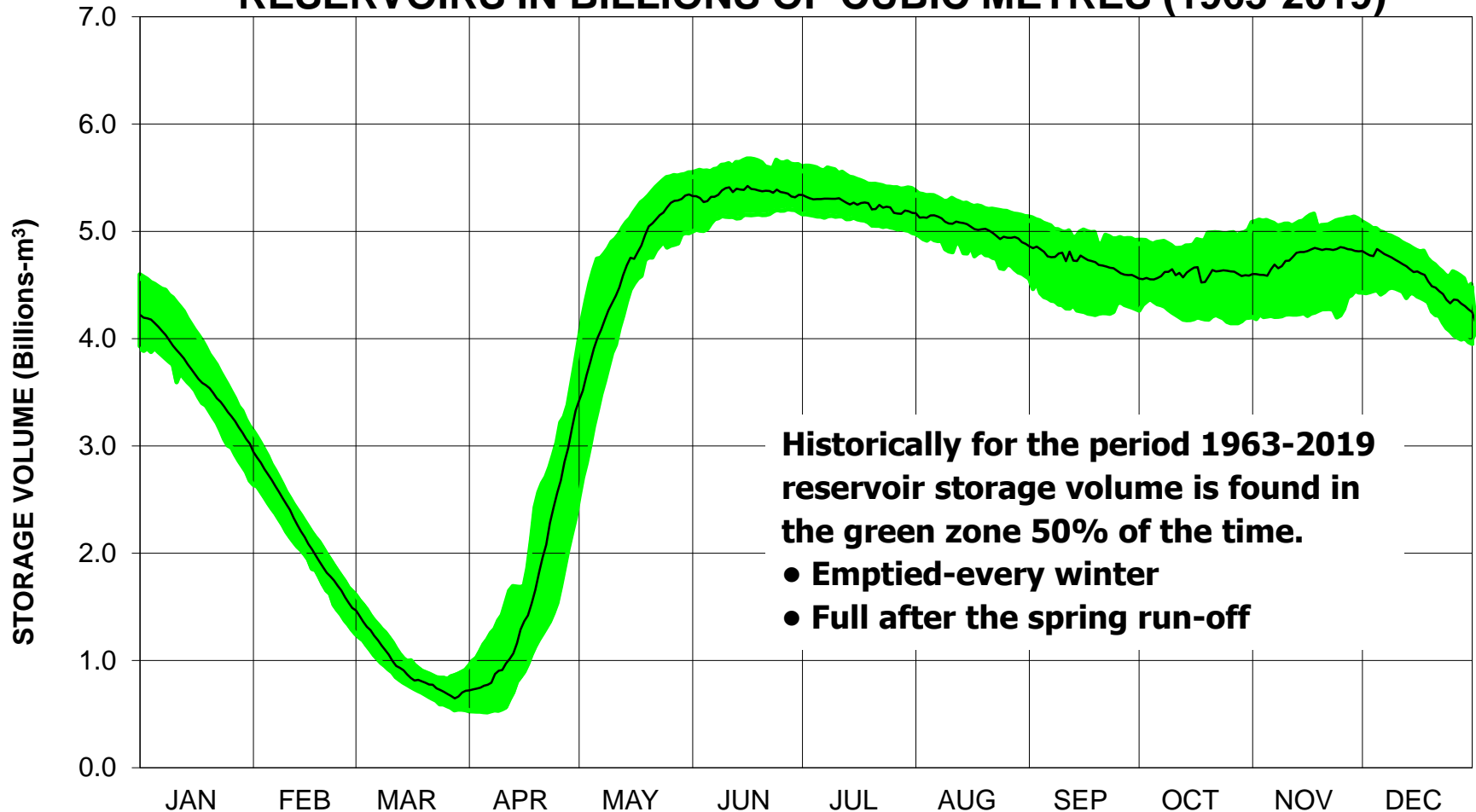
Summer

Summer level management and drought mitigation

Fall

Operations for fall flood control and reservoir refill

WATER STORED IN ABITIBI-TIMISKAMING-BARK LAKE 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**

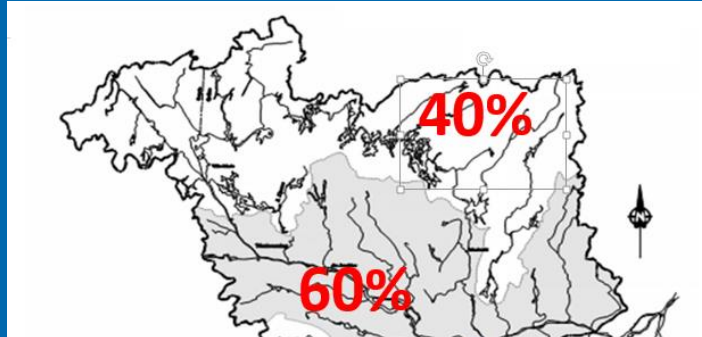
Limits of Flow Regulation

Flooding occurs when:

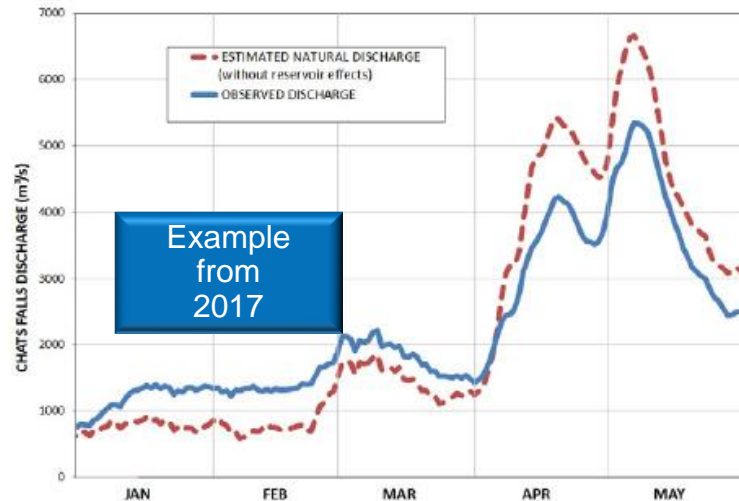
- Spring runoff greatly exceeds the size of reservoirs
- There is significant spring runoff in areas where there are no reservoirs

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

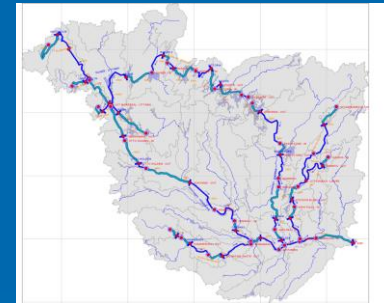
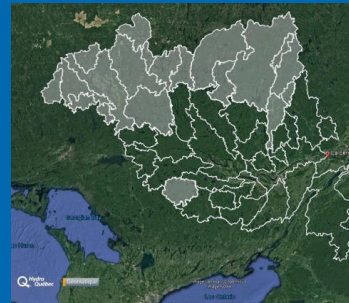


Daily work of the Regulating Committee

- Collect all information relevant to flow forecasting (Secretariat)



- Run flow models
(Hydro-Québec and Secretariat)

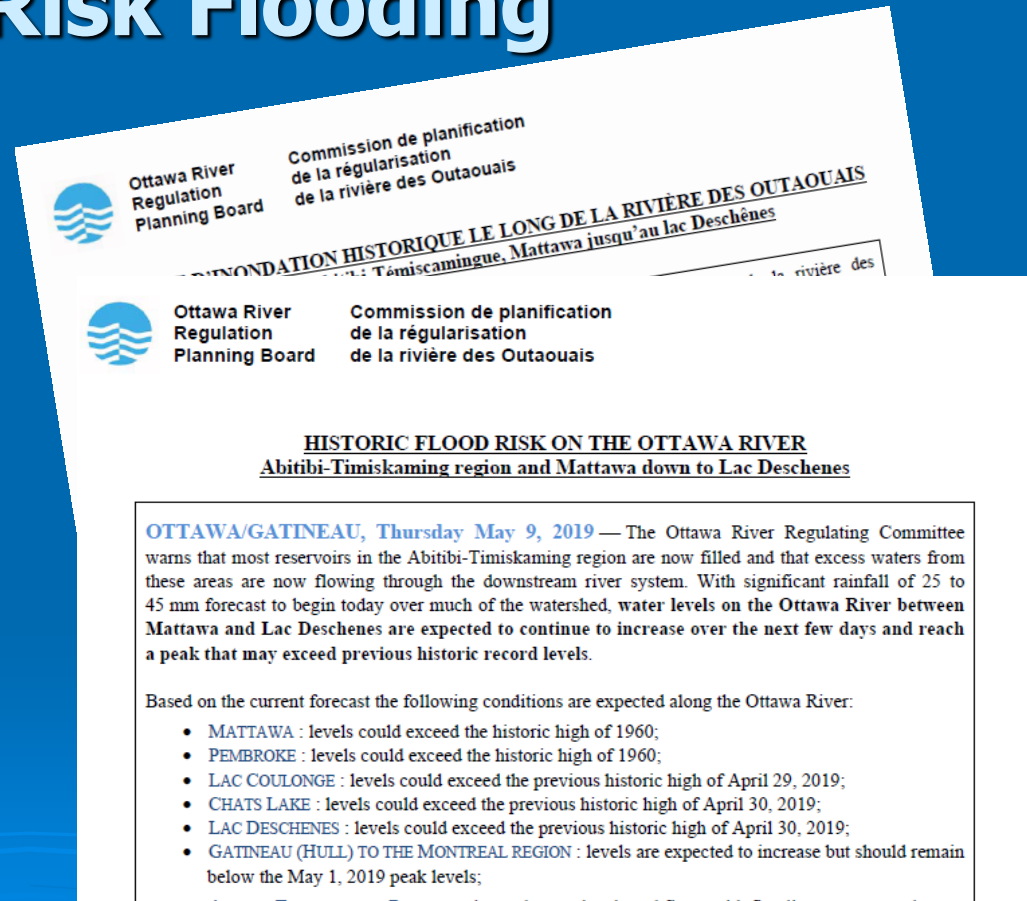


- Assess forecast conditions (weather, inflows and levels/flow rates) and optimize holding back to spring runoff in reservoirs to reduce flows downstream to maximize flood alleviation (Regulating Committee)
- Disseminate river conditions forecast to responsible authorities and the public (Secretariat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

Keeping the Public Informed of the Risk 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**




Communicating the Coming Flood Risk

- Government Agencies
 - ON - MNRF, Surface Water Monitoring Centre
 - QC – Sécurité civile, COG
 - Municipalities (Courtesy Calls)
- Traditional Media
 - Television, Radio and Newspapers
- Website
 - Record internet usage
 - Twitter

Daily updating of Website

RIVERS RESERVOIRS FORECAST LATEST BULLETINS HOURLY DATA




Publication: 2019-04-30 09:00

RIVER CONDITIONS FORECAST

In the Mattawa region, levels are expected to rise due to increasing flow from reservoirs in the Abitibi-Timiskaming area, with peak levels expected this Thursday or Friday. From Pembroke down to Lac Coulonge, runoff from snowmelt and precipitation is slowly decreasing with levels stabilizing close to current conditions. The peak level was reached yesterday at Lac Coulonge while peak levels will be reached today at Chats Lake and on Wednesday at Lac Deschenes. Along the lower Ottawa River, water levels are increasing due to arriving significant spring runoff from the west-central part of the basin. Combined with forecast precipitation, levels are expected to peak on Thursday or Friday. Levels should remain fairly high and stable thereafter depending on weather conditions. Reservoirs in the northern part of the watershed, which are being used to store runoff and minimize flooding downstream, are rapidly filling.

2019-04-30 09:00 Forecast Peak Levels

THIS MESSAGE WILL BE UPDATED
ON APRIL 30, 2019 AT 5 P.M..

LEVELS AND FLOWS FORECAST 

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*

OTTAWA RIVER REGULATING COMMITTEE (ORRC)

OTTAWA RIVER

FORECAST PEAK FLOOD LEVELS

2019-04-23 09:00

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



| | CURRENT LEVEL | | FORECAST PEAK LEVEL | | CHANGE (cm) * | |
|-------------------------|------------------|------------------|---------------------|------------|---------------|--------------|
| | 2017 PEAK (m)*** | 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 |

Increased Forecasting

2017 : 3-day forecast at 4 locations

| SITES | | OBSERVATIONS | | FORECAST | | |
|---------------------------------|--------------------------|--------------------|--------|------------|------------|------------|
| (PUBLICATION: 2017-04-27 15:31) | | 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

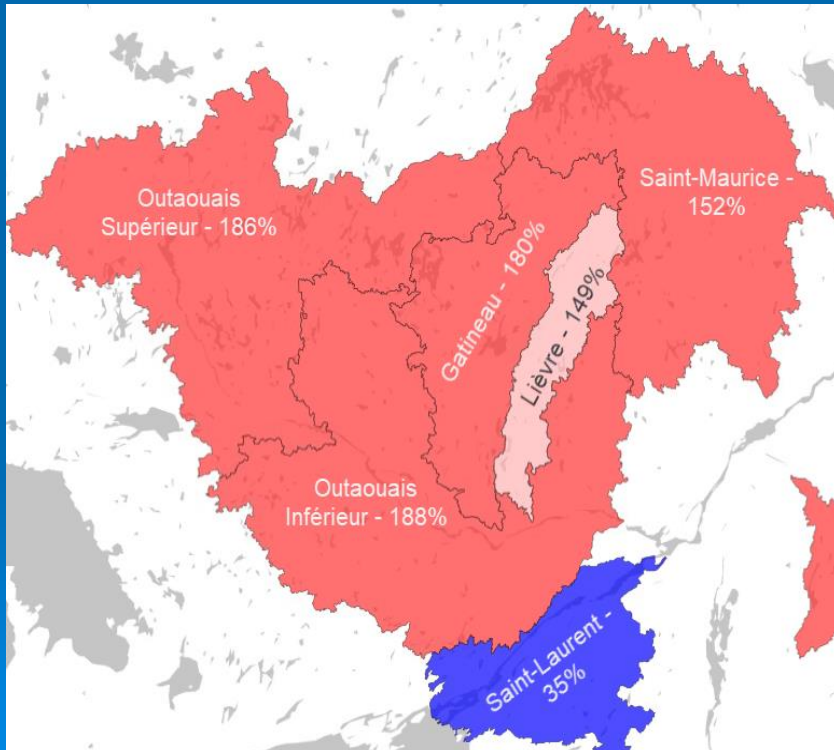
| (PUBLICATION: 2019-05-06 18:22) | | DATE/TIME | VALUE | 2019-05-06 | 2019-05-07 | 2019-05-08 | 2019-05-09 |
|---------------------------------|--------------------------|--------------------|--------|------------|------------|------------|------------|
| Ottawa River at Temiscaming | Flow (m ³ /s) | | | 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 | Level (m) | 2019-05-06, 8 A.M. | 60.45 | 60.40 | 60.38 | 60.40 | 60.45 |
| (Ottawa) | 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

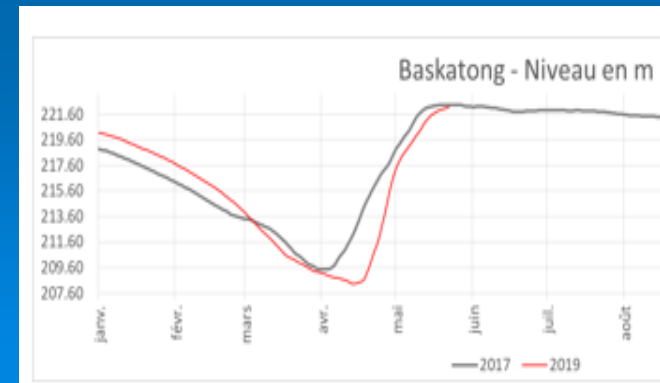
Snow on the Ground April 1st % of Average



Snowpack measurements



Drawdown of reservoirs

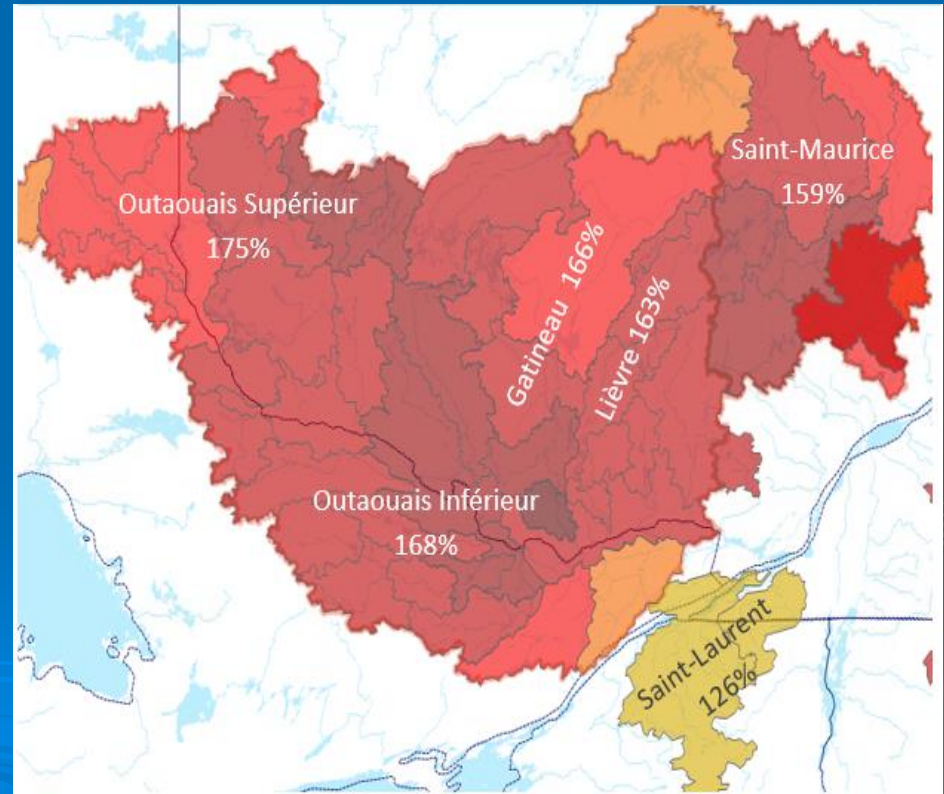


Spring Freshet 2019

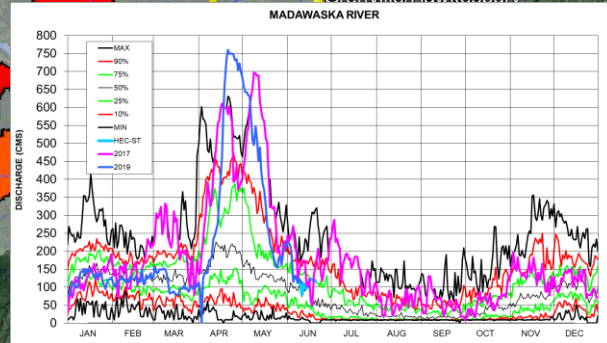
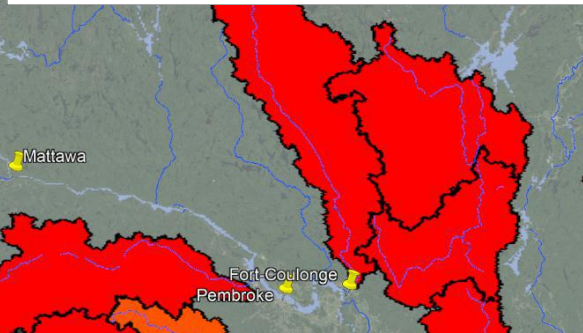
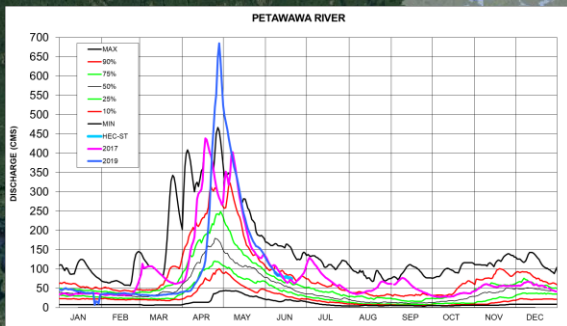
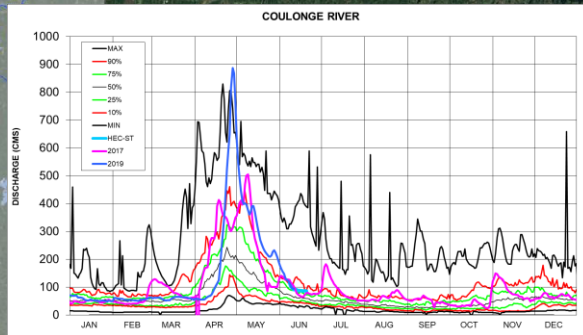
Excess precipitation over the whole basin

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

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



Tributary Flooding 2019



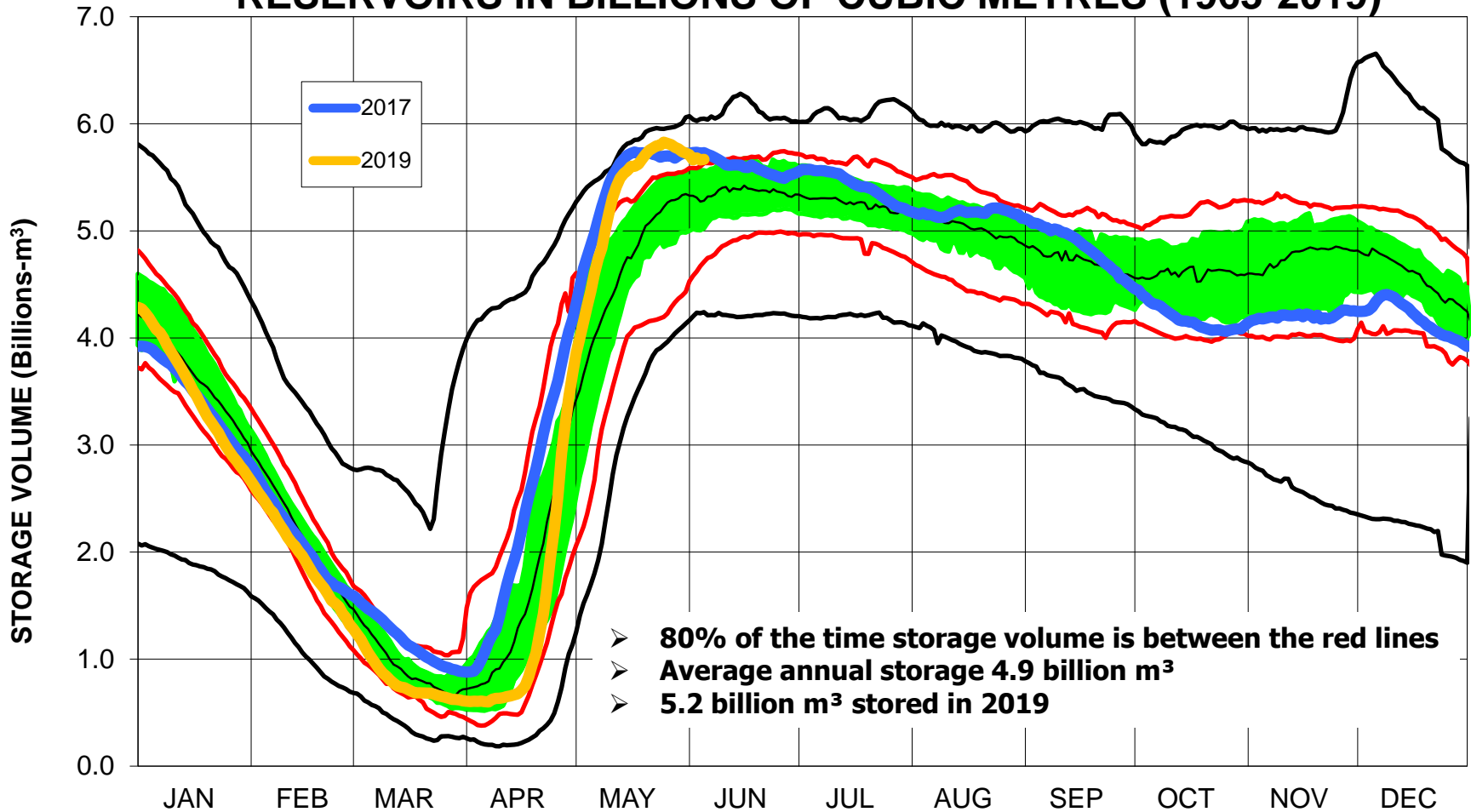
New historic record peak flows from the uncontrolled mid-basin tributaries

175 km

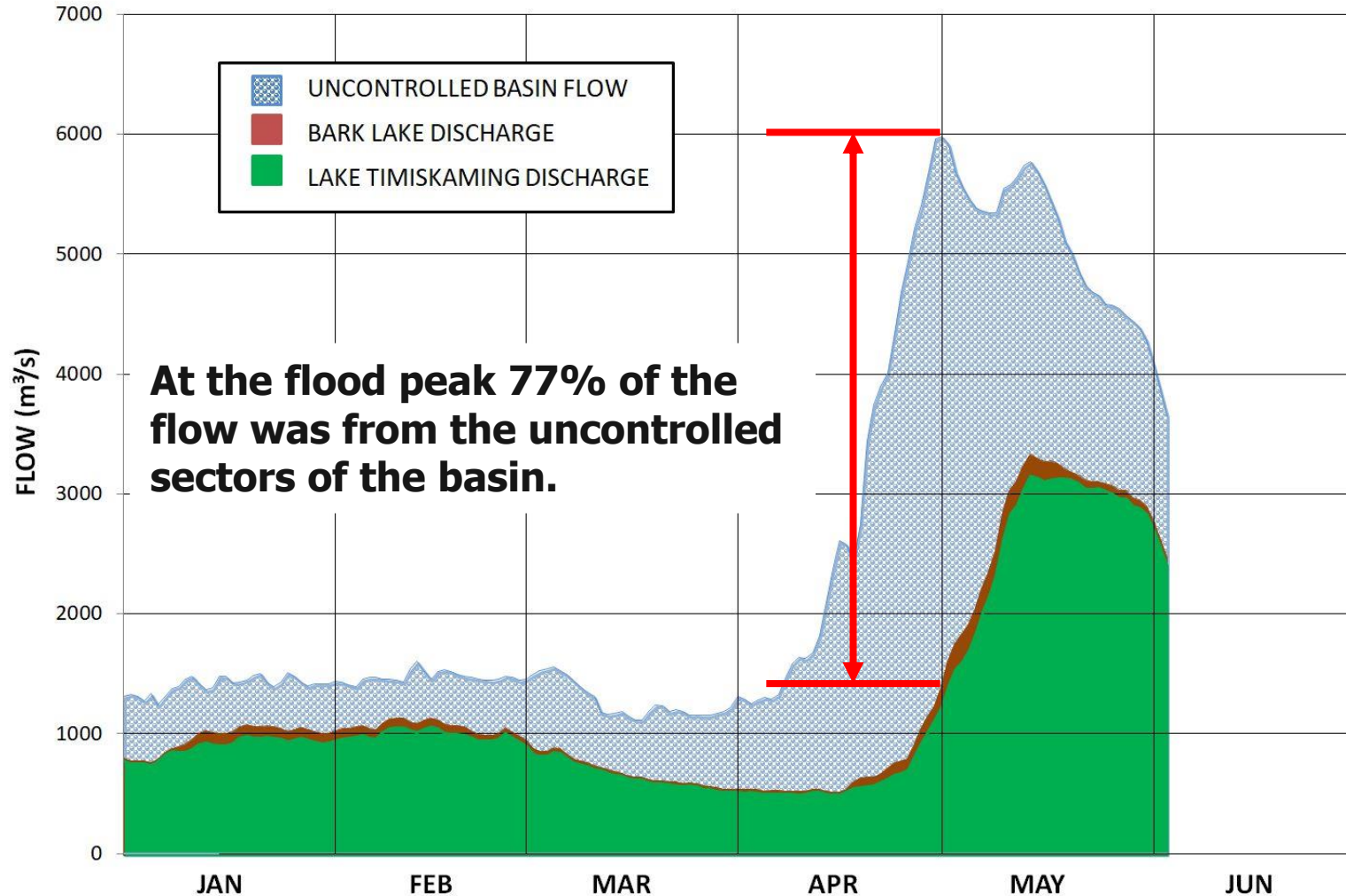
Image NOAA
Image Landsat / Copernicus

Earth

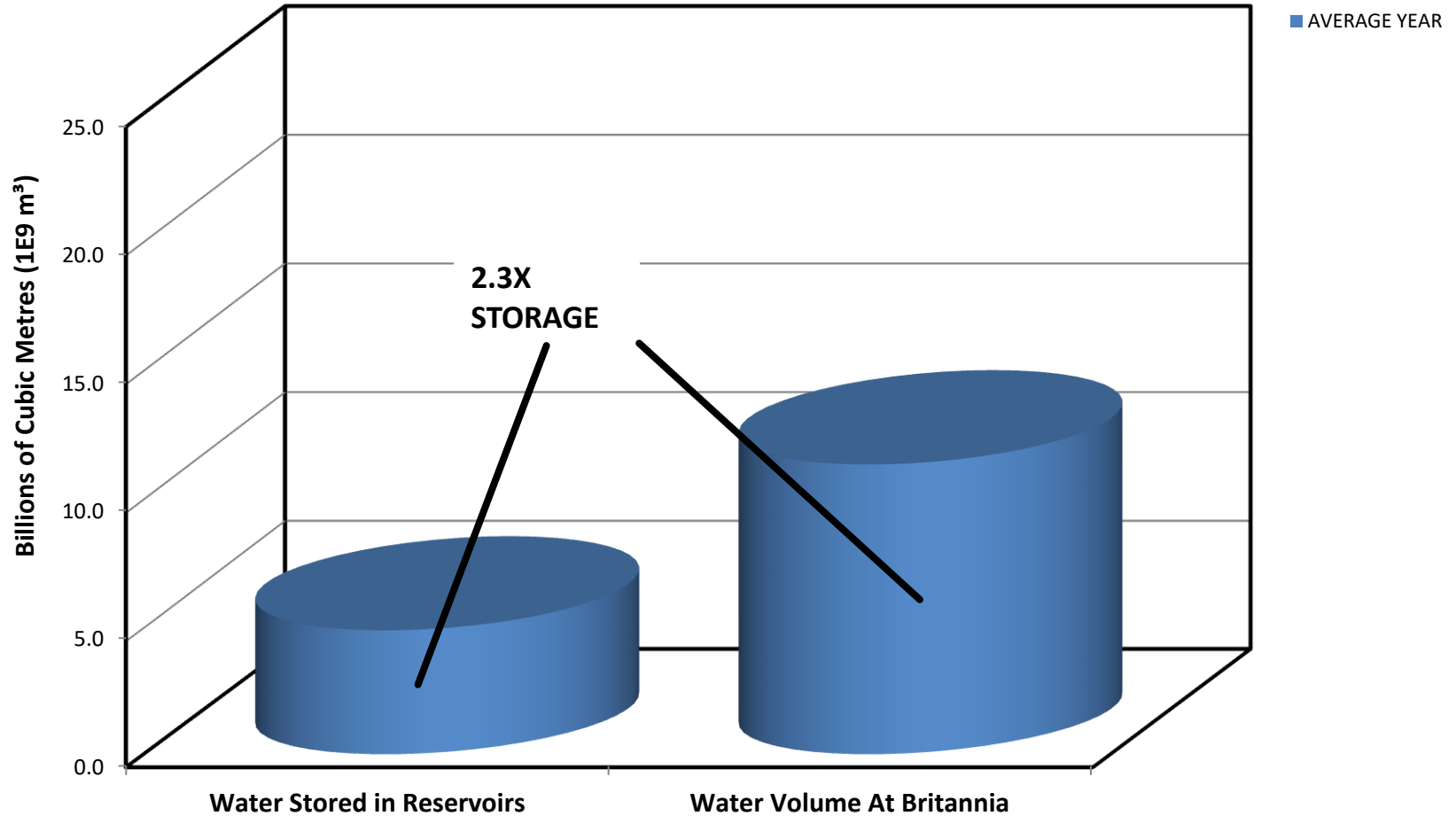
WATER STORED IN ABITIBI-TIMISKAMING-BARK LAKE RESERVOIRS IN BILLIONS OF CUBIC METRES (1963-2019)



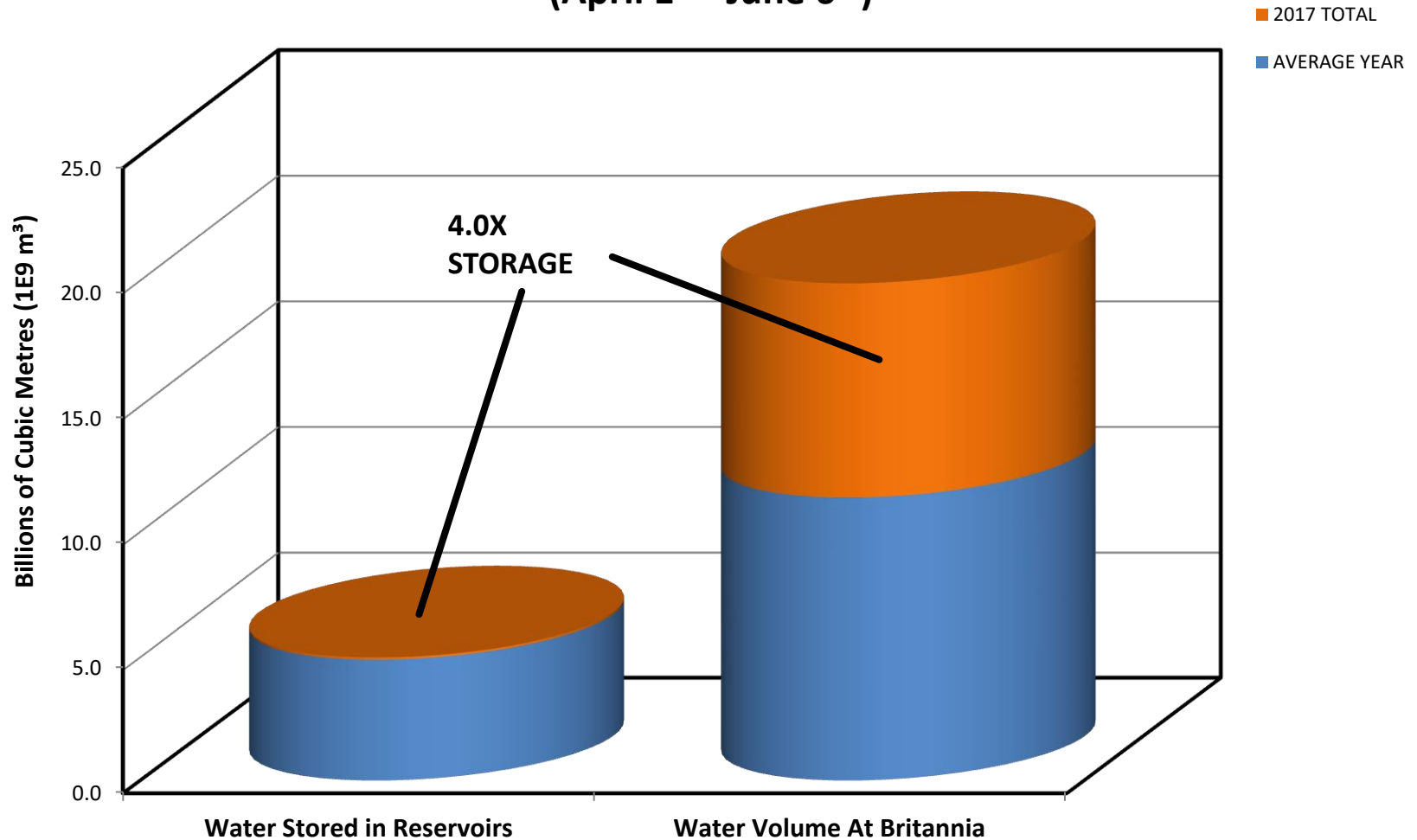
UNCONTROLLED PORTION OF BRITANNIA DISCHARGE



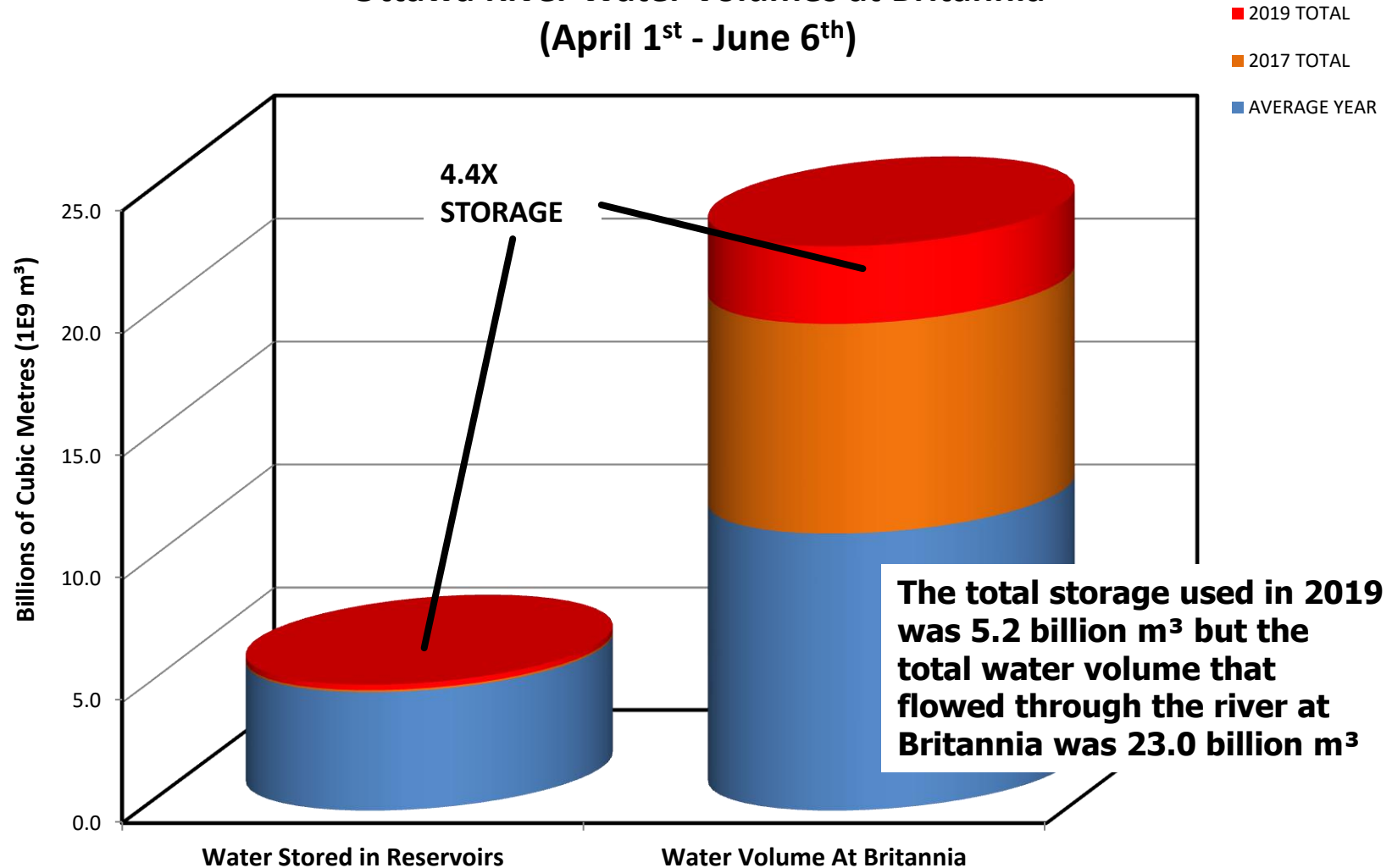
Ottawa River Water Volumes at Britannia (April 1st - June 6th)



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

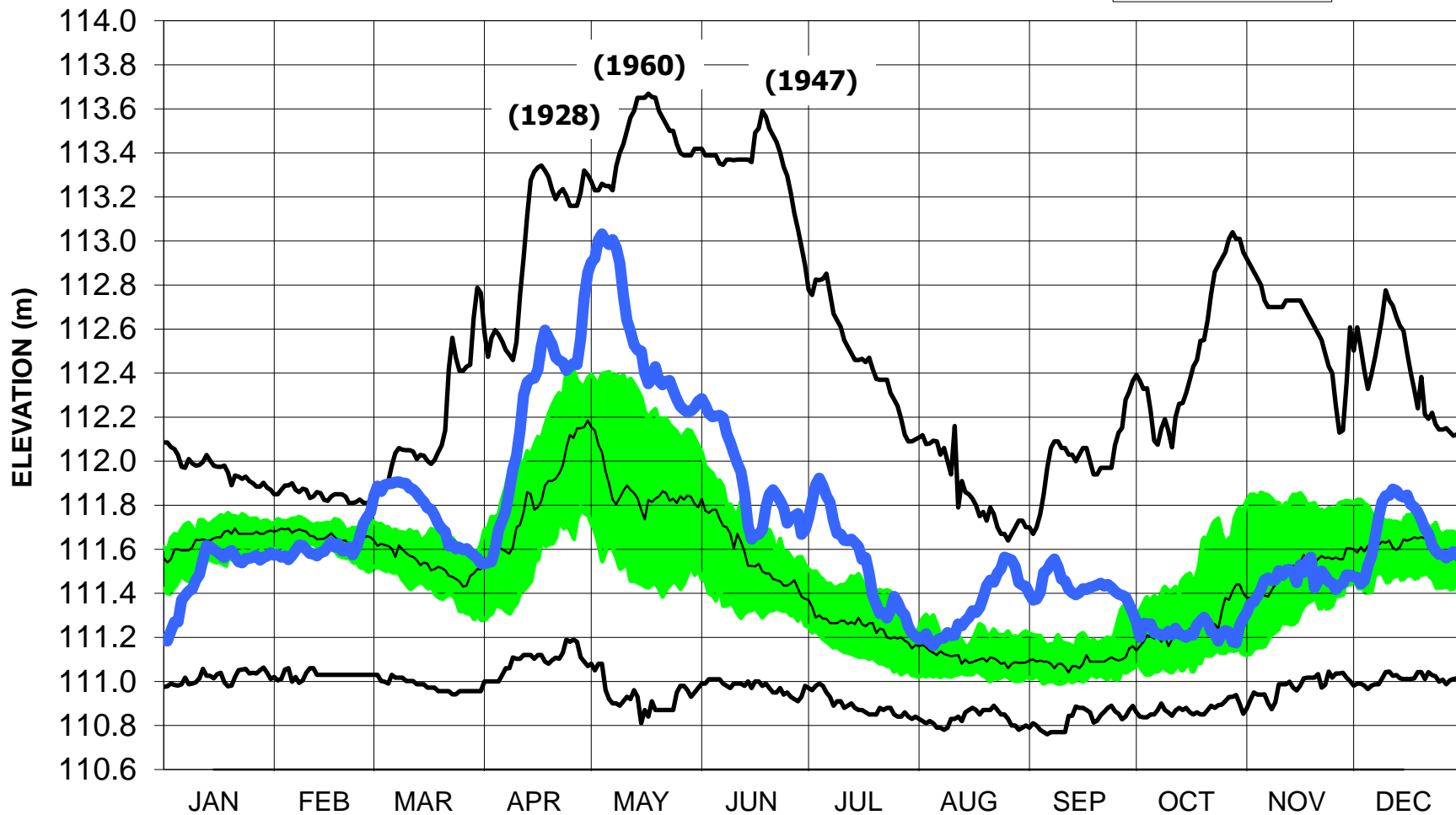


Ottawa River Water Volumes at Britannia (April 1st - June 6th)



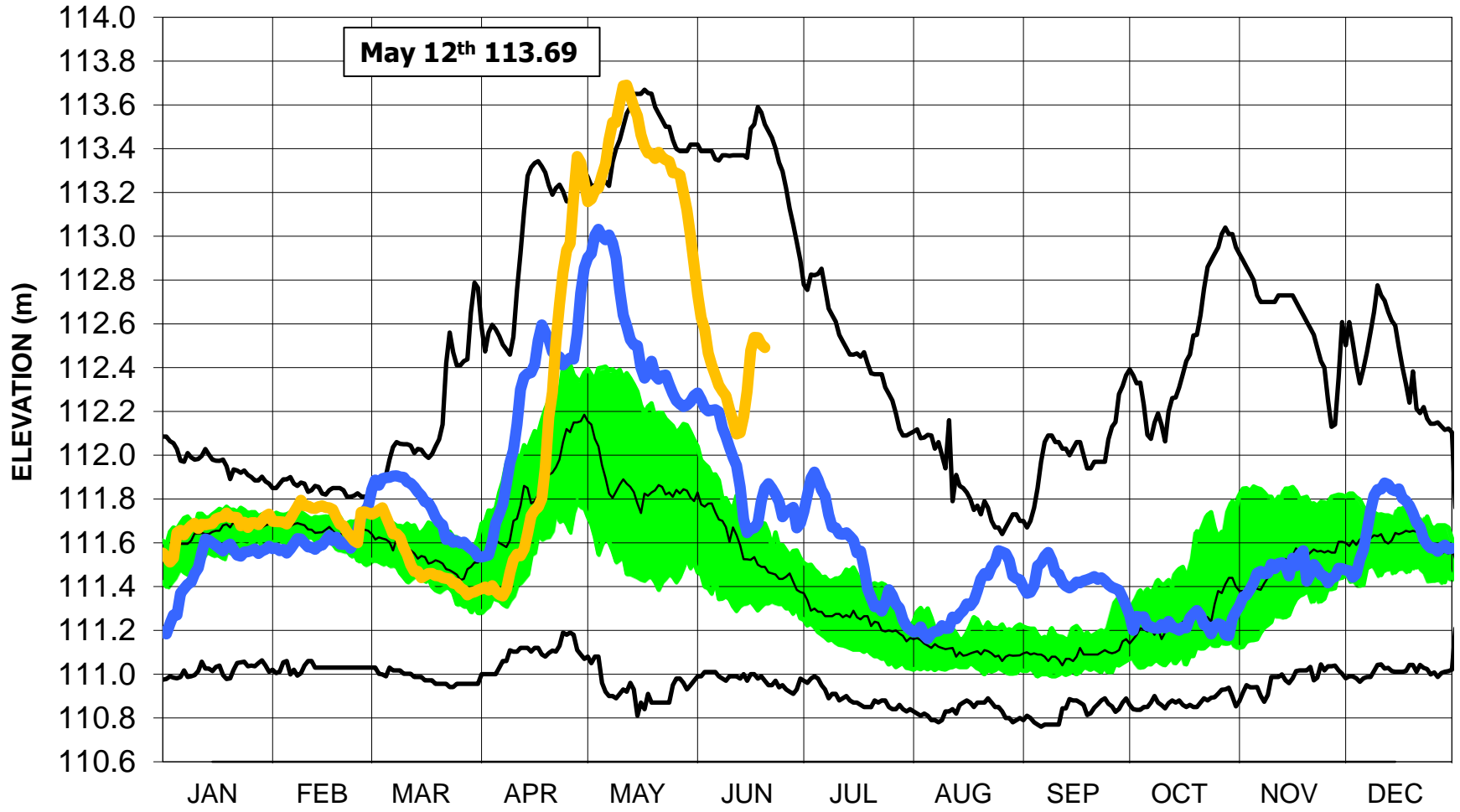
PEMBROKE LEVEL

2017

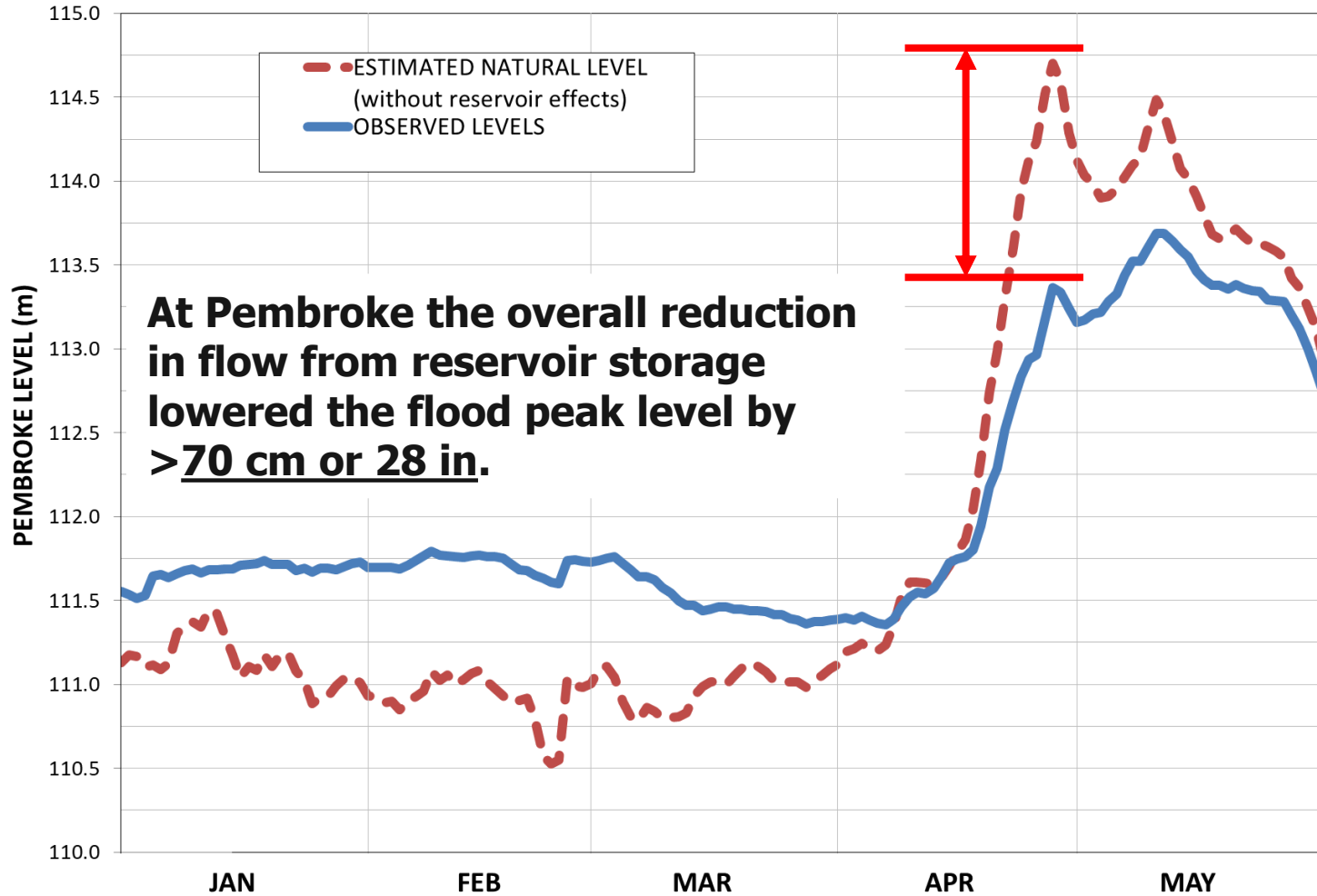


PEMBROKE LEVEL

2017 2019



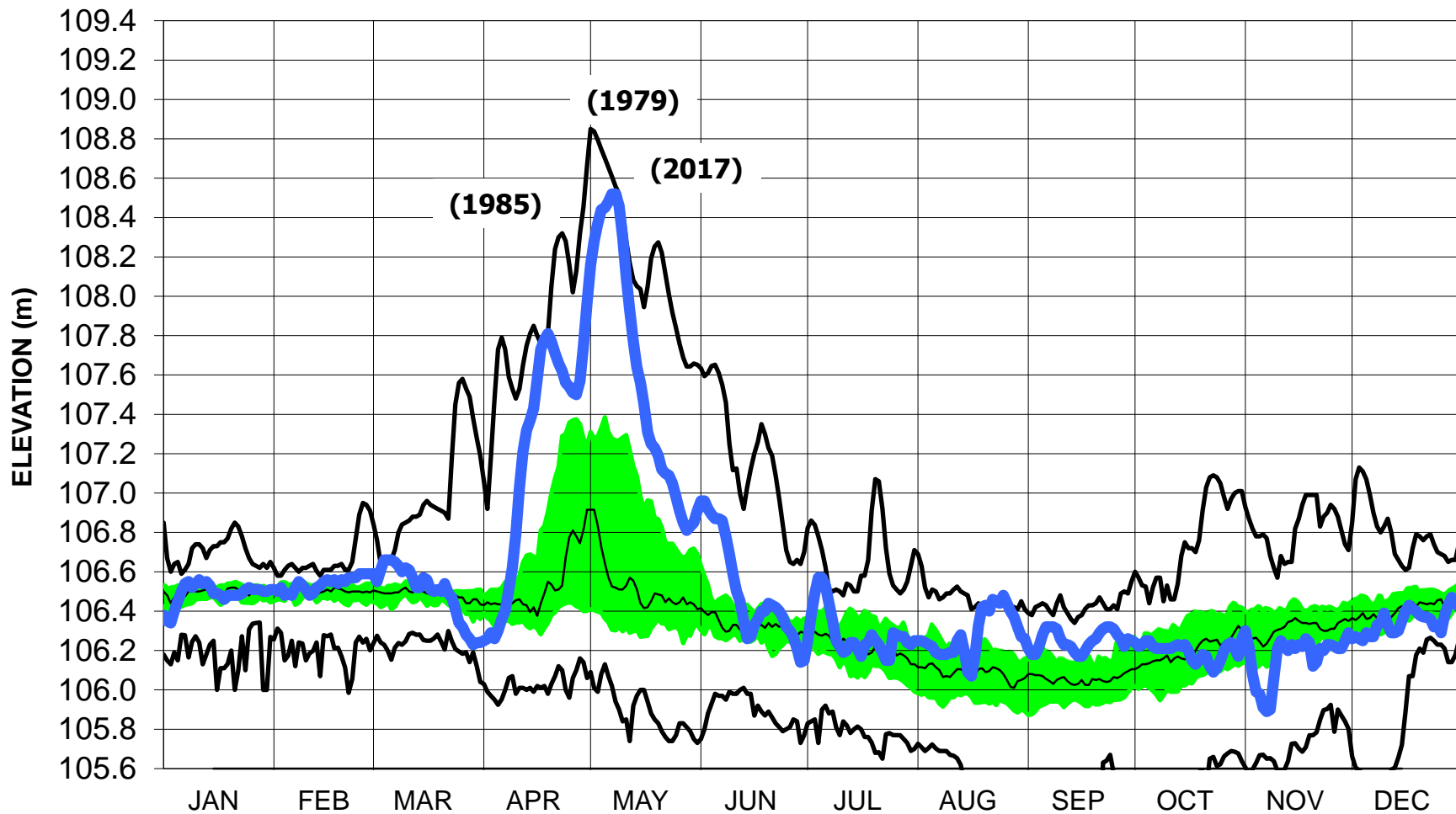
PEMBROKE - OBSERVED LEVELS AND RESERVOIR EFFECTS



At Pembroke the overall reduction in flow from reservoir storage lowered the flood peak level by >70 cm or 28 in.

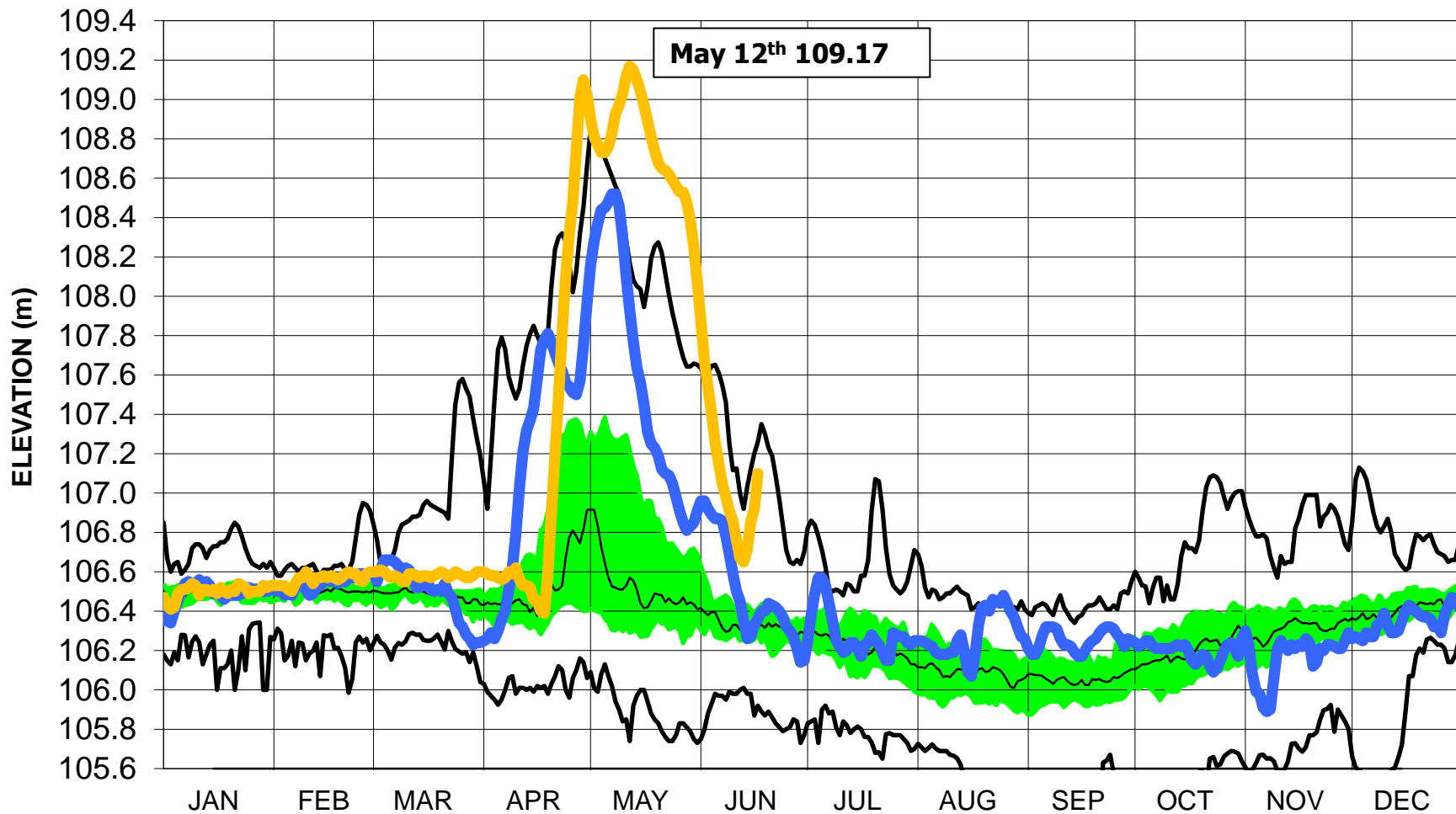
LAC COULONGE LEVEL

2017

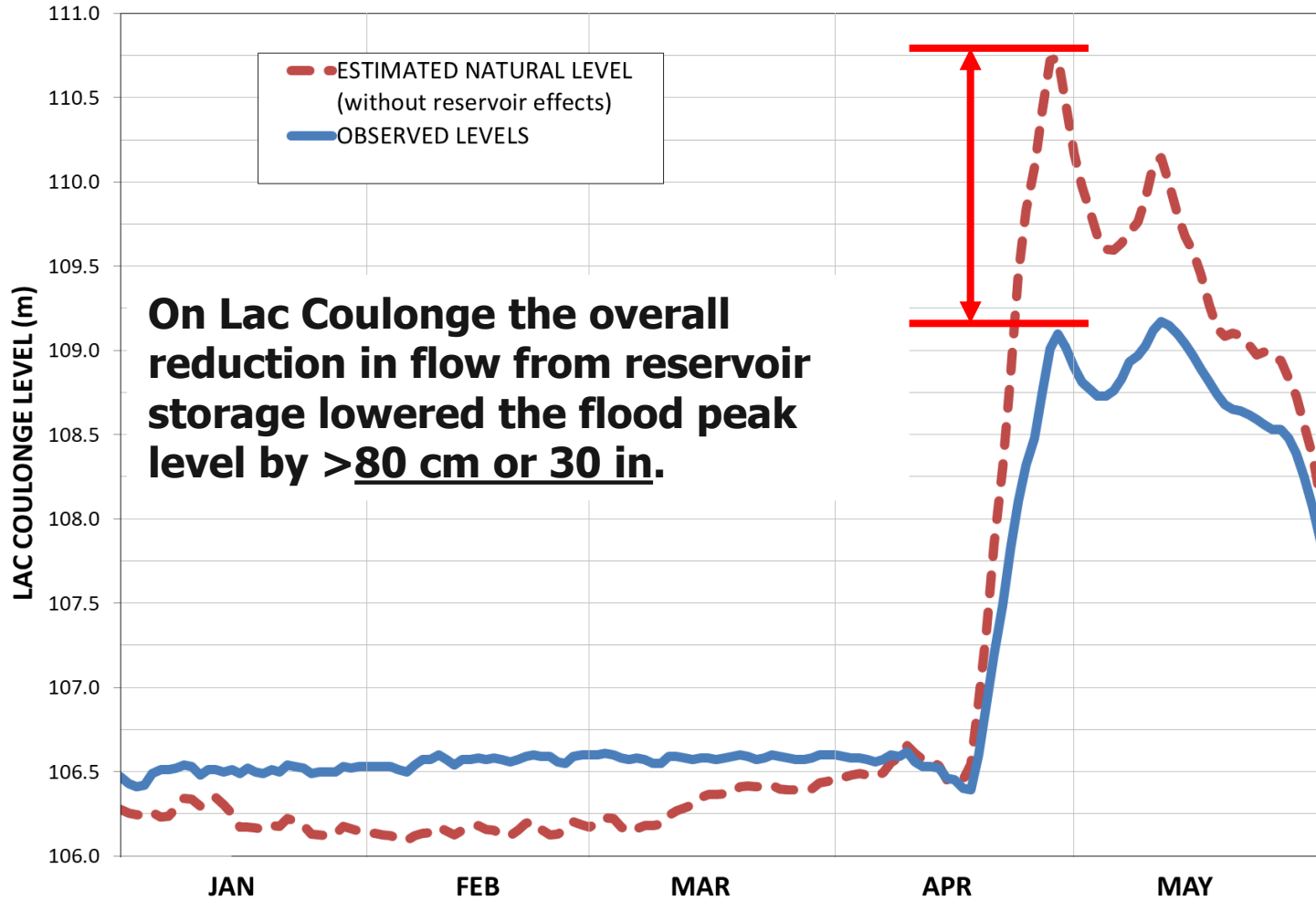


LAC COULONGE LEVEL

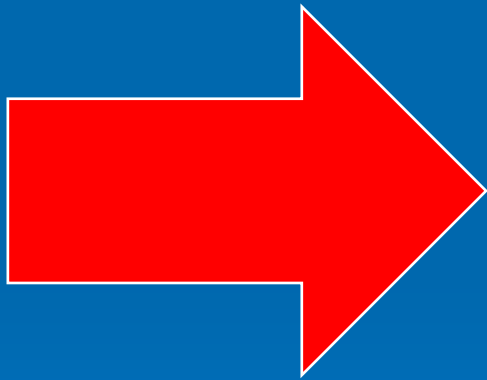
2017 2019



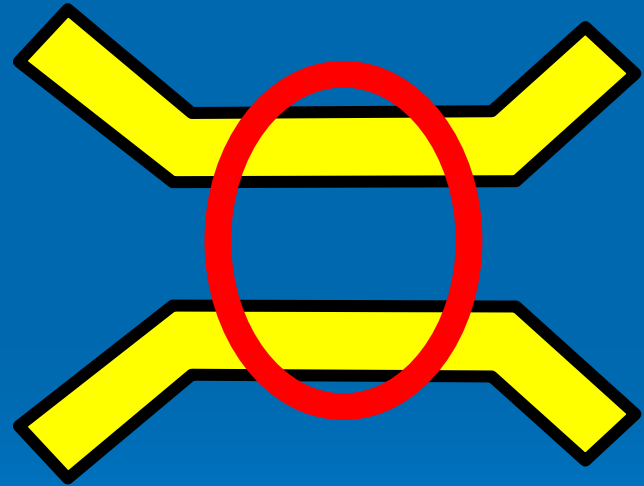
LAC COULONGE - OBSERVED LEVELS AND RESERVOIR EFFECTS



What determines the level in my area?

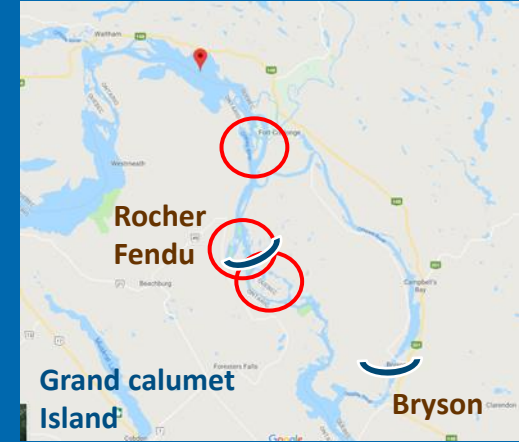
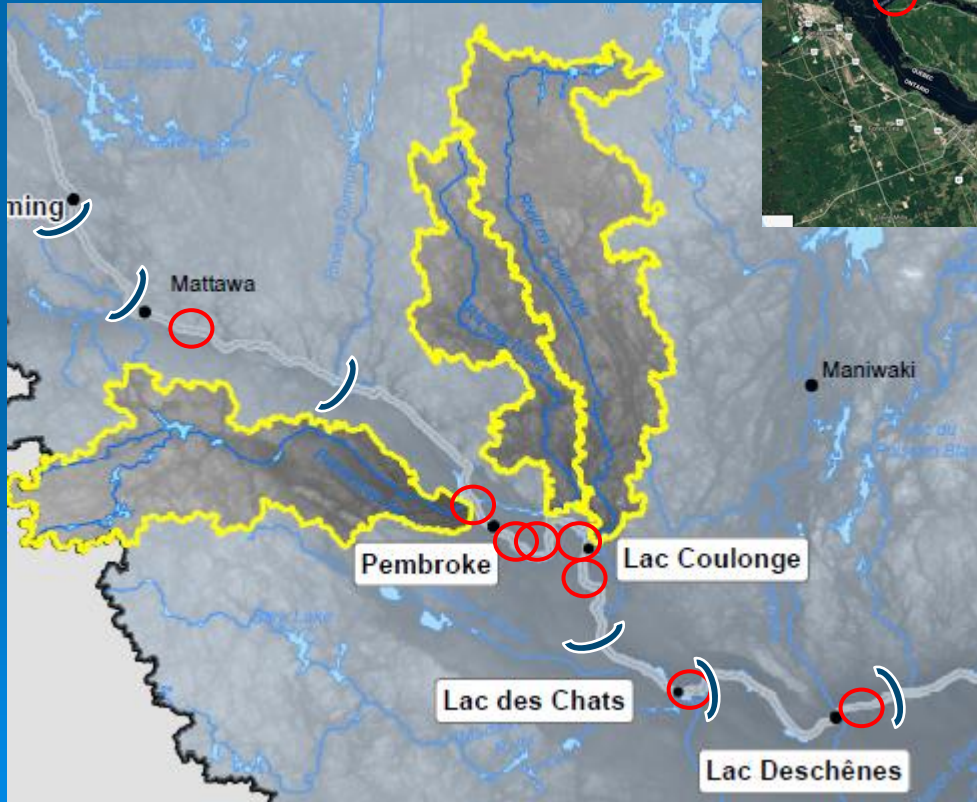


**Arriving Upstream
Flow**



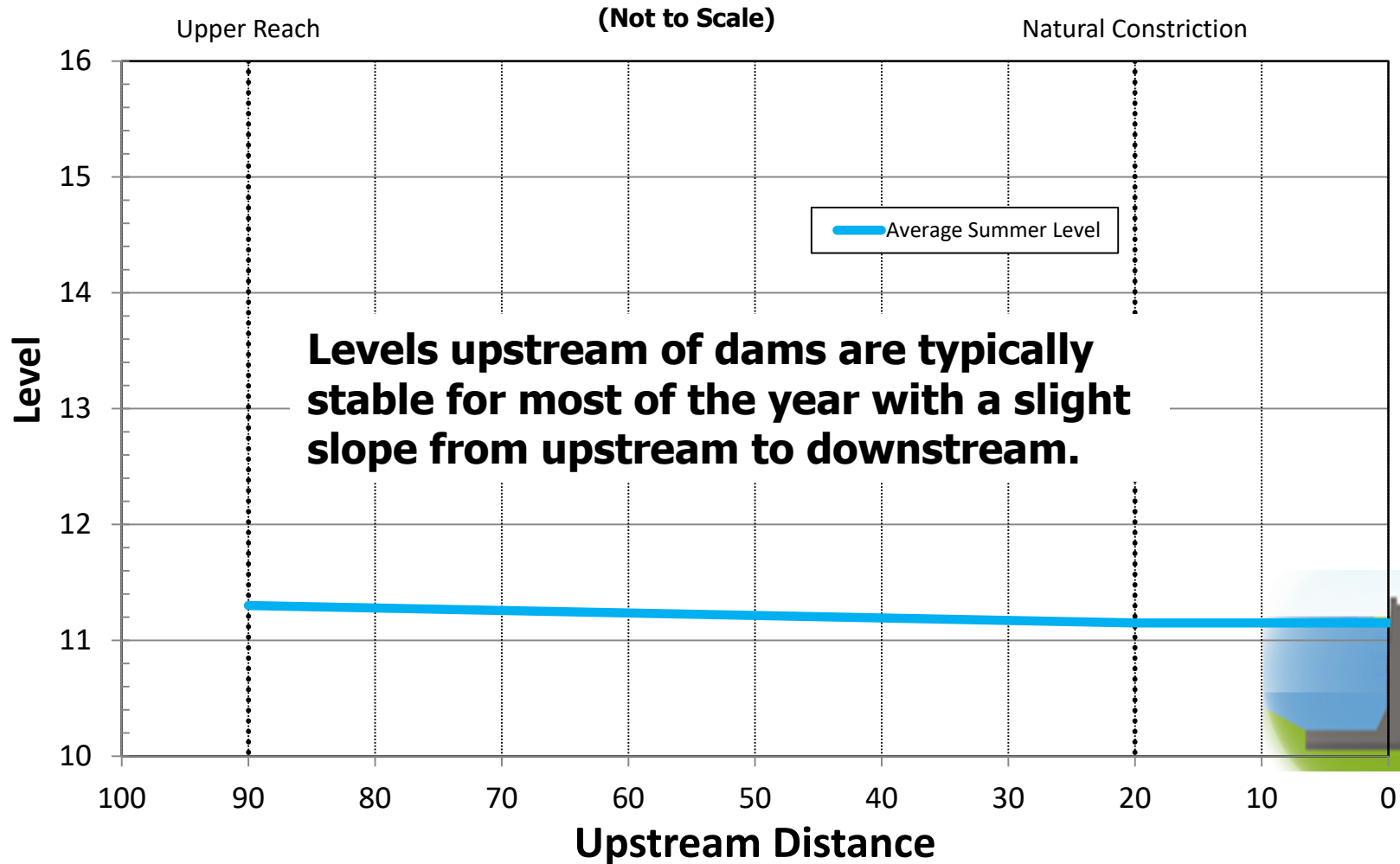
**Downstream Constrictions
(Control Point)**

Natural River Narrowings Restrict the Passage of Water

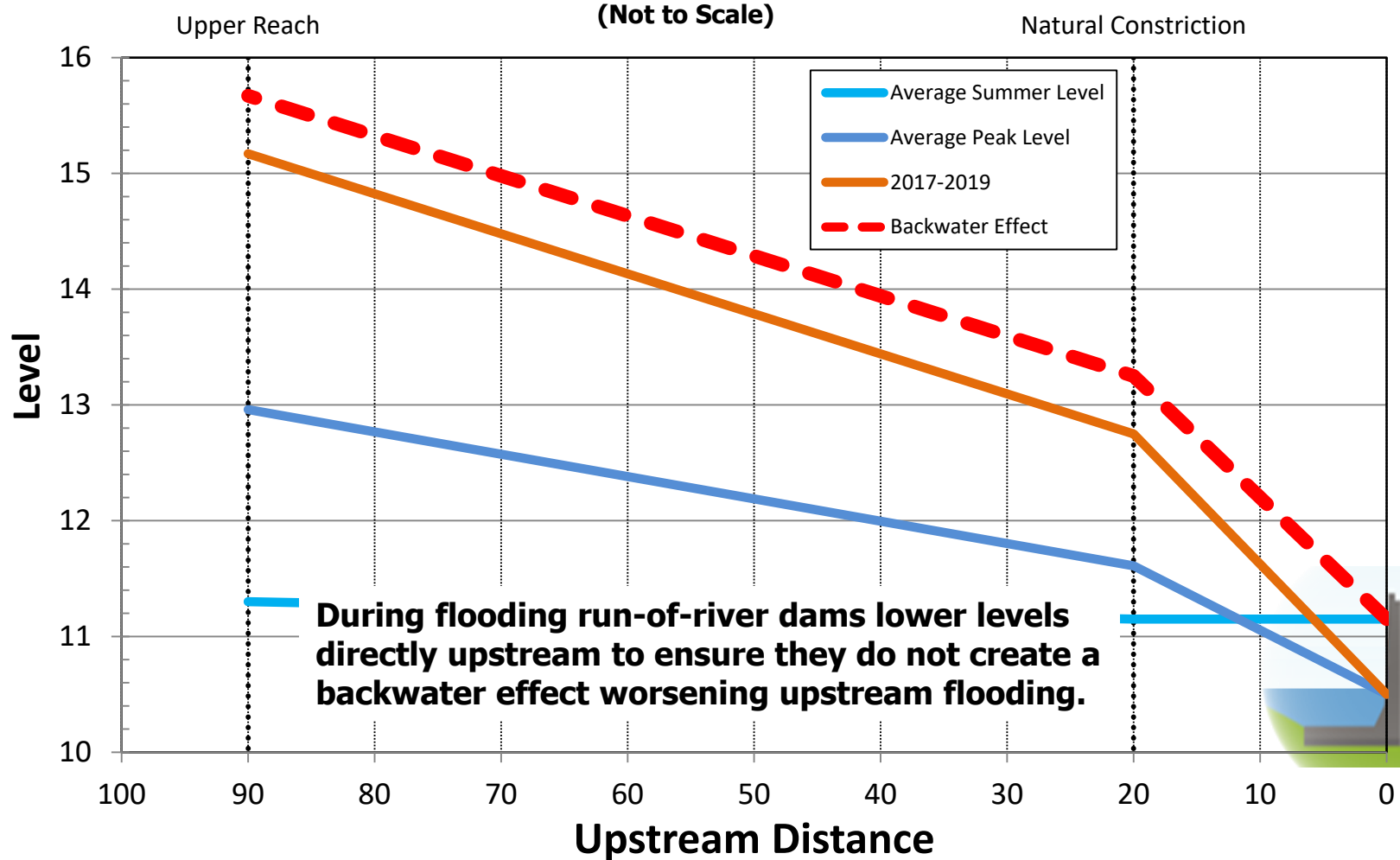


- Narrowings cause water to back up (similar to a funnel)
- Before river flows become high, run-of-river dam's lower their level above the dam and conditions return to a near natural state

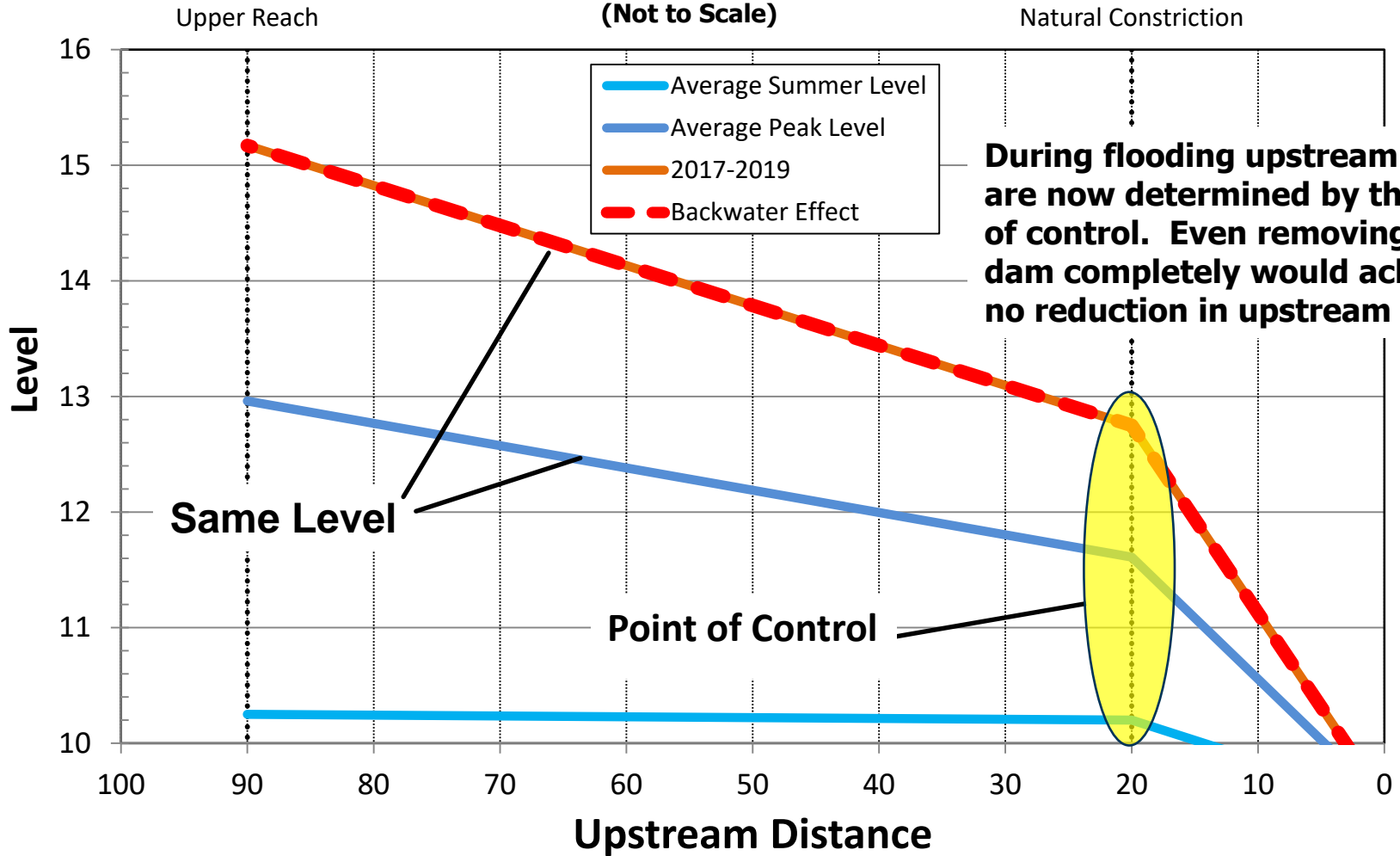
Upstream Water Level Profile



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 Joachims Dam

Bryson Dam

Chenault Dam

Chickamauga Dam

Carroll Dam

175 km

Image NOAA

Image Landsat / Copernicus

Google Earth

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 /**

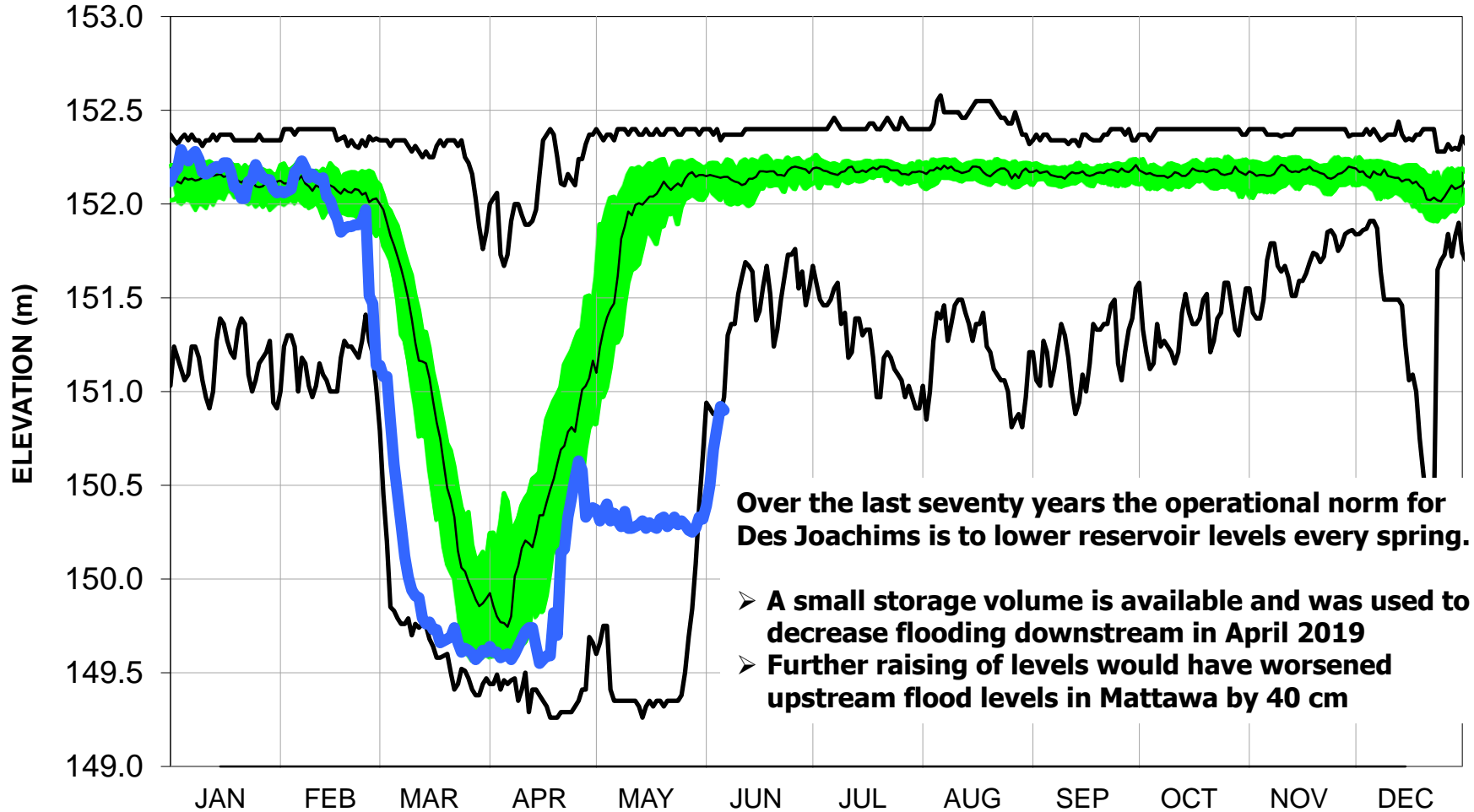
<https://globalnews.ca/video/3449848/quebec-lake-goes-dry-as-other-areas-face-floods>
News
Quebec lake goes dry as other areas face floods



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

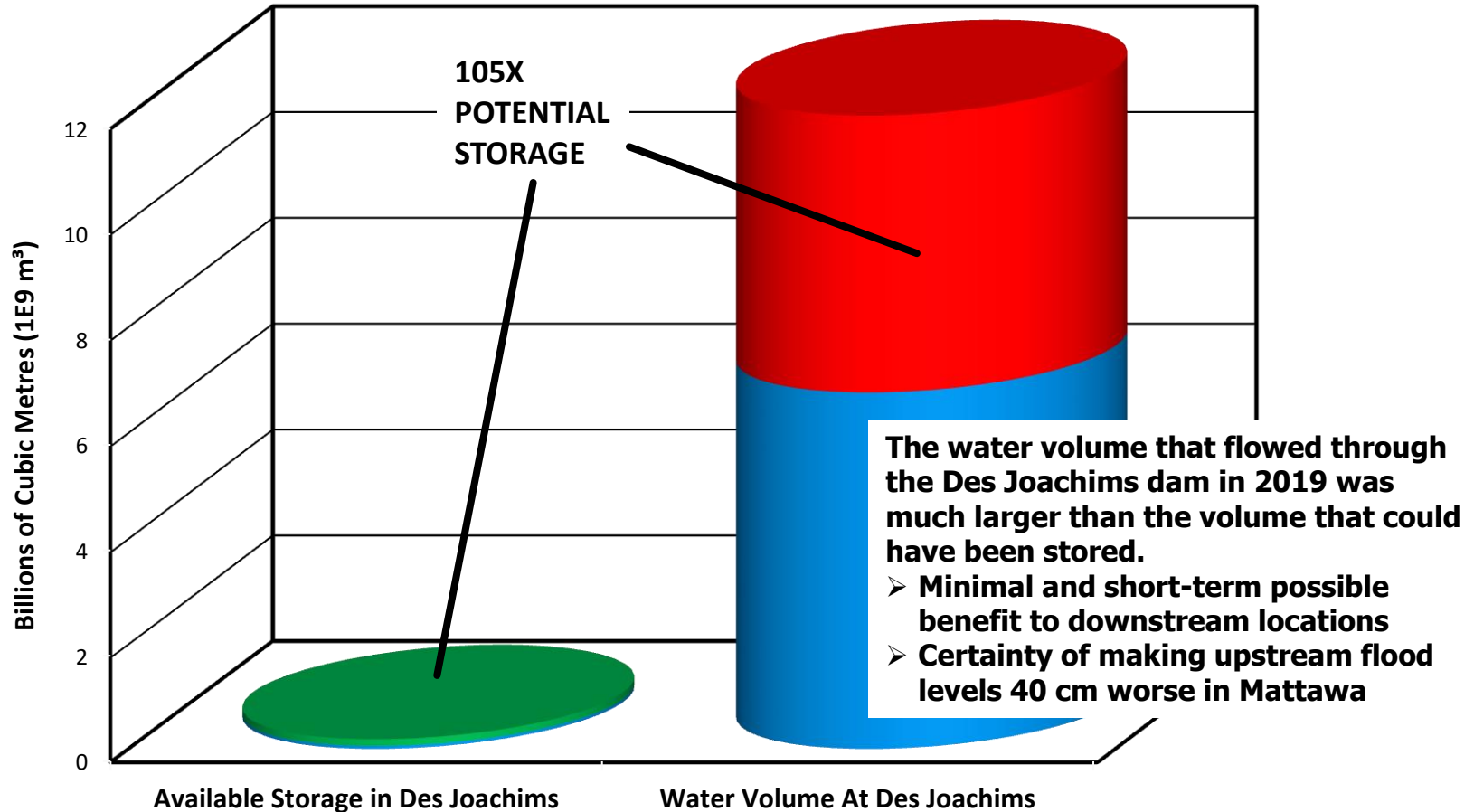
DES JOACHIMS LEVEL

2019



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

■ TOTAL 2019
■ AVERAGE YEAR



Exceptional Spring Flooding

- Historic flooding from Pembroke down to Montreal
 - Record levels recorded at Pembroke, Westmeath/Lac Coulonge, Chats Lake, Britannia beach
 - 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

Risks of Living in the Floodplain

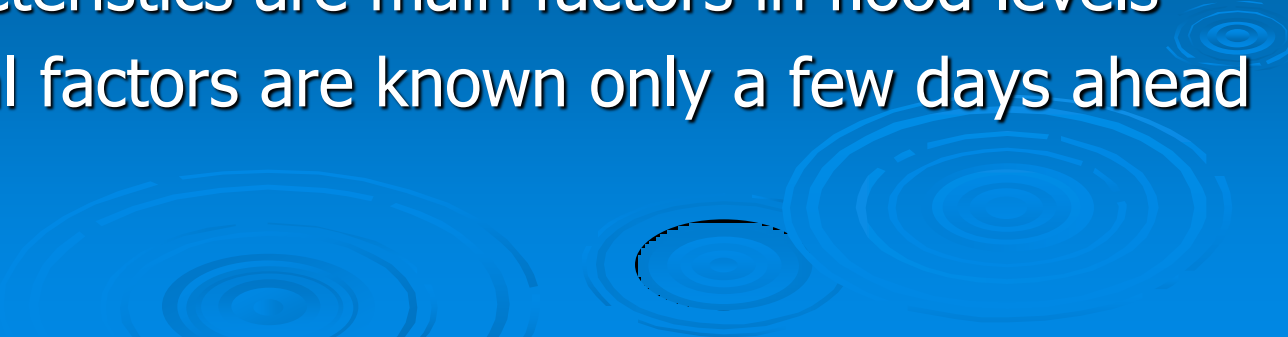
Risk over a 50-yr Period

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
- 



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>**

Twitter @ORRPB

Ottawa River Regulation Secretariat
373 Sussex Dr, Block E1, Room E120
Ottawa, Ontario
Email : secretariat@ottawariver.ca