



Ottawa River
Regulation
Planning Board

Commission de planification
de la régularisation
de la rivière des Outaouais

Flow Management in the Ottawa River Basin



PRESENTATION OUTLINE

Part A: The Ottawa River Basin and the Planning Board

- Facts about the Ottawa River basin
- Mandate of the Planning Board

Part B: Limits to Principal Reservoir Effects

- Mostly a natural river during spring floods
- Issues of common concern

Part C: Dams in the Basin

- Types of structures
- Natural river constrictions

Part D: Information available to you

- ORRPB website
- Stay informed

PART A

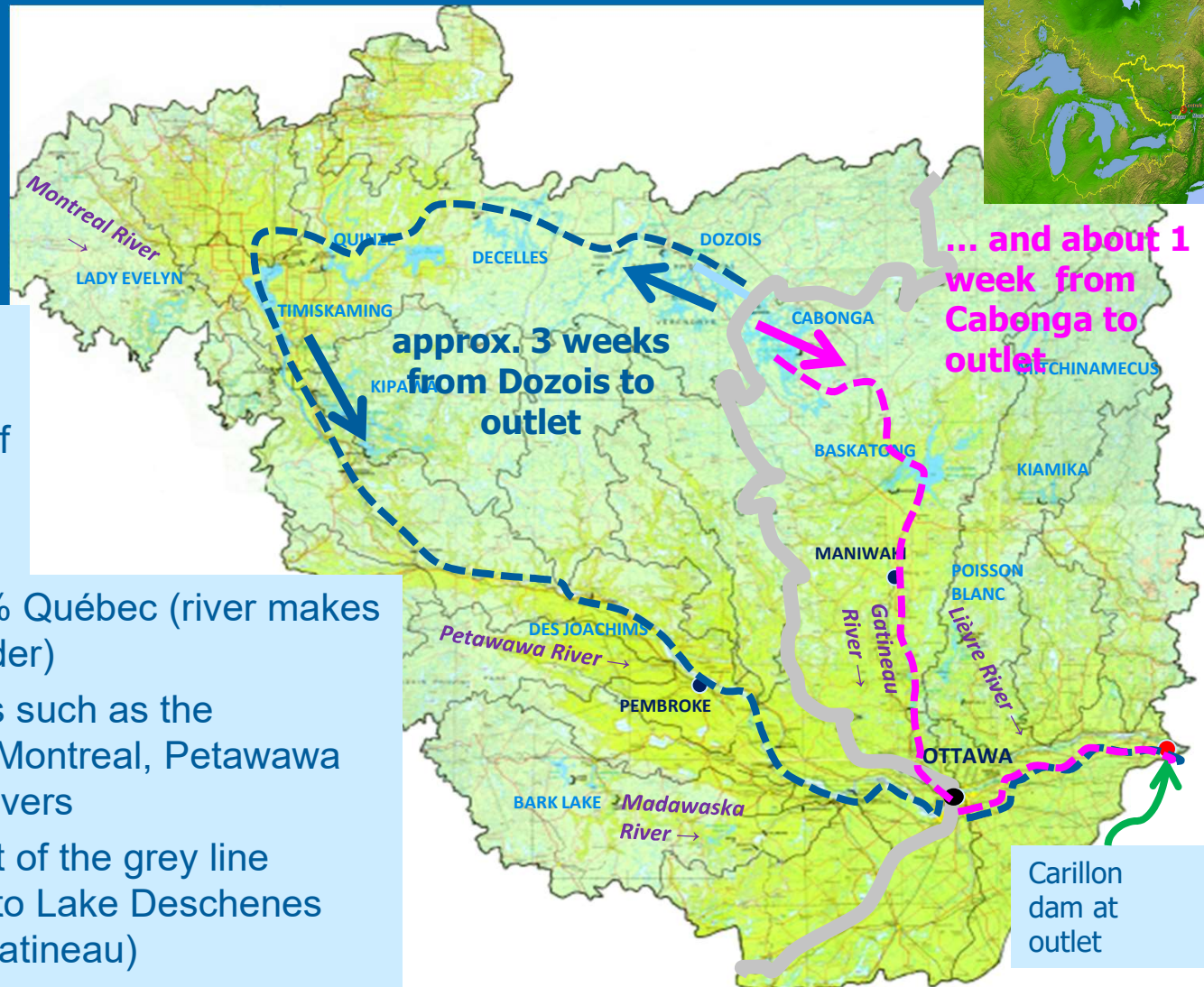
THE OTTAWA RIVER BASIN AND THE PLANNING BOARD



Ottawa River Watershed

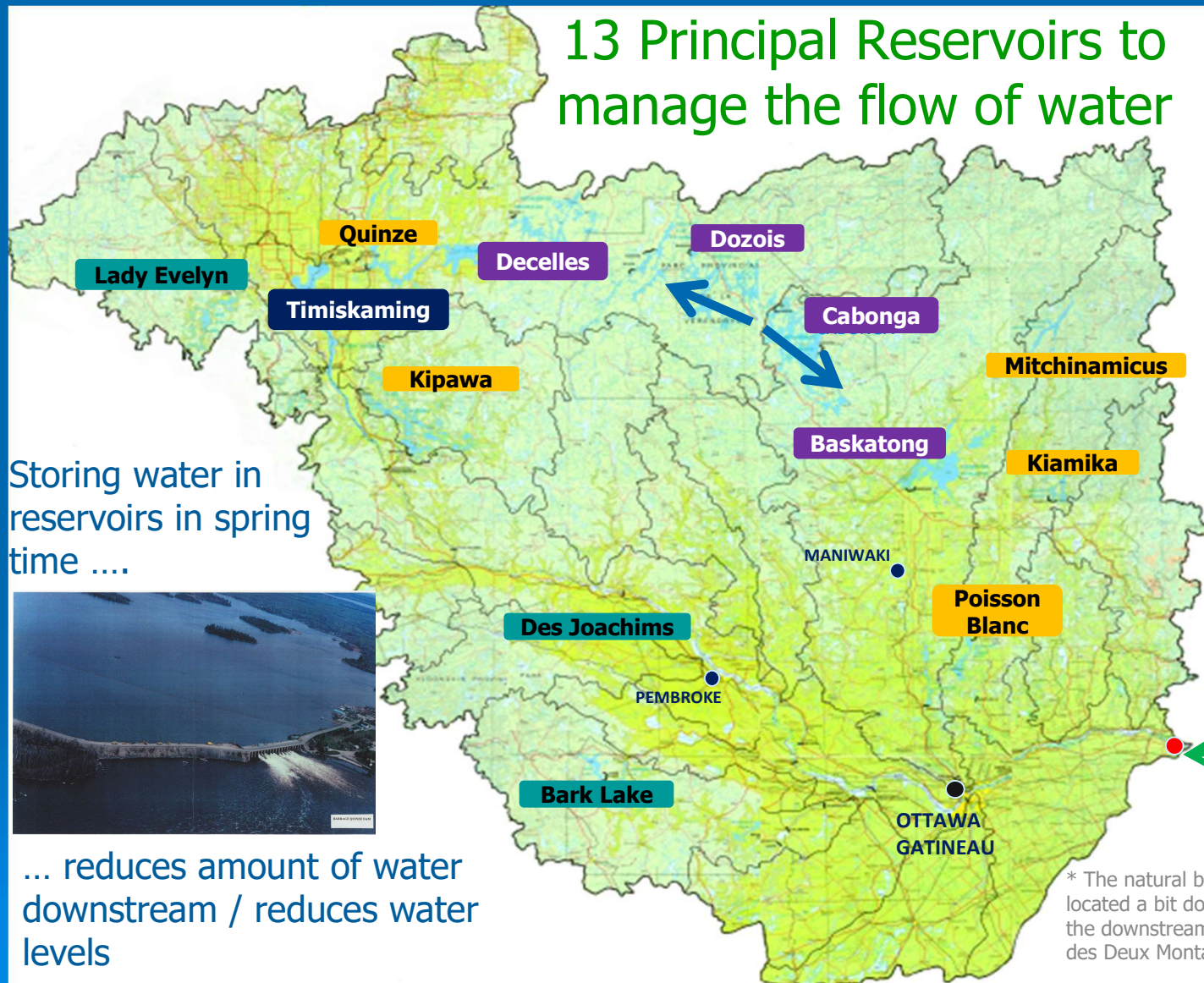


- Larger than England
- Largest tributary of the St. Lawrence River
- 35% Ontario / 65% Québec (river makes up majority of border)
- Over 15 tributaries such as the Gatineau, Lièvre, Montreal, Petawawa and Madawaska rivers
- Only the land west of the grey line contributes water to Lake Deschenes (west of Ottawa-Gatineau)





13 Principal Reservoirs to manage the flow of water



Storing water in reservoirs in spring time



... reduces amount of water downstream / reduces water levels

ONTARIO POWER GENERATION

 **Gouvernement du Canada**

 **Hydro Québec**

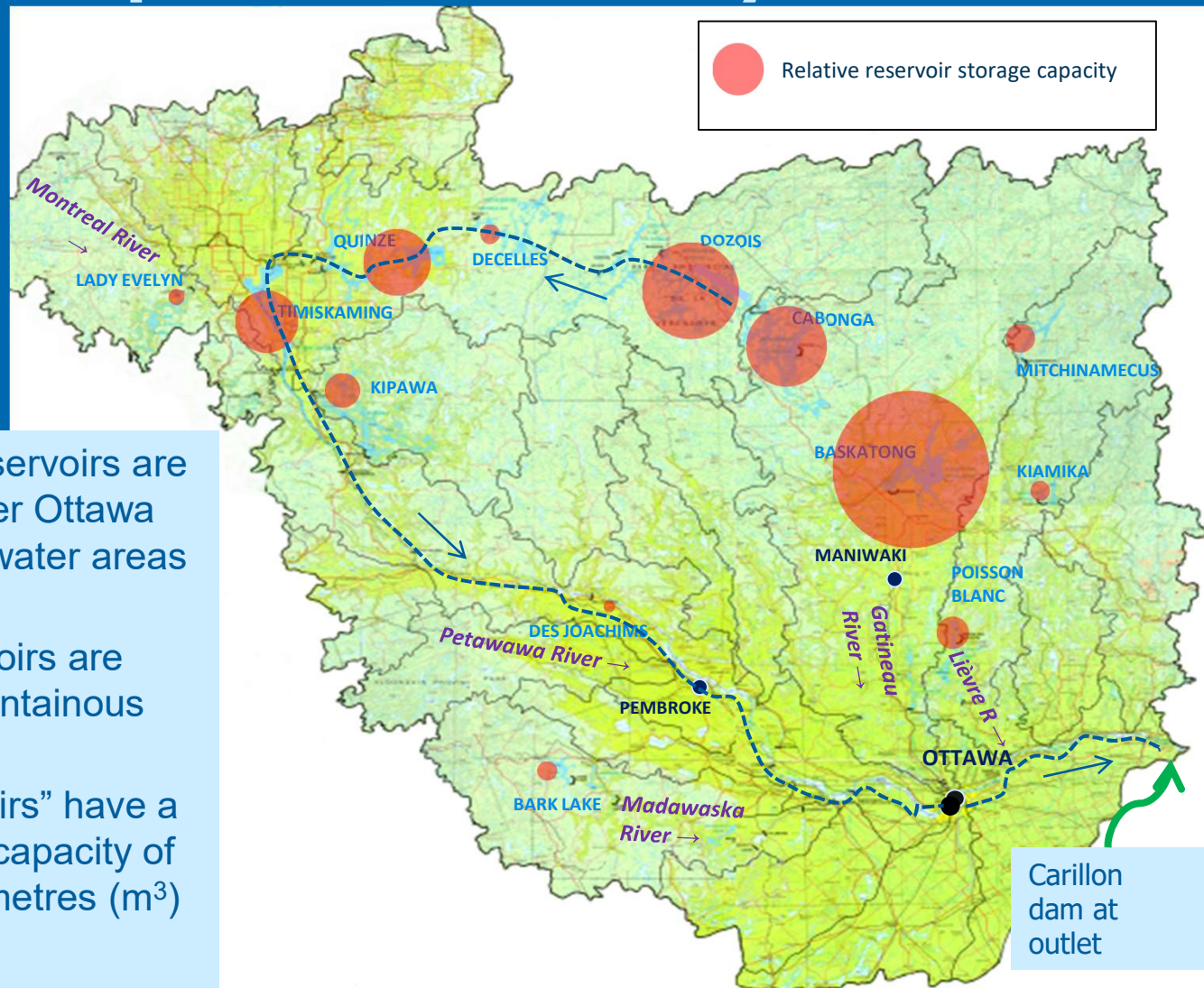
Québec 

Outlet at Carillon dam*

* The natural basin outlet is located a bit downstream at the downstream end of Lac des Deux Montagnes



Principal Reservoirs vary in size



- Most Principal Reservoirs are located in the upper Ottawa River and in headwater areas of its tributaries
- The largest reservoirs are located in the mountainous areas of the basin
- “Principal Reservoirs” have a minimum storage capacity of 200 million cubic metres (m³)



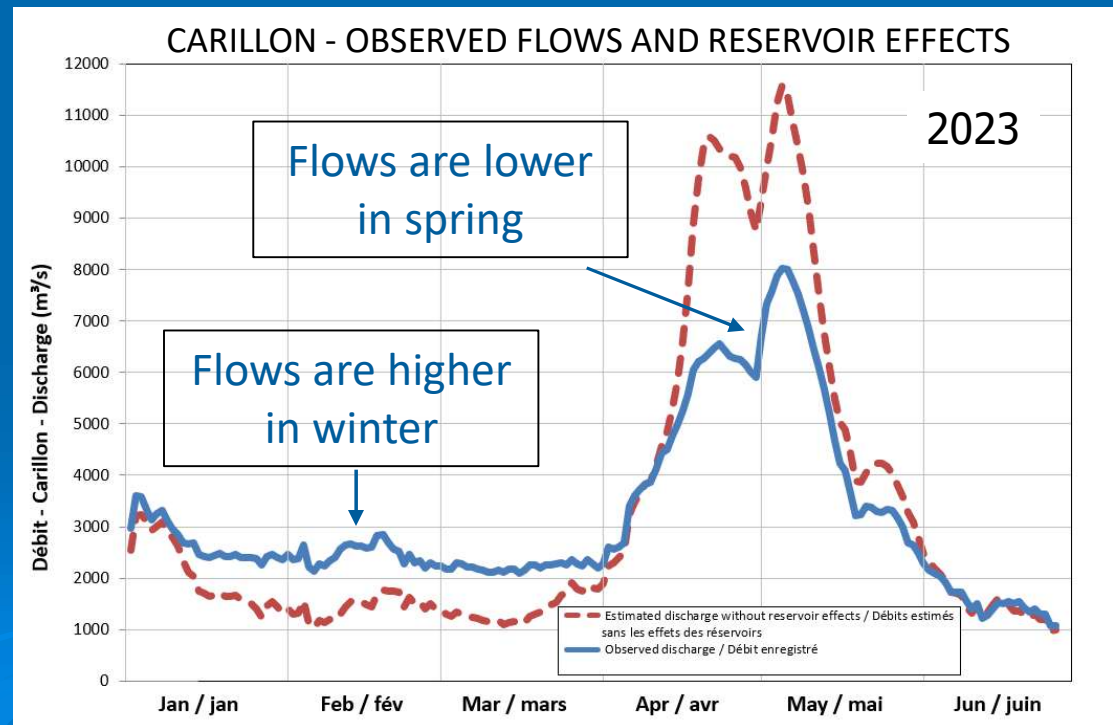
Something special about the Ottawa River

Principal reservoirs are used to partially regulate flows in the Ottawa River.

This partial regulation alters the natural flow pattern of the Ottawa River by:

- Reducing flows and flooding during the spring freshet (when reservoirs are filling with spring runoff)
- Augmenting flows in winter (when water is released from principal reservoirs)

To learn about 'discharges' that are illustrated on the figure, refer to the annex





Planning Board Main Objectives

The 1983 Canada-Ontario Quebec Agreement established:

- Ottawa River Regulation Planning Board (the Planning Board)
 - Ottawa River Regulating Committee (the Committee)
 - Ottawa River Regulation Secretariat (the Secretariat)
-
- *Main role* : to ensure that the flow from the principal reservoirs of the Ottawa River Basin are managed on a collaborative basis to minimize impacts of floods & droughts
 - *Secondary role* : to ensure hydrological forecasts are made available to the public and government agencies for preparation of flood related messages



Collaborative Agreement

www.ottawariver.ca



* The Ontario Ministry of Natural Resources and Forestry is an associate member as it contributes important hydrometeorological information and plays a key role in disseminating information in Ontario.



Planning Board Members

Quebec

Ministère de
l'Environnement, de la
Lutte contre les
changements climatiques,
de la Faune et des Parcs
(MELCCFP)

Hydro-Québec

Canada

Public Services
and Procurement
Canada

Canadian Coast Guard

Environment and Climate
Change Canada (ECCC)

Ontario

Ministry of Natural
Resources and
Forestry (MNRF)

Ontario Power
Generation

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



Planning Board Main Objectives

The Planning Board is not a “control board”.

- It facilitates the collaborative management of reservoirs by operators.
- It cannot direct how operators manage their reservoirs or facilities.
- Each operator remains responsible for the operational strategies and decisions at their facilities.
- The Board sets common goals for the operators of principal reservoirs to work towards.

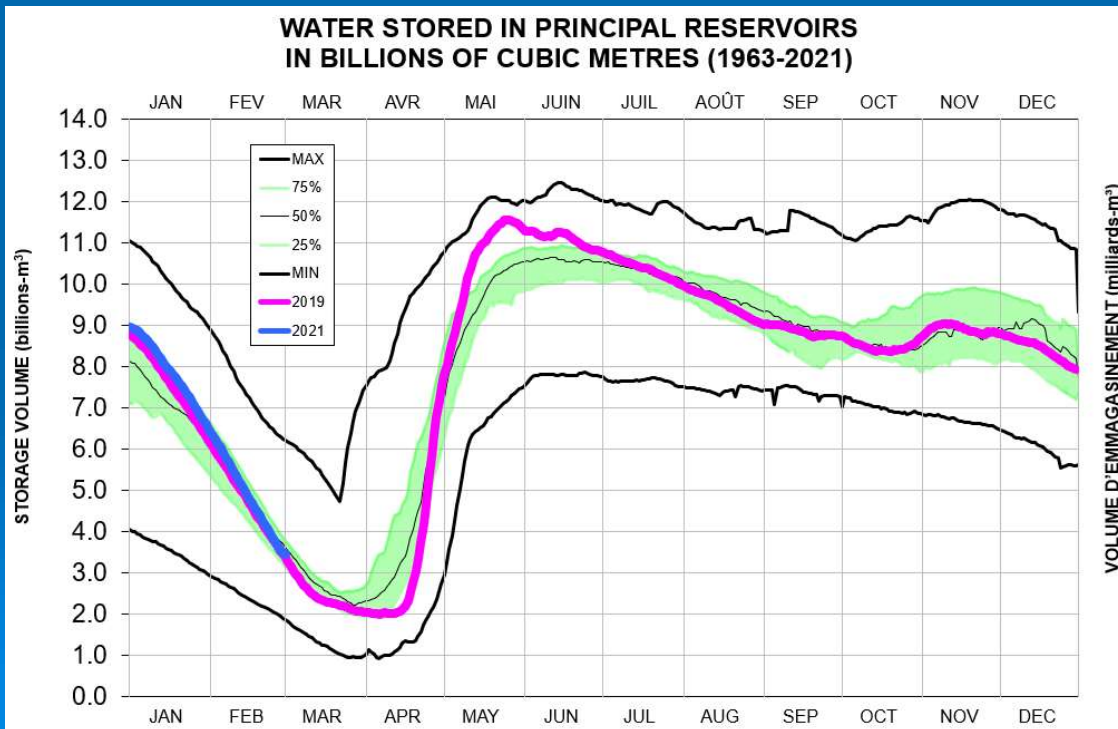
Operators work together to manage their principal reservoirs.

- They share the goal of minimizing impacts related to flooding.
- To limit the impact of flooding, they empty the reservoirs as much as possible before the beginning of the spring thaw. They then close the gates of their facilities to hold back as much water as possible for as long as possible.
- The reservoirs only make it possible to control 40% of the area of the Ottawa River watershed. Flooding occurs when the quantity of water generated by snowmelt and spring rain is significant and exceeds the capacity of the reservoirs in the north.



Work of the Committee and Secretariat

- Continuous monitoring of conditions in the basin, the river and its tributaries
- Gradual drawdown of the principal reservoirs (December to end of March)
- Optimize reservoir refill timing to reduce flooding impacts (during spring) while ensuring reserve to mitigate possible droughts



- Uses weather forecasts to predict river conditions weekly throughout the year and daily during freshet
- Adjust release of water from reservoirs to optimize benefits and reduce risks
- Makes river conditions forecasts available to responsible authorities

PART B

LIMITS TO PRINCIPAL RESERVOIR EFFECTS



*Partial control
of spring runoff*

40%

The Ottawa River
behaves
mostly like a
natural river

60%

*No storage
reservoirs to
hold back
spring runoff*

Basin Characteristics:

- Main reservoirs located mostly in the northern portion of the basin
- Over 60% of the basin area has no significant storage (minimal control over flows)



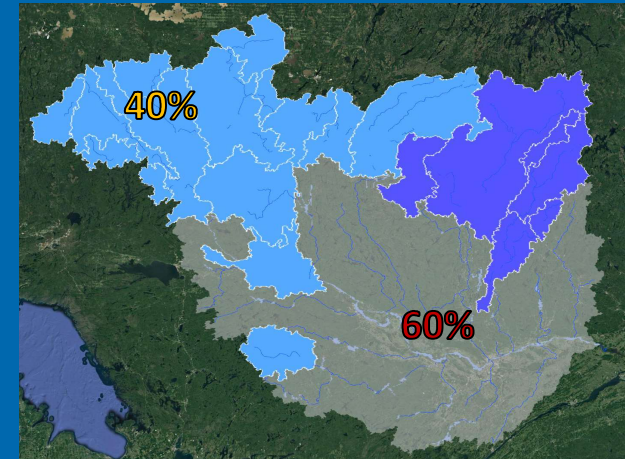
Google Earth



Limits of Reservoirs Effects

Flooding can occur when:

- Spring runoff greatly exceeds the size of reservoirs (in 40% of basin)
- There is significant spring runoff in areas where there are no reservoirs (in 60% of basin)



Reservoirs effects:

- Flooding extent and duration are always reduced
- Flooding is eliminated in many years

Estimated Reduction in Water Levels during the 2019 Flood Event As a result of Storing Runoff in Principal Reservoirs

Lac Coulonge (Fort-Coulonge)	120 cm
Chats Lake (Arnprior)	60 cm
Lake Deschenes (Britannia)	75 cm
Gatineau (Hull)	130 cm
Lac des Deux Montagnes	95 cm

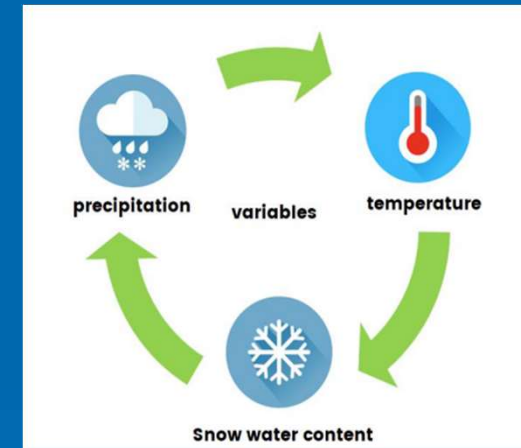


How strong will the spring flood be?

Unfortunately, it's not possible to forecast the strength of freshet in advance.

RISK FACTORS FOR A STRONG SPRING FLOOD :

- High amount of water contained in the snowpack when the freshet starts.
- Warm temperatures leading to rapid melt of the snowpack.
- Generally wet weather with above normal precipitation during the melt period.
- One or more rainfall event with over 25 mm in one day.
- Rainfall events hitting the central and southern portions of the basin where there are no large reservoir to hold back spring runoff.



Temperature and precipitation factors are known only a few days in advance!

Refer to FAQ # 1



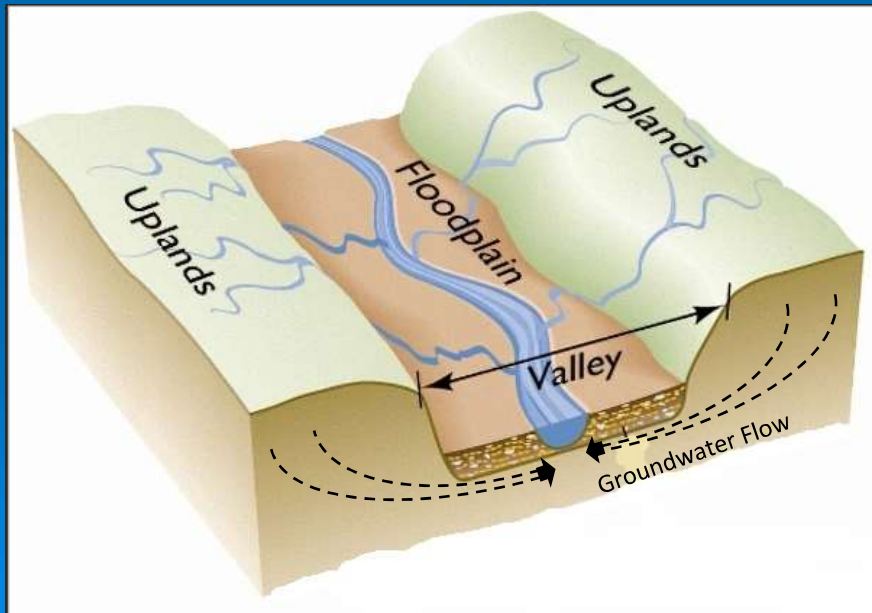
Is flooding the new norm?

Flooding occurs naturally when the water in the river needs more space and overflows onto normally dry land, which is called the floodplain.

Flooding is NOT expected to happen every second year.

Flooding is driven by weather, and weather can be cyclical.

Then flooding can be cyclical too. Flood events can be clustered.



Probabilities are used to describe how likely a flood is to occur.

There are 5 chances in 100, or a 5% chance, of having a medium flood (e.g. a 20-year flood) during a given year.

There is a 1% chance of having a very large flood (e.g. a 100-year flood) during a given year.

Refer to FAQ # 3
www.ottawariver.ca



Will climate change make flooding worse?

What research studies say:



Credit: Radio Canada

- Extreme rainfall events are more likely to occur.
- This makes flooding worse in smaller watersheds or areas, like in cities.
- The Ottawa River watershed is very large and flooding is more complex. Flooding along the Ottawa River typically occurs in spring, when the snow cover melts and rain is not absorbed by soils.
- Seasonal flows are expected to vary more, changing from wet to dry more rapidly and more often.

Climate change can affect flooding factors differently:

- More spring rain increases flood risk
- Variable snow cover means risk varies
- Faster snowmelt increases flood risk
- More evapotranspiration lowers flood risk

*Lots of
uncertainty*

*Refer to FAQ
14*





Can reservoirs be increased?

It is not feasible to prevent flooding in all locations:

The size of land needed to build new or expanded reservoirs would be too large.

Studies conducted in the 1980s showed costs of new reservoirs outweigh potential benefits.

Study results still considered relevant today.



*No global
solution*

Modern feasibility studies include:

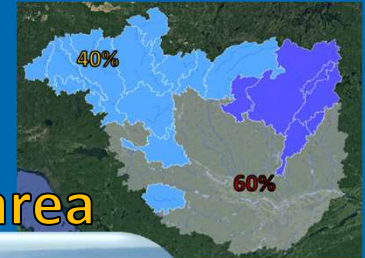
- Environmental impacts, including those to aquatic environment
- Social and cultural impacts of displacing people and changing the landscape
- Lifespan of the structure and on ongoing maintenance costs
- Risk of encouraging further development in the floodplain
- Social acceptability

PART C

DAMS IN THE BASIN



Types of Structures in the Basin



40% of basin area



Reservoir Dams

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

60% of basin area



Run-Of-River Generating Station

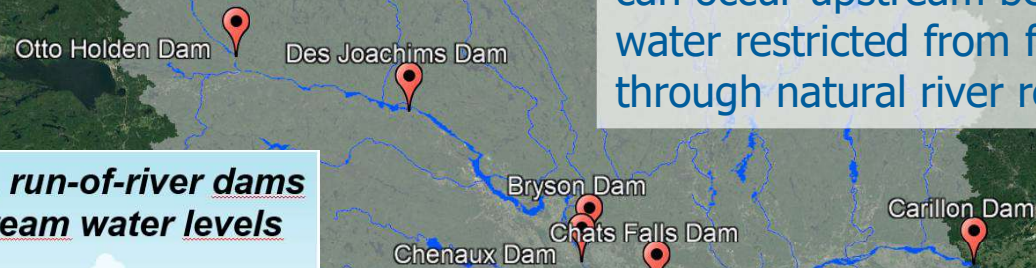
**Limited storage - Water
must pass through within
hours**
(Chats Falls, Carillon, etc.)



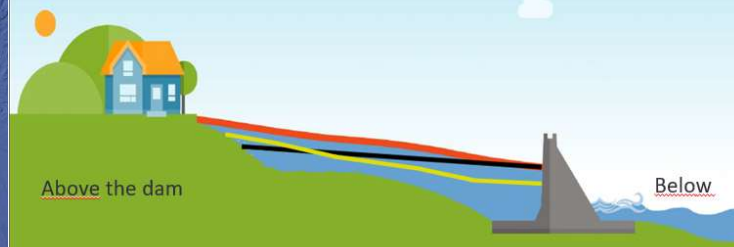
Major Run-Of-River Dams on the Ottawa River

These facilities operate as run-of-river generating stations during most high-flow events.

Even when operators lower water levels at run-of-river dams, flooding can occur upstream because of water restricted from flowing through natural river restrictions.



As river flow increases, run-of-river dams must lower their upstream water levels



- Normal operating level
- Potential flood level
- Lowered level during high flows

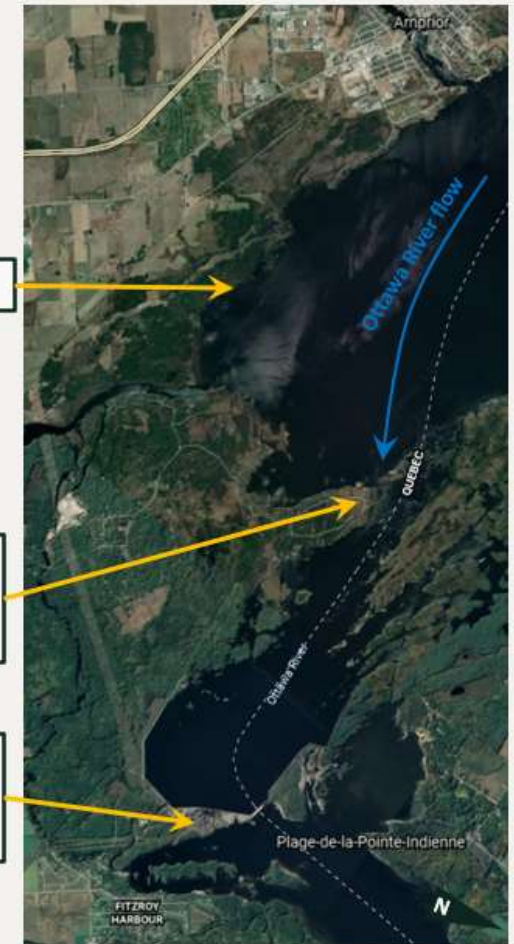
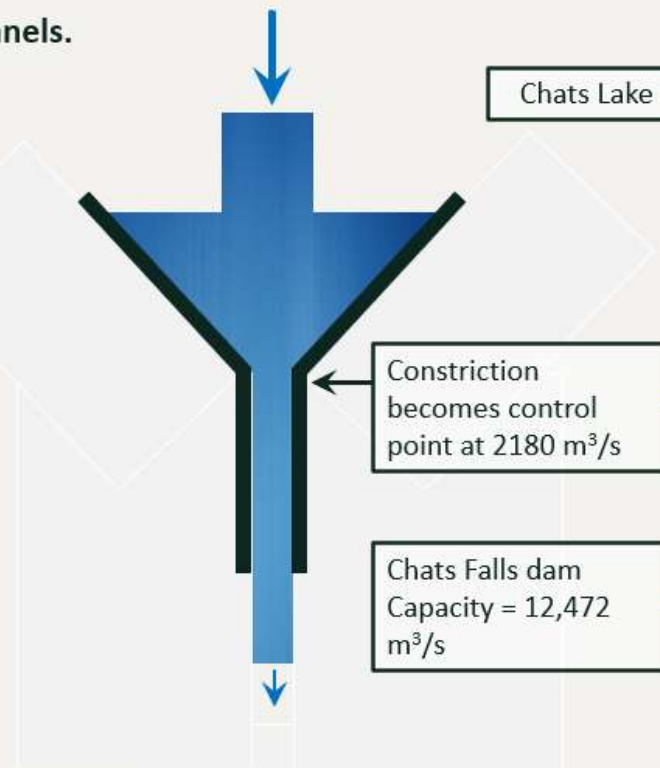
Image NOAA
Image Landsat / Copernicus



Natural River Constrictions

River constrictions are similar to funnels.

- Water will not build up in the funnel if poured in more slowly than the capacity of the narrow section.
- If water is poured in more quickly it will back up.
- Conditions downstream cannot lessen the backup caused by the constriction; the constriction is the control point.





Do downstream dams influence water levels on Lake Deschenes?

- Downstream dams have 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.



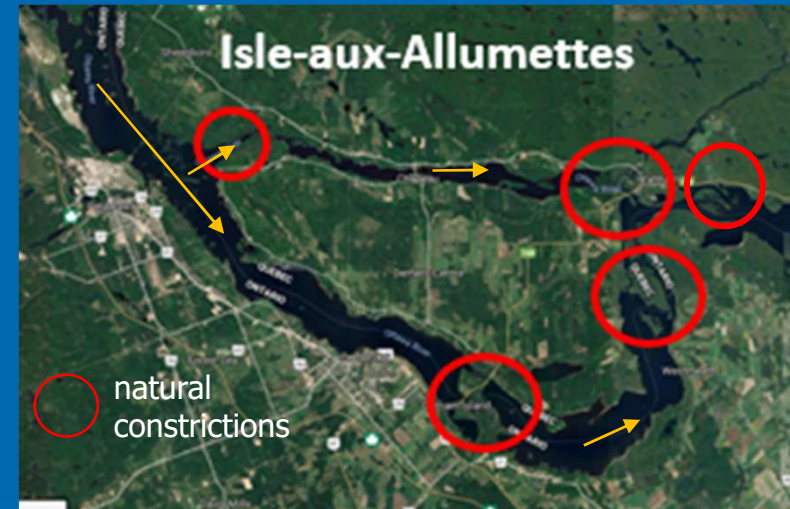
No downstream dam operator can “lower the water level” on Lake Deschenes.

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



Do downstream dams influence water levels at Pembroke?

- The presence of multiple natural constrictions in the river raises levels at Pembroke during periods of high flow.
- Downstream dams have no influence on the river levels at Pembroke.
- When flows are high, the Bryson and Rocher Fendu dams pass all arriving flow from Lake Coulonge.



No downstream dam operator can “lower the water level” at Pembroke.

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

Between Pembroke and the Bryson dam, there are multiple natural constrictions (narrows, rapids, presence of islands).

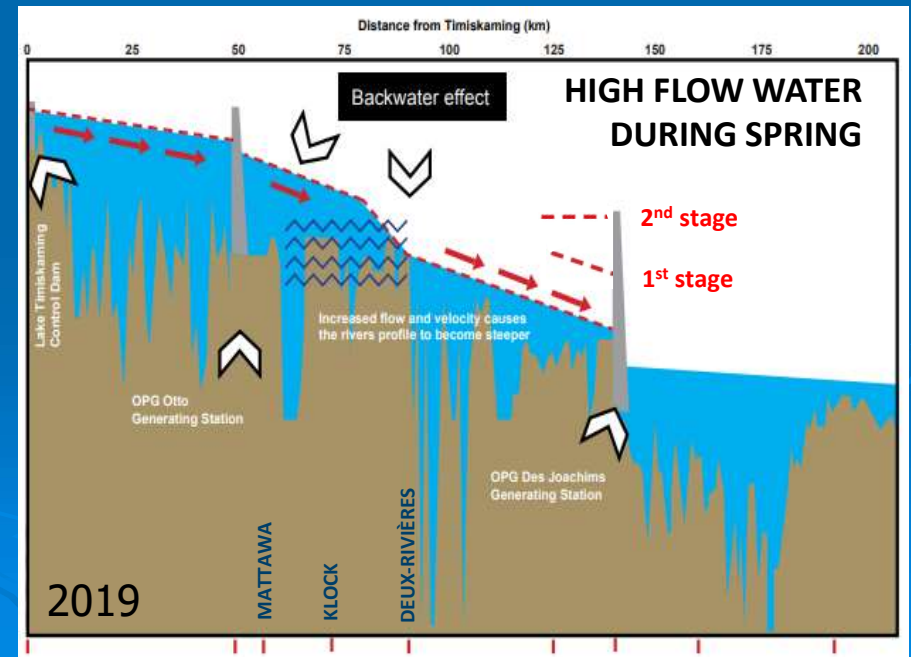
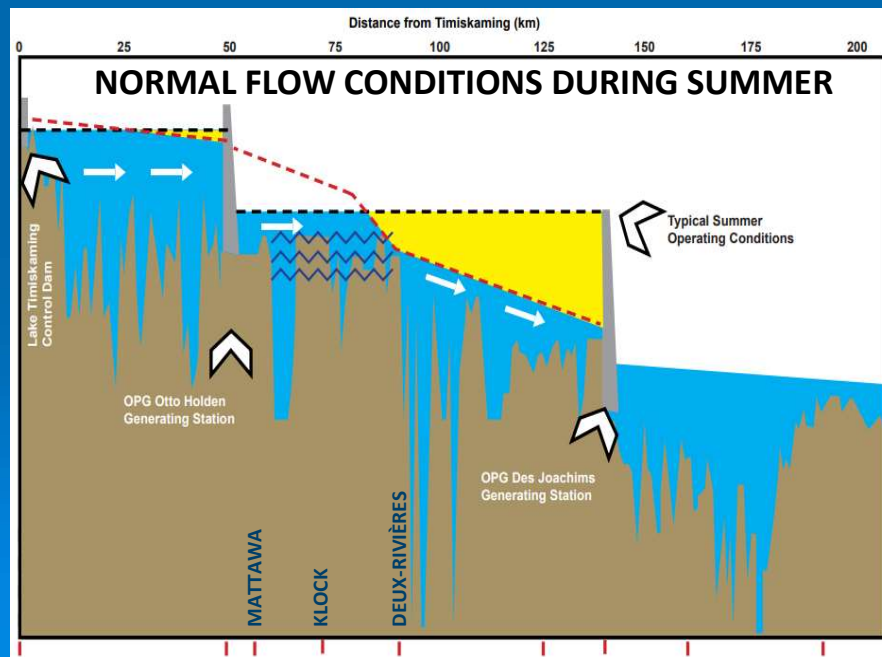


Des Joachims – Run-of-river AND Reservoir

- Des Joachims reservoir is the last of the 7 principal reservoirs located upstream of Pembroke to be completely refilled.
- It is operated as a run-of-river facility when there is a risk that high Ottawa River flows cause flooding in Mattawa.

- The spring refill strategy consists of two stages.
- The purpose is to reduce the risk of upstream flooding and provide some relief, when possible, to flooding downstream areas.

View a video on managing high water levels on the Ottawa River [here](#).



PART D

INFORMATION

AVAILABLE TO YOU

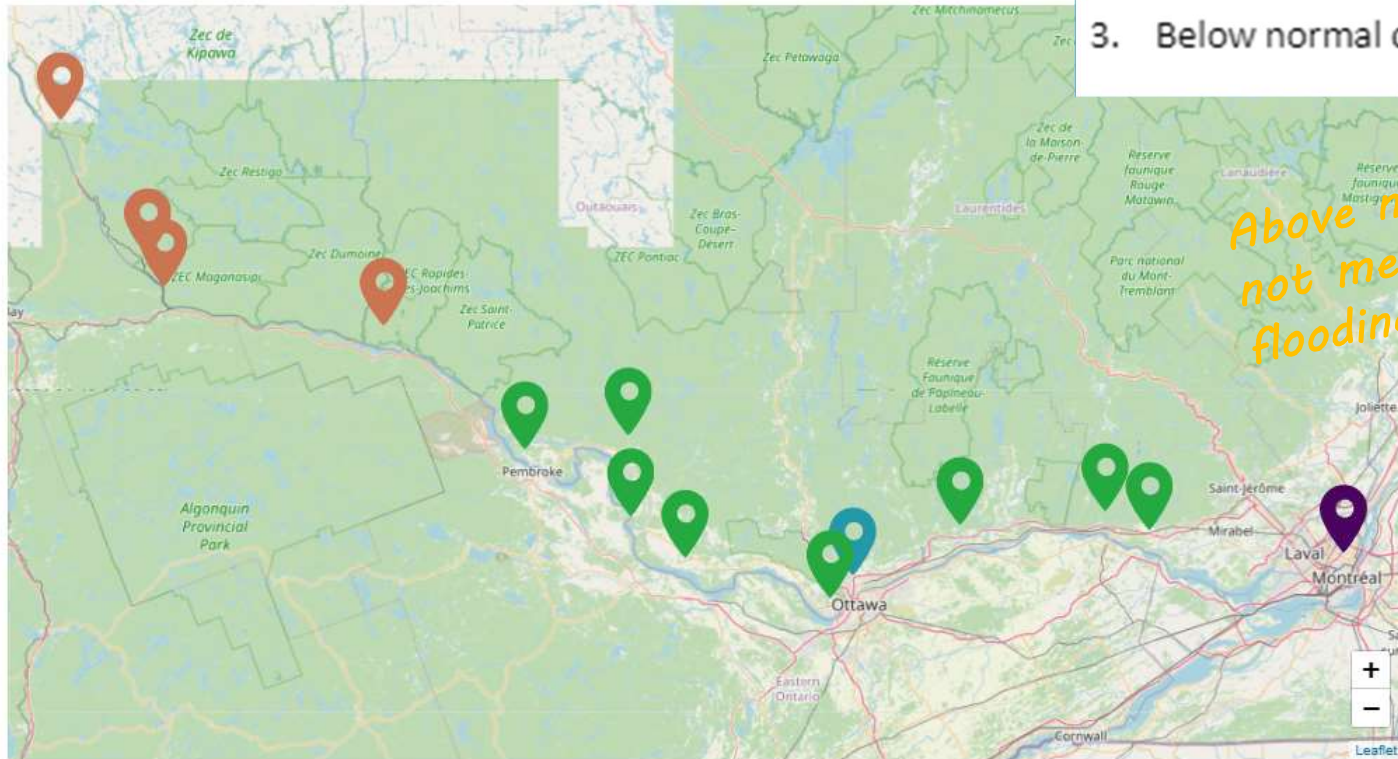


ORRPB Website

Current Conditions

Publication: 2024-04-10

Locations to display: River locations only | Reservoirs only | Other locations



1. Normal conditions



2. Above normal conditions



3. Below normal conditions



Above normal does not mean that flooding is occurring

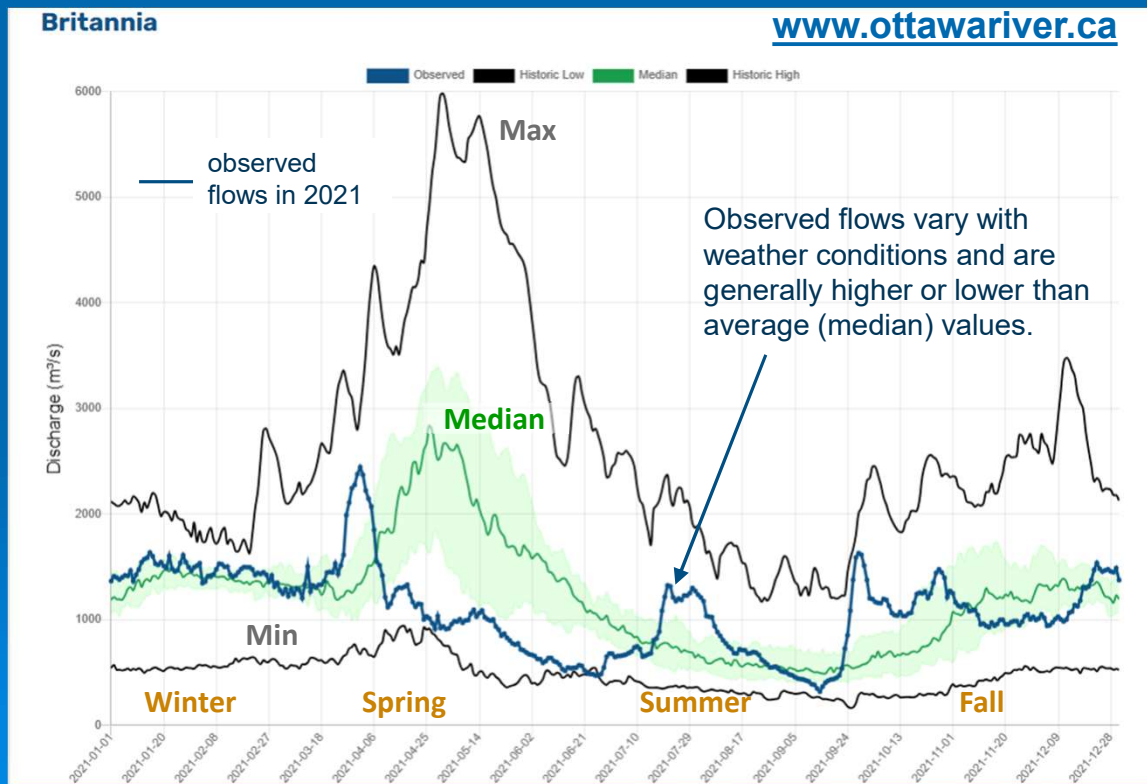
www.ottawariver.ca

[About this map](#)



How to read graphs

Flows have been measured at the Britannia station since 1916. There's over 100 years of data summarized in just one figure!





- The amount of water in the river (flows or discharges) vary from year to year. Flows are higher during wet years and lower during dry years such as 2021 (shown by the blue line).
- The black lines (historical high and historical low) illustrate, for each day of the year, the maximum and minimum flows recorded since 1916.
- 50% of the time, flows are within the green band (the normal range). The average conditions is illustrated by the 'median' (green line).
- Flows also vary from month to month, with spring bringing the highest flows. That's because large quantities of water are released in spring when the snow melts and rainfalls are not absorbed by the soil. This is called 'freshet'.



Compare Snow Cover with Normal

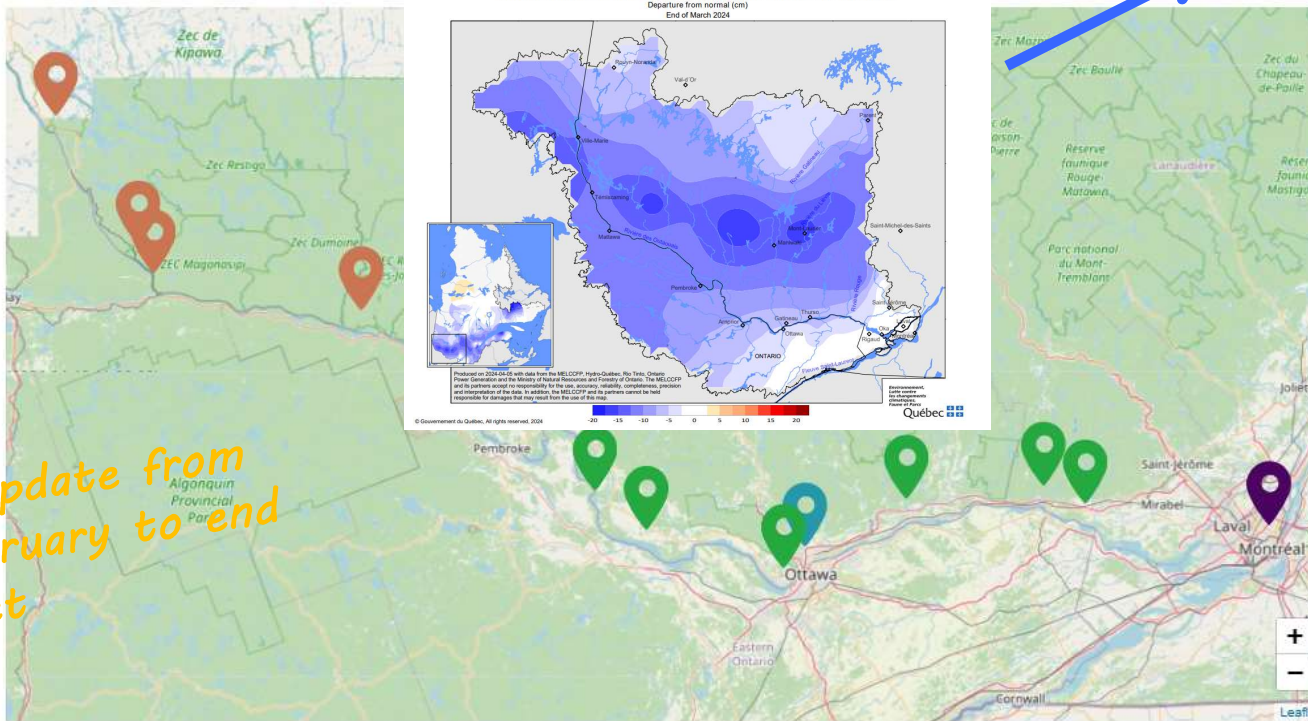
Current Conditions

Share  

Publication: 2024-04-10

Locations to display: River locations only | Reservoirs only | Other locations

SNOW MAP



About this map



The ORRPB Keeps the Public Informed on Basin Conditions

Ottawa River Commission de planification

Ottawa River Commission de planification

Ottawa River Regulation Planning Board Commission de planification de la régularisation de la rivière des Outaouais

OTTAWA assure au long Outaou dans le Condit

Fall Conditions Overview in the Ottawa River Basin

OTTAWA/GATINEAU, Thursday December 21, 2023 — The Ottawa River Regulating Committee provides collaborative management of the principal reservoirs in the Ottawa River basin throughout the year. Effective water management requires that the Committee continually monitors river conditions and forecasts the effects of weather conditions on water levels and flows at multiple locations throughout the basin. This report is a summary of fall conditions in the Ottawa River basin.

Fall River Conditions: Autumn, which began with dry and warm weather, was marked by very wet weather in October that brought large amounts of rain. The northern part of the basin was particularly affected by rainfall during the first three weeks of October. Portions of the Abitibi-Timiskaming area received nearly double the October monthly average rainfall over this period! An initial rain event from October 7 to 10 generated a lot of runoff, which caused water levels to rise along the main stem of the river from Mattawa to Lake Deschenes. A second rain event from October 20 to 22 affected the entire northern part of the basin and caused water levels to rise again. The reach from Mattawa to Lake Deschenes saw the largest level increases for this rain event. Levels remained below minor flood thresholds at all locations. These wet conditions prevailed for a period of six weeks. With below-normal precipitation throughout the watershed in November and daytime temperatures at times below freezing, levels and flows in the main stem of the river gradually returned to normal ranges in early December.

Ranking of maximum fall levels along the Ottawa River

Mattawa Start* 1910			Pembroke Start* 1911			Lake Deschenes at Britannia (Ottawa) Start* 1915			Gatineau (Hull) Start* 1985		
Rank	Date	Level** (m)	Rank	Date	Level** (m)	Rank	Date	Level** (m)	Rank	Date	Level** (m)
1	1928.10.26	154.40	1	1928.10.27	113.04	1	1928.10.28	59.80	1*	2003.12.15	43.10
2	1951.10.30	154.27	2	1968.12.10	112.78	2	1968.12.12	59.54	2	1968.12.13	42.96
3	1954.10.19	154.26	3	1932.11.01	112.73	3	1932.11.01	59.46	3	2010.12.17	42.94
4	1965.11.29	154.19	4	1951.11.01	112.62	4	2003.11.29	59.23	4	2008.11.22	42.77
5	1995.09.30	154.00	5	1954.10.10	112.55	5	1990.12.04	59.18	5	1979.12.20	42.69
6	1990.11.29	153.88	6	1979.12.03	112.43	6	1951.11.03	59.13	6	2017.12.15	42.65
7	1956.10.04	153.87	7	2014.10.21	112.40	7	2006.11.21	59.13	7	1980.12.04	42.67
8	1932.10.20	153.82	8	1995.10.01	112.39	8	2014.10.04	59.10	8	1988.11.15	42.59
9	2014.10.20	153.81	9	1990.12.01	112.39	9	1918.11.04	59.07	9	1999.12.10	42.48
10	2019.10.18	153.80	10	1941.11.14	112.38	10	1970.12.02	59.05	10	1967.11.05	42.44
11	2023.10.28	153.64	11	2023.10.30	112.26	11	2023.11.01	58.92	11	2023.11.02	42.29

* Start of record period
** Daily level
* 1928 level estimated to be 43.1 m

Flow Regulation Strategy during a Fall with High Flows: The management of water at the principal reservoirs during a high-flow event occurring in the fall aims to minimize downstream flooding while respecting maximum reservoir levels to ensure the safe operations of facilities. There has been no major flooding during the fall since the beginning of the data record (approximately 1915).

www.ri

www.ottawariver.ca

Page 1 of 2

Information bulletins:

- Prior to spring freshet
- After spring freshet
- In summer (if low flow conditions prevail)
- In fall

Watch our Latest News webpage

www.ottawariver.ca

Follow us on X
twitter.com/ORRPB



First Press Release Announces Start of Freshet

First Press Release

- Sent to mass media & agencies
- Forecast webpage is activated

If risk of flooding is increasing

- New press release
- Focus is on main stem of Ottawa River

When is Forecasts webpage deactivated?

- General trend is for a steady decrease of flow
- Flood risk is low and not expected to go up

Watch our Latest News webpage
www.ottawariver.ca

Follow us on X
twitter.com/ORRPB



Ottawa River
Regulation
Planning Board

Commission de planification
de la régularisation
de la rivière des Outaouais

Press Release

RISING OTTAWA RIVER WATER LEVELS

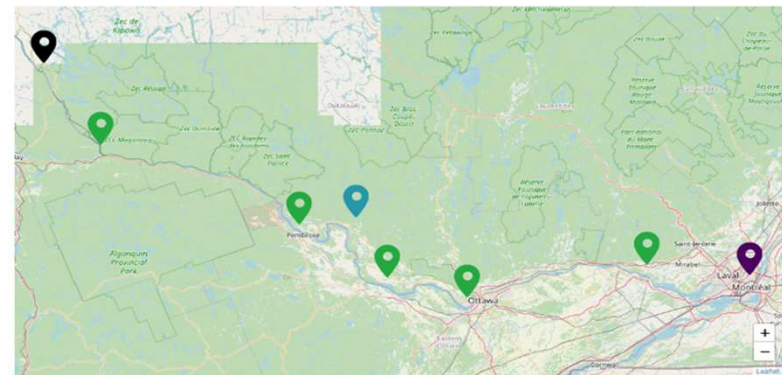
OTTAWA/GATINEAU, Friday April 7, 2023 — The Ottawa River Regulating Committee would like to inform watershed residents that levels and flows along the Ottawa River are expected to begin increasing over the next few days as a result of the onset of the spring freshet period in the Ottawa River basin. The levels and flows in the Ottawa River are currently close to normal, but are expected to start rising sometime during the weekend. With the snow pack being above normal for this time of year in several areas within the Ottawa River basin, flows and levels along the main stem of the Ottawa River are expected to rise above average values over the next few weeks. *While it is not possible to forecast peak flow conditions at this time, please note that meteorological events with above-normal temperatures or above-normal precipitation within the spring timeframe (next 6 to 8 weeks) can increase the risk of exceeding minor flood levels along the main stem of the Ottawa River (from*

Forecasts

Publication: 2023-04-12 3:12 PM



This map includes markers representing the locations where the Ottawa River Regulating Committee provides hydrological forecasts to the public.



About this map



Flood Risk is Communicated to Responsible Provincial Authorities

In Ontario:

Conservation Authorities and MNR District Offices are informed of forecasted Ottawa River conditions through MNR* associate membership on the Committee.

They issue flood related messages and information to those that may be at risk, and those that respond to flood events.



In Québec :

The Ministère de la Sécurité publique through the *Centre des opérations gouvernementales* and the Regional Directorates of the *Sécurité civile* collaborate with municipalities to protect residents. They are informed of relevant hydrological forecasts by member agencies of the Committee.

* The Surface Water Monitoring Centre of the Ministry Natural Resources and Forestry is an associate member of the Ottawa River Regulating Committee



Municipalities Respond to Flood Events

Roles and responsibilities of municipalities in emergency response include:

- Determining appropriate response to a flood threat and if necessary, deploy municipal services.
- If required, implementing their Emergency Response Plan.
- Maintaining liaison with flood coordinators at the provincial level:
 - In Ontario - liaison with conservation authorities or MNR District Offices
 - In Quebec - liaison with *Sécurité civile* and *Centre des opérations gouvernementales*

For complete information on roles and responsibilities:

- In Ontario: refer to the Emergency Management and Civil Protection Act ([Emergency management | ontario.ca](https://www.ontario.ca/government/emergency-management))
- In Quebec: refer to the [Plan national de sécurité civile | Gouvernement du Québec \(quebec.ca\)](https://www.quebec.ca/government/plan-national-de-securite-civile)



Closing Remarks

- The Ottawa River is only partially controlled. In spring, the river is largely at the mercy of natural snowmelt and rainfall events. Flooding has occurred in the past and will occur again. Droughts can also occur.
- The Committee monitors river conditions all year long and optimizes the use of principal reservoirs to reduce impacts of extreme events in the Ottawa River, its major tributaries and the Montreal region.
- If your home is located in the river floodplain, know how to stay informed and be ready for all river conditions.
- The governments of Canada, Ontario, and Quebec collaborate with Ontario Power Generation and Hydro-Québec to support the work of the Ottawa River Regulation Planning Board including the Committee and Secretariat.



Information

Current and
forecast
conditions
during freshet

www.ottawariver.ca
www.rivieredesoutaouais.ca

*Conditions
actuelles et
prévues en
rivière pendant
la crue*

@ORRPB

X (Twitter)

@CPPRO

Recorded message about river conditions – Toll-free number

1-888-621-0059

Ottawa River
Regulation Secretariat
Email : secretariat@ottawariver.ca

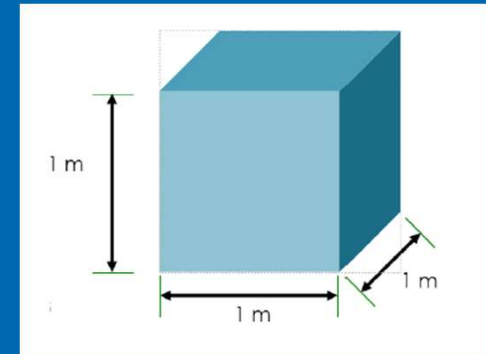
*Secrétariat pour la régularisation
de la rivière des Outaouais*
Email : bureau@ottawariver.ca

ANNEX



River Characteristics

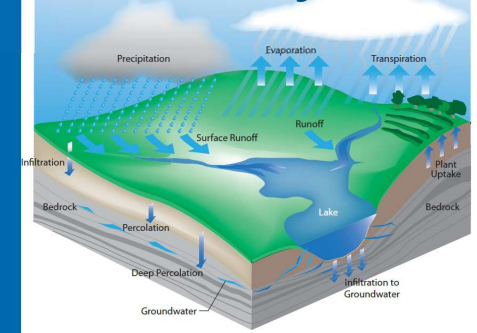
- What is flow?
 - How much water is coming into the river reach from the upstream part of the basin / out of the river reach towards the downstream area
 - Measured in cubic metres per second (m^3/s)
 - Flow \rightarrow same as “Discharge”
- What is level?
 - Level is the elevation of the water surface
 - Measured in metres (m) above sea level
 - Measured at strategic locations and dams
- *Natural rivers – the higher the flow, the higher the level*
 - Upstream – means upriver, against the water flow and towards the original source.
 - Downstream – is the direction with the flow of water



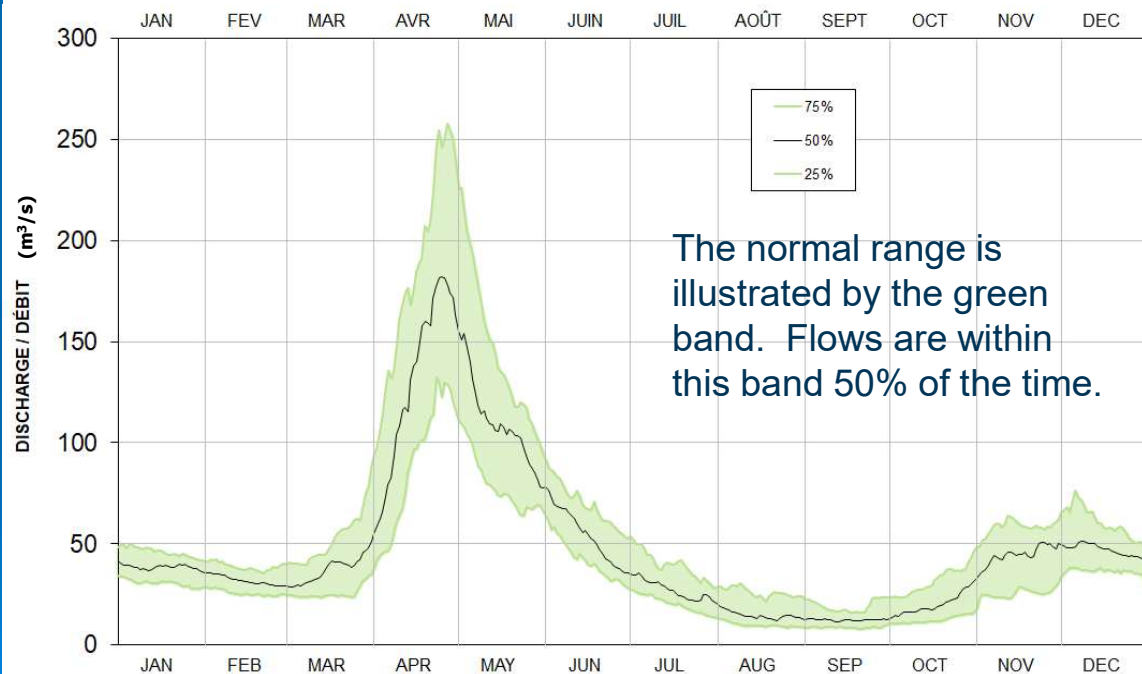


Variability of Flows in Natural Rivers - Not all Seasons are Equal

The water cycle



Petawawa River – Flow normal range (cubic metres per second)



The normal range is illustrated by the green band. Flows are within this band 50% of the time.

- In winter, precipitation is stored in the snowpack. Groundwater feeds streams and rivers.
- In spring, large quantities of water are released when the snow melts. This is called 'freshet'.
- In summer, most water from rainfall is taken up by vegetation.
- In fall, the soil becomes easily saturated when it rains and rain-water runs off to low-lying areas and streams.



In natural rivers, levels vary with flows

- In natural streams, levels go up when flows go up
- This is due to natural restrictions in river (such as rapids) that act as funnels.
 - If one pours water too quickly in a funnel, water will build up in the funnel (and will even spill up).
 - Similarly, if the river flow increases through a restriction, the water level in the river upstream of the restriction will rise.
- This is also observed in the Ottawa River (ex. near Pembroke, in Lake Deschenes)

