Ottawa River

An overview of water management

Ontario Power Generation | March 2022

Ontario Power Generation Land Acknowledgement

who we are

We are Ontario's largest clean power generator and clean technology innovator.

100% owned by the Province

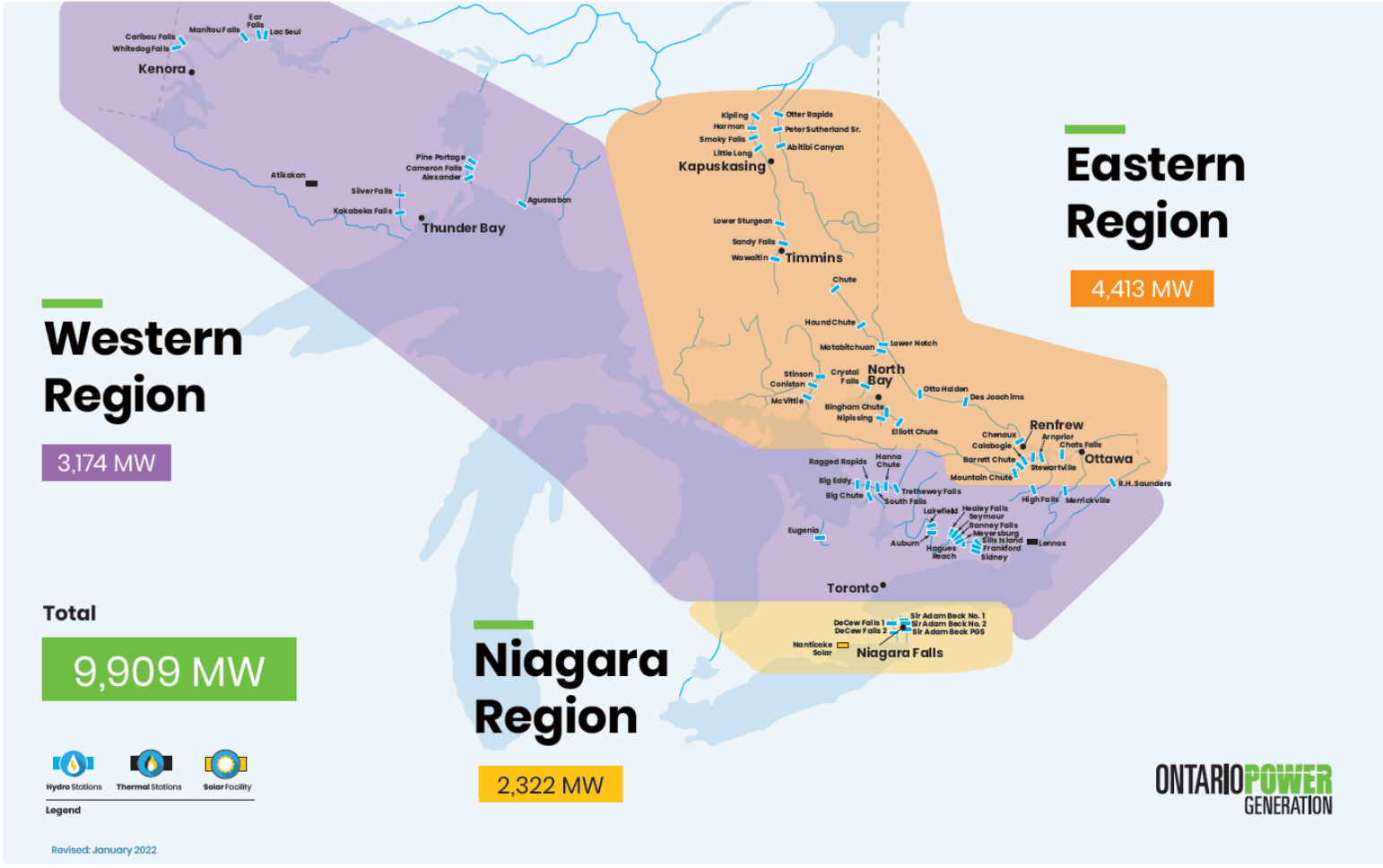
$59.8 billion in assets

More than 9,000 employees across Ontario

Leading producer of nuclear isotopes

ONTARIO POWER GENERATION

OPG's Renewable Generation Fleet



How hydro works

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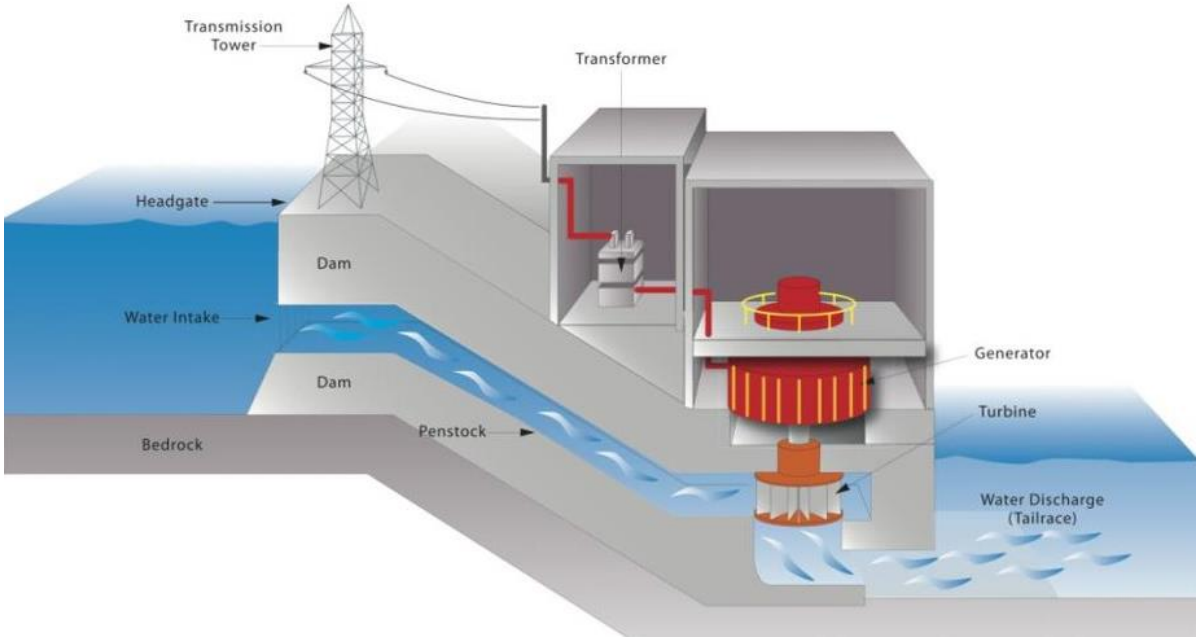
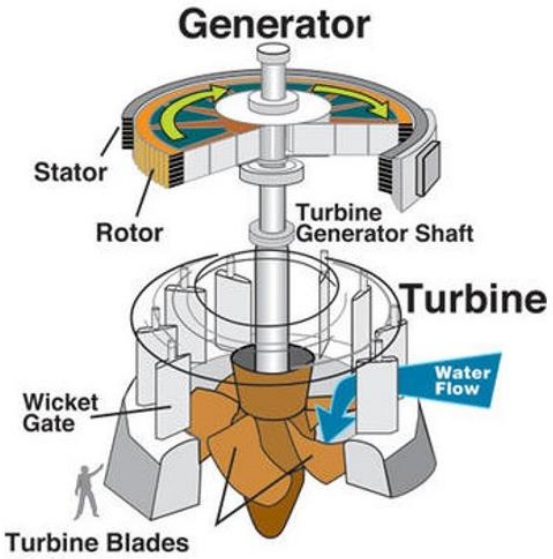
Where a brighter tomorrow begins.

A closer look: inside a hydro station





Water management

- Generating stations have two ways to pass water downstream:

  1) Through the turbines

  2) Through the spillway(s)

- When inflow is more than the turbine capacity, dams on the Ottawa River are operated so that dam outflow = inflow

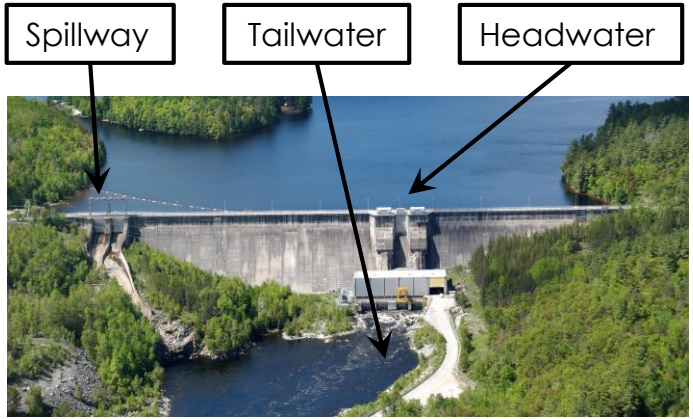
Chenaux GS turbine capacity = 1000-1600 m^3/s

Chenaux GS total spillway capacity = 5000-8000 m^3/s

Measuring water

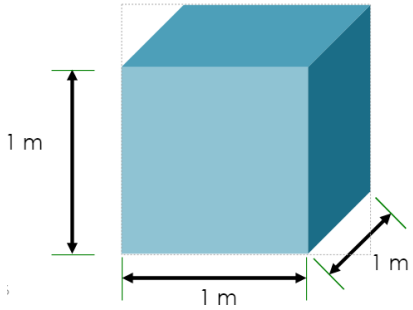
What is level?

- Level is the elevation of the water surface
- Measured in metres (m) above sea level
- Measured at dams and strategic locations
- Operating ranges are mandated limits



What is flow?

- How much water is coming into/out of the station
- Measured as cubic metres per second (m^3/s or cms)

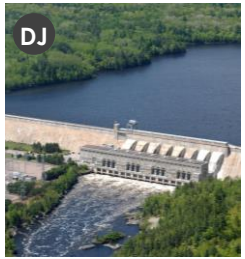


OPG's Ottawa River operations

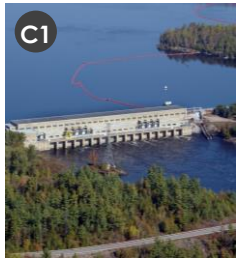
The Ottawa River watershed

- Basin drains an area of 146,000 km^2
- River travels over 1,130 km
- Since 1950, an average of 37,138,583,440 m3 has flowed though Chats Falls annually – enough to fill Lake Simcoe >3x/year

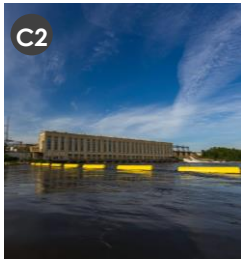
Otto Holden



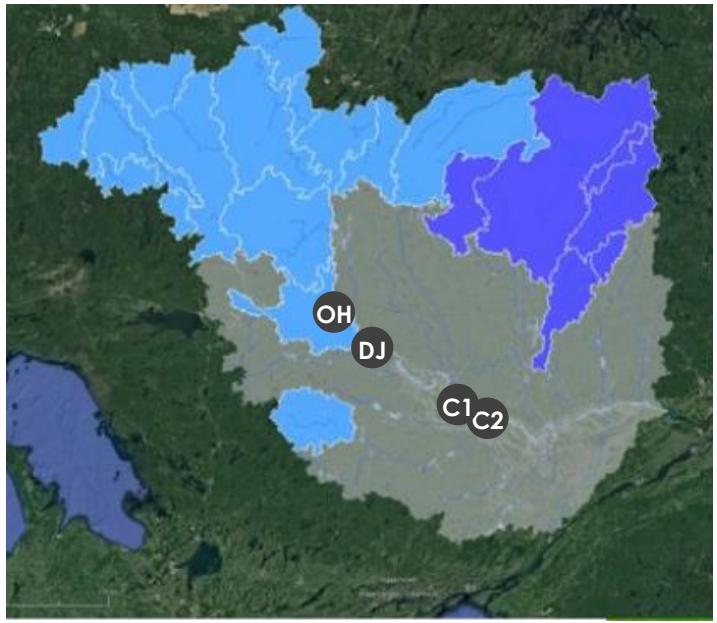
Des Joachims



Chenaux

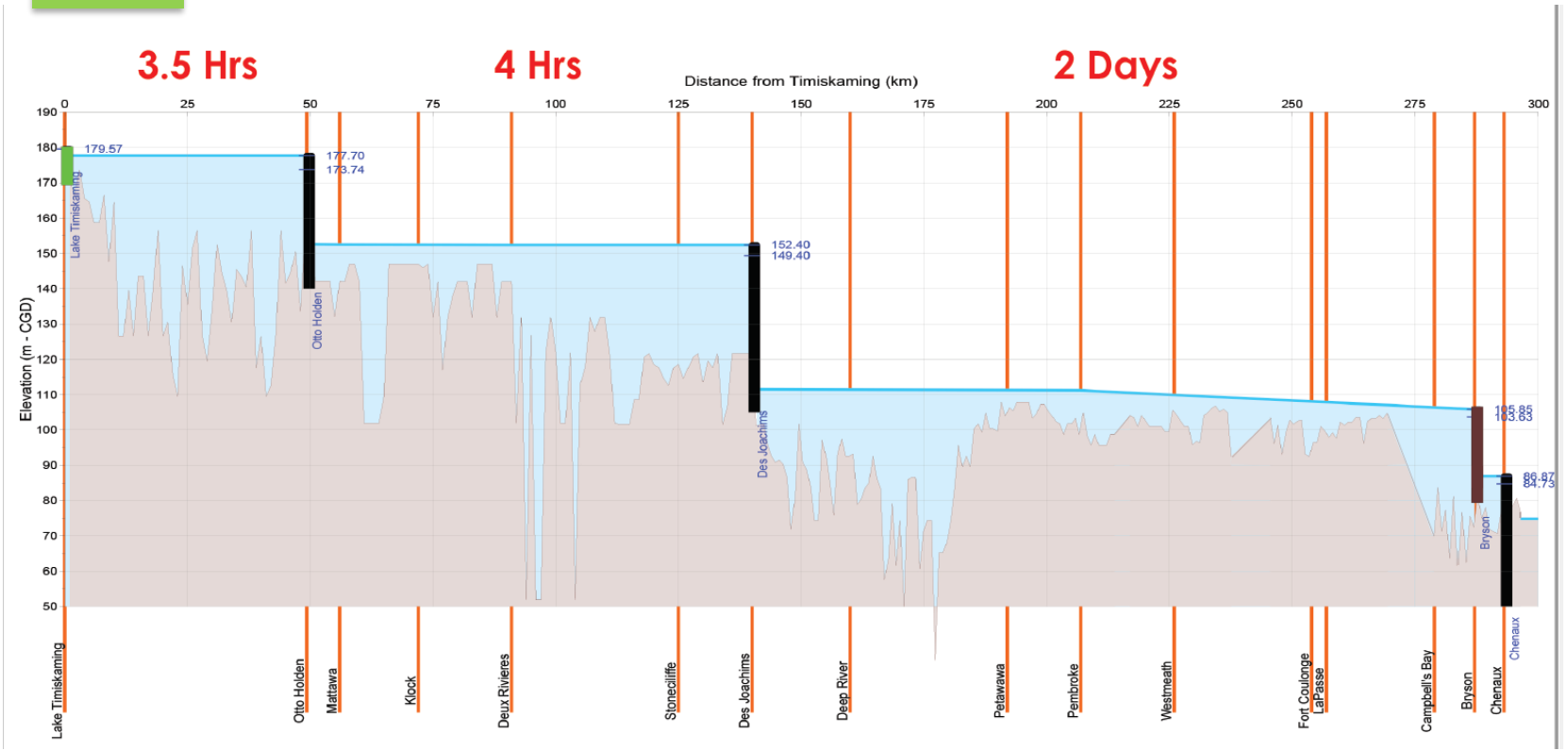


Chats Falls



Ottawa River watershed

Ottawa River Profile - OPG Operations



Operating ranges

- Every dam has a unique operating range
- Water levels vary within the operating range depending on conditions
    - •Public safety
    - •Dam inflow
    - •Upstream impact of water level
    - •Environmental considerations
    - •Season
- Water level fluctuation within the operating range is very similar year over year

Seasonal considerations

WINTER

Precipitaton falls as snow, operations within winter range

SPRING

When flows are the highest

aka freshet

SUMMER

Operate within summer range

FALL

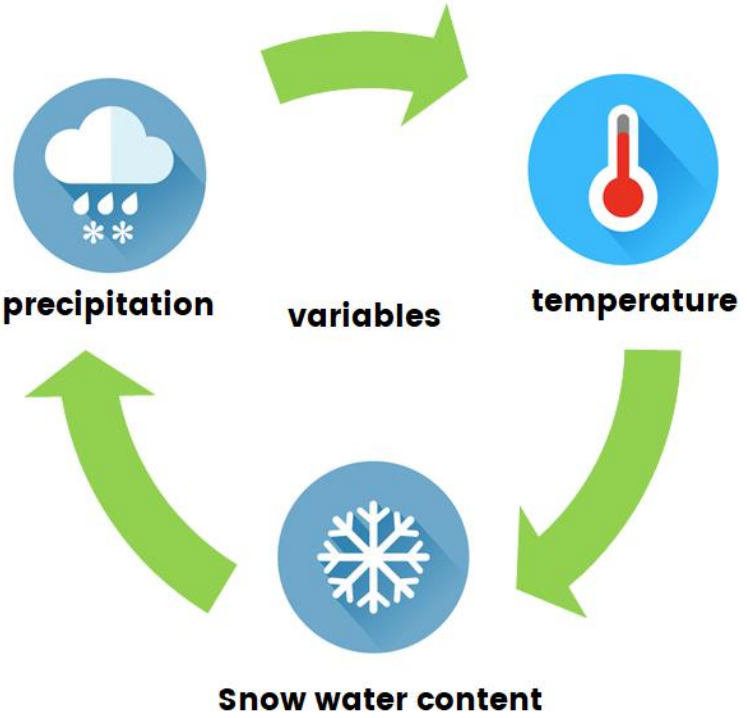
Fall rain can trigger high inflows

Freshet Factors

A coordinated approach is employed amongst OPG, other dam operators and agencies to ensure flooding across the region is lessened, or even prevented when possible.

We work with nature and monitor:

- Reservoir management (if available)
- Snow surveys
- Temperature monitoring
- Weather forecasting

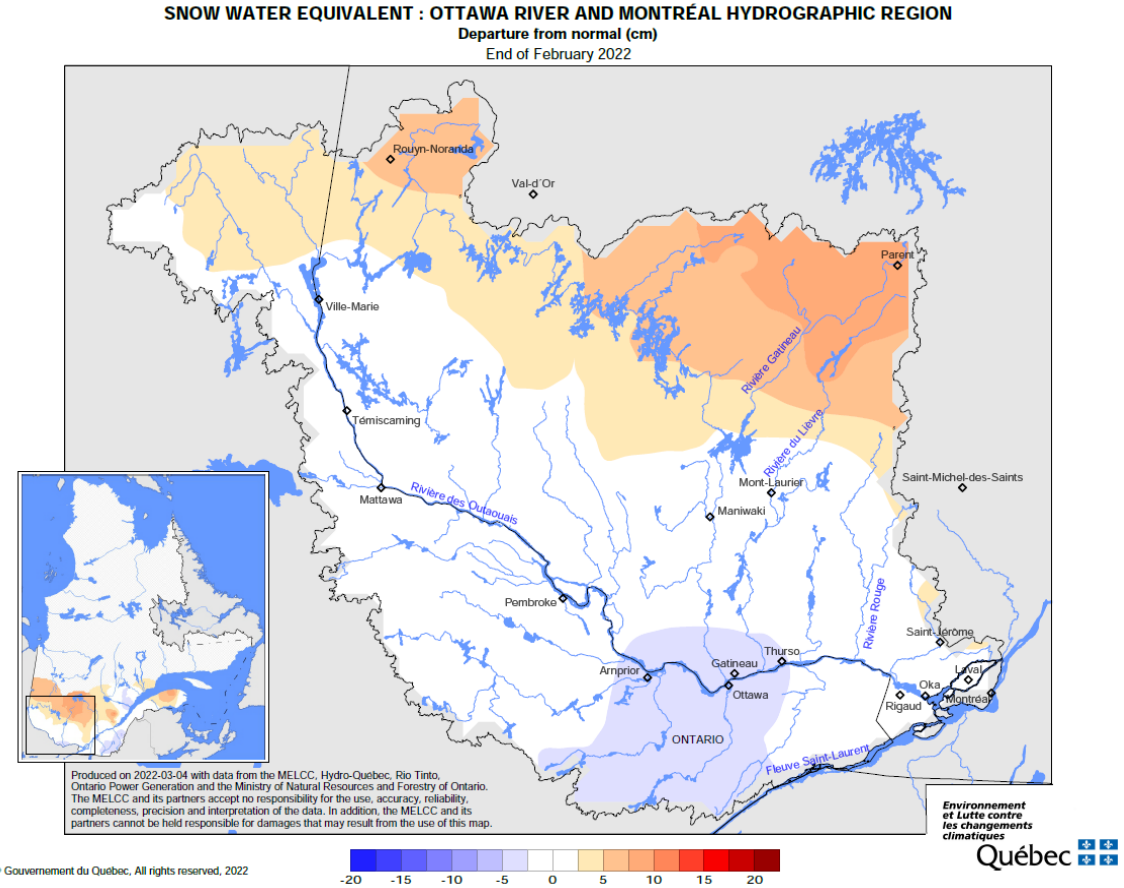


Freshet Factors

Snow Water Equivalent (SWE)

Current Conditions:

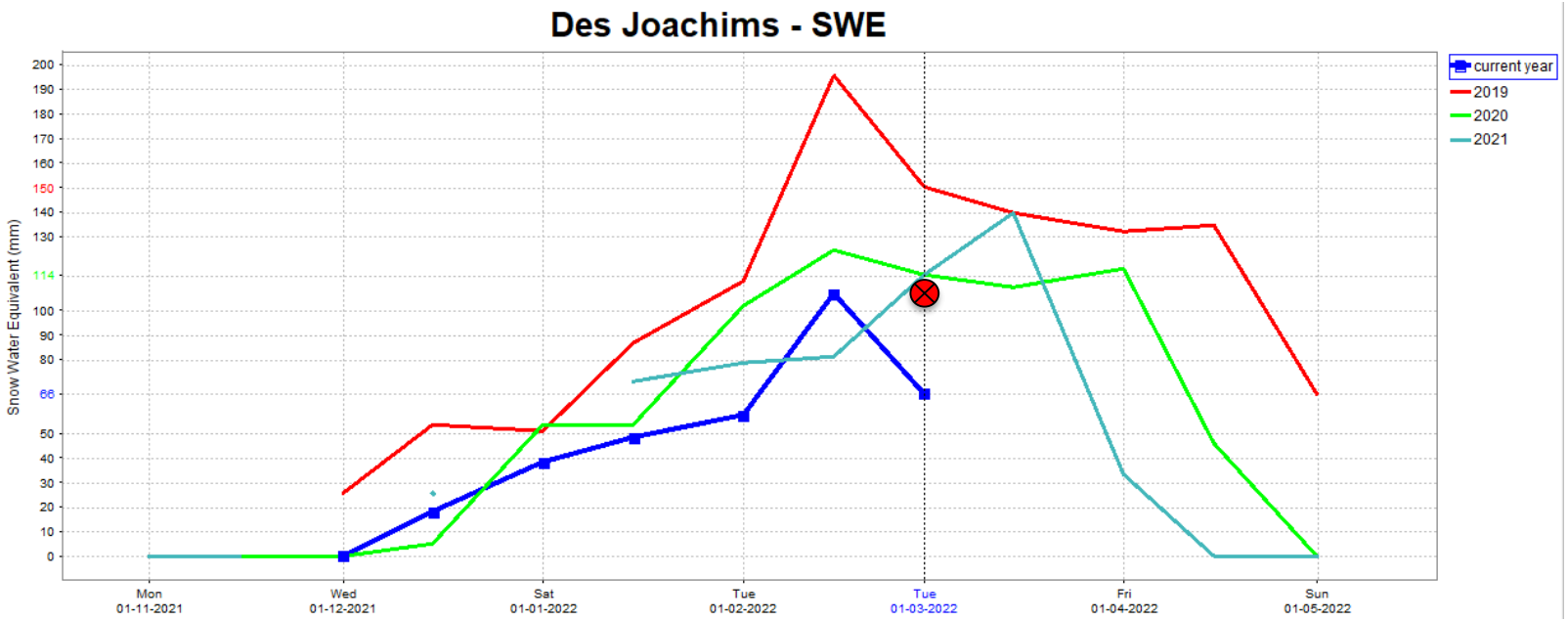
Departure from Normal (cm)



Freshet Factors

Des Joachims SWE March 1, 2022 = 66mm (62% of normal)

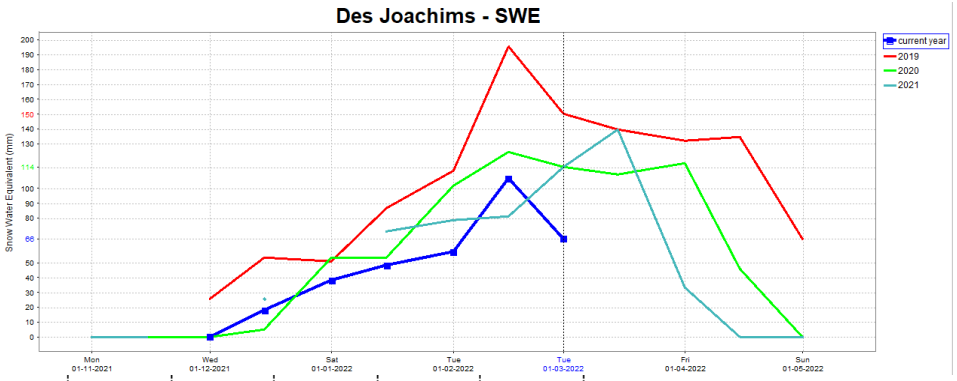
- March 1st Normal = 106mm

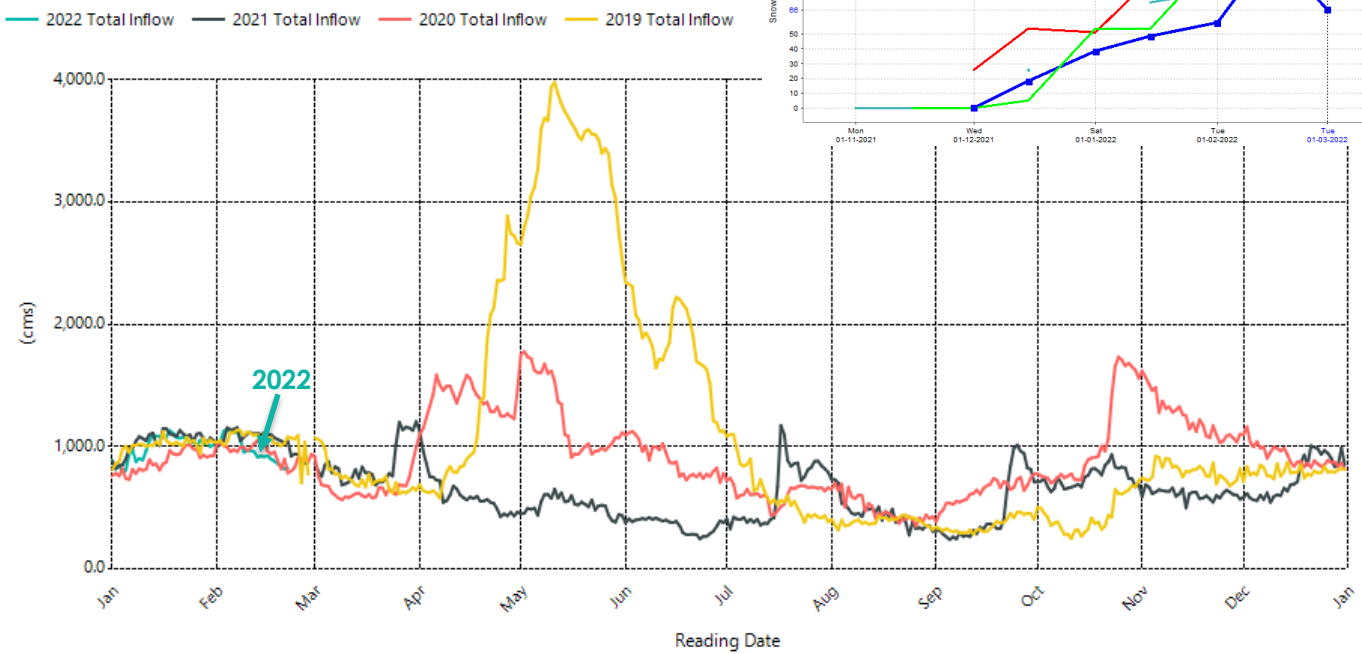


Freshet Factors

Total Inflow (cms)

Des Joachims 2019-2022

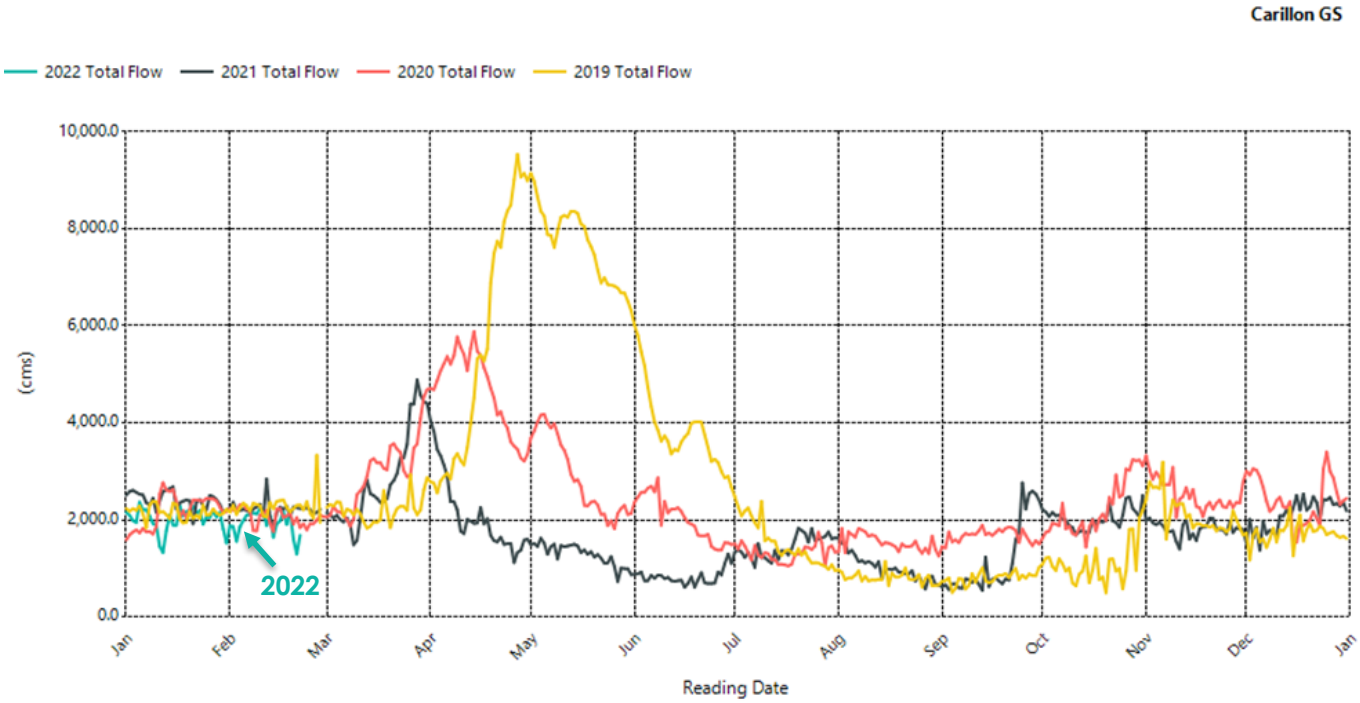




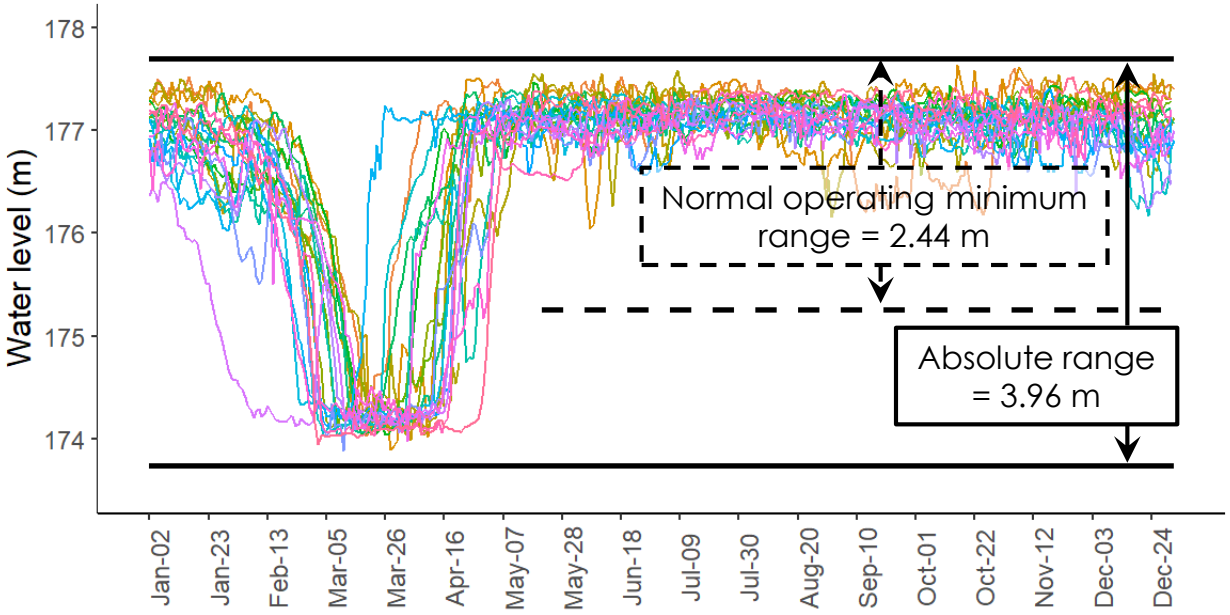
Freshet Factors

Total Inflow (cms)

Carillon 2019-2022



Otto Holden GS operations

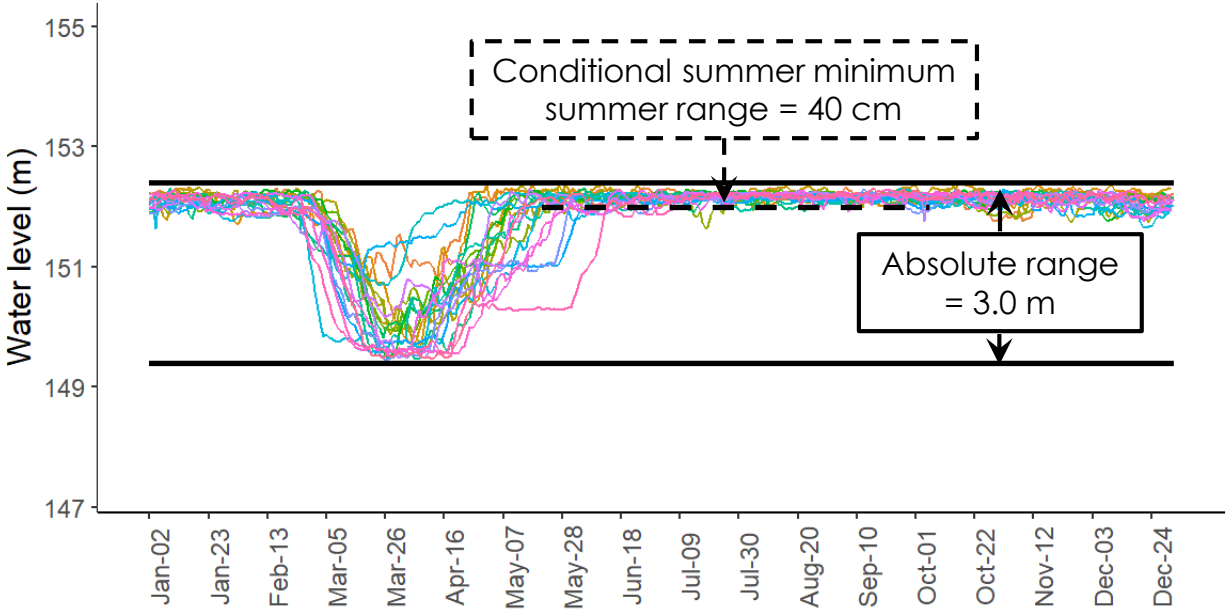


Otto Holden GS headwater level (2000-2020) with operating range

- Storage = 76 million m^3
  - ~47.5 Sky Domes
  - 13 hrs (normal peak flow)
- Normal volume of water through the dam annually = 23 billion m^3

➢ Every spring the headwater is lowered to help drawdown Lake Timiskaming

Des Joachims GS operations

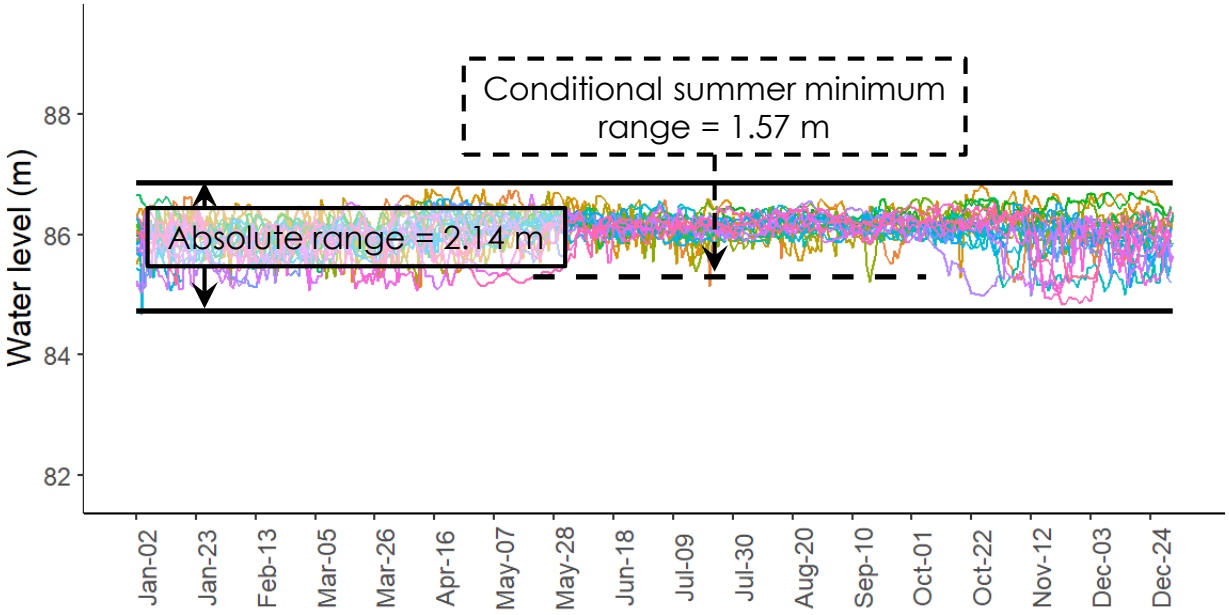


Des Joachims GS headwater level (2000-2020) with operating range

- Storage = 226 million m^3
  - ~141 Sky Domes
  - 31 hrs (normal peak flow)
- Normal volume of water through the dam annually = 27 billion m^3

➢ Every spring the headwater is lowered to avoid worsening upstream flooding and mitigate the impact of an upstream river constriction

Chenaux GS operations

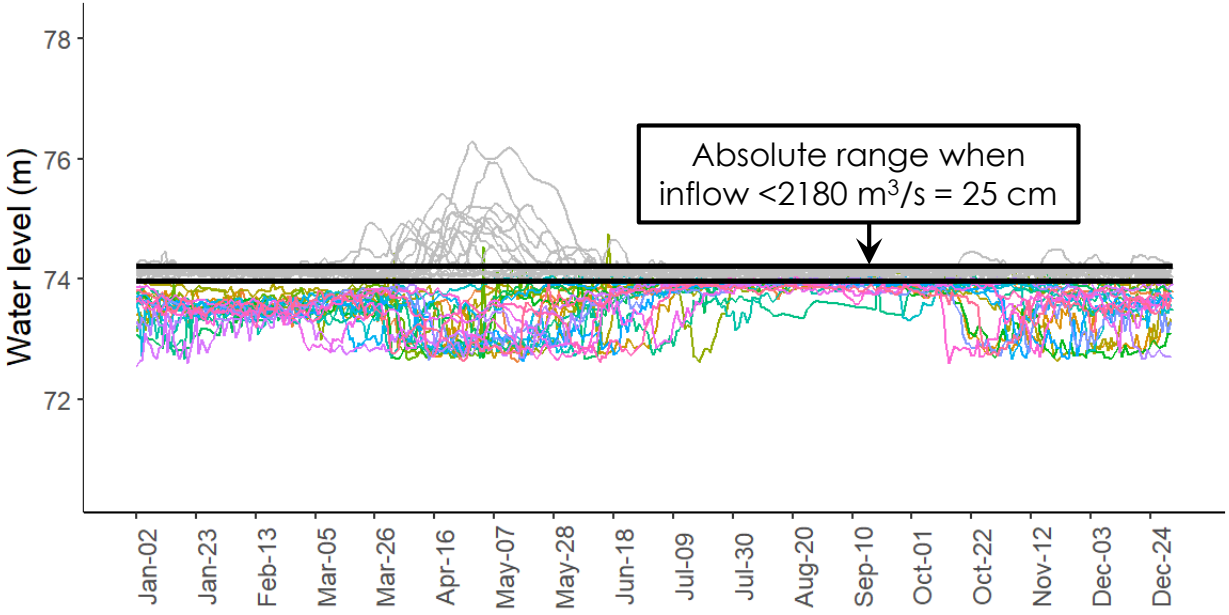


Chenaux GS headwater level (2000-2020) with operating range

- Storage = 37 million m^3
  - ~23 Sky Domes
  - 11 hrs (normal peak flow)
- Normal volume of water through the dam annually = 33 billion m^3

➢ Water level is relatively consistent through the year; typically higher in summer

Chats Falls GS operations



Chats Falls GS headwater (2000-2020) and Chats Lake level (in gray; 2000-2020) with operating range for Chats Lake

- Storage = 32 million m^3
  - ~20 Sky Domes
  - 3 hrs (normal peak flow)
- Normal volume of water through the dam annually = 38 billion m^3

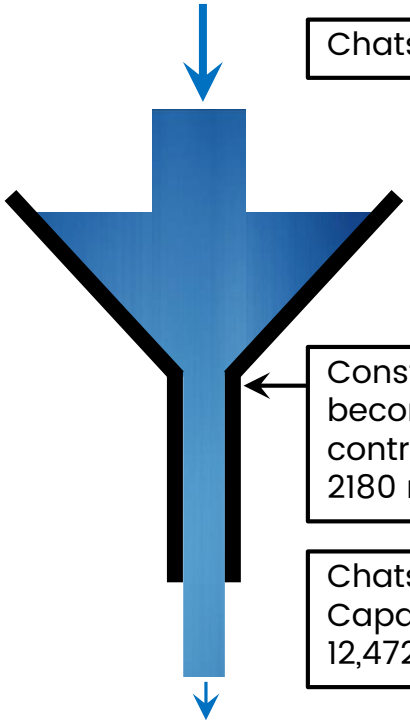
➢ When inflow >2180 m^3/s a river constriction between Chats Lake and the dam becomes the control point for the lake level

Natural river constrictions

Example #1 (Chats Lake)

River constrictions are similar to funnels

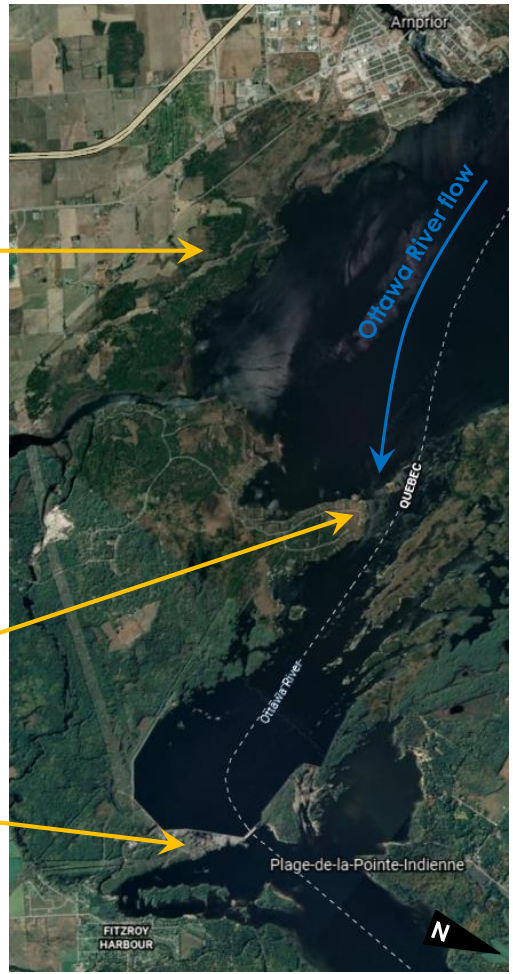
- Water will not build up in the funnel if poured in more slowly than the capacity of the narrow section
- If water is poured in more quickly it will back up
- Conditions downstream cannot lessen the backup caused by the constriction, the constriction is the control point



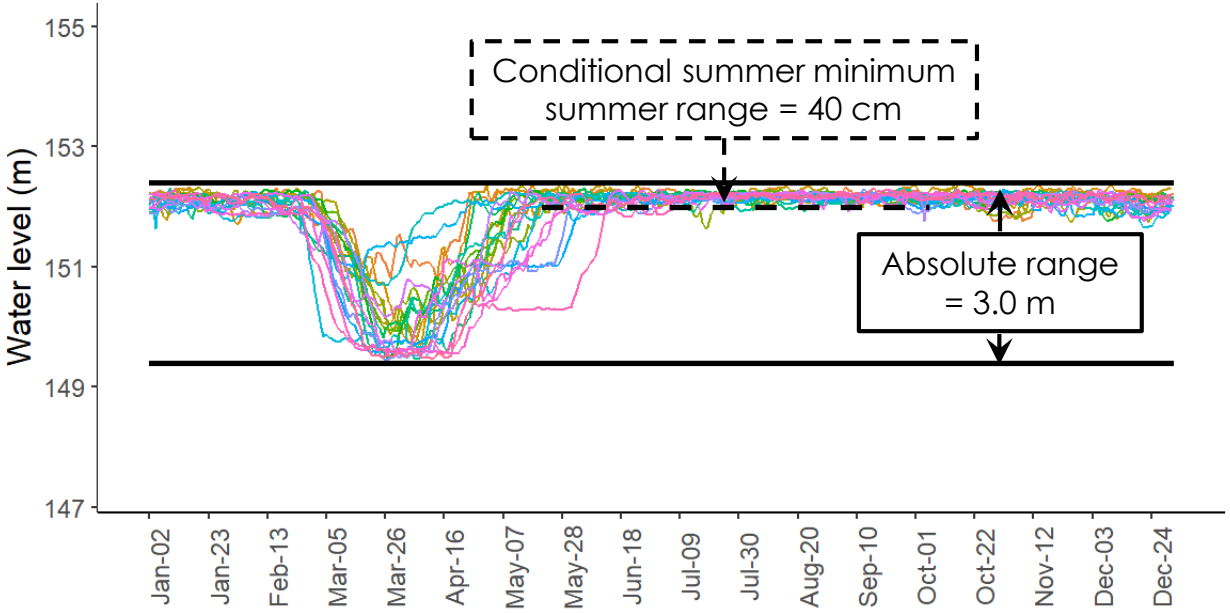
Chats Lake

Constriction becomes control point at 2180 m^3/s

Chats Falls dam Capacity = 12,472 m^3/s



Des Joachims GS operations



Des Joachims GS headwater level (2000-2020) with operating range

- Storage = 226 million m^3
  - ~141 Sky Domes
  - 31 hrs (normal peak flow)
- Normal volume of water through the dam annually = 27 billion m^3

➢ Every spring the headwater is lowered to mitigate flooding downstream and mitigate the impact upstream of the river constriction

Natural river constrictions

The Klock constriction and Des Joachims GS

Left: Low water near Deux-Rivières during the 2019 spring lowering of the Des Joachims headwater

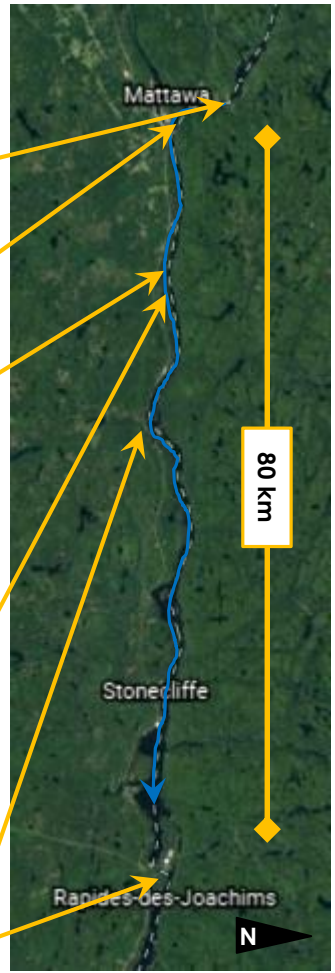
Otto Holden GS

Mattawa

The Klock constriction

Deux-Rivières

Des Joachims GS

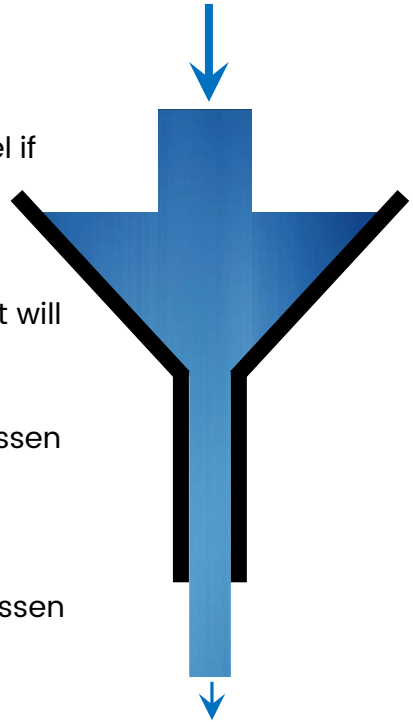


Natural river constrictions

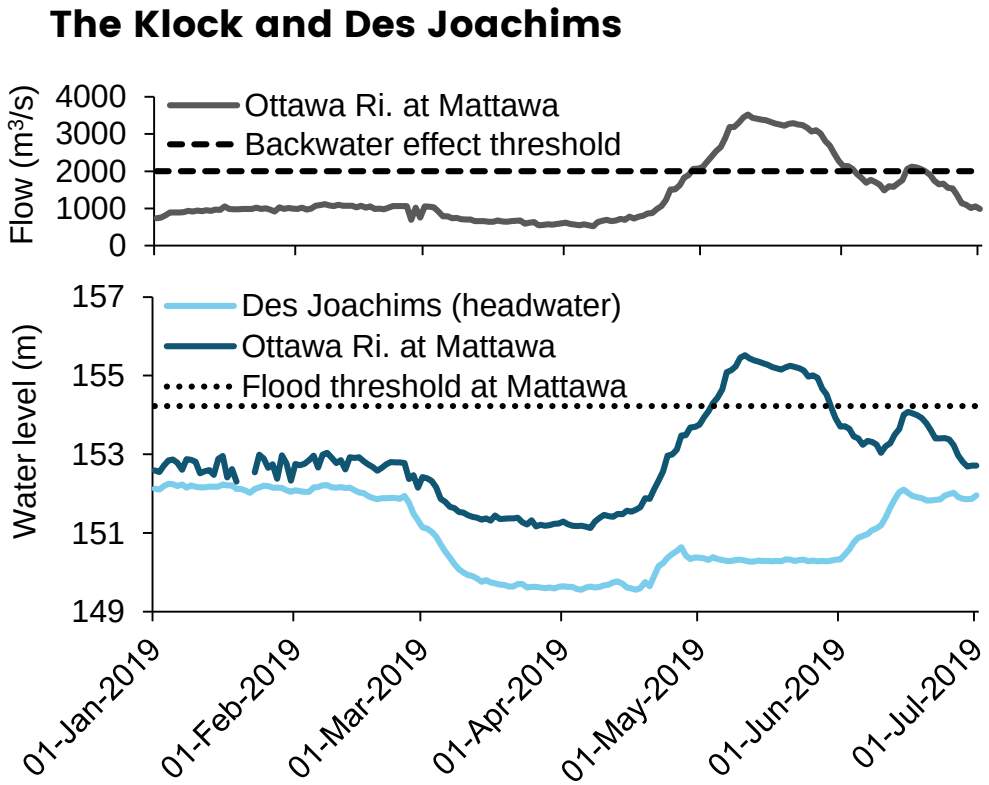
Example #2 (The Klock)

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 however a lowered headwater at Des Joachims will lessen the impact upstream of the constriction



Natural river constrictions



Additonal information

ONTARIO POWER GENERATION

Where a brighter tomorrow begins.

Additional resources

- About winter draw down article
- How hydro works video
- Managing high water levels on the Ottawa River video
- We work with nature video
- For more videos, visit www.youtube.com/opgvideos

Where to find more information

- www.Opg.com/river
- www.Opg.com/water
- www.ottawariver.ca - Ottawa River Regulation Planning Board
- Toll-free: 1-888-884-8022
- Ottawa River Stakeholder Relations Contact: Jennifer Gardiner

  Phone: 613-601-0654

Email: jennifer.gardiner@opg.com

- OPG Climate Change Action Plan: Climate change solutions - OPG
- OPG Reconciliation Action Plan - OPG


THANK
YOU

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