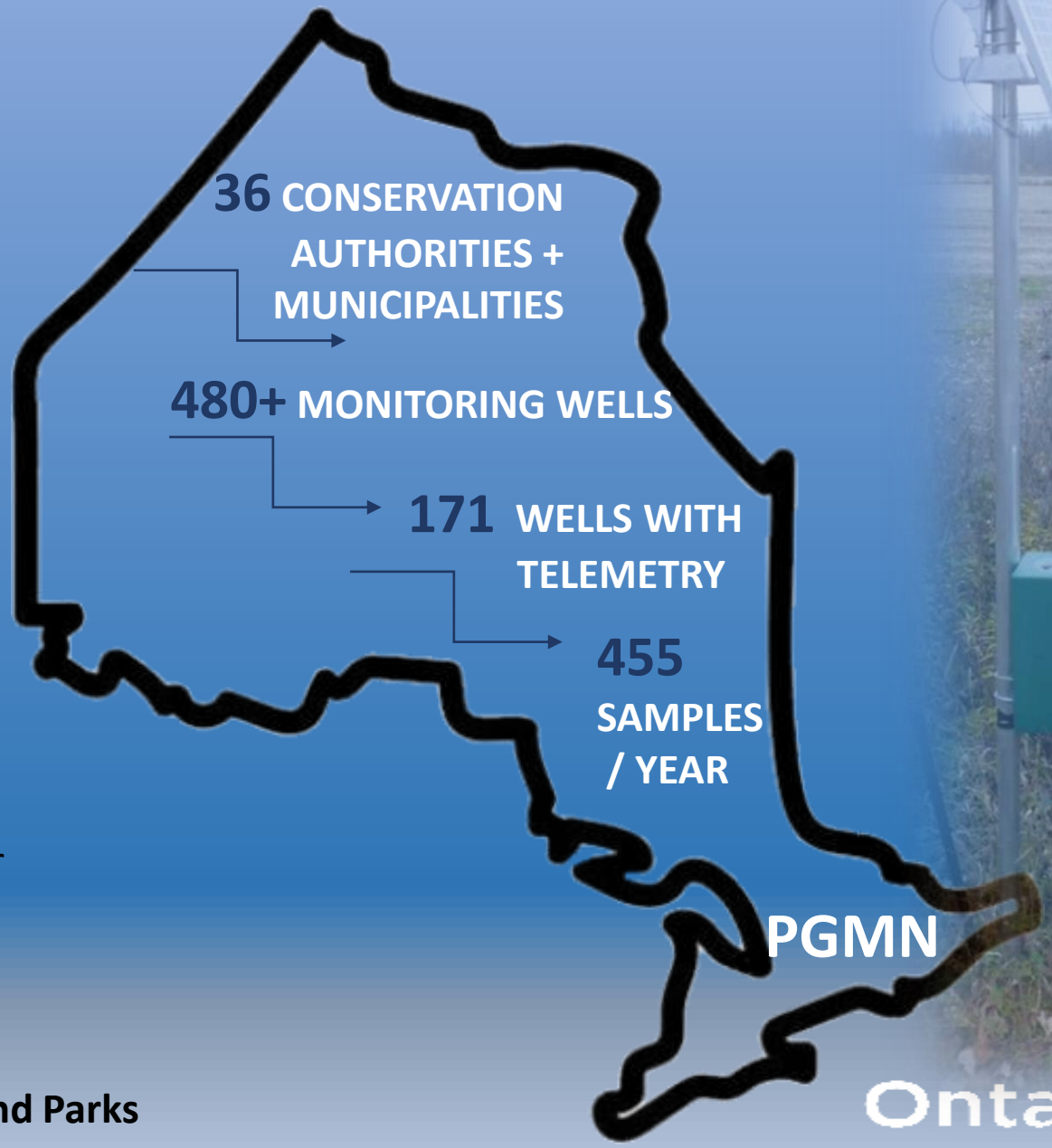
CELEBRATING 25 YEARS

of the Provincial Groundwater Monitoring Network



NRCAN National Dialogue on Groundwater
April 9th , 2025

Ministry of the Environment, Conservation, and Parks

Ontario

Groundwater Monitoring Program – Past 25 Years

- An overview of the Provincial Groundwater Monitoring Program (Program)
- Provincial Groundwater Monitoring Network (PGMN)
- Key achievements / products in the past 25 years
- Recent initiatives

Ontario

Groundwater Monitoring Network - Early Years

Year 2000: Provincial Groundwater Monitoring Network (PGMN) established in response to the 1999 Drought and the 2000 Walkerton Tragedy

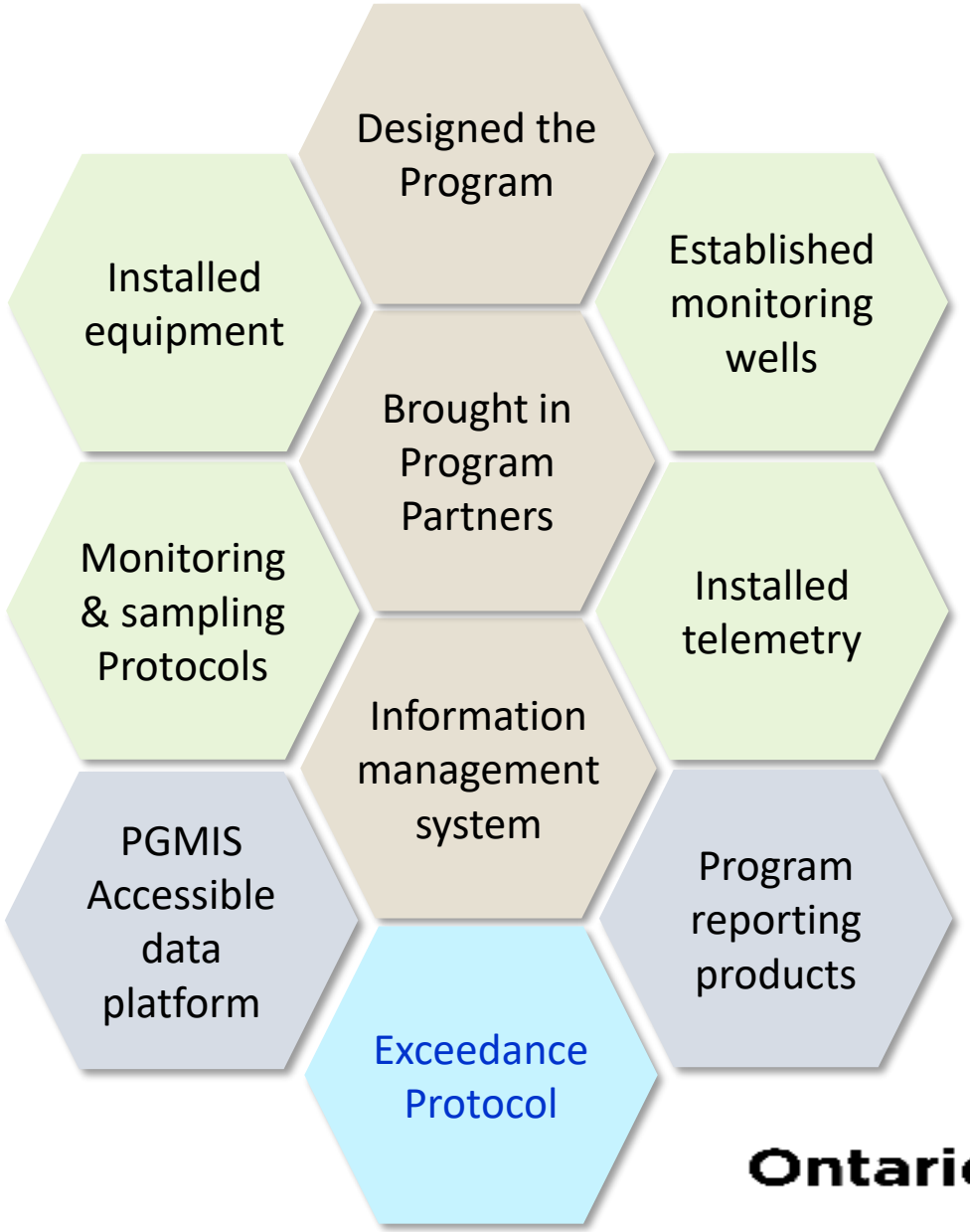
- $6.1 M in funding
- Partnerships established (all in by 2003)
- Network designed

Year 2003: PGMIS data system up and running (WQ module added in 2005)

Year 2004: Analog telemetry 80% of wells

Year 2005: Well acquisition and installation complete (427 wells in network)

Year 2005: PGMN Exceedance Protocol in response to concern from Walkerton Mayor and Citizens Group



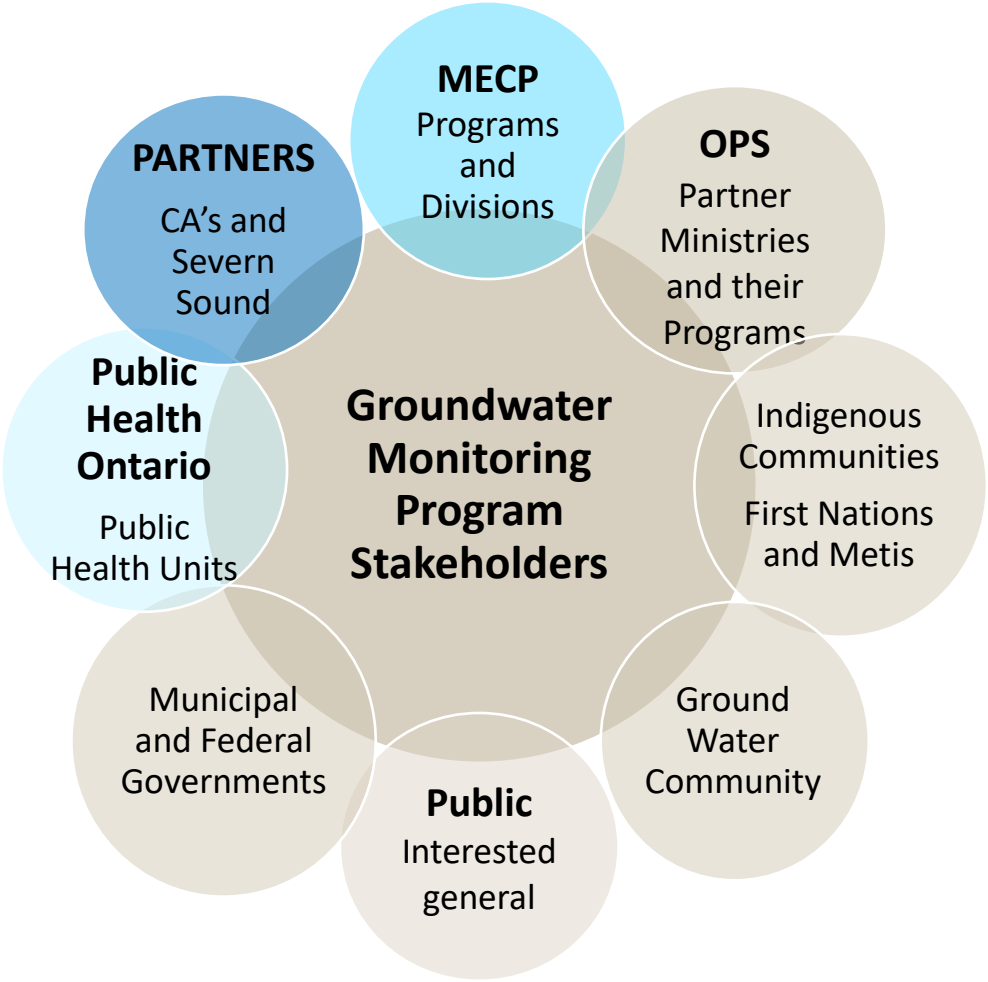
Ontario

PGMN, Partners and Stakeholders

Objectives:

- To track the state of ambient groundwater quality and quantity and identify trends and correlations with key factors that influence groundwater conditions
- To support decision making related to water management, environmental approvals, compliance, policy and standards development, and public health policy /outreach
- To provide a framework of groundwater information to enable detailed studies and modelling on issues of concern

Stakeholders:



Partnership:

Collaboration Agreement

Partners

36 Conservation Authorities (CAs) and the Severn Sound Environmental

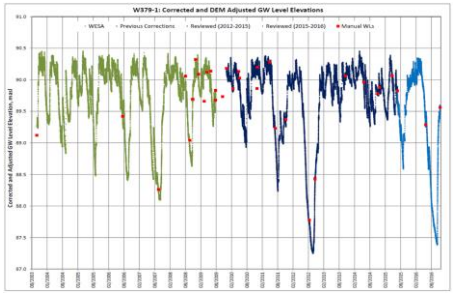
- Manage wells & equipment
- Liaise with landowners
- Data collection
- Sampling
- Report out on Data – Report Cards

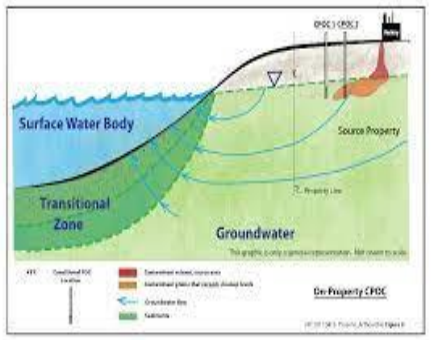
MECP

- Oversight
- Guidance and training
- Fund infrastructure & equipment
- Manage wells and sampling outside of partner borders
- Manage and report out on data

Ontario

Groundwater Monitoring Program Today



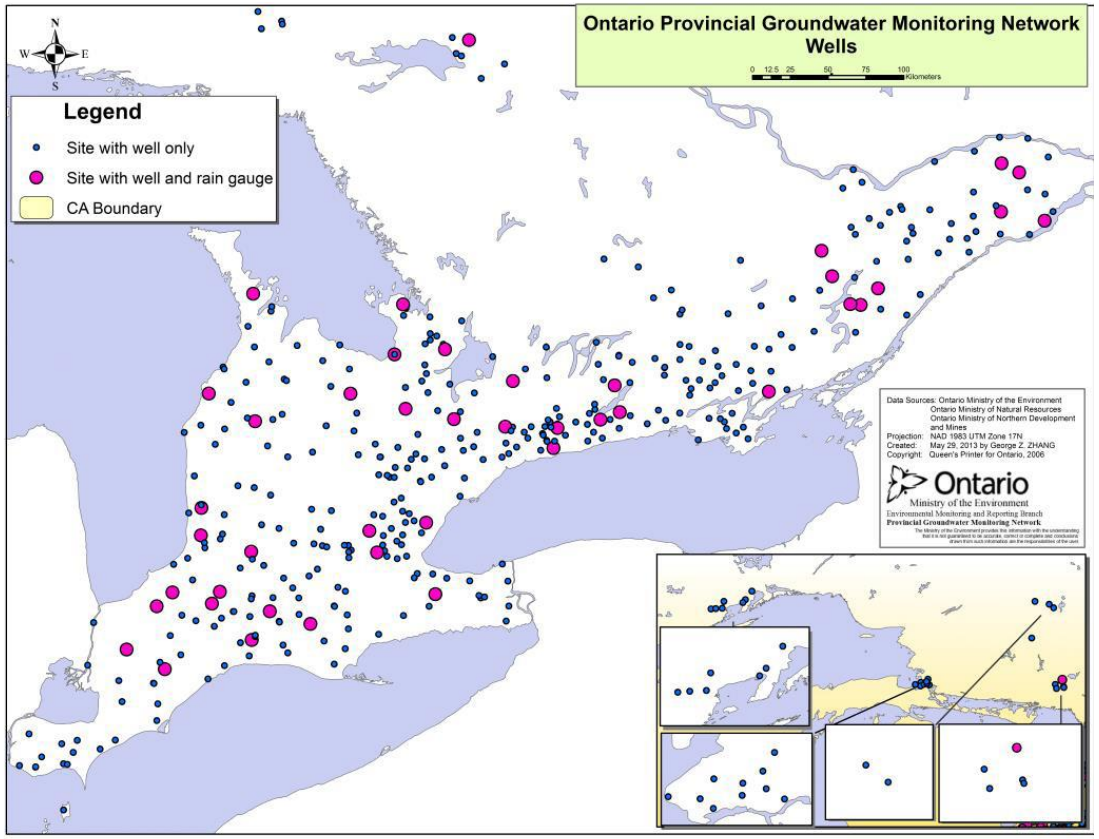


- **Provincial Groundwater Monitoring Network (PGMN)**
  - groundwater level and quality and precipitation monitoring
  - data management and sharing
  - Outreach to stakeholders
- **Great Lakes, Climate Change and Drought**
  - research, support to GLWQA, COA (Annex Management), Ontario Low Water Response, Climate Change adaptation, etc. (on-going since 2007)
- **Integrated Water - Climate Change Monitoring Network**
  - Groundwater, surface water, climate monitoring including flow, water levels and quality (since 2010)
- **Ring of Fire – peat pore monitoring network**
  - water level, conductivity and water quality monitoring (2013)
- **Expert Hydrogeological Advice**
  - Provision of expert advice including advice, reports, program requests, committees (since 2000 and before)

Ontario

Provincial Groundwater Monitoring Network (PGMN)

- ~480 wells with hourly groundwater levels
  - 150 locations representing 171 wells with satellite telemetry (move from cellular to GOES Satellite completed in 2014)
  - 115 locations with barometric pressure measured
- ~400 wells sampled for water quality, inc. up to 455 samples per year analysed by MECP laboratory (general chemistry, nutrients, major ions and metals) from:
  - Annually in fall – 320 wells
  - Biannually - 80 wells moved from annual to biennial in 2023/2024)
  - Spring sampling added for 40 wells in 2022, up to 80 in 2023
- 66 rain gages
- 12 operational soil moisture stations



Ontario

PGMN Data Management

Since 2019 , PGMN data sets have been stored and managed in the Water Information Systems KISTERS (WISKI)

THE INFORMATION MANAGEMENT SYSTEM (WISKI)

A one-stop solution for:

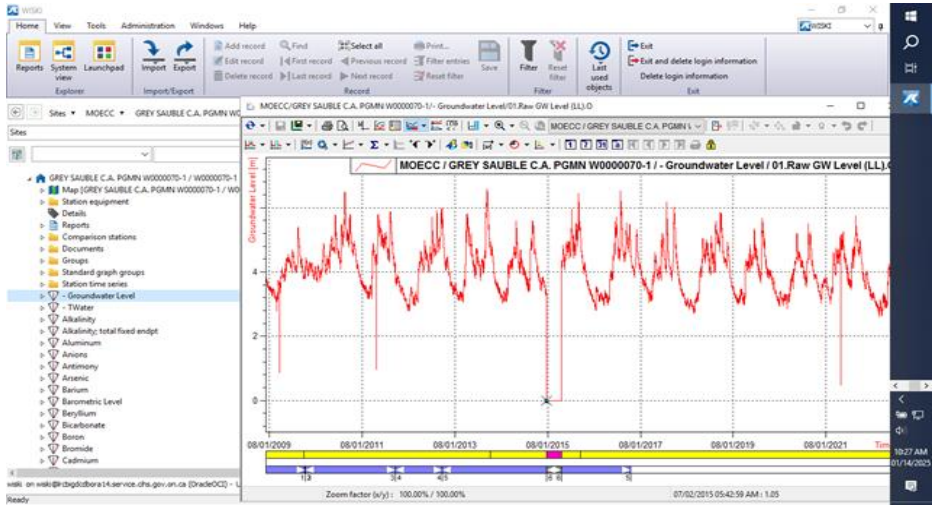
- the acquisition, storage, manipulation and management of PGMN data sets from multiple sources in ONE location
- calculation of raw water level data to barometrically compensated and static water level corrected water level data for use in scientific analyses
- assessment of the monitoring network design (i.e. distribution of various units of monitoring equipment throughout the province)

THE DATA

- hourly water level
- annual or biennial water quality
- hourly barometric pressure
- rain gage data (precipitation)
- soil moisture and other parameters
- groundwater quality
- metadata including well data

DATA MANAGEMENT

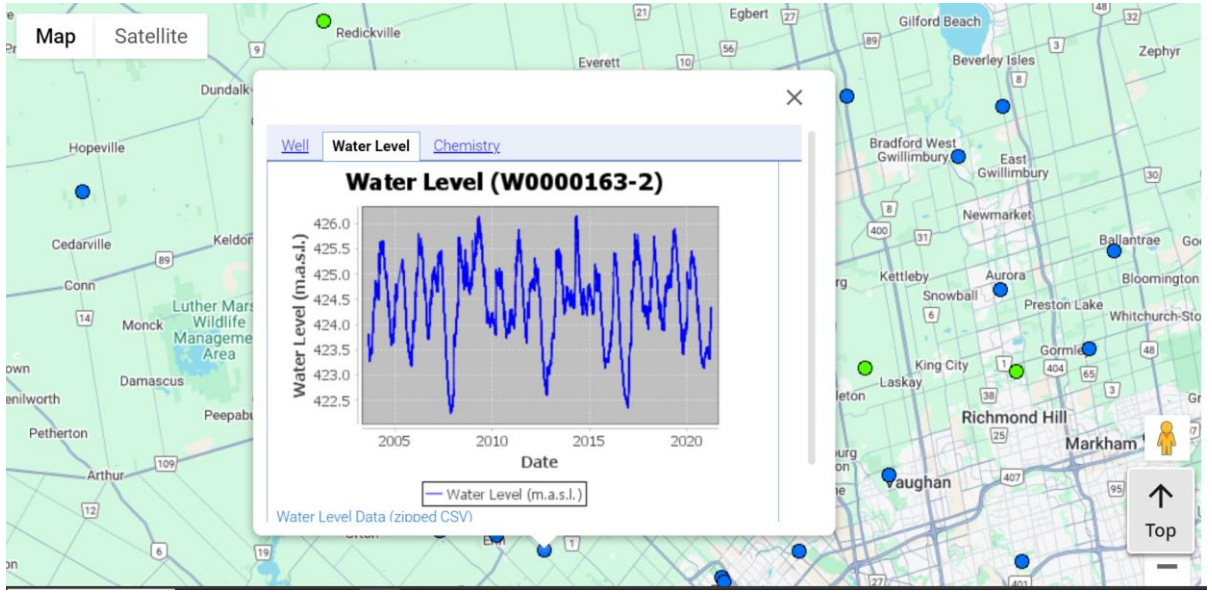
- Data is accessed in WISKI via tree views
- The design allows for :
  - ✓ data presentation and editing using graphs and tables
  - ✓ QA/QC and data validation by adding quality flags
    - ✓ and/or remarks and by using agents
  - ✓ performing statistical functions (min, max, mean)
  - ✓ reporting (standard and customized)



Ontario

PGMN Data Availability and Access

- Accessible to Public via the MECP Public web site
  - ✓ data catalogue: https://data.ontario.ca/dataset/provincial-groundwater-monitoring-network
  - ✓ Interactive map and graphs: https://www.ontario.ca/environment-and-energy/map-provincial-groundwater-monitoring-network



- Accessible to PGMN Program Partners (i.e. CAs and participating Municipalities) and Ontario Government via password-based Web-Portal

PGMN Well Data

- Location, elevation, well and geological details, ownership.

PGMN Well Data

- Provides location, elevation, well and geological details, and ownership.

Water Quality Data

- Ambient / background, tracking quality changes, land use, contamination, etc.
- Graphs not currently available – updating soon.

Water Level Data and Graphs

- Assessing seasonal water level trends, low water, mapping, groundwater modelling, etc..
- Updated water levels to January 2025 coming very soon.

PGMN Map

- Spatial presentation with access to data visually

3rd most accessed ministry open data page in 2024

Ontario

PGMN Groundwater Quality Data Use

PGMN Groundwater Quality and Public Health

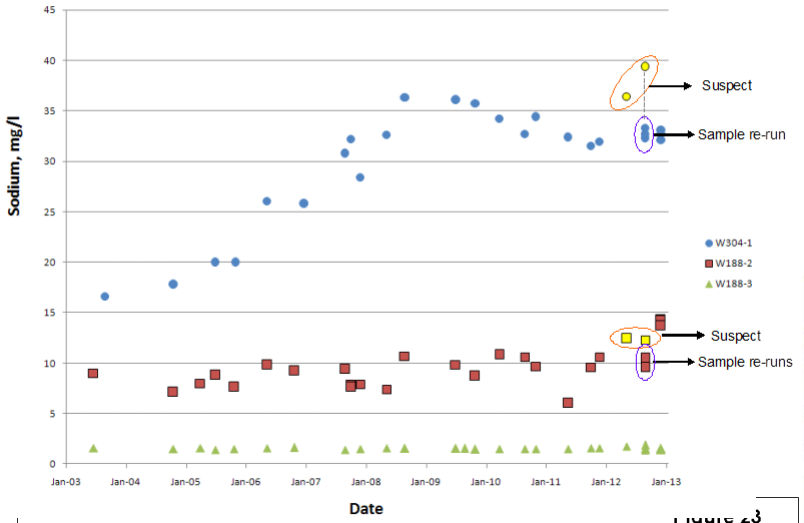
- 68 PGMN wells have reported exceedances of health related ODWQSs

Parameter	PGMN Wells
Fluoride	45
Arsenic	17
Nitrate + Nitrite	15
Uranium	2
Barium	3
Boron	1

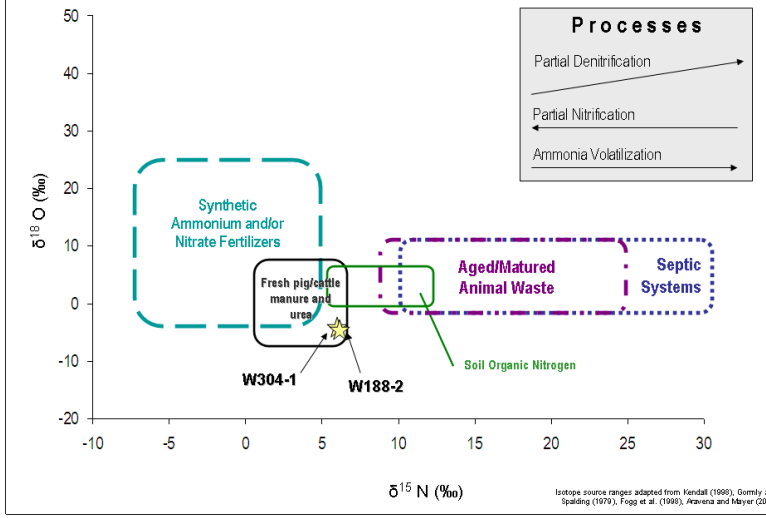
- Hydrogeological Reports written for 55 exceedances and released to the Public Health Units, MECP and CAs.
  - ✓ provides hydrogeological conditions, potential sources of elevated parameters, trends, water use, treatment options

- Well over 2,000 Exceedance Notifications sent to Public Health Units, MECP, and CAs.
- Notification Protocol updated in 2024 with an updated notification package.
  - ✓ Provides information on well and aquifer characters, trends, water use map in the area and parameter fact sheet
  - ✓ New fact sheets on Nitrate, Chloride, Arsenic and Uranium

Figure 16
Sodium concentrations from 2003-2012 – PGMN Walkerton Area Wells



PGMN Wells W188-2 and W304-1 Nitrate Isotope Results



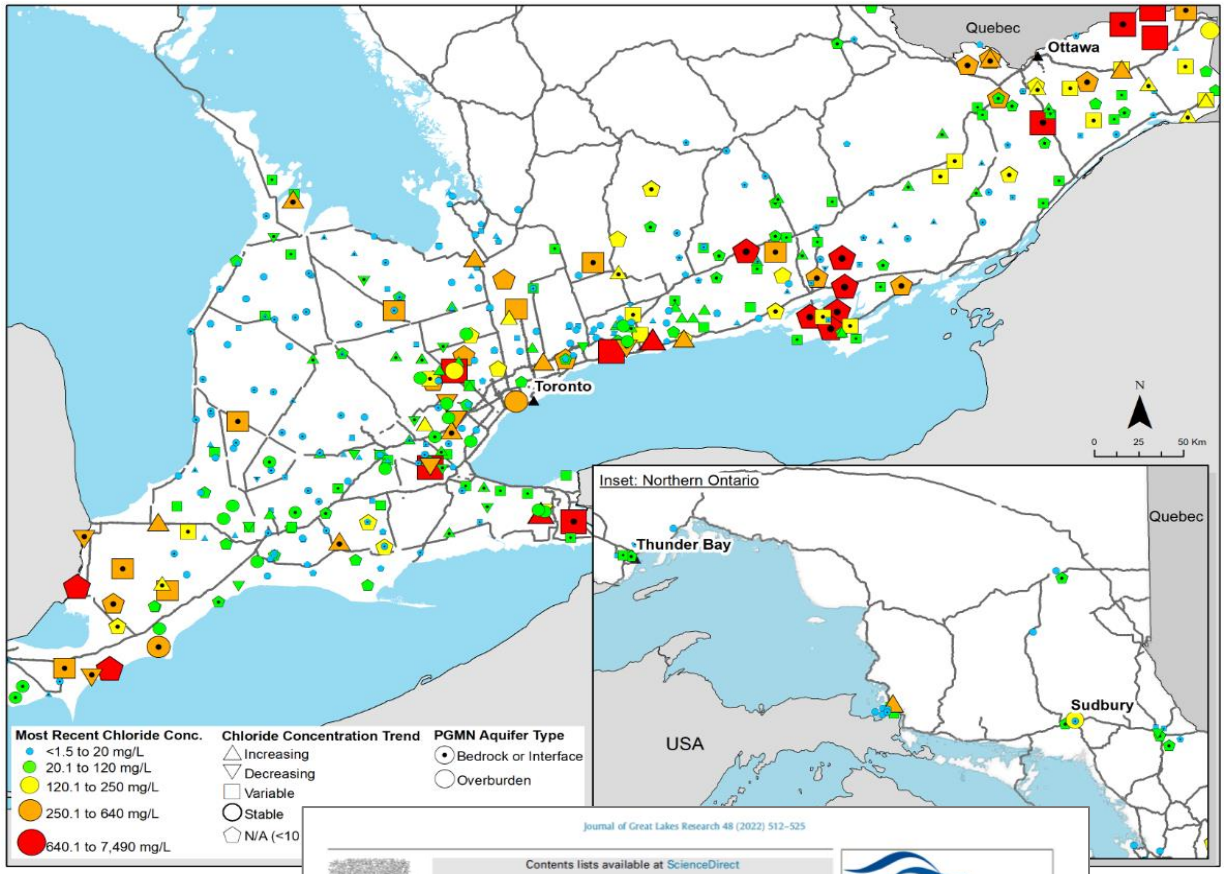
Conservation Authorities Watershed Report Card

Ontario's Conservation Authorities 2023 Watershed Report Cards provide a 'checkup' on the health of many of Ontario's watersheds. They track and report on the surface and groundwater quality as well as the conditions of our forests.

Ontario

PGMN Groundwater Quality Data Use

Beyond PGMN

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Chloride trends in Ontario's surface and groundwaters

Ryan J. Sorichetti [a,1,*], Melanie Raby [a,1], Claire Holeton [a,1], Nadine Benoit [a], Lucas Carson [a], Anna DeSellas [b], Ngan Diep [a], Brie A. Edwards [c], Todd Howell [a], Georgina Kaltenecker [a], Chris McConnell [b], Clare Nelligan [a], Andrew M. Paterson [b], Vasily Rogojin [a], Nure Tamanna [a], Huaxia Yao [b], Joelle D. Young [a]

[a] Ontario Ministry of the Environment, Conservation and Parks, Environmental Monitoring and Reporting Branch, 125 Resources Road, Etobicoke, Ontario M9P 3V6, Canada
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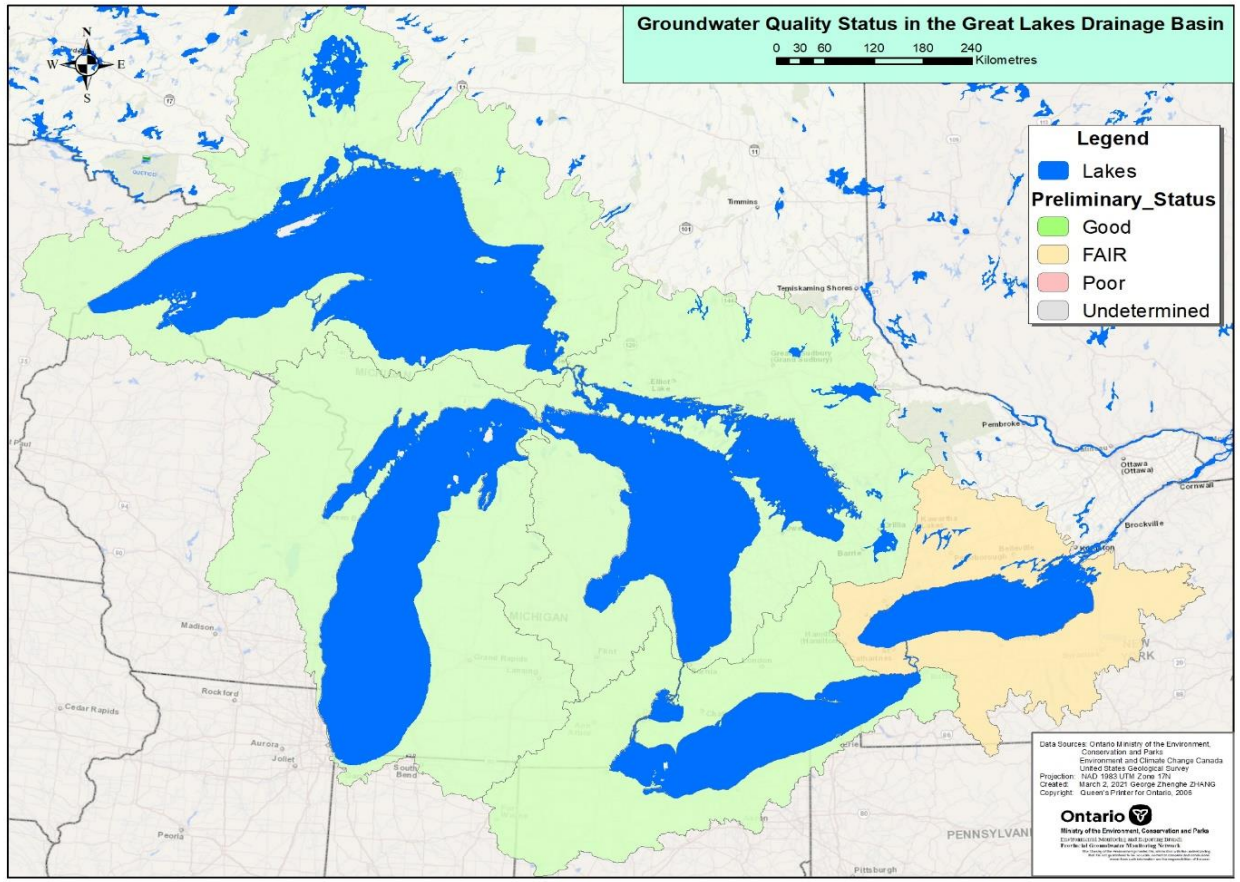
[c] Ontario Ministry of the Environment, Conservation and Parks Vale Living with Lakes Centre, 935 Ramsey Lake Road, Sudbury, Ontario P3E 2C6, Canada



STATE OF THE GREAT LAKES 2022

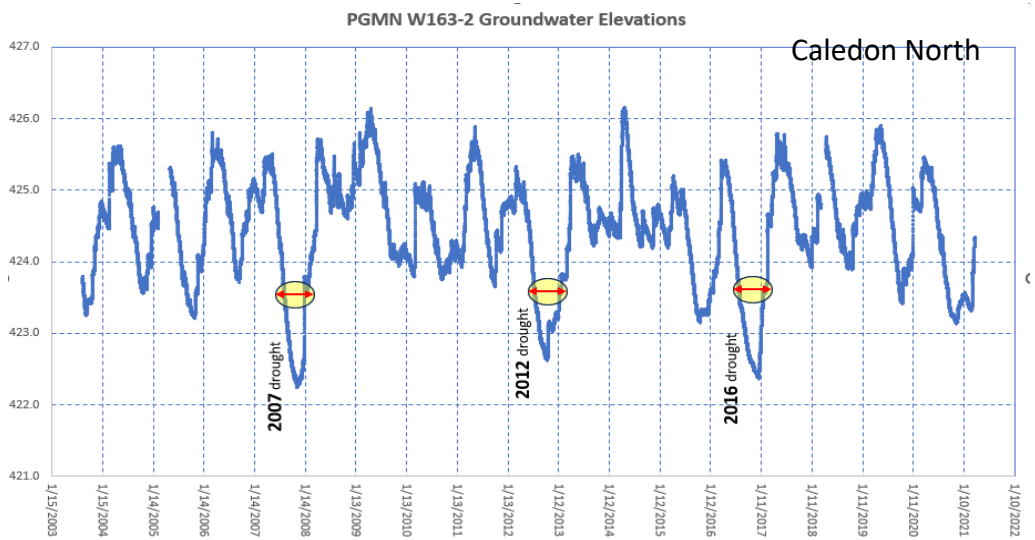
Technical Report

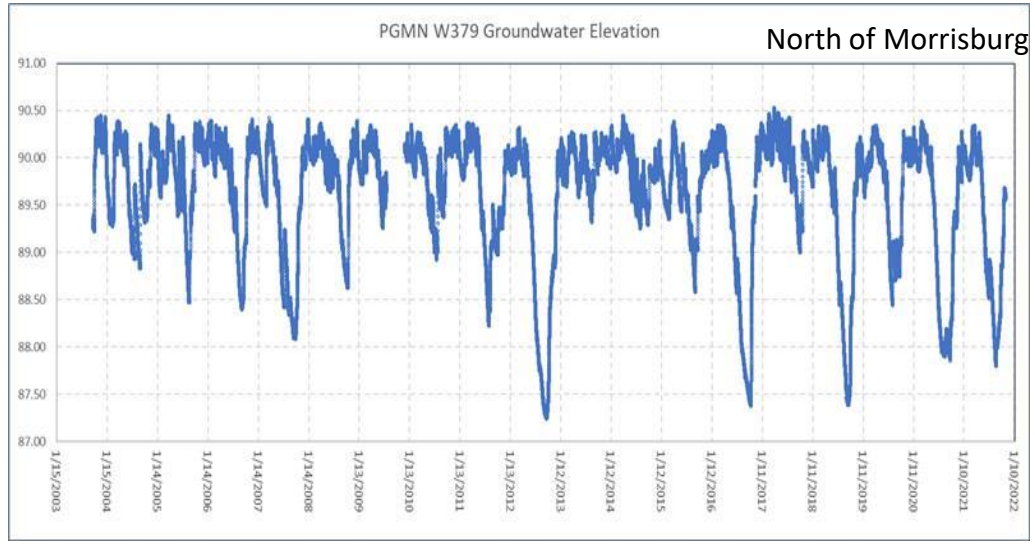
binational.net/wp-content/uploads/2022/07/State-of-the-Great-Lakes-2022-Report.pdf

Ontario

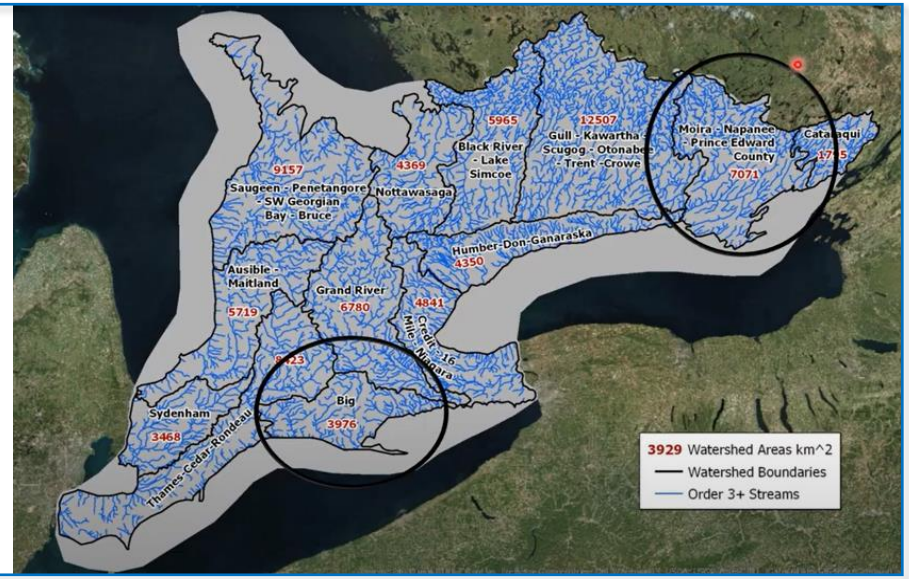
PGMN Groundwater Quantity Data Use

Long term groundwater trends and drought periods



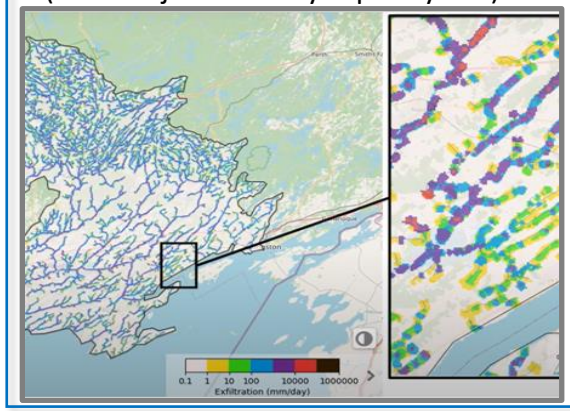


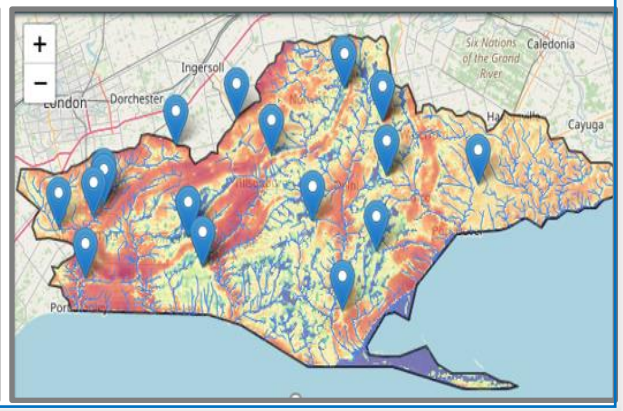
Fully integrated GW-SW model for Southern Ontario
(GSC Open File 8639)



Model simulated groundwater recharge and discharge

(COA Project 8400 by Aquanty Inc.)





Ontario

Recent program improvements:

Communication and Outreach

- Updated Exceedance Protocol
- Partners and OPS staff have access into database
- More visual products
- Seeking more opportunities for outreach

Timely Data Availability

- Automating water level and water quality QA/QC processes
- Improving real time data coverage

Network and Sampling

- Updates made to water quality sampling frequency and parameters

QUESTIONS OR SUGGESTIONS FOR THE FUTURE?

-
-
-
-

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