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**Groundwater
Monitoring**

January 15, 2018

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QuinteConservation.ca

Monitoring Programs



Quinte Conservation participates in many monitoring programs.

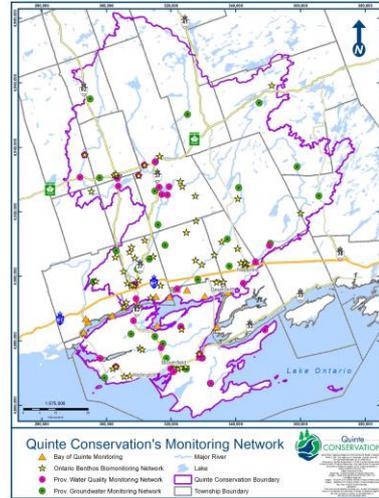
Surface Water – chemistry, benthic and fish communities, and quantity (flow)

Groundwater – chemistry and quantity

Wetlands – chemistry, aquatic vegetation and benthic, fish, bird and amphibian communities

Monitoring Programs

- Bay of Quinte Monitoring
- Ontario Benthos Biomonitoring Network
- Provincial Water Quality Monitoring Network
- Provincial Groundwater Monitoring Network



Quinte Conservation partners with other Conservation Authorities and government agencies with several of the monitoring programs including the Bay of Quinte Programs, the Ontario Benthos Biomonitoring Network, the Provincial Water Quality Network and the Provincial Groundwater Monitoring Network.

This map illustrates the many monitoring locations within the Quinte Watershed.

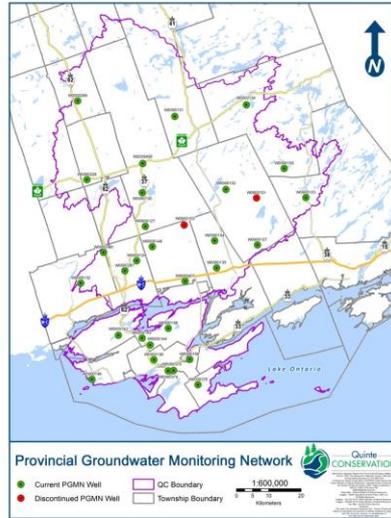
Groundwater Monitoring



Quinte Conservation, in partnership with the Ministry of the Environment and Climate Change, monitors groundwater as part of the Provincial Groundwater Monitoring Network (PGMN).

Across the province there are over 400 wells providing valuable information. This program provides groundwater quantity and quality information.

Monitoring Well Locations



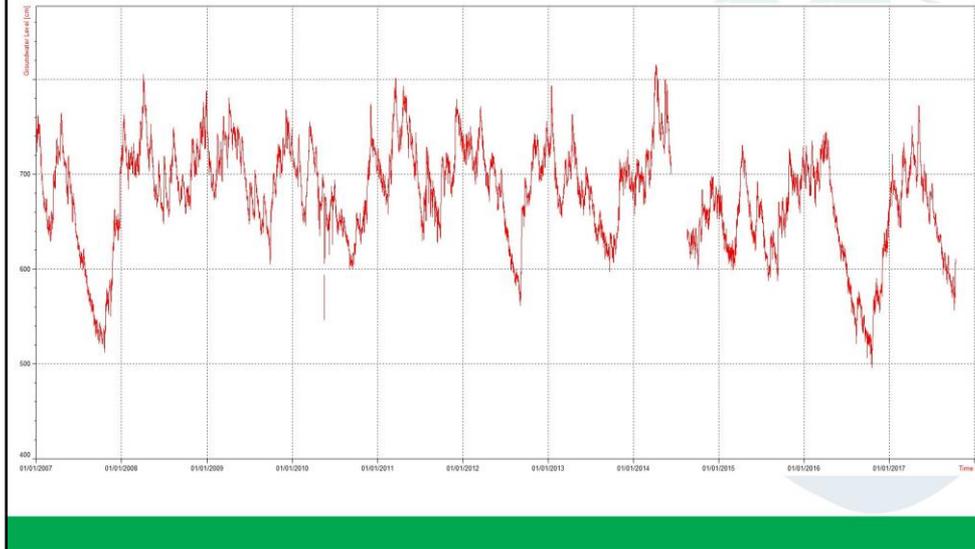
There are currently 29 monitoring wells within the Quinte Watershed as part of the PGMN.

Groundwater Quantity



Each monitoring well is equipped with instrumentation that records hourly groundwater levels and groundwater temperatures. Collected data is transmitted via satellite to the main office database where the data can be analyzed.

Groundwater Levels



Hydrographs are produced from the groundwater level data and are used to illustrate and analyze the various trends.

The hydrograph above illustrates the hourly groundwater data collected from one of the monitoring wells from 2007 to 2017. During this timeframe you can see that there were low (dry) years in 2007, 2012 and 2016.

You can also visualize the seasonal variability of the groundwater levels.

Precipitation Impacts



The hydrographs can also be graphed with precipitation data to illustrate groundwater recharge.

This graph (January 2016 to October 2017) shows that when it rains (blue line) it provides recharge to the groundwater water (red line). Recharge rates can also be determined based on this information (how long does it take for the groundwater level to react to a rain event and/or how much rain is required?)

Groundwater Quality



A portion of the wells are also instrumented with pumping equipment to perform annual groundwater quality monitoring.

The wells are purged and sampled every Fall for approximately 50 parameters including a general chemistry suite (i.e. chloride, fluoride, hardness, nutrients, etc) and metals suite (i.e. iron, lead, etc)

Information from sampling provides baseline conditions of the aquifers.

Watershed Report Cards



Watershed Report Card 2013

Quinte Conservation has prepared this report card as a summary on the state of our forests, surface water, and groundwater resources.

Ministry of
ONTARIO

Quinte
CONSERVATION

Groundwater Quality

A

The quality of groundwater is dependent on many factors including the initial use that the water is flowing through and impact from human activities. To assign an overall grade the following were used as indicators:

Nitrate & Nitrite: These are forms of nitrogen which can occur naturally in water. Excessive levels can be related to leaching of contaminants from excessive amounts of fertilizers and manure. Nitrites in drinking water can adversely affect children's health, sometimes causing methemoglobinemia.

Chloride: This is also naturally occurring and elevated levels can be related to salting activities, landfills, septic systems and water softeners. Elevated levels can include the corrosiveness of the water and be of concern to persons on low salt diets.

Surface Water Quality

B

Surface water quality reports on the water chemistry (total phosphorus) and aquatic species.

Total Phosphorus is naturally occurring, but can have elevated concentrations due to products such as soap, detergent, and fertilizers as well as sewage. Although it is a required nutrient in streams, high concentrations contribute to excessive algae growth and low oxygen levels in streams and lakes.

Benthic Macroinvertebrates are small creatures without backbones that live in the sediment on the bottom of streams and include aquatic insects, snails, clams and worms. They are good indicators of water quality and stream health.

Surface water quality in the northern third of the Quinte watershed is excellent. The lower two thirds of the watershed is in excellent to fair condition, decreasing where human population and activities increase. Increasingly, the water quality, stream channel, and watershed are showing the effects of climate change.

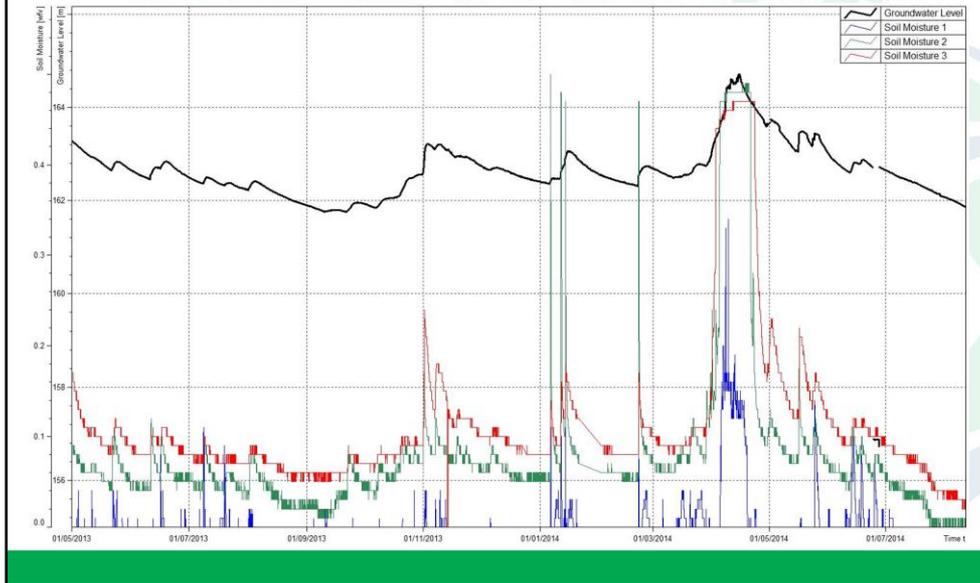
Along with other Conservation Authorities across the province, Quinte Conservation produces 'Watershed Report Cards' outlining the conditions of our watersheds with respect to Surface Water Quality, Groundwater Quality and Forest Conditions. These reports are published every 5 years and the newest one will be available March 22, 2018.

Climate Stations



Quinte Conservation also monitors 5 Climate Change stations. These stations collect information including groundwater levels and temperature, air temperature, precipitation (rain), soil moisture, snow depth and snow temperature.

Groundwater and Soil Moisture



The Climate Change Stations collect valuable data that can be overlapped with one another to illustrate a broader 'picture' of specific regions. This graph illustrates soil moisture at varying depths below the ground and compares it to groundwater levels. Precipitation can also be added to this graph to provide even more information. Groundwater recharge and/or discharge can be analyzed using graphs such as this one.

Thank You

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