Data Interpretation Guide:

UNDERSTANDING SURFACE WATER QUALITY

A guide to what the data is, what it means, and how to use it responsibly.

WHAT THIS DATA IS

Real-time data: The real-time map shows data collected by sensors installed directly in rivers. The sensors measure temperature, pH, conductivity (specific conductance), and dissolved oxygen. These readings are taken every hour and uploaded to the system each day. Legacy turbidity data is also available on the portal, but it has not been collected since 2024. Real-time data can help show how water conditions change throughout the day, across seasons, and during weather events.

Sample data: Sample data comes from water collected from lakes and rivers at specific points in time. Samples are sent to certified laboratories where they are tested for many things, including nutrients, metals, organic carbon and other characteristics. Unlike real-time monitoring, sample data represents a snapshot of conditions when the sample was collected.

WHY THIS DATA IS COLLECTED

This data helps us better understand the condition of Nova Scotia's lakes and rivers.
It is used to:

- identify long-term trends in water quality
- understand how water quality varies across the province
- study how geology, land use, weather, and climate change may affect freshwater systems
- support water management, planning, and protection decisions
- provide environmental information for researchers, communities, and the public
- The data is intended to support understanding and interpretation of surface water conditions over time

WHERE THE DATA COMES FROM

Rivers

Real-time: Real-time data is collected through the Automated Surface Water Quality Monitoring Network operated by the Nova Scotia Department of Environment and Climate Change (NSECC). Sensors installed directly in rivers collect measurements automatically and data is transmitted to the database by satellite.

Discrete Sample data is broken up into various monitoring categories:

- Most river sites are sampled 3–4 times per year
- Some sites have been monitored since 2002, while others were added more recently
- Not all locations have both real-time and sample data

Lakes

Discrete samples are collected in partnership with Nova Scotia Fisheries and Aquaculture.

- Samples are collected during late summer, when lakes are typically stratified (water is layered by temperature)
- Water is collected from several depths, including:
    - the surface
    - the depth light reaches (about twice the Secchi depth, or the bottom of the photic zone)
    - the thermocline (where temperature changes rapidly)
    - the bottom

WHAT THE DATA CAN TELL YOU

This data can help you:

- understand the range of water quality conditions across Nova Scotia
- identify some long-term trends in water quality parameters
- compare conditions between different locations
- explore how water quality changes over time or during weather events

Real-time data provides information about both near-current conditions and trends over time, whereas sample data provides a detailed picture of conditions at the time the sample was collected

WHAT THE DATA CANNOT TELL YOU

The data alone cannot:

- Tell you if the water is safe to drink. This dataset is not intended for assessing drinking water safety, and *all surface water should be properly treated before consumption*
- Determine the source or cause of changes in water quality (i.e. if they are natural, from a direct source, etc.)
- Assess regulatory compliance at individual properties, or short-term spills or incidents. Conclusions about cause, liability, or safety should not be made using this data alone
- Define background natural conditions; other considerations like land-use, geology, time of year and nearby impacts are required to understand natural (baseline) conditions
- Represent water conditions across entire lakes or rivers. Water quality can vary significantly within the same lake or river due to local conditions, groundwater inputs, tributaries, or nearby nutrient sources
- Predict future conditions
- Determine correlation between parameters. The sample data cannot provide information on current conditions, as these samples are snapshots of quality at a point in time

How to Interpret the Data

When viewing surface water quality data, consider the following:

- Look at patterns over time instead of individual results. One data point, or even a few, usually doesn't show the full picture
- Only compare results where appropriate:
    - Water quality changes with seasons, weather events, and other conditions, so comparisons over varying seasons or over long time periods may be misleading
    - Water quality conditions can vary over short distances and therefore comparison between locations should be interpreted cautiously
- Use additional context to support data interpretation. Information on land use, geology, weather, and flow conditions can support your understanding of the results
- Lake science is complex; start with samples that are taken at the surface
- Some parameters change quickly or naturally fall outside guideline levels without necessarily indicating a problem

More Detailed Considerations:

Changes to metals analysis methods

- The laboratory method used to analyze total metals changed in 2025
- At some locations, particularly those where the water is cloudier or contains more suspended material (water is more turbid), this may create the appearance of increased total metals concentrations between 2024 and 2025, even if environmental conditions did not change
- Interpret comparisons across this period carefully

Detection limits

- Some laboratory results are reported as below the detection limit of the test method
  - These values may appear as: "<2" or "<0.01"
- When performing calculations or statistical analyses, it is common practice to substitute half the detection limit value
  - For example: "<2" may be treated as "1"
- This type of processing must be done after downloading the data

Dissolved versus total measurements

- Some parameters are measured in both dissolved and total forms. When comparing results, ensure you are comparing the same type of measurement

Important Limitations and Caveats

- Water quality is naturally variable
- Single measurements should be interpreted cautiously
- Some parameters can change rapidly over short periods of time
- Advances in technology have improved our ability to detect lower levels of substances in water over time. This can affect how results appear when comparing data over a long period
- All laboratory methods and sensors have a small margin of uncertainty.
- Weather events such as storms, droughts, and snowmelt can strongly influence results
- Flow conditions can affect measured concentrations and may reflect natural processes, human influences, or both

While quality assurance procedures are used to review the data, errors, gaps, or inaccuracies may still occur. Users should interpret the data with appropriate caution, particularly when making decisions or comparing results across locations, time periods, or monitoring programs.

Common Misunderstandings

People often expect water quality to naturally meet standard guidelines (for example, Canadian Council of Ministers of the Environment (CCME) guidelines). However, guidelines are designed to protect most species across Canada and may not reflect natural local conditions everywhere. Where species have adapted to local conditions, lakes and rivers can naturally fall outside these levels without harming local ecosystems.

Where to Learn More or Get Help

- Water Quality in Canadian Rivers Indicators (CESI program)
- Water Quality in Canadian Rivers
- Acid Sensitive Lakes of Atlantic Canada
- ECCC Federal Environmental Quality Guidelines
- CCME Canadian Water Quality Guidelines:
    - Resources | CCME
    - CCME Guideline Summary Table