GEORGIAN BAY FOREVER

2025
Usage Guide for Lake Water:

A Reference for Using Lake Water

CONTENT

Understanding Water Sources

Water for drinking and recreational use can come from various sources, each with different treatment needs and safety considerations

Potable Water Sources (Safe for Drinking & Cooking)

Municipal Supply – If available, this is the most reliable and regulated source, requiring minimal treatment.

Private Wells – Groundwater sources that need regular testing for bacteria, nitrates, and heavy metals.

Lake or River Intake – Requires filtration, disinfection and regular testing to ensure the removal of contaminants like algae, bacteria, parasites, and sediments.

Rainwater Harvesting – A sustainable option that requires filtration and treatment before drinking.

Non-Potable Water Sources (For Irrigation, Cleaning, and Recreation)

Greywater Reuse – Water from sinks and showers can be recycled for irrigation, reducing waste.

Rainwater Collection – Used for outdoor watering, cleaning, and other non-drinking purposes.

Surface Water (Untreated Lakes/Rivers) – Typically used for outdoor activities such as swimming, but should not be consumed without treatment.

Water Testing & Safety

Ensuring water quality requires **routine** testing and awareness of potential contaminants.

Acceptable Limits

Acceptable limits for E. coli in water vary significantly depending on whether you are swimming in the water or drinking it. While a lake might be safe for a swim at 200 CFU/100 mL, that same water would be completely unsafe to drink without proper treatment.

Here are the acceptable limits:

Recreational Water

According to Health Canada's 2024 guidelines, for activities like swimming or wading, the acceptable E. coli levels are:

- Geometric mean: ≤ 200 CFU/100 mL (colony-forming units)
- Single-sample maximum: ≤ 400 CFU/100 mL

These values are based on a rolling average of at least five samples taken over 30 days. Exceeding these levels may trigger beach advisories or closures.

Drinking Water

For treated drinking water, the standard is much stricter.

- Acceptable limit: 0 CFU/100 mL

That means no detectable E. coli in any 100 mL sample. Detection of even a single colony is considered an immediate health concern and requires corrective action.

Testing Methods & Frequency

- Routine Testing – Check for bacteria, nitrates, heavy metals, pH levels, and other contaminants at least two to three times a year (spring, mid-summer and fall).
- DIY Test Kits vs. Lab Analysis – Home kits offer quick results, but professional lab tests provide greater accuracy for detecting dangerous substances.

Regular water testing and monitoring help to identify risks before they become health hazards.

Water systems must comply with provincial and municipal regulations to ensure safety and sustainability. Private wells and lake intakes may require permits and adherence to Health Canada guidelines and safety standards.

Key Regulatory Bodies & Guidelines

Provincial Guidelines (Varies) – Lake intakes, treatment systems, and covering private wells.

Health Canada Recommendations – Provides national drinking water standards to protect public health.

Permits for Well Drilling or Lake Intake Systems – Required in some areas to ensure environmental protection and water safety.

Environmental Impact & Responsible Use – Managing water sustainably helps preserve natural ecosystems and ensures long-term availability.

Health Risks

Contaminated water can pose serious health risks, leading to a range of symptoms and conditions depending on the type of pollutants present. Here's a breakdown of common indicators:

- Microbial
- Chemical
- Algal Blooms and Cyanobacteria Toxins
- Physical

Microbial Indicators

Microbial contamination is one of the most immediate health concerns in water. The presence of bacteria, viruses, and protozoa can signal fecal contamination and the potential for waterborne diseases. Key microbial indicators include:

- E. coli – A strong indicator of fecal contamination, used in drinking and recreational water testing
- Enterococci – Preferred for assessing marine water quality
- Total coliforms – Used to monitor system integrity rather than direct health risks
- Cryptosporidium & Giardia – Protozoan parasites resistant to chlorine, requiring filtration or UV treatment

Microbial Contamination Symptoms (Bacteria, Viruses, Parasites)

- Gastrointestinal issues – Diarrhea, nausea, vomiting, abdominal cramps
- Fever and chills – Often linked to bacterial infections like E. coli or Salmonella
- Dehydration – Due to excessive fluid loss from vomiting or diarrhea
- Jaundice – Possible sign of hepatitis A from viral contamination
- Fatigue and weakness – Common in prolonged infections

Routine testing for these organisms helps detect contamination early and prevent outbreaks.

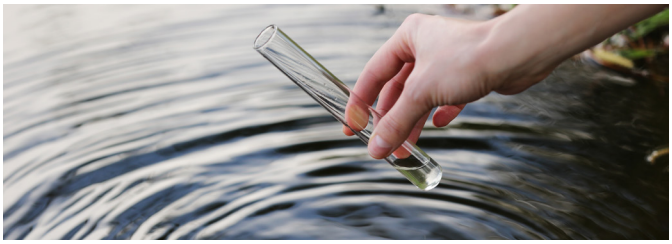
Chemical Indicators

Chemical pollutants can enter water sources through industrial discharge, agricultural runoff, or natural processes. Some key chemical indicators include:

- Heavy metals (lead, mercury, arsenic) – Can cause long-term health effects
- Nitrates & phosphates – Linked to agricultural runoff and harmful algal blooms
- Pesticides & hydrocarbons – Often found near agricultural or urban areas
- Disinfection byproducts – Formed when chlorine reacts with organic matter

Chemical Contamination Symptoms (Heavy Metals, Pesticides, Industrial Waste)

- Neurological symptoms – Memory loss, confusion, tremors (linked to lead or mercury exposure)
- Kidney damage – Associated with prolonged exposure to arsenic or cadmium
- Hormonal imbalances – Endocrine disruptors from pesticides or pharmaceuticals
- Skin irritation – Rashes or burns from chemical pollutants
- Cancer risk – Long-term exposure to carcinogens like benzene or asbestos



Algal Blooms and Cyanobacteria Toxins

Cyanobacteria blooms—often called blue-green algae blooms—can pose serious health risks when the water they are in is touched, inhaled, or ingested. These blooms thrive in warm, nutrient-rich waters, and can produce cyanotoxins, which are harmful to humans and animals. Appropriate monitoring programs for cyanobacteria blooms and their toxins provide early warnings to inform users of potential health risks. Both planktonic cyanobacteria and benthic cyanobacteria can cause illnesses in humans and animals.

If you detect or suspect a blue-green algae bloom:

- Assume that toxins are present (you cannot tell if toxins are present just by looking at a bloom).
- Avoid contact with the water, do not bathe or swim in it.
- Do not drink the water.
- Restrict pet and livestock access to the water.
- Report it (see below).

Reporting a Pollution Spill or a Cyanobacteria Bloom:

Submit a report online (https://report-pollution.ene.gov.on.ca/)

Toll-free: 1-866-MOE-TIPS (663-8477)

Toll-free TTY: 1-855-889-5775

Algal Blooms and Cyanobacteria Toxins Contamination Symptoms

- Skin irritation – Direct contact can cause rashes, itching, and burning
- Eye and respiratory issues – Aerosolized toxins can lead to eye irritation, sore throat, coughing, and difficulty breathing
- Gastrointestinal illness – Accidental ingestion may result in nausea, vomiting, diarrhea, and abdominal pain
- Neurological effects – Some cyanotoxins can cause dizziness, confusion, or muscle weakness
- Liver and kidney damage – Prolonged exposure to certain toxins can lead to organ damage

How to Stay Safe

- Avoid water with visible blooms (green scum, paint-like streaks).
- Do not swim, fish, or boat in affected areas.
- Keep pets away from contaminated shorelines. This can be a life-or-death situation for your fuzzy family members. Keep them safe.
- Use alternate water sources until advised.
- Follow local advisories on water safety.

Cyanobacteria blooms can be unpredictable, and their toxins may remain in the water even after the bloom disappears. If you suspect exposure, rinse off immediately and seek medical advice if symptoms develop.

Physical Indicators

Physical characteristics of water can influence its safety and usability. These include:

- Turbidity – High turbidity can indicate sediment contamination and microbial risks
- Temperature – Warmer water can promote bacterial growth and algal blooms
- pH levels – Extreme pH values can affect water treatment effectiveness
- Dissolved oxygen – Essential for aquatic life and an indicator of ecosystem health

Physical Contamination Symptoms (Sediment, Microplastics, Turbidity)

- Eye and skin irritation – Due to suspended particles
- Respiratory discomfort – Inhalation of aerosolized contaminants
- Digestive issues – Linked to ingestion of microplastics

If you are using lake water at a cottage, it is strongly recommended to treat and regularly test your water, especially if it is used for drinking or cooking.

Best Practices for Using Lake Water

Using a lake as a direct water source—especially for cottages or rural properties—can be convenient and cost-effective, and independent from municipal systems, but it also comes with responsibilities and risks that must be managed carefully.

For private residential systems (like individual wells), public health units may issue guidance or recommendations, but the homeowner is ultimately responsible* for monitoring and responding to water quality issues.

*If a private system is linked to a broader public health concern, authorities can still intervene.

How to Use Lake Water Safely

1. **Install a proper intake system:**
   - Use a foot valve with a screen to prevent debris and aquatic life from entering your drinking water.
   - Position the intake at least 1 metre below the surface and 30 cm above the lakebed.
2. **Filter and treat the water:**
   - Use multi-stage filtration (sediment + activated carbon + 1-micron absolute filter).
   - Add UV disinfection or chlorination to kill microbes.
   - For drinking water, consider reverse osmosis or boiling as a final step.
3. **Test regularly:**
   - Check for E. coli, total coliforms, turbidity, and chemical contaminants seasonally or multiple times a year.
   - Use certified labs or field kits like ColiPlates™ for microbial testing.
   - Winterize and maintain your systems: Remove or protect intake lines in freezing conditions. Clean filters and inspect UV bulbs or chlorinators regularly.

Understanding Water Clarity

E. coli can persist in aquatic environments, and is influenced by factors such as temperature, sunlight, sediment composition, and nutrient availability. Secchi depth measures water clarity: shallower Secchi depths indicate murkier water, often due to suspended particles and organic matter. These suspended particles can shield E. coli from sterilization by UV radiation and provide surfaces for attachment, enhancing bacterial survival.

In contrast, clearer water (with a greater Secchi depth) allows more sunlight penetration, which can accelerate the die-off of E. coli.

Best practices recommended by the Canadian Government in Ontario and across Canada:

Testing Frequency

Test for E. coli and total coliforms at least three times per year:

- When opening the cottage in spring
- Mid-season (typically summer)
- Before closing for winter

Additional testing is advised if:

- There has been heavy rainfall or flooding
- The water system has been inactive for a while
- You notice changes in taste, smell, or clarity
- You're renting the property to others

What to Test For

- Bacterial contaminants: At minimum, test for E. coli and total coliforms
- Protozoa: Giardia and Cryptosporidium, which are commonly occurring parasitic organisms in the environment
- Chemical contaminants: Every 2–3 years, test for nitrates, heavy metals (like lead), and other potential pollutants, especially if you're located near agricultural land or have older plumbing

Maintaining safe and reliable water from surface sources like lakes requires a thoughtful, layered approach. By combining physical filtration, chemical removal, and robust disinfection technologies—like UV and reverse osmosis—you create a multi-barrier system capable of addressing a wide range of contaminants, from sediment and tannins to bacteria and parasites like Giardia and Cryptosporidium.

Treatment Recommendations

- Filtration and disinfection are strongly advised. Health Canada recommends treating all surface water sources, even if they appear clean.
- Seasonal Considerations – Winterizing pipes prevents freezing and ensures safe drinking water year-round.
- Boiling is a last resort—it kills bacteria and parasites but does not remove chemicals, blue-green algae toxins, or metals - Boil Water Advisories are issued by public health units when contamination is detected; a rolling boil for one minute kills most bacteria, parasites, and viruses effectively.

Where to Get Help

- Contact your local public health unit for free or low-cost water testing kits.
- Consider consulting a water treatment professional to tailor a system to your specific water source.

GEORGIAN BAY FOREVER

Georgian Bay Forever is a registered Canadian charity founded in 1995 and focused on the health of Georgian Bay's aquatic ecosystem. With the support of our donors we work to conserve Georgian Bay using scientific research, public education, and progressive action to mitigate the various threats to its natural environment, now and in the future.

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