Water Quality

Great Lakes WISE
Water Innovation and Stewardship Exchange

POWERED BY
COUNCIL OF THE GREAT LAKES REGION
Solving for Sustainability

Water quality is a critical driver of operational resilience and corporate responsibility. By prioritizing clean, sustainable water practices, organizations safeguard supply chains, protect community health, and meet rising stakeholder expectations. Leadership on water quality today positions your company as an innovator committed to long-term value and environmental stewardship.

Water Quality in the Great Lakes Region

Despite the ecological and economic importance of one of the world's largest freshwater systems, the Great Lakes, water quality across the basin faces persistent threats from urbanization, agriculture, industrial activity, and climate change. Water quality in the Great Lakes is shaped by a complex interplay of natural and human factors.

Key indicators such as toxic chemicals, nutrient levels, algae blooms, and watershed health are generally rated as Fair, as reported in the 2022 State of the Great Lakes, with trends showing little to no improvement over time. Groundwater quality fares better, typically rated as Good, though long-term data is insufficient to confirm trends.

Chemicals of Concern in the Great Lakes Basin

Under the U.S. - Canada Great Lakes Water Quality Agreement (GLWQA), governments have identified key Chemicals of Mutual Concern (CMCs) that continue to impact water quality and aquatic life. These include mercury, PCBs, PBDEs, classes of PFAS, and short-chain chlorinated paraffins, legacy industrial pollutants that persist in sediments and food webs despite decades of control efforts.

New classes of contaminants, such as newly identified PFAS classes, microplastics, and pharmaceuticals are gaining attention through ongoing research and evolving EPA and provincial monitoring programs. These emerging pollutants are directly linked to industrial and agricultural practices and locations of intense activity, and they present a growing operational, regulatory, and reputational risk for companies operating in or sourcing from the Great Lakes basin.

Data Collection and Benchmarking Challenges

Gaps in Monitoring and Assessment

- Sparse hydrological data: Limited streamflow and groundwater data restrict the accuracy of nutrient and hydrological models.
- Irregular monitoring: Nearshore and tributary surveys are conducted inconsistently, hindering trend analysis.
- Climate change integration: Existing water quality models inadequately account for climate-related impacts.
- Jurisdictional fragmentation: Data sharing across federal, state/provincial, tribal, and private sectors remains inconsistent.

Benchmarking Limitations

- Enforcement variability: Water quality standards are unevenly enforced across jurisdictions.
- Funding constraints: Infrastructure and monitoring programs suffer from limited financial support.
- Lack of standardized metrics: Cross-border comparisons and progress tracking are hampered by the absence of unified indicators.

Point and Nonpoint Source Pollution - How Pollutants Travel

Urban Runoff

Stormwater flowing across impervious surfaces, roads, rooftops, and parking lots, picks up oil, metals, microplastics, salts, and pathogens before discharging into rivers and nearshore zones. During heavy rainfall, Combined Sewer Overflows (CSOs) release untreated sewage and industrial waste directly into waterways, increasing bacterial contamination and nutrient loading. As urban areas expand, storm intensity and impermeable coverage amplify pollutant pulses, especially in legacy industrial corridors like the Detroit and Cuyahoga Rivers.

Industrial Legacy & Atmospheric Deposition

Even as point-source discharges have declined, legacy contaminants in sediments, including PCBs, PAHs, mercury, and PFAS, continue to circulate through resuspension and storm-driven erosion. In addition, airborne deposition from industrial and transportation emissions remains a key pathway for mercury and organic pollutants entering the lakes from the Great Lakes region.

Agricultural Runoff

Runoff from cropland and livestock operations carries phosphorus, nitrogen, sediments, and pesticides into tributaries. Excess nutrients trigger harmful algal blooms (HABs) that degrade water quality, threaten fisheries, and raise drinking-water treatment costs. Climate change magnifies these effects; more intense storms increase runoff volumes, while warmer waters promote algal growth.

Satellite Image of 2024 Lake Erie Algal Bloom via NASA Earth Observatory

Regulatory Response

While the Clean Water Act (U.S.) and the Great Lakes Water Quality Agreement (GLWQA) have successfully reduced point-source pollution, they are less effective in addressing nonpoint sources. Canada's Freshwater Action Plan and Great Lakes Freshwater Ecosystem Initiative support phosphorus reduction and monitoring, but broader coordination is needed.

Great Lakes Water Quality

- Improved coordination, infrastructure investment, program support and cross-sector collaboration are essential for improving resiliency in the Great Lakes region.
- Nonpoint source pollution remains the most significant unresolved threat to water quality.
- Data collection is robust in some areas but fragmented and inconsistent across the basin.
- Benchmarking progress is hindered by data gaps, inconsistent enforcement, and lack of integrated climate modeling.

Call to Action: Take Business Action to Safeguard Water Quality

Improving water quality and ecosystem resilience in the Great Lakes requires collaboration across industry, municipalities, agriculture, and community partners. Forward looking corporate actors are actively integrating chemical management, supply-chain transparency, and source-reduction initiatives into their sustainability strategies.

Reduce pollutants at the source:

- Phase out or substitute priority Chemicals of Mutual Concern and identify emerging CMC in the value chain where feasible.
- Strengthen stormwater and spill prevention controls at industrial and distribution sites.

Support nature-based solutions and watershed restoration:

- Invest in wetland restoration, riparian buffers, floodplain reconnection, and shoreline rehabilitation in priority sub-watersheds.
- Support urban green infrastructure initiatives on production sites and beyond four walls (e.g., bioswales, permeable pavements, rain gardens) to reduce runoff.
- Partner with local environmental NGO's, land trusts, municipalities, or tribal nations on shared challenge identification and local habitat projects with measurable outcomes.

Advance data transparency and shared monitoring:

- Participate in standardized sectoral benchmarking initiatives to improve comparability across the basin.
- Contribute to regional monitoring efforts where gaps have been identified (nearshore, tributaries, groundwater).

Strengthen agricultural supply chain stewardship:

- Integrate water-risk screening tools (e.g., WRI Aqueduct, WWF Water Risk Filter) into procurement and sourcing policies.
- Work with suppliers and growers to implement nutrient stewardship programs and advanced efficiency and resiliency strategies (cover cropping, precision fertilizer application, water-use efficiency mapping).

Align organizational strategy with regional policy frameworks:

- Connect corporate water stewardship goals with the GLWQA, the U.S. Clean Water Act, Canada's Freshwater Action Plan, and local RAP/Watershed Plans.
- Track regulatory momentum on PFAS restrictions, CSO controls, and agricultural nutrient limits to stay ahead of compliance shifts.