Lake Erie Rangers:
Community scientists on the frozen frontline

Gabrielle Parent-Doliner

In February of 2026, Tom Liszt stood at the edge of a stormwater pond in Fonthill, Ontario, dipped his chloride test strip into the water, and watched the numbers climb. It had been a historically cold and icy winter across the Lake Erie basin, so elevated chloride was expected. Still, when his result registered 2,427 mg/L, nearly four times the acute guideline set by the Canadian Council of Ministers of the Environment (CCME), it was shocking. Nearby, another Lake Erie Rangers volunteer monitoring a stormwater pond near the Hamilton International Airport recorded 6,507 mg/L. That's more than ten times the acute guideline for freshwater health. These weren't industrial spills or chemical accidents. The culprit was road salt (Figure 1).

Figure 1. Lake Erie Rangers winter road salt chloride test strip.

An invisible threat

Salt has been used to de-ice Canadian roads since experiments in the 1940s. By the 1970s, it had become the dominant method of winter road maintenance: cheap, abundant, and genuinely effective. Spread on roads, sidewalks, stairs, and parking lots, sodium chloride lowers the freezing point of water, melting existing ice and preventing new ice from forming. Studies suggest it reduces road accidents by an estimated 80 percent.

But salt doesn't disappear after use. It dissolves, separating into sodium and chloride ions that run off into soils, streams, wetlands, and groundwater. And once chloride enters a watershed, it accumulates.

The consequences ripple through the entire food web. Aquatic invertebrates form the base of the food chain and are among the most sensitive organisms, with some species experiencing toxic effects at concentrations at 10-20mg/L, well below the CCME's chronic guideline of 120 mg/L. Fish are affected both directly through gill function and osmotic stress, and indirectly through the collapse of their prey. Elevated salinity disrupts the natural stratification of lakes and ponds, reducing oxygen circulation and creating dead zones in deeper waters. Wetland and riparian plants, many of which are salt intolerant, show reduced germination and growth with increasing chloride exposure, degrading the buffer zones that protect waterways from further contamination. The cumulative effect is a slow but measurable decline in biodiversity across affected watersheds.

Despite these serious concerns, road salt remains largely unregulated in Canada, and there are significant gaps in the data we have about chloride in our freshwater bodies. Most water monitoring happens in the warmer months, April through September, meaning the entire winter salting season goes largely untracked, including the critical salt-loading events that follow spring melts, heavy rains, and mid-winter thaws. Spatially, coverage is thin. Outside of government and conservation authority programs, very little testing gets done. Those gaps are exactly what the Lake Erie Rangers were built to fill.

Water Rangers is also working to address the problem at the source. Their Keep It Fresh campaign educates homeowners, businesses, and municipalities about the impacts of winter salt use on freshwater and offers practical guidance on how to use salt more efficiently. Simple changes – like applying salt before a storm rather than after, removing snow before salting, and using no more than a coffee mug's worth for a standard driveway – can significantly reduce how much chloride ends up in local waterways. The campaign reflects a core belief at Water Rangers: that protecting freshwater requires both better data and better habits, and that individuals have a real role to play in both.

Water Rangers: Community science at scale

To understand Lake Erie Rangers, it helps to understand the organization behind it. Water Rangers is a Canadian not-for-profit social enterprise founded in 2015 by Kat Kavanagh on a simple but powerful idea: that the people who live closest to a body of water are among its most important guardians, and that giving them the right tools can help them monitor water and generate freshwater data that governments and institutions simply can't collect on their own.

The Water Rangers program develops affordable, accessible water quality testing equipment and pairs it with an open data platform where results can be logged, visualized, and shared. The platform is free to use, designed for non-specialists, and built so that data flows not just to individual users but into broader databases that researchers, policymakers, and conservationists can draw from. Every test taken by a Water Rangers volunteer becomes part of a growing, publicly accessible record of freshwater health across Canada and beyond. Water Rangers is active in 20 countries, with serious hubs of community science activity in the United States and United Kingdon.

The organization has run community science programs on lakes and rivers across the country, but Lake Erie, one of the most ecologically stressed and densely populated watersheds in North America, represents one of its most ambitious efforts to date. With support from a three-year, $330,000 grant from the Canada Water Agency's Freshwater Ecosystems Initiative (2024-2027) and Ontario's Great Lakes Local Action Fund, Water Rangers launched Lake Erie Rangers in 2024 with a mandate to develop new community science tools, fill data gaps, expand the monitoring season, and bring communities into active participation in the lake's recovery. Turning data to action is a central goal of the project.

Getting their hands wet

The Lake Erie Rangers program now has nearly 200 active volunteers monitoring the lake's watershed at over 200 locations, with hubs in both the east and west ends of the lake. They include individuals, high school classes, college and university students, retirees, and families. What these community scientists share is not a background in science but a connection to the lake and a motivation to do something about what's happening to it. To date, the program has collected more than 20,000 freshwater data points.

The program is managed by Water Rangers' director, Gabrielle Parent-Doliner, and community data coordinator, Kiersten Garside.

Tom Liszt (Figure 2) is one of 80 volunteers who've been monitoring winter road salts as part of the program. A trained Environmental Technician and semi-retired Inspector with the Canadian Food Inspection Agency, Liszt spent his career monitoring invasive plants, insects, and fungi for plant health. Now he channels that same scientific rigor into his five monthly monitoring sites across Welland, Wainfleet, and Fonthill.

"Without monitoring and sampling, we have no facts to act upon," he says, "and without our science-based knowledge we cannot initiate change. The open-access water quality data and observations I gather help our local communities understand the health of our streams, rivers and waterways. Healthy water has never been more important in Canada than it is today."

Together, Lake Erie Rangers' road salt monitors have taken 515 chloride tests at over 170 locations since 2024 (Figure 3). Of those results, 12 percent exceeded the CCME acute guideline of 640 mg/L, and 34 percent exceeded the chronic guideline of 120 mg/L, a striking dataset that simply wouldn't exist without community scientists willing to go out in January.

But the work goes well beyond collecting samples. Lake Erie Rangers volunteers are active participants in developing and refining the very tools they use in the field. Water Rangers' winter road salt monitoring test kit was iterated and improved with input from the people using it in real conditions. Volunteers also helped test safety equipment, including a

Figure 2. Selfie photo of Tom Liszt.

Figure 3. Lake Erie Rangers winter road salt chloride test strip.

3D-printed throw bucket designed to collect water samples while keeping volunteers safely away from unstable ice at the water's edge.

Monitoring protocols have evolved too. When Lake Erie hit 100 percent ice cover during the 2025-26 winter, a historically rare event, the program adapted quickly. Rather than suspend operations, volunteers pivoted to ice-on/ice-off observations, documenting the progression and recession of ice cover across the lake with photos and field notes. They recorded 187 ice observations over the season, adding a layer of phenological data that complements the chemical monitoring and contributes to a longer-term picture of how the lake is changing.

Beyond chloride, the Lake Erie Rangers are working to expand what community scientists can measure. The program is developing an *E. coli* monitoring kit using Roth R.Cards, focused on understanding fecal contamination for both environmental health and recreational water quality. In partnership with McMaster University, volunteers are also piloting a new nutrient monitoring method that uses periphyton, the algae and microorganisms that colonize underwater surfaces, as a biological proxy for phosphorus and chlorophyll-a levels. Rather than relying solely on chemical tests, this approach reads the health of the ecosystem itself, using living organisms as indicators of nutrient stress. (Figures 4 and 5).

All data collected is uploaded to Water Rangers' open data platform and automatically shared with the Great Lakes DataStream, where it's available in both interpreted and raw formats to anyone who needs it. By feeding into open platforms, Lake Erie Rangers volunteers don't just generate local knowledge – they contribute to a basin-wide picture of freshwater health that researchers, conservation authorities, and government agencies can act on.

The program's partnerships reflect that ambition. Water Rangers works alongside the Niagara Peninsula Conservation Authority and the Essex Region Conservation Authority, McMaster University, the University of Windsor's Real-Time Aquatic Ecosystem Observation Network (RAEON), Niagara College, First Nation communities, and NGOs like Swim Drink Fish. Because Lake Erie straddles the Canada-US border, the program also collaborates closely with the Lake Erie Volunteer Science Network, a binational community science effort overseen by the Cleveland Water Alliance and the Ohio EPA, ensuring that data and methods are consistent and comparable across the whole lake.

Figure 4. E. coli *kit in action.*

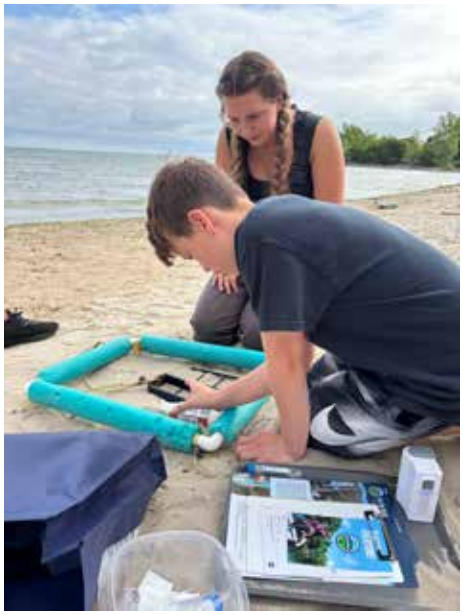

Figure 5. Perisplates in action – McMaster student Karolina with Lake Erie Rangers volunteers getting device ready for deployment.

From Monitoring to restoring

Understanding a lake's health has a way of deepening your commitment to it. For many Lake Erie Rangers volunteers, monitoring the water wasn't enough, they wanted to help heal it.

That impulse has taken root most visibly in the western basin. The northwestern shoreline of Lake Erie has lost a staggering proportion of its original wetlands since European settlement. In Essex Region alone, approximately 97 percent of the original wetland area has been lost (Snell, 1989, as cited in Essex Region Conservation Authority, 2013). Agricultural drainage, shoreline development, diking, and land conversion transformed what was once one of the most productive freshwater ecosystems in North America into a largely degraded landscape.

These wetlands weren't just habitat for fish and wildlife. They were natural filters, absorbing and processing the nutrient runoff, particularly phosphorus and nitrogen, that now fuels the harmful algal blooms Lake Erie has become known for. Restoring even a fraction of this lost habitat is essential to the lake's long-term recovery.

In Windsor-Essex County, Lake Erie Rangers volunteers have joined the Essex Region Conservation Authority in three wetland planting events, getting their hands into the soil alongside conservation staff to plant native species: button bush, swamp milkweed, blue flag iris, cardinal flower, and butterfly milkweed. Each of these plants plays a specific role in a restored wetland ecosystem, providing habitat for pollinators, stabilizing shorelines, filtering runoff, and supporting the birds and amphibians that depend on this wetland habitat (Figure 6).

Figure 6. Essex region planting event volunteers.

Figure 7. Lake Erie Rangers volunteers.

In the Niagara region, volunteers participated in a tree planting event in Thorold's Ashby Park, helping to improve ecosystem health and reduce flood risk along another stretch of the watershed by planting over 600 native trees on the banks of the stream.

The people at the water's edge

The data is compelling. The numbers, 6,507 mg/L of chloride, 20,000 data points, 90 percent of wetlands gone, tell a real and urgent story about a lake under pressure. But the deeper story is the people.

It takes something beyond duty to stand on the frozen bank of a creek in January, test the near-freezing water, and record what you find. It takes love. Love for a place, and a clear-eyed refusal to look away from what's happening to it no matter how hard it is to see. That's what Lake Erie Rangers volunteers share: not credentials or affiliations, but a conviction that their lake is worth showing up for, season after season, in all kinds of weather.

The program is still growing. New hubs are expanding westward and even beyond the Lake Erie basin into other watersheds. The volunteer base continues to build. The monitoring protocols are getting sharper, the data richer, and the partnerships deeper. There is still a great deal of work to be done, more gaps to fill, more shoreline to restore, more winters to get through. But on the banks of Lake Erie, in communities from Windsor to Niagara, people are already doing it. (Figures 7 and 8).

References

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Figure 8. Lake Erie Rangers volunteers.

Gabrielle Parent-Doliner is a national leader in community-based water quality monitoring and Director at Water Rangers, a Canadian non-profit that empowers people to test and understand the health of their local waters. Her career has been focused on making water data more accessible and actionable and she led multiple community-based recreational water quality labs in Ontario and worked with researchers to pilot tools for community scientists. Through Water Rangers, she brings together local monitoring groups, municipalities, researchers, and environmental organizations across Canada, providing training, equipment, and easy-to-use tools that help communities collect, share, and understand their water data. A frequent speaker on community science and water stewardship, Gabrielle has presented at the Great Lakes Beach Association annual conference, the International Association of Great Lakes Research, with the International Joint Commission, and the State of the Lakes conference. She is driven by a simple vision: that giving people the tools to understand and protect their waters creates safer, more resilient, and more connected communities.