CLEVELAND WATER ALLIANCE

and **Lake Erie Volunteer Science Network**

Present

2023 Lake Erie Watershed Health Summary

Data collected and analyzed by:

BUFFALO NIAGARA WATERKEEPER

Cleveland Metroparks

ERIE Conservation DISTRICT

Huron River Watershed Council

METROPARKS TOLEDO

Partners for Clean Streams

SUMMIT SOIL & WATER CONSERVATION DISTRICT

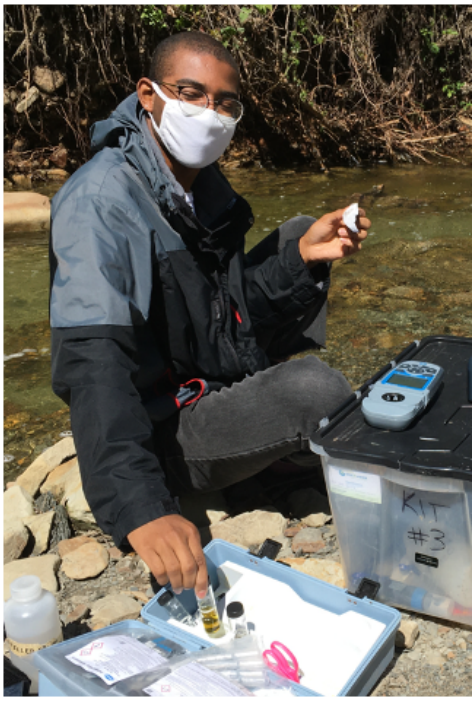
Tinker's Creek WATERSHED PARTNERS

TOLEDO ZOO & AQUARIUM

TMACOG

OLD WOMAN CREEK NATIONAL ESTUARINE RESEARCH RESERVE

Background: Lake Erie Volunteer Science Network



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Community engagement is critical to the long-term health of the Lake Erie Basin. As the shallowest and most biodiverse Great Lake, Lake Erie is also the most vulnerable to human activities such as industrial, agricultural, maritime, and recreational interests. This issue is further compounded by the limited resources local agencies and researchers have at their disposal to both monitor and manage water quality across the Basin. The results are stark gaps in water quality data collection necessary to inform the management, education, and advocacy activities that ensure residents' access to our freshwater resource.

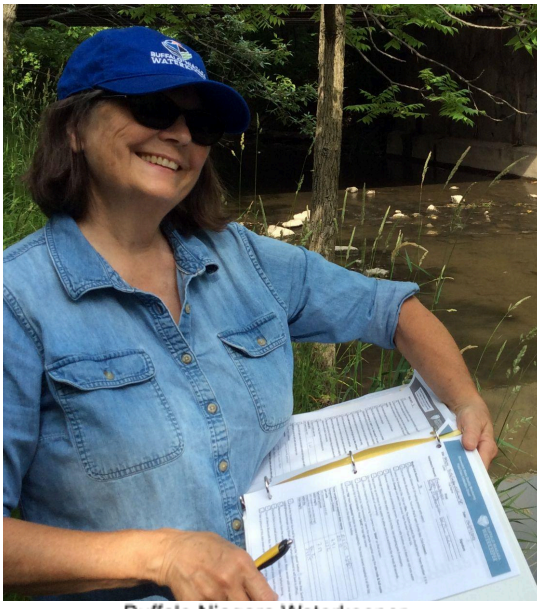
Fortunately, volunteer water quality monitoring programs, dubbed "Community," "Citizen," or "Volunteer" science groups, have been monitoring water quality across the Basin for years. Dozens of groups regularly collect data from streams and shorelines across the region. Volunteer science has immense potential to improve our approach to water resource management. However, lack of standardized methods as well as limited organizational visibility and credibility have often meant that their data are not considered in decision-making processes. As a result, volunteer science groups have historically struggled to have their voices heard in water resource governance, management, planning, and research conversations.

In 2020, Cleveland Water Alliance and a collaboration of community foundations launched the Lake Erie Volunteer Science Network (LEVSN) to unite these groups into a regional network. LEVSN works to fill critical information gaps and inspire action for the benefit of the Lake Erie region by:

- Equipping participants with standard water quality sensors for credible data collection.
- Supporting participants with a robust set of data tools and protocols to enable trustworthy insights.
- Empowering participants with a regional community to share best practices and grow.
- Engaging resource managers and decision makers with the potential of volunteer science data to help our Lake.

The Network has now completed their second fully-standardized field season and is launching their third. The eleven active groups participating in 2023 leveraged their combined 1,300 data points and with the Network's standardized analysis tools to conduct individual assessments of the health of 20 local watersheds, a collaborative evaluation of the health of the Lake Erie Basin, and documentation of these analyses in a highly rigorous field season report.

Standardizing Volunteer Science: Lake Erie Baseline Assessment Framework


Buffalo Niagara Waterkeeper

The Lake Erie Baseline Assessment Framework (LEBAF) is a process for standardizing data collection, management, and analysis that unlocks the potential of volunteer science to address gaps in water resource monitoring and tell a regional story about the condition of Lake Erie watersheds. LEBAF was given structure and life by LEVSN's Standards Working Group, a task force composed of volunteer groups as well as experts from research institutions, state agencies, and local government. This Working Group, together with the Water Data Collaborative, led a standards development process that engaged other LEVSN members and over 30 external partner organizations in setting shared priorities and methods that empower local groups to conduct reliable and comparable data across the region. This process resulted in the official launch of LEBAF at the inaugural Lake Erie Citizen Science Summit, co-hosted by the Cooperative Institute of Great Lakes Research and CWA, at the International Association of Great Lakes Researchers' State of Lake Erie conference in March of 2022.

The primary output of this process was a set of Standard Operating Procedures (SOP or "Standards") which describe program requirements and best practices for the collection, analysis, and reporting of volunteer science data. These standards are defined by shared:

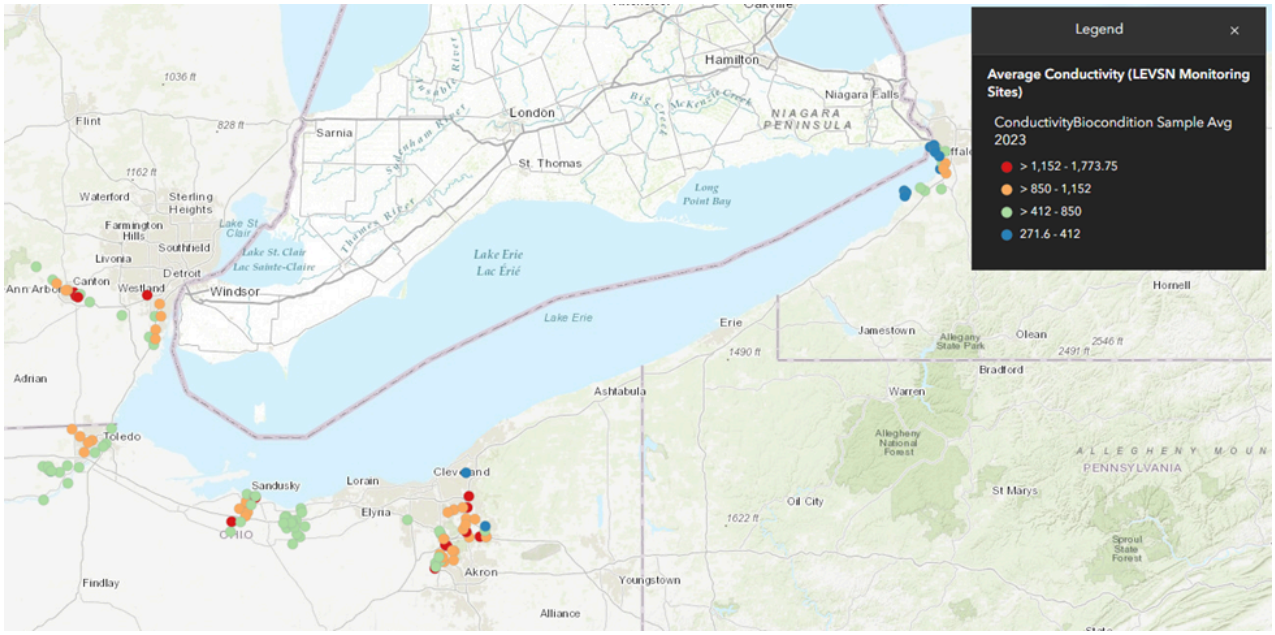
- ***Monitoring Purpose:*** Collection of conductivity, dissolved oxygen, pH, and temperature data that support screening of aquatic life impact as an indicator for the baseline conditions and trends in the health of Lake Erie watersheds at various scales.
- ***Intended Data Use:*** Data collected is intended to be used primarily as a water quality screening tool that drives 1) benchmarking of watershed health, 2) interoperability of results across watersheds, and 3) education and engagement of local communities. It is secondarily intended for use in resource prioritization and decision making (e.g. use support, advocacy, policy, resource management, and adaptive management).
- ***Target Data Users:*** LEVSN and its partners are the primary target users. Use by Federal, State and local decision makers is a priority, but secondary to the needs of the volunteer science groups implementing LEBAF.
- ***Expected Outcomes and Impacts:*** The implementation of LEBAF will 1) provide a regional condition assessment of Lake Erie streams over time, 2) identify potential problem areas to be investigated for impairment identification, 3) establish a shared lexicon to communicate program elements, shared goals, and watershed status to volunteers and the public, 4) demonstrate the capacity of regional volunteer science collaboration, and 5) create an iterative process for expanding the scope of shared standardizations and collaborations over time.

2023 LEBAF Field Season: Findings on the Health of Lake Erie

In 2023, LEBAF participants monitored over 100 stations across 20 rivers and tributaries located in the Lake Erie Basin. LEBAF participants were required to sample once per month from April to October. This resulted in data collection during 842 sampling events. Data included four core parameters – pH, DO, temperature, and conductivity – and three surrogate parameters – TDS, salinity, and chloride. Any sites with sparse data were caveated in the interpretation of results, especially if data deviated from basin-wide trends. LEBAF also recognizes its short 2-year history; continued sampling in future years will help to better characterize site, watershed specific, and Lake Erie Basin-wide variability.

Based on the LEBAF definition of health, the rivers and tributaries situated in the Lake Erie Basin are generally healthy and support aquatic life, particularly with respect to pH, temperature, and DO. Conductivity measurements, however, are cause for concern in some sections of the rivers and tributaries, but do not suggest that the rivers and tributaries are unhealthy overall. Some rivers and tributaries are healthier than others based on different parameter exceedances. Unhealthy conditions were most often event based (e.g. during periods of drought), short-lived (i.e. observed during a single sampling) and occurred in smaller tributaries of larger systems that drained highly altered land, primarily urban areas or in some cases row crop farmland.

Overall, the second year of data collection was a success. The full report - 2023 Lake Erie Watershed Health Field Season Report - includes more detailed analyses of the data, which supports the LEBAF monitoring purpose, data use of screening for primary data users, and the participating organizations.



2023 LEBAF Field Season: Improving the Program and Growing the Network

In addition to collecting, analyzing, and reporting 2023 data, the network worked hard to leverage lessons learned from 2022 to refine its processes and deepen its capacity. A rigorous evaluation process conducted following the 2022 field season resulted in the documentation of key gaps, limitations, and opportunities for improvement in a shared action plan. The LEVSN Standards Working Group used this plan to lead the network in updating its processes, tools, and supporting documentation to fine tune LEBAF. This process will be repeated to continue program refinement in preparation for data analysis and reporting in the Winter of 2023/2024.

Key successes of the 2023 season include:

- Expanding monthly sampling to over 100 sites across 20 Lake Erie Basin watersheds
- A better defined and documented validation process for ensuring data credibility
- A more streamlined, rigorous, and collaborative data analysis and interpretation process
- Empowering eleven local monitoring groups, including five new volunteer programs
- Engaging participants and external partners (including NYDEC, NEORSD, NOACA, & OEPA) in leading the network as part of a working group (Steering, Standards, & Equity)

Cleveland Metroparks

When asked about their experience with LEBAF, participants spoke about the value of contributing to a truly collaborative regional effort. Now with two years of joint data collection under their belts, they appreciated the opportunity to work alongside their peers from across the basin to identify and understand potential issues, contributing to a shared story about the health of their watersheds and the Lake Erie Basin. These groups see the tremendous potential of standardized, interoperable data being collected at the regional level - the capacity to integrate their work to build a data asset that is bigger than any one community or organization could do by themselves.

The potential impacts of this standardized approach are hard to understate. The analytical capability and programmatic credibility it enables for each participating group is complimented by the new capacity that they have to build a unified and effective screening tool at the scale of a Great Lake Basin. This process, now shown to be technically and organizationally possible, promises to produce significant value for Lake Erie communities and could serve as a model for the standardization of data from other sources such as deployed sensors and satellite imaging.

As LEBAF evolves and matures, LEVSN aims to tie its recommendations more closely to specific beneficial actions for various local and regional stakeholders. However, the network has already demonstrated communities' capacity to generate valuable scientific output. Moving into 2024, the movement will continue to build momentum as we grow our ranks to include 21 groups working to improve water quality and quality of life for all Lake Erie Basin communities.

Moving Forward: Growing the Network and Building the Movement

Since 2020, LEVSN participation has more than tripled and the network has partnered with professional scientists and decision makers to create a robust program that can fill data gaps and inform management efforts across the Lake Erie Basin. In 2023 alone, network participants engaged 143 volunteers in 3196 hours of service to collect over 800 samples across 20 local watersheds.


Metroparks Toledo

The network has already demonstrated the capacity of volunteer science to generate powerful scientific and community impact and we will continue to build momentum as our movement continues to grow. LEVSN invites communities, organizations, and individuals to join us in pursuing better water quality and quality of life for all Lake Erie Basin communities by:

- **Funding the Network** - Direct contributions to the network enable us to maintain critical functions such staff capacity and equipment upkeep.
- **Funding a Local Hub** - Direct contributions to your local volunteer science program enables their capacity to collect data, address local challenges, and participate in LEVSN.
- **Participation -** Bringing a new or existing volunteer program into LEBAF expands our capacity to collect data for impact and helps fill critical data gaps.
- **Leadership** - Participation in Working Groups or on our Steering Committee grows our organizational capacity to expand and evolve the network to address new challenges.
- **Technical Resources** - In-kind contributions of equipment, data tools, and technical support ensure that the network remains at the forefront of water data technology.
- **Scientific Expertise** - Collaborations with researchers, agency scientists, and water resource managers ensures that our movement remains scientifically rigorous.
- **Data User Relationships** - Leveraging our data helps the network build the partnerships and funding relationships needed to scale impact and ensure long-term sustainability.

If you are interested in supporting or partnering with LEVSN, please reach out to Max Herzog with Cleveland Water Alliance at mherzog@clewa.org. Together, we can ensure a healthier future for all Lake Erie Basin communities. With your help, the story has just begun.

Data Attribution and the Importance of Local Context

All of the data, interpretations, and recommendations presented here have been collected and refined by volunteer-driven groups that bring significant knowledge regarding their local water bodies to the table. LEBAF trusts each group's local wisdom will help inform any use of the data in their outreach, education, restoration and protection efforts. Any groups seeking to leverage LEBAF data or information products outside this local context are heavily encouraged to engage with the relevant participating groups to ensure responsible use.