



OVERVIEW: DATABASE FOR WESTERN LAKE ERIE BASIN NUTRIENT REDUCTION PROJECTS

June 2024 meeting of the WLEB Advisory Group (Monroe, MI). Photo: Fatimah Bolhassan.



PROJECT PARTNER

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Over the past decade, excess phosphorus has caused an increase in harmful algal blooms (HABs) in the Western Lake Erie Basin (WLEB), threatening Lake Erie's ecosystem, economy, and drinking water supply.

The WLEB Community Advisory Group, a coalition of community members, is dedicated to improving the health of Lake Erie. A team of University of Michigan graduate students partnered with this group to address two major obstacles: a lack of cohesion and limited public information about nutrient reduction efforts. To overcome these obstacles, the team created a pilot database to compile and share public information on efforts to reduce nutrient pollution in the WLEB. This document provides background on the need for the Nutrient Reduction Projects Database, as well as an overview of its development, data collection, and intended impact.



August 2024 Regenerative Agriculture Tour with WLEB Advisory Group. Photo: Fatimah Bolhassan.

WHY CREATE A DATABASE?

Lake Erie, the smallest of the Great Lakes by volume, borders Southeastern Michigan and provides the state with drinking water, recreation, transportation, energy, and food. Due to its shallow, warm waters, it is particularly vulnerable to nutrient pollution, which causes HABs that threaten the lake's ecosystem, economy, drinking water, and recreation. The WLEB watershed spans approximately six million acres across Michigan, Indiana, and Ohio, with nearly 75% of land used for agriculture—a major contributor to nutrient pollution. Since the early 2000s, Lake Erie continues to experience HABs every year.



Algal Blooms in the Western Lake Erie Basin. Photo: skypics.com

In response, the State of Michigan established the Domestic Action Plan (DAP), aiming to reduce phosphorus entering Lake Erie by 40%. The University of Michigan Water Center is working with the State to implement the DAP through an inclusive advisory process involving the WLEB Community Advisory Group, which includes representatives from rural communities, the agriculture sector, environmental organizations, water utilities, local governments, and lake-based businesses.

The idea to create this database emerged from the Water Center's collaboration with Michigan's Quality of Life Agencies and the WLEB Community Advisory Group. In initial interviews, members expressed the need for greater collaboration. Although they share a common goal of improving Lake Erie's health, parties often work "in silos," unaware of each other's efforts. Increased transparency and communication would enable the State, the Community Advisory Group, and other partners to more effectively address HABs in Lake Erie.

Inspired by this potential, the Community Advisory Group's program manager engaged University of Michigan graduate students to develop a database. In 2024, the students created a pilot Nutrient Reduction Projects Database to facilitate cross-party communication and data sharing. This publicly accessible database encourages collaboration and resource sharing, supporting the DAP and other community efforts reduce excess nutrient inputs to Lake Erie.

DATABASE DEVELOPMENT

To establish a Nutrient Reduction Projects Database that would *enhance communication and data-sharing in the WLEB*, the team developed a four-phase approach.

- **Phase 1:** The team met with WLEB community organizations to determine key database fields, methods for easy project entry, and ideas for an online interface.
- **Phase 2:** The team developed an online survey using the ArcGIS Survey 123 platform, ensuring compatibility with future mapping needs.
- **Phase 3:** The team piloted the survey at Community Advisory Group events and via email, with iterative updates based on participant feedback.
- **Phase 4:** The team designed a prototype map to help guide future work. The initial database, collection survey, and future plans will be managed by the University of Michigan Water Center moving forward.

Key Database Fields Include

Project Information

- Project name
- Brief summary of work
- Start and end dates
- Contact information (name, email, phone)

Funding Information

- Award amount
- Funding source
- Key partners

Project Details & Impact

- Location (county / watershed)
- Outputs and outcomes
- Additional links and resources

Figure 1. Key project information collected in the Nutrient Reduction Projects Database.

Database Projects by Community Type

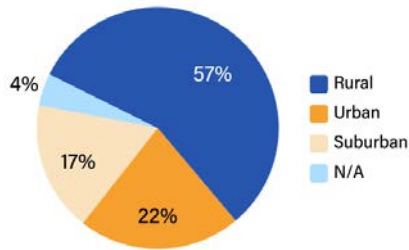


Figure 2. Pie chart of project community type: rural (57%), urban (22%), suburban (17%), and N/A (4%).

Database Projects by Purpose

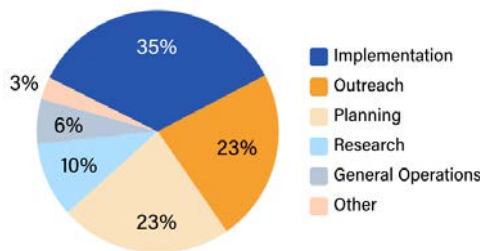


Figure 3. Pie chart of project purpose: implementation (35%), outreach (23%), planning (23%), research (10%), general operations (6%), and other (3%).

Database Projects by Pollution Source

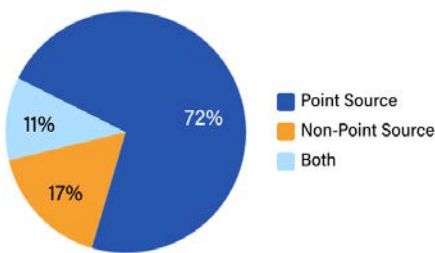


Figure 4. Pie chart of project pollution sources: point source (72%), non-point source (17%), and both (11%).

Database Projects by Budget

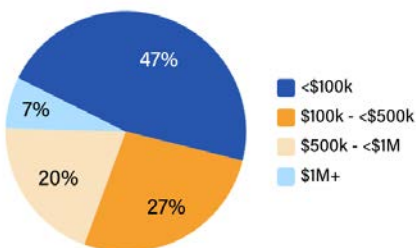


Figure 5. Pie chart of project budget: <\$100k (47%), \$100k-<\$500k (27%), \$500k-<\$1M (20%), and \$1M+ (7%).

DATABASE ANALYSIS

Eighteen survey responses were collected during the pilot data collection process. The projects varied in size, location, and purpose (see Figures 2-5). Additionally, from the eighteen projects, 58 organizations were listed as partners or funders (Figure 6). Preliminary results show the database's potential to facilitate collaboration across diverse projects with 72% of projects open to collaboration.



Figure 6. Wordcloud of organizations and funders. Larger text represents the most commonly referenced organizations.

DATABASE PROTOTYPE

The team created a prototype website that addresses the needs identified by project partners during the interview process. This prototype is designed with an emphasis on flexibility and searchability, offering a range of filter options such as viewing the map by county or watershed. The website enables users to explore detailed information about individual projects and to contribute their own projects to the database.

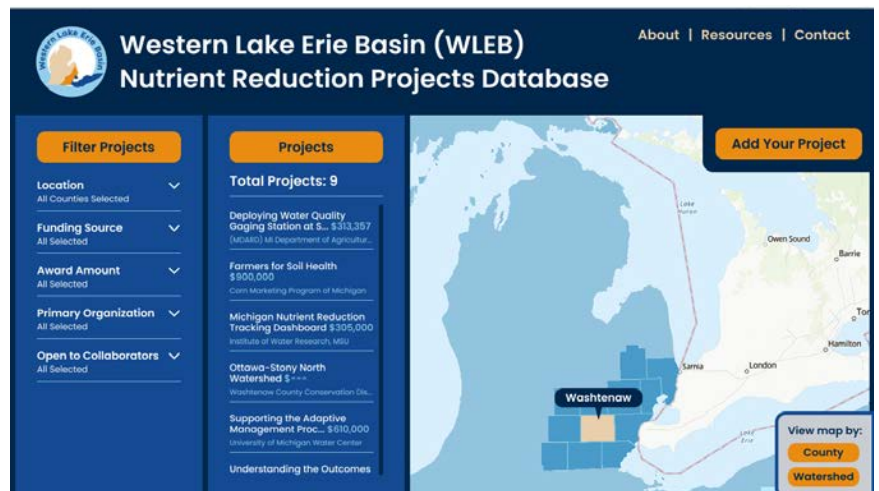


Figure 7. Prototype of WLEB Nutrient Reduction Projects Database.

FEATURED PROJECTS

Wetland Restoration Pilot Project (Lenawee County, MI):

Wetlands act as natural filters, removing pollutants from water. This Duck's Unlimited project is designed to demonstrate that wetland restoration could help reduce nutrient pollution in the WLEB watershed. To do so, project partners purchase marginal agricultural land, restore this land to wetlands, and monitor nutrient reduction. The project aims to advance wetland restoration as a best management practice within the WLEB watershed.

West Chicago South Stormwater (Detroit, MI):

This Detroit Water and Sewerage Department project addresses the critical issue of combined sewer overflows, which pollute rivers and streams that ultimately drain into the WLEB. To combat these challenges, the project involves constructing two miles of storm sewer and rerouting flow directly to the Ashcroft Sherwood Drain. These improvements aim to reduce basement backups and street flooding while enhancing the quality of water entering Lake Erie.

Expanded Water Quality Monitoring Program (WLEB):

This Alliance for the Great Lakes project expands water quality monitoring in Michigan's five priority subwatersheds to establish baseline water quality conditions, explore lower cost monitoring approaches at a subwatershed scale, and understand soluble reactive phosphorus trends in the WLEB.

IMPACT

As the Nutrient Reduction Projects Database continues to expand, it will help community leaders connect with one another and share important information about funding, best management practices, innovation, and opportunities to collaborate. By increasing community collaboration, this project will improve the health of Lake Erie.



Installation of turbidity sensors near Adrian, MI. Photo: LimnoTech/Freeboard Technology.



Maple River State Game Area (Fowler, MI).
Photo: Ducks Unlimited.

ACKNOWLEDGEMENTS

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MORE INFORMATION

- EGLE - Taking Action on Lake Erie: <https://www.michigan.gov/egle/about/organization/water-resources/great-lakes-coordination/taking-action-on-lake-erie>
- Western Lake Erie Basin Advisory Group: <https://graham.umich.edu/wleb>
- WLEB Nutrient Reduction Database: <https://graham.umich.edu/wleb/nutrient-reduction-database>



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