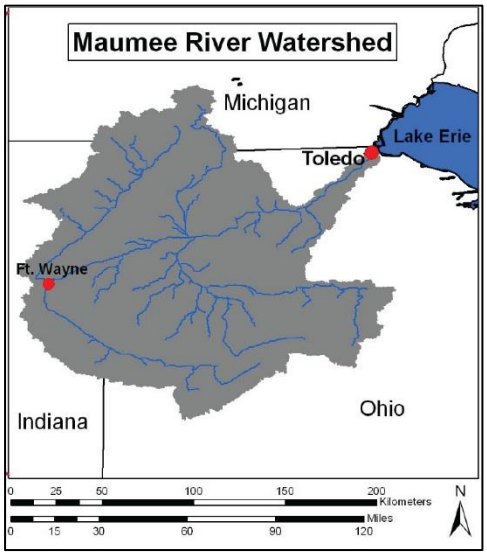
US Army Corps of Engineers

Phosphorus Optimal Wetland Demo

Maumee River Watershed, Ohio

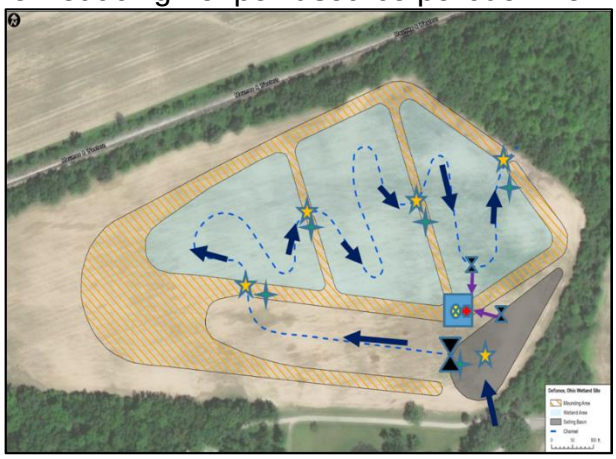
GLRI Nonpoint Source Pollution Focus Area

Project Location: The project is located within the Maumee River Watershed of Lake Erie. Project specific location lies within the township of Defiance, Ohio.



Problem: Excess phosphorus (P) runoff results in high levels of harmful algae that reduce water quality and create "dead zones" devoid of oxygen in the Lake Erie, harming coastal economies and threatening human health. In response, the Great Lakes Restoration Initiative (GLRI) Action Plan III seeks to reduce P runoff from "priority watersheds" including the Maumee River in Ohio.

Demonstration Project: The P-Optimal Wetland Demo provides for R&D to identify management actions and operational strategies to maximize P retention through multiple mechanisms. The project will investigate P reduction under a variety of scenarios and answer questions related to legacy P, P storage capacity thresholds, P fate within wetland systems, soil amendment effects, and associated implications for increased P removal. This will inform the improvement of water quality at multiple scales. The project demonstrates the benefits of P optimization in wetlands and promotes a methodology that may be applied as a valuable tool for reducing nonpoint source pollution from reaching the Great Lakes.



Phosphorus Optimal Wetland Design Concept and Final Construction in Defiance, OH.

Partners and Collaboration: The US Army Corps of Engineers, Buffalo District is working with the Engineer Research and Development Center (ERDC) in conjunction with the City of Defiance OH, and partners from the US Geological Survey and the private sector to construct, monitor, and conduct research on the Defiance wetland.

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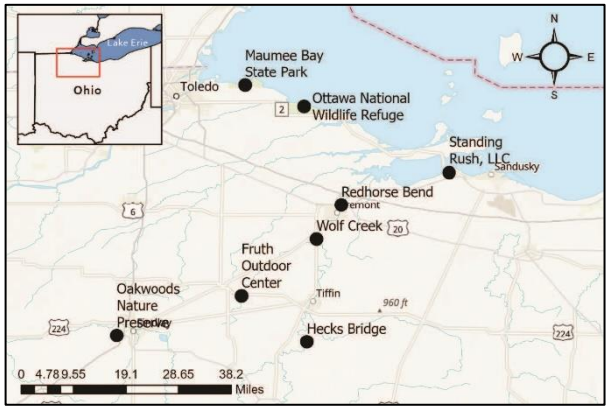

H2Ohio Study locations in northern Ohio.

Additional collaboration is underway with State of Ohio Department of Natural Resources, the Ohio Lake Erie Aquatic Research Network and other local and non-profit organizations to share and leverage best practices identified from across the Maumee River basin.

Research Products: This demonstration project is built on prior research conducted by ERDC and project partners to develop methodologies to optimize soil P storage capacity. Completed products include:

Title	Source	Date
An Evaluation of Soil Phosphorus Storage Capacity (SPSC) at Proposed Wetland Restoration Locations in the Western Lake Erie Basin	ERDC Technical Report	September 2021
Coupling watershed modeling, public engagement, and soil analysis improves decision making for targeting P retention wetland locations	Journal of Great Lakes Research	July 2020
Evaluating Soil Phosphorus in Nutrient Retention Wetlands https://www.youtube.com/watch?v=CUdAIz-sDSg&t=145s	YouTube video	January 2020
Soil P sorption capacity in agricultural treatment wetlands: Can a system designed for N reduction also retain P?	Wetlands	October 2019
Utilizing Wetlands for Phosphorus Reduction in Great Lakes Watersheds: A Review of Available Literature Examining Soil Properties and Phosphorus Removal Efficiency	ERDC Technical Report	October 2017

Project Benefits: Benefits include increased effectiveness of nonpoint source pollution control and application of an innovative solution to reduce nutrient loads from agricultural and urban watersheds. These benefits contribute to downstream and ultimately Lake Erie water quality. This demonstration project aligns with GLRI Action Plan III as outlined under Focus Area 3, Nonpoint Source Pollution.

Project Status: Project partners are currently conducting field research and monitoring of the P Optimal Wetland Demo. Wetland construction was completed in June 2021 and a 5-year monitoring program was established via contract and through partnerships with ERDC, USGS, and the USEPA.

Project Milestones	
Construction Completion	MAR 2021 (A)
Multi-year Research Onset	Jun 2021 (A)
Research Conclusion	May 2026

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