Tools and Projects for Reducing Nutrient Loading in the Western Lake Erie Basin

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“You’re glumping the pond where the Humming-Fish hummed!
No more can they hum, for their gills are all gummed.
So I’m sending them off. Oh, their future is dreary.
They’ll walk on their fins and get woefully weary
in search of some water that isn’t so smeary.
I hear things are just as bad up in Lake Erie.”
• **Binational Phosphorus Load Reduction Target:** Reduce TP loading entering the western and central basins by 40%

• **State of Michigan Domestic Action Plan for Lake Erie**
Lake Erie Phosphorus Loading

- Total P loading has remained fairly steady, but DRP has increased – and is nearly 100% bioavailable (it supports rapid algal growth and reproduction)
- Western Lake Erie Basin is receiving >60% of the P loading
- In heavy agricultural watersheds, including the Maumee, Sandusky and Raisin River, DRP has increased two-fold since the mid-1990s

Source: glc.org/work/habs-collaboratory
Approximately 40% of agricultural land is tile drained in the Midwest.
How do we lower P loading to Lake Erie?

- Adaptive Management
- 4Rs of nutrient stewardship: Right fertilizers, Right rate, Right time and Right place
- Slow down the water (restoring natural wetlands, filtering tile water, cover crops, buffer strips)
River Raisin Watershed
River Raisin Watershed

- 1,072 square miles
- Includes parts of five counties
- 3,000 miles of man-made drainage systems
- 65% agricultural land
Package of Tools to Reduce Risk of P loss

Contact: Jeremiah Asher, MSU-IWR
Increase voluntary practices by informing farmers about resource concerns and recommending conservation treatments.
Provides quick vulnerability risk assessment for field-crop systems

- Soil erosion
- Manure runoff
- Phosphorus loss
- Nitrate leaching
SAIS Map Layers

- Waterbodies and Streams
- Concentrated Flow
- Sediment Delivery
- Nitrate Leaching
- Soil Erosion by Wind
- Sheet/Rill Erosion by Water
Produces PDF report:

- Risk assessments/maps
- Recommended conservation treatments
- USDA Service Center information
- Identified Risks
- Michigan Phosphorus and Manure Risk Index
- Soil Information
- Recommended Practices
- Field-specific maps of identified risks
- NRCS Practice Guidelines for recommended practices
Supports conservation planning and programs by evaluating, tracking and reporting water quality and quantity improvements at the field-scale.
• Simulates benefits from 30+ best management practices using HIT, SWAT and L-THIA models
• Estimates water erosion, sediment loading, nutrients, water runoff, water infiltration and more
Current Geographic Scope

- Saginaw (MI), Maumee (OH), Lower Fox (WI), Genesee (NY) Basins
- Kalamazoo
- River Raisin
- Runoff risk tool linked to real-time weather data
- View 7-day forecasts anywhere in Michigan
Today's forecast for runoff is **Moderate**.

Alert Name: Runoff Alert

[Show Location on Map]

What should I do?

[Advice for Spreading on a High-Risk Day]

[Michigan GAAMPS]
CANMaPP (Computer-Assisted Nutrient Management Planning Program) is an online tool, currently in-development, that assists with nutrient management plan implementation and documentation in Michigan. Users will be able to import existing nutrient management plans into CANMaPP and view plan requirements in a user-friendly environment. The system will facilitate plan implementation and help users document their plan, including any adjustments that are made. CANMaPP is designed for use by farmers, conservation technicians, Extension educators, crop advisors, agency personnel and other conservation professionals across Michigan.
WLEB – River Raisin Projects

- Accelerating Conservation Adoption through Farmer-led Engagement
- In-ditch Wetland Treatment for Nutrient Removal from Agricultural Tile Drains
- Tile Drain and Edge of Field Monitoring
Accelerating Conservation Adoption in the River Raisin

**Goal:** Help improve water quality in Lake Erie; focused on phosphorus reduction

**Provides:**
- Funding for conservation practices in the River Raisin Watershed (cover crops, filter strips, reduced tillage, nutrient management, conservation crop rotation)
- Training on online conservation tools for producers and conservation professionals

*Funded by Great Lakes Restoration Initiative*
Current Mgmt

Proposed Mgmt
Constructed Wetlands for Treatment of Surface and Subsurface Drainage
Wetland Design
<table>
<thead>
<tr>
<th>RESEARCH QUESTIONS</th>
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<tbody>
<tr>
<td><strong>SIZE RATIO</strong></td>
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<tr>
<td>.004% ratio with hyper phosphorus</td>
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<tr>
<td>absorbing plants - .03 acres to</td>
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<tr>
<td>treat 7.5 acres</td>
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<tr>
<td><strong>LIFE EXPECTANCY</strong></td>
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<td>Can harvestable floating plants</td>
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<tr>
<td>increase life expectancy of</td>
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<td>wetland and significantly</td>
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<td>reduce nutrients?</td>
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<tr>
<td><strong>PLANT TYPES</strong></td>
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<td>Which plant types offer the greatest</td>
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<td>phosphorus uptake?</td>
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<tr>
<td><strong>COST COMPARISON</strong></td>
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<td>How does the cost of removing a</td>
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<td>pound of phosphorus via wetland</td>
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<td>compare to traditional in-field</td>
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<td>practices?</td>
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Tile Drain Monitoring

- Characterize water quality from tile drains
- Better understand what impact practices are having on subsurface drainage
- Increase awareness of potential problems on the farm
- Change farm management behaviors
Edge of Field Monitoring

- Five year project researching saturated buffers and drainage water management effects on nutrient loss through tile drains

Contact: Ehsan Ghane, MSU-BAE
For More Information

- MSU Institute of Water Research (www.iwr.msu.edu)
- Gov. Whitmer Executive Directive (June 2019)
- Blue Accounting – Erie Stat (Great Lakes Commission)
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