Project 300-1150

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March 22, 2023

Southeastern Wisconsin

Regional Planning Commission

Delavan Lake
Comprehensive Lake Management Plan Update
March 22, 2023

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Brief Project Review

- Delavan Lake is perhaps the most intensively studied lake in Southeastern Wisconsin.
- Data continue to be collected. Concerns, approaches, and projects continue to evolve.
- Much work has been completed since the last comprehensive management plan was published during 2002.
- The Town Lake Committee recognized the need to update the 2002 comprehensive lake plan.
- The Commission's December 2019 scope of work formed the basis of a WDNR surface water grant application. Grant was awarded early 2020 and Commission initiated work later that spring.
- Working with the Delavan Lake Sanitary District, the Commission also initiated work on an aquatic plant inventory and management plan during 2020. The aquatic plan inventory and plan were published July 2022.

Project Scope Review

- A wealth of new information has been collected and numerous reports were published since 2002, the date of the existing comprehensive lake management plan.
- A unique scope of work was needed to avoid duplicating ongoing and past efforts.
- The Town, Commission, WDNR, and others met multiple times throughout 2019 to develop an appropriate scope of work. The final scope of work was outlined in the Commission's December 2019 staff memorandum.
- The 2019 scope of work addressed the known and anticipated lake management situation as of 2019.
- Lake management continues to evolve. The 2019 scope should be reviewed to assure that present-day lake management concepts and issues are addressed.

2019 Scope of Work
Commission Status Review and Impression of Project Components

- **Green: completed.**
- **Yellow: relevant component with significant work already completed**
- **Orange: relevant component with some work completed.**
- **Blue: component discussed with Town personnel but that was not included in the original scope of work.**
- ***Italics and underline: component that possibly has partially or fully lost importance and/or relevance.***

2019 Scope of Work Review

- **Evaluate Lake Conditions**
  - **Inventory aquatic plant community and update aquatic plant management plan.**
    - **MR 190 (2nd Edition) published in 2022**
  - **Update water quality data, examine trends and significance, and evaluate management implications.**
  - **Compare and contrast phosphorus and water budgets.**
  - **Evaluate ability to, and benefits of, water level manipulation.**
  - **Quantify boat traffic and use and examine boat use-conflict potential.**
  - **Evaluate fishery, inventory watershed physiography and hydrography, develop independent phosphorus load values, assist in development of aerial drone surveys.**

2019 Scope of Work Review

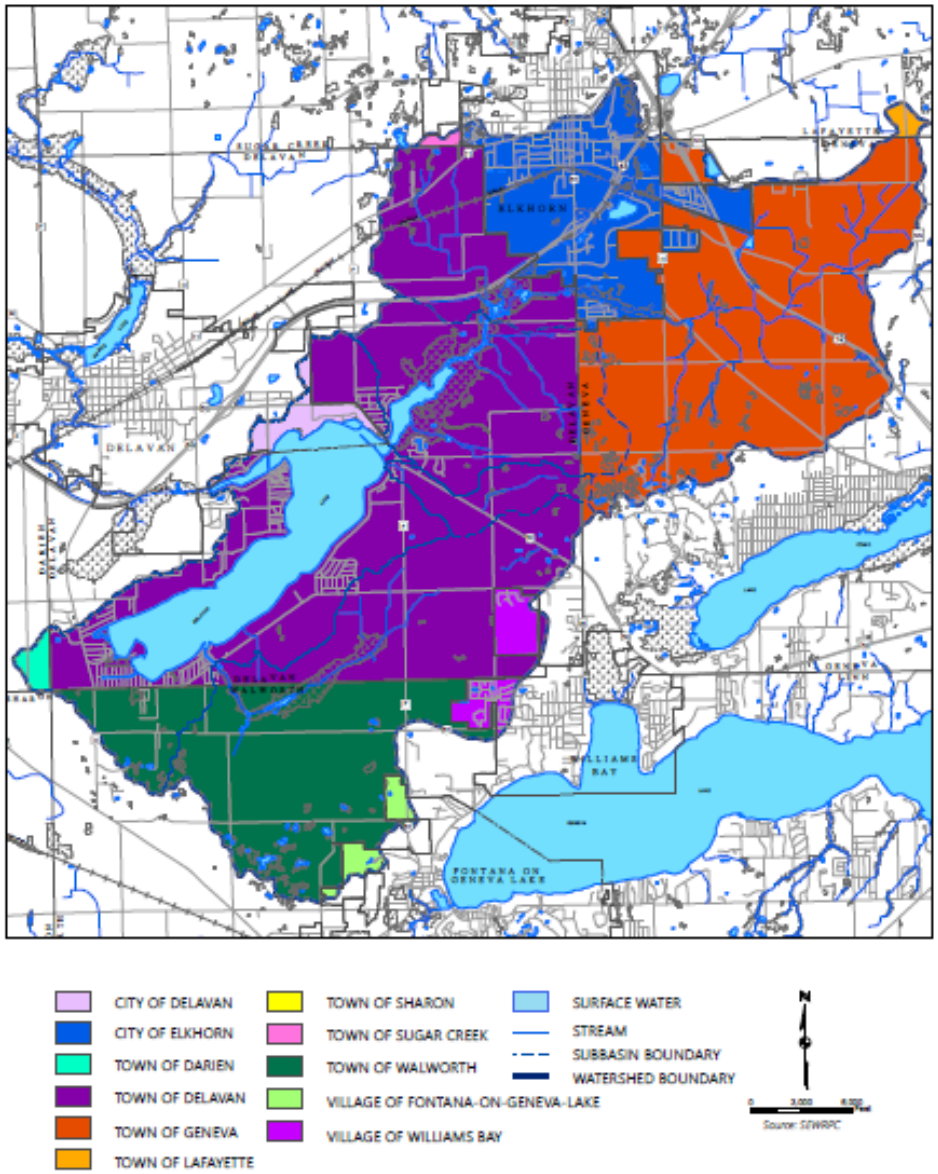
- **Watershed-Sourced Sediment/Nutrient Reduction**
  - ***Study Mound Road Ponds sediment characteristics.***
  - **Examine *and attempt to refine* Mound Road Pond's sediment load/capture dynamics.**
  - ***Evaluate effectiveness of select recently implemented watershed management practices.***
  - **Evaluate methods to capture sediment/nutrients in Lake inlets.**
  - ***Examine efficacy of lake-bottom sediment consumption pellets.***

2019 Scope of Work Review

- **Lake and Watershed Management**
  - **Integrate recent management recommendations.**
  - **Develop execution concepts.**
  - **Examine funding strategies.**
  - **Publish updated comprehensive lake management plan.**

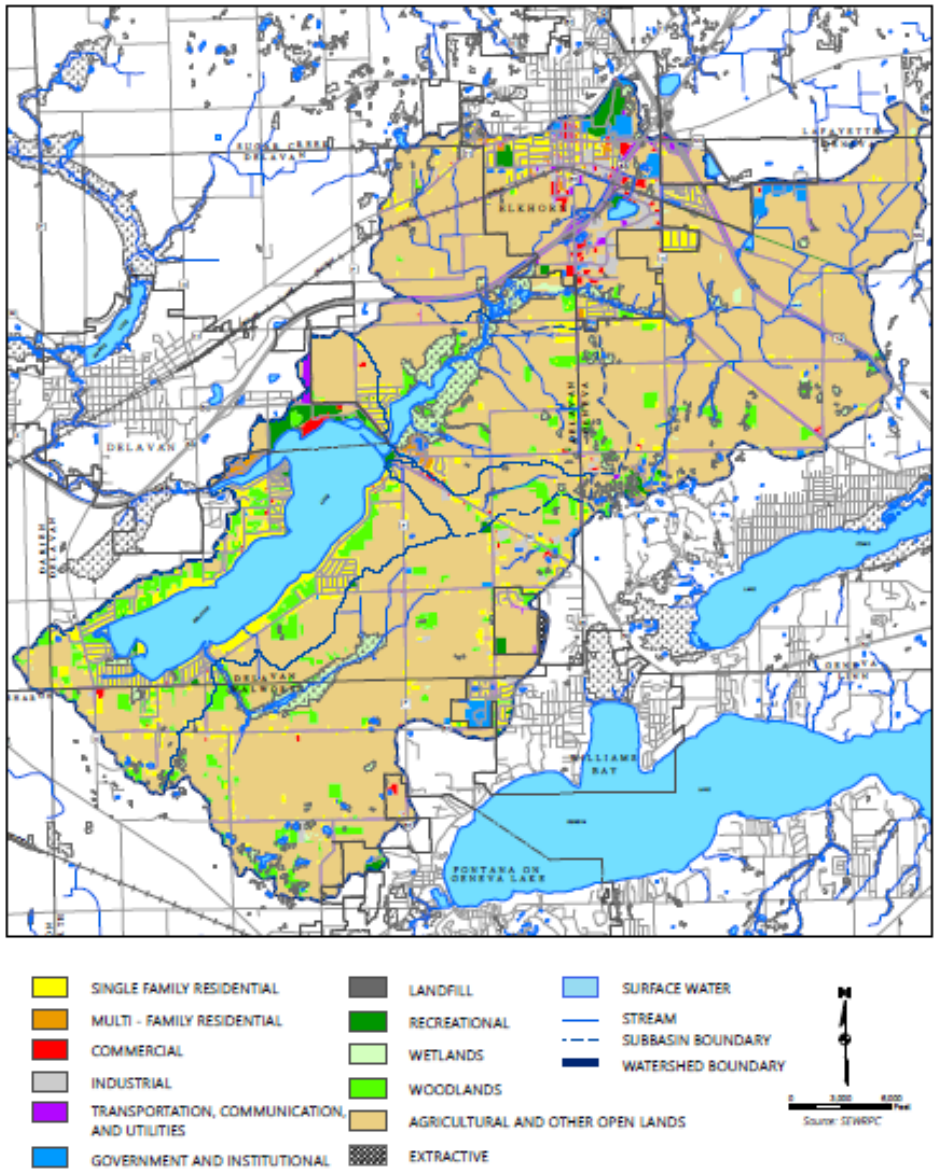
2019 Scope of Work Review

- Lake and Watershed Management
  - Integrate recent management recommendations.
  - Develop execution concepts.
  - Examine funding strategies.
  - Publish updated comprehensive lake management plan.
  - **Walworth County Land Use & Resource Management Targeted Runoff Management Grant Application**
    - **Large-Scale Agricultural TMDL TRM Grant**
    - **Implements agricultural best management practices**
    - **Cost-share up to 70% for eligible costs up to $600,000**
    - **Grant is anticipated to be submitted April 2023**
    - **Letters of support appreciated**



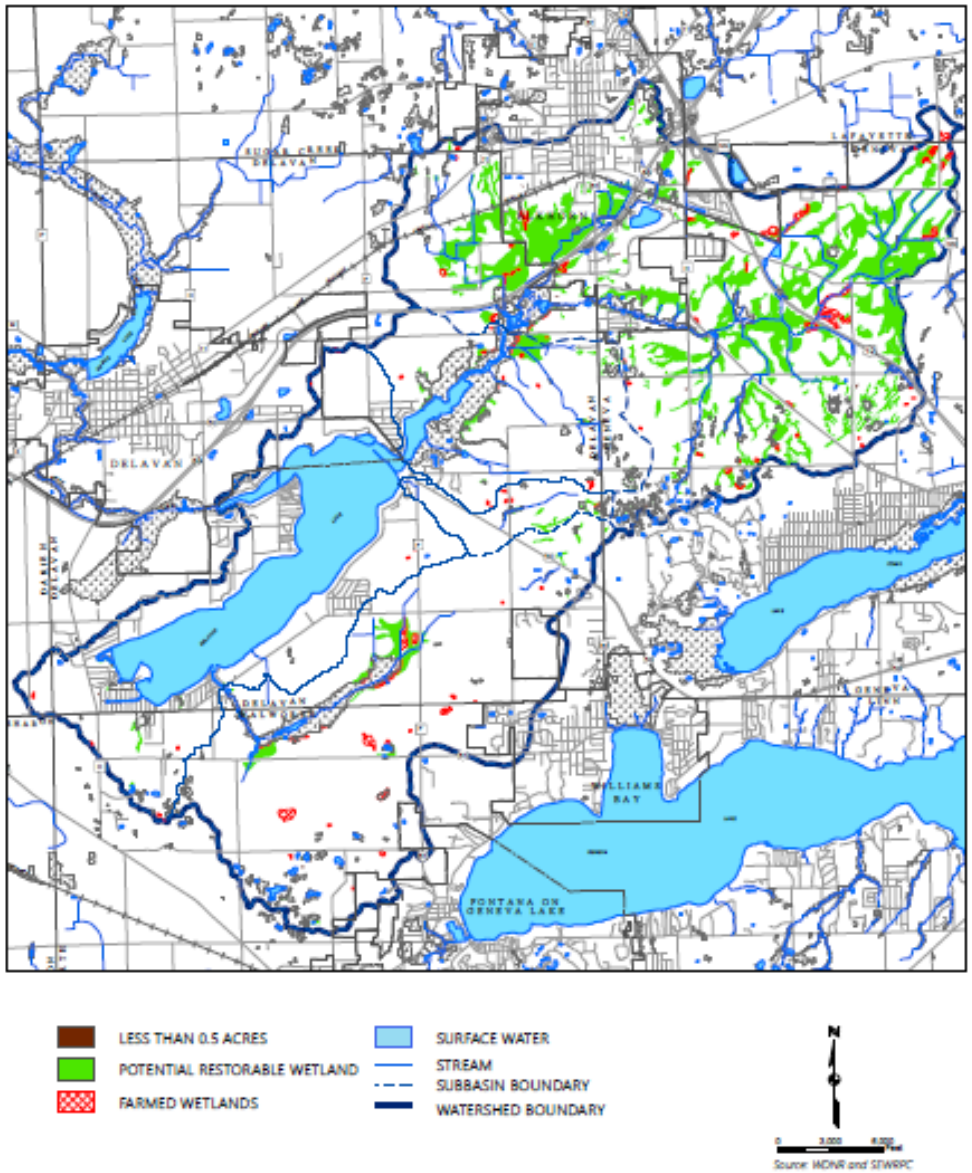
Delavan Lake Watershed Civil Divisions

- Four municipalities encompass most of Delavan Lake's watershed:
  - Town of Delavan: 45.3%
  - Town of Geneva: 24.4%
  - Town of Walworth: 15.1%
  - City of Elkhorn: 10.3%
- The seven remaining municipalities occupy the remaining ~5%



Delavan Lake Watershed Land Use

- Land use is predominantly rural
  - 65% agricultural and open land use
  - Urban land uses concentrated in Elkhorn and in Town of Delavan along Lake
- Engaging the farming community will be essential to improve water quality
  - Encourage formation of producer-led group
    - DATCP grant program
  - Incentivize best management practices
  - Soil-health initiatives will play a key role



Delavan Lake Watershed Potentially Restorable Wetlands

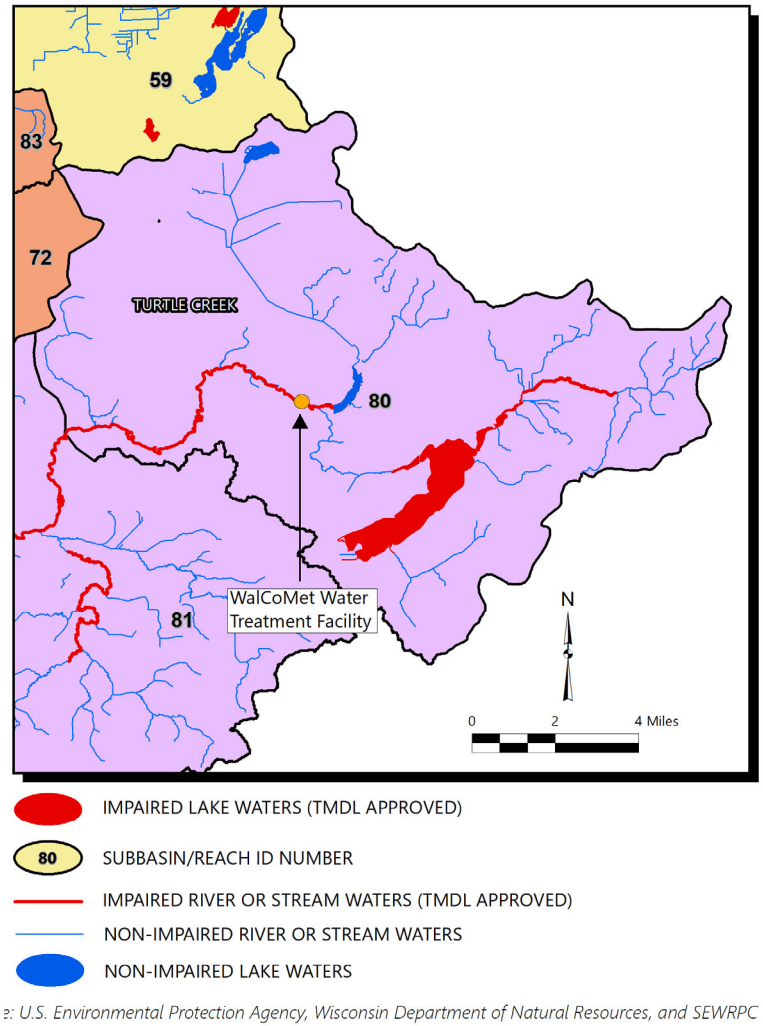
- 2,572 acres of potentially restorable wetland
  - 10% of entire Lake watershed
- Most of the potentially restorable wetland within three municipalities
  - Town of Geneva: 50.3%
  - City of Elkhorn: 26.4%
  - Town of Delavan: 21.0%

Watershed Nonpoint Source Phosphorus Load Comparison

Year Published	Reference	Data or Model(s) Used	Model Year	Phosphorus (lbs./year)
1988	USGS, Hydrology and Water Quality of Delavan	Monitoring data	1984-1985	8,980 - 9,500
2002	SEWRPC, Delavan Lake Management Plan	SEWRPC UAL/WiLMS	2000	15,600 - 29,600
2011	WDNR, Rock River TMDL	SWAT, SLAMM	2000	5,458
2016	Peter Berini and Northwater Consulting, Delavan Watershed Implementation Plan	SWAMM	2009-2014	3,340
2017	SEWRPC, Jackson Creek Watershed Protection Plan	STEPL	2010	53,533
2023, Draft	USGS, Response in Water Quality of Delavan Lake	Monitoring data with extrapolation	1984-2021	14,462
2023, Draft	SEWRPC, Delavan Lake Management Plan Update	WDNR Presto-Lite	2010-2012	2,950 - 20,236
2023, Draft	SEWRPC, Delavan Lake Management Plan Update	STEPL	2020	26,143

Phosphorus Load Reduction Goals and Plans

- Reduction goals
  - SEWRPC 2002
    - Reduce non-point sources by 25% urban and 48% rural sources
  - Robertson et al., 2009: attain average Secchi depth of 1.5 m
    - Reduce external loading from Jackson Creek by 75%
  - Rock River TMDL 2011
    - Goal would exceed Lake water clarity goals
    - Reduce non-point sources by 49% (25% TSS)
  - Robertson et al., 2022: attain WDNR TP limit of 0.030 mg/L
    - 17% controllable P reduction to attain WDNR water quality standard of 0.30 mg/l
    - 35% controllable P reduction to attain TSI and water clarity goals
- Implementing BMPs to attain reduction goals
  - Berini et al., 2016: Watershed Implementation Plan
    - 55% reduction in total phosphorus for entire lake watershed possible by implementing all BMPs
  - SEWRPC, 2017: Jackson Creek Plan
    - 44% reduction in total phosphorus from Jackson Creek to attain TMDL goals



ɛ: U.S. Environmental Protection Agency, Wisconsin Department of Natural Resources, and SEWRPC

Phosphorus Load Reduction Goals and Plans

- Water Quality Monitoring Stations

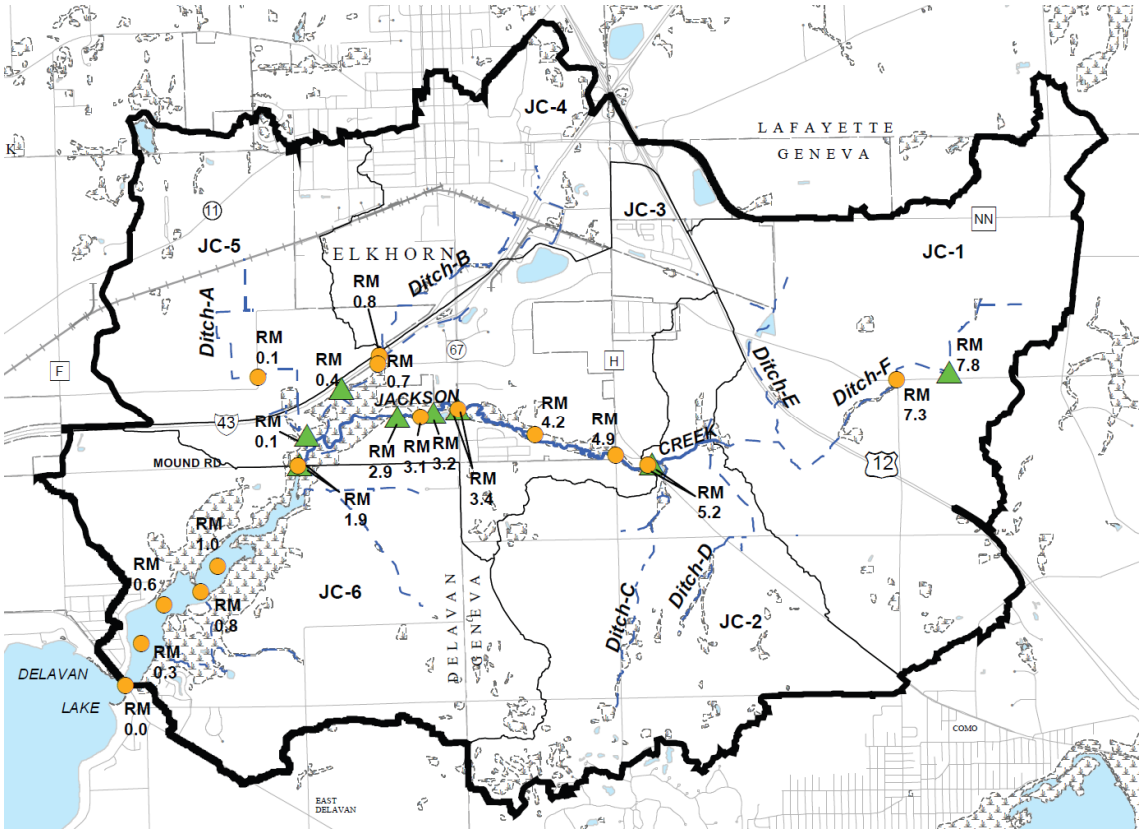
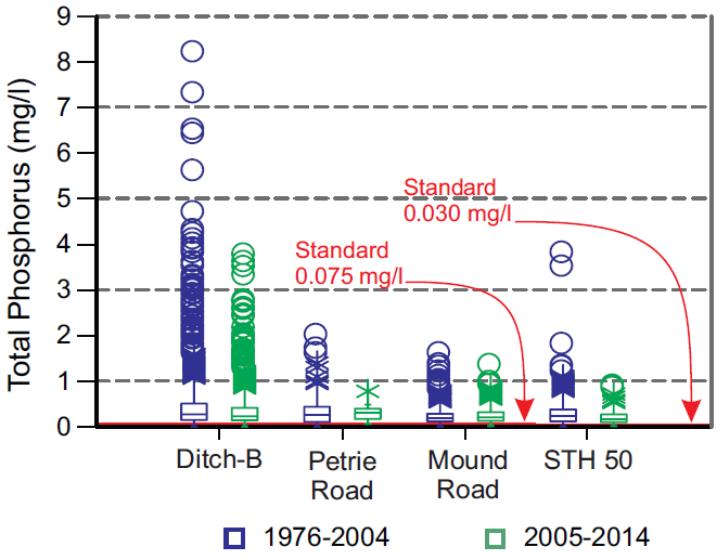


Figure 20

TOTAL PHOSPHORUS CONCENTRATIONS AT SITES WITHIN THE JACKSON CREEK WATERSHED: 1976-2014



Phosphorus Load Reduction Goals and Plans

- Reduction goals

Figure 13

COMPARISON OF FLOW DURATION CURVES FOR STREAM GAUGES IN THE JACKSON CREEK WATERSHED: OCTOBER 1993 THROUGH SEPTEMBER 1995

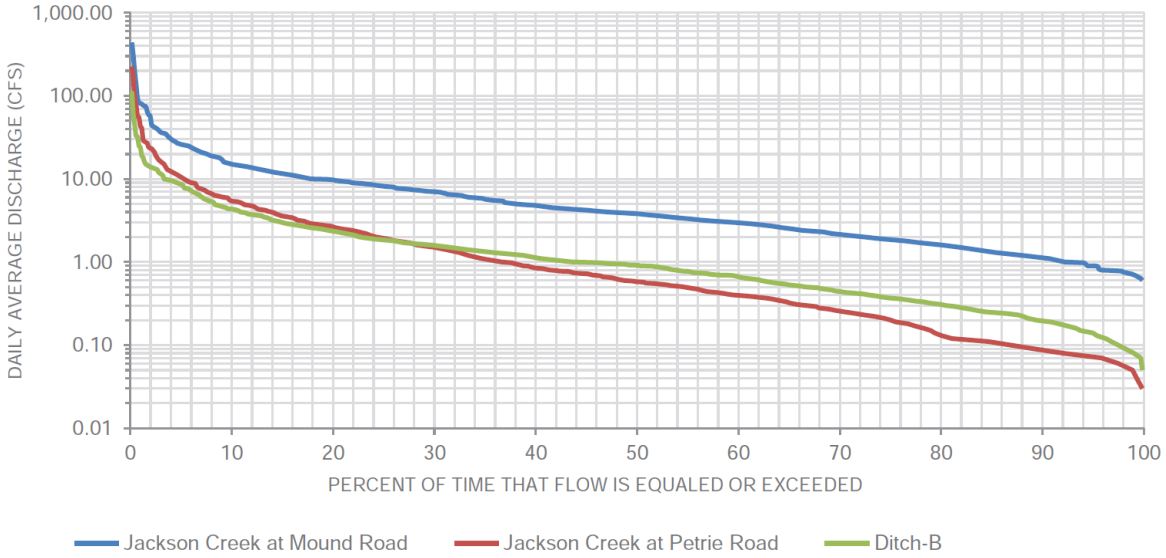
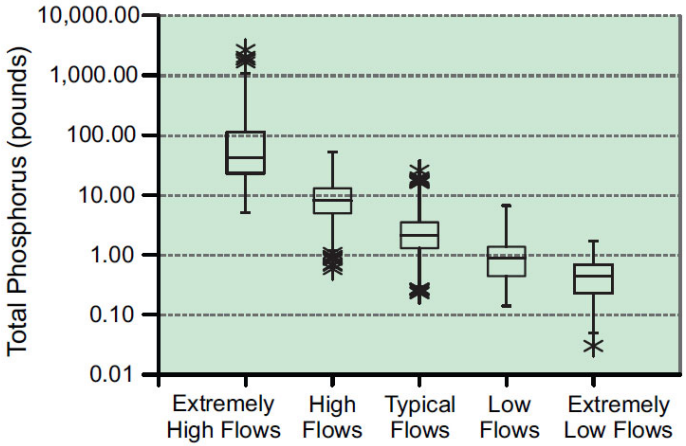


Figure 23

DAILY LOADS OF TOTAL PHOSPHORUS AS RELATED TO AVERAGE DAILY DISCHARGE IN JACKSON CREEK AT MOUND ROAD: 1993-2009, 2013

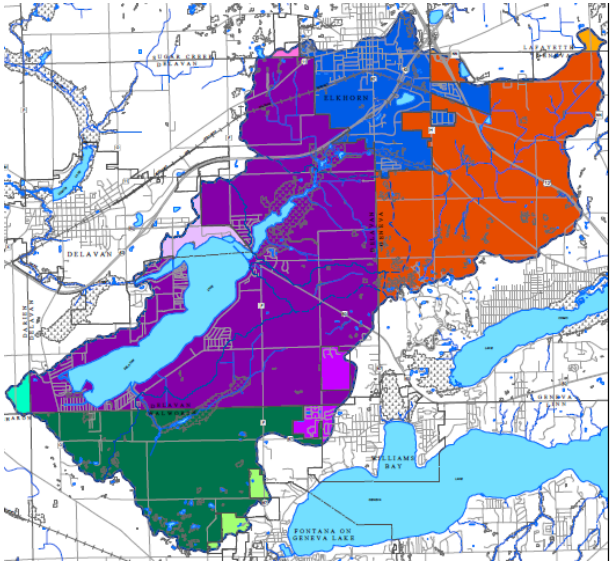


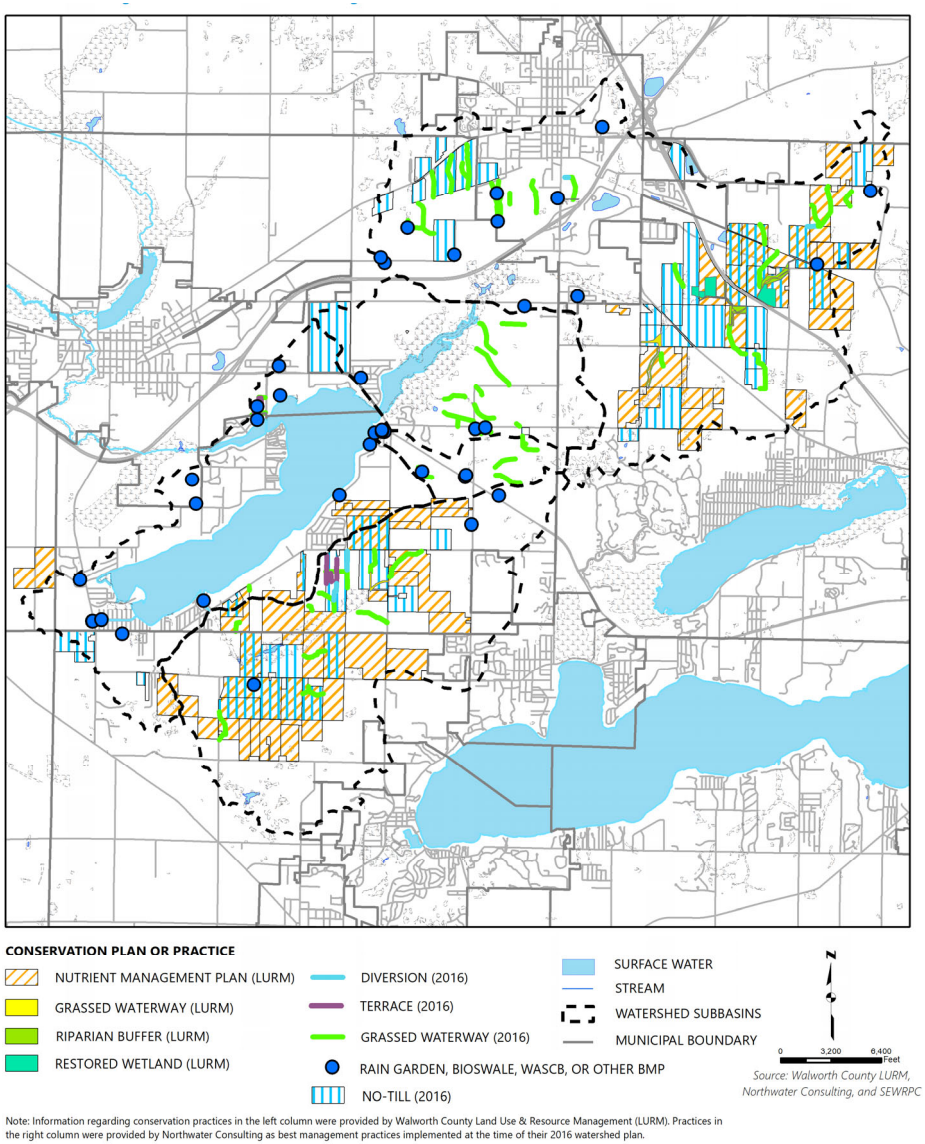
Phosphorus Load Reduction Goals and Plans

- **STORM EVENT ON JUNE 13, 2008**

Existing BMPs in Watershed

Municipality	Grassed Waterways (Miles)	No-Till (Acres)	NMPs (Acres)	Bioswales, rain gardens, etc. (count)
Town of Delavan	9.6	1,134	1,007	25
City of Delavan	0.6			5
City of Elkhorn	1.9	37		5
Town of Darien			121	
Town of Geneva	3.5	1,460	1,881	2
Town of Walworth	1.0	792	1,478	2





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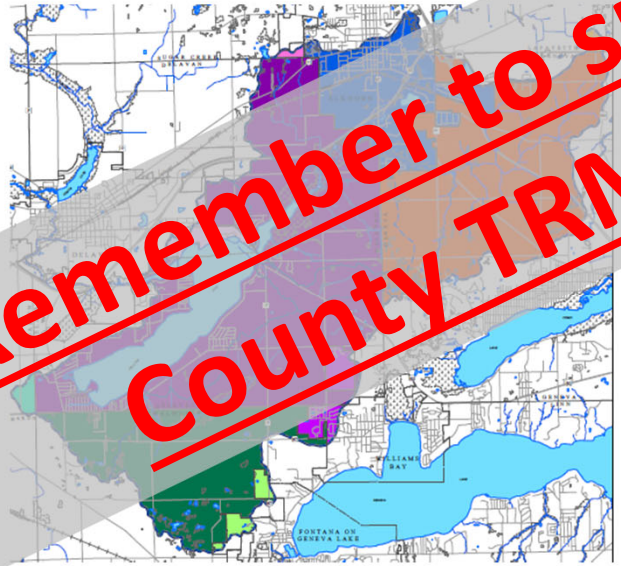
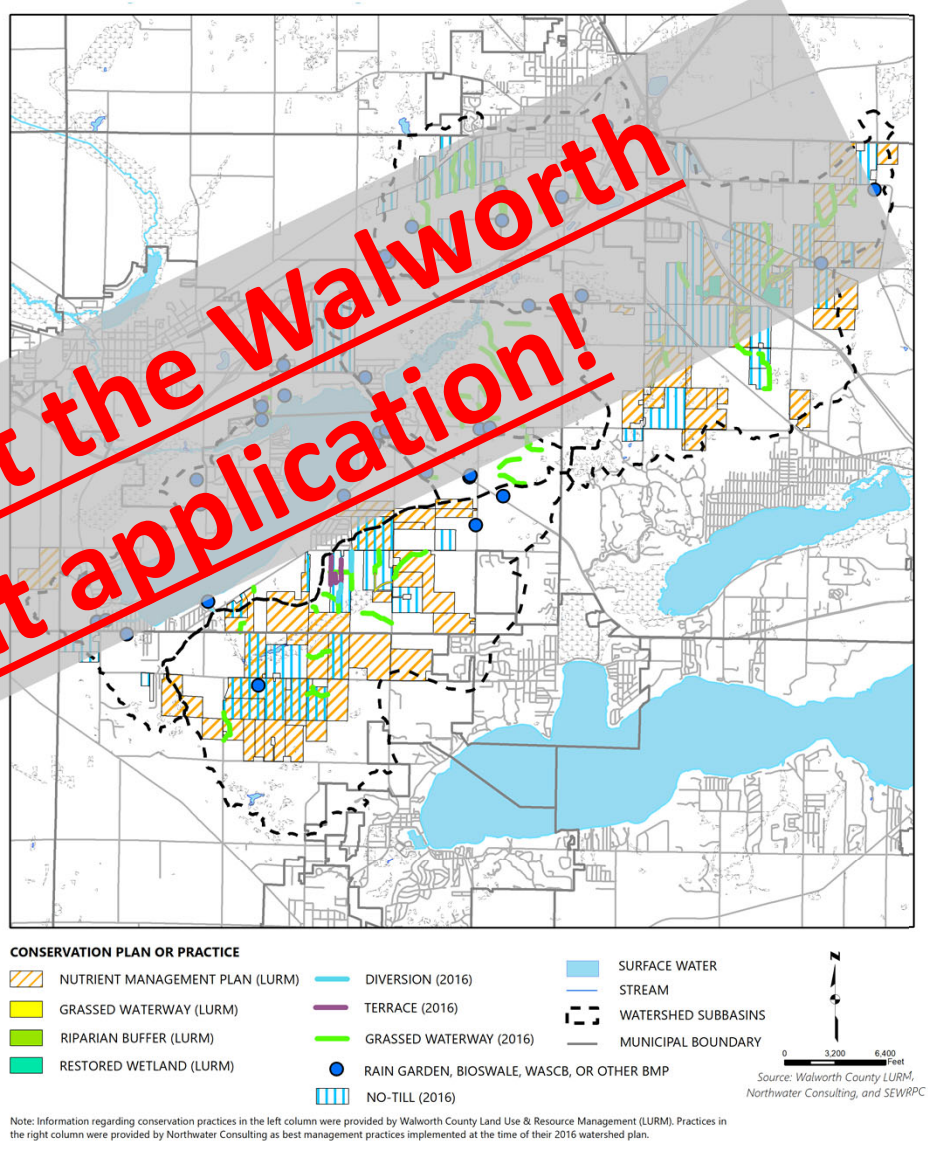
Remember to support the Walworth County TRM grant application!





Note: Information regarding conservation practices in the left column were provided by Walworth County Land Use & Resource Management (LURM). Practices in the right column were provided by Northwater Consulting as best management practices implemented at the time of their 2016 watershed plan.