

Connection Between Land & Water

Justine Bula
Education Coordinator
Sauk County Land Resources and Environment

1

Overview

- Land Use
- Groundwater
- Sauk County Drinking Water Program
- Surface Water
- Erosion
- Producer Led Groups
- Questions

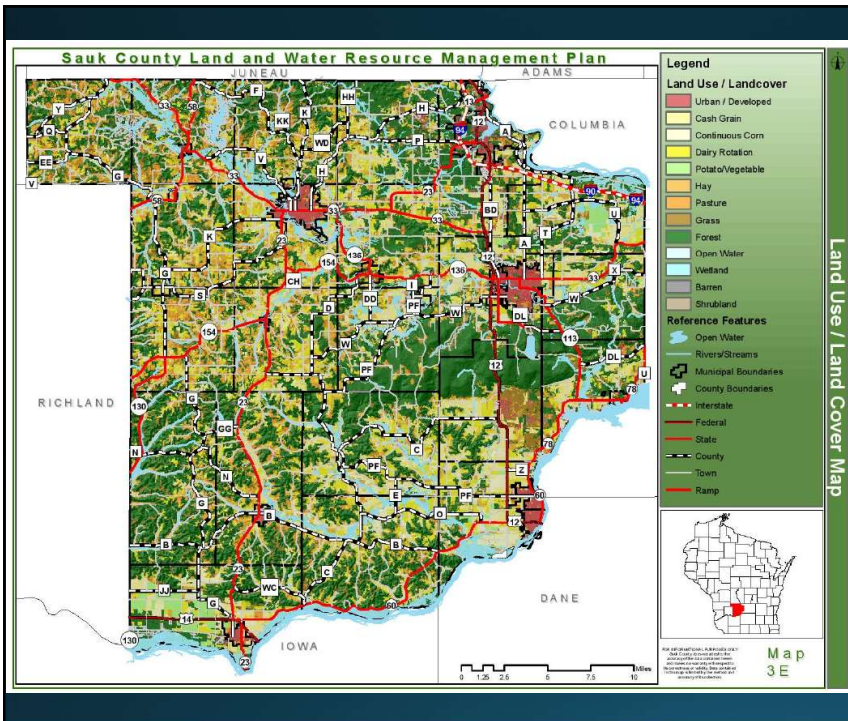
2



Land & Water

- We cannot control the weather but we can control how we manage our lands
- Farmland management can affect:
 - Groundwater
 - Surface water
 - Soil Health
 - Nutrient Density in products grown & raised
 - Farmland Productivity

3



Land Use

- Agriculture accounts for 61% of land use across Sauk County

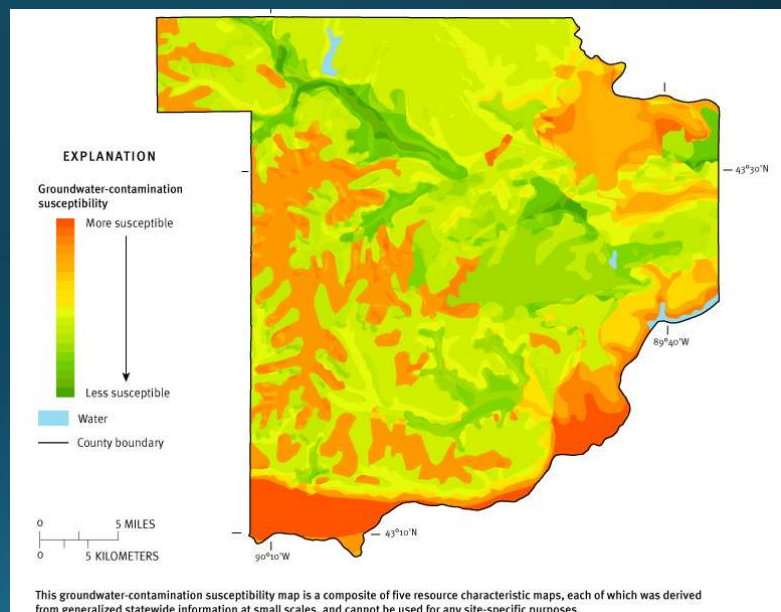
4

Groundwater

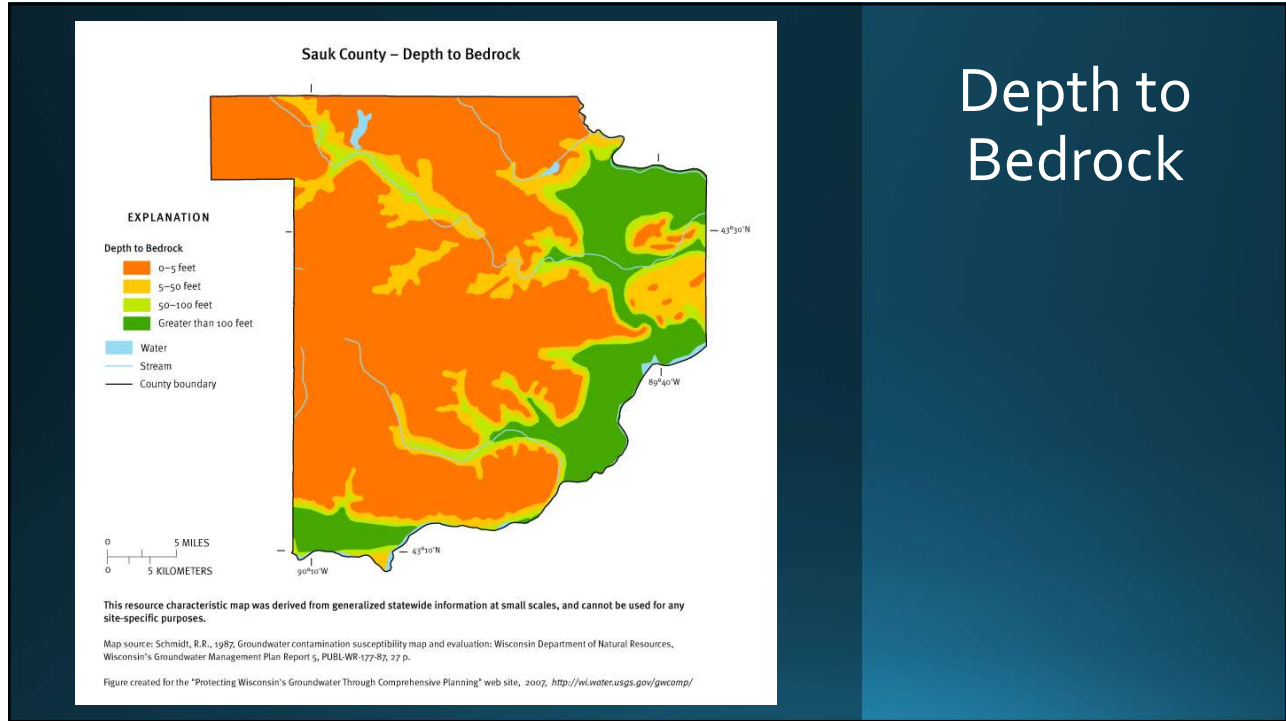
- Groundwater is an extremely valuable resource
- **70%** of Wisconsin Residents depend on groundwater for their drinking water
- **100%** of Sauk County residents depend on groundwater as their source of drinking water
- Susceptibility of Groundwater to Pollutants
 - Depth to bedrock
 - Type of bedrock
 - Soil characteristics (permeability)
 - Depth to water table
 - Characteristics of surficial deposits

5

Groundwater Contamination Susceptibility



6



Depth to Bedrock

7

UW Stevens Point Center for Watershed Science and Education

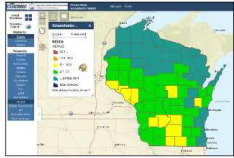
Center for Watershed Science and Education

University of Wisconsin-Stevens Point > CNR Associated Programs > Center for Watershed Science and Education > WI Well Water Viewer

- Home
- Water & Environmental Analysis Lab (WEAL)
- Groundwater Center
- Activities
- Reports
- WI Well Water Quality Viewer
- Student Involvement
- Staff/Contact Us
- Archives

Well Water Quality Viewer: Private Well Data for Wisconsin

WI Well Water Quality Interactive Viewer



[Use the Interactive Well Water Quality Viewer](#)

Disclaimer:

The WI Well Water Quality Interactive Viewer was created as an educational tool to help people better understand Wisconsin's groundwater resources. Communities or individuals have used it to:

- See what is known about general well water quality in Wisconsin.
- Compare water quality in different areas.
- Raise awareness of local groundwater quality issues.

Introduction

The WI Well Water Quality Interactive Viewer was created as an educational tool to help people better understand Wisconsin's groundwater resources that many of us rely on for our drinking water.

Nearly 900,000 households rely on private wells as their primary water supply. Homeowners with private wells are encouraged to have their well tested on a regular basis to determine the safety of the water supply for purposes such as drinking and cooking. While testing is the only way to determine the types and amount of contaminants in a well water system, homeowners and local officials often want to know more about water quality issues in their community.

How does the viewer work?

The viewer relies mostly on voluntarily submitted well water samples from homeowners and other well water data collected by state agencies over the past 25 years. It would not have been made possible without the many well owners who took the initiative to have their wells tested.

Because groundwater quality can often be very site specific for certain contaminants, many water samples are required to get a sense of groundwater quality at a county or watershed scale. By combining all of this data together we are able to look at averages or the number of samples that exceed drinking water standards to better understand private well water quality across the state.

- Select a county, township or section to view water quality summaries at different scales.
- Select from one of 14 different water quality parameters.

<https://www3.uwsp.edu/cnr-ap/watershed/Pages/WellWaterViewer.aspx>

8

Nitrates

Range	Number	Percent	Summary
None Detected	11	2%	Minimum: No Detect
< 2.0	89	20%	Average: 6.6
2.1 - 5.0	138	31%	Median: 4.6
5.1 - 10.0	115	26%	Average: 6.6
10.1 - 20.0	71	16%	Maximum: 94.4
20.1 -	19	4%	
Total Samples:	441		
> 10mg/l N:	89	20%	Exceeds Health Standard

- 16% of wells sampled in Sauk County exceed the health standard for Nitrate (10mg/l)
- Sources of Nitrate:
 - Fertilizers (both agricultural & lawn)
 - Septic Systems
 - Animal Waste

9

Bacteria

- 15% of wells sampled in Sauk County tested positive for coliform bacteria
- Sources of Bacteria:
 - Lives in soil and on plants
 - Human Waste
 - Animal Waste
 - Human error with sample collection

Parameter	Number	Percent
Bacteria	16	16%
Coliform Positive	16	16%
Coliform Negative	84	84%
Total:	100	
E. coli Positive	1	1%
E. coli Negative	7	7%
Total:	8	8%

10

Well Water Testing

- Extension Sauk County
 - Drinking Water Testing Program: <https://sauk.extension.wisc.edu/community-development/sauk-county-drinking-water-testing-program/>
 - <https://sauk.extension.wisc.edu/community-development/natural-resource-education/>
- Sauk County Public Health Dept.
 - Free well water testing kits are provided to anyone who is pregnant or has an infant that is 12 months of age or under
 - <https://www.co.sauk.wi.us/environmental-health/testing-your-well>

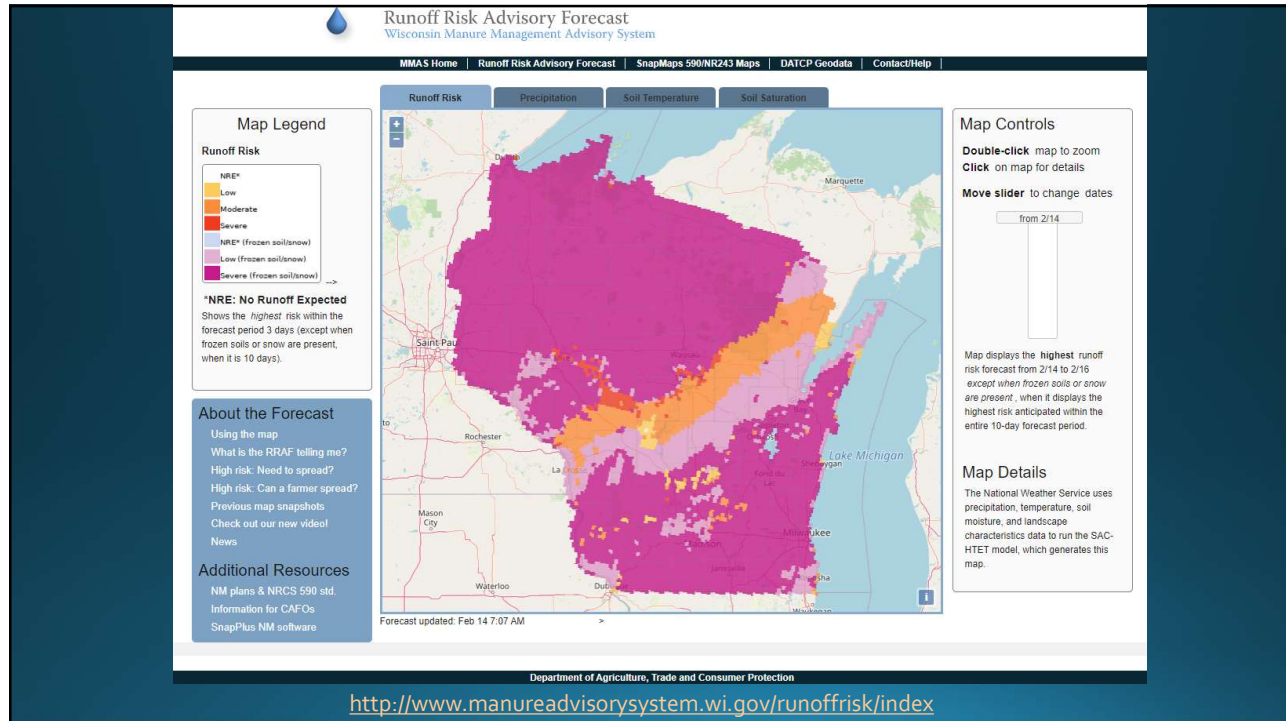
What Tests are Available?	
Homeowner Package includes tests for nitrate, coliform bacteria, pH, alkalinity, hardness, conductivity, corrosivity, and chloride	\$60
DACT Screen tests for triazine-type pesticides like atrazine.	\$35
The Metals Package tests for copper, lead, iron, manganese, zinc, potassium, sodium, calcium, and magnesium	\$57
All three tests listed above as a package deal	\$146 Save \$6

11

Protecting Groundwater

- Easier and much cheaper to prevent contamination than it is to clean groundwater
- Testing your drinking water wells
- Soil Tests
 - Nitrogen Use Efficiency program
 - Potential for cost savings
- Nutrient management plans
 - Quantity
 - When to apply

12



13

Surface Water

- Factors that affect surface water quality:
 - Management & Land Use
 - Soil Type
 - Topography & Slope
 - Weather

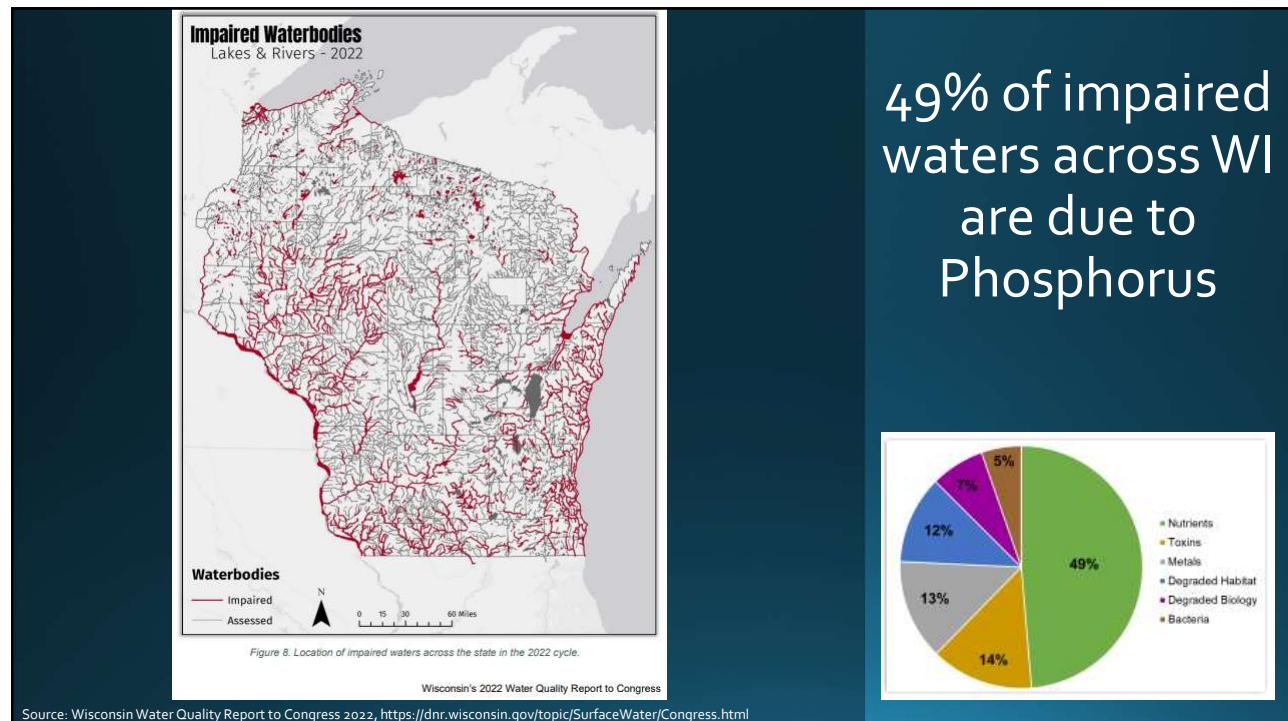


14

What does Erosion Cost?

- 1 Dime is 0.053 inches thick – spread over one acre of land, that's just under 8.8 tons/acre of soil (*that would fill about 80% of a 10 cu/yd dump truck*)
- Depending on your region, a dump truck load of topsoil can cost \$150-300.
- A 10-acre field that lost a dime's worth of topsoil would be equivalent to 10 dump trucks of soil removed from your land.
 - 27 lbs/acre – Nitrogen
 - 3 lbs/acre – Phosphorus, Potassium, Sulfur
 - Carbon = \$4.00/ton
 - Nitrogen = \$0.50/lb
 - Phosphorus = \$0.70/lb
 - Potassium = \$0.40/lb
 - Sulfur = \$0.50/lb
- Total loss of \$18.83/acre in nutrients alone
- USDA estimated cost of soil erosion= \$44.39 billion for the US (2017)
- Water holding capacity of a dime's thickness over an acre is 303 gallons +
 - 100-acre field could potentially hold 30,300 gallons of water

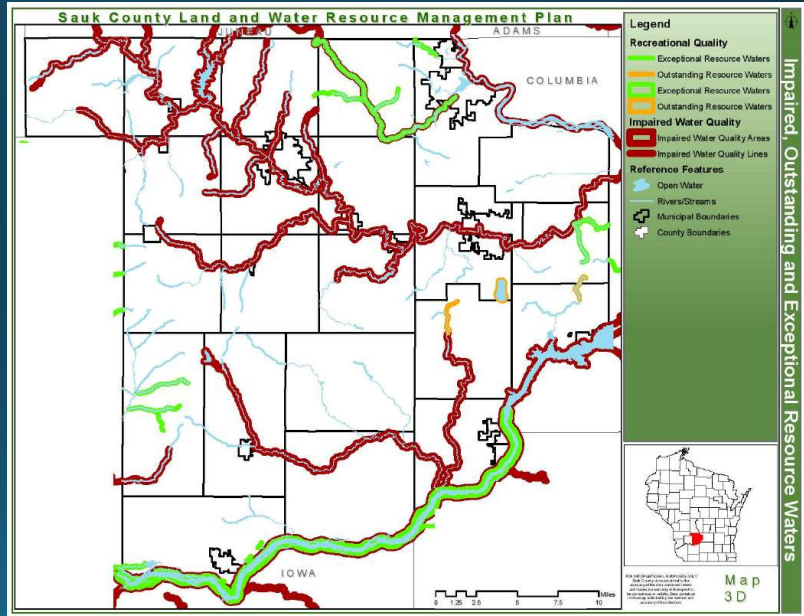
15



16

Baraboo River

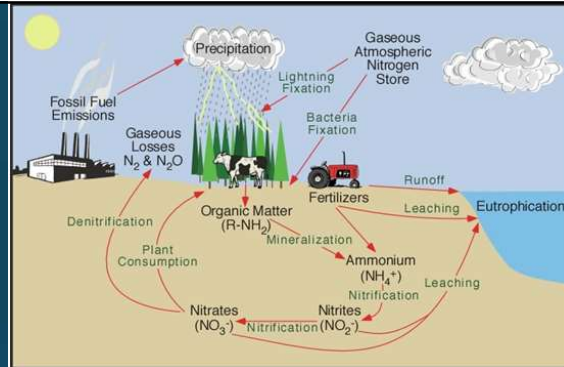
- Impaired Waters
- 2nd largest source of nutrient loading to the Wisconsin River
 - Mean total Phosphorus loading: 0.26 mg/l
 - State standard: 0.10 mg/l



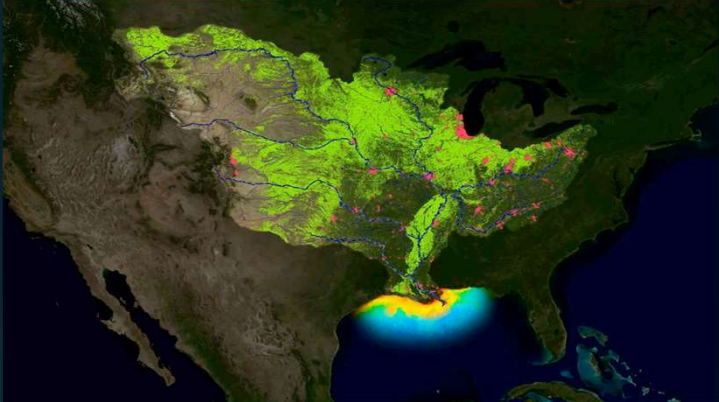
Impaired, Outstanding and Exceptional Resource Waters

17

Runoff



18




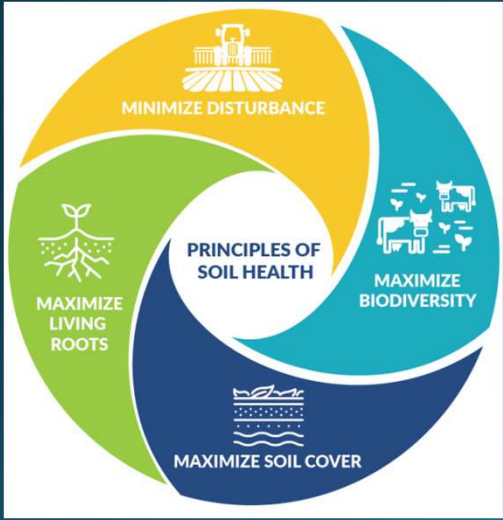
The Dead Zone

- Eutrophication
- Low Levels of dissolved oxygen
- One pound of phosphorus can grow 700 pounds of algae

The image shows a satellite-style map of the United States with a glowing green and yellow area in the Gulf of Mexico, representing the 'Dead Zone'. To the right, the title 'The Dead Zone' is followed by a bulleted list of three points: Eutrophication, Low Levels of dissolved oxygen, and One pound of phosphorus can grow 700 pounds of algae.

19

Soil Health Principles



MINIMIZE DISTURBANCE

MAXIMIZE LIVING ROOTS

PRINCIPLES OF SOIL HEALTH

MAXIMIZE BIODIVERSITY

MAXIMIZE SOIL COVER

WINDBREAKS

RIPARIAN FOREST BUFFERS

FILTER STRIPS

WETLAND RESTORATIONS

GRASS WATERWAYS

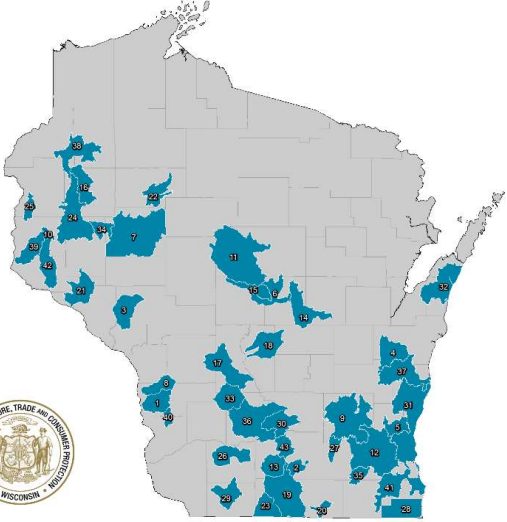
USDA NRCS, Ohio

Source: USDA Natural Resource Conservation Service, <https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health>

The slide features a central diagram titled 'PRINCIPLES OF SOIL HEALTH' with four quadrants: 'MINIMIZE DISTURBANCE' (top, yellow), 'MAXIMIZE LIVING ROOTS' (left, green), 'MAXIMIZE BIODIVERSITY' (right, blue), and 'MAXIMIZE SOIL COVER' (bottom, dark blue). To the right is an aerial photograph of a farm with various conservation practices labeled: 'WINDBREAKS', 'RIPARIAN FOREST BUFFERS', 'FILTER STRIPS', 'WETLAND RESTORATIONS', and 'GRASS WATERWAYS'. The source is cited as USDA NRCS, Ohio.

20

2023 Funded Producer-Led Watershed Protection Groups



Map No.	PRODUCER-LED GROUP	Map No.	PRODUCER-LED GROUP	Map No.	PRODUCER-LED GROUP
1	Bad Axe Farmer-Led Watershed Council	15	Farmers of Milk Creek Watershed Council	29	Ladygate Ag Community Alliance
2	Bellevue Farming Friends	16	Farmers of the Horton County Watershed	30	Farmer Watershed Council
3	Bellevue Transportation Farming Friends	17	Farmers of the Leominster Valley	31	Madison River Watershed Clean Farm Coalition
4	Calumet County Ag Ambassador	18	Farmers of the Rockwell	32	Parsons Pike Farmer
5	Castles Creek Cider Crew	19	Farmers of the Sugar River	33	Producers of Labor
6	Central Wisconsin Farmers of Colwell	20	Farmers of the Rock	34	Conservation Junction
7	Chippewa Valley Producer Led Watershed	21	FARMERS OF THE ALBANY CREEK	35	Rocky Hill Regenerative Systems
8	Clear Creek Watershed Council	22	Thomson Valley Watershed Group	36	Sauk Soil & Water Improvement Group
9	County Water Farmers for Healthy Soil & Water	23	Thomson County Clean Water	37	Shedgum River Progression Farmers
10	County Water Farmers for Healthy Soil & Water	24	Way River Farmer-Led Watershed Council	38	Shull Lake, Yellow River Watershed Council
11	County Water Farmers for Healthy Soil & Water	25	Way River Farmer-Led Watershed Council	39	South Main Farmer Led Watershed Council
12	Farmers for Lake Monona	26	Iron County Watershed Group	40	Water & Soil Conservation Council
13	Farmers for Lake Monona	27	Jefferson County Soil Solutions	41	Wisconsin Producers Coalition of Monroe County
14	Farmers for Lake Monona	28	Madison County Regenerative Producers	42	Wisconsin Producers Conservation Council
				43	Water & Pike Farms

https://datcp.wi.gov/Pages/Programs_Services/ProducerLedProjects.aspx

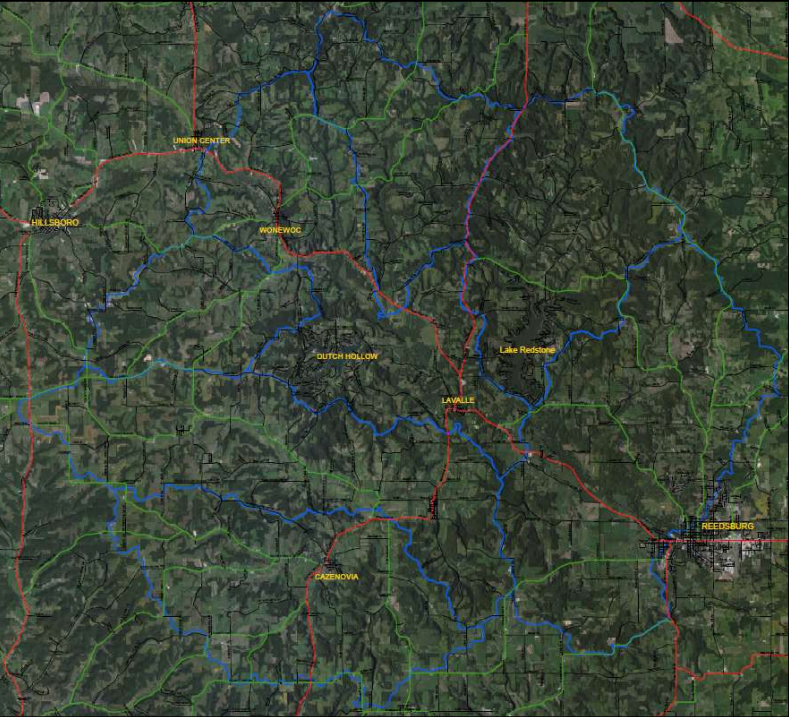
Producer-Led Watershed Protection Groups

- Groups of farmers and partners that work together to address nonpoint source pollution
- Groups are comprised of farmers, conservation staff, and community partners working together towards the goal of clean water
- Grant funds available through DATCP for groups to host education programs, on-farm demonstrations, and research, and offer cost-share programs
- 2 Groups within Sauk County
 - Producers of Lake Redstone
 - Sauk Soil & Water Improvement Group (SSWIG)

21

Producers of Lake Redstone

- **Vision statement:** The Producers of the Lake Redstone Watershed are working towards the goal of improving the water quality and soil health within the watershed.
- **Mission statement:** Our producer-led group is using on-farm research and innovative practices to improve conservation in and out of the watershed.
- **Goals:** 2023 goals include increasing group participation and trying new conservation practices



22

Producers of Lake Redstone



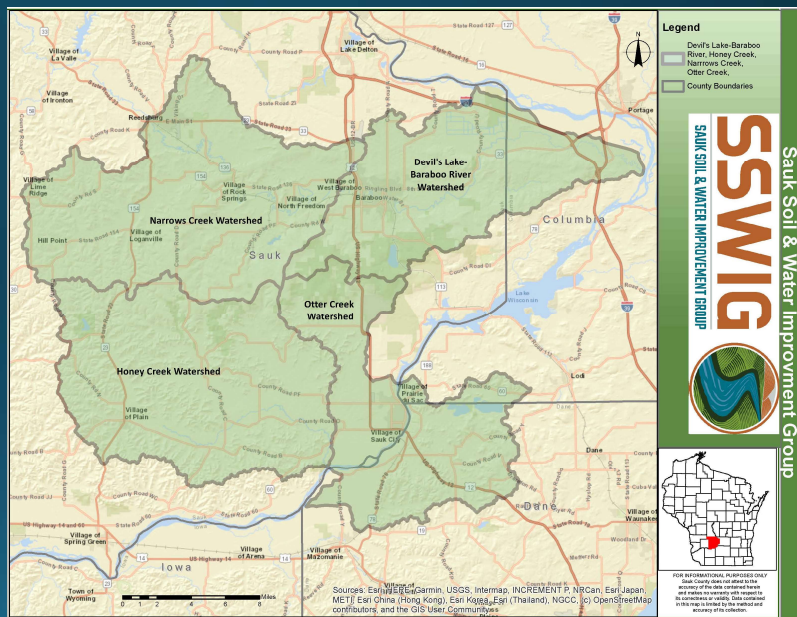
- One of the watershed issues the Redstone group is working on is using conservation practices to improve the surface water quality of Lake Redstone.
- *There are two Edge-of-field sites monitoring surface water runoff and three stream-gaging sites in the Redstone watershed, these sites monitor and collect water samples that are tested for Nitrogen, Phosphorus, and Total Suspended Solids.



23

Sauk Soil & Water Improvement Group

- **Vision:** Healthy soils, clean waters, and thriving communities supported by resilient family farms.
- **Mission:** Improving soil health and water quality through regenerative agricultural practices and education to build resilient family farms and thriving rural communities



24

Sauk Soil & Water Improvement Group

- **Goals:**
 - **Goal 1:** Measure and increase the adoption of regenerative practices and management systems that improve soil health and water quality.
 - **Goal 2:** Increase awareness and understanding of the impact regenerative management systems have on soil health, water quality, and farm resilience
 - **Goal 3:** Develop the outreach and networking capacity of SSWIG
 - **Goal 4:** Expand SSWIG's organizational capacity



"Plant"



"Harvest"



Educate



25

Sauk Soil & Water Improvement Group



- Cost share incentives available for any acres within focus watersheds for 2023:
 - No-till and Cover Crop system: \$70.00/acre
 - *Incorporate no-till **and** cover crops on the same fields within the same growing season*
 - Planting Green: \$20.00/acre
 - *Plant cash crop into living cover crop prior to termination.*
 - Grazing Cover Crops: \$80.00/acre
 - *Integrate livestock onto cropland by grazing cover crops.*
 - Grazing Management and Planning: \$10.00/acre
 - *Implement a grazing management plan approved by SSWIG and track pasture rotations over the course of a grazing season.*

26

Justine Bula
 Education Coordinator
 Sauk County Land Resources and Environment Department
 Phone: (608) 355-4842
 Email: justine.bula@saukcountywi.gov

27

Resources:

- Protecting Wisconsin's Groundwater Through Comprehensive Planning: <https://wi.water.usgs.gov/gwcomp/find/sauk/index.html>
- Sauk County LWRM Plan: <https://www.co.sauk.wi.us/landconservation/2018-land-and-water-resource-management-plan>
- UW Steven's Point Center for Watershed Science and Education: <https://www3.uwsp.edu/cnr-ap/watershed/Pages/default.aspx>
 - UW Steven's Point Groundwater Quality Viewer: <https://www3.uwsp.edu/cnr-ap/watershed/Pages/WellWaterViewer.aspx>
- Wisconsin's Water Quality Report to Congress: <https://dnr.wisconsin.gov/topic/SurfaceWater/Congress.html>
- Wisconsin Manure Management Advisory System: <http://www.manureadvisorysystem.wi.gov/runoffrisk/index>
- Department of Agriculture Trade and Consumer Protection (DATCP)
 - Producer-Led Watershed Protection Groups: https://datcp.wi.gov/Pages/Programs_Services/ProducerLedProjects.aspx
- Sauk Soil & Water Improvement Group: www.sswig.org
- Producers of Lake Redstone: <https://www.facebook.com/profile.php?id=100057120833210>

28